

Current status of vegetable seed industry in India and future prospects

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Introduction

Seed is a key component among all inputs for sustainable crop production. It is estimated that quality of seed accounts for 20-25% of productivity. The importance of quality seed has been realized by mankind long ago. The need for a good viable seed for prosperity of human race is mentioned in *Rigveda* of ancient India. It is mentioned in the Primeval Manusmriti as “SubeejamSukshetreJayateSampadyate” which literally means “A good seed in a good field will win and prosper”. Albeit there have been few private seed industries dealing with production of vegetable seeds, the growing of crops especially for seeds in an organized fashion to maintain quality in terms of genetic and physical purity is realized for first time during green revolution period with the establishment of National Seeds Corporation (NSC) in 1963. It is setup by aiming at promoting healthy development of seed industry in India. The principle responsibilities of NSC are establishing an adequate system of quality control inspection for scientific processing, storage and marketing of seeds. Currently there are about 850 seed companies (mostly seed producers) operating in India in 2014, of which about 50 have capacity in crop breeding research. It also undertakes the responsibility of multiplication of seed of pre released varieties and production of foundation seed of varieties. The SRR in vegetable crops has gone from 20 percent in eighties to >90 percent.

At present the total Indian traded seed market is Rs. 20,000 crore. Out of this total vegetable seed market including Open Pollinated varieties is Rs. 4000 crore. Out of 110 hybrids released by AICRP, 60 percent are from Pvt.

Sector. Indian seed Industry is currently occupying the 5th position. During the past 5 years the Indian Seed Industry has been growing at a CAGR of 12% compared to global growth of 6.7%. Few mile stone events in seed policy by Govt. of India are below.

1. The Seeds Act, 1963
2. National Seeds Project
3. New Seeds Policy, 1988
4. PPV & FRA, 2001
5. The Seeds Bill, 2004

The overall market value of the global vegetable seed market increased roughly 6% from 2009 to 2010 to an estimated \$ 4 bn USD. With continued growth and new shifts occurring within regions and production practise, the industry required accurate and applicable data to market effective and critical decisions. The global seed sector outlook 2025 for major vegetable crop spices such as Brassica (Cabbage, cauliflower, broccoli), cucurbits (Muskmelon, watermelon, cucumber, squash), corn (Baby corn, sweet corn), Legumes (Pea, beans), leafy vegetable (Lettuce, spinach), Root – Bulb (Carrot, radish, onion), and Solanaceae (Pepper, eggplant, tomato) is a dynamic capture of semi-annual long range (10-15 year) forecasting data for global vegetable seed market. These crops provide a unique perspective of a complex global sector of agriculture with significant growth opportunities. The Indian seed industry is the fifth largest seed market in the world, accounting for 4.4 % global seed market after the US (27%), China (20%), France (8%) and Brazil (6%). In terms of global trade, India is self sufficient in seed of vegetable, flower, fruit and filed crops. It is expected that market size of Indian seed will grow at a rate of 11% per annum to \$ 3.2 bn till 2016 financial year on account of governments continued focus on improving seed replacement rate.

Vegetable seeds are the fastest growing category within the overall seed market. Vegetable play a major role in proving an affordable balanced died.

Globally, vegetable seeds market has grown consistently over the past 5 year on account of rising worldwide population, expanding middle class and shifting eating habits with growing consumption of green vegetable in the diet.

Potential of vegetable seed production in India

India is endowed with several advantage making it competitive for production of open pollinated varieties and hybrid vegetables seeds for domestic and foreign companies and meeting domestic and international seed quality standard. With the liberalization of seed policy in 1988 in India, the private companies grew fast and currently, there is 60:40 ratio between the private and public sector. There are more than 200 private seed companies of which over 30 per cent have global partner. The role of 13 state owned corporation has declined and they now deal with government notified products. Vegetable seeds accounts for about 18 per cent of the total production of certified seeds. In the public sector, there are 15 state seed corporations, 22 state seed certification agencies and 104 state seed testing laboratory in addition to the National Seed Corporation of India.

With low cost labour availability and environment suitability for quality, vigorous and bold seed production, all kind of vegetable seeds can be produced in India for domestic and export market which will not only save foreign exchange instead earn it besides empowering rural poor with skill, generate employments and income. Private sector instead prefers to import than to empower and develop entrepreneurship among our own small holder farmers.

Global Perspective

High quality seed production and export is the best choice, since it does not require additional investment by the government. Seed industry can expand on its own, both in domestic and export trade, once we have market friendly regulations and encourage more investigation. In future, the vegetable seed sector is expected to be active and dynamic with hybrid varieties developed indigenously for domestic markets and commercial farmer and superior open

pollinated varieties produced for the benefit of marginal farmers and homestead gardens.

PVP pattern in public sector

India's Plant Varieties and Farmers' Rights (PPV&FR) Act of 2001, the establishment of the PPV&FR Authority in 2005, and the commencement of varietal protection application processing in 2007 have helped to some extent in providing the IPR environment needed to incentivize private investment in the seed sectors. The objective of this legislation was to provide an effective system for the protection of farmer's rights which would also stimulate investment for research and development both in public and private sector for the development of new plant varieties by ensuring appropriate returns on such investments. In total, about 1700 varieties developed by the ICAR were eligible for registration under PPVFRA, but only about 50 per cent of these varieties were protected.

Factors promoting vegetable seed industry in India

- 1) Ever Increasing Demand
- 2) Varied Agro Climatic Conditions
- 3) Cheap labour availability
- 4) Vast Domestic and International market

Influence of vegetable seed industry on economy

- 1) Income generation
- 2) Employment generation
- 3) Foreign Exchange Earning

Role of Public & Private Seed Sector

The private sector has started to play a significant role in the seed industry over the last few years. At present, the number of companies engaged in seed production or seed trade is of the order of 400 or 500. However, the main focus of private seed companies has been on the high value low volume seeds and market for low value high volume seeds of cereals, pulses and oilseeds is still dominated by the public sector seed corporations. Private sector companies have a significant place mainly in the case of maize and sunflower and cotton. However, in the case of vegetable seeds and planting materials of horticultural crops, the private sector is the dominant player. As the private sector has not been enthusiastic about entering into seed production of high volume low margin crops of wheat, paddy, other cereals, oilseeds and pulses, the public sector seed corporations will continue to remain dominant in cereals, pulses and oilseeds for many more years to come. At present 15 State Seeds Corporation and 2 National level seeds Corporations.

Constraints in vegetable seed industry

- 1) High Cost and Vague Market Demand
- 2) Perishable Nature of Seed
- 3) Problems linked with contract farming
- 4) Climate, Pest and Disease related problems
- 5) Stringent seed policies and laws

Conclusion

- ▶ Vegetable seed business will ever have huge scope to success and will play an important role in economy in countries like India
- ▶ Making available quality seeds to the farmers in time and in sufficient quantity at reasonable prices
- ▶ Policy making and implementations shall be free from political motivations

- ▶ Strengthening of public sector in R&D is needed to compete with private seed companies so as to provide good quality seeds to the farmers at cheaper rates

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3. Scope for vegetable seed production in India

India is the second largest producer of vegetables only next to China. In India vegetables are grown in 6.2 million ha with a production of 94 mt. Our vegetable requirement in the country is estimated at 225 mt by 2020. Substantial increase in yield and quality of vegetable crops depends upon a number of factors viz., quality seed, fertilizers, irrigation and plant protection measures and suitable agronomic practices. Among these use of quality seed plays a pivotal role. As per Manusmanti – an ancient Hindu Scripture, “Good seed on good land yields abundant produce” adds age-old recognition to the importance of good quality seed in crop production.

Economically, the cost of seed is less but it is realized only on possession of good quality characters. The importance of seed quality is emphasised as “seeds of hope may turn into seeds of frustration” if they are not of high quality. It is therefore, important to use the seed conforming to the prescribed standards in terms of high genetic and physical purity, physiological and health quality.

In most of the public sectors, the major concentration is on open pollinated varieties of which wheat and rice account for about 60 per cent. Majority of the promising hybrids of vegetables are from the private sector as they mostly deal with high value, low volume seeds. Thus, private companies have good scope and opportunity to sell seeds, as large area is still being sown with farm saved seeds. Private sector seed companies account for about 67 per cent of seed production and farmers keep their own seed. Government agencies including public sector corporations at the central and state hardly contribute 33 per cent of the total seed requirement. However, the estimated requirement of vegetable seeds at present is about 20,000 t for tropical and subtropical kinds and 200 t for temperate ones, which will constantly increase in the years to come. Among the vegetables, garden pea constitutes 6,000 to 7,000 t, bhendi around 5,000 t, onion 2,500 t.

Annual sale of seed of Indian Seed Industry

Indian Seed Industry ranks 6 in domestic seed sales. Value of the seeds sold in the domestic markets of India is USD 1500 million or Rs.6675 crores. The present value of

the seeds exported from India is around Rs.111.3 crores. India is at 29th place in export of seeds. This amounts to 0.35% of the world seed exports and 0.12% of the India's agricultural exports.

World: Value of domestic seed markets (top ten countries) – 2010

Country	Domestic Market Value
U.S.A	12000
China	6000
France	2370
Brazil	2000
Germany	1950
India	1500
Japan	1250
Italy	715
Argentina	695
Canada	550

The commercial world seed market is assessed at USD 42 billion.
(Source: International Seed Federation – 2010.)

India is bestowed with varied agro climatic conditions / zones, experienced and dedicated farmers, viable seed industry, legislations etc., favouring the production of quality vegetable seeds. Our strengths and the weaknesses in vegetable seed production are as below.

Strength of Indian seed sector

- A well developed and knitted seed multiplication and distribution systems linked with several ICAR institutes / SAUs / NSC / SFCI etc.
- A network of 20 seed certification agencies at national level central & referral laboratory and 108 notified seed testing laboratories in state level to legally assure the quality seeds moving in the seed market.
- Over 6000 varieties & hybrids of different crops suitable for varied agro-climatic conditions were registered in National catalogue. This makes the selection easier for taking up production in a particular area.
- Our country is bestowed with varied agro climatic conditions, which can be exploited for taking up seed production of vegetables at any time of the year in one or other part of the country.

- Strong Network of Public & of Private stake holders of Seed Industry with Research and Development facilities
- A very fast development of private seed companies which are helpful in bridging the gap between demand and supply of vegetable seeds in the country.
- Proactive Government Policies and Programmes

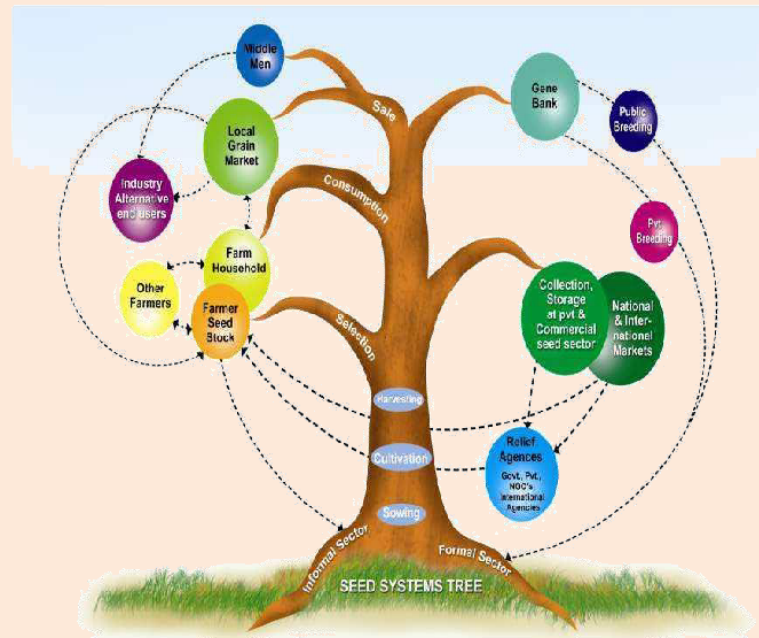
Weaknesses

- Vegetable seed production in the country has been vulnerable to vagaries of weather resulting in production of poor quality seeds.
- Availability of realistic data on actual area under vegetable and requirements of vegetable seeds is inappropriate.
- There is no proper planning for cropping system and restriction for planting a particular crop, maintenance of isolation distance is difficult.
- Very low or no indents for new improved varieties due to ignorance about the performance of newly developed improved varieties.
- Non-availability of adequate nucleus and breeder seeds in the seed production chain.
- Problems in lifting of produced seeds against indents.

Seed improvement programmes in India

Support of World Bank to Indian Seed Programme

The world bank supported the Indian seed programme to the amount of US \$.7M in NSP-1, US \$ 34.9M in NSP-II, later on huge outlay was also provided under NSP-III to develop infrastructure in SSCA,SSC,NSC/SFCI STL's and NARS. Private companies also benefited from this programme by getting refinance loan from NABARD.



National Efforts on Seed Development

- ICAR has strengthened the seed research programme through launching of special project on Promotion of Research and Development efforts on vegetables hybrids during 1992.
- Formulation of New Seed Bill 2004.
- Establishment of - NSRTC an exclusive seed quality control and Central capacity building centre.
- PPV&FR Authority for protection of Intellectual Property Rights on new crop varieties.
- Formulation of National Seed Plan - Envisages role of Central, State Govt., ICAR/SAUs, SSCs' to produce more quality seeds.
- Launching of National Seed Mission. Member of OECD, ISTA & ITPGRFA.
- 61 varieties of 19 crops included in OECD varietal list – July 201.
- Breeder Seed Production Programme: ICAR has provided revolving fund of Rs.1500 lakhs. The income generated out of revolving funds can be utilized for the development of infrastructure for the breeder seed programmes to make the programme self-sustainable.

Strategies for seed improvement

Exploitation of Hybrid Vigour

It is the best approach for varietal increase in production of crops. The area under hybrids is about 27 per cent while their contribution to yield is 40 per cent.

Description of otified Varieties

The implementation of plant variety protection would necessarily require detailed characterization of all varieties. The variety registration would have on DUS criteria. Efforts are being made to characterize all the crop varieties under seed production chain.

Enhancement of Seed Replacement Rates

The socio-economic status of the farmer does not permit to purchase quality seeds. Therefore the seed replacement rate is very low. The realistic indents and production of breeder seed of different crop varieties by maintaining quality can enhance SRR.

Seed Replacement Rate is the rate at which the farmers replace the seeds instead of using their own seeds.

Seed Replacement Rate of major vegetables

Crop	SRR (%)
Brinjal	63.4
Cabbage	100
Cauliflower	86.4
Chilli	83.7
Gourds	73.5
Melons	89.2
Okra	92.4
Tomato	99.3
Beans	62.2
Onion	87.3
Peas	93.5
Others	72.6

Enhancement of Seed Multiplication Ratio

SMR is nothing but the number of seeds to be produced from a single seed when it is sown and harvested, which can be altered by adoption of proper seed and crop management techniques. However, according to expert group of seeds (1989), the seed multiplication ratios for different crops are as follows.

Crop	SMR
Okra	1:100
Tomato	1:400
Brinjal	1:450
Chillies	1:240
Watermelon	1:100
Pumpkin	1:160
Bittergourd	1:41
Bottlegourd	1:99
Ridgegourd	1:83
Cucumber	1:200
French bean	1:9
Clusterbean	1:50
Peas	1:19
Onion	1:171
Radish	1:100
Carrot	1:83

Identification of suitable area for seed production

Diversification of seed production areas in terms of seasons and regions helps in enhancing the seed production. The search for disease free areas is much warranted to maintain seed health and also to check the spread of the disease from one area to another. Dry and cool regions could be used for effective seed storage at much lower cost and lesser risk on account of seed viability. According to Rai (1997) strategies for improvement in seed programmes are

1. Popularization of quality seed
2. Liaison between Scientists and Department of Agriculture
3. Intellectual Property Right
4. Variety Characterization
5. Strengthening of hybrid programme
6. Exploitation of CMS system for reducing cost of hybrid seed

7. Production of disease free seed
8. Seed processing
9. Packaging and storage
10. Biotechnology and bio-safety
11. Human resource development
12. Seed demand and forecasting
13. Export of seed
14. Five Generation system of seed multiplication (Nucleus – Breeder – Foundation I – Foundation II – Certified) should be strictly followed.
15. Seed Village Scheme need to be promoted.
16. Contract seed production at the farmers' field could be encouraged.
17. Providing incentives and adequate infrastructure facilities like power, irrigation, credit etc., for private seed producers
18. Seed Bank may be established to meet the demand during natural calamities.