The SAARC Regional Seed Bank

A Case Study for India

CUTS International

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Abbreviations

AP	Andhra Pradesh
ABS	Access and Benefit Sharing
AICBA	All India Crop Biotechnology Association
AICRP	All India Coordinated Research Project
BBA	Beej Bachao Andolan
BDA	Biodiversity Act
BGREI	Bringing Green Revolution to Eastern India
BMC	Biodiversity Management Committee
BRAI	Biotechnology Regulatory Authority of India Bill
Bt	Bacillus thuringiensis (a Gram-positive, soil-dwelling bacterium, commonly used as a biological pesticide)
CABI	Centre for Agricultural Bioscience International
CBR	Community Biodiversity Register
CIK	Center for Indigenous Knowledge
CIMMYT	Centro Internacional de Mejoramiento de Mäiz y Trigo
CMQS	Common Minimum Seed Quality Standards

CMSA	Community Managed Sustainable Agriculture
DAC	Department of Agriculture and Cooperation
DDS	Deccan Development Society
DRS	Directorate of Seed Research
EDV	Essentially Derived Variety
ENDEV	Society for Environment and Development
EU	European Union
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
FiBL	Forschungsinstitut für biologischen Landbau (Research Institute of Organic Agriculture)
FSSAI	Food Safety and Standards Authority of India
GATT	General Agreement on Tariffs and Trade
GE	Genetically Engineered
GEAC	Genetic Engineering Approval Committee
GHG	Green House Gas
GM	Geneticaly Modified
GMO	Genetically Modified Organism
GoI	Government of India
GPL	General Public Licensing
HYV	High Yielding Variety

IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ICSB	Indian Community Seed Bank
IFOAM	International Federation of Organic Agriculture Movements
IPM	Integrated Pest Management
IPR	Intellectual Property Right
IRRI	International Rice Research Institute
ITPGRFA	International Treaty on Plant Genetic Resources
MP	Madhya Pradesh
MNC	Multi-National Corporation
MoFF	Ministry of Environment & Forests
MoU	Memorandum of Understanding
MTA	Material Transfer Agreement
NAPCC	National Action Plan on Climate Change
NAPP	National Accreditation Policy and Programme
NARS	National Agricultural Research System
NBA	National Biodiversity Authority
NBAIM	National Bureau of Agriculturally Important Microorganisms
NBPGR	National Bureau of Plant Genetic Resources
NCRB	National Crime Records Bureau
NDUS	Novelty, Distinctness, Uniformity and Stability

NERG	National Rural Employment Guarantee
NFSM	National Food Security Mission
NGO	Non-Government Organisation
NHM	National Horticulture Mission
NICRA	National Initiative on Climate Resilient Agriculture
NIRD	National Institute of Rural Development
NMSA	National Mission for Sustainable Agriculture
NMSD	National Mission on Sustainable Development
NOC	No Objection Certificate
NPM	Non Pesticide Management
NPOP	National Programme on Organic Production
NSAI	National Seed Association of India
NSC	National Seed Corporation
NSP	National Seeds Project
NTC	National Technical Committee
OECD	Organisation for Economic Co-operation and Development
OGL	Open General Licence
OSB	Open Source Biology
PBR	People's Biodiversity Register
PBR	Plant Breeders' Rights
PCR	Parliament Committee Report
PoA	Programme of Action
PPV&FRA	Protection of Plant Varieties & Farmers' Rights Authority, India

PPVFR	Protection of PlantVarieties and Farmers' Rights Act, 2001
PRA	Pest Risk Analysis
PVP	Plant Variety Protection
RCGM	Review Committee on Genetic Manipulation
RKVY	Rashtriya Krishi Vikas Yojna
SAARC	South Asian Association for Regional Cooperation
SAU	State Agricultural Universities
SBB	State Biodiversity Board
SFCI	State Farm Corporation of India
SMTA	Standard Material Transfer Agreement
SRI	Systems of Rice Intensification
SRR	Seed Replacement Rate
SRSB	SAARC Regional Seed Bank
SSC	State Seed Corporations
TEC	Technical Expert Committee
TK	Traditional Knowledge
TRIPs	Trade Related Aspects of Intellectual Property Rights
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme

UPOV	International Union for the Protection of New Varieties of Plants
WTO	World Trade Organisation
ZSI	Zoological Survey of India

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Kasturi Mukhopadhyay

Preface

The importance of seed security before food security cannot be ignored. A definition of sustainable development cannot be validated unless strategies towards sustainable agriculture are in line, especially in case of SAARC economies, where the high population base is directly or indirectly dependent upon agriculture and food procurement. Against this backdrop, there is a growing public debate on production and distribution of seed varieties in the context of its influence on the poor farmers.

On the one hand, chemical-intensive farming is damaging the soil, increasing input costs, and has negative health impact on both humans and animals, on the other hand, crony capitalism and industrial takeovers have moved the control of seed production from farmers to the corporates. That is something that has severely marginalised the farmers, forcing them to leave farming in search of other livelihoods, as is the case in India, where suicides touched a figure of 14,027 in 2011.

The issues regarding seed security and seed research are similar in most of the SAARC countries and henceforth, a proposal to setup a SAARC Regional Seed Bank (SRSB) has been agreed upon by member countries. The purpose of the proposed bank is to achieve collective sub-regional reliance in agriculture and to attain seed security as a means of ensuring food security through collective action, and inter-country partnership.

The study attempts to understand what role can the proposed regional seed bank play in the current scenario and tries to give an overview of seed dynamics in India in the context of realising the effectiveness of the SAARC Regional Seed Bank's efforts.

The study has relied on primary literature survey and multi-stakeholder consultations. This was done to avail the views and observations of the stakeholders on multiple issues relating to seed and seed bank, and also, on bigger issues of present agricultural crisis in India. There had hardly been any growth in the informal seed sector which is actually the farmers, even though, more than 70-80 percent of the total seed demand of the country is met by the farmers. In fact, almost the entire high volume low value seed, which forms the backbone of food security, is met by this sector.

The study supports India as one of the largest national agricultural research system in the world. With well documented and ecologically sound methods of cultivation in varied agro-climatic zones, it has the potential and advantage to play an important role as a hub for production of quality seeds in the region. The Indian seed programme boasts one of the biggest seed markets in the world, with annual sales at around US$920mn. Despite this, insufficient domestic policies are pushing farmers out of their profession making it unlucrative for them.

The Seed Bill 2010, with its many amendments, shows that powerful commercial interests s are exerting pressure on policy-makers in the Central Government. Whereas, the Seed Bill is essentially to ensure availability of quality seeds to the farmers and protect their rights. The traditional folk varieties *vis-a-vis* genetically modified (GM) crops can be saved and reused after initial purchase, apart from being ecologically and

economically sustainable. Many states in India like Uttaranchal, Punjab, Andhra Pradesh, Madhya Pradesh, Karnataka etc. have declared their organic policy and few states like Sikkim, have decided to go fully organic in few years.

The proposed SRSB has a limited scope when it comes to determining domestic policies but it does have a great potential in directing regional agriculture policies. Rather than restricting it to a seed bank image, it needs to be seen as an agent for policy advocacy amongst the SAARC nations and as a watchdog as well.

Individual state efforts are not adequate to cope up with climate change situations in the area of agriculture and food production and that collective measures are essential to addressing situations that are created due to climate change. Setting up of SRSB would be one such noble step in the direction of mutual cooperation and benefit.

I would like to congratulate and express my gratitude to all those associated with SRSB study and its implementation and hope that it shall yield results beyond expectations in the coming time. Special mention and thanks goes to Kasturi Mukhopadhyay and Ujjwal Kumar for making this study possible.

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Secretary General
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Executive Summary

It was hurricane "Aila" which devastated the deltaic islands of Sunderban in West Bengal, three years back on 25th May 2009. The estuarine surge deep into the land left its mark even after the water receded. Huge areas of land, ponds and even wells were left saline with sea water surge.

As these communities tried to recover, it was a sudden shock for the farmers as well as the agricultural experts to know that none of the modern varieties could withstand the high salinity of the Sunderban and that they are no match for the 'primitive' traditional rice varieties that were created by the ancient farmers of the region.

Thus a frantic search started for these traditional salt-tolerant rice varieties, most of which have already vanished from the fields barring a few marginal fields where nothing else can grow. The national Gene Banks had records to show that they had all the varieties but could dole out only few viable ones serving as morgues for other varieties with years of disuse. These varieties in small amount were finally available from remote islands of Sunderban. Careful multiplication and distribution of these varieties have again successfully re-established these varieties in the farmers' field in the region.

Throughout the green revolution period much of such useful heirloom varieties were displaced even without evaluating their merits. Also the policies that were taken in the last 50 years have not taken into consideration the wisdom and contribution of traditional ecological farming marching fast towards

unsustainable industrial farming and corporatization of agriculture.

Needless to say, seed is the most important component of agriculture and the basis for food security. But lot of controversy has been generated in relation to seed in India in the recent years. Climate change has added a new dimension to this debate as many modern varieties are unable to cope with changing climatic conditions especially in severe marginal conditions which are created after natural disasters.

India is one of the centres of mega biodiversity and farmers had developed thousands of varieties of crops. Although in marginal and rain fed regions, Indian farmers still grow some traditional landraces, in the irrigated regions, in the last 50 years, the heirloom varieties have literally been wiped out and the farmers have become totally dependent on the market for their seeds.

This has been directly caused by specific policy directions which promoted monoculture of HYVs and hybrids, without any policy measure for *in-situ* conservation of diverse landraces. Through the green revolution period, these new varieties increased the yield but within 40 years, the chemical and water intensive farming practice destroyed the ecological base on which agriculture depends upon.

The soil has been poisoned, and groundwater not only poisoned but also severely depleted. Chemical contamination has giving rise to increased incidence of cancer and various other serious ailments among farming community. Yields have shown decrease especially in the areas which had played major roles in Green revolutions, as the soil lost its fertility completely due to indiscriminate chemical use. Without adequate support, yield is plateauing in other areas as well.

Over the years, government policy to promote the private seed industry and its dependence on technology to usher in greater productivity has boosted and led to the growth of the

private seed sector. Thus government policiesin India are highly biased in favour of seed companies to increase private participation. However, the private seed companies with their inherent profit motives have restricted their operation to the high value, low volume crops without sharing the burden of providing food and nutritional security to the country. The duty of ensuring food security to the country is still performed by the public sector and the farmers. India today is still self-sufficient in seed production because of its farmers who provide 70 percent of the total seed demand of the country according to some estimates.

Hence, Indian agriculture today is at the crossroads. On the one hand, there had been tremendous growth in the Indian seed Industry, on the other hand, the Indian farmers are committing suicide in lakhs due to crop loss or bumper production and many are even ready to leave farming if they are provided with anaternative livelihood. It is clear that growth of the seed industry in the country has failed to bring the caimed benefits to the farming community. In fact, growth of the industry has come at the expense of the farmers' self-reliance as more and more farmers are buying seeds than ever, since the hybrids cannot be saved. This clearly has a bearing on the seed production and its availability in the country.

The private sector has now moved on from simple hybrids to GM crops (as in the case of Bt Cotton) monopolis ing almost the entire seed supply chain. According to some estimates, more than 90 percent of all cotton seeds available today are only Bt varieties displacing all traditional varieties within 10 years, as seed costs escalated in an unprecedented manner. This experience in the Bt Cotton case has even emboldened the industry to invest in research to genetically modify many commercially important seeds in India including vegetables and grains.These technologies have been pushed into India overriding huge farmers' protest and strong public opinion.

This is perhaps the worst threat on food and national sovereignty ever faced by the country. All the promises relating to high production and pest control that Bt came with, turned out to be only shortlived. Hoarding, overpricing, artificial short supply to facilitate black marketing and supply of inferior quality seeds has recently prompted Maharashtra state governmentto ban the sale and distribution of Bt cotton seeds in the state.

After the euphoria of the initial years, Bt Cotton cultivation has only added to the miseries of the small and marginal farmers. A very recent high panel Parliamentary Committee Report[1] (PCR) on agriculture states that, though the seed industry has immensely gained from the introduction and adoption of GM seeds, not even a trickle down effect of this benefit has reached the farmers recommending a ban on GM crops. On the contrary, farmers have incurred huge debts because of thiscapital-intensivepractices. Incidentally, many reports including this indicate that the farmers' suicide is most prominent in areas which cultivated Bt cotton.

Right from the beginning in India, there had been tremendous pressure on the regulatory authorities to approve GM varieties including Bt Brinjal without undertaking proper bio- safety protocols. The above report stated that the officials of Genetic Engineering Approval (Appraisal) Committee (GEAC) and the Review Committee on Genetic Manipulation (RCGM) admitted being under pressure from ministers, corporate colleagues within GEAC and the corporate sector to approve GM crops without undertaking biosafety tests which were instructed by the Supreme Court nominee. The

1. The panel's study on Cultivation of Genetically Modified Food Crops-Prospects and Effects is among the most extensive studies conducted by a parliamentary standing committee. The panel received 467 memorandums, 14,862 documents and reviewed evidences given by 50 organizations during its 27 sittings on the subject. The text is available here: http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf

composition of these regulatory bodies have also come under the scanner after many of the members have been found to have corporate tie-ups, and serious conflict of interest. Also various stakeholders involved in the regulatory mechanism have been reported. The report indicated that collusion of the worst kind has- taken place in India in relation to GM seed entry, approval and regulation spanning several ministries. It also stated that the Indian regulatory system was grossly inadequate and antiquated in dealing with GM testing and monitoring and, the inability of the government to monitor impacts of growing GM crops.

According to the report, while there is hardly any labelling in place, there is a lot of apprehension about the safety of the technology. What is more worrying is the absence of any liability clause or mechanism in the system which could compensate the poor farmers and the consumers in the eventuality of crop loss and harm to bio-diversity health, environment, etc.

GM cultivation has other effects as well. Gene transfers to non-GM crops have been reported from many places andAyurvedic practitioners have reported adverse effect of Bt on medicinal plant cultivation in India. Adverse allergic effects on farmers and death of livestock in thousands due to grazing in Bt fields have also been reported prompting Andhra department of animal husbandry to issue official notice, warning farmers against grazing cattle on Bt cotton fields.

Many such experiences have been reported from other countries as well. Another interim report by the Supreme Court appointed Technical Expert Committee (TEC)[2] stated that post-release monitoring of GMOs has been almost completely absent in India and there is no statutory mechanism in place

2. The text is available here: (http://indiagminfo.org/wp-content/uploads/2012/10/SC-TEC-interim-report-oct17th-2012-GMO-PIL.pdf)

to address the issue of compensation in relation to contamination of non-GM crops by GM crops and there are serious weaknesses relating to bio-safety in the present guidelines.

After decades of complacency, the agriculture department has recognised the futility of promoting the private sector for addressing the greater agricultural needs of India especially in the rain-fed areas. Hence, there are some national policies formulated in recent years to boost the informal sector. However, even these new policies have emphasised technological fixes to bail them out of the present crisis without realising that the present crisis has been created primarily due to devaluation of ecological principles and can be solved only by restoring it, understanding the laws of nature and helping the ecological process to regenerate and recover itself.

This can only be done by promoting and adopting ecological farming which on the one hand can help in restoring ecological balance by promoting diversity of crops and micro fauna in the soil and on the other hand also increasing the organic matter in soil. It also increases carbon sequestration, and fix nitrogen and thus equally suitable for climate change mitigation apart from its ability to trap water and use it efficiently. Ecological or organic farming is naturally pest resistant due to its diverse cultivation practices.

Contrary to what the companieswant the governments to believe, many including World Bank, FAO and UNCTAD reports state that all these can be done without sacrificing on productivity and yields. It is possible to have higher yields, more carbon in the soil and greater resilience to droughts and heat. This is called the 'triple win' interventions that would increase yields (poverty reduction and food security), making yields more resilient in the face of extremes (adaptation), and make the farm a solution to the climate change problem rather than part of the problem (mitigation).

However, the biggest challenge in India lies in changing the mindset of many agricultural scientists and policy-makers to believing that such a paradigm shift in agricultural policy is necessary and possible. Superior heirloom varieties or landraces are neither assessed for their useful traits and claimed benefits nor are they promoted through the mainstream distribution channels as seed corporations are helped through relevant capital subsidy and various schemes though the technology, know-how and IPRs in respect to crop remains with the corporates.

The Protection of PlantVarieties and Farmers Rights Act (PPVFR), 2001 of India was the first legislation in the world on Farmers' Rights. But in reality, farmers' right is becoming meaningless in the face of such promotions, policies and practices as farmers' suicide is escalating in number every day. Neither has there emerged any consensus in India on how to implement farmers right, nor it is clear how farmers right can be practically realised if the very resource base for sustained agriculture is devastated, genetic pool eroded, contaminated and economic security of farmers jeopardised. All of these should serve as a signal internationally that formulating a legislation is insufficient.

Moreover, new legislations relating to seed like the much controversial Seed Bill, 2004 have been formulated in India which, inspite of much discussion and deliberations, tends to dilute the provisions of PPVFR on farmers' rights and reflects its bias towards private seed sector emphasising conflicting provisions with PPVFR. It has ignored most of the suggestions made by the Standing Parliamentary Committee on Agriculture. The Indian government is also trying to introduce a new oversight regime for GMOs in the form of Biotechnology Regulatory Authority of India Bill (BRAI). This new bill is also alleged to be highly biased in favour of proponents of GM crops and is yet to be introduced in the parliament due

to wide spread protest. The Seed Bill and many of its latest amendments and also the BRAI bill show signs of powerful commercial interest, and the pressure seed companies are exerting on the policy-makers in the Central government.

In India, in a new trend, already lakhs of farmer in many states have shifted to organic farming as a result of their experience with industrial farming. State policies are showing a major drift from the mainstream national policies. Few states have decided to scale up this approach to make states entirely free of chemical pesticides and go fully organic in few years while providing support for enhancing organic cultivation as many states in India have declared their "State Organic Policy".

Others have decided to be GM-free. Community seed banks are playing a unique role in these transitions with their years of expertise in making available displaced traditional varieties and training farmers in carrying out scientific organic/ ecological farming and to make every farmer seed sovereign.

Community Managed Sustainable Agriculture (CMSA) with seed networks, soil management practices, conservation together with intercropping, multi-cropping, improved planting techniques, and increased on-farm water capture, non-pesticide management is making CMSA farms more resilient to climate shocks. CMSA farmers are growing more food, and a wider variety of food both for themselves and for sale to local markets, with positive effects on nutrition and food security and above all remunerative returns. Farmers have lowered the cost of cultivation while maintaining yields, with more profit to invest in livelihood assets. New local enterprises producing bio-pesticides and leasing farm implements are emerging to meet growing needs.

Moreover, pesticide-free groundwater and soil have also had a positive impact on community health and biodiversity. In some areas, community seed banks have become defunct

as each farmer has turned into a seed banker revealing the ultimate success of these banks' mission.

These farmers in transition are using mainly traditional landraces. Farmers preferences for traditional seeds, open pollinated varieties and locally adaptable seeds have stemmed from the fact that mostly being *non-uniform* these have evolved over time, have a strong resilience to local conditions, vagaries of climate, pest and disease attacks and have easier and sometimes less intensive management in terms of labour and costs. The uniform seeds developed out of hybridisation have never shown such resilience and has much less scope, as it has no history of having evolved in the locality, adapting to local conditions.

Since hybrids and other HYVs can perform only in optimal conditions, they failed completely to perform in marginal and suboptimal conditions. While 60 percent of Indian cultivated land is rain-fed, more land would probably be classified as marginal in future with climate change aggressing, thus obviating further the dependence on hybrids. Thus the concept of "location specific" seeds and related technology is now getting increasingly significant.

Additionally, the type of farming that can be practiced depends heavily on the type of seed used. All the hybrid/GM varieties that are used commercially today are input dependent. Hence, they are not suitable for ecological/organic farming. Moreover, none of the hybrid or GM varieties available today are stress-tolerant. In fact (in) tolerance of these varieties is one of their main features. With expected extreme climatic situations in future, where heat and salinity would be high and water would be scarce, GHG emitting chemical industrial farming processes can prove to be disastrous.

Thus, modern agriculture apart from being safe, climate resilient and mitigative, needs be bio-diverse, which itself is an insurance against the vagaries climate change, while seed

varieties need to be resource and energy- efficient, capable of thriving and producing reasonable yield even in the face of extreme weather and ecological conditions, ideally they should be pest and disease resistant and adaptable to changing weather conditions. Input intensive uniform modern varieties and their monoculture practices are far from meeting these future conditions. Hence, future modern agriculture would have to give more importance to traditional varieties which not only are climate resilient but are suitable for ecological farming.

In future, companies might come up with climate ready varieties (which itself is very complex process involving cloning of multiple genes), as they are heavily investing in research on abiotic stress resistant crops. But they would all come with IPR protection (even though the genes may be available from the farmers' variety), and depending on few profit oriented corporate player to dictate seed supply and hence food production in the region may be a terrible blunder.

This can have serious repercussions on the food and crop price inflation (as already evident), and on food security. A country or a region cannot be food secure unless it is seed secure. Also it would lead to further marginalisation and displacement of farming communities. It can create huge exodus from rural sector as farmer refuges might create severe pressure on the jobs and infrastructure facilities available in urban sector. Needless to say, that these can have serious bearing on the economy.

The Formation of SAARC Regional Seed Bank (SRSB) indicates that individual state efforts are not adequate and that collective regional measures are essential to cope with climate change situations in the area of agriculture and food production. Hence, the SRSB principles should highlight such adaptation and mitigation instruments that can combat climate change and not aggravate it. SRSB needs to consider the new dimensions in seed debates while formulating its guidelines.

However, the agreement in its present form does not highlight the fact that in the face of climate change only ecological/organic farming along with climate resilient varieties, (which presently are mainly the common traditional landraces, farmers variety and heirloom varieties) has the ability to adapt and mitigate climate change. Depending on intolerant hybrids may be a complete futile exercise. Nor does the agreement have any focus on the role and rights of farmers and their self-resiliency without which achieving the goal of regional self-resiliency will remain a dream. Hence, efforts should be there to include common heirloom or farmers' varieties that may be concurrently present among countries and design testing and quality control facilities so that these varieties can qualify for the reserve of SRSB.

However, the issues relating to IPR, biopiracy and benefit sharing in matters relating to sharing of these resources, especially landraces will need to be addressed before such sharing can take place. The issue of Farmers' Right should be considered beyond IPR, as development rights also, to avoid legitimising fallacies that breeders and farmers have competing rights and platforms, when in reality they are much more asymmetrical.

Equally important is to take into consideration the ability of varieties to withstand abiotic stress that might be the reality after disaster and their ability to adapt to changing climatic conditions and water scarcity or flooding that can follow. In such marginal conditions, there might be a greater demand for the use of adapted landraces. Thus, it is important to broaden the seed-basket, so that South Asia, as a region has a better capacity to combat these adverse situations. Priority should thus be given to those traditional heirloom varieties that are stress-tolerant if they are common among member countries.

Hence, SRSB needs to redefine "quality seed" (not only in the context of climate change situation but also considering the biosafety threats associated with biotechnology) while harmonising policies so that superior landraces or heirlooms can qualify in the list.

SRSB's seed reserve would need to be carefully decided as such a release has a great potential to replace existing local varieties after natural calamities. The choice of seed in fact might decide the future agricultural policy thrust of the member countries. Informal sector should play a more important role in this matter and governments should make efforts to boost this sector and revive thet traditional landraces to increase crop diversity not just to reduce risk from climate change but also from corporatisation of agriculture which might severely increase impoverishment of SA farmers who still form the majority of population. The private sector would have little role to play in absence of hybrids if SRSB reserve is meant to cater to suboptimal conditions created post calamities.

However, if the situation after disaster is conducive for hybrid cultivation, private sector can have some role to play, but knowing the previous track records of private seed companies, their activities need to be carefully monitored. In fact, SRSB needs to decide whether it has the capacity to monitor and regulate the private sector activities before involving their breed in its reserve.

With the past record of insufficient monitoring, evaluating and regulating capacity of the Indian GM regulatory authority, with no testing facilities available and on the other hand, immense ability of the MNCs to push their products through unaccountable regulatory authorities in different countries; and with various reports of corruption and nexus between government officials and seed companies, especially MNCs, in India (apart from many other countries like some African countries), transgenic varieties should be strictly excluded

from SRSB storage so that these varieties are not passed on to the unsuspecting farmers in times of distress and till there is consensus in future among scientific community that these varieties do not pose any threat relating to biosafety. Care should be taken so that the "acute seed crisis" felt after a disaster does not lead to a "chronic seed crisis" due to displacement of suitable landraces with unsuitable varieties.

SRSB has limited scope in directing domestic policies, but it should learn from the mistakes of India and direct regional agricultural policies towards sustainable organic/ecological agriculture so that the biodiversity, health and safety of humans and other species are not compromised or jeopardised. The governments should take decision whether to adopt a linear path of agricultural growth, which does not take into account ecological and greater human benefits or to take the cyclical path through the roadmap of ecologically sustainable farming, since the problems of seed sector cannot be addressed in isolation. India, in fact,should take a lead in sharing its experiences and mistakes so that it can guide other member countries from facing similar consequences in attaining seed and food security.

SRSB can treat industrial agriculture as man-made calamity to help slowly phase out hybrids from member countries towards more ecologically sound and climate-friendly traditional varieties. It can act as a platform for member countries to revive and introduce cultivation of displaced dormant varieties from gene banks which are in demand, by using modern technologies to remove their dormancy. It can emphasise urgent search for displaced useful heirloom varieties among its member countries so that the diversity in crops can be restored to certain degree and the choice of the common seed basket for sharing among SA farmers can be increased.

South Asia is a huge potential market for agri business. It is expected that there would be both direct and indirect pressure

on SRSB in India to promote hybrid and GM varieties from the private sector. The acid test for SRSB would be to withstand these pressures from becoming an extension service for agro-corporates if seed sovereignty and food security of the South Asian countries along with welfare of millions of its farmers are of any concern.

1
Introduction

Seeds, carriers of genetic diversity, are the building blocks of food security, the nature and type of which is an essential component for achieving the desired yield. In the past farmers have been the main players in seed production, selection, breeding, saving, conserving and managing seed diversity through generations feeding the entire world. However, in the recent history, government, public and private breeders and research institutions have been playing an important role in plant breeding, varietal development, and designing agriculture policies in most part of the world, including developing countries many of which are rich in bio diversity.

Traditional seeds that have been adapted for more than 300 million years logically could withstand vagaries of climate change better than those that are newly created in laboratories. Thus, there is a need to save them before they are lost forever. Frequent natural disaster ushered in by climate change, like flood, drought, volatile temperature, both high and low or increased salinity etc. is leading to sudden seed crisis among different farming communities. This calls to save seeds before disaster and make them available to the communities at the right time and in right quality post-disaster so that such communities can recover.

India was the hotbed of crop diversity, blessed with many agro-climatic zones. In India, significant transformation in traditional seed variety improvement took place in 60s and 70's to increase theyield. Modernisation of agriculture along with introduction of hybrids and HYV varieties paved the way for green revolution. This led to considerable increase in crop yield and made India self-sufficient in food production – from food shortage and import to food surplus and export.

For a few decades it increased the political and economic power of the farming community but with time this led to loss of plant and animal biodiversity and unprecedented displacement and extinction of traditional folk and heirloom crop varieties. Thus taking away political and economic power of the farming community along with their control over seeds.

As these hybrids can perform only in optimal condition rampant application of chemical fertiliser, pesticides with irrigated water left the whole ecosystem severely polluted in many places including Punjab, Haryana etc. destroying the very resource base on which agriculture is based. The ground water table had been terribly depleted and farmers in many areas are suffering from serious health issues.

As India marchestowards industrialisation and corporatisation of agriculture with intensive farming and lately though introduction of genetically modified crops to increase yield, the self-reliance of farmers has been lost. Presently, India is going through a severe agricultural crisis. Farmers are debt-ridden, they are marginalised and from 1995, more than 2.7 lakh Indian farmers have committed suicide[1] and this is still continuing. The yield has plateaued inspite of more chemical intensification as the government is looking for technical quick-fix solutions in an era of farmer unfriendly international trade and IPR rules.

There has been a tremendous growth in the seed industry as more farmers have become dependent and are buying more

seeds than ever, with hardly any traditional varieties left to fall back on. The industry would not have seen this growth if the farmers had been self-reliant and thus there is a tremendous pressure on the government to adopt policies that are in favour of the industry. These macabre domestic policies are pushing farmers out of farming, making the it an unprofitable enterprise for the farmers.

As an answer to these problems many community seed banks have been set up in India mainly to arrest displaced varieties from extinction, and revive the ecological sustainable farming practice. Many benefits of traditional varieties are, natural resistance to pests, disease, drought, floods, salinity, compatibility to local farming conditions, economic practicality and environmental sustainability. These community seed banks are trying to save, multiply and bring back some available varieties to the farmers and to re-establish the desired bio-genetic complexities.

Farmers' seeds can be saved and reused, however, hybrid seeds diminish in vigour and needs to be bought every year. Some of these seeds have prohibitively high price mainly due to IPR protection leading to debt trap for the farmers. Saving of farmers' variety is thus very important for the self-reliance of the farmers. This self-reliance is intricately linked to the seed and food security and sovereignty of the country, and hence of immense importance. Thus lately, the national agriculture system has realized the importance of the contribution and importance of the informal sector and formulating policies to boost this sector.

In this backdrop, the SAARC regional seed banks has been agreed upon by member countries to achieve collective sub-regional reliance in agriculture to attain seed security as a means of ensuring food security through collective action, and inter-country partnership. However, much of this goal depends on the path that is taken for achieving these objectives.

This study tries to give an overview of the seed dynamics in India in the context of realising the effectiveness of the SAARC Regional Seed Bank efforts. The study has attempted to take into consideration primary literature survey and multi-stakeholder consultation. This was done to avail the views and observations of the stakeholders on multiple issues relating to seed and seed bank and also on bigger issue of present agricultural crisis in India. Thus the study attempts to understand what role the SAARC proposed regional seed bank can play in the current scenario.

Questionnaire for four different sectors were prepared, namely "Community Seed Banks and Farmers", "Civil Society Experts", "Industry Both Private and Public", "Policymakers at the Agricultural Bodies and the Gene Banks". Since India is a huge country and the time-frame for this study was short, we have not been able to receive the inputs from all sectors. However, attempts have been made to fill the gap with relevant literature survey.

Some of the quotes that are used without references in the study are from the personal interview with the individuals. Annexure 10 gives list of people interviewed.

The terms sustainable agriculture, ecological farming and/or organic farming have at times been interchangeably used in this report, since there are many common ecological approaches (low external inputs, low energy intensive and less polluting and ability to mitigate and help in adapting to the climate change) respected by them even though there are some differences as far as definition and requirements are concerned.

2
Status and Trend of Indian Seed: Production to Use

Structure and Status

Today, the Indian seed programme boasts one of the biggest seed markets in the world, with annual sales at around US$920mn. About 52 percent of the total workforce is still employed by the farm sector which makes more than half of the Indian population dependent on agriculture for sustenance (NSS 66th Round), majority being small farm holder while 80 percent farms are less than 2 hectares (N. Anand. 2011).

India is served by both formal and informal seed systems. The informal sector is mainly governed by the farmers. 60 percent of the cultivated land in India is rain fed. More than 100 million farmers in these areas practice ecological farming as against the mainstream agriculture where input intense industrial farming is propagated and practiced.

The informal sector has concentrated on crops – mainly self- or open-pollinated varieties – that are crucial to local food production systems. These systems operate mainly at the community level through exchange mechanisms and involve limited quantities per transaction (Cromwell et al. 1992). These systems play an important role in the seed security at

the household and community levels and can be linked to germplasm conservation, enhancement and utilisation.

The formal seed sector is governed by the public sector and a growing private sector. India's National Agricultural Research System (NARS) is one of the world's largest, with 26,178 full-time research staff functioning in government, public and higher education institutions and universities. It comprises the Indian Council of Agricultural Research (ICAR)'s 45 National Institutes, 17 National Research Centres, 6 National Bureaus, 25 Directorates and 4 National Institutes with Deemed University status; and one Central Agricultural University, 45 State Agricultural Universities (SAUs) and various other universities which have agricultural faculties. About 93 percent of the funds for NARS research and development (R&D) are sourced from the government (Pandey, mimeo).

The public sector consisting of National Seed Corporation (NSC), The State Farm Corporation of India (SFCI) and 13 State Seed Corporations (SSCs). The industry comprises of around 600 players of which around 17 are from public sector and the rest are from private sector.

The composition of the seed industry by volume or turnover has reached a ratio of around 60:40 between private and public sectors[2] while "30 percent of seeds sown every year in India by small and big farmers are supplied by the formal seed trade. The remaining 70 percent lies in the farmer seed system" (Ravi, 2010) i.e. farm saved seeds from seed stocks selected and saved by farmers.

While the public sector is mainly into high volume and low value food crops like cereals, the private seed sector has been dominating the high value and low volume hybrids, and a major player in the hybrid seed markets of vegetables, sorghum, oilseeds (e.g., sunflower), maize, cotton and pearl millet. For the cereal crops of rice and wheat, the principal source of

seeds is not the seed industry whether private or public but the farmers themselves. Seed saved from the preceding crop supplies nearly 90 percent of requirements in these crops. Hybrid seeds capable of giving higher yield are not available for some important crops like Pulses.

The private sector consists of several multinational corporations, joint venture companies and domestic research-based seed companies, which are all involved in producing, processing and marketing both public and private varieties. In addition, there are about 150 small- and medium-sized seed companies engaged in the production and marketing of improved seed through both public and private channels. These companies produce seed on contract for larger companies, but also supply seed to small dealers and key farmers within their localities.

Different private sector seed producers, including multinational companies (MNCs) like Novartis, Cargill and Pioneer Seeds, have been active in India for several years. A number of mergers and acquisitions between MNCs and domestic companies have taken place in India. Monsanto acquired 26 percent stake in Mahyco, Agrevo controls 100 percent of ProAgro, Emergent Genetics has acquired 74 percent stake in Maharashtra Hybrids and Pioneer has 51 percent stake in SPIC (Rangnekar, 2003).

Seed Production and Multiplication

A generation system of seed multiplication involving breeder – foundation – certified seed classes is effectively functioning. Research Institutes and Project Directorates of ICAR and SAUs comprising NARS are primarily responsible for the production of breeder seed of different crops. The foundation and certified seed is produced by the SSCs, NSC, State Farms Corporation of India and private seed companies.

Table 1: Requirement and Availability of Certified Seeds in India

Year	Requirement	Availability	Surplus(-) Deficient(+)
2006-2007	128.76	148.18	+19.42
2007-2008	180.74	194.31	+13.57
2008-2009	207.28	250.35	+43.07
2009-2010	249.12	279.72	+30.60
2010-2011	290.76	321.36	+30.60
2011-2012	330.41	353.62	+23.21

Source: DAC, Seed Division; http://agricoop.nic.in/SIA111213312.pdf

Seed firms, whether in the private or public sector, outsource the production of seeds to contract growers. These growers are supplied with the foundation seed that is used to produce commercial seed.

Private seed companies are encouraged to develop their own varieties and sell seed on their own or tie up with national seed companies for multiplication and marketing of their material. Increased plant breeding activity by private sector has resulted in increased availability of diverse varieties and hybrids in crops like maize, sunflower, cotton, tomato and to some extent in sorghum and pearl millet. However, seed distribution is low and costly in the North- Eastern States and other hill States which has an impact on overall agricultural production and nutritional security.

In the major food crops, like rice, wheat, pulses, soybean, sugarcane, groundnut, millets, potato, tuber crops and many indigenous vegetables which are the life line of food security in the country and for rain fed, hilly, lowland and other sub optional ecologies, the public sector research institutions and seed organizations is still playing and probably will continue to play a role in developing varieties and producing seeds since the private sector is not expected to invest in research and

seed production of self-pollinated crops in a significant way. However, the efficiency of public enterprises is increasingly being called into question.

The seed multiplication programme is handled by the Agricultural and Horticultural Departments in their State Seed Farms. There are certain practical difficulties in the production of quality seeds in government owned farms by the Agriculture and Horticulture departments, which are now thought to be responsible for non-availability of adequate quantities of seed material.

Scheme such as Seed Village programme have been introduced to improve the quality of farm saved seeds. Seed infrastructure facilities relating to seed production, processing and storage is said to require improvement and substantial up-gradation including high capital investment. Frequent occurrence of natural calamities like drought, floods, etc. in one or the other parts of the country enhances the seed requirement of the affected area [S. Selvaraj, Deputy Commissioner (Seeds)].[3]

In recent times Indian Government's emphasis on biotechnology to increase production has led to introduction of GM seeds. The private sector is actively involved in the development of bio-engineered crops of cotton, oilseed and other vegetables like brinjal. Many more are in different stages of trial. The Bt cotton seeds have been commercialised and have said to increase yield in the irrigated areas and crop failure in the marginal areas.

Seed Release, Distribution and Marketing

To ensure that only quality seeds are produced and released, the Indian agriculture system has sophisticated system of seed certification and varietal release. The NARS has developed and released more than 400 high yielding varieties and hybrids

after the formal system of varietal release came into existence in 1966.

Many truthfully labelled seeds are also permitted in the market. Currently some 500 hybrids of field crops and vegetables are being marketed as truthfully labelled seeds mostly by the private seed companies.[4] There is not much regulation by the government on the price of seed sold by the private companies.

Table 2: Production and Consumption of Seed in India

Types of seed	1991-92	1995-99	2000-01	2005-06	2009-10	2010-11
(i) Production of Breeder Seeds, Thousand Qtls	34.9	43.36	42.69	68.64	105	119.21
(ii) Production of Foundation Seed Lakh Qtls	3.75	4.76	5.91	7.4	10.5	17.53
(iii) Distribution of certified/Quality Seeds, Lakh Qtls	57.5	69.9	86.27	126.75	275.11	277.3

Source: Directorate of Economics and Statistics, DAC.[5]

At public sector level, the NSC, SFC and State Seed Corporations are producing quality seeds and distributing to the farming community. The quality seeds produced in government owned seed farms and farmers holdings under seed farm agreement condition are being distributed through Agricultural Extension Centres to the farming community. Most of the seeds that are released by the national agriculture extension service are only those varieties that are developed in the formal sector. The major focus of the varietal development is more in the area of addressing biotic stress like yield and pest and less in the area of abiotic stress like drought, flood etc.

Therefore, the hybrid or HYVs presently released are not necessarily climate resilient. On the other hand the many

farmers and ecologist claim that there are high yielding traditional folk varieties available which can give higher yield in shorter span of time. Many of these are naturally pest resistant and much better suitable for suboptimal and marginal conditions of high salinity, flood, or drought and are naturally adaptable to changing climatic conditions apart for having many useful traits. However, these varieties are almost never integrated into the mainstream distribution channels.[6]

Effect on Seed Use

There is no doubt that varieties produced through such stringent procedure are free of many seed borne disease compared to the traditional varieties, these seeds are suitable for only optimal conditions of temperature, water and chemical inputs. Any deviation in these conditions leads to non-performance of these varieties. Over dependence on these varieties since green revolution has landed India in the present agro-ecological crisis where output have not increased in spite of increased investment in chemical fertiliser and pesticide,[7] especially in states like Punjab and Haryana. Agricultural performance in recent years has been quite volatile and this trend is likely to increase due to climate change.[8]

On the other hand, even though the traditional farmers' variety does not undergo such stringent procedure of seed quality maintenance, and many times suffer from seed related disease, their robust biotic and abiotic qualities to withstand ecological distress makes them suitable for the areas which experience such stress or are under constant marginal conditions or are rain fed.

Thus, even though India was one of the early countries to adopt hybrid seeds, the area cultivated under hybrid seed remains low till date. Unlike the hybrids, the traditional folk varieties can be saved and reused after initial purchase, apart

from being ecologically and economically sustainable. Hence they still remain popular and in use among large section of farmers in India. Hybrid of some other crops such as rice have not become popular on account of high cost of seeds and low purchasing power of the farmers (S. Selvaraj, Deputy Commissioner Seeds).[9]

Export and Import of Seeds

Apart from practical problems in production of quality seeds by seed owned farms, major areas of land being diverted to cultivation of wheat and rice after green revolution leading to a shortfall in the availability of pulses and oilseed,[10] calling for import of seeds in these crops. With the liberalisation of seed import in 1988, import of high quality of seeds of vegetables crop hybrids including Open Pollination (OP) in Cauliflower, carrots and beetroots are imported and made available to the growers (N. Anand, 2011).

India's import of seeds for commercial sale are also in vegetable crops (mostly of F1hybrid) viz. of Cabbage, Capsicum, Chillies, Musk melon, Water melon and Radish. In these crops, the present coverage under hybrids is ranging between 2 percent-30 percent. Thus, apparently, there is tremendous scope to increase the imports and widening the coverage under high productivity hybrids. According to some, imports should not be looked down upon as most of these imported world class seed would enable Indian farmers to become competitive in the world markets.

Before 1988, India was importing crops like wheat from Mexico. But those imports were dependent on domestic need. However, after 1988, the restrictions on seed import have been relaxed and The Seed (Control) Order, 1983 had allowed the unbridled import under Open General Licence (OGL) of planting material and seeds. This Order was exploited by

unscrupulous seed trade and business to import plant materials without undergoing any rigorous phytosanitary and quality checks. These imports are many a times driven by company interest and not necessarily because of domestic need (Dr Sharma). Most of the importing agencies did not even deposit a sample of the imported seed with the National Bureau of Plant Genetic Resources (NBPGR), bypassing the quarantine requirements of NBPGR. It is believed that the imports have come with a heavy load of pests and diseases posing serious damages to crop cultivation and to the country's food security. Many hitherto unknown pests have also entered the country (Sharma, 2010a).

As per World Seed Trade Statistics, India has sixth largest size of domestic seed market in the world, estimated to be at about 1300 million dollars. However, India's share in global trade in seeds (import & export) is of only about 37 million dollars only. To give a boost to seed export, India has decided to participate in OECD Seed Schemes for the following categories of crops: Grasses and legumes, Crucifers and other oil or fibre species, Cereals, Maize and sorghum and Vegetables.

3
Status of Policies, Legislation, Regulations and Institutions in Indian Seed Sector

Indian Agriculture has made enormous strides in the past 50 years, raising food grains production from 50 million tonnes in 1947 to 218 million tonnes in 2010. In the process, the country has progressed from a situation of food shortages and imports to one of surpluses and exports. After the introduction of The Seeds Act, 1966 and the New Policy on Seeds Development, 1988, far-reaching changes have taken place in the national economic and agricultural scenario and in the international environment and to match these changes, Indian Government framed the National Seed Policy, 2002.

Box 1: Important Events in India's Seed Industry

1957 First All India Coordinated Maize Improvement Project established

1960 Similar projects on sorghum and pearl millet started

1961 First four maize hybrids released

1963 National Seeds Corporation established

1965 First hybrid in pearl millet released; 250 tons of seed of dwarf varieties of wheat imported from Centro Internacional de Mejoramiento de Mäiz y Trigo (CIMMYT);

All India Coordinated Project on wheat established

1966 Seed Act passed

1968 Report of Seed Review Team submitted; Seed Act operational

1969 State Farms Corporation of India created, UP Seeds & Terai Development

Corporation established

1971 National Commission on Agriculture constituted; Indian Society of Seed

Technology established; minimum seed certification standards adopted

1975 National Commission on Agriculture's report submitted; report of National Seeds

Prject (NSP) submitted

1977–78 NSP phase I launched with World Bank assistance of US$52.7mn

1978–79 NSP phase II launched with World Bank assistance of US$34.9mn

1979–80 All India Coordinated National Seed Project (Crops) launched;

All India Coordinated Project on Seed borne Diseases launched

1981 First workshop on seed technology held under NSP

1988 Separate section on seed created in ICAR; new seed policy

implemented

1989–90 Special project on hybrids in nine selected crops and seed, National Technology

Research Project started by ICAR

1990–91 NSP phase III launched

1991 All India Coordinated Research Project (AICRP) on Seed borne Diseases merged

with NSP (Crops)

1994 Government of India signs the General Agreement on Tariffs and Trade (GATT)

2001 Protection of Plant Variety and Farmers' Rights Act passed

2002 National Seed Policy formulated

2004 Directorate of Seed Research established

2004 The Seeds Bill

Box 2: Major Policy Initiatives taken by the Indian Government in Seed Sector

- Enactment of the Seeds Act, 1966
- Launching of the World Bank aided National Seeds Programme (1975-85) in three phases leading to the creation of State Seeds Corporations, State Seed Certification Agencies, State Seed Testing Laboratories, Breeder Seed Programmes etc.
- Seed Control Order, (1983)
- New Policy on Seed Development (1988)
- Seed Bank Scheme, 2000
- Protection of Plant Variety and Farmers' Rights Act, 2001
- National Seeds Policy, 2002
- The Seeds Bill, 2004
- Formulation of National Seed Plan, 2005

The Seed Act 1966 and Modernisation of Agriculture

Significant transformation took place in the traditional variety improvement and seed production programmes in the sixties and modernised with initiation of hybrid development programme in maize, sorghum and pearl millet, as well as with the introduction, breeding and release of semi dwarf high yielding varieties of wheat and rice.

To support the release of varieties and their quality seed production Indian Parliament enacted Indian Seeds Act in 1966. Subsequently, National Seeds Corporation was launched by Government of India for scientific growth of seed industry in the country. All these developments led to the green revolution and country attained self-sufficiency in food crops.

The major legislative measures involved under the Act are Seeds Rules framed in 1968, (Annexure 1b) and Seeds (Control) Order, formulated in 1983 after including seeds as an essential commodity. Both the Seed Act and the Seed Rules were adopted during 1969 for the whole of India except Sikkim and Kashmir. Amendments were made subsequently for the

Seeds Act during the years 1972, 1973, 1974 & 1981 (Annexure 1c). With newer varieties coming into the agricultural scenario, the seeds control order was formed insisting on compulsory licensing of the dealer. This was made even more stringent by bringing the seeds under the Essential Commodity Act, 1955.

The National Seed Project undertook various measures and had set up huge processing plants in order to provide processing of certified seeds of self-pollinated food crops to farmers. However, it did not result in complete fulfilment of the mission since private sectors were able to take forward their quality seeds in both self and cross pollinated crops of varieties/ hybrids respectively. In the year, 1971, National Commission on Agriculture recommended breaking of Public sector hold and entry of private sector into the Indian seed market. Subsequently, the National Seed Policy in 1988 further liberalised the imports of seeds.

National Seeds Programme (1975-85)

A major re-structuring of the seed industry by the Government of India through the National Seed Project Phase-I (1977-78), Phase-II (1978-79) and Phase-III (1990-1991), was carried out, which further strengthened the seed infrastructure (of the public sector) that was most needed and relevant around those times. Launching of the World Bank aided National Seeds Programme (1975-85) in three phases leading to the creation of State Seeds Corporations, State Seed Certification Agencies, State Seed Testing Laboratories, and Breeder Seed Programmes etc.

Seed Control Order, (1983) of EXIM Policies

The inclusion of seeds as an essential commodity item under the Essential Commodity Act, 1955 brought the Seeds (Control)

Order.

- A person carrying on the business of selling, exporting and importing of seeds needs to obtain a license
- The Essential Commodity Act, 1955 gives powers to State governments to regulate various aspects of trading in essential commodities under the supervision of Central Government. The Act was again amended in the year 1980 clearly stating that detaining of persons whose activities are unethical in the supply of essential commodities. This help in prevention of black marketing of the supplies
- The license provided to a seed dealer remains valid only for 3 years from the date of its issue which can be later renewed
- The seed dealer has to essentially display the stock position (opening and closing) on daily basis along with a list indicating prices or rates of different seeds
- A cash or credit memorandum has to be given by the dealer to purchaser of seeds, compulsorily
- The State Government is empowered with appointing a licensing authority, inspectors and mode of action for supply regulation.
- Under this order the time period for completion of seed analysis in case of any doubt about quality is 60 days compared to 30 days under Seed Rules
- Cancellation of license if obtained through misrepresentation
- Provision for appeal and an appellate has also been provided
- Provision for amendment of license and need for maintenance of records and submission of monthly returns by the dealer

New Policy on Seed Development (1988)

Introduction of New Policy on Seed Development, 1988 led in significant transformation of the Indian seed industry.

The very objective of the policy was to give access of the best seed and planting material available anywhere on the world, to Indian farmers. The new seed policy introduced significant deregulation and attracted several national and multinational companies into the seed business. Incentives encouraged private companies to undertake seed production and conduct research on hybrids and high-yielding varieties. The policy stimulated appreciable investments by private individuals, Indian Corporate and MNCs in the Indian seed sector with strong R&D base for product development in each of the seed companies with more emphasis on high value hybrids of cereals and vegetables. This has had a significant impact in recent years as private-bred hybrids now play a key role in seed production.

The salient features are:

- The policy permits the import of selected seeds under Open General License (OGL), to make available to farmers high quality seeds to maximise yield, increase productivity thereby farm income. The policy allow import under OGL of items such as seeds of oilseed crops, pulses, coarse grains, vegetables, flowers, ornamental plants, tubers, bulbs, cuttings and saplings of flowers.
- While the import of horticultural crops including flowers need recommendation from Directors of Horticulture, import of crop seeds require permission from ICAR. ICAR will direct multi-locational trials in various agro-climatic conditions at least for one season.
- Evaluation of important traits such as yield, pest resistance etc. needs to be done within 3 months of harvest after which importer shall apply to the DAC for permit. Within a month, DAC will process it and thereafter controller of Imports and Exports will issue a license.
- Private seed producing firms should compulsorily register with NSC before importing the seeds.

The policy was immediately followed by an order by Government of India (Plants, Fruits and Seeds Order) for the purpose to regulate the import of agricultural items into India. (Annexure 2a and 2b)

Central Sector Scheme for Establishment & Maintenance of Seed Bank

Seed Bank Scheme, 2000

Objectives

- To make available seeds for contingent situations and also develop infrastructure for seed storage. Scheme is in operation since 1999-2000.
- Scheme is being implemented through NSC, SFCI and seed corporations of Andhra Pradesh, Assam, Orissa Gujarat, Haryana, Karnataka, Madhya Pradesh, Punjab, Rajasthan, UP, Maharashtra, and West Bengal while the benefit of the scheme is available to the entire country.
- Seed of about 17 crops of various varieties which are suitable for different agro-climatic zones of the country specially for meeting any contingent situation arising out of drought/ flood situation are maintained in the seed Bank.

Assistance

- Revolving funds provided for procurement of seeds (50 percent cost of raw seed) for keeping in the seed bank.
- Reimbursement of maintenance cost of seed or various components like processing/ packing, revalidation, transportation, storage, storage loss, insurance of seeds during storage and price differential for undistributed quantity of seeds as per norms fixed under the scheme

Salient features

- Establishment of seed bank for maintenance of foundation and certified seeds of different crops to ensure timely availability of seeds to the farmers.
- To take care of the special requirement of seed at the time of natural calamity
- To create infrastructure facilities for production and distribution of quality seeds

Protection of Plant Variety and Farmers' Rights Act, 2001

Recognising the role of farmers as breeders and in conserving and maintaining plant genetic resources, major policy initiatives have been taken in India in favour of farmers' right in Plant Variety Protection and Farmers Rights Act, 2001. These extensive provisions on farmers' right in PPVFR arose due to internalisation of the ethics and relevant provisions of CBD and ITPGRFA, facilitated by the *sui generis* option given under the WTO TRIPS Agreement. The campaign to get Farmers' Rights incorporated into law took almost seven years of consultative process and many provisions attracting the public interest were brought under stakeholders lens and revised to balance the rights of the industry and farmers.

India's *sui generis* law combines elements of the WTO/ TRIPs, UPOV and CBD. It was discussed in two Parliamentary Committees and passed through the hands of three national governments. It is not a perfect legislation but it is a unique legislation, the only one in the world which grants parallel rights to Farmers along with that of Breeders (Sahai, 2008).[11] Some of the unique feature of the Act especially those relating to farmers' rights are highlighted below. The Salient features of the Act is available in (Annexure 3)

An extensive list of farmers' rights includes the following main aspects:

a) Right to register farmer's varieties.
b) Entitlement for benefit sharing for the use of biodiversity conserved by the farming community.
c) Right to save, use, sow, re-sow, exchange, share or even sell farm produce including seed of registered variety but not the branded seed.
d) Right to claim compensation for under performance of a right protected variety from its promised level under defined production conditions.
e) Mandatory need to secure consent of farmer(s) when a farmer variety is used to develop an essentially derived variety (EDV).
f) Protection from legal proceedings related to alleged infringement.
g) Exclusion from paying fee in any legal proceedings in the Tribunal and Higher Courts.The act is unique in the world with inclusion of
    - rights of farmers, breeders, researchers and equity concerns
    - The responsibility for realising Farmers' Rights rests with Central government. In accordance with their needs and priorities, each Contracting Party should, take measures to protect and promote Farmers' Rights, including:
        (a) Protection of traditional knowledge relevant to plant genetic resources for food and agriculture;
        (b) The right to equitably participate in sharing benefits arising from the utilisation of plant genetic resources for food and agriculture; and
        (c) The right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

- The PPVFR Act allows the registration of three types of plant varieties. These are farmers' varieties, extant varieties and new varieties.
- The variety being claimed for protection needs to be notified.

Criteria for Registration

- A new variety can be registered for protection if it satisfies the criteria of Novelty, Distinctness, Uniformity and Stability (NDUS).[12]
- For Extant Varieties requirements are distinctiveness, uniformity, stability as specified/relaxed by the Authority
- Researchers are not prevented for conducting research using the registered variety or using the same for creating newer varieties provided an authorisation is given by the breeder indicating the necessity of use of protected variety
- The breeder of essentially derived varieties so developed using the protected varieties shall have the same rights as the breeder of other new varieties

Farmers' Right

Some of the rights provided especially to the farmers are listed below:

- The definition of farmers given in this Act is very unique. The Act defines the farmer as a person cultivating crops or conserving and preserving traditional crop varieties or wild species of crops and selecting them for their useful properties. In other words, the Act recognises the farmer as a cultivator, conserver and breeder. This definition embraces in all farmers, landed or landless, male and female.
- Farmers' variety as part of the extant variety will be entitled for registration/protection. Traditional varieties developed or conserved by a community of farmers and new varieties

developed by one or more farmers, i.e. the farmer's community are eligible for registration.

- Farmers have been provided right to avail PBR protection of varieties conserved or developed by them, recognizing them as breeders.
- Allows exclusive legal right to the PBR-holding farmers to produce and market its seed.
- Farmers can save, re-sow, exchange, share and sell farm produce of any protected variety except its commercial marketing with brand name[13]
- Farmers have the right for innocent infringement when, at the time of infringement he is not aware of the existence of breeder rights
- A National Gene Fund has been constituted which will be utilised for payment as rewards to farmers who has preserved a variety and which has been used as donor of genes in development of a new variety by any breeder
- Farmers' Right to receive Compensation for Undisclosed use of Traditional Varieties either from an honest ignorance on the identity and origin of the parental varieties or a dishonest suppression of parental variety identity. The communities concerned may not have the capability to detect such use of their varieties or traditional knowledge in the breeding of a new variety. Under such situations, any third party, who has a reasonable knowledge, is eligible to prefer a claim for compensation on behalf of the concerned local or tribal community [Section 41 (1) of PPVFR Act].
- While allowing exclusive right to the PBR-holder on commercial production and marketing of seeds, the Act directs the PBR-holder to meet farmers' demand for seeds of the variety at reasonable prices. If the PBR-holder does not satisfy this requirement three years after registration of the variety, farmers have the right to take the matter of

non-availability of seed, its poor supply, or its high price to the PPVFR-Authority [Section 47]. On receiving such complaints and on its verification, the PVP Authority may take remedial actions, which includes compulsory licences.

- Compensation to be given to farmers if the registered variety does not meet the promised level of performance under given conditions. The gene fund is also utilised for providing compensation to farmers if the variety does not perform to the expected performance of the variety. The expected performance of a protected variety under specific condition needs to be compulsorily provided to the farmers during.
- National Gene fund is credited with the benefit sharing from the breeder, the annual fees payable by the breeder through royalties and contribution from any national and international organisation and other sources
- Breeder has to pay an annual fee based on the royalty gained by the variety for retention of registration of the same. Considering the poor economic capability of farmers the PPVFR Act totally exempts farmers from paying any fees [Sections 18, 44]
- Breeder needs to share the benefits accrued from a registered variety with the necessary claimers who shall be heard and if convinced, his share may be given as per the nature and extent of the benefit
- Fund will be utilised for disbursing shares to benefit claimers, compensation to seekers, supporting conservation and sustainable use of genetic resources, and for strengthening the capabilities of the *Panchayat* in carrying out such conservation measures

Exclusion of Varieties

- Plant Varieties can be excluded from registration in case where prevention of commercial exploitation of such varieties is necessary to protect public order or public

modality or human, animal and plant life and health or to avoid serious prejudice to the environment
- Registration of plant varieties will not be allowed if the variety in question involves any technology such as Genetic Use Restriction Technology and Terminator Technology, which is injurious to the life or health of human beings, animals or plants

National Seed Policy, 2002

National Seed Policy was formulated in 2002 to raise India's share in the global seed trade by facilitating advanced scientific aspects such as biotechnology to farmers and in March 2002, first transgenic Bt cotton was approved for commercial cultivation in India.

- The policy encourages private sector participation in research and development of new plant varieties.
- The rights empowered to various bodies for regulating the quality of seeds produced, distributed and for providing variety protection as per the Seeds Act, 1966 and PPV & FR Act, 2001 have been retained in the policy
- Promotion of seed village scheme to increase the production and make available the seeds in time as well as upgrading the quality of farmers' saved seeds
- Establishment of seed banks for ensuring supply in times of calamity and storage facility at village level
- Establishment of a National Seed Board in place of Central Seed Committee and Central Seed Certification Board to undertake seed certification and advising Government on all matters related to seed planning and development. NSB will serve as the apex body in the seed sector
- Setting up of National Seed Research and Training Centre to impart training in seed technology

- Development of a National Seed Grid to provide information on availability of different varieties of seeds with production details. Both public and private sector will be encouraged to join the grid for a clear assessment of demand and supply of seeds

Few of Policy's other recommendations have been addressed in PPV &FR, Act, 2001 also. Major ones are maintenance of a National Register on seeds of varieties, establishing a national gene fund, disclosure of the variety's expected performance and provision for farmer to claim compensation in case of crop failure. Further, aims of National Seed Policy such as development of infrastructure, ensuring supply of good quality seeds and facilitating the International seed trade are sought to be addressed through the proposed Seeds Bill, 2004.

Aims and Objectives are

- Enhancement of seed replacement rates (SRR) of various crops through increase in the production of quality seeds and making it available to farmers at economical cost, in which the private sector is expected to play a major role.
- Creation of a facilitative climate for growth of a competitive and localised seed industry, encouragement of import of useful germplasm, and boosting of exports are core elements of the agricultural strategy of the new millennium.
- Creation of conducive atmosphere for application of frontier sciences in varietal development and for enhanced investments in research and development
- Providing an appropriate climate for the seed industry to utilize available and prospective opportunities, safeguarding of the interests of Indian farmers and the conservation of agro-biodiversity.

- Dismantling of unnecessary regulation and at the same time having a regulatory system which will encompass quality assurance mechanisms coupled with facilitation of a vibrant and responsible seed industry to ensure that gullible farmers are not exploited by unscrupulous elements.

Major thrust areas of National Seeds Policy, 2002 are: (*For details see Annexure 4*)

- variety development
- plant variety protection
- seed production
- quality assurance
- seed distribution and marketing
- infrastructure facilities
- transgenic plant varieties
- import/export of seeds and planting materials
- strengthening of the monitoring system

The Seeds Bill

The seed Bill is proposed to replace the seed Act, 1966 (See Annexure 5a for Salient Features). A public opinion has emerged on the fact that Seed Bill provisions tend to dilute the Farmers' Rights provisions of the PPV&FR Act. The controversial Seed Bill 2004 having conflicting provisions tends to limit the famers' rights and was biased in favour of the private seed sector. Consequently after strong public opposition, the government referred the Bill to the Parliamentary Standing Committee on Agriculture. The Committee through a consultative process offered valuable recommendation to revise the deficiencies in the Bill.

The Seeds Bill, 2004, was introduced to the Rajya Sabha on 9 December 2004, and the Standing Committee submitted its report on 28 November 2006; the draft of the Seeds Bill

has been revised three times in last eight years (2004, 2008, and 2010), however, the latest 2011 version is still pending in the Upper House of Parliament. (Current Science, 2012).

A 2008 edition of the Bill introduced in Parliament accepted many of these recommendations, but that Bill lapsed with the 14th Lok Sabha. Once again in 2010, the Cabinet approved a new edition of the Bill, and the Agriculture Minister moved several amendments in November 2010 and in February 2011. The Bill, incorporating the latest amendments, will now be called the Seed Bill 2011.[14]

The Seeds Bill seeks to regulate the production, distribution and sale of seeds. It requires every seller of seeds (including farmers) to meet certain minimum standards. The Standing Committee has recommended that farmers selling or exchanging seeds from other farmers be exempt from this requirement. The Seed Bill 2010 has excluded farmers, who constitute the major proportion of seed handlers and users, from its purview.

In response to outspoken protest, the Seed Bill in its latest amended shape explicitly states that it will not "restrict the right of the farmer to grow, sow, re-sow, save, use, exchange, share or sell his farm seeds or planting material," and it also specifies that the farmer is not to be included under the ambit of 'producer.' But it does restrict the farmer from selling such seeds or material under a brand name. Thus it spells a clear message to small farmers to stay out of the formal seed market.

The Bill now defines the farmer as a cultivator of crops and also as "the person who conserves or preserves, severally or jointly with any person, any traditional varieties or adds values to such traditional varieties through selection and identification of their useful properties." These amendments are, however, inadequate to protect the full traditional rights of farmers as cultivators, conservers, and breeders of new seed varieties.

The new Seed Bill that has been reintroduced after much deliberations and discussions still takes a soft line against the seed companies, and provides no succour to farmers. Ignoring most important suggestions made by the Standing Parliamentary Committee on Agriculture, and also by several civil society groups and farmer unions, including provisions for price controls[15] and fixing of royalty it tows the line of the seed industry without stressing any liability for the seed corporates in face of crop failure (Sharma, 2010b).

As in the case of Andhra Pradesh, where Monsanto have filed a case against state governments for regulating seed price, Seed bill in its present form can not only take away the rights of the farmers but also the powers of the state governments to protect its farmers.[16]

The Seed Bill, including many of the latest amendments, show signs that powerful commercial interests and seed companies are exerting pressures on the policy-makers in the central Government.[17] According to some the proposed Seed Bill 2010 in its present form will fail to ensure availability of good quality seeds at an affordable price (Sharma 2010a)

(See Annexure 5b for Highlights of the Bill after the Official Amendments and Key Issues and Analysis after the Official Amendments).

The Seeds Bill should be seen in the context of the Seeds Act, 1966 which it replaces. The main objective of the Seeds Bill is to ensure availability of quality seeds to farmers. The proposed Bill seeks to update the existing Act in order to address changes in technology and the structure of the seeds sector. Below are the main changes in the Seeds Bill 2004 from the Seeds Act, 1966.

P*olicies relating to Biotechnology*

Recognising the potential of Genetic Engineering and its relevance to India, Ministry of Science and Technology gave

sufficient impetus for research and monitoring of transgenic seed development. The measures of transgenic regulation fall under "Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms, Genetically Engineered Organisms or Cells, 1989" of the Environment and Protection Act, 1986. The Indian Government is trying to introduce a new oversight regime for GMOs in form of Biotechnology Regulatory Authority of India Bill (BRAI). The same however has not been introduced in the Parliament due to wide spread opposition. This new Bill is allegedly highly biased in favour of the proponents of GM Crops.

Table 3: Comparison of Seeds Act, 1966 and Seeds Bill, 2004

	Seeds Bill 2004 (amended)	Seeds Act, 1966
Definitions	"Agriculture" includes horticulture, forestry, cultivation of plantation, medicinal and aromatic plants.	"Agriculture" includes horticulture.
	Definitions of "Seed" and "Variety" have been changed to make them more specific and technical.	
	Defines terms such as "Dealer", "Essentially Derived Variety", "Extant Variety", "Farmer", "Horticulture Nursery", "Misbranded", "Spurious Seed", and "Transgenic Variety". It has also expanded the definition of a 'farmer' to include all those who conserve or preserve, severally or jointly with any person, any traditional varieties or adds value to such traditional varieties through selection and identification of their useful properties	Does not define these terms

Contd...

	Seeds Bill 2004 (amended)	Seeds Act, 1966
Registration	All seeds for sale must be registered.	Only varieties notified by the government need to be registered.
Seed Committee	Constitutes Central and State Seed Committees. A Registration Sub-Committee would register seeds of all varieties.	Constitutes Central Seed Committee. The central government, after consulting with the CSC, may notify a seed in order to regulate the quality of seed.
Transgenic Varieties	No transgenic variety of seed would be registered unless cleared under the provisions of the Environment (Protection) Act, 1986. Such seeds would have to be labelled and conform to specific standards.	No provision for transgenic varieties of seeds.
Compensation to Farmers	Provides for compensation to farmers under the Consumer Protection Act, 1986 in the event of underperformance of seeds.	No specific provision for compensation mentioned in the Act.
Export and Import	All seed imports are regulated by the Plant Quarantine (Regulation of Import into India) Order, 2003 or any corresponding order of the Destructive Insects and Pests Act, 1914; shall conform to minimum limits of germination etc. Exports can be restricted if it adversely affects the food security of the country.	A person is restricted from exporting or importing notified variety of seed unless it conforms to minimum limits of germination etc.
Penalties	Amendment to raise the maximum penalty for "misrepresentation/ or suppression of facts, procedural violation or non-performance of the seeds "without intention" to one year and Rs. 5 lakh. Provision for cancellation of registration	Any person, who contravenes any provisions of the Act, prevents a Seed Inspector from taking samples etc. shall be punished for the first offence with a fine which may extend to Rs 500. If the offence is repeated he may be imprisoned for a maximum term of six months and/or fined up to Rs 1,000.

- Some of the important events in this area oBiotechnology are: Establishment of Department of Biotechnology in 1986 exclusively to apply biotechnological approaches in agriculture and human health
- Establishment of Review Committee on Genetic Manipulation (RCGM) in 1989 for effective monitoring and evaluation which lay guide lines for assessment of GM crops
- Establishment of Institute Bio-safety Committee at the organization level, to monitor r-DNA technology work
- Establishment of Special Monitoring cum Evaluation Committee under RCGM to monitor the impact of transgenic plants on the environment with following members:
- Establishment of Genetic Engineering Approval Committee which will recommend the Government for approval of a transgenic variety for commercial cultivation
- An All India Crop Biotechnology Association (AICBA) was also formed to represent seed industry in addition to existing ones such as Seed Association of India at New Delhi and Association of Seed Industries at Mumbai

Other Recent Schemes

Indian government has formulated and provides assistance through many schemes to give impetus to seed production, distribution and regulation. *(For details see Annexure-6)*. Important to mention are the National Mission for Sustainable Agriculture (NMSA), the recent National Initiative on Climate Resilient agriculture (NICRA) and Seed Village Programme.

National Mission for Sustainable Agriculture (NMSA)

NMSA, which is one of the eight Missions under the National Action Plan on Climate Change (NAPCC) seeks to

address issues regarding 'Sustainable Agriculture' in the context of risks associated with climate change by devising appropriate adaptation and mitigation strategies for ensuring food security, equitable access to food resources, enhancing livelihood opportunities and contributing to economic stability at the national level.

The mission identifies ten key dimensions for promoting the sustainable agricultural practices by implementing a programme of action (POA) covering both adaptation and mitigation measures through four functional areas, namely, Research and Development, Technologies, products and practices, Infrastructure and Capacity building. While modern technologies and research would continue to play an important role in promoting the sustainability of agricultural production, the Mission also recognises the need to harness traditional knowledge and agricultural heritage for *in-situ* conservation of genetic resources.

The POA would be operationalised by mainstreaming adaptation and mitigation strategies in on-going research and development programmes and in flagship schemes including; *Rashtriya Krishi Vikas Yojna* (RKVY), National Horticulture Mission (NHM), National Food Security Mission (NFSM) etc. through a process of selective up scaling and course correction measures which would further be supplemented by introduction of new programmatic interventions.

For details visit:

http://agricoop.nic.in/Climatechange/ccr/National%20Mission%20For%20Sustainable%20Agriculture-DRAFT-Sept-2010.pdf

National Initiative on Climate Resilient Agriculture (NICRA)

The objectives are:

- To enhance the resilience of Indian Agriculture covering crops, livestock and fisheries through climate variability and climate change through development and application of improved production and risk management technologies.
- To demonstrate site specific technology packages on farmers field for adapting to current climate risks; and
- To enhance the capacity of scientific and other stakeholders in climate resilient agricultural research and its application.

The scheme will be implemented for (2010-11 and 2011-12) of the XI Plan and likely to continue with the XII Plan with the following components

1. Strategic research on adaptation and mitigation
2. Technology demonstration to cope with current climate variability in 100 vulnerable districts
3. Capacity building
4. Sponsored competitive research to fill critical gap

For details, visit: http://nicra-icar.in/nicrarevised/

Seed Village Programme

The objectives are:

(i) To upgrade the quality of farmer saved seed financial assistance for distribution of foundation/certified seeds at 50 percent cost of the seed for production of quality seeds.

(ii) Assistance to train the farmers on seed production and seed technology @ ₹15000/- for a group of 50-150 farmers.

(iii) To encourage farmers to develop storage capacity of appropriate quality assistance @ 33 percent subject to a

maximum of ₹3000/- for SC/ST farmers and @ 25 percent subject to maximum of ₹2000/- for other farmers for procuring seeds storage bin of 20 qtl. Capacity. Assistance @ 33 percent subject to maximum of ₹1500/- to SC/ST farmers and @ 25 percent subject to maximum of ₹1000/- for other farmers for making seeds storage bin of 10 qtl. capacity in the seed villages where seed village scheme is being implemented.

National Seed Plan 2005-06

The thrust will be on

- Raising productivity per unit of cultivated land
- Quality seeds appropriate to different agro-climatic conditions and in sufficient quantity at affordable prices are required to raise productivity.

Self-Pollinated Crops	– 25%
Cross Pollinated Crops	– 33%
Hybrid Crops	– 100%

Requirement of seed 258.87 lakh qtls. as in 2005-06 and determined a gap of 118.37 lakh qtls. in terms of availability at that point of time.

Biodiversity Act 2002

The Central Government has brought Biological Diversity Act, 2002 with the following salient features:

- To regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources; and associated knowledge relating to biological resources;
- To conserve and sustainably use biological diversity;
- To respect and protect knowledge of local communities related to biodiversity;

- To secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources;
- Conservation and development of areas of importance from the standpoint of biological diversity by declaring them as biological diversity heritage sites;
- Protection and rehabilitation of threatened species; and
- Involvement of institutions of state governments in the broad scheme of the implementation of the Biological Diversity Act through constitution of committees.

Biological Diversity Rules, 2004

To implement the Biological Diversity Act 2002, Rules have been notified in 2004. The salient features of the Bio diversity Rules 2004 are:

- Procedures for appointment of Chairperson and Members of the Authority, conduct of authority meetings, and general functions of the authority are described in the Rules 3-8, 10 and 12 respectively.
- The process to regulate activities for access to biological resources and associated traditional knowledge in accordance with the Sections 3 (Access to Biological Resources), 4 (Transfer of Research Results) and 6 (Seeking 'No objection Certificate' for obtaining patent) under the Biological Diversity Act, 2002, are given in Rule 14, 17 and 18 respectively.
- The Procedure to revoke written agreements, action in prohibiting access and recovery of damages (Rule 15)
- Restricting access of endangered, endemic and rare species, restricting access in case of adverse environmental impact, genetic erosion, ecosystem function and purposes contrary to national interest as well as international agreements (Rule 16)

- Imposing terms and conditions for ensuring equitable sharing of benefits on access, transfer of results of research, application for patent / IPR claims (Rule 20) Constitution of Biodiversity Management Committee (BMC) and Preparation, maintenance and validation of People's Biodiversity Register (PBR) in consultation with the local people should be done as per Rules 22(2) and 22(6) respectively.
- Appeals for settlement of disputes between National Biodiversity Authority (NBA) and State Biodiversity Board (SBB) or between SBBs are dealt under Rules 23.

The Rules also have prescribed formats viz, Form-I (Access to Biological resources and associated traditional knowledge), Form-II (Transfer of Research results), Form-III (Seeking 'No objection Certificate' for obtaining patent) and Form-IV (Seeking approval for Third Party Transfer)

National Biodiversity Act, 2002 (extracts) which might be important from the perspective of SAARC Regional Seed Bank and Farmers Rights[18]

- Certain persons not to undertake Biodiversity related activities without prior approval of NBA.
- Results of research not to be transferred to certain persons without approval of NBA. Application for intellectual property rights not to be made without approval of NBA Prior Intimation to SBB before obtaining biological resource for certain purposes.
- Determination of equitable benefit sharing by NBA
- Central government to develop national strategies, plans, etc. for conservation, etc., of biological diversity.

Farmers' Rights - Is It Recognised?

The ultimate test for any seed is in the farmers' field. Linked to that is the issue of 'if and how' a certain agricultural technology impacts farmers' rights to the seed. The idea of farmers' rights is still a developing one in India. The Protection of Plant Varieties and Farmers' Rights Act (PPVFRA), 2001 is the only law in the country, that even mentions 'Farmers' Rights '. But the list of farmer freedoms that it offers could be rendered ineffective by many policies adopted by the GoI.

Right from the 60's, till date, the main focus of the dominant agricultural policies have been on increasing yield either through introduction of hybrid, HYV, or recent GM varieties. Focus has been placed on increasing SRR, to bring more land under the cultivation of hybrids as an option to increase the production of "quality" seed. Assistance in the form of subsidies and supportive schemes were offered so that the farmers can be encouraged to adopt these so called "improved varieties". However, in the process, many basic requirements for sustainable production have been overlooked.

National Seed Policy, 2002 and National Seed Plan 2004-2005, place "increase of SRR" as an important agenda for achieving its multiple goal of increased food production through increased quality seed production and hence the ultimate goal of poverty reduction. However, the seeds that are generally replaced in the process are the traditional farmers' varieties causing their eventual loss. This process of loss of genetic diversity is called genetic erosion.

Thus, "Seed Replacement Rate" in effect erases in one season millions of years of evolution and thousands of years of farmers breeding which occurred due to years of selection and conservation of important traits, and is indeed a heavy loss to humanity. Modern varieties that give a higher yield are important to meet the rising needs of an exploding population. A discussed earlier, while the new varieties may be superior

in yield, traditional varieties are superior in many other important biotic and abiotic traits with enhanced economic, social, cultural, and medical supportive features and in some case in yield also. Hence, their conservation and further enrichment are as important as cultivation of high yielding varieties (Ravi, 2004).

Many of these incredibly high yielding traditional varieties have already been lost forever during the Green Revolution period. Few that are still left have many merits to claim including climate resilient properties, as the farmers selection process is much wider which takes into consideration the Ecological, environmental, and socio-cultural dynamics and not "yield" alone.

Commodified Hybrid seeds are ecologically incomplete. In fact, through technology, seed is transformed from a renewable to a non-renewable resource. Second, it does not produce by itself. Whether a chemical is added externally or internally, it remains an external input in the ecological cycle of the reproduction of seed. It is this shift from ecological processes of production through regeneration to technological processes of no regenerative production that underlies the dispossession of farmers and the drastic reduction of biological diversity in agriculture. It is at the root of the creation of poverty and of non-sustainability in agriculture (Shiva, 2011).

The intense water and chemical usage needed for these hybrids can only worsen climate change conditions and further deplete the already shrinking aquifers.[19] It reduces farmers into growers of someone else's proprietary seeds. It completely destroys the self-reliance of the farmers since these seeds cannot be saved, exchanged or re-sowed and needs to be purchased every year.

The GoI is also promoting several policies in favour of industrial agriculture to increase private participation. The National Seed Policy 2002 emphasise on providing an

appropriate climate for the seed industry to utilise available and prospective opportunities. According to many, the amended Seed Bill 2010 which was originally drafted in 2004 in line with the New Agriculture and Seed Policies have created a conducive environment for the establishment of a monopoly on seeds by large private seed companies, pirating of bio-resources, denial of farmers' rights and evasion of public accountability (Rajukkannu et.al, 2009).

Seed Bill 2010 appears to have been drafted by the seed industry, for the seed industry. The proposed amendments once again favour private seed companies and corporations at the expense of farmers. (Sharma 2010a).

Experts have contended that the Seed Bill, on the other hand, places greater manoeuvring space in the hands of large seed companies and gives them a carte blanche on pricing their products (Times of India 2010) as government has done little to curb the escalating price of hybrid seeds[20]. Several schemes and programmes are offered to address the food shortage[21] through increased yield, though food shortage is not necessarily a production problem, but more often a problem associated with distribution, access to food and lack of facilities for proper procurement and storage.

In all these schemes like, National Food Security Mission,[22] Integrated Cereal Development Programme in rice based cropping system, and the policy for Bringing Green Revolution to Eastern India (BGREI), which is being called Green Revolution II, hybrid seed is promoted as a means of attaining higher productivity. Many state level policies have been promoting hybrid rice.[23]

Many states in India are signing MOU's with seed corporations to supply and distribute company owned seeds subsidising public land for "Technology demonstration of these seeds, which are mainly hybrids and GMOs.[24] Instead of breeding and distributing public varieties, the state agriculture

universities are acting against their public mandate and violating the public interest by facilitating the privatisation of the seed supply like a private agent.

Besides the handing over of seed and land, corporations are helped in the establishment of infrastructure through access to relevant capital subsidy[25] and other schemes. While public resources are made available to these corporates as a subsidy, "propriety tools, techniques, technology and knowhow and IPR with respect to the crops remain with these corporates." These MOU are clear violation of farmers' rights. Lately GM trait is introduced in many local varieties also.[26]

The Indian Government is also trying to introduce a new oversight regime for GMOs in the form of Biotechnology Regulatory Authority of India Bill (BRAI). This new bill also is also alleged to be highly biased in favour of proponents of GM crops and is yet to be introduced in the parliament due to wide spread protest.[27] Thus, the so-called 'farmers' rights' in domestic law is becoming meaningless in the face of such promotion. Even when legislature gives some rights via one legislation it takes it away through other legislations and the executive takes it away through policy and practice. More than 270,000 farmers have committed suicide[28] in India since corporate takeover of seed started as a result of globalisation.

Farmers' rights to seeds are also violated if the natural environment favourable for the cultivation of seeds is destroyed in any way. Chemical intensive farming damages the soil, increases inputs costs and has negative health impacts on both humans and animals. Even in the much acclaimed Bt cotton, which was introduced to reduce pesticide usage, reports are emerging of increased use of pesticide in the long run.[29]

Not only incidence of cancer has increased among farmers in the green revolution belt of Punjab, Haryana etc, many farmers from Punjab and Madhya Pradesh have reported allergic reactions in hand and feet working in Bt cotton fields.

Thousands of cattle deaths have also been reported after grazing in Bt fields in Andhra Pradesh. Few reports of transgenic negatively affecting rhizophoric soil microbial diversity have also been reported along with the other inherent risks[30] this new technology poses. The real concern is whether biotechnology is providing short-term solutions at the cost of worsening the underlying problem.

With the very resource base for sustained agriculture devastated,[31] genetic pool eroded, health[32] and economic security jeopardised, how, farmers rights can be attained practically in India through legislation alone is not clear at all.

As far as legislation is concerned, even though there is legal recognition of farmers' right in PPVFR, no consensus has emerged in India on how to implement it. Many in India feel that FR should move beyond IPR to incorporate development rights of farmers, however, there is no consensus regarding the nature of development needed among stakeholders. (Ramanna A., 2006).

It is important to evaluate which broad approach to defining Farmers' Rights would be most beneficial for developing countries. Two broad approaches to defining Farmers' Rights in India reflect the options facing developing countries: 1) Farmers' Rights as a form of IPRs 2) Farmers' Rights as a development right.

The first approach poses Farmers' Rights as a counter to Plant Breeder's Rights and argues that if commercial breeders can acquire intellectual property over their inventions, then farmers' innovations must also be recognised and rewarded. The second encompasses a range of concerns including food security, livelihood rights, social justice and access to resources.

Thus the first approach is an attempt to use the TRIPs flexibilities to the fullest, while the second is a much broader strategy. India's policy largely adopts the first approach, but tends to undermine the second view by providing adverse

policy environment. India's PPVFR Act tries to extend IPR type rights to both breeders and farmers, and the National Biodiversity Authority (NBA) stipulates sovereign rights over genetic resource. Although some unique provisions in these Acts such as: the right of farmers to compensation in case of crop failure, the right of farmers to adequate supply of registered material, and measures to promote conservation and benefit sharing can be seen as an attempt to promote Farmers' Rights as development rights, concerns remain. The approach of defining Farmers' Rights as IPRs may provide political rather than economic benefits, whereas defining Farmers' Rights as development rights may ensure greater economic/ social advantages. (Ramanna A., 2006).

The demand for Farmers' Rights as currently defined has not emerged from the farmers themselves. It is not that farmers do not want recognition and rewards for their innovations, but their primary concerns are development rights such as basic rights to water, land, power and markets.

Farmers' right also is enhanced when farmers are aware of their legal rights. However, it is also not easy to build awareness due to the complex nature of IPRs. Another danger of defining FRs as IPRs, according to Borowaik (2004), is that it may end up helping to legitimise asymmetries by creating the impression that there is parity among competing rights: breeders and farmers have parallel rights platforms to get their fair shares. However, he notes, reality is much more asymmetrical and such systems could promote a further shift away from farmer-centred agriculture (Borowaik, 2004).

Yet the strategy of defining Farmers' Rights holds important political benefits for developing countries and this must be acknowledged. The strategy provides a powerful counterpoint to the IPR regime embodied in TRIPs. As Borowaik (2004) points out, '(…) Farmers' Rights advocates work toward such a transformation of a normatively very powerful language.

While they may have lost much in terms of the struggle against the commercial model of development, if they are able to achieve recognition through the language of rights, they may yet have gained in terms of having opened up new conceptual pathways for recognising the needs and claims of otherwise marginalised populations'. The strategy has enabled developing countries to adopt a unified position in the WTO negotiations by clearly articulating the exclusionary nature of intellectual property regimes.

The Farmers' Rights movement has witnessed a long and chequered history. India's ability to be one of the first countries in the world to forge a national legislation on Farmers' Rights is a significant landmark. The Indian case provides important lessons for other countries in establishing Farmers' Rights, and demonstrates the complex and contentious issues that must be tackled to implement Farmers' rights. The fact that agreement on defining and implementing Farmers' rights has not emerged in India, even after establishing a law on Farmers' rights, should serve as a signal internationally that establishing legislations is insufficient. A global mechanism is urgently required to promote some level of consensus on defining and implementing Farmers' rights. Attention must now turn to the brass tacks of how to achieve Farmers' rights. The political and strategic gains of defining Farmers' rights as IPR type rights must be accompanied by measures to ensure economic benefits by focusing on Farmers' rights as development rights.

Farmers' rights must also incorporate mechanisms to promote access and sharing of resources rather than only ownership rights. Farmers themselves must be seen as important stakeholders in policy making. If the global community does not face up to the challenge of unambiguously articulating Farmers' rights, what has been achieved so far in the battle to establish Farmers' rights may be lost. Without proper policy direction, the Farmers' Rights movement itself may come to a grinding halt (Ramanna A., 2006).

4
Challenges and Opportunities in the Seed Sector and the Role of the Agricultural Bodies and Gene Banks

Indian seed industry has seen great expansion in recent years and expecting greater market in future. This success and growth is due to the fact that farmers are buying more seeds than ever, which are mainly hybrids and lately GM seeds as in the case of cotton. This growth in the private sector, except for few cases, has not been reflected in the wellbeing of the farming communities. The total number of farm suicides since 1995 has touched 2,70,940, with a figure of at least 14,027 in 2011 according to the National Crime Records Bureau (NCRB)[33]. This number is rising every day whether there is crop failure or inability to sell bumper harvest at a reasonable price. Interestingly, growth of the seed industry would not have been possible if farmers have been self-reliant.

There had been hardly any growth recently in the informal seed sector which is actually the farmers even though more than 70-80 percent of all the total seed demand of the country is produced by the farmers and almost the entire high volume low value seed, which forms the backbone of food security of the country is also met by this sector. The public sector has also suffered a setback due to lack of incentives, as GoI started boosting the private sector with anticipation of greater efficiency, cutting edge technology and higher investment.

Hence it can be stated that the major challenges that is prominent in the Indian seed sector is not in the private sector but mostly in the public and informal sector. The study tries to analyse the basis of these problem and seeks to find the opportunities available which can help in mitigation.

Legacy of Past: Industrialisation and Hybrids

Though the Agricultural department claims that the present agrarian crisis is *in spite of* all the efforts they are taking to revive it, those in the civil society holds the opinion that the present crisis is mainly *because of* the policies and practices of NARS and our policy makers for the past 50 years.

According to many experts, (Shiva, 2011, Ramprasad) the problem started with the introduction of hybrids, during the green revolution period, which was an important decision at that juncture to meet the food crisis in the country. It did solve the problem in the short run with bumper yield, but in the process, seed, which was a renewable resource, was converted through technological intervention, into a non-renewable commodity (Shiva). The growth of the seed industry has been due to the adoption of this non-renewable commodity by the farmers, which forced them to buy seed every year from the companies as against their earlier saving methods greatly affecting their self-reliance.

The 1988 new policy on seed gave further boost to the industry as restriction on import of seed and planting material and FDI was relaxed. As a result, seed industry grew further bringing greater investment in R&D and entry of major MNCs in Indian seed sector. Many of the varieties, sold by the companies now have IPR protection and are priced very high with the inclusion of royalty in form of technology fee. This changed the dynamics of seed development and seed supply in areas where these seeds were adopted.

However, Hybrids could grow only in optimal condition and were input-responsive seeds. When green revolution started, more and more farmers adopted the hybrid varieties observing the success of their neighbours. The World Bank, seed companies, the state agriculture department, universities and national and international NGOs also advised farmers to adopt these miracle seeds. Consequently, after few years, traditional varieties began to disappear. When the farmers began to experience problems with the hybrids in marginal conditions they had no other seeds to fall back on. Their only option was, and still is to apply more chemicals and water, escalating the cost of production. Finally, the dependence on technology to ensure food security made farming a risky enterprise with ever greater debt for farmers.

According to Dr. Devender Sharma, it was not the HYV seeds which were responsible for the green revolution, but the enabling atmosphere provided by the government to the farmers during that period, that helped increase the yield. He stated that if subsidies were not provided for pesticides, fertilizer and electricity, and if Food Corporation of India was not created to procure the increased yield as a ready market, the dream of green revolution would not have been materialized. He states that with similar support, especially a ready market in offering would have been enough to usher in an increased yield even if hybrids were not introduced.

More than 60 percent of Indian cultivated land is rain-fed and hence unsuitable for hybrid cultivation. In these suboptimal conditions the landraces thrives much better than the present hybrids and modern varieties. As climate change progresses, more land would probably come under the category of 'marginal land' with rising salinity, temperature, water scarcity, etc. making similar hybrid cultivation even more undesirable. On the other hand traditional crop varieties are often recorded to have out-yielded modern varieties in marginal environmental conditions (Cleveland et al. 2000).

Status of Heirloom Varieties and Role of Agriculture System

Whether or not, hybrids were required to usher in a green revolution, but it was definitely a major policy lack that did not take efforts to save the traditional heirloom varieties through *in-situ* cultivation. This led to mass extinction of many landraces within a very short time span, increasingly narrowing the genetic base in crop diversity.[34] The reason for this lies in the dominant belief among the NARS that all traditional folk or farmers' varieties are inferior compared to the hybrids that are developed in the lab under strict control measures. They failed to appreciate, evaluate and give due importance to the past achievements and contribution of Indian farmer-scientists who for generations had breed, selected and developed thousands of locally adopted varieties to address various economical, ecological, social, cultural and even medical need of the local communities[35](Deb, 2009). Over-emphasis on "yield" by our policy makers, over all other qualities of a seed, was also one of the driving reasons which pushed away the traditional varieties into extinction to make place to the modern high yielding varieties.

For example there were reportedly 2 lakh varieties of rice available in India before the advent of green revolution (Richaria and Govidaswamy 1990). Perhaps few thousands are still surviving on marginal farms where no other cultivars can grow.[36] Even after extensive search for many years for heirloom varieties, only few hundred to thousand varieties have been revived and brought back into cultivation by some NGOs and community seed banks. Among the lost heirloom varieties were many exceedingly high yielding varieties[37] also. Others were either resistant to pests[38] and disease.[39] For example, Asan leya, Aush pakal, Ban kata, Heera moti, Kaya Kelas, Katke laghu, Kabirajsal, Narasimha Jata and Raghu-Sal Resistant to Bacterial Leaf Blight (BLB): Bhut moori, Bans kathi, Chandrakanta, Kamal bhog, Karakuti, Katari bhog, Mala, Srabanti-sal and Simul kuri Resistant to Bacterial Leaf Spot and Leaf Streak diseases; Kalo nunia, Kashiabinni and Tulsi manjari

Resistant to Blast and: Katari bhog (moderately, stress tolerant[40] or had enhanced taste, nutrition, fragrance,[41] medical[42] or other special qualities. Neither the merits of these local farmers' varieties being studied before they were left to die out through planned replacement programmes, nor was there any realisation how sophisticated and scientific some of the traditional practices were, before they were mistakenly advised to be replaced by modern chemical intensive monoculture practice.[43] According to Dr. Ashish Ghosh, Ex-Director, ZSI, and President, Society for Environment and Development (ENDEV), "instead of seed replacement, seed rotation should have been practiced, so that the genetic base was not narrowed down". But that the farmers were never advised or trained how to keep alive these folk varieties while they were advised to adopt modern varieties was clearly a myopic policy measure of our agriculture system.

Many farmers' varieties that are in cultivation even today are also high yielding varieties (Jhardari), apart from being stress and pest resistant, locally adapted and climate resilient (Deb 2009). There are many folk beliefs associated with these varieties. Verification of these beliefs through experiments and tests has not been carried out officially.[44] Many farmer communities and community banks have made comparative studies and recorded that many local varieties available even today can give higher yield compared to modern varieties in shorted span of time[45] (See Annexure 7 for a few comparative charts). However, none of these varieties have been integrated into the mainstream public agricultural distribution chain since they were not developed by the scientists.[46]

The same process of seed replacement with high yielding hybrid is still continuing unabated even when it is well known that the industrial farming contributes, and is vulnerable to climate change[47] and the economic advantage of ecological agriculture, compared to chemical agriculture has also been demonstrated in many such field experiments by farmers and NGOs. Interesting to note here is the fact that not only SRR is replacing the locally adapted varieties by ill adapted hybrids; crop failure is also leading to increasing SRR[48] in Tamil Nadu and Andhra Pradesh.

Climate Resilient Seed

Being aware of the future need, the industry, mainly the private sector is funding huge amount on R&D to develop climate resilient hybrids and GM seeds which can withstand climatic stress so that they can cater to and be in control of the future seed market. (See Annexure 8 for example). However, the problem of these new climate resilient seeds developed by private companies is that these would come with IPR protection[49] apart from being a hybrid or GM variety. Hence they would keep the control of the seed production

out of farmers reach. Thus, if such future climate friendly seeds need to be developed, it should be developed at the public sector only so that such seeds are made available to the farmers for sustainable agriculture and not for profit motive. Nevertheless, the risks associated with GM technology still remains.

There are still many folk varieties available which are stress tolerant (few examples available with community seed banks[50]) and since they are in the public domain, they do not affect the self-resiliency of the farmers. Thus an urgent search for existent locally adapted landraces is more important than trying to develop it through technological interventions. This can save millions in R&D.

Present Government Initiatives and Performance

India is self-sufficient in seed, mainly because more than 70 percent of the total seeds demand is supplied by the farmers. However, these seeds are not considered "quality seeds" by the NARS since they are not produced under strict criteria laid down by the national seed policy. Hence there is an increased need felt by the agriculture bodies to increase supply of "quality seeds", which are not only climate resilient but also of desired quality, since according to NARS, almost 20 percent of yield increase depends on the quality of seed.

In reality, the government is trying to achieve this desired result by incorporating two conflicting approaches simultaneously: 1) through support of biotechnology and GM technology:- by taking policies which are in favour of the agro-biotech companies to facilitate their greater investment and participation in the agricultural sector. 2) by trying to provide support to the informal seed sector for development of quality seeds (majority of which still practices ecological farming in more than 60 percent of rain-fed areas of India). It is not clear

however, how these two conflicting approaches can co-exist in the long run.[51] It must be noted that the first approach is being given much more emphasis than the latter, which raises the suspicion of corruption due to increasing strength of government-bureaucrat-business nexus.[52] Even the National Seed Policy 2002 emphasises on an appropriate climate for the seed industry to utilise available and prospective opportunities, while safeguarding of the interests of Indian farmers and the conservation of agro-biodiversity. However, there is no provision for such safeguard feature in the major thrust area of the National Seed Policy, 2002.

GM Seed Controversy

Though any GM variety developed in the private sector will have strong IPR protection disconnecting the farmers from seed breeding and transforming them to seed consumers, there are other serious controversies in India relating to the whole gamut of GM seed issues relating to field trials, approval,[53] transparency, regulation, violation of rules and bioethics.

According to Dr P M Bhargava, eminent microbiologist and the founder and first Director of Centre for Cellular and Molecular Biology, the decision of adopting a risky GM technology in Indian agriculture scenario had been undertaken without proper need assessment studies or assessment of available alternatives overriding strong public opinion. He said, "the democratic government in India has become one of the largest breakers of the law and has engaged in activities which are anti-people….(and) has also succumbed to the pressures of large corporations."[54]

The issue of GM crop is also dealt by other ministries apart from Agriculture. Ministry of Science and Technology, Environment and Forest, Commerce and Industry, Heath and Family Welfare etc. are also involved.[55] The duty of monitoring,

regulation and approval relating to GM seed falls under the Genetic Engineering Approval committee (GEAC), which is under the Ministry of Environment & Forests. There had been a tremendous negligence of duty by the nodal body GEAC in the way they had handled the regulation of GM issue for the last 10 years. There has been widespread allegation of corruption[56] relating to GM regulation in India. There are principally three fronts on which the GEAC has failed: Enforcing rules for trials,[57] Carrying out biosafety tests,[58] and Methodology for taking decisions.[59]

After the damning report of the parliamentary committee on agriculture, a panel of technical experts appointed by the Supreme Court has recommended a 10-year moratorium on field trials of all GM food and termination of all on-going trials of transgenic crops.[60]

Impact of Seed Import and Corporatisation

Since India is self-sufficient in seed, import on seed is mainly on few vegetables. Also stress tolerant varieties are being imported to India since not much is happening in the area of abiotic stress in R&D. However, import of food can also bring in pests and negatively impact seed sector.[61] After 1988, removal of restriction allowed bulk import under OGL. According to some, as an effect of this free trade, some of the imports that are taking place are not necessarily to support domestic need but due to corporate interests and changing food habit of the urban consumers.

According to Dr. Devender Sharma, the recent Papaya seed import from Taiwan has been because of corporate interest since there was no apparent domestic need for such an import.[62] Because of its perceived advantage, it is surely going to be adopted by more farmers. But, once adopted in large scale, this can displace again many local varieties and reduce

the genetic base required to fight climate change. Apart from that, it can negatively impact the domestic papaya farmers who would like to grow Indian varieties.

Moreover, some of the bulk imports in food, such as in fruits are bypassing the quarantine requirements of the NBPGR, with possibility of bringing in new disease and pest.[63] Bulk import of these fruits can indirectly impact the future domestic seed production capacity of the state, since the farmers growing domestic varieties are already facing hard competition.[64]

However, now with the advent of technology, import of seed *per se* is not required to capture domestic markets. As in the case of Bt cotton, Mahyco began the process of backcrossing the gene extracted from the Bt seed that was bought from Monsanto to produce local Bt Cotton varieties. Aggressive control of market has taken place in Bt cotton where more than 90 percent of all cotton varieties available today is Bt cotton while the price of cotton seed have skyrocketed. This has left very little option for farmers who do not want to cultivate GM cotton. Thus, while traditional farming allowed the farmers to take his own decisions relating to his choice of crop and farming techniques and retain his knowledge and power to exercise that knowledge, corporatisation of agriculture has taken away these rights.

Initially Bt cotton was meant for cultivation in irrigated land. The initial success of the Bt cotton in some areas encouraged farmers of the other areas to cultivate this crop. These seeds were also sold to farmers of the unsuitable rain-fed area at steep price. This led to crop failure and severe debt crisis among farmers in a large part of Maharashtra. In absence of crop insurance, the farmers were debt stricken and the cotton belt of Vidharba district earned the title of "Farmers suicide capital" in the country, even though similar

suicide cases have been reported from Punjab, Haryana, Andhra etc. for similar reason.

It is thus, not corporatisation of agriculture alone, but the failure of the regulatory agencies to control the activities of the seed companies, which is making farming a non-profitable business for the farming community. A survey conducted stated that 40 percent of Indian farmers are ready to leave farming if provided other livelihood options.[65]

With many acquisition and merger taking place as bigger companies are buying off the smaller seed companies, the seed sector is moving into the hands of few MNCs who probably would control the entire seed market in future. This has happened in many western countries. However, unlike the western world, more than half of Indian population is directly dependent on agriculture. Moving the control of seed production from the hand of farmers to the corporate would severely marginalize the farmers forcing them to leave farming in search of other livelihood option. This would create a huge pressure on government to provide additional job for more than half of Indian population, mainly unskilled labour.

Also there would be tremendous pressure on the cities as farmer refugees in huge numbers would start migrating to the urban sector in search of livelihood.[66] Needless to say this can negatively impact the economy of the country in a big way.

Moreover, the corporate giants who are into agribusiness do not have the same relation with seed as a farmer. They are in the business recently purely for profit reason. It cannot be expected of them to have the same stake as the farmers in either providing nutritional or food security to the nation. And needless to say, food security is intricately connected to sovereignty of the country. Thus the challenges in the seed sector can have far reaching consequences. Many of the corporate giant in agro-business, are into other areas of business as well. If ever, the agro-sector is not profitable, they

can surely diversify and move out from investing in agro-business. Without having the farming community, the question of food security will not exist.

Challenges and Opportunities

Long term solution lies in the policies that will induce farmer to cultivate crops, which offer best return and have low risk. Taking into consideration the climate change conditions, ecological farming[67] along with cultivation of climate resilient traditional landraces or heirloom varieties[68] seems to be the most appropriate option. Future farming system should be based on production process that is sustainable, energy[69] and water efficient,[70] bio-diverse, climate resilient and also contributes to climate change adaptation and mitigation. Many researches indicated strong evidence that ecological or organic farming helps combat global warming by capturing atmospheric carbon dioxide and incorporating it into the soil (increased carbon sequestration),[71] in fixing nitrogen, and in reducing GHG,[72] whereas conventional farming exacerbates the greenhouse effect by producing a net release of carbon and other GHG into the atmosphere.[73]

Many believe that apart from climate change adaptation and mitigation, sustainable ecological farming has great potential for meeting global and national food security requirements[74] even as it leads to improvement of farmers' livelihoods[75] through enhancing their net incomes and improving the productivity of their resources in the long run.

The most important challenge in this effort is to change the mind-set of some of our agricultural scientists and policy makers, that such a paradigm shift in agriculture policy is necessary and possible. However, in recent time there seems to be an increased understanding among many policy makers and agricultural scientist within the Agricultural Ministry,

leading to strategies and policies which try to address the some key problems. Yet, there are many other policies under implementation or waiting for clearance, which raises question whether Indian government is confused of its mission and objectives. Some of these are policies like "Bringing Green Revolution to Eastern India" (BGREI)[76] and "National Food Security Mission" (NFSM) which are still promoting Hybrids,[77] and proposing measures which tries to replicate the old model of green revolution without learning from the earlier mistakes, and project sunshine etc., which are measures to push an unwanted and risky GM technology.

Also the proposed Seed Bill 2004 which is supposed to replace the Seeds Act of 1966 and is lying in the parliament for the last few years is alleged bending backward to accommodate the interest of the transgenic plant varieties and can allow a unique monopolistic commercial advantage without acquiring plant breeder rights and without attracting any Public interest liabilities. As discussed earlier, the Seed Bill 2010 does not propose any price controls in spite of several recommendations by NGOs, farmer groups and civil societies other than the Parliamentary Standing Committee on Agriculture and three amendments. Over the years, sale of spurious and sub-standard seeds has grown, and in the absence of any price controls, as companies are charging prices at will and without any rationale, farmers are not only being fleeced but are increasingly being burdened with rising cost of cultivation thereby rendering farming non-remunerative.

"National Initiative on Climate Resilient Agriculture" (NICRA) by DAC, "The National Mission on Sustainable Development" (NMSD) by ICAR and "Strategies to Build Viable Community Seed System in Dry Land Ecosystems for Sustainable Seed and Food Security in India" by DSR seemed to be positive attempts in this direction though there is hardly any specific budget allocation (2012-13) for sustainable

agriculture which makes these efforts toothless (Ghosh, 2012). The case for saving traditional seeds or increasing use of bio-pesticide and bio-fertiliser has not found a place in the budget. In the era of climate change, climate resilient seeds are needed and ecological agriculture is a must for improvement of soil (Ghosh, 2012).

Though these policies suggest many effective suggestions these policies are still dependent on technology to bring solution to climate change without trying to address the root cause that the present problems of agriculture has in fact appeared due to devaluation of ecological principles and can only be solved by restoring these ecological principles and not through technological fixes.[78] Thus GM technology does not seem be an answer to the present and future agrarian crisis (which might aggravate significantly due to climate change). In fact, an assessment of the stress (in)tolerance of GE crops should be an important part of understanding the implications of Genetic Engineering as an agricultural technology in the era of climate change. Hence, solution lies in understanding the laws of nature and helping the ecological process to regenerate and recover itself. Moreover, the top-down, non-inclusive approach of many of these policies are mere reflection

Box 3: GM Commercial Plant

At present there is no GM commercial plant available throughout the world that has qualities to live up to climate change challenges. The more complex characters such as stress responses are driven by multiple (almost 50) genes that are not even cloned all today. Even if they may be obtained, it will take many years to develop these crops on a worldwide basis, since today's crops have been developed 15 years ago. Climate adaptation and mitigation cannot wait that long. Neither is there a need too,.. Many traditional folk and farmer varieties available are already stress-tolerant.

of the past which never tried to imbibe, understand, develop or disseminate the ground level experiences and innovation of farmers.

Though NMSA[79] mention "biotechnology", "NICRA" mention only "technology" requirement to address climate change. Nowhere ecological farming is mentioned either as a paradigm shift needed to address this crisis. "Technology" exists among farming communities also, and most of these technologies are also sustainable[80] and in tune with the ecological principles. Hence measures should be taken to avoid any technological interventions which contradict the principles of ecology while these schemes are implemented along with other similar schemes like NFSM, NMSD or SRI.

More than 85 percent of farmers in India are small or marginal farmers. Understanding the important role that the informal seed sector has played in conservation of agro-bio-diversity, at the gene, ecosystem and farmers level to ensure food security, and the failure of the private sector to address the needs of marginal farming communities even after they have been provided ample support, the Directorate of Seed Research, (DRS), ICAR has declared that national seed policy would devote more effort to sustaining and strengthening the informal seed sector

However, the motive of the DSR effort on "Strategies to Build Viable Community Seed System in Dry Land ecosystem for sustainable seed and food security in India" becomes questionable when *major challenge in seed sector* in marginal environment is projected as one due to "*the extant and persistence of farm saved seeds*"! It is surprising that the most sustainable and resilient strategy in the face of climate change is being posed as its problem! The reason attached states that this "…limits the farmers' choice to diversify their portfolio and thus improve productivity..." It does not even mention the fact that the industrial linear methods and monoculture

practiced for years had been actually the reason for this present lack of resource option!

According to Dr. Tonapi, head of Science and Technology Division, IARI, "Seed industry (both public and private) cater to only 30 percent of the total seed requirement. Rest are managed by farmers save and exchange, and informal seed selling. Best thing for India would be to strengthen community seed system. NGOs, along with, Kisan Vigyan Kendras, can play very important role. Even private company can adopt a village, which is already happening in Andhra Pradesh. For dry land farming (rain fed regions) open pollination varieties should be chosen. Access to credit would also facilitate the system."

More than 3.5 lakh farmers in Andhra and many in Bihar, Tripura, Uttaranchal, North Eastern states and Madhya Pradesh have shifted to organic farming as a result of their experience with industrial farming.[81]

Since Agriculture is also a state subject, many states in India like Uttaranchal, Punjab, Andhra Pradesh, Madhya Pradesh, Karnataka etc. have declared their "State Organic Policy" and few states like Sikkim, have decided to go fully organic in few years. Others have decided to be GM free[82]. Many states are giving funding supports for enhancing organic cultivation is their states. These state policies need reflection in the central agricultural policies, which at present is not happening.

According to Dr. Anurag Chaurasia, Scientist (Biotechnology), NBAIM, "...GM technology is not going to be the final solution for enhanced agricultural productivity. Insects are reported to have developed resistance in few countries, so integrated approach including Integrated Pest Management (IPM) is going to play an important role… where conventional techniques too are going to play an important role."

There are many problems encountered while transition takes place from industrial to organic cultivation. The

chemically treated degraded soil is the biggest problem (Dr. Ramprasad, Dr. Sahai). In some places the soil needs to be left idle for few years before it can regain its capacity to produce any crop.[83] In severely degraded areas like Punjab and Haryana this can take several years, while in other less degraded areas crop yield can be low in the initial years[84], before the soil is enriched through the process of organic cultivation.

Dr. Sharma stated, "...the biggest problem today if there is an attempt to go back to ecological farming is to find the traditional seeds. Even if they are found in small quantity, the problem of multiplying them appears due to erosion of the traditional knowledge associated with the seed. Thus, a whole package of practice needs to be developed to encounter this. Subsidy in organic manure should be provided in the way subsidy is provided to inorganic manure, and also there should be transition subsidy for farmers who wants to move back to ecological farming, as is heavily practiced in US."

Small and marginal farmers cannot take the risk of low yields for the initial 2-3 years on the conversion to organic farming. There are no schemes to compensate them during the gestation period. Few studies have suggested that such transition should be done in phases so that the economic loss would not be severe. According to Dr. Tonapi, "strengthening traditional farming is also very important. Government should use subsidy approach to help the transition."

Others have suggested that the funds from the National Rural Employment Guarantee (NREG) Scheme, which is available for providing remuneration during lean period, can be used effectively as transition subsidy (Dr. Vanaja Ramprasad). Some experts have suggested transfer of subsidies from chemical fertiliser and pesticides to organic fertiliser and pesticide to promote their greater use (Dr. Ashish Ghosh, Dr. Devender Sharma).

The most important step towards organic farming taken by the government was to draw a regulatory framework. The implementation of National Programme on Organic Production (NPOP) is ensured by the formulation of the National Accreditation Policy and Programme (NAPP). The regulations make it mandatory that all organic certification bodies should be accredited by an Accreditation Agency. The international certification agencies operating in India even prior to these regulations will also have to get accreditation under the new dispensation.

International market has rising demand for organic produce. India has huge potential to meet this demand (Dr. Tonapi). Organic certification[85] has also been suggested by others to increase export potential of Indian agro-products.[86] This can also capitalise the rising domestic demand for organic produce, especially from marginal lands where organic cultivation is already in practice. However, the price premiums on the organic products will disappear once significant quantities of organic farm products are made available. Till that is reached, organic produce will continue to enjoy premium price.

Gene Banks and Linkage with Farmers

In India, for various reasons, farmers hardly have an access to the varieties that are stored in the gene banks, which originally were the farmers' variety. Though NBPGR and its regional branches have records to show that they have all varieties, they can hardly dole out any viable seed in situations of emergency[87] (Ghosh, 2012a) . According to Dr. Deb (2009), these banks serve as morgues for these seeds with years of disuse and the tragedy of *ex-situ* banks. Trait evaluation of the acquisition has not yet been carried out at national gene banks[88] and hence gene flow remains low (Dr. Pandey). Many of the variety are that lost from the farmers field, are saved in

the gene banks. There had been efforts in the past by certain NGOs to avail these lost varieties from the gene banks and cultivate them in the fields (Dr. Ramprasad). However, most of these seeds would not germinate since they were not cultivated for many years. Sophisticated technologies can be made available to help germinate these useful varieties.[89]

Linking the gene banks to the community seed banks can go a long way enriching the crop diversity that has been lost in the course of modernising agriculture. Moreover, reviving "these" seeds would help farmers avoid IPR complication as these are originally farmers' variety compared to newly breed modern varieties which may be developed by private breeder using these same germplasm.

Efforts should be taken to make farming economically remunerative for the farmers so that the control of seeds (from production to use) remains in the hands of the farmers, who understand it best, by providing all round support to the farmers' preferred choice of practice, product,[90] and market[91] and an overall enabling atmosphere. All policies relating to future agriculture should be taken in consultation with farming community[92] if food security is in the national agenda, and food security can come only if there is seed security (Sahai).

The problems of the seed sector should not be seen in isolation, but in the context of policies taken in the area of agriculture and climate change. Hence, its solutions cannot be achieved in segregation either. It can be effectively addressed only through a holistic approach. Agricultural sustainability consists of long-term productivity, not short term increase of yield. Ecological agriculture which seeks to understand and apply ecological principles of farm ecosystems, is the future of modern agriculture (Deb 2009), the main pillar of which is diversity. Diversity at multiple levels - genetic, crop, copping system, farming system, community and intellectual diversity leads to sustainability (Tracy, 2003).

Modern ecological research (Folke et al. 2004; Allesina and Pascual 2008) supports the fact that biological diversity enhances ecosystem persistence and resilience. This ecosystem resiliency enhances farmers' resilience on which the state or regional collective self-resiliency would have to be built upon.

Indian farming is at a cross-roads and climate change is one more factor adding to the existing agrarian and agriculture crisis in the country that requires a decisive direction shift at the policy level:

- Fundamental changes have to come from the acknowledgement that unilateral, top-down, prescriptive "knowledge generation and transmission" models of agriculture development adopted in the country so far have in fact resulted in an ecological, economic and social crisis in the farming sector of the country and conventional models of agricultural research and extension will fail to address the need of the hour unless some fundamental recasting is done.
- Existing mainstream models of farming are GHG-inducing and are not conducive to adaptation either given their high external-input dependency, which increase the risk of vulnerable farmers.
- Sustainable agriculture, on the other hand, holds immense mitigation and adaptation potential, specifically in the context of climate change even as it improves rural livelihoods and addresses the ecological crisis in Indian farming (genetic erosion, land degradation, water depletion and contamination etc.) apart from addressing long term food security.

There are no options in front of the Indian government and Indian farmers but to establish, promote and adopt sustainable agriculture for all of India, in a phased manner.

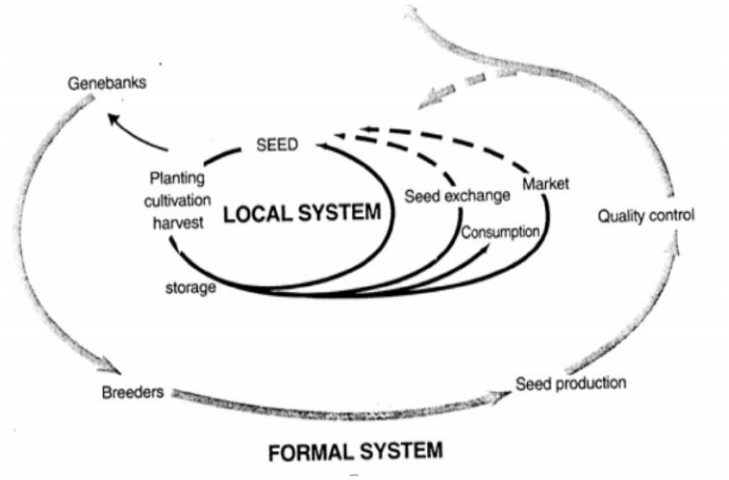
5
Farmers' Seed system, Community Seed Banks and SAARC Regional Seed Bank

In India as in the rest of the globe, farmers, particularly small farmers, are involved in multiple kinds of seed systems, which help them produce and obtain the seed they need. These systems can be broadly divided formal seed system and a local system. The local system is also sometimes called the "informal," "traditional," or "farmer" seed system. At the same time, the formal and local seed systems are not always as distinct or separated as the two labels may imply. While some farmers treat "seed" specially, in the local seed system, there is not always necessarily a distinction between "seed" and "grain."

Encompassing a wider range of seed system variations, what characterises the local system most is its flexibility. Varieties may be landraces or mixed races and may be heterogeneous (modified through breeding and use). In addition, the seed is of variable quality (of different purity, physical, and physiological quality) (Almekinders and Louwaars, 2003).

Looking at the seed system interfaces

One of the most oft-cited and useful figures diagramming seed system components appears below. It shows formal and local seed systems as distinct but intersecting.



Source: Almekinders and Louwaars (1999).

Status and Predictions : Farmer Managed Seed System

In India, more than 70 percent of national seed demand is met domestically through farmers' seed. As per government records, India is self-sufficient in seed mainly because of its farmers. The local seed system is most evident in the marginal areas. As more than 60 percent of arable land in India is rain-fed, these areas have predominantly local or farmers seed system though local seed system is also present in the prime irrigated areas. In this seed system many farmers still practice ecological farming though they are also provided subsidies to adopt the modern improved varieties. However, as discussed earlier, adoption of modern hybrid varieties along with industrial agriculture in these regions has created and is still

creating immense economic problem for the Indian farmers marginalizing and causing death. Serious health related problems due to exposure to industrial chemicals have also been affecting the local seed system as farmers are trying to look for other avenues of income generation as agriculture is becoming non-profitable enterprise for them.

The impacts of climate change are already visible in Indian agriculture. ICAR reported that the warming trends over past 100 years indicate 0.6 degree centigrade increase in temperature in India. There are already evidences of negative impacts on the yield of wheat and Paddy in parts of India due to increased temperature, increased water stress and reduction in number of rainy days.[93] A network of 15 centres of ICAR working on climate change has reported that apple production is declining in Himachal Pradesh due to inadequate chilling. This is also causing a shift in the growing zone to higher elevations. It has also been recorded that the pest ecology of certain crops is changing due to climate change, while predictions of even severe climate change related warnings are coming in.[94]

It is reported that the poorest people are likely to be hardest hit by the impacts of climate variability and change because they rely heavily on climate-sensitive sectors such as reined agriculture and fisheries. They also tend to be located geographically in more exposed or marginal areas, such as flood plains or nutrient-poor soils.[95] The poor also are less able to respond due to limited human, institutional and financial capacity and have very limited ability to cope with climate impacts and to adapt to a changing hazard burden. It is predicted that in near future climate change is likely to create a new community called "climate refugees", and needless to say these will be initially the poorest people.

Recent Trends in Local Seed System

Having experienced the problems of chemical farming and its inability to adapt to climatic changes, many farmers in India have started returning to ecological farming. This trend is growing in many states of Andhra Pradesh, Bihar, Punjab, Uttaranchal, Karnataka, Maharashtra[96] etc. It has been noted that once these farmers returned to organic farming there had been little or no incidence of farmers suicide[97] even when there was drought like situation, since the farmers did not have to spend on pesticide and seeds.

Reports have been made of traditional varieties doing better in extreme climatic fluctuation when hybrids have failed providing necessary nutrition at farmer's family level. The farmers from the states of Punjab, which has one of the worst soil condition in terms of chemical residue and nutritional degradation also reported that the soil is getting restored with ecological farming and multi-cropping.[98] The farmers have reported gaining profits with the transition after suffering loss due to industrial farming.[99]

In certain places in Maharashtra, organic cotton farmers have reported similar yield in comparison to the average yield of Bt cotton without the expense on pesticide and seeds, which are giving them higher net return. Organic farming they reported reduces production costs drastically, because the inputs are available within the farm. Many state governments are already supporting this transition.

However, the promotion of sustainable agriculture on a large scale is often confronted about its potential as well as its practical limitations. In the last five years two large scale initiatives, Non-Pesticidal Management (NPM) scaling up Community Managed Sustainable Agriculture-(CMSA) in Andhra Pradesh[100] and Systems of Rice Intensification (SRI) promotion in states of Tripura,[101] Orissa and Tamil Nadu have

brought in new learning and broken the earlier apprehensions on scaling up such practices and their relevance on a large-scale.

These successful experiences had three elements in common. First, all have made use of locally adapted resource conserving technologies. Second, in all there has been coordinated action by groups or communities at local level. Third, there have been supportive external (or non-local) government and/or non-governmental institutions working in partnership with farmers. Almost every one of the successes has been achieved despite existing policy environments which still strongly favour 'modern and established' approaches (technology and support systems) to agricultural development.

Community Seed Banks

As a response to combat the local seed scarcity created by modernization of agriculture in India, many community seed banks have been established all over India to provide support to the local farmers system. The mandates of these community banks are discussed below:[102]

***Mandates of Indian Community Seed Banks*:**

- To combat seed insecurity due to introduction of modern varieties and policies promoting them through subsidy by saving, and promoting cultivation of folk/traditional varieties and land races
- To document and share among members the traditional knowledge associated with displaced local traditional varieties
- To keep alive their practice by providing access to these seeds and assisting farmers in choosing varieties appropriate for the farm /land type

- To conserve these varieties by increasing the area under traditional variety *in-situ* cultivation and seed multiplication
- To study the growth conditions of folk varieties and document their agronomic, morphological characteristics, cultural uses to prevent bio-piracy
- To re-establish the vanishing culture of non-commercial sharing of seeds and associated traditional knowledge with displaced traditional varieties
- To halt further erosion of genetic diversity
- To help increasing the self-reliance of farmers making them less dependent on modern varieties
- To impart practical training in ecological agriculture
- To generate awareness of the benefits of organic farming through *in-situ* demonstration, farmers meet, posters, skits and folk songs, mobile gene bank procession etc.
- To provide marketing support to organic farming (organic certification in many cases to obtain better price for the produce)
- To enhancing livelihood security of marginal farmers through cultivation of traditional landraces
- To take up research and advocacy for an alternate farming system
- To promote seed and food sovereignty for the country by reducing the corporate control on seed market
- To achieve seed sovereignty at individual farmer level (Some banks have become defunct as every farmer has become a seed banker and achieved seed sovereignty and do not need a bank support as in case of DDS)
- To seek direct representation of farmers in policy decision making
- To rejuvenate traditional knowledge and culture

In the course of the study we have focused on few community Seed banks in India. They are run by:

- Research Foundation for Science, Technology and Ecology - Navdanya
- Centre for Interdisciplinary Study - Vrihi
- Deccan Development Society (DDS)- Medak Women Farmers
- Green Foundation
- Gene Campaign
- Beej Bachao Andolan (BBA)
- Centre for Indigenous Knowledge (CIK)

Case studies on Selected Community Seed Banks are available in (Annexure 9)

Some of the major learning from the study of these community banks are:

- Formation of a seed bank at the initial phase is helpful in addressing the need created due to insecurity of local/ folk/ heirloom seed, though the ultimate aim is to make the farmers self-reliant
- In many instances, women have been more responsive than men in leading the efforts towards ecological farming and the mandate of these banks
- By tracking down history and capturing traditional knowledge, rare but valuable resources can be accessed and climate change can be combated by adaptation
- The community seed banks play an important role in boosting the informal seed sector by improving the traditional crop diversity and increasing the traditional seed options for the farmer by helping farmers in
- Making *available* suitable heirloom varieties through guidance in choosing varieties
  - Giving easy *access* to these seeds by making all transfer mandatory through seeds instead of money

- Proper *utilisation* of the resource through demonstration, practical training and advocacy

- The community seed banks are playing a critical role in reviving and returning back the legacy of forgotten traditional knowledge to farmers by
  - Acting as a base for awareness generation
  - Creating a platform for discussion and sharing of knowledge and information
  - By documenting TK in CBR and ensuring their protection through copyright and by preventing patents/ PBRs by establishing prior art
- The community seed banks can support the transition of farmers to ecological/organic farming not only in their vicinity but in other parts of the globe by
  - Providing economic support through creation of market
  - Enhancing their exposure to a wider issues and to wider communities for sharing their experience with ecological farming
  - Providing a self-help strategies to ensure long term resiliency
  - Locating and amassing stress resistant varieties to overcome acute climatic conditions
  - Supporting the farmers of other areas by providing them stress resistant (saline-resistant, flood-resistant and drought resistant) seeds after natural disaster.
- The ultimate success of these banks obviate the existence of these banks as every farmer becomes a seed banker (in-situ banker) as in DDS
- It is possible to have highly productive organic farm producing diverse indigenous crops without the use of synthetic chemicals
- Seed sovereignty can lead to socioeconomic development including livelihood enhancement and greater access to food (increased food security at family level)

The successes of these banks among other reasons are due to

- Easy accessibility/ proximity to the farmers
- Mostly local seeds which are locally adapted
- Upholding the basic philosophy and ethics of the farming community like free sharing
- Providing a complete package which supports access to utilisation
- Free exchange - not creating economic pressure to adopt transition
- Providing a bottom-up participatory process
- Involving farmers in decision making
- Inclusive growth concept - the growth of the bank includes the growth of its members
- Promotion of sense of ownership, dignity and pride among its members

Some interesting but heterogeneous approaches in the selected models are:

- Created and managed by a group of farmers - no formal NGO involved – BBA
- Initiated by an NGO but managed by women in the community – DDS, Green Foundation
- Centralised system – Vrihi, Gene Campaign
- The bank is decentralised and is operated at several places in the region. It also percolates to family levels. Many families have their own banks – DDS, BBA
- A system which ensures on increasing the bank's accession in diversity and quantity - where to avail seeds from bank, a farmer would have to give seeds of at least one folk variety which would then be passed on to another farmer – Vrihi, Navdanya, DDS
- Free seed delivery – Green Foundation
- Centre works in assisting seed mapping, planning and management – Green Foundation

- Mostly self-multiplying system of access, Seed avail: seed return ratios are generally 1:2, 1:2.5 or 1:1.5 - vrihi, navdanya, DDS, Green Foundation , CIK
- Creation of self-help group – DDS, CIK
- Different modes of information transmission e.g.
  - Setting up of learning centre- "Beej Vidyapith" as in Navdanya, Doon Valley
  - Creation of Grandmothers university for dissemination of knowledge to wider global citizens - Navdanya
  - Creation of Mobile seed banks - DDS, Green Foundation
  - Using the audio-visuals media by the Dalit downtrodden women for dissemination of information - DDS
  - Seed fair, yatras, skits , play for awareness generation as in Vrihi, Navdanya, green foundation
  - Giving women farmers exposure and chance to interact through international travel - DDS
  - Involving youth, schools students and teachers in awareness generation – CIK
  - *In-situ* demonstration in Field - Vrihi, Navdanya
- Biodiversity register or Community Bank Register for documentation of traditional knowledge - Navdanya, Vrihi, Green foundation
- Development of new varieties through crossing and selective breeding of various landraces - Vrihi
- Copyright on biodiversity registers - Vrihi
- Do not register to PPVFR Act since they do not believe in IPRs - BBA
- Involvement of women as primary stakeholder as in DDS, Navdanya and Green foundation
- Organic certification as in DDS, Navdanya
- Organic farm for training, conservation and experimentation - Vrihi, Navdanya
- Demand for –
  - Farmer status for women as in BBA, DDS, Navdanya
  - Scientist Status for Farmers as in DDS, Vrihi, Navdanya

Observations of Stakeholders

The study tried to incorporate the views and observation of the stake holder in relation to the contribution of the community seed banks and the farmers' seed system.

Dr. Dadlani, Director, NSAI, from the corporate sector did not want to call these banks, "community seed banks", since he felt these banks are not owned by the community, and their operational structure does not designate them as community banks

However, the civic society experts and policy makers felt that the community seed banks have tremendous scope in addressing the issues of current agricultural crisis and can play a major role by providing incentives to the conserver and provider of the seed. Nevertheless, they lack enough infrastructure and support from agricultural extension services etc. (Dr. Ghosh).

Improper seed selection (Dr. Tonapi) and storage (Dr. Sahai, Dr. Tonapi) has also been mentioned as the weakness which affect the yield in the farmers' seed system. Dr. Tonapi stressed the need of increasing SRR within farmers' seed system in community bank structure to increase yield of traditional varieties. However, a discussion with Shri Vijay Jardari gives a very different picture.[103] He mentioned clearly that the process of seed selection, seed storage etc. are part of the traditional knowledge. Thus, it seems that the difference lies in the fact whether or not the traditional knowledge and practice among farmers have been eroded (as experienced by DDS).

According to Dr. Devender Sharma, the net impact of all the community seed banks on the national scale is hardly felt since they are operating at a small scale and their area of coverage is not adequately growing. Their examples are still to be adopted by majority of farmers. They are hardly playing

a role big enough to create a visible impact. A lot of it is due to the fact that these community banks suffer from funds and support which is their weakness and limitation.

He stated that ICAR has complied more than 4000 traditional knowledge related to traditional farming practice and has validated more than 2000 varieties. But none of these are promoted even when they have validated them[104]. Thus the community banks have immense role to play but the main problem is that the official system do not accept their claims and contribution and do not promote the resources that are present with them.

He stated that there is inadequate linkage among different community banks and that needs to be developed. Though few are having facilities, many also lack the technological support and the capacity to study and evaluate seeds and put them into the market. Neither do they have capacities like their MNC counterpart to push their product, nor do they have the communication facilities needed to promote their product. They are also not powerful enough to influence the government to promote their products or take policies in their favour.

The SAARC Regional Seed Bank

Acknowledging the urgency that is posed by the effect of climate change on agriculture and recognising the importance of sub-regional collective self-reliance in Agriculture with respect to attaining seeds security as a means of ensuring food security, SAARC committee has proposed a Regional Seed Bank. See Annexure 11 for the Agreement on Establishing SAARC Seed Bank.

The Salient Features of SAARC Regional Seed Bank Agreement are:

- SAARC members plan to set up a regional seed bank to help farmers get quality seeds from the reserve in case of a shortage due to natural and manmade calamities
- Each member state will take initiative to be self-sufficient in seed, to meet its own requirement and contribute to ensuring food security in the region
- The member states will try to increase SRR at a faster rate, and produce quality seed
- SAARC Seed Bank will identify common varieties of priority crops and create opportunity for exchanging suitable and common varieties among the member states, establishing collaboration in the field of biotechnology, biosafety and genetic resources
- Common varieties of rice, wheat, maize, pulses and oilseed (priority crops) will be maintained in the reserve, which will remain the property of the member state
- Develop a list of common variety to take part in adaptive trials in agreed ecological zones in the region
- Member states will update and harmonise relevant Acts, Rules/ Regulations /Orders regarding all aspects of seeds
- Seek to develop harmonised procedure for transgenic varieties
- Framework for material transfer to be applicable to facilitate easy movement of plant material across member states (it takes about four months to exchange seeds between countries through IRRI). The framework will perform in accordance with existing law, regulations and guidelines of member states and that of ITPGRFA.
- The IPR and Benefit Sharing shall be as per the existing laws of the providing country
- Member states will develop Common Minimum Seed Quality Standards (CMQS) and seed testing procedures and develop Common Seed Certification System and standards

- Member states that release seeds from the reserve will have to replace the quantity not later than one calendar year.
- Price, terms of payment in respect to seed release will be subject to direct negotiation of the member states based on board guidelines

The objective of the framework is to facilitate supply/ exchange of seeds of common crop varieties among the member countries for the purpose of achieving food security in the region.

An Analysis of Proposed SAARC Regional Seed Bank and Possible linkages with Indian Community Seed Banks

SAARC Regional Seed Bank (SRSB) and the Indian Community Seed Bank (ICSB) has the same mission: Banking seed to address shortage of seeds at present or future and making available quality seeds for plantation to farmers in times of crisis, both natural and man-made. However, the objectives of the SRSB and that of ICSB are different in many areas. While mandate of ICSBs is to combat the seed insecurity created by introduction of modern variety which displaced landraces and heirloom varieties SRSB mandate is to address the adverse effect of natural and manmade calamities.

It is not clear whether mass extinction of species through implementation of wrong policy should be considered a man-made calamity or not. It is not clear either whether that gives any state a chance to avail seeds in need if in future any traditional crop variety turns extinct.

The SRSB focuses on: "the common varieties of major priority crops, while recognising the need to preserve local varieties" (Art IV.1), while the main focus of ICSB is on the local /traditional/ indigenous/folk/farmers' varieties.

This makes the focus of SRSB completely different from that of ICSBs. Clarity is required what "common variety" stands for.

Bearing in mind, the experience of ICSB, and the fact that none of the present hybrids can survive in marginal ecological conditions that may be created after natural or man-made disaster, open-pollinated traditional, folk or heirloom varieties seems to be the only option for a regional seed reserve, since this reserve is going to be utilised only in sub optimal situations that may prevail after a disaster. Thus SRSB should focus mainly on common landraces or heirloom varieties that might be present concurrently among/between neighbouring countries. Other modern varieties may simply fail to germinate or survive in post disaster marginal conditions.

Here development of a National Seed Grid to provide information on availability of different varieties of seeds with production details as proposed in The National Seed Plan 2002 might be useful in availing a clear assessment of demand and supply of seeds. This could be part of a SAARC regional seed grid. Such a seed grid can also be replicated in other member countries also to help assess the status of seed availability and need on a regional frame. However, all these can lead to stronger chances of misappropriation if regulations are not strongly implemented. Hence such possibilities should be approached with caution.

However, there can be several issues relating to IPR and Benefit Sharing in relation to sharing of landraces which are not present in common domain. Although the SAARC Agreement says that IPRs and Benefit Sharing would be governed by the laws of the supplying members, there are scope of misappropriation when the seeds goes out of the national boundary.

SRSB states that in order to identify and develop a list of common varieties, member states will take part in adaptive trials…

These adaptive trials should take into consideration apart from commonality, the most important aspect, the stress tolerance capacity of these varieties. All the varieties for reserve in the bank should be tested for their climate change adaptation and mitigation properties before they are selected or listed. Otherwise the whole exercise will remain futile.

SRSB urges member states to undertake planned approach to increase seed replacement rate at a faster rate to ensure supply of quality seed (Art III.I)

The Seed Replacement Rate (SRR) is defined in the official website of the DAC[105] as "...the percentage of area sown out of total area of crop planted in the season by using certified/ quality seeds other than the farm saved seeds". In the mainstream agriculture most often, only hybrid seeds which are certified, are considered as "quality" seeds. However, traditional farmers' variety can also be of good quality if good management practices are followed.

Though the government claims that the seed quality among farmer's variety or folk variety is low due to seed related disease and improper selection and storage, the farming community do not necessarily agree. Many think that the seed production and management that they practices are part of their traditional knowledge and effective within their local agro-climatic conditions. According to them they effectively rotate the seed and undertake time-tested ecologically sustainable practices like seed rotation, IPM, multi-cropping, storage etc. to avoid seed related disease.

The stringent quality control that is present and practiced in the industrial agriculture for mono-cropping may not be required with the ecological multi-cropping that many farmers practice, since it is naturally pest resistant. Hence many experts have stated that the definition of "quality" seed needs to be revisited especially in the era of climate change. Others highlighted that instead of seed replacement, "Seed Rotation"

should be the correct terminology which enhances *in-situ* cultivation and broadens the gene pool.

For the purpose of SRSB, a farmer-friendly "quality" definition needs to be specified so that the superior quality of common traditional varieties can also qualify as "Quality Seeds" and if required be integrated in the SRSB reserve.

The SRSB focuses on self-reliance at a regional level to overcome the challenges of climate change

Though SRSB speaks of collective self-reliance at a regional level, and achieving food security, it does not speak of self-reliance of farmers which is an essential component of achieving seed sovereignty. However, the ultimate mandate of ICSB is to bring self-reliance of farmers at a local level and if possible at individual level as the case study of DDS shows.

Taking into consideration the complexities arising out of sharing common genetic resources for the fear of bio piracy, a decentralized storage system seems to be most suited among member countries so that they have the ownership and control over their own resources. This would also ensure long term safety against natural calamities like cyclone, flood, etc. which most often is area specific. Even though a central bank is proposed under SRSB, the approach of ICSB, to make individual farmers self-reliant should also be the criteria of SRSB, so that even if the central seed reserve is affected, there would be a decentralized reserve to fall back on.

The agreement proposes member states to develop common seed certification system and standard. (Art V.2)

The criteria for certification are established in the "Indian Minimum Seed Certification Standard", 1988. However, all these processes take long time and are extremely expensive for farmers. They are not the mandate of all the ICSBs as most of them do not consider only branded or certified seeds as quality seeds. The certification system hence should be made

affordable and accessible for farmers and communities so that SRSB can take advantage of having quality seeds from ICSBs.

The linkages between the farmers' right and their participation in the decision making process, which affects their livelihood has not been adequately established in SRSB. If farmer' right and farmers' self-resilience is in the agenda of SRSB, then farmers involvement in decision making process relating to their choice of variety, pre and post disaster also needs to be taken care of. A regional seed grid also can cater to this situation effectively.

In such a case, SRSB would have to develop a farmer-friendly seed certification system while farmers should be trained wherever necessary to produce good quality seeds if farmers have lost traditional knowledge associated with seed management or if the traditional practice is not sufficient enough to cater to the changing needs that climate change can bring. However, before making such changes, the merits of existing practice should be properly evaluated and need assessment of transition should be carried out.

Art V.V of the Agreement urges member states to seek to develop harmonised procedure on transgenic varieties.

In India, the production, distribution and control of seeds is controlled by the Seed Act 1966. It does not speak anything about GM seeds; It is governed under the provisions of EPA 1986 along with Rules 1989. However, if the corporate produced climate resilient varieties are chosen against climate friendly landraces, the problems relating to corporatisation of agriculture will become predominant. However, a middle path may not be possible since there are practical problems relating to coexistence of GM and organic seed cultivation. The regulations do not have a positive record to its claim either.

SRSB should have regulatory approach to transgenic exchange, if ever required. It should have clear policy that such transgenic sharing should be under Prior Informed

Consent not only by the government but approval of the target farmers' community should be made mandatory to avoid unsuspecting farmers' field getting contaminated with transgenic varieties.

SRSB agreement does not take into account the role of farmers in making available seed varieties which are better adapted to combat the vagaries of climate change, as is evident from the study on ICSBs. There is a need to recognize the broad-based ecological wisdom of many traditional farming techniques which had brought millions of varieties of crops without causing the acute crisis that government imposed scientific industrial farming has posed.

Harmonisation of policies, laws and regulations at a regional level as proposed by the draft agreement might be helpful in addressing issues relating benefit sharing and biopiracy, since many landraces or heirloom varieties might be concurrently present in neighbouring countries. This can help prevent playing one country against the other in matters of access to biological resources and ensure better benefit sharing regionally. Member countries might have conflicting provisions as per their own domestic laws etc. on material transfer and access benefit sharing. Harmonisation of these policies might help solve such contentious issues.

The SRSB agreement needs to be consulted with a wide range of stake holders, including South Asian farmers since it would immediately impact the lives of millions of these farmers in the entire region and ultimately the rest of the people in the region. The future of our food supply requires not only genetic diversity but also diversity of decision makers. Diversity at multiple levels - genetic, crop, copping system, farming system, community and intellectual diversity leads to sustainability (Tracy, 2003).

An Effective Regional Seed Bank

Since this regional seed bank is supposed to be used only after a calamity as a relief, some of the guiding Principles for Seed Relief may also equally be effective for this purpose. Box 4 show a list of these guidelines. The initial draft was prepared by the FAO seed relief discussion group.

Integration of Community Seed Bank with Regional Seed Bank

The study tried to find the opinion of experts in different field to take into view their expectation and observation in relation to the SAARC regional seed bank. They were asked whether the traditional varieties should be taken into consideration as a possible reserve and whether the community seed banks should be integrated with the SAARC regional seed bank. Also they were asked if they perceive any benefit or threat, constrains or opportunities in relation to SAARC regional Seed bank.

Many experts questioned the need for the SAARC seed bank while posing their apprehensions relating to the threats that may be associated with the sharing of common resources while few welcomed it. They pointed out that many issues would have to be resolved and the provisions of the agreement require wider multi-stakeholder consultation before decisions are taken.

While some experts felt that the community seed banks can play a major role in meeting the mandate of the regional seed bank and they should be integrated into the proposed regional seed bank, others felt that it can cause severe problems relating to IPR and benefit sharing. However, almost everyone who chose to answer said, that in relation to harmonization of laws and policy, India should be leading the role while the

Box 4: Basic Guiding Principles for Seed Relief

1. Seed relief activities should aim to both:
   - be effective with the immediate objective of facilitating access to appropriate planting material
   - contribute to the restoration, rehabilitation, or improvement of agricultural systems in the longer term
2. Ideally, considerations of seed system sustainability should be built into seed interventions from the beginning. As a minimum, seed aid should do no harm to farming systems. Thus, emergency relief activities should support local seed system development, ideally by integrating long-term needs in the design of the project.
3. Seed relief activities should be built upon a solid understanding of all the seed systems farmers use and the role they have in supporting livelihoods. The local system is usually more important in farmers' seed security and has been shown to be quite resilient. Depending on the context, the focus in an emergency should normally be on keeping the local seed system operational. One practical problem is that seed systems are often not sufficiently understood, especially in emergency situations. Hence, there is a need for more emphasis on understanding seed systems and their role in supporting livelihoods, and on needs assessment.
4. Seed relief interventions should facilitate farmers' choices of crops and varieties. Seed relief interventions should aim to improve, or at least maintain, seed quality and aim to facilitate access to varieties that are adapted to environmental conditions and farmers' needs, including nutritional needs.
5. Monitoring and evaluation should be built into all seed relief interventions, to facilitate learning by doing and thereby to improve interventions.
6. An information system should be put in place to improve institutional learning and as a repository of information gained from cumulative experience. Such information systems should be institutionalised at national levels, to the greatest extent possible.
7. A strategy to move from the acute emergency response to a capacity building or development phase should be included in the design of the intervention.

other countries would have to formulate legislations relating to farmers right among others, and would have to catch up with the legislative maturity of India. Although this might be politically very difficult, but if the harmonisation takes place keeping Indian laws on Farmers' Rights as benchmark, then it would bring good dividends as far as internationalisation of few *sui generis* concepts like farmers' rights, prior informed consent, benefit sharing etc. while SRSB should learn from the mistakes of India to be able to avoid them.

After signing the SAARC Seed Bank Agreement, India is in the process of establishing an institutional set up for its implementation. The National Seed Corporation (NSC) has been designated to work as the National Focal Point for the purpose of the Agreement. In addition, a National Technical Committee (NTC) has been formed for over all coordination and for working out modalities of participation in the SAARC Regional Seed Bank. The NTC constitutes of representatives from Department of Agriculture and Cooperation, Indian Council of Agriculture Research, NBPGR, NSC and PPVFR Authority. It has been decided by the Indian government that all agencies (including state governments) participating in the schemes relating to Seed Bank are to apportion 1 percent of the total seed stock towards seed bank reserve for the SAARC Seed Bank.

What Did the Experts Say?

Below are the observations of some of the experts in the field.

Dr. Vanaja Ramprasad

According to Dr. Vanaja Ramprasad, traditional varieties can be integrated along with the community seed banks to the regional seed banks. However, strict regulations should be in

place to stop misappropriation and biopiracy. Such regulation can be in the form of general public licensing and Open source biology, as opposed to public domain which is much misused. Here the countries can be bind by common agreement and regulations where the common genetic resource can be used by the larger community and anybody can make improvement but nobody can avail any monopoly or IPR protection. She suggested such strict regulation should be in place among SAARC nations and implemented properly if common resources are to be shared.

Dr. Suman Sahai

Dr. Sahai said technically what cannot be accessed bilaterally cannot be accessed through regional seed bank. She stated that common traditional seeds can be saved but reserved apprehensions relating to abuse and misappropriation and revealed her concerns how to stop misuse of a traditional resource once it is out of the Indian public domain. Realisation of collective regional self-reliance of the nations will depend upon state of regional politics. Food security is not possible without food sovereignty. Having a decentralised seed bank is meaningless. Countries can have their own seed banks in different places. She, however, asserted that SAARC seed bank is a good idea

Shri VijayJardari

Shri Vijay Jardari, of BBA said that they do believe in sharing common seeds and if such sharing takes place it would/should benefit farmers across the borders. Also the sharing will be effective if the seeds are similar. However, he said that they would have to think well before they can get involved in the integration with regional seed banks.

Dr. Devender Sharma

Dr. Sharma cautioned that industry is only looking for avenues to increase their seed market in India and other countries. The regional seed bank has all the possibilities of falling prey to such an attempt, as the MNC provided seeds are the best common seeds that they sell to the neighbouring countries. They are looking for a free market to side track the quarantine parameters of the seed imports. The regional seed bank testing mandate should not be allowed to dilute domestic quarantine features of seed import.

He does not agree to the idea of community seed banks integrating into the regional seed bank structure stating that the New Policy on Seed Development 1988 permits the import of selected seeds under Open General Licence (OGL). This bypass the quarantine features on seed import leading to more pests. He cited the example of apples being transferred straight to Himachal without NBPGR involvement and its quarantine requirements.

Thus the focus on common traditional seeds and its climate resilient qualities may not be given due importance in the regional seed bank structure while company seeds would continue to play an important role. However, precaution is needed if traditional seeds along with the community seed banks are integrated into the regional bank structure if they are not common among countries, i.e. if they are not in the public domain. He said companies would be more than happy to avail these seeds bypassing SMTA and benefit sharing.

Dr. Vilas Tonapi

Dr. Tonapi does not seem to have any worry regarding regional seed bank. He feels that regional seed bank will not have any adverse effect towards the drive relating to ecological farming.

Dr. Ahish Ghosh

Dr. Ashish Ghosh said that threats relating to a number of issues including IPR, misuse, biopiracy, benefit sharing, pest and farmers' right are present with regional seed bank. He said that if benefit sharing is strictly followed, seed exchange can benefit the Indian farmers. However, sharing of common traditional seeds should take place strictly on the basis of prior informed consent, benefit sharing on mutually agreed terms and under regulatory control. He said as of now, SAARC forum has done little or nothing for agro-biodiversity or environment. He is of the opinion that SRSB seed testing procedure should be designed to cater to the qualities of farmers' variety and land races. He feels that India should play a role in SRSB only with consultation with NBA. According to him, trained staff, IT, and easy connectivity have to be ensured for mobilising better access to the SRSB resource. He urged for a detail regional consultation before decisions are taken.

Ms. Shalini Bhutani

Ms. Bhutani expressed concerns over India's role in SA regional agricultural cooperation. India has played such a role in the past in areas of agricultural cooperation in South Asia with other SA countries. It assisted Sri Lankan post conflict agriculture reconstruction and also cooperated with Bangladesh and Pakistan. However, not all of these are in the right direction as case of in India-Pakistan exchange of GM seeds. In the height of flood, in May 2010 GEAC gave clearance for transportation of Monsanto seed *Bollguard* II for large- scale field trial to Pakistan, who did not have adequate biosafety provision in place. She said that India's faulty biosafety laws are already a problem, and if Indian system is replicated, it would be extremely difficult. In a letter addressed to Indian Union Minister for Environment Jairam Ramesh, five

organisations (four Indian, one Pakistani) have urged him to reconsider the GEAC decisions because such exports amount to promoting GM seeds in the neighbouring country by India while India's own experience with Bt cotton has not been encouraging.

With the present reality of politics between the countries in South Asian region, where food system is not free of politics, she wondered how regional seed bank can operate.She expressed her concern and fear relating to the possibility of seed industry dictating the terms of use, access, and IPR. She also voiced her concern about the effect of all these on farmers' right.

Regarding the integration of community seed bank with SAARC regional seed bank, her answer was on negative due to IPR issues relating to germ plasm. She cautioned that such gene bank-corporate tie up has happened in Africa and Latin America. She cautioned that if the corporate tries to dictate the terms of seed use and access, it would be extremely dangerous for entire South Asian region.

6
Conclusion

Formation of SAARC Regional Seed Bank (SRSB) indicates that a profound need has been established in the arena of International cooperation that individual state efforts are not adequate to cope with climate change situations in the area of agriculture and food production and that collective measures are essential to address situations that are created due to climate change. Hence the SRSB principles should highlight such adaptation and mitigation instruments that can combat climate change and not aggravate it.

The SRSB will have the primary function of providing seed support to member countries after a disaster. It is supposed to act as an immediate and assured seed security and relief after a local seed system collapse. However, when a local seed system collapses, it may not be easy to restore it in a short time. In such a situation, local varieties are easily lost and replaced by relief supplied seeds. Hence it is extremely important to control the relief supplied varieties so that landraces are not wiped out.

Varietal Selection

With the present understanding that modern agriculture is vulnerable and contributes to climate change, and that ecological farming has the capacity not only to adapt but also

mitigate adverse effects due to climate change, apart from increasing yield, SRSB policies on seed selection and reserve should reflect these present needs. Thus it is imperative to choose only those varieties that are suitable for ecological farming system. The Seed Grid proposed under the National Seed Plan 2002 should also consider these requirements other than only total seed demand and availability.

The experience of "Aila" Hurricane and the later seed system recovery episode throws some new light on what should be SRSB's future guidelines relating to varietal selection. The case study clearly shows, no modern varieties can survive the harsh ecological marginal conditions that are created by natural disasters like "Aila" and that cultivation of traditional landraces may be the only solution to recover the local seed system.

Thus apart from looking for commonalities, the field trials should take into consideration the ability of varieties to withstand abiotic stress that might be the reality after disaster and its ability to adapt to changing climatic conditions that can follow. With climate change conditions aggravating, more area would probably be classified as marginal lands in future demanding greater use of the adapted landraces. Thus it is important to broaden the seed basket so that SA as a region has a better capacity to combat these adverse situations.

Priority should thus be given to those traditional heirloom varieties that are stress tolerant[106] and do not cause biosafety concern if they are common among member countries. Hence SRSB need to redefine "quality seed" (not only in the context of climate change but considering the bigger issue of biosafety and food security for entire south Asia) while harmonising policies so that superior landraces can qualify in the list.

Important to note that good and bad seed can be found in both farmers' own saved seed and so-called "certified seed." Seed may be of good quality when produced but be poor once

it reaches the farmer, if there is inadequate attention to conditions during storage and transport. Also Distance may be a determining criterion in relation to seed health. Box 5 shows some of the potential weakness of direct seed distribution. These needs to be attended, while formulating SRSB guidelines.

Thus SRSB should take into consideration few criteria while developing its seed reserve: The varieties apart from being common, i.e. in public domain

Box 5: Direct Distribution of Seed: Potential Weaknesses

- May undermine local seed system and long-term system resilience
- May erode local diversity (crop or variety)
- Need to have outside control of quality because farmers have no clear idea of what they are given
- May not benefit most needy; targeting can be difficult and is potentially divisive
- Suitable varieties of acceptable quality are not always available
- Potential for donors/governments to push varieties/seed of special-interest groups and for special-interest groups—such as particular seed companies; potential for corruption

Contexts:

- Where seed economy is predominately formal (introduced crops; improved seed and varieties regularly provided from outside farming system)
- Where there is total crop failure (and seed not available) e.g., drought/disease
- Major emergences (where large numbers of people are affected)
- Where there is long-term displacement of populations
- Where insecurity prevents operation of markets
- Where there is a tradition of seed giving (that is, where people are used to producing their own seed or exchanging it)

Source: FAO relief seed discussion group synthesis, May 2003.

- Must be adapted varieties
- Should be able to give good yield under stressful condition - Should be stress resilient according to specific need of farmer
- Should be ideally pest or disease resistant
- Should be tested for germination and physical purity by independent qualified experts for specific sub-optimal or marginal condition

May be a traditional or newly introduced variety, depending on farmers' needs and capacity to "experiment", the ecological benefits of introducing these varieties, and whether or not release of these varieties can increase the local seed system resiliency and ensure or enhance biosafety The quality of these varieties should be according to the requirement specified by the farming communities and not according to the standards of private parties or ruling governments to avoid systematic phasing out of landraces in the name of quality control.

Corporates and Technology

The role and involvement of private sector, especially the MNCs and the application of GM or any risky technology needs very careful monitoring and regulation. SRSB should try to evaluate whether it or any of its member countries have the capability to undertake such an activity, which requires not only sophisticated technology support but also scientifically skilled manpower and ideally a corruption free environment. In any case, the vendors should not be allowed to become the regulator as it has been evident in India.

Release of transgenic in India has led to tremendous controversies in relation to biosafety encompassing socio-economic and health related issues. There is a vast majority of scientists who warn that these varieties can cause ecological

disaster. These warnings have continuously being ignored by many governments pushing transgenic varieties against the will of the people to satisfy corporate interest.

With the past record and insufficient monitoring, evaluating and regulatory capacity of the Indian GM regulatory authority and lack of available testing facilities; the ability of the MNCs to push their products through unaccountable regulatory authorities to different countries; and with various reports of corruptions and nexus among government officials and seed companies, especially MNCs, in India and many other countries (e.g.-some African countries), as a precautionary principle, transgenic varieties should be strictly excluded from SRSB reserve so that these varieties are neither released nor passed on to the unsuspecting farmers in times of distress, till there is consensus in future among scientific community that these varieties do not pose any threat relating to biosafety.

The Parliamentary Committee Report notes that "India today is not in the situation of desperation that was obtained before the first green-revolution. Hence any short-cuts or desperate measures are not required to be experimented with, while it urged for simpler, safer, easier and biodiversity friendly available alternatives.

In matters relating to application of biotechnology, especially GM technology, scientists who works on other areas of science, like ecology, evolution, conservation, ethno-biology, health etc. should also be consulted apart from taking the views of biotechnologists, geneticists or agriculture scientists, since the decisions relating to seed use can affect many areas. Many experts during interaction have openly expressed their concern that SRSB agreement does not speak anything about sustainable agriculture which is at the core of climate change adaptation and mitigation and is susceptible to falling prey to corporate interest. SRSB should be vigilant that seed selection, reserve and release are according to the need of demanding

communities and not because of corporate interest and involvement.

Varietal Release and Use

Seed development takes long time. The seeds that we are using today had been produced 15 years back. It is important that actions are taken now. Stress tolerant traditional folk and farmer varieties are already present, and can be used readily if mainstream policies promote them. Providing seeds to the farmers from external source and disintegrating farmers from seed production greatly increase their vulnerability and decrease their self-reliance. Thus SRSB should take adequate precautions that the varietal release post disaster should give priority to non-hybrid varieties like common heirloom varieties or folk varieties, which are farmers' variety, and can be saved and reused. In the absence of any such common traditional varieties, hybrids might be considered which are bred in the public sector as against those bred in private sector.

Moreover, germination and adaptive capacity of such hybrids under specific situation should be evaluated before they are selected for storage or release. SRSB should take all efforts to ensure that its intervention in dealing with "acute seed insecurity" due to adverse climatic condition does not lead to "chronic seed insecurity".[107] It is also important that the quarantine and domestic seed testing features of Indian or any other country's seed import policy should not be diluted as under Open General Licence (OGL) to make way for entry of seeds released by SRSB.

Further research is needed to develop mechanisms for integration of such landraces with desirable traits which are country specific (i.e. not common among countries or not in public domain) with SRSB so that they can be made available to population under distress while obviating their chance of

misappropriation. Dr. Ramprasad suggested General Public Licensing (GPL) and Open Source Biology (OSB),[108] as a new but effective legal instrument to arrest misappropriation. However, Dr. Sharma cautioned that integration of such traditional varieties which are not common among countries can give companies opportunities to bypass Standard Material Transfer Agreement (SMTA) and benefit sharing. Here further research is needed to understand the long term effectiveness of GPL on OSB and its implications for SRSB.

Farmers Involvement

Taking climate change into account, one of the most important requirements for adaptation would be farmers' knowledge, in negotiating complex agro-ecosystems. As a philosophical approach, organic farming has always laid thrust on farmers' skills, knowledge, innovation, horizontal sharing, observations and intuition etc. Thus all SRSB guidelines for seed mobilisation should be undertaken with wider SA farmers' consultation and participation, something which does not find any mention in the present agreement.

Revival of Long Dormant Varieties

There are thousands of useful landrace that have moved out of the grip of the farmers to different gene banks, both national and international, in the last 50 years. Many displaced varieties of crops in gene banks revered for their special characteristics have not been adequately studied not have they made a comeback to the ultimate beneficiaries they were saved for the farmers. Hence, there is a need to ensure that these targeted landraces that have vanished from the farmers' field but are in demand by the farmers can be released, multiplied, distributed and made available to the farmers without changing

their genetic makeup. This can greatly enhance the biogenetic diversity of crops which is itself a guarantee against vagaries of climate change. The NARS and agricultural universities can play an important role in adopting effective techniques in removing dormancy in the long-stored dormant varieties. For this, governments should provide all possible supports to national gene banks to carry out the trait evaluation urgently. Some of these heirloom varieties can also be common varieties among nations increasing the varietal options for SRSB.

The Standard Material Transfer Agreement (SMTA) of the International Treaty of Plant Genetic Resources (ITPGR) which details the legal norms for transfer of genetic resources states in Art 6 that "the Material (germ plasm) shall be used or conserved only for the purposes of research, breeding and training for food and agriculture." Thus it states that such transfer should be only for "non-commercial purpose".

The SMTA, hence effectively prevents any recipient including famers from using materials acquired under the SMTA for direct use in production systems as production system is "for-commercial purpose". The SRSB can play a pivotal role in enhancing the collective strengths of the SA countries in efforts needed to release the targeted varieties *to donor countries* for cultivation from international gene banks subject to the need of the donor country.

However, large scale distribution of germ plasm can come under the control of private seed companies who can incorporate those materials into their breeding programs. This can negate the benefit sharing provisions in the ITPGRFA. Some biopiracy of this kind is already thought to have occurred in the past between the public and private sector. More research is needed to find if such release can be made without affecting the benefit sharing provisions and also how it would affect the issues regarding farmers' right, food security, IPR on traditional varieties and associated traditional knowledge and ABS.

SRSB: Threats and Possibilities

Some experts have expressed their reservation relating to the complexities arising out of sharing common genetic resources for the fear of bio-piracy. It is not clear to many, how misappropriation of resources or knowledge can be arrested in relation to such sharing. Again the effectiveness of general public licensing and Open source biology, as an effective legal instrument to arrest misappropriation should be studied in detail.

Some experts on the other hand suggested decentralized storage system as opposed to a central storage to be most suitable among member countries so that they have the ownership and control over their own resources. This would also ensure long-term safety against natural calamities like cyclone, flood, etc. which most often is area specific. Here also, more research is needed. The issues governing IPR and ABS might be governed by the legislation of the providing country, as mentioned in the MTA. It seems to be also suitable for a decentralised banking system.

If however, a centralised bank is proposed, efforts should be taken to choose an area which might have least impact in terms of volatile weather condition in future. A backup system in another country may also be important to avoid total loss of varieties in case the bank comes under severe climatic catastrophe.

However, many suggested that harmonisation of policies, laws and regulations at a regional level as proposed by the Agreement might be helpful in addressing issues relating BS and biopiracy, since many landraces or heirloom varieties might be concurrently present in neighbouring countries. This can help prevent playing one country against the other in matters of access to biological resources and traditional knowledge and ensure better benefit sharing regionally. It is felt by most experts that the other countries would have to formulate their

laws on Farmers' Right and other seed related provision that India has already done to achieve the legal maturity of Indians legislative system.

The present Indian agricultural model of linear growth has devastated the ecology of the country and depleted its natural resource on which agricultural productivity depends. Renewal of soil fertility is fundamental to increasing agricultural productivity. This cannot be achieved through the present unsustainable model. Moreover, planned phasing out of traditional seeds and increased corporatisation of agriculture has ravaged the lives and livelihood of many Indian farmers. If SRSB adopts the Indian model of agriculture which depends greatly on technology to solve the crisis created as a result of its wrong policy measures, it can greatly increase the vulnerability of South Asian farmers.

The governments would have to take a decision whether to take the linear path of Growth, based on GDP, which does not consider ecological or greater human benefit or to take the cyclical path through the roadmap of ecologically sustainable farming. It is more important to place trust on real ecological assets that are still present than companies who can diversify any time.

India's Role

India, with one of the largest National Agricultural Research System in the world, and enough documented ecologically sound methods of cultivation in varied agro-climatic zones has the potential, and advantage to play an important role as a seed hub for production of quality seeds in the region. However, Dr. Sharma pointed out that India should rather try to take the role of a teacher and guide, passing on technology while evaluating and building up regional capacity. All the countries in the region should try to become self-

sufficient and India should help in this endeavour instead of trying to control.

Finally, it is imperative to have a wider stakeholder consultation especially with SA farming communities so the operational guidelines of SRSB are bottom-up, participatory, inclusive, equitable and fair. SRSB has limited scope of determining domestic policies but it has significant potential to direct regional agriculture policies in the right direction.

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Endnotes

1 http://www.thehindu.com/opinion/columns/sainath/article3595351.ece

2 Sangar, Abrol & Raina, , http://www.nistads.res.in/indiasnt2010-11/T5_Rural/Seed%20sector%20%E2%80%93%20R&D%20and%20policy%20support.pdf

3 http://www.slideserve.com/mabli/promotion-of-quality-seed-through-various-schemes

4 "structure of seed sector" http://seednet.gov.in/Material/Structure.pdf

5 http://agricoop.nic.in/SIA111213312.pdf

6 The problem lies in the definition of "quality seed" as understood by the main steam agriculture bodies. The major reason for this have been the past idea among the NARS that only varieties produced in the laboratory under specific conditions in the formal sector can qualify as quality seeds. However, in the last few years this ideology among the NARS has changed and the informal seed system is gaining importance while policy initiatives are formulated to support informal sector.

7 Consumption of Fertiliser, has increased from 69.84 Kg / Ha in 1991-92 to 144.14 Kg / Ha in 2011-1012 and Consumption of Pesticides, though decreased from 72.13 Th Tonnes in 1991-92 to 39.77 Th Tonnes in 2005-06 again increased to 55.54 Th Tonnes in 2010-11; Source: Directorate of Economics and Statistics, DAC

8 State of Indian Agriculture; http://agricoop.nic.in/SIA111213312.pdf

9 Promotion Of Quality Seed Through Various Schemes"; http://www.slideserve.com/mabli/promotion-of-quality-seed-through-various-schemes

10 However, oilseed is imported in bulk through Open General license (OGL) for crushing and not for sowing to meet the shortfall in demand in edible oil and avail domestic idle crushing capacity. There was an umbrella ban on the import of oilseed under OGL due to belief that imports may also bring in some disease spreading pests that could disturb/destroy the local crop of oilseeds. After Pest Risk Analysis (PRA) in respect of soya bean, sunflower seed and rapeseed had been carried out, imports of these oilseeds had been recommended (Shah,99).

11 http://www.forumue.de/fileadmin/userupload/publikationen/le_2008_saatgutrecht_engl.pdf

12 Novel means the variety was not sold or disposed by the breeder for commercial exploitation in India earlier than one year or outside

India, earlier than four years before the date of filing of application for registration. Distinct means the variety is clearly distinguishable by at least one essential characteristic from any other variety whose existence is known in any country at the time of filing of application Uniformity means the variety is sufficiently uniform for essential characteristics other than the variation that may be expected within the variety due to its mode of reproduction . Stability means the variety remain unchanged for its essential characteristics even after repeated propagation

13 Senior scientists of the ICAR system and top bureaucrats of the Agriculture Ministry were the principal opponents of the farmers' right to sell seed, drafting legislation countless time, as governments changed, that allowed the farmer the right to save, sow, exchange - but not sell seed. It took the intervention of two Parliamentary Committees and strong civil society action lasting almost seven years, to get past their blockade and get a reasonable Farmers' Rights in place. According to Dr. Suman (Sahai, 2008), if the farmer can be stopped by law from selling seed (and by implication, producing seed), the market automatically becomes available to the next alternative, the MNC. Strong Farmers' Rights keeps the farming community alive as viable competitors and an effective deterrent to a takeover of the seed market by the corporate sector. Control over seed production is central to self-reliance in food. Food sovereignty and food security is in the forefront of national security. A nation that does not produce its own seed and its own food cannot be a secure nation

14 (http://www.cpiml.org/liberation/year_2011/august_11/policy_watch.html)

15 In the last few years, farmers and many state governments have been challenging exorbitant pricing and royalty by companies like Monsanto. The AP Government had to slash the price of Bt-cotton seed by more than half of what Monsanto had fixed. Seed companies have gone to court challenging the right of state government to regulate prices and royalty.

16 Since the Bill failed to define the required statutory powers to the State Governments, they are unable to control the prices to save the farmers from the clutches of seed companies. The incident in the Andhra Pradesh with regards to large scale cotton seeds failure in Warangal District (in 2005) is a classic example. The A.P. Government in spite of failure of cotton seed, it is unable to do anything to the suffered farmers since no statutory powers are provided with the State Government. Further, when the A.P. Government reduces the seed prices of Bt. Cotton Seeds, the seed producers approached the Delhi High Court questioning the power

of the Government. In 2010, Monsanto filed case in the A.P. High Court questioning the action of the Government in reducing the royalty. These instances clarifies that the State Governments are in helpless situation to control the prices and royalties and also the action of the seed companies and producers.

17 (http://www.cpiml.org/liberation/year_2011/august_11/policy_watch.html). Also see footnote 15 for similar allegations as far as PPVFR is concerned.

18 However, the recent Parliament Committee Report indicates the rudimentary existence of NBA compared to the mammoth task of ensuring India's interest in context of Nagoya Protocol and benefit sharing goes to show the (lack of) seriousness of the government interest towards this very important responsibility. (PCR pg 233)

19 Subsidies in chemical fertilizer, pesticide and water is considered as the perverse subsidies by some scientists. However, there is no subsidy for organic fertilizer and pesticides in India.

20 Black marketing of Bt cotton seeds has become a routine issue during the sowing season in the past few years. At many of the places farmers have to pay as much as Rs 2000- 3000 for a 450 g Bt cotton seed packet with a printed price of Rs 700- 900. The seed companies have also taken advanced booking amounts from the dealers and, in turn, dealers also get bookings from farmers as early as January for ensuring the required seed quantity. Inter-state black marketing is in operation across the border districts of Andhra, Maharashtra and Karnataka at very large scale. The black marketers earn booty within a few days, almost equalling to their year round income.

21 In reality there is excess production in many crops like wheat and reports suggest that huge amount of food is wasted in absence of proper storage facility. India had been exporting wheat as animal feed for a lower price than the domestic price to get rid of the excess production. As of July 1, 50 million tonnes (mt) of wheat is languishing in public godowns, against buffer/reserve norms of 20 mt. The enormity of the task of evacuating Government-held stocks via export has, therefore, multiplied. (http://www.hellenicshippingnews.com/News.aspx?ElementId=f286ef3b-18a8-4f0b-8ead-89890fa0015a)

22 Under the NFSM the hybrid rice seeds recommended for use in Odisha are: KRH-2, PA 6201, PA 6444, PRH-122 (Ganga), Suruchi, Raj Laxmi 1, Ajay, JKRH and Naveen.

23 Jharkhand's Draft agricultural policy, 2011 and approved State plan for Agriculture, Tripura (2009 -2010) talks of giving subsidy for hybrid paddy.

24 Monsanto's hybrid maize expansion programme called "Project Sunshine" is seeking to bring about a "Yellow Revolution" in tribal areas of India and is being implemented under various names in 8 states incliding Gujarat, Orissa and Rajasthan. Many questioned why the State government is using taxpayers' money to provide ready market for corporations like Monsanto even when an organic policy is in place in many states." There have been consistent protests against similar projects in Orissa (Project Golden Days), Gujarat (Project Sunshine) and Rajasthan (Project Golden Rays). However, many states have decided to discontinue this project after initial year.

25 Monsanto's Dekalb hybrid maize seeds are being distributed in the State of Gujrat with 50 per cent subsidy from the Rashtiya Krishi Vikas Yojana fund, while the Tribal Welfare Department is subsidising another 40 per cent.

26 The seed supply that the agriculture universities are handing over to corporates are not the property of the state, nor of the corporates. They are the common property of farming communities. However, Monsanto's now controls 95% of the cotton seed market. It controls 60 Indian seed companies through licensing arrangements. It pushed the price of seed from Rs. 7/kg to Rs. 3600/kg, with nearly half being royalty payments. It was extracting Rs. 1000 crore per annum as royalty from Indian farmers before Andhra Pradesh sued Monsanto in the MRTP commission.

27 Biotechnology Regulatory Authority of India (BRAI) Bill, is supposed to replace the GEAC. If (BRAI) is passed, it would have authority to curtail public debate, criminalize protest of GM crops and restrict the state governments' role and decision making in matters relating to biotechnology like field trials. (See: http://pib.nic.in/newsite/erelease.aspx?relid=75820).

28 The cost of inputs in agriculture is increasing day-by-day; land holdings are simultaneously decreasing making agriculture unviable for majority of farmers. Baring some big farmers, almost all are caught in the debt trap and are unable to repay their loans. The land is mortgaged with the moneylenders, who some times use hard tactics for recovery. Due to their inability to pay back the huge debts, many farmers have committed suicide in Punjab, Maharashtra and Andhra Pradesh and now tribal areas of Adilabad district . Interestingly there had been few suicide or no suicide in places which practices organic farming.

29 Some reports indicate that even though there was reduced pesticide usage initially, pests are developing resistance to Bt and urging development of new of Bollgard II, and other non-targeted pests, like sucking pests are increasing calling for increase in pesticide use.

30 The risks of insecticide traits passing to weeds have been a major cause of concern among many scientists.

31 There isn't any piece of land in Punjab where crops can be grown without inorganic synthetic fertilizers and pesticides. Virtually the total land of Punjab has turned barren because it has lost its natural nutrient pool. (http://www.countercurrents.org/en-dutt230306.htm)

32 Incidences of Cancer among farming community in the successful green revolution belt of Panjab and Haryana has risen considerably due to indiscriminate pesticide use (Singh 2008).
In a small farm town in Punjab called Bathinda, Train No. 399 which stops at the station every night at around 9:30 is called the "Cancer train", a name it earned over the last decade as it has daily ferried people with cancer from Bathinda to a charitable cancer hospital in Bikaner for cheap treatment of the deadly disease. On any given night, there are about 70 to 100 cancer patients.The cancer-affected on this train are small farmers from the southern districts of Punjab: Bathinda, Faridkot, Moga, Muktsar, Ferozepur, Sangrur and Mansa. Known together as the Malwa region, farmers and families here are grappling with cancer and health problems that have crept into their homes through the backdoor as the farmers of India's grain bowl fed the nation (SenGupta,2011)

33 Maharashtra remains the worst single State for farm suicides for over a decade now. The total number of farmers who have taken their own lives in Maharashtra since 1995 is closing in on 54,000. Of these 33,752 have occurred in nine years since 2003, at an annual average of 3,750. The figure for 1995-2002 was 20,066 at an average of 2,508. Significantly, the rise is occurring even as the farm population is shrinking a fact broadly true across the country. And more so in Maharashtra which has been urbanising more rapidly than most. The rising-suicides: shrinking-population equation suggests a major intensification of the pressures on the community. (Sainath, 2012). Seven years after Bt came in there have been an increase of 60% in the average annual number of suicides of farmers in Maharashtra as per NCRB records (pg 308, PCR)

34 Recent study shows that loss of biodiversity due to species extinction which also include loss of crop diversity can have major impact in reducing nature's ability to produce goods and services and can have adverse effect on stabilizing climate change (Bradley Cardinal, University of Michigan). A wide genetic base crop provides "built-in insurance " (Harlan 1992) against crop pests, pathogens and climate vagaries and best bet for sustainable food production

35 Unlike scientists, a farmers' vision of seed production is more holistic. It takes into consideration many other parameters apart from yield. Traditional farming meant that the farmer donned the

mantle of several scientists rolled into one: a botanist, a zoologist,a veterinarian, a soil scientist, a climatologist, and so on.

36 A World Wildlife Fund (WWF)-India survey, conducted in 1994 in six districts of southern West Bengal, recorded 137 traditional rice varieties still surviving in marginal farms (Deb, 1995).

37 On the other hand, when yield is calculated as production of grains per unit of inputs of water and agrochemicals, most of the local landraces have better yields than any HYVs (Cleveland et al., 1993; Deb, 1995, 2000). In particular, rice grain yields may be objectively measured in terms of output per unit of nitrogen fertilizer input. By this definition, the yields of most local rice landraces seem to be spectacularly higher when compared to HYVs. For example in Bengal, rice varieties Punjab-sal, Bahupuri, Juqal, Kabiraj-sal and Darka sal have a mean panicle weight of 4 g or ,more; Punjab-sal, Tulsi mukul and Kabiraj also have high particle density (4.5 g weight); Tulsi mukul and KabirajSal grown in farms with optimal soil nutrients indicate that the yields of such native rice varieties can match those of many HYVs

38 Rice varieties of Bengal- Caseworm resistant:Gangajal, Sharita and Balam; Brown Plant Hopper (BPH) resistant: Dahar nugna; Stem borer resistant: Khudi Khasa and Sindur mukhiresistant) Resistant to the Tungro virus (Rajukkannu, 2009)

40 Kelas and Bhutmuri rice varietiesin the Medinipur District of West Bengal are the best examples of such upland rice varieties that need no irrigation during cultivation. Kappakar rice variety which is grown in dry land areas, and can survive and produce yields even under extreme dry conditions where no other rice cultivars can survive While Jabra, Lakshmi dighal, and Pantara can grow up to 18 inches above water in seasonal wetlands (Rajukkannu, 2009).

41 Bengal boasts of at least 16 indigenous varieties that are grown by indigenous farmers to produce fragrant rice for special culinary purposes. These include: Badsha bhog, Bhim Sal, Cheena Kamini, Chini atap, Chhoto nunniya, DanaGuri, Dar-Sal, Dehradun Gandheswari, Gandha malati, Gandheswari, Kanthali Chamba, Lilabati, Mohan bhog, Narasimha Jata, Subasita, Swaranakanthi, Rani Kajal, Tulsi manjari, etc. In addition, non-local varieties like Dehradun-bas and Basmatiare grown in West Bengal while Tulsa and Garam masala can be found in Maharashtra and Jagannathbhog in Orissa(Rajukkannu, 2009)

42 Rice varieties of Tamil Nadu,W est Bengal and Orrissa:Bhat moori cures anaemia and enhances blood circulation in women after childbirth. The rice contains folic acid, which helps in the assimilation of dietary iron. Parmai-sal has special nutritional value

for strength. Kabiraj-sal is fed to convalescing patients to quicken recovery (used by village doctors). (Rajukkannu, 2009)

43 There were many scientific and sustainable methods of cultivation practiced in India before the advent of green revolution which suffered setback due to the monoculture practice. For example, Baranaja system of traditional cultivation. Baranaja refers to inter-cropping of twelve (or sometimes more) crops. Under Baranaja a combination of cereals, lentils, vegetables, creepers, and root vegetables is grown. The twelve crops are such that they can grow in harmony with each other.

44 Many examples are available, like Kabiraj-sal is believed to provide sufficient nutrition to people who cannot digest a typical protein diet. This rice contains a high amount of labile starch, a fraction of which yields important amino acids (the building blocks of proteins). The pink starch of Kelas and Bhut moori is an essential nutrient for tribal women during and after pregnancy, because the tribal people believe it heals their anemia. Preliminary studies indicate a high content of iron and folic acid in the grains of these rice varieties. Local food cultures hold Dudh-sar and Parmai-sal in high esteem because they are "good for children's brains." While rigorous experimental studies are required to verify such folk beliefs, the prevalent institutional mindset is to discard folk knowledge as superstitious, even before testing it– until, that is, the same properties are patented by a multinational corporation. (Deb, 2009)

45 The Beej Bachao Andolan has prepared a comparison chart of high-yielding varieties of seeds and traditional seeds to clear the confusion among farmers. Gorakhpuri Paddy of Tehri takes 95 days to harvest and yields 35-40 quintals per hectare.Dr. Debal Deb states that there is a plethora of folk varieties/ landraces …perfectly adapted to marginal farm conditions and environmental vagaries …evince amazing yield performance on farm fields…yet unachievable by any modern variety on two counts, a) zero input of agrochemicals ; b) long term yield stability.

The mean yield of numerous lowland landraces exceeds the mean yield of the best modern HYVs. For example Bahurupi's (rice variety), average yield generally exceeds 6t/ha in southern west Bengal. With adequate rainfall (but no irrigation), its yield can exceed the Chinese average of 6.3 t/ha- after subtracting the loss due to sterile (unfilled) grains. Many other can outperform modern high input-responsive varieties in similar environmental conditions. Baigana Manija of Odisha gives 5.6 t/ha, which is substancially greater than so called HYVs tested in odisha under identical edaphoclimatic conditions in Basudha farm. Dhankadi Deepa, an

upland-adapted landrace from Tamil Nadu can yield 5.10 t/ha if rain is generous.

46 In 2004 a Hybrid Rice variety developed by the company Mahyco named Suruchi was released by the State Variety Release Committee. Mahyco's Suruchi is being promoted under NFSM. This is not happening with superior traditional varieties. (Bhutani 2011)

47 The Government of India's ambition currently centres around making hybrid rice a success in the country following the 'Chinese model' to increase productivity of rice by bridging yield gaps. It is being promoted through various government programmes viz. National Food Security Mission (NFSM), Bringing 'Green Revolution' to Eastern India (BGREI), System of Rice Intensification (SRI) etc. and crores of rupees are being allocated for each programme. (Bhutani, 2011)

48 While the food crisis in the rural areas goes up it makes labour move out of in search of both work and food. States such as TN and AP are experiencing increased SRR in hybrid rice due to labour shortage. More hands on the farm are needed to separate, package, process and dry seeds for the next planting season. Therefore, wealthy farmers simply prefer to buy hybrid seeds (Bhutani 2011)

49 According to Hope Shand "in the face of climate chaos and a deepening world food crisis, the Gene Giants are gearing up for a PR offensive to re-brand themselves as climate saviours and engaged in climate change profiteering. The focus on so-called climate-ready genes is a golden opportunity to push genetically engineered crops as a silver bullet solution to climate change. But patented techno-fix seeds will not provide the adaptation strategies that small farmers need to cope with climate change. The emphasis on genetically engineered, so-called 'climate-ready' crops will divert resources from affordable, decentralized approaches to cope with changing climate. Patents will concentrate corporate power, drive up costs, inhibit independent research and further undermine the rights of farmers to save and exchange seeds". (ETC Group, 2008)

50 Traditional farmers grow some rice varieties for their specific adaptations to the local environmental and soil conditions. In eastern India, Rangi, Kaya, Kelas, and Noichi are grown on rainfed dryland farms, where no irrigation facility exists. Late or scanty rainfall does not affect the yield stability of these varieties. In flood-prone districts, remarkable culm elongation is seen in Sada Jabra, Lakshmi-dighal, Banya-sal, Jal kamini, and Kumrogorh varieties, which tend to grow taller with the level of water inundating the field. The deepest water that Lakshmi-dighal can tolerate was recorded to be six meters. Getu, Matla, and Talmugur can withstand up to 30 ppt (parts per thousand) of salinity, while Harma nona is

moderately saline tolerant. No modern rice variety can survive in these marginal environmental conditions (Deb, 2009). Navdanya and many other NGOs have example of and has amassed many stress tolerant varieties of crops and have distributed to farmers after natural disasters (See Annexure 9).

51 Co-existence of GM crops and organic crops may not be feasible, since gene transfer can take place which will lead to genetic contamination of the organic crops. This can negatively impact the organic export potential of the country. Bt brinjal contamination has been reported from Matti, Gujrat. Gulla,- a round and aromatic variety of brinjal, which has been given Geographical Indication tag, is Matti's only crop that has fetched the villagers their livelihood. The proliferation of Bt brinjal around the village has led to a fall in yield of this exotic crop, grown in about 750 acres. The agriculture department had carried out surveillance and awareness campaign in the area against bio-contamination. Local agricultural experts say the damage to the crop by way of bio-contamination appears to be grave with patches of gulla farms showing signs of degeneration for the second crop. (Raghuram, 2012). Ayurvedic practitioners have also reported adverse effect of Bt on medicinal plant cultivation in India. Traders feel that GM contamination can severely damage India's agricultural export potential especially in rice

52 Also see Parliament Committee Report at http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf and Supreme Court Technical Expert Committee Interim report at http://indiagminfo.org/wp-content/uploads/2012/10/SC-TEC-interim-report-oct17th-2012-GMO-PIL.pdf

53 In an unprecedented, though much delayed, decision, the National Biodiversity Authority of India (NBA) had decided to initiate legal action against M/s Mahyco/Monsanto and their collaborators for accessing and using local brinjal varieties in developing Bt Brinjal without prior approval of the competent authorities. The official resolution giving effect to this decision was taken in the NBA's meeting of 20th June 2011

54 BT Cotton and Beyond, An Afro Asian Conclave at National Institute of Rural Development [NIRD], Hyderabad, January 16, 2012, http://www.ddsindia.com/www/pdf/B&B%20Report.pdf. Even the Chairman of GEAC admitted being under pressure from his GEAC colleagues, Industry and minister for approval of Bt brinjal even when the required tests were not carried out . See Parliamentary Committee report , Dr. Bhargava, Pg 40 and Pg. 72(27.79) http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf

55 According to PCR (pg.376)... "Most of the 376 Ministries, Departments and other agencies of the Government who have to shoulder major responsibility, when the transgenic agricultural crops come into the system, are not at all ready to optimally perform their designated roles. … FSSAI, which has to play the most important role in the scheme of things along with NBA is still grappling with teething troubles and is not in a position to deliver at least for coming years. NBA and PPV & FRA, …, are virtually non-existent. In such a scenario how the Government intends to deal with the effects of cultivation of transgenic crops outside containment defies logic…. The entire system, therefore, reflects a pro-DBT/pro-industry tilt which is best avoided" (http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf)

56 Many GEAC members, who are expected to take objective decisions, are themselves developers of GM crops and members of bodies sponsored by the biotech industry. A media advisory from the Centre for Sustainable Agriculture noted many conflicts of interest. For details see (http://www.indiatogether.org/2007/aug/agr-geac.htm).

57 Under the 1989 Rules of the Environment Protection Act, the GEAC is the only body which is authorised to permit trials of GM crops. In 1998, the states governments of Andhra Pradesh and Karnataka protested against illegal Bt cotton trials being carried out by Mahyco-Monsanto. These trials were permitted by the Department of Biotechnology (DBT), which is a violation of the 1989 Rules. Instead of disciplining the DBT, the GEAC declared that these trials are meant for 'experimentation and research' and therefore the permission was valid! The regulator has failed to control the illegal proliferation of Bt Cotton across the country since 2001. It has itself violated the Environment Protection Act by allowing trials in states where State Biotechnology Coordination Committees and District Level Biotechnology Committees have not been formed. The State governments and farmers are not informed of these trials. In fact, the GEAC itself is not aware of the locations of all the trials and, naturally, monitoring was said to be inadequate. (Goswami, 2007) (http://www.indiatogether.org/2007/aug/agr-geac.htm)

58 More than 12,000 sheep were killed in 2006 in Andhra Pradesh after grazing in Bt Cotton field. An alarmed Director of the State's Animal Husbandry Department urged the GEAC to carry out rigorous biosafety tests and also asked farmers not to graze their animals in Bt cotton fields. Yet the GEAC brushed aside these concerns. In Gujarat, there is also a report that the soil after it has been used for Bt. Cotton for several years becomes incapable of sustaining any other crop possibly because of dehydration and loss

of micro-nutrients. Parliamentary Committee report, Pg 38,(http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf) Prior to this, cotton workers in Madhya Pradesh had reported allergic reactions to Bt cotton. Bt Cotton farmers in Punjab have also reported skin allergies among workers engaged in harvesting. None of these have been investigated by the GEAC. (Goswami, 2007) (http://www.indiatogether.org/2007/aug/agr-geac.htm)

59 See Supreme Court TEC report on GM crops (http://indiagminfo.org/wp-content/uploads/2012/10/SC-TEC-interim-report-oct17th-2012-GMO-PIL.pdf), India does not have independent GM testing labs for carrying out tests objectively. Parliamentary Committee report on "Cultivation of Genetically Modified Food Crops-Prospects and Effects" (http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf) and Also See (http://www.gmwatch.org/component/content/article/14333)

GEAC had been accused of relying on the data produced by the biotech companies instead of independent research by government agencies. This data is treated as proprietary information and is neither peer-reviewed not put in the public domain for scientists to evaluate. Failure of the regulatory mechanism has evoked strong reactions from some states. The Agriculture Ministers of Kerala and Orissa have announced that they will not allow any GM trials in their states. Farmers' movements have uprooted and burnt fields of GM rice in Haryana and Tamil Nadu for violation of GEAC norms. Officials from the states of Uttar Pradesh, Chattisgarh, and West Bengal have written to the Centre pointing out irregularities during field trials on GM brinjal, okra and rice. Yet the GEAC has ignored all calls to exercise caution. While hearing an appeal on safety of GM products, the Supreme Court, through its order on 8 May 2007, clearly upheld the importance of biosafety. However, the GEAC during its subsequent meetings has deliberately misinterpreted the decision and approved fresh field trials. (Goswami, 2007). (http://www.indiatogether.org/2007/aug/agr-geac.htm)

60 http://indiagminfo.org/wp-content/uploads/2012/10/SC-TEC-interim-report-oct17th-2012-GMO-PIL.pdf

61 However, the import guidelines for the genetically modified products issued by the Directorate General of Foreign Trade very clearly stipulate that such imports will be allowed only with the approval of GEAC. According to PCR, there are no checks as far as import of GMOs are concerned. The violation of these provisions have not been reported due to absence of surveillance mechanism. (PCR, Pg. 252)

62 However others reported that the Red Lady variety of Papaya seed imported from Taiwan have a great taste, needs little maintenance, gives good yield and has longer shelf life, and hence bringing more profit.

63 The issue of increase in import of Chinese apples was flagged recently in the Parliament. According to food policy analyst, Devinder Sharma apples from Himachal are being edged out by the Chinese varieties. What's worse, these apples are not even quarantined. Centre for Agricultural Bioscience International (CABI) has studies to show that these apples can have pests and may lead to diseases.http://articles.timesofindia.indiatimes.com/2012-01-30/delhi/31005153_1_apple-growers-shaanxi-varieties

64 Indian apples fetch a piddling amount since the Chinese varieties are available in bulk. Apples from Himachal Pradesh and Kashmir are more than enough for the domestic market," said the general secretary, Apple Merchants Association, and president, Fruit and Vegetable Traders' Chamber, Metharam Kriplani. With their entire produce getting sold out at cheap prices, the apple growers of Himachal Pradesh and Kashmir are hard hit. The surfeit of apples from the US also eats into their profits. Estimates by the apple merchants' association place the annual losses suffered due to stiff competition somewhere between Rs 20,000 and Rs 30,000. http://articles.timesofindia.indiatimes.com/2012-01-30/delhi/31005153_1_apple-growers-shaanxi-varieties

65 http://www.farmerswelfare.org/enews/newsletter.html

66 On the other hand organic agriculture improves food access by increasing productivity, diversity and conservation of natural resources, by raising incomes, improving employment and by reducing risks. It has been recorded that shift to sustainable agriculture practices can reduce the outward migration from rural areas.

67 A recent report by UNEP and the UN Conference on Trade and Development surveyed 114 small-scale farms in 24 African countries, publishing findings in late 2008. It stated that: Yields had more than doubled where organic, or near-organic practices had been used, with the in yield jumping to 128 per cent in east Africa. The study found that organic practices outperformed traditional methods and chemical-intensive conventional farming and also found strong environmental benefits such as improved soil fertility, better retention of water and resistance to drought.
The research also highlighted the role that adapting organic practices could have in improving local education and community cooperation.

http://www.treehugger.com/green-food/25-reduction-in-global-food-production-by-2050-organic-agriculture-part-of-the-solution.html http://unctad.org/en/docs/presspb20086_en.pdf
Organic farming practices are in a good position to maintain productivity in the event of drought, irregular rainfall events and rising temperatures, notes a recent technical paper from International Trade Center (WTO) and FiBL.

68 Since many of the traditional varieties are not necessarily uniform, they have better ability to adapt to changing climatic condition like higher or lower thermal stress, water stress or salinity etc. than the homogeneous and uniform hybrid varieties. According to Dr. Tonapi, Head, Div. of Science and Technology, IARI, heterogeneousity of landraces and heirloom is boon in tackling climate change stresses.
According to Dr. Dadlani, Director, NSAI, non-uniform tendency of these seeds has been observed in certain cases to perform better in climate stresses. For example in Bihar in 2009, maize crop of certain hybrid varieties expectedly failed because of temperature going below normal as the verity required certain minimum temperature while the farmer' heirloom varieties were able to produce some yield owing to their non-uniform nature.

69 Organic farming is also associated with decreased irrigation needs by about 30-50%. This becomes an important part of adaptation in drought conditions. Organic farming reduces its fossil fuel dependence in many ways. For instance, for soil productivity management, internal inputs and practices are used rather than chemical fertilizers. Pest management also does not depend on chemical pesticides but a variety of local resources and practices

70 Soils under organic management retain significantly more rainwater thanks to the "sponge properties" of organic matter. Water percolation is 15-20% more in organic systems. Water capture in organic plots was twice as high as conventional plots during torrential rains, which in turn reduces the risk of floods.

71 EU agriculture officials cite that organic agriculture can remove 7000 pounds of CO2 from the atmosphere per acre every year. http://www.treehugger.com/green-food/use-organic-agriculture-to-fight-climate-change-eu-official-says.html

72 Changes in farming models and practices towards sustainable agriculture offer a significant opportunity at reducing GHG emissions. Organic farms use on an average 33 to 56 per cent less energy per hectare, as per FAO (2007). While production of chemical fertilizers is an energy-intensive process that emits carbondioxide and nitrous oxide, application of nitrogen fertilizers makes the soil emit nitrous oxide. These can be avoided through

organic farming IFOAM notes that avoidance of methane emission is also possible through organic agriculture – through the promotion of aerobic micro-organisms and high biological activity in soils, oxidation of methane can be increased. Through practices like System of Rice Intensification, which is mostly based on principles of ecological farming, flooding in rice paddies can be reduced and thereby, methane emissions.

73 A publication by the International Trade Centre UNCTAD/WTO and the Research Institute of Organic Farming (FIBL), entitled 'Organic farming and climate change'states "..organic agriculture holds an especially favourable position, since it realizes mitigation and sequestration of carbon dioxide in an efficient way… Organic production has great mitigation and adaptation potential, particularly with regard to soil organic matter fixation, soil fertility and water-holding capacity, increasing yields in areas with medium to low-input agriculture and in agro-forestry, and by enhancing farmers' adaptive capacity. Paying farmers for carbon sequestration may be considered a win-win-win situation as (a) carbon dioxide is removed from the atmosphere (mitigation); (b) higher organic matter levels in soil enhance their resilience (adaptation), and (c) improved soil organic matter levels lead to better crop yield (production)." http://www.intracen.org/Organics/documents/Organic_Farming_and_Climate_Change.pdf

74 A question that is often posed with regard to sustainable agriculture or organic farming is whether it will be able to feed the growing population. However, sustainable agriculture does not imply lowered yields, as experience of successful farmers bears out on the ground. This is reinforced by an FAO report (2007) which says that "conversion of global agriculture to organic management, without converting wild lands to agriculture and without using N-fertilisers would result in a global agricultural supply of 2640 to 4380 Kcal/person/day". Sustainable intensification in developing countries through organic practices would increase production by 56 per cent. A meta-analysis of 133 scientific papers concluded that organic agriculture was particularly competitive under lower yield environments, a feature that is common in developing countries. Organic yields on average are comparable to conventional yields although yields do decline initially when converting from high-input systems and almost double when converting from low-input systems. In India, it should be remembered that a majority of land is rainfed and continues to be low-input by default.
For a more elaborate overview of the developmental co-benefits of organic agriculture, see UNCTAD (2008 and 2009a); UNCTAD/UNEP (2008a); and Niggli (2010).

75 FAO notes access to food will increase by livelihood improvement both for farmers and agricultural workers through organic farming. Organic agriculture improves food access by increasing productivity, diversity and conservation of natural resources, by raising incomes, improving employment and by reducing risks. FAO report (2007).

76 This is done to release pressure from Punjab and Haryana as the yield there is decreasing due to chemical intensive farming, only to turn eastern India to similar status in the long run

77 While modern science understand the limitation of available resource and energy and is looking for renewable options, taking technological support to change a renewable resource to a non-renewable resource is not just unethical, but bad science. Moreover, with the present precarious climatic condition it is not advisable..

78 The government should focus on reducing the present subsidies to GHG-emitting practices like fertilizers rather than come up with GE seed varieties which are supposed to reduce GHGs.

79 According to the Civil Society Position Paper on Sustaining Agriculture in the Era of Climate Change in India (2009), By center for sustainable Development, Secunderabad, "Sustainable Agriculture is a misnomer for what has been proposed in the India's National Action Plan on Climate Change (NAPCC), under the name of Sustainable Agriculture. The current set of proposals would not lead to improving the soil health, central to sustainable agriculture, nor to cyclical models of farming, internalizing farm inputs (including crop waste) into farming systems, which define sustainable agriculture . On the contrary, the existing suggestions would continue the conventional linear, intensive models that further the existing dependency of farmers on external agencies for everything, including knowledge. That is one of the reasons for the current day crisis in agriculture....NAPCC makes no mention and assessment of Green Revolution-induced climate change in India. Shying away from stating the issues with the current model of agriculture will not create the imperative for a shift to sustainable agriculture, which is a requirement both for mitigation as well as adaptation. The NAPCC should clearly specify incentives to farmers for shifting to organic farming and sustainable agriculture practices. The government should realize that the imperative to shift to sustainable agriculture is larger than climate change."(http://www.kisanswaraj.in/wp-content/uploads/civil_society_position_paper_with_coverpage.pdf)

80 Some traditional practices which are not in tune with ecological farming, (eg. burning of fields after harvest, which increases GHG and/or damage soil health) are not recommended.

81 A study of 100 farmers in Himachal Pradesh during a period of 3 years found that the total cost of production of maize and wheat was lower under organic farming and the net income was 2 to 3 times higher. Both productivity and premium prices contributed to the increased profitability. Another study of 100 farmers of organic and conventional methods in five districts of Karnataka indicated that the cost of organic farming was lower by 80 per cent than that of the conventional one (Thakur, et. al., 2003 and Narayanan, 2005).

82 In India, at least eight states including Bihar, Rajasthan, MP, Chhattisgarh, West Bengal, Orissa, Kerala and Karnataka have decided not to allow any GM crop trials, while Uttarakhand and Himachal Pradesh have also said NO to such trials. Some of them have declared their desire to remain totally GM free. Only three states have allowed trials of this controversial technology: Andhra Pradesh, Haryana and Gujarat. In Gujarat, NOC by state government was given to about 10 "events", all of which have proprietary right of MNCs. It was also found that this was done without the legally obligated institutions in place for monitoring and supervision.

83 Restoration of full biological activity in terms of growth of beneficial insect populations, nitrogen fixation from legumes, pest suppression and fertility problems will take some time and the reduction in the yield rates is the result in the interregnum. It may also be possible that it will take years to make organic production possible on the farm

84 Field trials of organic cotton at Nagpur revealed that during the conversion period, cotton yield was low compared to the conventional (using fertilizer and pesticides) and integrated crop management (using 50 per cent each of organic and inorganic inputs). However, the yields of organic cotton started rising from third year. Cotton yields under organic, conventional and the mixed systems were 898, 623 and 710 kg/ha respectively at the end of the fourth year of the cultivation. The yield of soyabean under organic farming was also the highest compared to e other systems ,. (Narayanan,2005)

85 Field trials of GM crops have been reported to have negatively impacted the organic trade in many countries and there is fear especially among Basmati Rice traders that GM contamination can adversely affect rice export to European and Arab countries.

86 The process of transportation of items from place of origin to place of consumption releases GHG and aggravates climate change. Thus the issue of climate incompatibility would still remain relating to export of organic produce.

87 During Hurricane Ayala, which hit the Sunderbans three years back, huge devastation took place salinating the agricultural field, ponds and wells. Since none of the modern hybrid varieties could grow in these highly saline fields a massive search was conducted by ENDEV team for the traditional salt resistant varieties which were developed by the ancestral farmers of the area. NBPGR could provide only 2 (Talmugur, and Nona Bokra) out of 6(others were Matla, Hamilton, Lal Getu and Sada Getu)varieties to the team though they have records to show that they have all the varieties. State Agricultural deparmentt and ICAR institute at Canning was also of no help. Finally these varieties were available from Mousami island of Sunderbans.

88 Dr. Sharma stated that the gene banks have huge accession of traditional seeds and germplasms with them, but since they are not validating most of them these germplasm conservation is becoming ineffective. (As an example he cited a research which revealed that in wheat, Cobalt reduction has been almost 80% with the use of HYV with direct linkage with increase in cholesterol among the mass. However, when approached for a higher cobalt content wheat variety, NBPGR revealed that they were not aware of any such variety even though they have all the pre- GR varieties with them.)

89 Though it takes 6-7 years and 7-8 generation before a germplasm can be made into a seed, such attempts should be made by the government to link up the community banks with the gene banks. However, doubts have been raised how these seeds would behave since they have been removed from the process of natural selection for many years

90 At times however, even the farmers have the tendencies to select improved modern HY varieties at the expense of all other important local varieties. There is a need to check this pattern. The farmers should be encouraged to select a good mix of crop diversity. The community seed banks can play a big role here with their experience.

91 Farmers should be allowed to sell what they produce rather than the market dictating what they should produce. Farmers should be given Autonomy of production, seed marketing and Media. (P.V. Satheesh, at the IIED/Hivos Provocations Event in Stockholm; http://www.youtube.com/watch?v=D0-69dATyD4)

92 The Top-Down, lab to land approach involving NARS that had been followed, had failed to take the farmers knowledge and perspective into consideration. The present action plan also does not say much about programmes to be implemented immediately at the farmers' level. However, there is a strong opinion that there is enough evidence of time-tested practices and experiences from the ground of certain sustainable agriculture principles and practices

creating resilient farming systems. It was felt that popularization of traditional knowledge in addition to ever-evolving innovations in the fields of practicing organic farmers should be considered to be an important component of adaptation to climate change in agriculture. Such farmers should be identified and lessons are to be learnt and disseminated through the extension system. Civil Society Position Paper, http://www.kisanswaraj.in/wp-content/uploads/civil_society_position_paper_with_coverpage.pdf

93 Brochure, NICRA

94 Increased climatic extremes like droughts and floods are likely to increase production variability. Productivity of most cereals would decrease due to increase in temperature and decrease in water availability, especially in Indo-Gangetic plains. The loss in crop production is projected at 10-40% by 2100, depending upon the modelling technique applied. Also temperature rise in rabi season will impact production of wheat, a critical food-grain crop.

95 About two-thirds of the sown area in the country is drought-prone and around 40 million hectares is flood-prone

96 Data compiled by the Maharashtra Organic Farming Federation (MOFF) suggests that over 26,000 farmers paid Rs. 51,000 each to register with the organization for their training workshop, farming kits and have switched over to organic farming. From June 2006 to March 2007, the MOFF ran Farmers suicide Prevention Mission in Vidarbha. In all, 7,384 farmers from Amravati district , 5,500 from Washim , 2750 from Yavatmal and 2,500 from Wardha registered with MOFF to learn and adopt organic practices,". The six districts were chosen because of their high suicide rate.

97 http://www.moffindia.org/Inner/News.aspx

98 http://www.hindustantimes.com/Punjab/Bathinda/Organic-farming-attracts-more-Punjab-peasants/SP-Article1-855042.aspx

99 Subhash Sharma of Yavatmal village in Maharashtra, is an expert at growing organic vegetables. In a gathering organized by The Kheti Virasat Mission, he stated recently that since 1994, he grows organic vegetables, and other crop on 20 acres, and have saved money on chemicals and harmful sprays, got out of debt and into huge profit."; Khanna, 2012

100 In Andhra Pradesh the Community Managed Sustainable Agriculture Program in collaboration with Society for Elimination of Rural Poverty, CSA and Federations of Women Self Help Groups and NGOs are now supported under Rastriya Krishi Vikas Yojana. During Kharif 2007, more than 3,50,000 farmers from 1800 villages in eighteen districts of the state are practicing NPM in more than 2.80 lakh ha in various crops. Sixteen of these districts are part of the 32 districts with serious agrarian crisis identiûed by the

Government of India. The savings (on chemical pesticides) in costs of cultivation on pest management ranged from Rs. 600 to 6000 per ha without affecting the yields.

101 Tripura state government achieved 30,000 ha area (16 % of paddy area) under SRI during 2007-08. Between 2002-05 the farmers adopting SRI went up from 44-880 and to 70,000 farmers in 2007. Yields from Aman (Kharif 2006) under SRI from the 17 agricultural subdivisions works out to 3,519 kg/ ha, five-year average without SRI ending 2005 working out to be 2,618 Kg/ha indicating a 34% increase.

102 The observation of this study is based on literature survey, telephone and email interactions and visiting community bank areas (Tehri, Beej Bachao Andolan). However, detail stake holder study involving farmers and other members of the bank at sites have not been possible. The reasons are, time constrain, lack of response from community bank management, apathy among some members to make the bank an object of study and lack of time available to members of the bank. Thus this part of the study is based more on secondary information and internet search.

103 According to Shri Vijay Jardri, " As far as quality of seed is concerned, first seed is maintain at selection level. *Most healthy plants are selected for seed purpose*. Storage is mainly done by women. *They have knowledge about how to store it, when to dry it etc. which is part of traditional knowledge,* For saving them from pests, they use traditional methods. Although they do not have neem in mountains, they have plants like makain, akhrot, tikru etc. which are used as natural pesticides. Also it is necessary that the same crop is not shown on the same field repeatedly. Therefore there is a practice of rotating fields for this purpose. If a seed is sown in village 'A' this year, then after 2-3 three years it would also be sown in different villages. This "adla-badli" practice is age old is being followed by them. There is continuous rotation of fields in the region for the same crop. Every year they select seed from their fields and sow the new seeds. Therefore SRR is quite high. There are different ways to select seed for different crops, and having adopted the traditional agriculture system farmers has knowledge about the same."

104 Dr. Devender Sharma cited examples of a traditional paddy variety *Mysore Malligae*, developed by a farmer with major improvements in Karnataka which brought him honour, "Beeja Mitra award" from GREEN foundation. This paddy has been certified being much better than many other varieties but still it is not being promoted by the government. The story is same about *HMT paddy*. Dr. sharma is of the opinion that the gene banks which have huge accession of

traditional seeds and germplasms are not validating most of them and hence they may not be expected to validate what the community banks are proposing.

105 http://agricoop.nic.in/faq/faq_seed.htm

106 The Community seed banks in member countries can play an important role in making available traditional resources and knowledge relating to these landraces if linkages with SRSB are possible.

107 There are two broad categories of seed insecurity, "acute" and "chronic." Acute seed insecurity is brought on by distinct, short-duration events like flood drought etc. that often affect a broad range of the population. Those communities and farmers who recover quickly, with or without one-off seed-distribution assistance, are often those who suffered only from acute stress.
Chronic seed insecurity is independent of an acute stress or disaster, although it may be exacerbated by it. Chronic seed insecurity may be found among populations that have been marginalized in different ways: economically/socially (poverty, little land, little labor); ecologically (repeated drought, degraded land); politically (insecure areas, on land with uncertain tenure) Chronically seed-insecure populations may be characterized by (1) continual shortage of adequate seed to plant, (2) difficulties in acquiring off-farm seed because of poverty, or (3) the utilization of low-quality seed and poorly-adapted varieties on a routine basis. The result is households with a built-in vulnerability to seed system calamities. Understanding seed systems and strengthening seed security: A background paper, http://www.ciat.cgiar.org/work/Africa/Documents/understanding_seed_systems.pdf

108 As opposed to leaving things in public domain which is much abused, here the countries can be bind by common agreement and regulation where the common genetic resource can be used by the larger community and anybody can make improvement and add value, but nobody can avail any monopoly or IPR protection.

Annexure 1a

Seed Act, 1966

The major legislative measures involved under the Act are Seeds rules framed in 1968, Seeds (Control) order, formulated in 1983 after including seeds as an essential commodity

A total of twenty five clauses have been mentioned in the act and they are:

1. Enacted by Parliament for the whole of India to regulate seeds
2. Seeds of food crops, oil crops, cotton seeds, seeds of cattle fodder and all types of vegetative propagating material are included
3. Constitution of a Central Seed Committee (comprising eight members) to advise the Central and State Governments on matters arising out of the administration of this act and carry out other functions assigned to it by the Act
4. Establishing a Central Seed Laboratory as well as State Seed Laboratory to carry out seed analysis of notified variety
5. Empowerment of the Central Seed Committee to notify any variety found suitable as per the Act after notification in the Official Gazette
6. Empowerment of the committee to fix the minimum limits of germination and purity of seed for a variety to be notified as well as for marking or labeling a seed lot to be sold commercially
7. Regulation of sale of seeds of notified varieties by compulsory truthful labeling revealing the true identity of the variety, germination as well as purity
8. Constituting a certification agency for undertaking the process of certification

9. Power of certification agency to recommend notification of suitable variety and grant of notification certificate provided the seed meets minimum limits of germination and purity
10. Empowerment to the agency for revocation of certificate if the agency is convinced that holder has obtained certificate by misrepresentation or not complied with the conditions
11. Provision for an appeal by the holder on payment basis to express before an appellate Technical Bulletin from CICR (www.cicr.org.in) 6 Legislations for Seed Quality Regulation in India authority, his limitations for not complying with the conditions
12. Appointment of a seed analyst to undertake seed testing.
13. Appointment of seed inspector who is deemed to be a public servant within the meaning or section 21 of the Indian Penal Code (45 of 1860)
14. Empowerment of seed inspector to draw samples from any seller or a purchaser and verify the quality by sending samples to a seed analyst in the seed testing laboratory
15. Laying-out of procedure for seed sample collection and other rules. The clause also entrust inspector with the power to break open any seed container or door of any premises where such seed may be kept for sale, under those circumstances when owner refuses to cooperate. The whole operation has to be done in presence of two witnesses with their signatures on a memorandum
16. Responsibility of Seed analyst to report the results in a specified format after analysis of the seed samples to Seed Inspector as well as the seller/ purchaser. Complainant if dissatisfied with the result can apply to the court for sending samples to Central Seed Testing Laboratory. Central seed laboratory shall thereupon send its report to the court in the prescribed format within one month from the date of receipt of the sample
17. Restriction on import and export of seeds of notified varieties. Any variety imported or exported should meet the minimum limits of seed germination and purity marked or labeled on the container truly
18. Recognition of seed certification agencies of foreign countries for the purpose of this act
19. Penalty or punishment or both for those who do not comply with the provisions of the act and also prevent seed inspectors from executing his power

20. Forfeiture of property (seeds) belonging to any person convicted under this act due to contravention of the procedures under this act
21. Punishment for offences committed by companies or any body corporate. All who was incharge of, when the time the offence was committed and was responsible to the company shall be deemed to be guilty of the offence and punished accordingly
22. Protection of Government action taken in good faith that is no prosecution or legal proceeding will lie against Government or any Government Officer for anything that is done in good faith
23. Power for Government to give directions for smooth conduct of the act
24. Non-application of the act to the seed exchange by the farmers without any brand name Technical Bulletin from CICR (www.cicr.org.in) 7 Legislations for Seed Quality Regulation in India
25. Power of Government to make rules to carry out various functions of Central Seed Committee, Central Seed Laboratory, Certification Agency and Seed Inspectors

Annexure 1b
Seed Rules, 1968

The rules have been framed to implement various legislations given under Seed Act, 1966 and contain 11sections

I. *Preliminary*
This section provides definitions of various terminology used under the seed rule.

II. *Central Seed Committee*
This section describes the specific functions entrusted to the committee by the act such as recommendation for Seed Testing fee, advice on the suitability of seed testing laboratory, recommendation for the procedure and standards for seed certification and testing. Also the rules provide details of traveling and daily allowances payable to the members of the committee.

III. *Central Seed Laboratory*
In this section it describes the specific functions entrusted to the Central Seed Laboratory such as coordinating with State Seed Laboratories for uniformity in test results, collecting data on quality of seeds available in the market and any other function assigned to it by the Central Government.

IV. *Seed Certification Agency*
This section deals with the specific functions entrusted to the Certification Agency such asoutlining the procedure for submission of applications, growing, harvesting and processing and storage of seeds indented for certification, maintaining a list of recognized nucleus seed breeders, inspections of seed production fields, seed processing plant and seed stores, grant of certificates.

V. *Marketing or Labeling*

Rules for marking or labeling of seed lots indented for certification have been provided in this section. The label should contain name of the person or agency that produced the seed and shall be responsible for the accuracy of information given in the unopened original container. The label should contain the name, the address of the person offering the sale of the seed, name of the variety, germination and purity level of the seed, net weight of the seed, date of seed testing and a statement if the seed is treated. Any transparent cover used solely for the purpose of packing during transport or delivery need not be marked or labeled.

VI. *Requirements for Certification*

Three classes of certified seed have been specified in this section, viz.Foundation (progeny of breeder seed), Registered (progeny of foundation seed) and Certified (progeny of registered / foundation seed) and each class shall meet the specific standards. Certification agency has the discretion of producing certified seed from certified seed provided that it does not exceed three generation and the genetic purity is not significantly altered.

VII. *Certification of Seeds*

The detailed procedure of seed certification starting from applying for certification till the grant of certificate has been provided in this section. Application has been outlined by the certification agency containing the name and details of the applicant, the name of the seed to be certified, class & source of the seed, germination and purity and mark or label. A fee of Rs. 25 is levied for certification. Once certified, the certification tag containing information such as name and address of the certification agency, name of variety, lot number, name and address of the producer, date of issue of its certificate and its validity, an appropriate sign, to designate certified seed. The color of the tag shall be white for foundation, purple for registered and blue for certified seed. The holder of certificate shall allow any seed inspector to enter and inspect the seeds kept for sale, registers or other documents.

VIII. *Appeal*

Provision for appeal has been provided by submitting a memorandum accompanied by a treasury receipt for Rs. 100. The appellate authority shall exercise all the powers which a court has, while deciding appeal under the code of civil procedure, 1908.

IX. *Seed Analyst and Seed Inspectors*

The specific qualifications and duties of seed analyst and seed inspectors have been provided in this section. Seed analyst should possess a Master Degree in Agriculture/ Agronomy/ Botany/ Horticulture from a recognized University with at least one year experience in Seed Technology or possess a Bachelors degree in Agriculture/Botany from a recognized university with a minimum of three years experience in Seed Technology for this purpose. Seed analyst shall analyze the seed samples according to the provisions of the Act. Seed Inspector shall be a graduate in agriculture with at least one year experience in Seed Technology.

X. *Sealing, Dispatch and Analysis of Samples*

The details of sampling, labeling, manner of packing and sealing the samples as well as its dispatch to the seed analyst has been provided.

XI. *Miscellaneous*

The need to maintain stock record of seeds and record of the sale of seed have been provided in this section.

Annexure 1c
Amendments to the Seed Act/Seed Rules

The Seeds (amendment) Rules, 1972
Inclusion of "jute seeds" to the Seeds Act, Establishment of a Seed Certification Board, and empowerment of the Board to fix minimum standards

- Certification Board Establishing Central Seed Certification Board to advise Government on all matters relating to the certification and co- ordinate the functioning of certification agencies. Details of the Board members to be included with a Chairman and employees nominated by the Central Government, Directors of Agriculture and Directors of Research. Membership period has been given for two years. The board can make by-laws for regulating its own procedure. The Central Government shall appoint a Secretary for the board
- The rule says seed should not just meet a minimum limit of germination and purity as given in SEED ACT, 1966, but should meet a prescribed standard provided that the standard is not lower than the minimum limits of germination and purity specified for the seed.
- Clause for "Power to fix standards for which seeds should confirm" was added under the power to make rules in the Seeds Act, 1966.

The Seeds (amendment) Rules, 1973
Powers of appellate authority and duty of seed analyst have been slightly modified. Seed Testing Manual published by ICAR has been mentioned to be referred by the seed analysts

- Judicial powers of authority provided in Seed Rules under Appeal, has been omitted.

- Seed analyst shall analyze samples in accordance with the procedures laid down in the Seed Testing Manual published by the ICAR.
- Amendment has been made by specifying the time period (maximum 30 days after receipt of the sample) within which the seed analyst should report the result.
- Amendment by empowering the State Government to assign any duty to Seed Inspector has been made.

The Seeds (amendment) Rules, 1974

More powers conferred on seed inspector during crop failure

- Modified the seed rules by adding a clause on action to be taken by the seed inspector if a complaint is lodged with him as a result of crop failure.
- The amendment says that in cases of crop failure, the inspector shall investigate causes of failure by sending seed samples for detailed analysis.
- He shall also submit the report to the competent authority
- If the inspector comes to conclusion that failure of performance is due to low quality seed not meeting the minimum standards notified by the Central government he shall take proceedings against supplier.

The Seeds (amendment) Rules, 1981

A new rule added under the seed certification and has mentioned

Indian Minimum Seed Certification Standards published by the Central Seed Committee to be referred for certification

- The amendment says certification agency shall ensure that the seed standards confirm to the minimum seed certification standards laid down in the manual known as Indian Minimum Seed Certification Standards published by the Central Seed Committee which is commonly called as Blue Book.

Annexure 2

Plants, Fruits and Seeds Order (Regulation of Import into India order) 1989

The order was made suppressing the Plants, Fruits and Seeds Order (Regulation of Import into India) 1984 and provides regulations during import based on post entry quarantine checks.

- Post entry quarantine facilities shall be established which shall be permitted to be released by Designated Inspection Authority.
- Import of any form of seed for consumption or sowing should carry a permit issued by the competent authority, and the import should be only through specified customs stations.
- The consignment shall be inspected by the Plant Protection Advisor.

Amendments have been made for the above order during 1998, 2000 and 2001. With the liberalized trade in agriculture, as consequence to WTO agreements, Government thought of providing new legislative provisions under the new order, Plant Quarantine (Regulation of import into India) Order, 2003. The Order has now replaced the Plants, Fruits and Seeds order, 1989

Plant Quarantine (Regulation of import into India) Order, 2003
The order has widened the scope of plant quarantine activities and has made pest risk analysis compulsory for imports

- The order includes provision for regulating the import of soil, moss, germplasm and GMO's for research, insects, microbial cultures and bio-control agents, timber and wooden logs

- The order prohibits import of commodities contaminated with weeds, alien species, and packaging material of plant origin unless the material has been treated
- Agricultural imports are thus classified as: prohibited plant species, restricted species where import permitted only by authorized institutions and declarations and plant material imported for consumption or industrial processing permitted with phytosanitary certificate
- Phytosanitary certificate according to Plant Quarantine requirements has to be provided so as to prevent spread of noxious pests
- Pest risk analysis during post entry quarantine is compulsory.
- Import of germplasm has to be permitted by NBPGR and any other biological materials such as soil, microbes, moss etc. has to be permitted by Plant Protection Advisor
- A list of 590 quarantine pests and 61 weed species have been declared under the Order
- Notified entry points for import have been increased compared to PFS Order, 1989
- Strengthening Plant Quarantine facilities, opening new quarantine stations, establishing advanced molecular diagnostic facilities for rapid pathogen detection, setting up of National Pest Risk Analysis unit are other important features of the Order

Annexure 3
PPV&FR Act 2001

- The Act covers all categories of plants except microorganisms
- The variety being claimed for protection needs to be notified
- The act is unique in the world with inclusion of rights of farmers, breeders, researchers and equity concerns
- The Central Government shall establish a PPV & FR Authority with a Chairman and 15 members to implement the various functions of the Act

Registration of Plant Varieties :

- Registration of new varieties, as notified by the Central Government.
- The PPVFR Act allows the registration of three types of plant varieties. These are farmers'varieties, extant varieties and new varieties .

Criteria for Registration :

- A new variety can be registered for protection if it satisfies the criteria of Novelty, Distinctness, Uniformity and Stability (NDUS).
- For Extant Varieties - distinctiveness, uniformity, stability as specified/relaxed by the Authority
- The detailed contents to be provided in the application form for registration has been given. Complete passport data of the variety, clear pedigree and source of origin of the variety, statement declaring no terminator gene is present, specification on novel and distinct character of the variety etc. are some of the major features in the form
- It shall not apply for registration of farmers' varieties
- Period of protection is six years in case of crops and may be renewed on condition that the total period of validity does not exceed 15 years

- Breeder has to pay an annual fee based on the royalty gained by the variety for retention of registration of the same

Researcher's Right

- Researchers are not prevented for conducting research using the registered variety or using the same for creating newer varieties provided an authorization is given by the breeder indicating the necessity of use of protected variety
- The breeder of essentially derived varieties so developed using the protected varieties shall have the same rights as the breeder of other new varieties

Farmers Right

- The definition of farmers given in this Act is very unique. The Act defines the farmer as a person cultivating crops or conserving and preserving traditional crop varieties or wild species of crops and selecting them for their useful properties. In other words, the Act recognizes the farmer as a cultivator, conserver and breeder. This definition embraces in all farmers, landed or landless, male and female.
- Farmers variety as part of the extant variety will be entitled for registration/protection. Traditional varieties developed or conserved by a community of farmers and new varieties developed by one or more farmers are eligible for registration.
- Farmers have been provided right to avail PBR protection of varieties conserved or developed by them, recognizing them as breeders.
- Allows exclusive legal right to the PBR-holding farmers to produce and market its seed.
- Farmers can save, re-sow, exchange, share and sell farm produce of any protected variety except its commercial marketing with brand name
- Farmers have the right for innocent infringement when, at the time of infringement he is not aware of the existence of breeder rights
- A National Gene Fund has been constituted which will be utilized for payment as rewards to farmers who has preserved a variety and which has been used as donor of genes in development of a new variety by any breeder

- Farmers' Right to receive Compensation for Undisclosed use of Traditional Varieties either from an honest ignorance on the identity and origin of the parental varieties or a dishonest suppression of parental variety identity. The communities concerned also may not have the capability to detect such use of their varieties or traditional knowledge in the breeding of a new variety. Under such situations, any third party who has a reasonable knowledge, is eligible to prefer a claim for compensation on behalf of the concerned local or tribal community [Section 41 (1)].
- While allowing exclusive right to the PBR-holder on commercial production and marketing of seeds, the Act directs the PBR-holder to meet farmers' demand for seeds of the variety at reasonable prices. If the PBR-holder does not satisfy this requirement three years after registration of the variety, farmers have the right to take the matter of non-availability of seed, its poor supply, or its high price to the PPVFR-Authority [Section 47]. On receiving such complaints and on its verification, the PVP Authority may take remedial actions .
- Compensation to be given to farmers if the registered variety does not meet the promised level of performance under given conditions. The gene fund is also utilized for providing compensation to farmers if the variety does not perform to the expected performance of the variety. The expected performance of a protected variety under specific condition needs to be compulsorily provided to the farmers during sale.
- Under situations of unavailability of seeds of protected varieties, the authority can grant compulsory license to any person for producing and distributing the seeds to public at a reasonable price, provided the expiry period of 3 years of registration of variety is completed
- National Gene fund is credited with the benefit sharing from the breeder, the annual fees payable by the breeder through royalties and contribution from any national and international organization and other sources
- Considering the poor economic capability of farmers the PPVFR Act totally exempts farmers from paying any fees [Sections 18, 44]
- Breeder needs to share the benefits accrued from a registered variety with the necessary claimers who shall be heard and if convinced, his share may be given as per the nature and extent of the benefit

- Fund will be utilized for disbursing shares to benefit claimers, compensation to seekers, supporting conservation and sustainable use of genetic resources, and for strengthening the capabilities of the Panchayat in carrying out such conservation measures

Exclusion of Varieties

- Plant Varieties can be excluded from registration in case where prevention of commercial exploitation of such varieties is necessary to protect public order or public modality or human, animal and plant life and health or to avoid serious prejudice to the environment.
- Registration of plant varieties will not be allowed if the variety in question involves any technology such as genetic Use Restriction Technology and Terminator Technology, which is injurious to the life or health of human beings, animals or plants.
- Constitution of Plant Variety Protection Appellate Tribunal to exercise jurisdiction and powers consisting of Judicial as well as Technical members
- The authority provide measures to Institutions for registration of extant (already known to exist) and new varieties, characterization, documentation and developing a data base of all existing varieties, cataloguing of farmers' varieties, ensuring availability of seeds of registered varieties, maintenance of register of plant varieties etc. taking advantage of any institution including ICAR
- Identification of possible reference varieties is a requirement under DDS testing which has to be for all crop species. Their storage is an important component of the act for which appropriate storage facilities need to be created at selected locations

Annexure 4
National Seed Policy 2002

1. Variety Development

The testing of the varieties is done by ICAR research institutes and SAUs under the All India Co-ordinated Crop Improvement Projects (AICCIP). Each variety has to pass through 3 phases of evaluation. Breeders contribute their best entries on the basis of evaluation carried out in their local programmes for testing in the Initial Yield Evaluation Trial (IET) or Preliminary Yield Trial (PYT). These trials are organized in selected number of Places in each zone. Simultaneously, these entries are supplied to Pathologists to study their reaction to important diseases. Entries qualifying from yield, disease and quality point of view are tested in the Uniform Regional Trials (URT). These trials are also called Advanced Varietal Trials (AVT) or Coordinated Varietal Trials (CVT). These trials are organized at a very large number of locations in each zone and the plot size is larger than that in IET. These tests are followed by a critical discussion by a Special Committee of multi-disciplinary scientists in the crop workshop to consider the proposals for identification of the varieties for release and then the proposals are sent to Central Sub-committee on Crop Standards, Notification and Release of Varieties, for official release and notification.

2. Plant Variety Protection

Plant Variety protection is extended through the PPVFR Act 2001 (as explained above). For the purpose of this Act, PPV & FR Authority was set up in November, 2005. The objectives of the Authority are:

- Establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage development of new varieties of plants.
- Recognition and protection of the rights of farmers in respect to their contribution in conserving, improving and making the

available plant genetic resources for the development of new plant varieties.

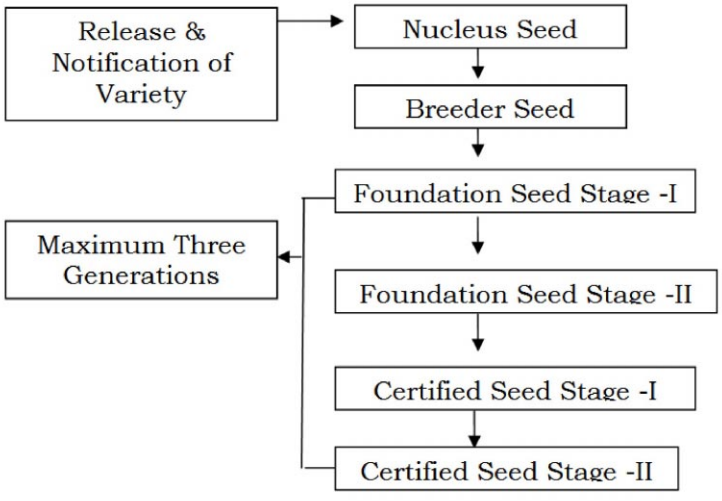
- Accelerated agricultural development in the country by stimulation of investment for research and development both in public and private sector.
- Facilitate growth of seed industry to ensure the availability of quality seeds and planting material to the farmers.

Around 49 DUS testing centres have been strengthened all over the country for conducting the essential DUS tests. These centres are present in different agro-climatic zones and some of them are multi-crop and others are single crop centre. DUS testing guidelines of around 40 crops are already finalised by involving the senior crop specialists/researchers in crop specific deliberations of the working group. With the inception of Protection of Plant Variety process, 225 crop varieties have been have been granted protection of which 188 are from National Agricultural Research System.

3. Seed Production

The Indian seed programme largely adheres to the limited generation system for seed multiplication chain to maintain the purity

Generations/Steps in Seed Multiplication Programme



of variety as it flows from breeder to the farmer involving breeder – foundation – certified seeds.

Research Institutes and Project Directorates of Indian Council of Agricultural Research and State Agricultural Universities comprising NARS are primarily responsible for the production of breeder seed of different crops. The foundation and certified seed is produced by the State Seed Corporations, National Seeds Corporation, State Farms Corporation of India and private seed companies.

Breeder Seed

Breeder seed is the progeny of nucleus seed of a variety and is produced by the originating breeder or by a sponsored breeder. Breeder seed production is the mandate of the Indian Council of Agricultural Research (ICAR) and is being undertaken with the help of;

i) ICAR Research Institutions, National Research Centres and All India Coordinated Research Project of different crops;
ii) State Agricultural Universities (SAUs) with 14 centres established in different States;
iii) Sponsored breeders recognized by selected State Seed Corporations, and
iv) Non-Governmental Organizations.

ICAR also promotes sponsored breeder seed production programme through the National Seeds Corporation (NSC) / State Farms Corporation of India (SFCI), State Seeds Corporation (SSCs), Krishi Vigyan Kendras (KVKs) etc. There has been a steady increase in the production of breeder seed over the years.

The indents from various seeds producing agencies are collected by the State Departments of Agriculture and submitted to the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India, which is turn compiles the whole information crop wise and sends it to the Project Coordinator/Project Director of the respective crops in ICAR for final allocation of production responsibility to different SAUs/ICAR institutions. The allocation of responsibility for production of breeder seed is discussed in the workshop in respect of the particular crop and is made to various centres as per the facilities and capabilities available at the centres and the availability of nucleus seed of a particular variety. It may be noted that indents are compiled and forwarded to ICAR at least 18 months in advance. To make the programme systematic,

and for proper evaluation of the breeder seed production programme, monitoring teams have been constituted and reporting proformae have been devised. The monitoring terms consist of breeder of the variety, the concerned Project Director or his nominee, representative of NSC. The production of breeder seed is reviewed every year by ICAR-DAC in the annual seed review meeting. The actual production of breeder seed by different centres is intimated to DAC by ICAR. On receipt of information from ICAR, the available breeder seed is allocated to all the indenters in an equitable manner. In the case of varieties which are relevant only to a particular State, the indents for breeder seed are placed by the concerned Director of Agriculture with the SAUs/ICAR institutions located in the State. The breeder seed produced is lifted directly by the Director of Agriculture or foundation seed producing agencies authorized by him.

Foundation Seed

Foundation seed is the progeny of breeder seed and is required to be produced from breeder seed or from foundation seed which can be clearly traced to breeder seed. The responsibility for production of foundation seed has been entrusted to the NSC, SFCI, State Seeds Corporation, State Departments of agriculture and private seed producers, who have the necessary infrastructure facilities. Foundation seed is required to meet the standards of seed certification prescribed in the Indian Minimum Seeds Certification Standards, both at the field and laboratory testing.

Certified Seed

- Certified seed is the progeny of foundation seed and must meet the standards of seed certification prescribed in the Indian Minimum Seeds Certification Standards, 1988. In case of self pollinated crops, certified seeds can also be produced from certified seeds provided it does not go beyond three generations from foundation seed stage-I.
- The production and distribution of quality/certified seeds is primarily the responsibility of the State Governments.

Foundation/Certified seed production is organized by:

- National Seed Corporation (Seed production is mainly organized through contract growing arrangements with progressive farmers

and NSC markets its seeds through its own marketing network and also through its dealer network)

- State Farm Corporation of India (Seed production is mainly on its own farms and SFCI markets its seeds mainly through the State Departments of Agriculture and the State Seed Corporation)
- State Seed Corporations (Seed production is mainly organized through contract growing arrangements with progressive farmers)
- Cooperatives

The distribution of seeds is undertaken through a number of channels i.e. departmental outlets at block and village level, cooperatives, outlets of seed corporations, private dealers etc. The efforts of the State Governments are being supplemented by NSC and SFCI which produce varieties of national importance. NSC markets its seeds through its own marketing network and also through its dealer network. SFCI markets its seeds mainly through the State Departments of Agriculture and the State Seed Corporations. The production of certified seed by NSC and State Seed Corporations is mainly organized through contract growing arrangements with progressive farmers. SFCI undertakes seed production on its own farms. The private sector has also started to play an important role in the supply of quality seeds of vegetables and crops like hybrid maize, sorghum, Bajra, cotton, castor, sunflower, paddy etc.

The requirement of certified/quality seeds is assessed by State Governments on the basis of the area sown under different crop varieties, area covered by hybrid and self-pollinated varieties as well as the seed replacement rate achieved. The availability of seed is ascertained by the State Departments of Agriculture on the basis of the production of seed in government farms and production of seeds by State Seeds Corporations and other agencies. The Government of India periodically assesses the requirement and availability of seeds through detailed interaction with State Governments and seed producing agencies in the bi-annual Zonal Seed Review Meetings and the National Kharif and Rabi Conferences. The Department of Agriculture and Cooperation facilitates tie-up arrangements with seed producing agencies to ensure that the requirement of seeds is met to the maximum extent possible.

The private sector seed companies have started playing a significant role in the seed industry over the last few years and at present, more than 400 companies are engaged in seed production or seed trade.

Strengthening of alternative seed supply systems through further expansion of breeder/foundation seed programmes of SAUs and ICAR Institutes. involvement of Krishi Vigyan Kendras in seed production and distribution; development of entrepreneurship in seed production among resourceful farmers in each village and a massive programme of training of farmers in scientific on farm seed production, processing and storage can play a significant role in improving and sustaining supply of quality seeds of improved varieties in the villages to the farmers.

4. Quality Assurance

Seed certification is a legally sanctioned system for quality control of seed multiplication and production.

Seeds Act, 1966 provides for the establishment of Seed Certification Agencies in each State, to undertake seed certification and quality assurance programme. For quality control, there are 21 State Seed Certification Agencies and 100 seed testing laboratories functioning in India and any variety to become eligible for seed certification should meet the following requirement:

- General requirements (a notified variety under Section-5 of the Indian Seed Act, 1966)
- Field requirements
- Specific requirements
- Seed standards

Unlike the Seeds Act of 1966, the new Seed Bill insists that no seed, except farmers' seeds, without registration by the Central Registration Sub-Committee could be traded in India. Every producer of such seeds, except the farmer, processing unit, distributor and trader are to be compulsorily registered at the state level. The New Seeds Bill demands that any traded seed should be identified in terms of the variety to which it belongs, meet the minimum prescribed standards for germination, genetic and physical purity, maximum standard in seed health and an acceptable level of agronomic performance. Certification of seed standards is mandatory and done by accredited central and state Seed Testing Laboratories. The Bill introduces assessment of agronomic performance in multi-location trails to determine the eligibility of a variety for registration. Details of all registered varieties are to be recorded in the National Register of Seeds. The Bill provides new labelling standards and also a declaration

on the expected performance of the seed and the conditions required to realise such performance. Farmers failing to realise this performance from such seed under the prescribed cultivation condition are eligible for compensation.

Phases of Seed Certification are:

i. Verification of seed source, class and other requirements of the seed used for raising the seed crop.
ii. Receipt and scrutiny of application.
iii. Inspection of the seed crop in the field to verify its conformity to the prescribed field standards.
iv. Supervision at post-harvest stages including processing and packing.
v. Drawing of samples and arranging for analysis to verify conformity to the seed standards; and
vi. Grant of certificate, issue of certification tags, labelling, sealing etc.

5. Seed Distribution and Marketing

The policy underlines that availability of high quality seeds to farmers through an improved distribution system and efficient marketing set-up will be ensured to facilitate greater security of seed supply. Efforts are made to achieve better coordination between State Governments to facilitate free Inter-State movement of seed and planting material through exemption of duties and taxes. .

For promoting efficient and timely distribution and marketing of seed throughout the country, a supportive environment is being provided to encourage expansion of the role of the private seed sector. Private Seed Sector is encouraged and motivated to restructure and reorient their activities to cater to non-traditional areas.

Under the governments Central Sector Scheme on Transport Subsidy for the movement of Seeds to the North-Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttaranchal and Hill Areas of West Bengal, provision is being made to ensure supply of seeds to the farmers in time at reasonable prices in the identified States through subsidising the cost of transportation of seeds required by the farmers.

There is proposal to establish National Seed Grid as a data-base for monitoring of information on requirement of seed, its production, distribution and preference of farmers on a district-wise basis.

Distribution and marketing of seed of any variety, for the purpose of sowing and planting will be allowed only if the said variety has been registered by the National Seeds Board, which are to sell or distribute seeds in a specified manner in a specified area if it is considered necessary to the public interest.

6. Infrastructure Facility

The plan proposes creation of new infrastructure facilities along with strengthening of existing facilities for seed production, processing and storageto meet the enhanced requirement of quality seeds. The Indian Council of Agricultural Research initiated a Mega seed Project which carried out through 85 centres in India including SAUs and ICAR centres, with the objectives of providing reliable quality seed directly to the farmer's vis-à-vis stepping towards self sustenance during 2006-2007 at a cost of 45 Million US$. National Seed Research and Training Center was be set up to impart training and build a knowledge base in various disciplines of the seed sector. The Central Seed Testing Laboratory was established at the National Seed Research and Training Center to perform referral and other functions as required under the Seeds Act.

There is proposal to establish a computerized National Seeds Grid to provide information on availability of different varieties of seeds with production agencies, their location, quality etc. This network will facilitate optimum utilisation of available seeds in every region. Initially, seed production agencies in the public sector would be connected with the National Seed Grid, but progressively the private sector will also be encouraged to join the Grid for providing a clear assessment of demand and supply of seeds. Presently the information is available on the website http://seednet.gov.in/

7. Transgenic Plant Varieties

Indian Government acknowledges that fact that Biotechnology will play a vital role in the development of the agriculture sector. This technology can be used not only to develop new crops/varieties, which are tolerant to disease, pests and abiotic stresses, but also to improve productivity and nutritional quality of food. Accordingly, a specific provision has been made for the registration of transgenic varieties in the Need Seed Bill, 2004.

As per the Nation Seed Policy, 2002, all genetically engineered crops/varieties will be tested for environment and biosafety before

their commercial release, as per the regulations and guidelines of the Environment Protection Act (EPA), 1986. Import of seeds of transgenic plant varieties for research purposes is permitted only through the National Bureau of Plant Genetic Resources (NBPGR) as per the EPA, 1986. Transgenic crops/varieties will be tested to determine their agronomic value for at least two seasons under the All India Coordinated Project Trials of ICAR, in coordination with the tests for environment and bio-safety clearance as per the EPA before any variety is commercially released in the market. After the transgenic plant variety is commercially released, its seed will be registered and marketed in the country as per the provisions of the Seeds Act. There is also provision for the protection of transgenic varieties under the PVP legislation in the same manner as non-transgenic varieties after their release for commercial cultivation. The policy clearly states that emphasis will be placed on the development of infrastructure for the testing, identification and evaluation of transgenic planting materials in the country.

8. Import and Export of Seeds

The objective of the import/export policy is to provide the best planting material available anywhere in the world to Indian farmers, to increase productivity, farm income and export earnings, while ensuring that there is no deleterious effect on environment, health and bio-safety. The export/import of seeds and planting material is governed by the Export and Import (EXIM) Policy 2002-07 and the requirements of the Plants, Fruits and Seeds (Regulation of import into India) Order, 1989 as amended from time to time. Import of parental lines of newly developed varieties will also be encouraged. Restrictions on export of all cultivated varieties of seeds have been removed w.e.f. 01.04.2002, except the following:

(i) breeder or foundation or wild varieties
(ii) onion, berseem, cashew, nux vomica, rubber, pepper cuttings, sandalwood, saffron, neem, forestry species and wild ornamental plants;
(iii) export of niger which is canalized through TRIFED, NAFED, etc.
(iv) groundnuts, exports of which is subject to compulsory registration of contract with APEDA;

As per World Seed Trade Statistics, India has sixth largest size of domestic seed market in the world, estimated to be at about 1300 million dollars. However, India's share in global trade in seeds (import & export) is of only about 37 million dollars only. To give a boost to seed export, India has decided to participate in OECD Seed Schemes for the following categories of crops:

- Grasses and legumes
- Crucifers and other oil or fibre species
- Cereals
- Maize and sorghum
- Vegetables

The Joint Secretary (Seeds) in the Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India has been nominated as the National Designated Authority. Further, Heads of Seed Certification Agencies in Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Rajasthan, Uttaranchal, Uttar Pradesh Haryana, Bihar and Assam have been nominated as the Designated Authorities under the Scheme to undertake certification work under OECD Seed Schemes. The department is in the process of completing other formalities under the OECD Seed Scheme guidelines before the certification work gets started.

9. Strengthening of Monitoring System

The Department of Agriculture & Cooperation (DAC), Ministry of Agriculture, Government of India will supervise the overall implementation and monitoring of the National Seeds Policy which requires coordination with 28 State Governments, 7 Union Territories and several stakeholders. The physical infrastructure in terms of office automation, communication facilities, etc., in DAC is being augmented in a time bound manner. The technical capacity of DAC is also being augmented and strengthened to undertake the additional work relating to implementation of National Seeds Policy, implementation of PVP&FR Bill, Seeds Act, Import and Export of Seeds, etc.

[Source: Pandey, S.; "Seed Policy Implementation in India"]

Annexure 5a
Seed Bill (2004)

- Compulsory registration of seeds that are to be offered for sale through test for Value for Cultivation and Use (VCU)
- Seed certification will continue to be voluntary
- VCU will be tested by multi- locational trials over three seasons. Samples of materials for registration will also be sent to NBPGR for retention in the National Gene Bank
- Enable provisional registration based on the information filed by the applicant relating to trials over one season to tide over the stipulation of testing over three seasons before the grant of registration. The provisional registration will be for a period not exceeding two years
- Accreditation of any organization or individual or any seed producing organization to carry out self- certification subject to the control of the seed committee and State Government
- Registration of seed processing units will be required.
- Varieties already in the market at the onset of policy implementation will have to be registered within a fixed time period
- Compulsory disclosure on the expected performance of a variety sold to a farmer. During failure the farmer may claim compensation under the Consumer Protection Act, 1986
- All registered seeds should meet the minimum limits of germination, purity and seed health and the seed lots on sale should be compulsorily labeled. In transgenic varieties, the label should carry the name of transgene
- Compulsory registration of seed producer or any seed production organization, horticultural nurseries engaged in business
- Any registered varieties offered for sale can also be certified by the State Certification Agency if the dealer intents to A Central

Seed Committee in line with National Seed Board provided in the Seed Policy, 2002 will be the apex body to fix or set the minimum standards for the seeds and decide which seeds are harmful or dangerous to the environment and public health

- Empowerment of Central Government to declare any Seed testing laboratory as the Central Seed Testing laboratories which will also serve as referral lab in case of disputes.
- Empowerment of State Government in establishing one or more State Seed testing laboratories
- Seed testing labs will be established in conformity with ISTA to meet the quality requirements of seeds during export
- Special provision for registration of transgenic provided the applicant has obtained clearance from GEAC
- The seeds imported can be subject to registration granted based on the results of multilocational trials
- The import of transgenic seeds to be done only through NBPGR after approval from GEAC as per the EPA, 1986
- During import to the country all seeds are required to be accompanied by a certificate from competent authority regarding their transgenic character
- Compulsory testing of transgenic crop varieties under AICCIP to determine their agronomic value in co-ordinance with the tests for environment and bio-safety clearance as per the EPA before its commercial release
- Post release monitoring of transgenic for performance for 3 - 5 years by the Ministry of Agriculture and State Departments of Agriculture
- Provision of protection of transgenic as per PPV & FR provisions
- Appointing Seed inspectors with more powers unlike that mentioned in Seed Act, 1966. No warrant or procedural safeguards shall be applicable
- Plant quarantine procedure need to be strictly followed during import of seed material with a permit from Plant Protection Adviser to the G.O.I
- Creation of data base on availability of seeds of different crops to assess the impact of exports on domestic availability of seeds
- Strengthening of testing and certification facility with international standards
- Encouraging seed production in non-traditional areas and subsidy to take up seed production in marginal lands

- Revocation of certificate under misrepresentation
- Recognition of Seed Certification Agencies in foreign countries
- Provision of appeals and establishment of an appellate authority

Annexure 5b
Highlights of the Seed Bill

The Seeds Bill, 2004 aims to regulate the quality of seeds sold, and replaces the Seeds Act, 1966.

All varieties of seeds for sale have to be registered. The seeds are required to meet certain prescribed minimum standards.

The Bill does not restrict the farmer's right to use or sell his farm seeds and planting material, provided he does not sell them under a brand name. All seeds and planting material sold by farmers will have to conform to the minimum standards applicable to registered seeds.

This page is organised as follows: The highlights of the Bill and the key issues to be considered are listed briefly first; the details of each are presented thereafter. Click here to see the highlights in detail, and here to see the detailed analysis of key issues.

If a registered variety of seed fails to perform to expected standards, the farmer can claim compensation from the producer or dealer under the Consumer Protection Act, 1986.

The Bill permits self certification of seeds by accredited agencies and allows the central government to recognise certification by foreign seed certification agencies.

Every seed producer and dealer, and horticulture nursery has to be registered with the state government.

Highlights of the Bill after the Official Amendments

- The Seeds Bill, 2004 aims to regulate the quality of seeds sold, and replaces the Seeds Act, 1966. All varieties of seeds for sale have to be registered. The seeds are required to meet certain prescribed minimum standards. Transgenic varieties of seeds can be registered only after the applicant has obtained clearance under the Environment (Protection) Act, 1986. In addition, the label of a seed container has to indicate specified information.

- The Bill exempts farmers from the requirement of compulsory registration. Farmers are allowed to sow, exchange or sell their farm seeds and planting material without having to conform to the prescribed minimum limits of germination, physical purity and genetic purity (as required by registered seeds). However, farmers cannot sell any seed under a brand name.
- If a registered variety of seed fails to perform to expected standards, the farmer can claim compensation from the producer or dealer. The Bill provides for setting up a compensation committee that shall hear and decide these cases. It also provides for an appellate mechanism to be set up by notification.
- The penalty for contravening any provision of the Act or selling misbranded or substandard seeds is a fine ranging between Rs 25,000 and Rs 1 lakh. The penalty for giving false information may incur a prison term for upto a year and/or a fine of upto Rs 5 lakh.

Official Amendments to the Seeds Bill, 2004

The government has circulated a list of amendments to the Seeds Bill, 2004. These amendments shall be voted upon when the Bill is taken up for consideration and passing. In Table below, is the comparison on the Seeds Bill, 2004 with the proposed amendments to the Bill.

Comparison of Seeds Bill, 2004 and the Amendments to Seeds Bill, 2004	
Seeds Bill, 2004	**Amendments to Seeds Bill, 2004**
Exemption of farmers	
The Bill exempted farmers from the requirement of compulsory registration. However, it stipulated that a farmer cannot sell any seed under a brand name and any seed sold by the farmer has to conform to the prescribed minimum limits of germination, physical purity and genetic purity.	The issue has been addressed by allowing farmers to sow, exchange or sell his farm seeds and planting material without having to conform to the prescribed minimum limits of germination, physical purity and genetic purity (as required by registered seeds). However, farmers cannot sell any

Defines a farmer as any person who cultivates crops either by cultivating the land himself or through any other person but does not include any individual, company, trader or dealer who engages in the procurement and sale of seeds on a commercial basis.	Expands the definition of a farmer by including any person who conserves jointly with any person any traditional varieties or adds value to such traditional varieties. Excludes farmers from the definition of producer.seed under a brand name.
Transgenic varieties	
No transgenic variety of seed would be registered unless the applicant has obtained clearance under the provisions of the Environment (Protection) Act, 1986.	In addition to this requirement, the registered seeds have to conform to specified standards for transgenic events and corresponding traits for transgenic seeds which registered seeds. Also, the label of a seed container has to indicate the above mentioned information.
Allows transgenic variety of seeds to be registered provisionally for two years if it has been cleared under the Environment (Protection) Act, 1986	This provision has been deleted
Registration of seeds	
Any type of seed for sale has to be registered with the Registration Sub-Committee. The registration is valid for 15 years for annual/ biennial crops and 18 years for long duration perennial crops.	Amended the registration time limit. The registration is valid for 10 years for annual/biennial crops and 12 years for long duration perennial crops
Central Seeds Committee	
Central Seeds Committee may specify minimum standard of germination, physical purity, and genetic purity applicable to registered seeds.	Amends the clause by stating that the central government may notify minimum standard on recommendation of the Central Seeds Committee.

Contd...

Compensation	
For all registered varieties, seed producers, distributors and vendors have to disclose the expected performance under	Amends the provision by setting up a Compensation Committee where farmers can claim compensation if seeds fail
Accreditation of Seed Certification Agencies	
Any seller of seeds can get the seed certified by the State Seed Certification Agency or any other accredited certification agency; self certification may also be permitted to accredited agencies. The accreditation shall be done by the CSC in consultation with state government and state seed committee.	Amends the provision by allowing only organizations owned or controlled by the central or state government to be accredited. The accreditation can be done only by the state government with prior approval of the central government.
Power of Seed Inspector	
The Seed Inspector does not require a warrant to take samples of any variety from a seed seller; send the samples for analysis to the Seed Analyst; enter and search any place where he has reason to believe that an offence has been committed against the provisions of the Act; and break open any container of seeds or any door where any such seed may be kept for sale.	The provision has been amended by adding that the prior written authorization of the District Magistrate is required by the Seed Inspector if he wants to enter and search a place
Penalties	
The penalty for selling substandard seeds is between Rs 5,000 and Rs 25,000. Increased the range of penalty to be between Rs 5,000 and Rs 30,000.	The penalty for giving false information is a prison term up to six months and/or a fine up to Rs 50,000. Increased the fine to Rs 1 lakh.
Source: Kaushiki Sanyal; April 20, 2010,Center for Policy research,www.prsindia.org	

Key Issues and Analysis after the Official Amendments

- The Bill does not specify whether the committees will be set up at the national, regional, state or district level; that decision would determine whether farmers can easily access the compensation mechanism.
- Every seed that is sold needs to be registered. It is not clear whether the registration is an exclusive right (similar to a patent). That is, whether a producer is permitted to produce seeds registered by a different producer.
- There is no provision for tracing back faulty seeds. This is in contrast to the provision of food articles in The Food Safety and Standards Act, 2006.
- That Act requires every person in the value chain to keep track of the preceding person, so that a faulty lot can be withdrawn.
- The financial memorandum does not include the cost required to establish central and state seed testing laboratories and for employing seed analysts and inspectors.

(http://www.prsindia.org/billtrack/the-seeds-bill-2004-104/)

Seed Bill 2011: Anti-Farmer, Pro-Agribusiness

Ever since the Seed Bill 2004 was introduced, it has met with severe opposition from farmers, who recognised it as an assault on their traditional rights over seeds. As a result, it was referred to a Parliamentary Standing Committee, which did recommend several amendments in keeping with the concerns of farmers' organisations. A 2008 edition of the Bill introduced in Parliament accepted many of these recommendations, but that Bill lapsed with the 14th Lok Sabha. Once again in 2010, the Cabinet approved a new edition of the Bill, and the Agriculture Minister moved several amendments in November 2010 and in February 2011. The Bill, incorporating the latest amendments, will now be called the Seed Bill 2011.

In response to outspoken protest, the Seed Bill in its latest amended shape explicitly states that it will not "restrict the right of the farmer to grow, sow, re-sow, save, use, exchange, share or sell his farm seeds or planting material," and it also specifies that the farmer is not to be included under the ambit of 'producer.' But it does restrict the farmer from selling such seeds or material under a brand name.

The Bill now defines the farmer as a cultivator of crops and also as "the person who conserves or preserves, severally or jointly with

any person, any traditional varieties or adds values to such traditional varieties through selection and identification of their useful properties." These amendments are, however, inadequate to protect the full traditional rights of farmers as cultivators, conservers, and breeders of new seed varieties. The Seed Bill must protect the rights of farmers to grow, breed, select, sow, re-sow, save, use, exchange, share, distribute or sell all varieties of seeds.

The Seed Bill in its present form cannot protect farmers from exploitative pricing or hoarding of seeds, because it has no provisions for price controls and fixing of royalty, nor for ensuring supply of seeds. In the last few years, farmers and many state governments have been challenging exorbitant pricing and royalty by companies like Monsanto. The AP Government had to slash the price of Bt-cotton seed by more than half of what Monsanto had fixed. Seed companies have gone to court challenging the right of state government to regulate prices and royalty. The Seed Bill must provide for stringent regulation of prices and royalty, as well as supply.

The Bill provides for compulsory registration and certification for all commercially traded seeds (barring farmer varieties). The Bill provides for registration for 10 years for annual and biennial seeds, and 12 years for long duration perennials. It also allows for re-registration. Effectively, therefore, it allows commercial marketing of registered seeds for 20 years for annual/biennial varieties and 24 years for perennials. This paves the way for seed monopolies by a back door route. This provision for re-registration must be deleted and the registration period further shortened.

Unlike the Protection of Plant Variety and Farmers Rights (PPVFR) Act, the Seed Bill has no provision for pre-registration publication of the application and for pre-grant opposition, in case members of the public know the seed to be spurious or sub-standard. Further, whereas the PVPFRA requires the declaration of parentage and pedigree of seeds, the Seed Bill does not. This will encourage piracy of seeds developed by famers or in the public domain. One of the most objectionable clauses – of provisional registration for transgenic seeds - has been deleted in the 2010-11 amendments.

The Bill requires compulsory certification of seeds (except farmer varieties) by accredited agencies owned or controlled by central or state governments. This is certainly an improvement on the 2004 Bill which allowed for "voluntary certification" and "truthfully labelled" seeds.

In spite of great opposition, the clause allowing the Central Government to grant recognition to recognition to foreign seed certification agencies has been retained. Foreign certification is unacceptable, simply because seeds must be tested for performance in Indian soil and climate conditions in multiple locations before being given registration.

The Bill stipulates multi-location locations to check the seed's performance, as a crucial pre-condition for registration. But which institution will be empowered to conduct these trials? The Standing Committee had recommended that only accredited government/semi-government/autonomous organisations, such as the Indian Council of Agricultural Research, State Agricultural Universities, conduct such trials. The 2008 edition of the Bill had accepted this amendment, but the 2010-11 version reverts to the 2004 Bill's provision for private "organizations fulfilling the eligibility requirements" to conduct the trials. This will undoubtedly lead to conflict of interest, wherein the tame in-house organisations of Monsanto-type private interests may qualify to conduct the trials on the seeds marketed by the same interests!

Similarly, the Bill provides for Central and State Seed Testing Laboratories. But while the 2008 version of the Bill had, in keeping with Standing Committee recommendations, excluded laboratories in the "non-government sector," the 2010-11 version again brings back the clause allowing seed testing laboratories "in the Government or non-Government sector."

A Central Seed Committee (CSC) will be constituted to oversee implementation of the Seed Act, and every State Government shall also establish a State Seed Committee. However, all states are not represented on the CSC, and farmers too are inadequately represented.

In the latest version of the Bill, Seed Inspectors will have to take prior written permission from District Magistrate to search any place where they believe the Seed Act is being violated. They will be empowered to break open doors or containers where seed is being stored. But, as a concession to apprehensions that these powers may be misused to harass farmers, the latest amendments require the Seed Inspector to conduct these actions in the presence of two independent persons from the locality.

The penalty for violating the Act, selling or importing misbranded seeds, or selling substandard seeds, is still fixed extremely low, at between Rs 25,000 and Rs 1 lakh, while the penalty for giving false

information will be a prison term of up to 1 year and a fine of up to Rs 5 lakh. Not only should the penalty be of a truly deterrent nature, there must be provision for blacklisting of offending individuals and companies.

The clause on penalties retains a loophole for any official of a seed companies, maintaining that he will not be liable to any punishment "if he proves that the offence was committed without his knowledge." Again, this provision in the 2004 edition was deleted in 2008, but brought back in 2010-11! This is nothing but an escape route for guilty officials. Also, the Seed Bill has no liability clause holding seed exporters responsible for compensation and clean-up in case of any pest outbreak.

The latest amendments in the Seed Bill allow the Central Government to exempt from the provisions of the Act "any educational, scientific, research or extension organisation." Unless this clause is restricted only to well-established public sector institutions, in-house 'research' institutions of private seed companies might seek and secure exemption!

The Bill does not provide for any time-bound mechanism for farmers to get a hearing for their complaints, nor does it set out any terms for compensation. Grievance redressal must be time-bound, and compensation should be fixed to cover costs incurred by the farmer, as well as the shortfall from the value of the expected yield and promised performance.

The Seed Bill in its present form stipulates no adequate safeguards to protect against 'terminator' seeds. It paves the way for GM (transgenic) seeds being researched and marketed by MNC seed monopolies, without putting in place any adequately stringent procedures for verifying bio-safety or safety for human consumption.

(http://www.cpiml.org/liberation/year_2011/august_11/policy_watch.html)

Annexure 6
Schemes relating to Seeds

Central Sector Scheme on Transport Subsidy for the movement of Seeds to the North-Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttaranchal and Hill Areas of West Bengal

Objectives
To ensure supply of seeds to the farmers in time at reasonable prices in the identified States.

Salient features
1. To subsidise the cost of transportation of seeds required by the farmers in the North Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttaranchal and; Hill Areas of West Bengal so as to make seed available at reasonable rate as prevailing in other parts of the country.
2. To make available seed well in time before sowing season to the farmers in above areas.

Pilot scheme on Seed Crop Insurance
Objectives
1. To provide financial security & income stability to the breeder/ seed growers in the event of failure of seed crop.
2. To strengthen confidence in the existing seed breeder/ growers and stimulate participation of new breeder/ growers to undertake seed production programme of newly released hybrid/improved varieties.
3. To provide stability to the infrastructure established by the state owned seed corporations/state farms.
4. To give a boost to the modern seed industry to bring it under scientific principles.

Salient features

To cover the risk involved in seed production at field stage, loss in expected raw seed yield, loss of seed crop after harvest so that more number of the breeder/ institutions/ organisations/ seed growers would take up and come forward in seed production.

Quality Control Arrangement on Seeds

Salient features

1. To establish the NSTC to impart training to the officials working in various discipline of seed industry. The proposed Seed Testing Laboratory would also act as Central Seed Testing Laboratory (CSTL) as required under Seeds Act,1996.
2. Strengthening of 25 Seed Development Organisations including State Seed Testing Laboratories (SSTLs) and State Seed Certification Agencies (SSCAs)
3. To provide secretariat support to Central Seed Committee (CSC) and Central Seed Certification Board (CSCB), statutory bodies established under Seeds Act 1966.
4. To provide financial assistance to CSTL.
5. To provide financial assistance to NSC/State Seeds Corporation for conducting training.
6. To provide financial assistance to strengthen the Seed Division of Department of Agriculture and Cooperation, Ministry of Agriculture.

Pattern of Assistance 100 per cent by Central Government.

Eligibility: State Seed Testing Centre (SSTCs) and State Seed Certification Agencies (SSCAs) having inadequate infrastructure facilities and quantum of seeds tested and certified.

Central sector scheme for implementation of legislation on plant varieties and farmers rights protection

Objectives

To provide requisite strength to the seed sector to fulfill the obligation under TRIPS agreement of WTO. The Scheme is in operation since 1999-2000

Salient features
1. Establishment of plant variety and farmers rights protection authority.
2. Strengthening and development of identified centers for various tests viz. Distinctness, Uniformity and Stability (DUS) for granting Plant Breeder's rights.

Implementation Status

The scheme is a statutory requirement for implementing of plant varieties and farmers rights legislation. The establishment of plant variety and farmers Rights Protection Authority will grant plant Breeder's Rights and cater to the need of entire India.

Seed Bank Scheme (2000)

Objectives

To make available seeds for contingent situations and also develop infrastructure for seed storage.

Salient features
1. Establishment of seed bank for maintenance of foundation and certified seeds of different crops to ensure timely availability of seeds to the farmers.
2. To take care of the special requirement of seed at the time of natural calamity
3. To create infrastructure facilities for production and distribution of quality seeds.

Other Schemes: Seed infrastructure & Seed production
- Production and Distribution Subsidy
- Distribution of Seed Mini-kits
- Macro Management of Agriculture (New Intervention).
- ISOPOM

PROMOTION OF QUALITY SEED THROUGH VARIOUS SCHEMES

- ***Technology Mission on Cotton.***

50% of the cost or Rs.50/- per kg. whichever is less for foundation seed production.

(ii) 25% of the cost or Rs..15/- per kg. whichever is less for Certified seed production.
(iii) Rs.20/- per kg. for certified seed distribution.
(iv) 50% of the cost limited to Rs.40/- per kg. seed treatment

- ***Technology Mission on Jute & Mesta.***

(i) 50% of the cost limited to Rs.3000/- per quintal for foundation seed production.
(ii) 25% of the cost limited to Rs.700/- per quintal for Certified seed production
(iii) 50% of the cost limited to Rs.2000/- per quintal for certified seed distribution.

- ***Integrated Scheme on Oilseeds, Pulses, Oil Palm and Maize***

Constraints in seed production

i). Seed infrastructure facilities relating to seed production, processing and storage requires improvement and substantial upgradation which requires high capital investment.

ii). Almost 80% of the seeds used in Indian agriculture is farm saved seeds. Systematic upgradation of the quality of farm saved seeds is required including training in seed production technology. Scheme such as Seed Village programme have been introduced to improve the quality of farm saved seeds.

iii). Frequent occurrence of natural calamities like drought, floods, etc. in one or the other parts of the country enhances the seed requirement of the affected area.

iv). Seed distribution is low and costly in the North Eastern States and other hill States which has an impact on overall agricultural production and nutritional security.

v). Seed quality control arrangements require upgradation and strengthening.

vi). Hybrid seeds capable of giving higher yield are not available for some important crops like Pulses. While hybrid of some other crops such as rice have not become popular on account of high cost of seeds and low purchasing power of the farmers.

Creation and Strengthening of Infrastructure Facilities

- To create/strengthen infrastructure facilities for production and distribution of quality seeds for the States/State Seeds Corporation financial assistance for creating facilities for seed cleaning, grading, processing, packing and seed storage is being provided in public sector

National Food Security Mission (2007)

Objective

In view of the stagnating food grain production and an increasing consumption need of the growing population, Government of India has launched this Centrally Sponsored Scheme, 'National Food Security Mission' in August 2007.

The major objective of this scheme is to increase production and productivity of wheat, rice and pulses on a sustainable basis so as to ensure food security of the country. The approach is to bridge the yield gap in respect of these crops through dissemination of improved technologies and farm management practices.

Rice

(i) Rs.1000/- per quintal or 50% of the cost whichever is less for certified hybrid rice seed production.
(ii) Rs.2000/- per quintal or 50% of Seeds cost whichever is less for certified hybrid rice seed distribution.
(iii) Rs.5/- per kg.. or 50% of the cost, whichever is less for certified high yielding varieties seed distribution.
(iv) Full cost of Seed Minikits of high yielding varieties.

Wheat

(i) Rs.5/- per kg. or 50% of the cost whichever is less for certified high yielding varieties seed distribution
(ii) Full cost of Seed Minikits of high yielding varieties.

Pulses

(i) Rs.1000/- per quintal for foundation and certified seeds production.
(ii) Rs.1200/- per quintal or 50% of the cost whichever is less for certified seed distribution.

(iii) Full cost of Seed Minikits of high yielding varieties

Rashtriya Krishi Vikas Yojna (2007)

In its meeting held on 29.5.2007, the NDC resolved to introduce An additional Central Assistance Scheme (now RKVY) that incentivizes states to increase public investment in Agriculture and allied sectors..

Key end goal – achieve at least 4.1% growth in agriculture by the end of XI Plan

Basic features of the RKVY

It is a State Plan scheme

The eligibility of a state for the RKVY is contingent upon the state maintaining or increasing the State Plan expenditure for Agrl. & Allied Sectors

The base line expenditure is determined based on the average expenditure incurred by the State Government during the three years prior to the previous year.

The list of allied sectors is as indicated by the Planning Commission

The preparation of the district and State Agriculture Plans is mandatory

Encourages convergence with other programmes such as NREGS, SGSY, BRGF, etc.

7. Pattern of funding is 100% Central Government Grant.
8. If the state lowers its investment in the subsequent years, and goes out of the RKVY basket, then the balance resources for completing the projects already commenced would have to be committed by them.
9. It will be an incentive scheme – allocations are not automatic
10. It will integrate agriculture and allied sectors comprehensively
11. It will give high levels of flexibility to the states – including approvals at the level of the state governments
12. Projects with definite time-lines are highly encouraged

Thrust on seed production

1. Madhya Pradesh,
2. Chhattisgarh,
3. Bihar,
4. Orissa,
5. Jharkhand,
6. Karnataka,
7. Assam,
8. Jammu & Kashmir,
9. Himachal Pradesh
10. West Bengal
11. All North-Eastern States

Annexure 7
Yield Characteristics of Selected Rice Landraces

Landrace	Origin Density	Pinnacle Grain (g)	1000 Weight Grains	% Sterile	Yield T/ha
Modern HYV (Lowland)					
Lalat	CRRI	172.20	28.30	10.50	4.80
Sabital	CRRI	139.53	30.20	7.90	5.60
Landraces (Lowland)					
Bahurupi	West Bengal	573.20	20.90	4.30	6.34
Baigana Manja	Odisha	493.08	16.05	4.67	5.61
Bishmoni	West Bengal	341.67	24.60	6.47	5.72
Bourani	West Bengal	412.70	24.20	3.30	5.51
Ghora-sal	West Bengal	312.67	27.75	5.10	5.58
Saline Land (Landraces)					
Lal Getu	West Bengal	230.80	24.25	11.20	3.61
Nona Khirish	Wst Bengal	206.33	33.20	5.60	3.73
Talmugur	West Bangal	200.00	31.25	5.40	4.34
Upland (Landraces)					
Basumati	Odish	313.00	15.95	6.00	4.82
Dhankadi deepa	Tamil nadu	304.33	24.30	8.80	5.10
Jhanjhi Aush	West Bengal	215.00	21.25	6.10	5.04
Lal Boro	West Bengal	227.33	22.05	5.00	3.70
Pitti Hidsk	Chhatisgarh	172.33	15.20	4.80	3.25

Source: Data from Basudha Farm (2011)

Comparative net rice obtained from paddy yields (per 100 kg)	
TRADITIONAL Variety Net rice (kg)	**HYBRID Variety Net rice(kg)**
Jhumkya 76.5	Saket – 470.0
Rikhwa 75.0	Dwarf 65.0
Thapachini 75.0	Dwarf 60.0
Ghyasu 74.0	
Source From Beej Bachao Andolan field records	

Comparative yields from some traditional and hybrid paddy varieties (per hectare)					
TRADITIONAL Variety	Yield(kg)	Fodder(kg)	HYBRID Variety	Yield(kg)	Fodder (kg)
Thapachini	7000	6600	Saket-4	6000	5000
Jhumkya	8800	8000	Dwarf	6400	8000
Lalmati	7000	5600	Kasturi	4000	3200
Nagmati	6000	6500	Sabarmati	6000	4800
Source: From Beej Bachao Andolan field records, http://beejbachaoandolan.org/wp-content/terragreen-bba.pdf					

Performance of traditional rice varieties versus conventional varieties (Nagappattiman District, Tamil Nadu)		
PARTICULARS	**TRADITIONAL VARIETIES**	**CONVENTIONAL VARIETIES**
1. Total expenditure for cultivating 1 acre (1 US$ = Rs. 49/-)	Rs. 4,800	Rs. 9,800
2. Yield of produce – Grain (kg) Yield of produce – Straw (kg) Total returns per acre	1,000 kg @ Rs. 8/kg = Rs. 8,000 1,200 kg @ Rs. 1/kg = Rs. 1,200 Rs. 9,200 (Rs. 8,000 + 1,200)	1,500 kg @ Rs. 8/kg = Rs. 12,000 1,850 kg @ Rs. 1/kg = Rs. 1,850 Rs. 13,850 (Rs. 12,000 + 1,850)
3. Net profit per acre (Total returns – Total Expenditure)	Rs. 4,400	Rs. 4,050

Contd...

4. Soil Fertility Status i. Nutrients availability ii. Soil microbial population	The study on organic farming with traditional varieties and conventional farming showed that the available NPK (nitrogen, phosphorous and potassium, respectively) contents in traditional rice variety cropped fields had increased while in the conventional plots, the contents had decreased. The analysis of soil samples from the selected organic experimental and conventional plots for the soil microbial population showed that the initial populations of microbes viz., bacteria, fungi and actinomycetes (general heterotrophic microorganisms, nitrogen and zinc-fixing micro-organisms in the soil) in organic plots found before planting had increased manifold during the crop growth phase
5. Pest population and disease index	The data recorded on attack of pests and diseases in selected fields of organic and conventional farms during the crop phase indicated that there were always less pests and diseases in organic farming fields than the conventional ones.

Source: Rajukkannu et.al, http://p7953.typo3server.info/uploads/media/ricediversityinindia.pdf

Annexure 8
Regulatory genes Used for Enhancing Drought tolerance of Plants

Genes	Species	Phenotype
DREB2/DREB3	Wheat and Barley	Drought and frost tolerance
OsWRKY45	Arabidopsis	Drought tolerance
SodERF3	Tobacco	Increased tolerance to drought and osmotic stresses
OsiSAP8	Rice/Tobacco	Tolerance to drought, salt and cold stresses
OsCIPK01	Rice	Drought, cold and salt tolerance
OsMYB3R-2	Arabidopsis	Drought, salt, freezing tolerance
Hvcbf4	Rice	Drought, salt, chilling tolerance
AREB1/ABF2	Arabidopsis	Dehydration tolerance
ZmDREB1A	Arabidopsis	Desiccation tolerance
ASR1	Tobacco	Decreased water loss: salt tolerance
DREB1A	Wheat	Delayed wilting under drought stress
ALDH3	Arabidopsis	Tolerance to dehydration, Nacl, heavy metals
OsCDPK7	Rice	Drought/salinity tolerance
Source: Dadlani, Tonapi and Kumar, 2011		

News Release: Gene Giants Grab "Climate Genes" : Amid Global Food Crisis, Biotech Companies are Exposed as Climate Change Profiteers; ETC group;

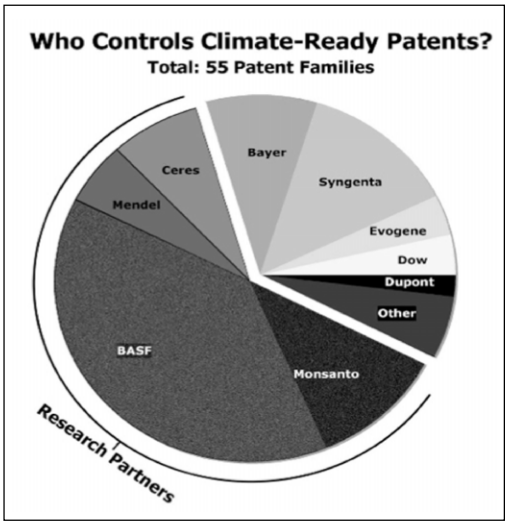
ETC Group, reveals that the world's largest seed and agrochemical corporations are stockpiling hundreds of monopoly patents on genes in plants that the companies will market as crops genetically engineered to withstand environmental stresses associated with climate change - including drought, heat, cold, floods, saline soils, and more.

According to ETC Group's report, ("Patenting the 'Climate Genes' . . . and Capturing the Climate Agenda,"), Monsanto, BASF, DuPont, Syngenta, Bayer and Dow - along with biotech partners such as Mendel, Ceres, Evogene and more - have filed 532 patent documents on genes related to environmental stress tolerance at patent offices around the world. A list of 55 patent families (subsuming the 532 patent grants and applications) is appended to the report.

ETC group warns that "in the face of climate chaos and a deepening world food crisis, the Gene Giants are gearing up for a PR offensive to re-brand themselves as climate saviours." The Group argues, however, that "patented techno-fix seeds will not provide the adaptation strategies that small farmers need to cope with climate change," and that the so-called "Gene Giants" are merely engaging in "climate change profiteering."
http://www.etcgroup.org/node/688

The focus on so-called climate-ready genes is a golden opportunity to push genetically engineered crops as a silver bullet solution to climate change. But patented techno-fix seeds will not provide the adaptation strategies that small farmers need to cope with climate change. These proprietary technologies will ultimately concentrate corporate power, drive up costs, inhibit independent research, and further undermine the rights of farmers to save and exchange seeds.

The Gene Giants are staking sweeping patent claims on genes related to environmental stresses – not just those in a single engineered plant species – but also to a substantially similar genetic sequence in virtually all engineered food crops. Beyond the U.S. and Europe, patent offices in major food producing countries such as Argentina, Australia, Brazil,



Canada, China, Mexico and South Africa are also swamped with patent filings. *Monsanto (the world's largest seed company) and BASF (the world's largest chemical firm) have forged*

a colossal $1.5 billion partnership to engineer stress tolerance in plants. Together, the two companies account for 27 of the 55 patent families (49%) of those identified by ETC Group.

http://www.etcgroup.org/content/patenting-climate-genes-and-capturing-climate-agenda

Dr. Alan Bennett, a plant geneticist at the University of California, Davis and the head of the Public Intellectual Property Resource for Agriculture (PIPRA), a non-profit initiative supporting agricultural innovation for both humanitarian and small-scale commercial purposes, put the debate between the ETC Group and the agricultural-biotech industry into some perspective in the Nature News report. Calling the introduction of the global warming angle nothing more than a public relations stunt, Dr. Bennett observed that the agricultural-biotech industry was merely engaging in business as usual; namely, focusing on the search for hardy crops that survive in harsher environments (i.e., poor soils, less water, fewer fertilizers), and the genes responsible for conferring such traits.
http://www.patentdocs.org/2008/05/etc-group-oppos.html

Annexure 9
Case Studies on Selected Community Seed Banks

Navdanya

Website: www.navdanya.org

Navdanya started as a program of the Research Foundation for science, Technology and Ecology (RFSTE), a participatory research initiative founded by world-renowned scientist and environmentalist Dr. Vandana Shiva, to provide direction and support to environmental activism.

Navdanya means nine crops that represent India's collective source of food security. The main aim of the Navdanya biodiversity conservation programme is to support local farmers, rescue and conserve crops and plants that are being pushed to extinction and make them available through direct marketing.

Navdanya, a women centred movement for the protection of biological and cultural diversity based on the premises that conserving seed is conserving biodiversity, conserving knowledge of the seed and its utilization, conserving culture, conserving sustainability. Navdanya is a network of seed keepers and organic producers spread across 16 states in India.

Navdanya has a primary membership of more than 5,50,000 farmer families in sixteen states of India namely Uttarakhand, Uttar Pradesh, Himachal Pradesh, Haryana, Rajasthan, Jammu & Kashmir, Madhya Pradesh, Bihar, Jharkhand, Maharashtra, Orissa, West Bengal, Tamil Nadu, Kerala and Karnataka. As a result of their effort, more than 2,00,000 farmers have been converted to organic farming in different parts of the country. It has, trained over 5,00,000 farmers in seed sovereignty, food sovereignty and sustainable

agriculture over the past two decades, and helped setup the largest direct marketing, fair trade organic network in the country.

Over past two decades Navdanya has helped set up 65 community seed banks across India with partners including:

- Beej Bachao Andolan in Uttar Pradesh,
- Green Foundation, Navdarshanam and Centre for Tropical Ecosystems, all three in Karnataka,
- Rishi Valley in Andhra Pradesh,
- Centre for Indian Knowledge Systems in Tamil Nadu,
- Vrihi in West Bengal,
- Prakruti Paramparika Bihana Sangarakhna Abhijan in Orissa,
- Kisan Samvardhan Kendra in Madhya Pradesh,
- Kisan Vigyan Kendra in Banda, Uttar Pradesh,
- Indian National Trust for Art and Cultural Heritage, CISSA and the Environment collaborative in Kerala,
- Jharkhand Alternative Development Forum and Manavi in Jharkhand
- Women's Alliance and Ladakh Ecology Group in Jammu & Kashmir.

Navdanya has also set up a learning center, Bija Vidyapeeth (School of the Seed) in Ramgarh village on the outskirts of Dehradun,. It is spread over 45 acres, most of which is used to study farming practices. It also houses a massive "seed bank", which contains more than 1,300 varieties of indigenous seeds, including more than 500 varieties of rice and over 100 varieties of wheat.

Till date it has conserved 3,000 varieties of rice. Navdanya's seed bank in the farm at Dehradun preserves 500 land races of paddy, 80 land races of wheat, 11 land races of barley, 5 varieties of barnyard millet, 10 varieties of oats, 6 varieties of finger millet, 3 varieties of foxtail millet and 7 varieties of mustard.

Till date Navdanya's conservation farm has protected 12 genera of cereals and millets, 16 genera of legumes and plants, 50 genera of vegetables, 7 genera of oil yielding plants, 13 genera of spices and condiments, 20 genera of aromatic plants, 54 genera of fruit and flower yielding plants and 250 genera of ornamental, timber and medicinal plants.

The seed bank is Navdanya's most crucial tool to protect India's biodiversity. In fact, setting up community seed banks across India was one of the first priorities of the organization. The seed banks

also lend farmers in the area as much seed as they need for free. If the crop from these seeds is successful, the farmer is required to give 1.25 times the amount of seeds he got in the first place back to Navdanya or to other farmers in the area.

Through extensive research among farmers whose crops did not fail in the event of a natural disaster, Navdanya has amassed saline-resistant, flood-resistant and drought-resistant seeds. Navdanya has provided

- saline resistant seeds to Orissa after the cyclone
- drought resistant seeds to Bundelkhand after the drought and
- flood resistant seeds to Bihar after the floods

Helped setup the largest direct marketing, fair trade organic network in the country. As part of their effort, 2,00,000 farmers have been converted to organic farming in different parts of the country.

Till date Navdanya has formed more than 5000 Jaiv Panchayats in different parts of the country. They have their own Community Bank Registers (CBRs) wherein they register the diversity and knowledge that exist in their village. It has organized more than 50 international courses on Biodiversity, Food, Biopiracy, Sustainable Agriculture, Water, Gandhian philosophy, Globalization, IPRs, Business Ethics, Grand Mothers University etc.

Navdanya is actively involved in the rejuvenation of indigenous knowledge and culture. It has created awareness on the hazards of genetic engineering, defended people's knowledge from biopiracy and food rights in the face of globalisation and climate change.

Medak Woman Farmers -Deccan Development Society
Location: Andhra Pradesh
Website: www.ddsindia.com
Empowerment of Dalit women with seeds banks

It all started with the Deccan Development Society (DDS), a non governmental organisation (NGO) visiting the Dalit people in the semi arid belts of Medak district in Andhra Pradesh about 25 years ago. At that time, most of them were landless peasants, and if at all they had a small piece of land, they had to beg for seeds. They had also forgotten the age old way of cultivating the semi arid land with intercropping growing many crops placed alternately on the land, at the same time.

DDS initially tried to organise the men folk, providing finance and training to improve their farming practices. But it failed due to poor repayment of loans and low level of development. It was then that the NGO hit upon the idea of working with the women. After helping the women financially to buy seeds and start cultivation initially, DDS advised them to start their own sanghams, and it was at one of the sangham meetings that the women decided to have a common seed bank.

The women themselves have developed their own unique 'crop financing' through a community seed bank, where membership is a fistful of grain. Those who borrow grains from the bank must then pay back five times the amount owing in grain. The total amount of grain is sifted for good seeds and the rest is sold on the open market or back to members at lower rates, or distributed to poor families. Money earned at the market is deposited into a regular bank and the earned interest helps to finance future loans to members. Over 50 different varieties of seeds - millets, wheat, red gram, linseed and sorghum - are now stored at the bank.

From the seed bank, if a farmer borrowed a kilogram of seeds, she had to repay two kilos after the harvest according to the sangham's arrangement. In two years' time the number of villages that had seed banks went up from 18 to 55. Instead of borrowing seeds from landlords, women starting getting seeds from seeds banks but in the

last five years, seed banks have also become redundant and therefore defunct in around 27 villages! Every woman has become a seed banker, rather they have achieved seed sovereignty. Today, DDS works with 5000 women farmers and none of their farmers borrow seeds from the seed banks. "Only farmers and NGOs from the nearby regions come and collect seeds from these banks.

In the early 1950s, there were 100 different varieties of crops grown here. By the 1980s, it had shrunk to 20-25 varieties. In the mid-1990s, DDS took a decision to revive the diversity. With the number of varieties of seeds going up to 85-90 and women starting seed banks in their villages, DDS found that it was time to spread the message to the nearby villages too. So they started the mobile seed bank trips where farmers went around the nearby villages in their colourful bullock carts to create awareness. The culmination of the mobile bank's journey is celebrated as the bio-diversity festival every year now. In 30 days, the carts covers around 70 nearby villages across 60 to 80 kilometres. The procession on February 13 were the culmination of their successful journey. The mobile seed banks celebrates the liberation of the Dalits from the clutches of the rich upper caste landlords and their total dependence on them for seeds to sow in their small pieces of land. It was also the celebration of empowerment of Dalit women as they goes around with the seeds, and women videographers who shows what they had documented to the other villagers.

For the women who originate from 75 villages across the region, switching to organic agriculture was the best logical choice to fight climate change. But the scheme has not only helped the women earn extra income, it has also given them a sense of dignity and pride. It has led to positive social changes and instrumental in proving better education, healthcare apart from bringing economic and social upliftment for women. They created common plots for medicinal plants to learn and teach the healing arts and started a green school "pathaasale" and "night school" for Dalit children.

DDS women run their own "media trust," learning and teaching videography through which they are documenting their journey, as well as their own community radio station that broadcasts tips on ecological farming, health, raising trees, and other relevant information. DDS has been instrumental in training these women in filmmaking. They have produced documentaries on organic farming, seed sovereignty, bio-fertilisers, dangers of BT Cotton, critical farm

practices and these videos have been screened worldwide. Some women who once worked as a labourer, now travel to abroad demonstrating their methods to local farmers. Others, who went begging for work and food have their own land, house and married their daughters or provide education to children.

The community does not pay a predatory external certification agency for certifying its produce. It has. The grains are certified by the third-party global Participatory Guarantee Scheme (PGS)'s Organic India Council, and are being sold with overwhelming success - a far cry from the low-paying, menial jobs that many of these women once held.

The women have gained immensely from rejecting the mainstream market through establishing their own autonomous local market. This market has defined for itself what it wants to buy and sell. On its shelves are traditional local millets such as foxtail millet, little millet, kodo millet along with pulses and oilseeds. This market is a true mirror reflection of the ecological, biodiverse farming systems of the owners of market [3000+ women farmers]. The market has rejuvenated this farming system and on its strength reintroduced more than 60 crop varieties which the region had lost because of the compulsions of the external markets. It is growing by at least 20 percent a year

Like two-thirds of Indian farming, there's no irrigation here. Rain matters a lot. When author Frances Moore Lappe asked them (June 2012), whether they were worried about climate change bringing more drought...they replied… "No. We know what to do. If rainfall is cut by half, we know which seeds will work. If it drops more, we have other seeds. We have achieved food sovereignty. From the sanghams what we've gained most is courage." The women farmers of the region took a vow that they would never allow any genetically modified (GM) seed to enter their villages. They have conducted several meetings in the villages to make all women aware of the impact of GM seeds.

A few years ago, DDS calculated that the women's leadership has meant the production of almost three million extra meals each year, as well as almost 350,000 additional days of employment in their villages. And that same leadership is re-balancing gender relationships, radically reducing domestic abuse.

Vrihi

LOCATION: BARRACKPORE, KOLKATA, WEST BENGAL, INDIA

Website: *www.cintdis.org/vrihi*

In February 2009 Vrihi received the National Plant Genome Saviour Award from the Plant Variety Protection & Farmers' Rights Authority, Government of India.

In 1997, the Indian ecologist Dr. Debal Deb established Vrihi (Sanskrit name for rice), the first non-governmental rice seed bank in West Bengal.

Farmers Exchanging Seeds at Vrihi

Since 1960 West Bengal has lost over 5100 land races of rice due to a move to a monoculture system involving HYV of green revolution that rely on substantial inputs of agrochemicals and water. In view of the failure of all ex situ rice seed banks to protect the erosion of rice genetic diversity, Center for Interdisciplinary study(CIS) established Vrihi (Sanskrit name of "rice"), the first non-governmental rice seed bank for farmers, in 1997. Vrihi Beej Binimoy Kendra is the largest folk rice seed bank in eastern India, established not only to promote cultivation of folk rice varieties, but also re-establish the vanishing culture of non-commercial seed exchange.

Extensive field surveys in remote parts of the country in search of heirloom crop varieties reveal that an astonishing genetic diversity of rice (and other crops) still survives in indigenous societies where seed exchange continues. Some folk rice varieties were also conserved by indigenous farmers due to their cultural value.

After an extensive search over 14 years for extant rice varieties in West Bengal and a few neighbouring States, Dr. Debal Deb was able to rescue only 610 rice landraces from marginal farms. All others have disappeared from farm fields. The seed stock of vrihi is composed of hundreds of rice samples donated by farmers and scientist, from interior villages of India and abroad with an understanding that folk crop genetic diversity would ensure the country's food security, many farmers have come forward to donate seeds, and pledged to save and exchange those seeds.. By the end of 2008, the number of folk rice varieties in Vrihi's collection has exceeded 700. According to Deb,

some of the folk rice varieties conserved at Vrihi possess "unique therapeutic properties".

Vrihi's collection has thus expanded by accessions from interior villages of West Bengal, Bihar, Orissa, Jharkhand, Assam, Meghalaya, Tripura, Nagaland, Arunachal Pradesh, Chhattisgarh, Maharashtra, and Tamil Nadu. Rice samples from Bangladesh, Nepal, Pakistan and Italy, donated by farmers and scientists abroad have enriched Vrihi's stock. By the end of 2008, the number of folk rice varieties in Vrihi's collection has exceeded 700.

With over 600 traditional rice varieties cultivated in situ and distributed freely to farmers from 18 districts, Vrihi has become the largest rice seed exchange center in eastern India. Any farmer can receive any indigenous rice variety, free of cost, from Vrihi seed bank at Panchal. Vrihi assist farmers who intend to take rice seeds in choosing the rice varieties appropriate for his/her farm's land type, and soil characteristics, and local climatic conditions.

In order to receive seeds from Vrihi the farmer must give, in exchange, seeds of at least one folk rice variety (about 1 kg), which would then be passed on to another farmer. In case the farmer does not have any folk variety seeds to exchange, (s)he must pay a 'security deposit' for obtaining a packet of 1 kg of seeds. A paper receipt is issued against this payment, which is refunded when the farmer returns 2 kg of that rice after harvest. This arrangement is to ensure cultivation and multiplication of the seeds.

Vrihi documented India's first copyrighted biodiversity register of folk rice varieties in 2000. The copyright is held by Vrihi as a consortium of farmers who cultivate and exchange the rice varieties on their farms. The register gives a list of all farmers who either donated or received different rice seeds for in situ conservation. An enlarged and updated version of this register, incorporating description of characteristics of 416 rice landraces, was published in 2005

The traditional rice varieties were cultivated on basudha farm (= 'earth mother' in bengali), a small (1.7 acre) farm in the midst of paddy fields close to a forest in southwest bengal. Now it is shifted to Odisha

Basudha aims to conserve bengal's vanishing rice varieties; encourage, demonstrate and support organic farming and traditional methods of multiple cropping; and preserve and develop local knowledge of biodiversity and its uses. Trying To Secure An Alternative Farming Future For The Country

At Basudha, farmer-researchers have developed eight new varieties through crossing and selective breeding of various landraces. Basudha is a partner of the nationwide anti-WTO movement, and locally engaged in non-formal education and heuristic science teaching for the rural youth.

Basudha's activities:

- Saves more than 600 rice land races and are growing all these rice varieties and 20 other crops in their own farm. Documents their agronomic and morphological characteristics and cultural uses to prevent biopiracy.
- Study their optimal growth conditions and record their associated biodiversity
- Basudha also gives practical training in ecological agriculture Acts as the base for awareness of the benefits of organic farm management through in-situ demonstration, farmers meet, posters, skits and folk songs. Demonstrations include different techniques of composting, mulching, cover crops and multi cropping.
- The farm created on a dry waste land, has developed without the use of synthetic chemicals into a highly productive organic farm producing diverse indigenous crops

Center For Indian Knowledge System (CIK)
Website: www.ciks.org
CIKS community seed bank project aimed at:

- identifying important traditional seed varieties
- orienting the agricultural community towards conserving and cultivating them- currently, focusing on indigenous paddy and vegetable varieties.
- enhance the livelihood security of small and marginal farmers through conservation of indigenous genetic resources and empower them with organic farming technologies

The strategies involve

- Setting up farmer's community seed banks for seed exchange, distribution and utilization.
- Setting up an in-situ conservation centre for the preservation of these varieties.
- Evaluation, characterisation and multiplication of these varieties involving the community, namely the farmers

- Survey, collection and documentation of Indigenous grain varieties
- Encouraging farmers to grow these indigenous varieties organically
- Creation of awareness in the community.
- Setting up organic farmers sangams (37 presently) in villages to maintain and run community seed banks and drive seed conservation effort
- providing certain agricultural implements like sprayers, tarpaulin sheets for drying grains which is hired out for a nominal rate
- Mintaining subscription in Bank Account
- Marketing support through Arogyam scheme.

So far 37 organic farmers sangams have been established for the cause of organic farming and indigenous seed conservation.The sangam members pay a monthly subscription which is maintained in a bank account. The sangams maintain the village community seed bank. The borrowing and returning is controlled by the sangam.

Sangams also provide certain agricultural implements like sprayers, tarpaulin sheets for drying grains which is hired out for a nominal rate. Some sangams also run biopesticide units as an income generating activity

A network of farmers are organized for exchange of seeds and exchange of information. Participants of the farmers seed bank then put aside a part of their land towards conservation of indigenous grain varieties. They are then provided with the initial supply of seeds, which are procured from the farmers who are already cultivating them in the local area and surrounding areas.

Farmers who are interested in cultivating these varieties are given the technical know-how of manuring their field organically, treating pests by natural control methods etc. At the end of the season the farmer then returns twice the quantity of seeds that he had taken from the seed bank. These seeds are the given to other farmers in the next season and this has a multiplying effect.

The seed bank is organized in such a fashion that the collection made creates a revolving fund and the community takes over the management of it in due course of time.

Some of the activities involve

Setting up of in situ conservation centres :

Plots are chosen in study areas where indigenous varieties are multiplied in-situ. This is done in addition to multiplying grain varieties in the farmer's fields. This in-situ centre also serves as a demonstration plot. It also enables us to multiply varieties which are rare and those varieties where the quantity of seeds are less.

Creation of awareness in the community:

An important component of this programme is the creation of awareness in the community about the diversity of traditional varieties and their importance.

To achieve this, the following efforts are being made:

- Organising illustrated talks and competitions in schools.
- Students in rural areas are asked to provide and collect information regarding indigenous varieties grown in the area, the farmers who grow them, the characteristics of the varieties etc. They are also asked to collect samples (seeds, ear heads) of these varieties.
- Students are then asked to make presentations of their work along with displays and incentives and prizes are provided for the best entries.
- These competitions serve a two fold purpose - by creating an awareness among the student community regarding biodiversity conservation and it also provides leads to farmers who are cultivating indigenous varieties.
- Distribution of educational material and pamphlets through various schools and voluntary agencies in the locality.
- Charts, posters and educational material, displays of traditional varieties are arranged in stalls during village fairs and festivals.

Gene Campaign- Gene Seed Banks

Website: www.genecampaign.org

Gene Campaign, a leading NGO in India, has recently completed a project in the preservation of plant genetic resources in tribal areas of Ranchi, Hazaribagh and extending to Nalanda and Nalanda districts of Bihar.

One of the major goals of this project was germplasm conservation through the setting up of Gene-Seed Banks. Five Gene-Seed Banks

have been set up in Kacchabari, Kulli, Pannakhunti, Icchak and Birsa Agriculture University.

Another three are proposed in Adampur, Kerua in Nalanda and Ganeshpura in Ranchi district.

A total of 1,782 samples of traditional varieties of rice, millets, legumes and vegetables have been collected, characterised and processed for storage in the Gene-Seed Banks.

These consist of 1,613 varieties of rice, 7 varieties of millets, 90 of legumes and 72 varieties of vegetables. More and more farmers are showing interest in cultivating traditional rice at least in part of their land.

Over 1,350 farmers have taken 600 traditional rice varieties from the Gene-Seed Banks to cultivate in their fields. This is a good indicator for on-farm conservation.

These Gene Banks are administered by special committees-Beej Bank Sanchalan Samitisor Gene/Seed Bank Management Committees set up at the block level. The committees work under the guidance of Gene Campaign. They are to be ultimately responsible for collection, processing and storage of collected samples, for distribution of samples among farmers for seed renewal and for returning for cultivation in farmers' fields.

Gene Campaign teams along with village youth visit villages and conduct meetings on issues like the need for gene-seed banks and importance of conserving traditional varieties. In Uttaranchal, Gene-Seed Bank has been set up in the village Orakhan in Ramgarh block.

The GREEN Foundation
Webaddress: http://www.greenconserve.com/

The GREEN Foundation is a community-based organization that has been working since the early 1990s with about 4200 households of small and marginal farmers spread across 109 villages in Thally Block, Dharmapuri District, Tamilnadu and Kanakpura Taluka, Ramanagara District, Karnataka. It aims to preserve and promote agro-biodiversity in this region by conserving seeds of indigenous varieties of plants. In order to do this, the foundation introduced and promoted the concept of community seed banks in conjunction with other organizations working at the grassroots level with farming communities among small and marginal farmers where they could conserve, borrow, lend and multiply their seeds.

According to Dr.Vanaja Ramprasad, seed bank is not just a store house where seed is kept for distribution or marketing or a sophisticated storage facility which is controlled for temperature and humidity. It is an important self-help strategy for maintaining genetic diversity in crop and plant species on farms. It is also a system in the process of community agriculture which includes village level facilities, a garden or field where traditional varieties are safeguarded. Through this system, farmers have played a key role in the creation, maintenance and promotion of genetic diversity. They have developed skills to meet their specific needs such as quality, resistance to pests and pathogens, adaptation to soils, water and climate etc. Under this system local farmers have established their own seed networks to facilitate seed supply to their families and local markets.

Seeds are given free of cost to members of a seed bank. Any one from the community can become a member by paying a nominal annual fee. The member then sows the seed, harvests the crop, and later returns to the seed bank twice the quantity he received to replenish the store. The seed bank also works on seed treatment, seed selection, maintaining a record of needs, and planning for the next season.

The seed banks are managed by women's groups. The women have the capacity to select the seeds, store the seeds and maintain the germination to the level of improving their performance. Seeds are distributed to the farmers and in return twice the quantity is received to replenish the store. Their work involves the process of seed mapping which is to gather information about the varieties of seeds that had become extinct or fallen into disuse and then collecting small quantities of them. The foundation then multiplies these seeds by growing them on small plots of lands and setting up seed banks.

Among the various methods adopted by the foundation for this purpose, on-site conservation involves distribution of seed diversity among farmers, monitoring it using cards and then collecting them after the season. Seed bank register, monitoring card and in-situ farmers' list are maintained as part of conservation activity. The farmer is also encouraged to put aside part of her/his seed supply for sowing, farmer to farmer exchange and for selling in the market.

The Green Foundation also organizes seed fairs, seed yatras and exposure visits where farmers interact and understand the need to conserve agro-biodiversity and also get an opportunity to exchange seeds.

Beej Bachao Andolan

Contact:
Vijay Jardhari
Beej Bachao Andolan
PO Nagni, Tehri Garhwal
Uttaranchal, India

The hallmark of the BBA is that it is a people's campaign and flourishing without any government financial assistance or help, Beej Bachao Andolan is a non-registered organisation. The movement aims at promoting agricultural biodiversity and sustainable agriculture through old agriculture practices.

The *Beej Bachao Andolan*, or Save the Seeds movement began in the late 1980s as a group of activists from the Henwal River Valley in Tehri district (Uttarakhand, India), led by Vijay Jardhari, drew links between the erosion of agricultural biodiversity and rural livelihoods, and sought to preserve the people's cultural and scientific patrimony, as well as fight back against agrarian policies that favour corporate agribusiness at the expense of small farmers.

Shri Jardari, a farmer and social activist from Jardhargaon realised that modern agriculture was destroying traditional farming. Crop yields of the 'high-yielding varieties' in modern agriculture were actually low and soil fertility was declining, leading to an increasing dependence on toxic chemicals. Along with other activists of the Chipko movement, this activist formed the BBA to promote traditional agriculture and crop varieties.In the valley of Ramasirain, Uttarkashi district, farmers were growing a distinctive variety of red rice called chardhan. The rice was nutritious and suited to local requirements and conditions. Farmers also grew indigenous varieties like thapchini, jhumkiya, rikhwa and lal basmati. Agriculture here was untouched by modern practices and good yields were obtained without the use of chemical fertilisers and pesticides. What the farmers here were doing was avoiding monocultures in a method called baranaja (12 grains) that involves the multicropping of a number of cereals and legumes. This diversification is security against drought and crop failure. Different crops are harvested at different times of the year and ensure year-round supply of food. This also maintains soil fertility and replenishes nitrogen.

Today BBA has about 150 varieties of paddy from which 100 different varieties can still be grown. Of these, tapachini and jhamcha yield about 72 quintals per hectare. BBA has also collected 170

varieties of rajma. Effective pest control is accomplished by using the leaves of the walnut and neem, and the application of ash and cow's urine. The use of traditional farming methods and seeds has resulted in higher yields, improved health of humans and livestock, and the increased conservation of soil fertility and agro-biodiversity.

Beej Bachao Andolan activists have resolved to undertake the following:

- **Value Traditional Knowledge and Wisdom** that ensures sustained survival and well being of agriculture and people.
- **Practice Principles of Traditional Agriculture** that maintain a balance between man, animal, plant, water, air and earth.
- **Preserve the Sociology of Traditional Agriculture** that enables self-sufficiency, yet also inter-dependence within society, lending collective support to individual efforts.
- **Conserve Forests** that provide food and fuel to the people, fodder to the cattle, fertilizer to the fields, and water to the springs and rivulets.
- **Conserve Biodiversity** which cuts risks, enhances food security and promotes a healthy variety to life.
- **Prevent the Poisoning of the Earth**, its denizens and life-support systems, from the use of chemical fertilizers and pesticides in agriculture.
- **Help People Wrest Control** over natural resources for their common good.
- **Demand Legal Farmer Status for Women**, the true keepers of holistic, sustainable agriculture.
- **Seek Recognition** for small farmers in their capacity as providers to the nation.
- **Seek Scientist Status for Farmers** who have tried, tested, improved upon and sustained the various facets of a healthy, sustainable agriculture through the history.
- **Seek Direct Representation of Farmers** in policy decision making.

Activities undertaken

- There were over 3000 varieties of wheat in Garhwal before the Green Revolution. Now these are down to 320. To date, they have collected some 200 varieties of kidney beans, 100 of paddy, seven of wheat - to mention just a few.
- (Baranaja) had suffered a major jolt after the Green Revolution. Baranaja (literally meaning twelve grains) system of traditional

mixed farming, has made a comeback in the agriculture fields in the hills. This is a traditional practice of growing a combination of cereals, lentils, vegetables, creepers, and root vegetables.

- Incidentally, many of indigenous seeds yield more in fewer days than the high yield variety of seeds. Like the Gorakhpuri Paddy of Tehri takes 95 days to harvest and yields 35-40 quintals per hectare. "
- The Beej Bachao Andolan has prepared a comparison chart of high-yielding varieties of seeds and traditional seeds to clear the confusion among farmers.

Annexure 10
Experts Interviewed
(please offer more inputs if you are aware)

Dr. Ashish Ghosh
Presedent, Society for Environment and Development (ENDEV)
Ex-Director, Zoological Survey of India
Kolkata

Dr. N.S. Dadlani
Director, National Seed Association of India
Delhi

Dr. Devender Sharma
Distinguished food and trade policy analyst
An award-winning Indian journalist
writer, thinker, and researcher
Delhi

Ms. Shalini Bhutani
Lawyer
Delhi

Dr. Suman Sahai
Padma Shri, 2011
Convener, Gene Campaign
Delhi

Dr. Vanaja Ramprasad
Founder and Director
Green Foundation
Bangalore

Shri Vijay Jhardari
Beej Bacahao Andolan
(Former member- Chipko Movement)
Tehri, Garwal
Uttaranchal

Dr. Vilas Tonapi
Head and Nodal Officer,
Division of Seed Science and Technology
Indian Agricultural Research Institute
New Delhi

Annexure 11
Agreement on Establishing the SAARC Seed Bank

PREAMBLE

The Governments of the SAARC (South Asian Association for Regional Cooperation) Member States, comprising Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka, hereinafter referred to as "Member States";

Recognizing the importance of regional and sub-regional collective self-reliance in Agriculture with respect to attaining Seed Security as a means of ensuring Food Security, particularly addressing the adverse effect of natural and man-made calamities;

Inspired by the directives of the Thirty-seventh session of the Standing Committee and Sixteenth SAARC Summit (*Thimphu, 28-29 April 2010*) for expeditious action on regional collaboration in the seed sector in mutual spirit and benefit and based on the principle of collective self-reliance;

Recognizing *further* that the establishment of a Regional Seed Bank *inter alia* may contribute to the objective of harmonized seed testing and certification, facilitate seed trade within the region by Member States, and would thereby contribute to attaining respective Food Security;

NOW, *THEREFORE*, in the spirit of solidarity and mutual cooperation, have agreed as follows:

ARTICLE I
Establishment of the SAARC Seed Bank

1. The Member States hereby agree to establish a SAARC Seed Bank *(hereinafter referred to as "the Seed Bank")* for the purposes and on the conditions described in this Agreement.
2. The Seed Bank shall be administered by the SAARC Seed Bank Board (*hereinafter referred to as "the Board")*, as provided for in **Article XIII.**

ARTICLE II
Objectives

1. The objectives of the Seed Bank shall be:
   a. to provide regional support to national seed security efforts; address regional seed shortages through collective actions and foster inter-country partnerships.
   b. to promote increase of Seed Replacement Rate (SRR) with appropriate varieties at a faster rate as far as possible so that the use of quality seed for crop production can be ensured; and
   c. to act as a regional seed security reserve for the Member States.

ARTICLE III
The Seed Replacement Rate

1. The Member States will undertake planned approach to increase Seed Replacement Rate at a faster rate, as far as possible, to ensure supply of quality seed.
2. The Member States will produce quality seed beyond the quantity planned to meet the SRR and the Seed Reserve.

ARTICLE IV
The Common Varieties

1. Member States will collaborate with each other in the development of list of a common variety(ies) of major priority/identified crops while recognizing the need to preserve the local/indigenous varieties, as may be appropriate.
2. Member States, in order to develop a list of common variety(ies), will take part in adaptive trial in agreed/identified agro-ecological areas/zones in the Region, to be facilitated by the Seed Bank.

3. To operationalise the Regional Seed Bank, the Framework for Material Transfer, shall be applicable with a view to facilitate easy movement of seed and plant materials across the Member States.

ARTICLE V
Maintaining Seed Quality

1. Member States will develop a Common Minimum Seed Quality Standard (CMQS) and Seed Testing Procedures for different quality attributes (of all the crops) e.g. genetic purity, germination capacity, physical purity, moisture content, seed health or others as specified by the Board, keeping conformity with the ISTA procedures.
2. Member States will seek to develop a common Seed Certification system and standard.
3. Member States will designate respective Nodal Laboratory(ies) and undertake activities to improve Seed Testing capacities and capabilities in each country.
4. Member States will update and harmonize, in due course, the relevant Acts, Rules/Regulations, Orders regarding all aspects of Seed e.g. Quality Control, Seed System Management.
5. Member States will seek to develop harmonized procedure on transgenic varieties in due course.

ARTICLE VI
The Reserve

1. The Seed Reserve, to be maintained under the Seed Bank (*hereinafter referred to as "the Reserve"),* shall consist of quality seeds of the Common Variety(ies) of rice, wheat, maize, pulses, and oilseeds[1] (*hereinafter referred to as "seeds", as referred to in Art. IV*) earmarked by the Member States, exclusively for the purpose described in **Article VIII.**
2. The Reserve shall remain the property of the Member State, which has earmarked it, and shall be in addition to any national reserve that may be maintained by that Member State.

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1. Initially, collaboration would begin with Rice, Wheat, Pulses and Oilseeds as they remain most critical w.r.t. attaining Food Security and ensuring Nutrition Security. Gradually, other crops may be considered.

3. Each Member State undertakes to earmark, as its assessed share of the Reserve, the amount of quality seeds allocated to it in the **Schedule-I** of this Agreement; and to keep the Board informed of the quantum of its reserve with locations of the designated seed storage.
4. The Member States shall keep the **Schedule-I** under review and may amend it in the light of operating experience.

ARTICLE VII
Quality of the Reserve

1. The quality of all earmarked seed shall be as per the quality standards/requirement of the recipient Member State.
2. Each Member State shall undertake to: (a) provide adequate storage facilities for the quality seed earmarked quantum; (b) inspect the quality seed stock periodically; (c) apply appropriate quality control measures, as necessary, with a view to ensuring that at all times the seeds meet the required quality standards; and (d) replace forthwith any quality seed stock that do not satisfy the said standards. In addition, each Member State agrees to undertake every effort to comply with any guidelines on seed procedures and preservation methods or quality control measures adopted by the Board.

ARTICLE VIII
Withdrawal of Seed

Each Member State shall be entitled, on the conditions and in accordance with the procedures laid down in Articles VII and IX, to draw on Seeds forming part of the Reserve in the event of requirement of seeds.

ARTICLE IX
Procedure for the Release of Seed from the Reserve

1. The Member State in need shall directly notify, through its designated Nodal Point(s), the other Member State(s) of the amount of seed required.
2. The other Member State(s), on being so requested, shall take immediate steps to make necessary arrangements to ensure immediate and speedy release of the required quality seed, subject to availability.

3. The requesting Member State shall, at the same time, inform the Board of its request to the other Member State(s) to coordinate.

ARTICLE X
Replenishment of the Reserve

1. A Member State that has released all or part of the seed forming its share of the Reserve shall replace such quantity as soon as practicable and, in any event, not later than one calendar year following the date on which the release of the seed took place.
2. A Member State that has released all or part of the seed forming its share of the Reserve shall notify the Board at an early date of such release, of the terms and conditions on which it was effected and the date on which the seed that had been released were replaced.

ARTICLE XI
Determination of Price

1. The prices, terms and conditions of payment, in kind or otherwise, in respect of the seed so released, shall be the subject of direct negotiations between the Member States concerned, based on the guidelines to be approved by the Board for determination of price, which shall be reviewed periodically.
2. The requesting Member State shall specify the need while making a request. In the case of emergency, humanitarian aspects would be given due importance while determining prices.
3. The determination of prices shall be done in accordance with the following broad principles:

a. Price shall be representative of the market, both domestic and international, and may be adjusted suitably to reflect seasonal variations and the price movements in the recent past;
b. Price quoted, in general, shall be lower than prices generally charged or quoted for countries beyond the region;
c. A responding Member State shall endeavor to accord, as far as possible, national treatment in respect of calculating the cost components e.g. related to storage, internal freight, interests, insurance and overhead charges, margin of losses etc., while maintaining its reserve and making releases; and
d. Provision of deferred payment may be made.

ARTICLE XII
Institutional Arrangements

1. There shall be a Board consisting of one member from each Member State, one farmers' representative, on rotational basis from a Member State, and two members from the private sector[2] to administer functioning of the Seed Bank and for its policy making.
2. Rules of Procedure for the meetings of the Board shall be the same as for other SAARC meetings.
3. Decisions and recommendations of the Board shall be taken on the basis of unanimity.
4. The Board shall elect a Chairperson preferably based on the principle of rotation among Member States whose terms of office shall be the duration from one annual meeting to the next annual meeting.
5. The Board shall meet at least once a year or, more often, as considered necessary.
6. Each Member State shall designate a Nodal Point responsible for transacting all business at the national-level related to operations of the Seed Bank.
7. Private sector entrepreneurs/traders in a Member State may apply to the designated Nodal Point of that country, who shall transact all activities on behalf of the provider(s)/recipient(s) and shall be responsible for the transaction(s). Member States may develop appropriate guidelines for involving the private sector, in conformity with its national legislations, procedures and requirements.
8. The Board may constitute committee(s) to perform different supporting activities, as assigned by the Board, for smooth conduct of the functions of the Board.

ARTICLE XIII
Functions of the Board

The functions of the Board shall include:

1. Undertake activities to develop a list of common crop varieties, quality testing method, Common Seed Certification Standard and Procedures.

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2. Private sector representation will, for instance, be from SAARC Seed Forum - not from some other platform not formally constituted under SAARC.

2. Facilitate harmonization of legislative measures like Acts, Rules/ Regulations, Orders and Procedures concerning seed system and make appropriate recommendations.
3. Undertake a periodic review and assessment of the Seed Replacement Rate and prospects in the region, including factors e.g. production, consumption, trade, prices, quality and stocks of seeds. These periodic assessment reports shall be disseminated to all Member States.
4. Examine immediate, short term and long term policy actions, as may be considered necessary, to ensure adequate supplies of quality seeds in the region; and to submit, on the basis of such examination, recommendations for appropriate action to the SAARC Agriculture Ministers.
5. Review implementation of the provisions of the Agreement, calling for such information from Member States, as may be necessary, for effective administration of the Seed Bank and issuance of guidelines on technical matters e.g. maintenance of stocks, storage conditions, quality control and price.
6. Assess the demands of seeds and identification of institutions and organizations in Member States that are to be contacted in case of release and withdrawal from its Reserves.
7. Devise appropriate mechanism(s) to collect, compile, generate, analyse and disseminate information to facilitate its own work.
8. Facilitate strengthening of capacities and capabilities in Member States, including mobilising resources.
9. Resolve any dispute or difference regarding the interpretation and application of the provisions of this Agreement and functioning of the Seed Bank.
10. Keep the Schedules to this Agreement under review.
11. Recommend amendment(s) or developing protocol(s) to the Agreement, as and when considered necessary.

ARTICLE XIV
Miscellaneous

1. **Schedule-I** shall be an integral part of this Agreement.
2. Expenditures relating to the functioning of the Seed Bank shall be borne by the Member States proportionately. Certain additional expenditure, as relevant, may be met out of the Budget of the SAARC Agriculture Centre (SAC).

ARTICLE XV
Secretariat

1. The Board shall be assisted by the SAARC Secretariat, which shall coordinate the work of the Board, monitor all matters relating to the functions of the Seed Bank and convene and service meetings of the Board.
2. The establishment of a permanent setup of the Seed Bank with dedicated staff may be considered by the Council of Ministers at a future date, in the event of such a request made by the Board based on the experiences of operations of the Seed Bank.

ARTICLE XVI
Entry into Force

This Agreement shall enter into force on completion of formalities including ratification by all Member States and upon issuance of a notification thereof by the Secretary General of SAARC.

ARTICLE XVII
Amendment

Any amendment to this Agreement may be submitted by a Member State to the Board and recommended by consensus to the Meeting of SAARC Agriculture Ministers. Such amendment(s) will be effective upon deposit of the instruments of acceptance with the Secretary General of SAARC.

ARTICLE XVIII
Depositary

The Secretary General of SAARC shall be the depositary of this Agreement and amendments thereto.

IN WITNESS WHEREOF, the undersigned being duly authorized thereto by their respective Governments have signed this Agreement.

Done in Addu, Maldives On This Eleventh Day of November Two Thousand Eleven in Ten Originals In The English Language, All Texts Being Equally Authentic.

Dr. Zalmai Rassoul
Minister of Foreign Affairs
Islamic Republic of Afghanistan

Dr. Dipu Moni, MP
Minister for Foreign Affairs
People's Republic of Bangladesh

Khandu Wangchuk
Minister-in-Charge of Foreign Affairs
Kingdom of Bhutan

S.M. Krishna
Minister of External Affairs
Republic of India

Ahmed Naseem
Minister of Foreign Affairs
Republic of Maldives

Narayan Kaji Shrestha 'Prakash'
Deputy Prime Minister and
Minister for Foreign Affairs
Nepal

Hina Rabbani Khar
Minister for Foreign Affairs
Islamic Republic of Pakistan

Prof. Gamini Lakshman Peiris
Minister of External Affairs
Democratic Socialist Republic of Sri Lanka

SCHEDULE – I

SAARC SEED BANK
Assessed Shares[3] of Quality Seeds for the Reserve
(*In Metric Tons*)

Afghanistan	___
Bangladesh	___
Bhutan	___
India	___
Maldives	___
Nepal	___
Pakistan	___
Sri Lanka	___
Total:	———

3. Member States would maintain at least one percent of seed stock of the common varieties under the Seed Bank reserves.

FRAMEWORK FOR MATERIAL TRANSFER AGREEMENT
as applicable to operationalisation of the SAARC Seed Bank Agreement

PREAMBLE

The Governments of the SAARC (South Asian Association for Regional Cooperation) Member States comprising Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka hereinafter referred to as "Member Countries";

Reaffirming the spirit of cooperation and commitment of the Member Countries to realise the objectives as enshrined in the SAARC Charter;

Recognizing the significance of ensuring food and nutritional security in the SAARC region to enhance the quality of life of South Asian people;

Acknowledging the crucial linkage between agriculture, food security and poverty alleviation in the region;

Appreciating the urgent need to foster food production;

Realizing fully that there is a dearth of quality seed availability throughout the region and that exchange of genetic materials could contribute to enhancing productivity;

Recalling the emphasis laid down by the Sixteenth SAARC Summit Declaration (*Thimphu, 28-29 April 2010*) on early establishment of a seed bank;

Desiring to operate a Seed Bank for ensuring Food Security in the Region; now, therefore, has agreed as follows to address the matter of exchange of materials from the Seed Bank among the Member States:

SECTION 1
OBJECTIVES AND PRINCIPLES

1. The objective of the Framework is to facilitate supply/exchange of seeds of common crop varieties among the Member Countries for the purpose of achieving Food Security in the Region.

2. The Framework shall be performed in accordance with the existing law, regulations and guidelines of SAARC Member States and the International Treaty on Plant Genetic Resources for Food and Agriculture.

3. A Format for Material Transfer Agreement shall be used to exchange materials amongst the Member States, as at ***ANNEX-A.***

SECTION 2
NATIONAL FOCAL POINT

There shall be a nominated National Focal Point in each Member State through whom the Member State shall conduct the business of material transfer.

SECTION 3
DISPUTE SETTLEMENT

1. Any dispute that may arise among the Member States/parties regarding the interpretation and application of the provisions of this Agreement and the Format for Material Transfer Agreement concerning the Rights and Obligations shall be amicably settled through a request for bilateral consultation. The request for such consultation shall be sent to the concerned Member Country/ies in writing and stating the reason for the request routed through the National Focal Point. The requested Member State would respond within thirty days extending up to sixty days by mutual consent and thereafter resume consultations to resolve the issue. Consultations should be confidential and without prejudice to the rights of the Member Countries in any further proceedings.
2. If the dispute is not resolved by consultations, the concerned Member State may seek mediation through the Seed Bank Board. The Board shall make recommendations within sixty days from the date of referral.

3. If the recommendations are not acceptable to the aggrieved Member State, it may then be referred to the SAARC Arbitration Council for final resolution.

ANNEX - A

FORMAT FOR MATERIAL TRANSFER AGREEMENT

PARTY TO THE AGREEMENT

The present Format for Material Transfer is hereinafter referred to as the "Material Transfer Agreement (MTA)". Any two Member States may wish to affect an exchange/transfer/supply of materials as in *ANNEX–1*.

1.1 This Agreement is: BETWEEN
.....(*Name and Address of the provider or providing institution , name of authorized official, contact information for authorized official)*
(hereinafter referred to as □ the "Provider"),

AND .....(*Name and Address of the recipient or recipient institution, name of authorized official, contact information for authorized official)*
(hereinafter referred to as □ the "Recipient").
(*Provider & Recipient may be Ministry of Agriculture/Research Council/Research Institutes etc.*)

1.2 The parties to this Agreement hereby agree as follows:

SUBJECT MATTER OF THE AGREEMENT

2. The Plant Genetic Resources for Food and Agriculture, Germplasm, Genetic materials, Genetic component, specified in Annex-A of this Agreement (*hereinafter referred to as the "Material")* and the available related information referred to in Article 4.3 and in Annex 1, are hereby transferred from the Provider to the Recipient subject to the terms and conditions set out in this Agreement.

RIGHTS AND OBLIGATIONS OF THE PROVIDER

3. The Provider (first party) undertakes that the Material is transferred in accordance with the following terms and provisions of the MTA:
   - 3.1 Access shall be accorded expeditiously, without the need to track individual accessions and free of charge, or, when a fee is charged, it shall not exceed the minimal cost involved;
   - 3.2 Access to the material(s) or visit, monitoring and evaluation as per desire of the Provider;
   - 3.3 All available passport data and, subject to applicable law, any other associated available non-confidential descriptive information, shall be made available with the Plant Genetic Resources for Food and Agriculture be provided;
   - 3.4 Access to Plant genetic Resources for Food and Agriculture under Development, including material(s) being developed by farmers, shall be at the discretion of its developer, during the period of its development;
   - 3.5 Access to Plant Genetic Resources for Food and Agriculture protected by intellectual and other property rights shall be consistent with relevant international agreements, and with relevant national laws;
   - 3.6 Right to withdraw the material from the recipient for their indiscriminate uses, if any.

RIGHTS AND OBLIGATIONS OF THE RECIPIENT

4. The Recipient (Second Party) undertakers that the Material is transferred in accordance with the following terms and provisions of the Agreement:
   - 4.1 The Recipient undertakes that the Material shall be used or conserved only for the purposes of research, breeding and training for food and agriculture. Such purposes shall not include chemical, pharmaceutical and/or other non-food/ feed industrial uses.
   - 4.2 The importer/recipient (Second Party) agrees to provide a concept note of research project in which the MATERIAL(s) will be used, including the manner in which to be used. The importer/recipient (2^{nd} party) agrees to case any use of the material in case of suspension of research project at the

instance of either party or due to factors beyond the control of either party. Upon such suspension of further research work, both parties will mutually agree for adopting a suitable provision for their preservation. In case of failure of the parties to arrive at an agreement, the materials, including derivatives will be destroyed upon 90 days notice from Provider.

4.3 All information material supplied by the provider shall be deemed to have been disclosed or provided to the recipient in confidence. The recipient agrees to preserve the confidential status of the material and information.

4.4 The germplasm MATERIAL(s) or its/their part(s), components or derivatives (including live or dead tissue/ DNA) that can be used to retrieve whole DNA/fragment or, sequence or, any other genetic information shall not be distributed or transferred to any third country/party, except those directly engaged in research under direct supervision of the recipient (second party), without prior written approval of the Provider.

4.5 Any development of commercial product based on research on gene manipulation/selective breeding programme for genetic improvement shall not be undertaken without written consent of Provider. Modalities of undertaking any such work will be worked out before its conduct.

4.6 If any third country/party is to be associated with any commercial development arising out of the germplasm accessed, permission from Provider shall be sought.

4.7 The recipient agrees to acknowledge explicitly the name, original identity and source of the material, if used directly or indirectly, in all research publication(s) or other publications, such as, monographs, bulletins, books, etc. and shall send a copy of each of the publications to the Provider.

4.8 The recipient agrees to supply the feedback information on the performance/utilization/research outcome of the material(s) to the provider.

4.9 The recipient agrees not to claim any intellectual property right over the MATERIAL(S) received including its related information and knowledge without prior written approval of the Provider.

4.10 The intellectual property protection or benefit sharing in respect of derivatives of the material(s) received/accessed, where applicable, shall be as per the IPR/ existing laws of the providing country.

4.11 The recipient agrees to hold the entire responsibility for the quarantine/SPS clearance of the material accessed as specified herein above. The recipient shall abide by the bio-safety guidelines of _____ (*name of the importing country/ organization*) and shall not hold Provider and to defend and indemnify them from all claims and damages/ recoveries arising from the use, storage or handling of the material.

4.12 The MTA is non-assignable. The recipient agrees to abide by any other conditions that may be set in any conveyed to them from providers in respect of this germplasm access/ exchange or any Law, Rules, Regulations, etc. enacted by Providing country from time to time.

ADDITIONAL ITEMS

Warranty

5.1 The Provider makes no warranties as to the safety of or title to the Material, nor as to the accuracy or correctness of any passport or other data provided with the Material. Neither does it make any warranties as to the quality, viability, or purity (genetic or mechanical) of the Material being furnished. The phytosanitary condition of the Material is warranted only as described in any attached phytosanitary certificate. The Recipient assumes full responsibility for complying with the recipient nation's quarantine and bio-safety regulations and rules as to import or release of genetic material.

Duration of Agreement

5.2 This Agreement shall remain in force so long as the two parties agree to.

Date of initiation (D/M/Y)	Date of completion (D/M/Y)

SIGNATURE/ACCEPTANCE

The provider and the recipients may choose the methods of acceptance unless either party requires this agreement to be signed.

I,_____ (*Full Name of the Authorized Official*), represent and warrant that I have the authority to execute this Agreement on behalf of the Provider and acknowledge my institution's responsibility and obligation to abide by the provisions of this Agreement, both by letter and in principle, in order to promote the conservation and sustainable use of Plant Genetic Resources for Food and Agriculture.

Signature.....
Date .....
Name of the Provider .....
Address .....

I,_____ (*Full Name of the authorized official*), represent and warrant that I have the authority to execute this Agreement, on behalf of the Recipient, and acknowledge my institution's responsibility and obligation to abide by the provisions of this Agreement, both by letter and in principle, in order to promote the conservation and sustainable use of Plant Genetic Resources for Food and Agriculture.

[Signature .....]
[Date .....]
[Name of the Recipient .....]
[Official Address .....]

ANNEX – 1

MATERIALS[4] UNDER THE AGREEMENT

FOOD CROPS: Cereal (i.e. Rice, Wheat)

Crops	Genus	Types of Materials	Observation
e.g. Rice	*Oryza*	Seed/tissue	
…	…	…	…

OTHER CROPS: (e.g. Pulses, Oilseed, Vegetables)

Crops	Genus	Types of Materials	Observation
e.g. Jute	*Chorcorus*	Seed/tissue	
…	…	…	…

4. The detailed description of the material(s) requested for has to be provided by the requested party.

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