Access to Improved Seed for Small and Marginal Farmers in India: Emerging Challenges and Policy Support

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Abstract

A survey experiment was conducted to access Improved Seed for Small and Marginal Farmers in India**.** The most vulnerable groups of the farming community in the India are marginal (less than one hectare of operational holding) and small (greater than one and less than two hectares of operational holding) farmers. Small and marginal farmers are the main contributors in Indian agriculture for food security and employment. Small and marginal holders have already recorded higher productivities compared to large sized holdings. They own 46.1% operational holding and contributes 51.2% to total crop output (GOI, 2011). But they are facing emerging challenges like population pressure, small holding, productivity, climate change, environment and resource degradation, infrastructure, input constraints, technology, post-harvest operations, trade, etc. Fragmentation to owners of small and marginal farms means higher costs for adopting modern technology and accessing production inputs and extension, credit and marketing services. Seeds are the important inputs for the productivity of crops. It is estimated that the direct contribution of quality seed alone to the total production is about 15–20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. Only seed can be expected to respond to fertilizers and other inputs in a desired manner. In this regard, the role of policy in catering to the interest of various stakeholders as well as facilitating the overall growth of the sector becomes crucial.

Keywords: Improved seeds, small and marginal farmers

1. Introduction

The most vulnerable groups of the farming community in the India are marginal (less than one hectare of operational holding) and small (greater than one and less than two hectares of operational holding) farmers. Small and marginal farmers are the main contributors in Indian agriculture for food security and employment. But they are very often constrained of securing on time quality production inputs, and technical knowledge of using them in right quantities. Small and marginal holders have already recorded higher productivities compared to large sized holdings. They own 46.1% operational holding and contributes 51.2% to total crop output (GoI, 2011). But they are facing emerging challenges like population pressure, small holding, productivity, climate change, environment and resource degradation, infrastructure, input constraints, technology, post-harvest operations, trade, etc. The biggest stress for marginal and small farmers in the country is their income volatility. Enhancing the productivity of small farms has been advocated by policy makers and various experts. Table 1: shows that trend of number and area of operational holdings by size groups from 2000-01 to 2010-11.

According to Agricultural Census 2010-11 out of 138 million farm holdings in the country, 117 million are small and marginal holdings. Small and marginal land holdings together constitute 85% in 2010–11 and own nearly 44% of the cultivated area. Number of holdings and average size of holding of small and marginal farmers shows a gradual declining trend.

1.1. Importance of seed

Fragmentation to owners of small and marginal farms means higher costs for adopting modern technology and accessing production inputs and extension, credit and marketing services. Seeds are the important inputs for the productivity of crops. It is estimated that the direct contribution of quality seed alone to the total production is about 15–20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. During the peak seasons of sowing the artificial scarcity of quality and certified seeds are created by wholesale or retail traders. Thus, marginal and small farmers feel safe to use farm-saved seeds which has low yield potential. This leads to decrease in seed replacement rate (SRR). The most sufferers are marginal and small farmers. Thus, Small farms need positive material and policy support by the Government. Only seed can be expected to respond to fertilizers and other inputs in a desired manner.

Table 1: Number and area of operational holdings by size groups ('000 No. and '000 ha)

Category of holding	2000-01			2010-11		
	No. of holdings	Area	Av. Size of Holding	No. of holdings	Area	Av. Size of holding
Marginal (<1 ha)	75408 (62.3)	29814 (18.7)	0.40	92356 (67.0)	35410 (22.2)	0.38
Small (1-2 ha)	22695 (19.0)	32139 (20.2)	1.42	24705 (17.9)	35136 (22.1)	1.42
Semi-Medium (2-4 ha)	14021 (11.8)	38193 (24.0)	2.72	13840 (10.1)	37547 (23.6)	2.71
Medium(4-10 ha)	6577 (5.5)	38217 (24.0)	5.81	5856 (4.3)	33709 (21.2)	5.76
Large (>10 ha)	1230 (1.0)	21072 (13.2)	17.12	1000 (0.7)	17379 (10.9)	17.37
All	119931 (100.0)	159436 (100.0)	1.33	137757 (100.0)	159180 (100.0)	1.16

In this regard, the role of policy in catering to the interest of various stakeholders as well as facilitating the overall growth of the sector becomes crucial. During the 1990s rates of increase in total factor productivity for crops were appreciably less than in preceding decades which was attributed to lower public investment in agriculture and its research and extension. This has adversely impacted the small and marginal farms. In view of above, a modest attempt has been taken here to examine the role s of the small and marginal farmers and seed supply mechanism in India. The study also tries to highlight the existing institutional arrangement and policy support. The objective of the study is to create an enabling environment that encourages interaction and helps to put knowledge into socially and economically productive use in the seed sector.

2. Methodology used

The study is analytical in nature. Based on the unique set of secondary information derived from different sources like Govt. publications (statistical data), journals, periodicals, articles, websites, etc., the analysis has been undertaken. For convenient, only tabular form of data presentation have been designed for interpretation.

3. Results

3.1. Small and marginal farmers' performance

These farmers use available inputs intensively and except in some region, show higher efficiency. In general small farmers are not less efficient than large farmers. Given right conditions, after the initial "transitory' period, the small farmers catch up and even surpass the large farmers in the use of improved technologies, provided they are backed up by the improved access to inputs and credit (NCEUS, 2008).

3.1.1. Output and productivity

Marginal and small farmers are found to produce more output as compared to their share in area. The share of these farmers was 46.1% in land possessed but they contribute 51.2% to the total output of the country at all India level in 2002-03. The contribution of small and marginal farmers to output ranges from 19% in Punjab to 86% in West Bengal (Dev, 2012).

3.1.2. Profitability

The results of NSS 2003 Farmers' survey has shown that small farms have capacity to earn more compared to that of the medium and large farms. Its estimates suggests that marginal farmers got total return of INR14754, small farmers INR13001, medium farmers INR10655 and large farmers INR8783 hectare^{-1}.

3.1.3. Access to irrigation

Out of total operational holdings having full irrigation facilities, marginal and small farmers account nearly 87% and in case of acreage coverage, it stands at nearly 51%. The rate of increase of coverage under irrigation is more in case of marginal and small farmers (Agriculture Census, 2005-06).

3.1.4. Area under HYV

The data presented in Table 2 shows that in the irrigated areas, the coverage of area under HYV was 89%, 86% and 78% respectively in marginal, small and large farmers in 2001-02. In the case of unirrigated areas, the coverage was above 50% for marginal, small and semi-medium but it was only 30% for large farmers in 2001-02. Similarly, % area under high yielding varieties (HYV) is also inversely related to farm size (Chand, 2011).

3.1.5. Cropping intensity

Cropping intensity is found to be higher for marginal and small farmers compared to medium and large farmers. For marginal farmers, cropping intensity increased from 134 in 1981-82 to

Table 2: Share of Area under HYV according to farm size class

Year	Marginal	Small	Semi-medium	Medium	Large	All
Total Area						
1996-97	59	55	54	53	42	54
2001-02	72	68	65	61	47	64
Irrigated Area						
1996-97	80	76	76	76	75	77
2001-02	89	86	85	82	78	85
Unirrigated Area						
1996-97	37	37	38	36	25	35
2001-02	52	54	52	46	30	48

Source: Chand et al (2011): from Input Survey, Ministry of Agriculture

139 in 2001-02. In the case of large farmer, it rose from 116 to 121 during the same period. The differences across farm sizes persisted over time (Chand, 2011).

Thus, above observations indicate that small holdings are comparable or even better placed in respect of farm efficiency to large holdings.

3.2. Present status of seed used by the farmers

Due to unavailability of quality and certified seeds locally and use of spurious seeds by small farmers, rate of germination (%) and yield declines. During the peak seasons of sowing the artificial scarcity of quality and certified seeds are created by wholesale or retail traders. Considering the problem most of the farmers especially marginal and small farmers feel safe to use farm-saved seeds which have low yield potential and in terms of seed requirement the quantity is also low. In spite of growing demand, certified seed distribution to the farmers remains almost stagnant for last three year w.e.f. 2010-11 to 2012-13 (Table 3). The seed demand and supply needs to be balanced to give farmers access to adequate quantities of good quality seed of the desired type at the required time and at affordable cost.

About 48% of the farmers households made the use of purchased seeds and 47% used farm saved seeds. Seed replacement rates were found to be low. About 30% farmers replaced seed variety every year and 17% changed it after four years. Replacement rates were the lowest among marginal farmers. Only 24% of the sub-marginal farmers and 29% of the marginal farmers replaced seed every year, compared to 40% of the large farmers. Farmers, in general, and marginal and small farmer, in particular, often face problems regarding easy and timely availability and quality of these inputs as also the costs and knowledge of use of these inputs at the right quantities. Among the various inputs (fertilizer, pesticides, HYV, organic manure, veterinary services), only the organic manures are readily available within the village. Farmer households have to travel more than 10 km. for seeds and pesticides (NCEUS, 2008).

Table 3: Crop-wise (cereal only) distribution of certified or quality seeds (Lakh Quintals)

Cereal crops	2008-09	2009-10	2010-11	2011-12	2012-13
Wheat	74.83	90.66	97.83	97.61	101.42
Paddy	58.18	60.95	69.34	74.41	72.27
Others	14.42	13.54	15.45	17.67	15.51
Total	147.43	165.15	182.62	189.69	189.20

Source: Ministry of Agriculture, Gov. of India, 2014

3.2.1. Present status of seed distribution

The types of seed distribution systems in India are: (a) Farmer to farmer distribution - This is the traditional method, where by farmers obtain their requirements from neighbours either on cash payment or on an exchange basis. No formal marketing organization is required for this type of distribution. (b) Distribution by co-operatives - This involves procurement of seeds by cooperatives and its subsequent distribution. The distribution of seeds through cooperatives has often been en-couraged by the government through subsidies and guarantees. (c) Distribution by Departments of Agriculture - Seeds are purchased by the government, out of the government funds,and are distributed through district Agricultural Officers and Block Development Officers (d) Distribution of seeds by non-government or quasi-government agencies - In this system, the seeds are distributed through a network of seed distributors and seed dealers (Kolvabi, 2008).

3.3. Seed System in India

Small and marginal farmers avail their seeds from two sectors viz. (1) formal seed system and (2) informal seed system.

3.3.1. Formal seed system

The formal seed sector of developing countries is controlled either by the state or private industry, which monitors the entire process of seed production. The formal seed sector dominates supply of seed to farmers in industrialized countries, the formal hybrid seed industry led by the private sector has tended to focus on profit-making crops. International support continues to be engaged with the formal sector. It is estimated that access to formal sector seeds by small and marginal farmers is presently only 20% of total seed used in India.

3.3.2. Informal seed system

The informal sector is the main actor in developing countries. Despite large investments over the past three decades to build formal seed systems, 90–95% of the world's smallholder farmers still obtain seed from informal sources, largely from other farmers. This seed system is heavily dependent on local resources and inputs, and highly vulnerable to natural disasters and sociopolitical disruptions.

3.4. Role of Public Sector

The organized seed sector particularly for food crops cereals continues to be dominated by the public sector. Public sector seed sector comprises of two central corporations viz. (i) National Seed Corporation (NSC) and (ii) State Farm Corporation of India and fifteen State Seed Corporations. NSC focuses to develop a sound seed industry in the country and to production and distribution of high quality seed to the farmers. In India, public sector seed programme includes the participation of Central and State governments, Indian Council of Agricultural, State Agricultural Universities system, cooperative sector, etc. For quality control and certification, there are 22 State Seed Certification Agencies and 104 State Seed Testing Laboratories. The public sector seed industry has to be revitalised to address the in R&D, development and protection of new varieties and efficient technology transfer systems (Manjunath, 2013).

3.5. Role of Private Seed Sector

Trade liberalization regimes invites private sector to play a significant role in the production and distribution of seeds. The seed chain stores are operated by public and private sector agencies. But the private sector agencies play a major role in the supply of hybrid and breeder seeds (Singh, 2008). These agencies do not operate in villages and their wider presence is in cities and towns. Studies show that majority of the companies were involved in low volume and high value crops in order to maximize their profit (Seed Association of India, 2006). Share of private sector seed production is nearly 42% but in term of value, it accounts almost 70% (approx.). Due to lower profit margin, private seeds at remote and distant villages are rarely accessible for small and marginal farmers. A study by the Bayer Crop Science internal estimate argued that top ten seed companies holding increased from 70 to 90 % of private seed market in a decade time (Olive, 2012). Thus, the concentration of private seed market is rapidly growing.

3.6. Evolution of Indian Seed Industry

Indian seed industry began its pace with the onset of Green Revolution in 1960s. The major re-structuring of Indian seed industry was taken place in three phases viz. (i) phase-I (1977-78), (ii) phase-II (1978-79) and (iii) phase-III (1990-91) which strengthened the seed infrastructures relevant to that times. Evolution of seed industry can be categorized in three periods which are as follows

1960s-1980: Minimum private sector participation, R&D in public domain & Restriction in germplasm exchange foreign ownership, etc.

Post-NSP 1988: Seed industry boom as a result of several Govt. initiatives, FDI allowed and encouraged, Import of varieties and breeding line liberalized and Trade regulations liberalized.

Current status: Private sectors account for 80% turnover in seed industry, Almost ⅓ of the companies have a global technology or financial partners, Private seed companies spending about 10-12% of turnover in seed R&D, R&D budget in medium sized companies is growing @20% p.a.

3.7. Policy Initiatives in Seed Sector

The following policy initiatives have been taken by the Government of India in seed sector:-

- Enactment of the Seeds Act, 1966
- Seed Review Team-SRT (1968)
- National Commission on Agriculture's Seed Group (1972)
- 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)
- Creation of the Technology Mission on Oilseeds & Pulses (TMOP) in 1986 now called The Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM).
- Production and Distribution Subsidy
- Distribution of Seed Mini-kits
- Seed Transport Subsidy Scheme (1987)
- New Policy on Seed Development (1988)
- Protection of Plant Varieties and Farmers' Rights Act, 2001,
- Seed Bank Scheme (2000)
- National Seeds Policy (2002)
- The Seeds Bill (2004)
- Formulation of National Seed Plan (2005)
- National Food Security Mission (2007)
- Rashtriya Krishi Vikas Yojna (2007)

(i) **National Seeds Policy, 2002: Thrust Areas**

- Variety development
- Plant variety protection
- Seed production
- Quality assurance
- Seed distribution and marketing
- Infrastructure facilities
- Transgenic plant varieties
- Import of seeds and planting materials
- Seed exports
- Promotion of domestic private sector seed industry
- Strengthening of the monitoring system

(ii) **Seeds Bill, 2004: Salient Features**

- Registration of kinds and varieties of Seeds etc.
- Evaluation of performance
- Compensation to Framers
- Registration of Seed Producers and Processing Units
- Seed dealers to be Registered
- Regulation of Sale of Seed and Seed Certification
- Seed Analysis and Seed Testing
- Export and Import of Seeds and Planting Material
- Offences and Punishment.

(iii) National Seed Project (NSP)

ICAR Launched All India Coordinated Project on seed named as NSP which has 35 central on breeder seed production centers and 22 centers on Seed Technology. It envisaged research

for development and improvement of seed at various SAUs, and ICAR institutes. It also gives financial support to NSC and SSC. Main objectives of NSP are :- (a) strengthening the breeder seed production of both field crop and vegetables,(b) giving support (financial or technical) to the NSC, SSC, SFCI, and private seed company for production of breeder and foundation seed, (c) acting as primary co-ordination body of planning and advisory services for seed production, processing and marketing of seed and (d) creating the new as well as strengthening the existing facilities of seed testing, tech, research, set up etc. of SSC and SSCA.

3.8. Perspectives for policy support

Green Revolution in 1960s became possible because of unflinching public and political support and policy backing for new technology. The country again needs similar supports from all quarters, particularly in policy backing in the areas of inputs supply mechanism.

Unlike rich farmers, the small and marginal farmers access to seed through buying or borrow in every season. Due inadequate awareness and knowledge about selection of good quality varieties, proper identification of variety and possibility of mixing of genetic materials becomes a problem. It is evident that traditional seed system has lot of impact for small farmers. Local level seed production and distribution enhanced (Reddy, 2007). Farmers' seed preferences will ultimately shape adoption patterns of these emerging, risk reducing seeds. Differences in resource endowment, management strategy and market situation affect farmers' valuation of seed production traits (yield potential and stability), consumption traits (taste, color, texture), economic traits (early maturity, market demand, storability), and cultural traits (beliefs, rituals)

(Lybbert, 2005)

It is pertinent to identify leverage points where innovative performance can be improved to benefit all stakeholders involved (institutions-industry-farmers). Accordingly, following strategies or intervention have been identified for actual availability of quality seed at affordable price and at right quantity, right place and right time by millions of small and marginal farmers.

- Organizing farmers' own seed producing programme on community basis like Seed Village Scheme which aims at to facilitate production and timely availability of seed of desired crops or varieties at the local level will be supplied to farmers. Seed exchange among farmers and seed producers will be encouraged to popularise new or non-traditional varieties.
- Popularization of Seed Bank for stocking specified quantities of seed during adverse situations and should be suitably strengthened with cold storage and pest control facilities.
- Seed growers need to be encouraged to avail of Seed Crop Insurance to cover risk factors involved in production of seeds.
- Developing contractual agreements with farmers to grow seed and establishment of parastatal seed cooperatives.
- Building capacity of self-help groups to facilitate community seed banks and provide incentives for farmers to grow indigenous varieties and seed conservation efforts.
- Facilitating marketing and credit support systems.
- Continual identification of opportunities and awareness for mutual learning by farmers and scientists to help improve the effectiveness of seed supply to local communities.
- Designing, developing and testing site specific alternative seed system models for improving local seed supply based on geographic and ethnic as wel as administrative boundaries.
- Taking into consideration and utilizing of the traditional seed management systems.
- Initiative by the stakeholders to work on Seed System of Innovation (SSI).
- Adopting socio-economic policies at macro level for development of small farmers.

4. Conclusion

The analytical exercise shows that small and marginal farmers are the major component to contribute more than half on the total agricultural output. These farmers are capable of equal or more efficient compared to large farmers. Small and marginal farmers are still largely dependent on public sources of their seed requirement beside their own-saved seeds and locally available seeds. Private seed sectors are biased towards producing and exchanging of high value crops only.

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