

Legumes Seed System in Asia: A Case in India¹

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Abstract

Legumes (*Leguminosae* family) seed system in India consists of the informal, formal and the integrated seed sector. However, the informal seed sector dominates the seed production system. The majority of farmers who grow legumes particularly as dry seeds (in short pulses), save a part of their produce (about 80-90%) as seed requirement. Although, the private sector is increasing its share of the market, it is the farmers' sector (farmer-saved seed and exchange systems) that produces 70% of the quality seed. Quality seeds are labeled as 'truthful' seeds when farmers follow the recommended package of practices in order to maintain the level of genetic purity of legumes. In the formal seed sector, private companies respond to commercial incentives on hybrids of high-value seeds. However, the existence of the developed formal seed sector at the national level cannot guarantee small-farmer seed security at the community and household levels. The integrated approach that takes into cognizance the formal and informal seed sector in breeding, seed production and distribution has shown to have promising potential for improving seed supply to smallholder farmers. Moreover, any seed system, for that matter, requires a regulatory framework as well as a seed policy that considers regulations of an expanding and diversifying seed sector for the benefit of the farmers engaged in the seed production system.

Key words: legumes, seed system, pulses, informal seed sector, formal seed sector and integrated seed sector.

1. Introduction

Legumes such as pigeonpea, chickpea, and groundnut play an important role for sustainable agriculture in rainfed areas of India. The increasing population growth and the poor productivity (635 kg/ha) have resulted in the reduction of per capita availability of pulses (dry seeds), which together with undue price hike has distorted the consumption pattern of households. Production growth has not been able to keep pace with the population growth and, as a consequence, India's per capita net availability of legumes has fallen from 27.3 kg/year in the 50s to 16 kg/year in 2001 and fallen further at 10 kg/year in 2010 (Gupta, 2008; www.commodityonline.com, 2009; www.rediff.com, 2009; Srivastava et al., 2010). The country's increasing demand for legumes has resulted in increase in imports to around 2.8 million tons in 2011-2012 (www.rediff.com, 2012).

Pigeonpea and chickpea are primarily cultivated in western, central, eastern, and peninsular regions, while groundnut is a dominant crop of western and peninsular India. The contribution of chickpea to the country's pulse production is about 40%, whereas groundnut contributes about 30% to the edible oil basket of the country. In spite a considerable production of these commodities (Table 1), reasonable quantities of these legumes are imported to meet domestic requirements (www.rediff.com, 2012). The development of new short duration varieties of chickpea and pigeonpea at ICRISAT has brought a major change in the cropping systems and adaptation patterns. The short duration pigeonpea are now grown on a fairly large scale in the north (i.e., Uttarakhan) in rotation with winter wheat. Similarly, short-duration

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and drought-tolerant groundnut varieties are becoming popular with farmers in India whereas short duration chickpea varieties have made a tremendous impact in peninsular India.

Table 1. Production statistics of pigeonpea, chickpea, and groundnut in India (2011).

Particulars	Crops		
	Pigeonpea	Chickpea	Groundnut
Average area (ha)	3,580,000	7,310,000	4,190,000
Average production (tons)	3,190,000	5,890,000	6,933,000
Average yield (current, kg/ha)	750	762	1,655
Projected yield (2015, kg/ha)	1,000	960	1,800
Expected growth of production (%)	5	5	5
Proportion of production sold (%)	60-75	50-90	85

2. Pulse Seed Systems in India

Seed is the lifeblood and foundation of agriculture for smallholder farmers. Good quality seeds, which have genetic and physical purity, health standards, high germination and moisture percentage can increase farmers productivity by 20-30% (Mula, 2012). In India, 70% of the country's seed system is managed by farmers' traditional practices, which involves saving seed from own harvest, and using seed for re-sowing, sharing, exchanging/bartering and selling. The formal seed sector has made some progress in certain crops but very little in others (i.e., legumes) where the traditional (informal) system remains dominant. Approximately 80-90% of all planting material used is largely sourced from farmers' own-saved seed or the informal seed sector. Farmers save seed of local varieties and use this continuously for about 3-4 years (Figure 1, i.e. pigeonpea) with low seed replacement ratio of 2-3% because the proportion of quality seed available each year is only 10-12% (Ravinder Reddy et al., 2007).

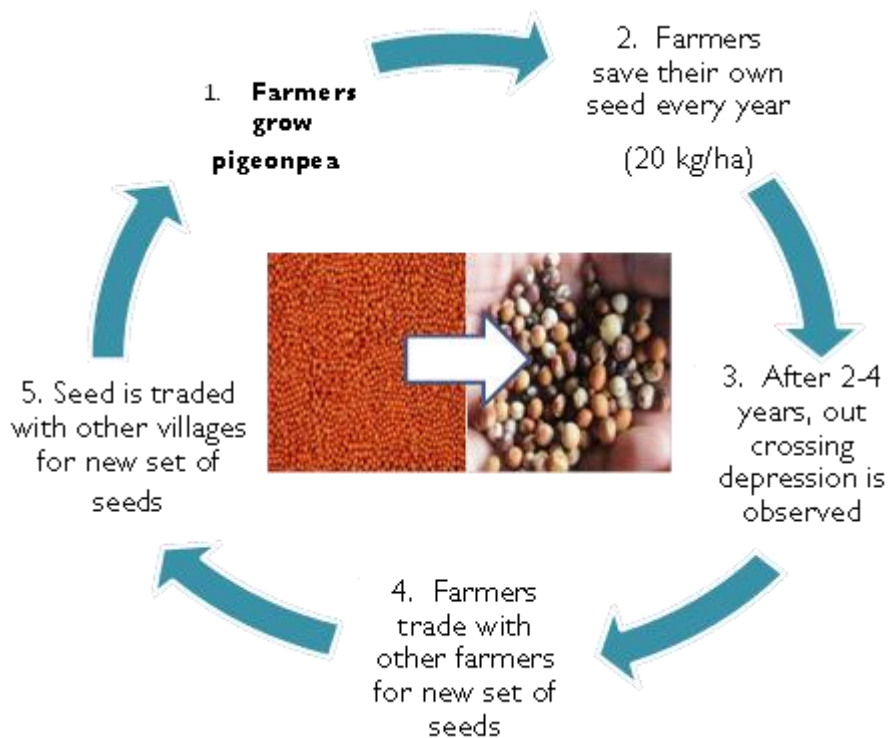


Figure 1. Existing pigeonpea smallholder farmers seed system model

The cultivars used are invariably local landraces, and awareness about improved varieties, seed availability and seed access is poor. Seed is procured off-farm only when necessary as when own seed is not available due to drought, poverty or seed pests and diseases. The main sources of off-farm seed are local markets, relatives, other farmers and government relief agencies. However, these statements about the predominance of the informal seed sector cover significant differences between crops, villages, farmer groups and their socioeconomic conditions. Traditional seed systems are location-specific and vary greatly within farmer communities.

3. ICRISAT’s Intervention

At present, ICRISAT has been involved in developmental projects aside from continuously breeding new high yielding cultivars of chickpea, groundnut and pigeonpea that complemented the seed delivery system of public and private sector partners and projects such as: Tropical Legumes II and the Odisha Pigeonpea project.

1. **Tropical Legumes II (TL II).** This project is funded by the Bill & Melinda Gates Foundation and has the objective of improving livelihoods of smallholder farmers through improved productivity and production of tropical legumes in South Asia. The incorporation of a seed system component in the project has provided avenue for smallholder farmers to be seed entrepreneurs. ICRISAT in collaboration with state universities of the five states in India (ANGRAU – Andhra Pradesh; UAS –F Dharwad and UAS – Raichur in Karnataka; BAU – Bihar; OUAT – Odisha; and TNAU – Tamil Nadu) have developed the seed system models for chickpea, pigeonpea and groundnut (Figures 2, 3 and 4) that resulted in total production of 61,783.78 tons of chickpea (50,801.93 tons), pigeonpea (1,202.59 tons), and groundnut (9,779.26 tons) of various seed class in 2012-2013 cropping season (Table 2). In pigeonpea, the concept of ‘one village one variety’ was institutionalized to guarantee isolation to avoid seed contamination whereas in groundnut, the Panjabrao Deshmukh Krishi Vidyapeeth (PKV) model was promoted in the informal seed sector (Abate, 2012).

Table 2. Seed production of various seed class of chickpea, pigeonpea, and groundnut under TL II project during 2012-2013 cropping season.

Crop	Seed class (tons)					Total (tons)
	Nucleus	Breeder	Foundation	Certified	Truthful label	
Chickpea	8.23	261.00	2,811.70	44,103.20	3,617.80	50,801.93
Pigeonpea	-	28.09	160.35	1,006.05	8.10	1,202.59
Groundnut	16.35	650.91	1,399.60	7,607.40	105.00	9,779.26
Total	24.58	940.00	4,371.65	52,716.65	3,730.90	61,783.78

In Andhra Pradesh, to facilitate efficient seed production and marketing, ANGRAU has established linkages with Andhra Pradesh State Seeds Development Cooperation (APSSDC), National Seed Corporation (NSC), State Farms Corporation of India (SFCI), and *Adarsh Rythu* for efficient production and seed diffusion. The involvement of Andhra Pradesh State Seed Certifying Agency (APSSCA) in roguing, inspection and selection, and certification of farmers’ seed production fields has ensured purity and quality of seeds (Holmesheoran et al., 2012).

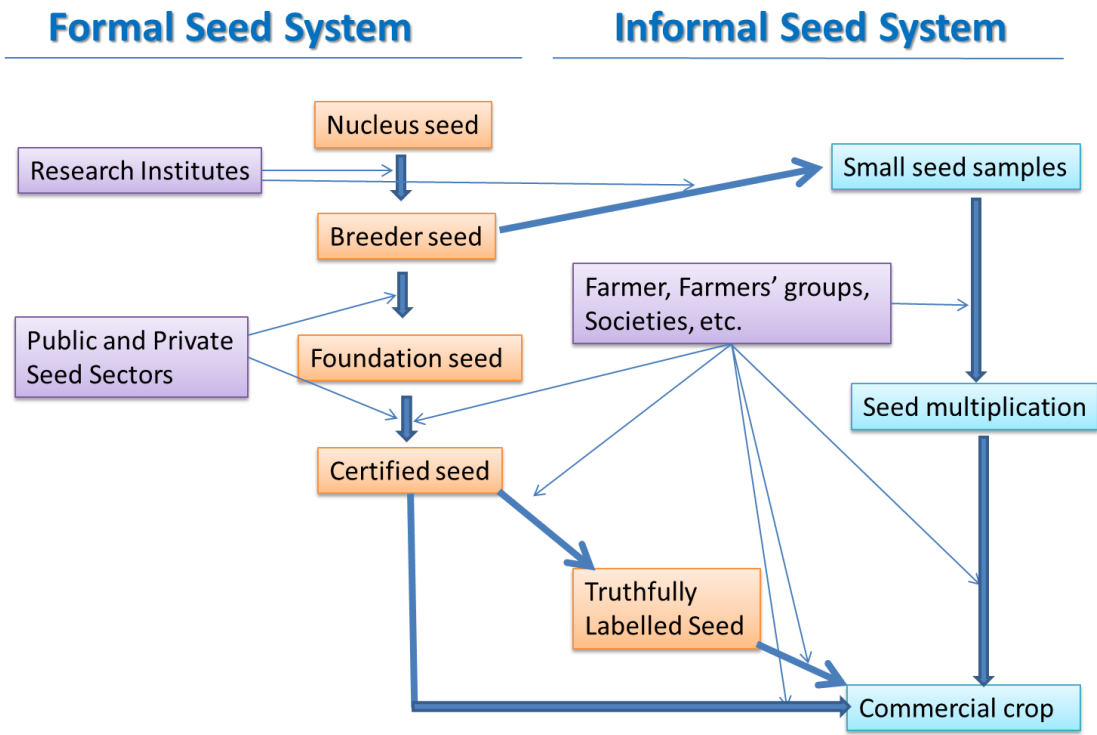


Figure 2. Chickpea seed production and delivery model in South Asia

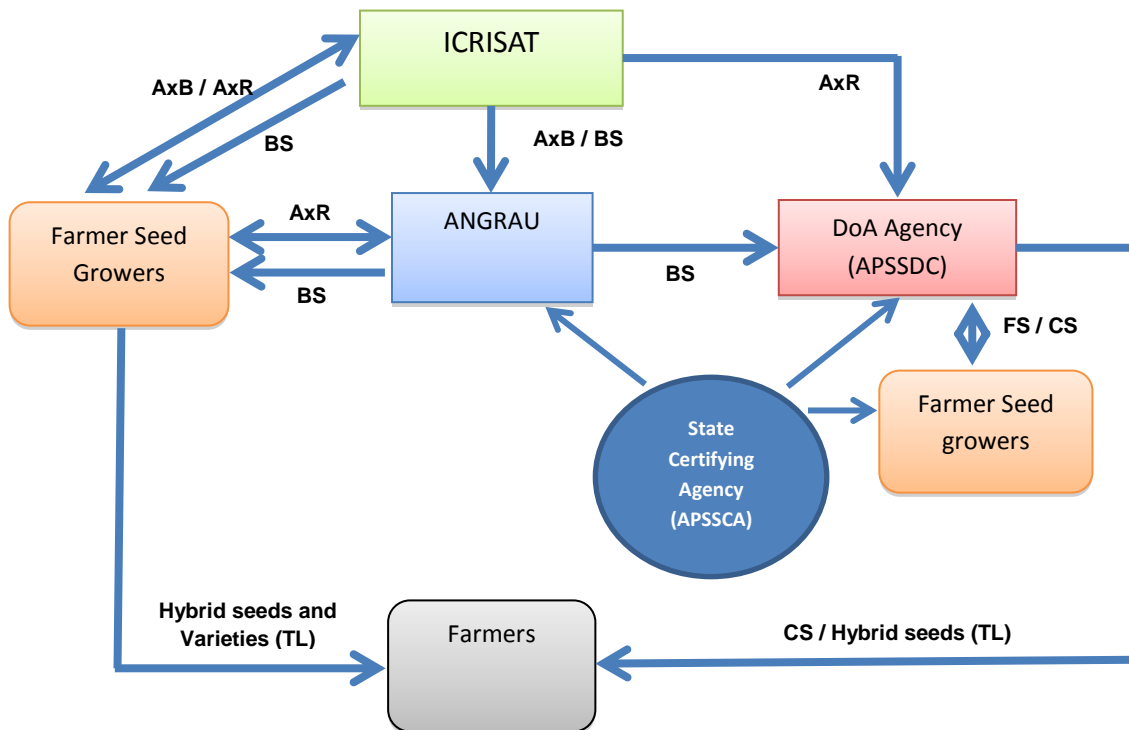


Figure 3. Pigeonpea seed system model in Andhra Pradesh, India

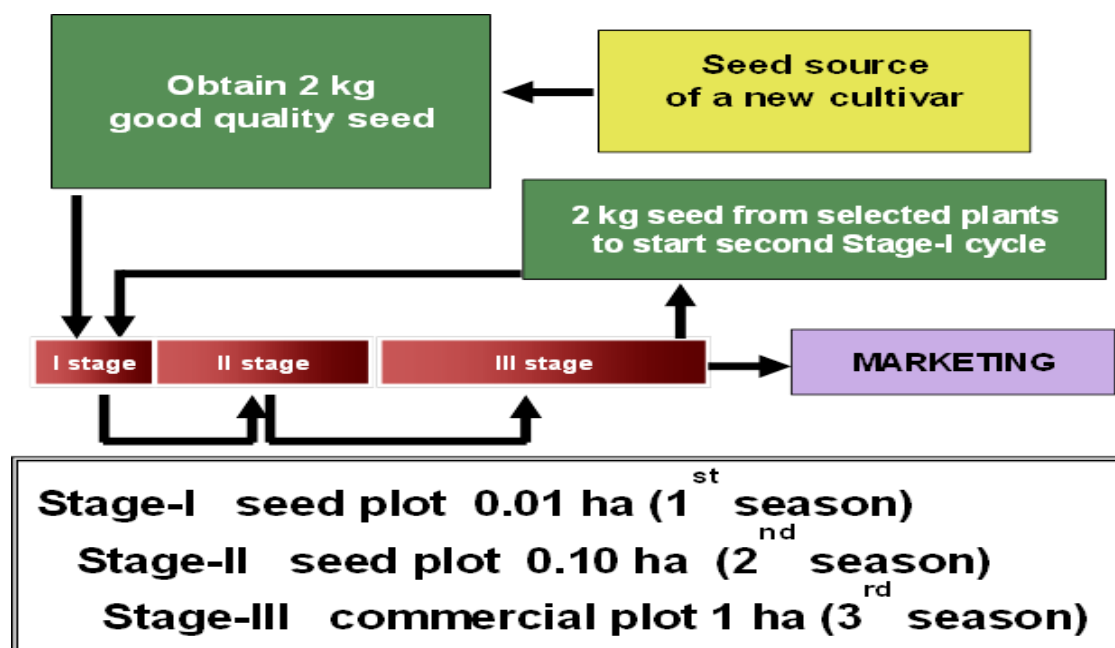


Figure 4. Community based groundnut seed production model (PDKV model)

2. **Introduction and Expansion of Improved Pigeonpea (Arhar) Production Technology in Rainfed Upland Ecosystems of Odisha, India.** This project is funded by the Department of Agriculture of Odisha under the *Rashtriya Krishi Vikas Yojana* (RKVY) sub-scheme. The partnering of ICRISAT with the Department of Agriculture, Non-Government Organizations (NGOs), Odisha State Seed and Organic Product Certification Agency (OSSOPCA), and the Odisha Agro Industry Corporation (OAIC) established the seed delivery system (Figure 5) that resulted in the production of 589.84 tons of farmer preferred varieties and hybrids of various seed class in 2012-2013 cropping season, making seed production system viable and remunerative to smallholder farmer seed growers. To maintain the seed production chain and purity of seeds, the project adopted the model of ‘one village one variety’ concept. The benefit of partnering with OSSOPCA has necessitated the strengthening and institutionalization of the formal and informal seed production system in the districts of Kalahandi, Nauparha and Rayagada. ICRISAT will continuously supply the Breeder seeds of farmer preferred varieties and parental lines of hybrids whereas the OAIC was tasked to procure all various seed class produced by smallholder farmers to be used by the Department of Agriculture in expanding area of pigeonpea in the entire state of Odisha (Mula and Saxena , 2013).

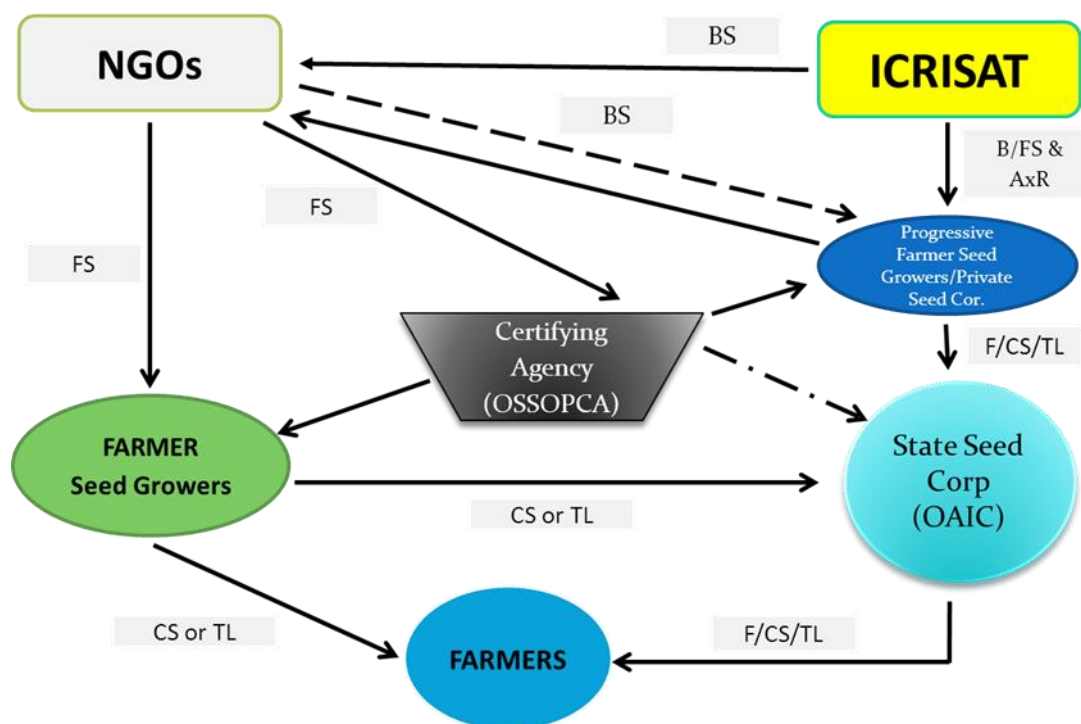


Figure 5. Pigeonpea seed system model in Odisha, India

4. The Way Forward

Seed system for legumes in South Asia has a long way to go. However, in developing and strengthening formal and informal seed production and delivery systems to ensure quality seed of improved farmer preferred varieties and hybrids, we should do the following:

- Improving access to seed for smallholder farmers that focus on subsistence production through the enhancement of local village seed systems by testing a range of seed production and delivery options and searching for options to scale-out and scale-up alternative seed production and delivery schemes;
- Knowledge empowerment of farmers/rural entrepreneurs in seed production, post-harvest and processing, and marketing;
- Exploiting market niches commercial (large scale) production by developing seed markets and identifying seed supply constraints and recommending options to improve its efficiency; and
- Developing and/or strengthening seed regulatory framework as well as a seed policy that considers regulations of an expanding and diversifying seed sector for the benefit of the farmers engaged in the seed production system.

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