

## Aspects of the Indian Vegetable Seed Industry

Anamika Walia<sup>1</sup> and Arun Lalotra<sup>2</sup>

<sup>1</sup>Dept. of Vegetable Sciences and Floriculture, Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu

<sup>2</sup>Dept. Of Agribusiness Management, Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu

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### INTRODUCTION

Seed is the most important and primary input in agriculture. It 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” (Poonia, 2013) which literally means “A good seed in a good field will win and prosper”. Saving of some portion of produce as seed for next cropping season or year in various structures is a very common and age old practice of Indian farming community. At present, only less than 15% of seeds used by the farmer are good quality seeds, and the rest of the seed demand is being satisfied by the saved seeds of farmers from the previous season.

Indian seed industry is one of the most mature and vibrant one in the Global Seed Market. It is built on the foundations of strong public sector commitment to research and development that started in the 1960s under the Green Revolution. Expansion of seed industry has occurred in parallel with agricultural commodity growth. The organized seed sector in the country is only 50 years old. In India, substantial increase in crop production has been due to high quality seed. With support from international foundations, India has established breeding centres for all major crops, through a nationwide trial system and extension support. India is 5<sup>th</sup> largest seed market in the world estimated at Rs 15000 crores.



### **Indian vegetable seed Industry**

India is the second largest producer of vegetables in the world. Its diverse soil and climate condition provides ample opportunity to grow a variety of crops (be it tropical, semi-temperate, or temperate type). Cultivation of vegetables is labour intensive and generates lot of employment opportunities throughout the year. They fit well in the cropping system either as main crop, intercrop or as a catch crop between the growing seasons. Vegetables are also rich source of vitamins, minerals, proteins, and antioxidants etc. which are deficient in the cereals. Hence, they are referred to as protective foods and assumed great importance as nutritional security of the people. Thus, cultivation of vegetables plays a vital role in the prosperity of a nation and is directly linked with the health and happiness of the people. Vegetables form a significant part of total agricultural produce in the country. Vegetable crops in India occupies 10.29 million ha of area, producing about 188.0 million tonnes with an average productivity of 18.8 t/ha (2019-20) of fresh vegetables, yet the productivity is not sufficient to provide diet to our growing population (NHB, 2019). According to an estimate the total vegetable seed requirement in India is 51,000 tonnes but the actual availability is around 40,000 tonnes and large chunk of seeds is still being multiplied by farmers themselves (Dutta, 2004). Vegetables play an important role in India's rural economy by improving the income of the farmers. Vegetables also play an important role in providing the base for growing agro-processing industry as well as helping in getting foreign exchange.

Vegetable seed producers consist of Govt. agencies like NSC, state seed corporations, SAU's, ICAR institutes and private seed companies. Unlike cereals, vegetable seed is categorised as low volume high value seed, which is dominated by the private seed companies, which concentrate on production of hybrids seeds of mainly tomato, cabbage, brinjal, chilli, okra and cucurbits, where the seed production is comparatively easy and more profitable. The government R&D institutes and production agencies are largely concentrated on development and seed production of varieties, of the 461 varieties released by AICRP-vegetables > 60 % varieties are O.P varieties. ICAR institutes and SAU's produce breeder seed, which is made available to the seed producing agencies/corporations and small private seed companies which don't have their own R&D setup. Private seed companies with their



large scale production and aggressive marketing are popular among vegetable growers (Koundinya, 2014).

### **Government players in Indian seed industry**

Government seed producing and R& D institutes include:

- 1) National Seeds Corporation
- 2) State Seed Corporations
- 3) ICAR institutes
- 4) State Agriculture Universities

Corporate seed firms are mainly concentrating on vegetables like tomato, cabbage, brinjal, chilli, okra and cucurbits. They have limited interest in self-pollinated crops. They rarely trade with the production of true seed or planting materials of potato, sweet potato and other tuber and bulb crops, leaving public sector to deal with these crops.

### **Private players in vegetable seed industry in India**

Around 500 seed companies of national and foreign origin few companies like M/S BejoSheetal, Indo-American Hybrid Seeds and Namdhari Seeds are working exclusively on vegetable hybrids. The major players of Indian vegetable seed industry are Nunhems (a subsidiary of Bayer Crop Science), Seminis (a subsidiary of Monsanto), Syngenta (Switzerland based MNC), Namdhari Seeds, Mahyco Seeds, Krishidhan Seeds, Bio seeds, Nuziveedu Seeds, RasiHyveg seeds and others. A number of medium and small sized companies have begun to operate now in this venture covering seed production in most of the solanaceous and cucurbitaceous crops for internal market and exports. These companies include Namdhari Seeds, Mahyco, Indo American Hybrid Seeds, Golden Seeds, Tropica, Exim, Oriental Biotech, Unicorn Biotech, Krishidhan Seeds etc. Custom production for export is mainly for companies in US, Europe and Japan. Vegetable seed export constitutes nearly 70% of total seed exports.

### **FACTORS PROMOTING VEGETABLE SEED INDUSTRY IN INDIA**

#### **1) Ever Increasing Demand**

The worldwide production of vegetables has doubled over the past quarter century and the value of global trade in vegetables now exceeds that of cereals. India is emerging



as the second largest producer of vegetables after China. Increase in yield is mainly attributed to expanding areas under high yielding vegetable varieties and hybrids. Finally, it leads to ever increasing demand for the quality vegetable seed. Total quantity of vegetable seeds produced in the country is not sufficient to meet the country's ever-increasing demand. Currently quality seeds are met to the extent of 20% only. Farmers themselves meet the 75% through own saved seeds (Poonia, 2013). India is still importing the vegetable seeds from other countries major being radish followed by cabbage and pea (Vanitha *et al.*, 2013).

## **2) Varied Agro Climatic Conditions**

India is blessed with assorted agro climatic conditions ranging from tropical to temperate which make possible the cultivation and seed production of all most all vegetables belonging to different temperature regimes. Seed production of warm season vegetables is possible in Indian plains and Deccan Plateau and seed production of winter vegetables like cabbage, cauliflower, broccoli, beetroot, European carrot and radish is possible in hill stations of Himalayan range. Some winter vegetables like Onion, Asiatic Carrot, Asiatic Radish, and tropical cauliflower produce seeds during winter season in North Indian Plains and Solanaceous vegetables, Cucurbits and Legumes set seeds throughout the year under South Indian conditions (Sharma, 2011).

## **3) Cheap labour availability**

Vegetable seed production particularly hybrid seed production demands much labour. Labour is needed for performing various cultural operations. Though mechanization reduces the human effort up to some extent, high cost fuel and energy limitations reduce full scale mechanization. Moreover, emasculation and pollination steps during hybrid seed production of vegetables solely depend on human labour (Sudha *et al.*, 2006). India is ranked second in hand pollinated vegetable seed production in Asia next to China (Sharma, 2011; Kalia, 2009). Average number of man-days per acre required for hybrid seed production of various vegetables as follows: tomato-480; Chilli-1800; okra-180; brinjal-600; cucurbits-150 to 450 (Hazra, 2005). India is having huge human resources availing at reasonably cheaper rates (Sharma, 2011). This is attracting various corporate sectors of national and international origin to invest in seed business in India.

## **4) Vast Domestic and International market**



Due to high profits in vegetable cultivation, area under vegetable cultivation is expanding enormously year by year. This creates huge demand for vegetable seed in the market. Requirement of vegetable seed is increasing annually. Now a days, hybrids are replacing the open pollinated varieties (OPV) largely due to higher yield, uniformity and their improved quality for instance India is second largest user of hybrid tomato seed after USA (Kalia, 2009). Vegetable seed exports consist of 70% of total seed exports (Kalia, 2009). Vegetable seeds of either OPV or hybrids from India are having cosmic demand in foreign countries like Pakistan, Bangladesh and Saudi Arabia.

## CONSTRAINTS IN VEGETABLE SEED INDUSTRY

### 1) High Cost and Vague Market Demand

Vegetable seeds are highly expensive especially hybrid seeds due to involvement of more labour and other inputs (Sharma, 2011). Small and marginal farmers cannot afford the high cost of vegetable seeds. Moreover, farmers have to purchase the hybrid seeds (F1 generation) every time as the seeds harvested from the previous season (F1) get alter in their genetic constitution due to segregation and recombination in F2 generation. The demand for vegetable seeds in the market is vague. Unlike cereal seeds, excess cannot be used for human consumption. Hence, surplus production of vegetable seeds will leads to huge economic loss (Sharma, 2011).

### 2) Perishable Nature of Seed

Seed is a living entity and a biological product unlike fertilizers and chemicals manufactured in factories. So, it is subjected to death depending upon its genetic potentiality to remain viable and storage conditions (Poonia, 2013). Storage for longer period shows negative effect on given germination percentage and optimum crop stand and specified yield. Sometimes seeds may attain expiry time within storage or transport due to delay in marketing and performing long formalities to export. Unlike cereals, vegetable seeds are not the edible portions in majority of vegetables (Sharma, 2011).

### 3) Problems linked with contract farming

Seed production by multinational companies in developed countries is carried out in their own fields. But, in India seed production is being done in farmers' fields through contract farming. Besides giving credit benefit to the farmers, it adversely affects the quality of the seed (Mazumdar, 2012). Most of the Indian farmers are small and marginal



and they may not be having scientific and technical knowledge on floral biology pollination mechanism, isolation distance, rouging etc. which plays a major role in quality seed production. Moreover, seed production is distributed over large areas. These not only result in the lack of uniformity in the seeds but also lead to contamination (Mazumdar, 2012).

#### **4) Climate, Pest and Disease related problems**

Seed production is a seasonal activity. Seed crops are grown in open conditions which are subjected to environmental extremes. High or low temperature and heavy or low rainfall leads to huge losses through crop failure. Moreover, flowering in most of the vegetables like tomato, okra, cucurbits and some temperate vegetables is temperature sensitive. Under climate change scenario flowering and pollination of these vegetables is going to be hampered (Koundinya, 2014). Generally seed production is done over larger area with same variety to avoid contamination, but it is favourable for outbreak of pest and diseases epidemics. Management of these pest and diseases again increases the cost of production.

#### **5) Stringent seed policies and laws**

Varietal notification and registration are compulsory and is time taking in bureaucratic system. Seed certification is another important time-consuming task, though truthfully labelled seeds do not need of certification (Sharma, 2011). Private seed companies want to maintain secrecy about pedigree and sources in the development of variety, but varietal registration demands these details. Though PPV & FRA, 2001 protects the rights of these firms by preventing the reproduction of branded seed by farmers, it allows the researchers to conduct research except using these varieties as parents in hybridization programme without prior permission from originating plant breeder or institution. Pricing policy of vegetable seeds is ambiguous and does not provide the means to predict the market demand pricing in the ensuing season (Sharma, 2011).

### **STRATEGIES FOR SEED IMPROVEMENT**

#### **1. 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.



## 2. Description of Notified 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.

## 3. Enhancement of Seed Replacement Rates

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

## 4. 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.

## 5. 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.

## CURRENT STATUS OF VEGETABLE SEEDS INDUSTRY

The Global Vegetable Seeds Market is estimated to be valued at USD 8.77 billion in 2018 and is projected to reach USD 14.00 billion by 2025, at a CAGR of +8.10% from 2019. Asian vegetable seed market is the largest where China and India are the major players in the region occupying 48 per cent of the global vegetable seed market share. The Indian market for vegetable seed is projected to grow at a CAGR of 9.8% for the forecast period between 2020-2025. Indian seed industry is the 5th largest in the world and is worth 2.7 billion US \$ (Dubey, 2016). Out of this, total vegetable seed market including OPV's is



4000 crores (US \$ 580 m). India is the tenth largest importer of vegetable seeds by value and seventh largest importer by volume, in the world. It accounted for about 1% of the total vegetable seed imports by volume during 2018. Europe stands next with 26 per cent share and France being major vegetable seed exporting hub to rest of the world. During 2015-16 India exported 18.7 million tonnes of vegetables worth 4866.91crores. Export of Vegetable Seeds from India was 11.99 thousand MT, valuing Rs. Crores 745.95 / US\$ Mill 107.76 during 2018-19. India exports vegetable seeds majorly to Netherlands (25.42 Mill USD), followed by USA (22.25 Mill USD), and Pakistan (17.1 Mill USD).

Indian seed industry has been growing awfully in quantity and value over the past fifty years. Both public and private sector corporations/companies are actively involving in quality seed production. The public sector component comprises National Seeds Corporation (NSC), State Farm Corporation of India (SFCI) and 15 State Seeds Corporations (SSCs) (Gadwal, 2003; Poonia, 2013), Indian Council of Agricultural Research (ICAR) institutions and State Agricultural Universities. ICAR launched an All India Coordinated Research Improvement project (AICRP) on seed production called National Seed Project in 1979 with 14 centres in different Agricultural Universities. AICRP on production of breeder seed in vegetable crops is started under National Seed Project in 1994. Twenty two State Seed Certification Agencies and 104 State Seed Testing Laboratories are involving in quality control and certification (Poonia, 2013). The private sector comprises around 150 seed companies of national and foreign origin but only few companies like M/S BejoSheetal, Indo-American Hybrid Seeds and Namdhari Seeds are working exclusively on vegetable hybrids (Mazumdar, 2012). The Indian public sector seed industry used to dominate the private sector in the very beginning. The order of type of seeds dominating the market in terms of quantity and value has been open-pollinated varieties followed by public hybrids and private hybrids. The situation is quite reversed currently. Seeds of the private hybrids are forming a significant portion of the total vegetable seed market. Due to advent of private seed companies with the liberalization of seed trade in 1988, the public sector seed corporations/companies have started declining and becoming inept. Now a days the public sector is mostly confined to certified seeds of high volume, low value segment of high yielding varieties of cereals, pulses and cotton with a limited presence in the high value hybrid sectors of cotton and cereals (Gadwal, 2003; Mazumdar, 2012).





## **FUTURE PROSPECTS OF VEGETABLE SEED INDUSTRY**

Vegetable seed industry has enormous employment generation potential. Hybrid seed production of vegetable requires lot of manual labour for emasculation and pollination. There is a need to diversify the vegetable seed production hubs to non-tradition high productive regions. Funds under various government programmes like Tribal sub plan, MNREGA should be made available to the rural areas for training them in seed production. Village level entrepreneurship development must be encouraged. Promotion of ancillary activities and diversification of farm enterprise is one of the important strategies outlined by the government to double the farmers' income by 2022, for which seed production of vegetables can be a major role player in doubling the farmers' income. India with its diverse climatic and soil and vast pool of man power can become the world leader in export of vegetable seeds and can ushering the rural prosperity.

## **CONCLUSION**

It can be concluded that vegetable seed business will ever have huge scope to success and will play an important role in economy in countries like India where the occupation of majority of the people is agriculture. There is a greater need to make available quality seeds to the farmers in time and in sufficient quantity at reasonable prices. Seed laws are to be implemented strictly to ensure supply of quality seeds and to protect the farmers from spurious seeds. Government has to reduce precincts on import and export of quality seeds and planting materials. 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. The collaboration of both public and private sector may obviously help in quality vegetable seed production in India. There should be exchange of germplasm and other inputs between public and private sectors as per some pre made agreements. The mammoth seed companies may not be interested in such deals as these companies are having established R&D wings and their own technical staff. Nascent seed firms with moderate level of establishment and technical staff may find better option by such covenant.

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