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INVITED ARTICLE

Social and Economic Empowerment of Farmers through Vegetable Seed Production in Odisha

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ABSTRACT

India is self-sufficient in production of flowers, fruits, vegetables but quality seeds of horticultural crops are not available to the farmers. The response of all other inputs is largely influenced by the quality of seeds, which is estimated to contribute 15–20% of the overall yield, depending on the crop, and can increase to up to 45% with effective control of other inputs. The farming community is heavily reliant on private sector for quality seeds of horticultural crops. The government of India has taken a number of progressive and reformative measures to help the country's seed industry expansion over the past three decades besides the rural youth involvement in the seed production programmes. In Odisha, Central Horticultural Experiment Station (ICAR-Indian Institute of Horticultural Research), Bhubaneswar has taken up considerable efforts for social and economic empowerment of farmers through commercial vegetable seed and is benefitting the farming community besides the rural youth and women empowerment.

Keywords : *Empowerment, Farmers, Quality seeds and Vegetable seed production*

High quality seed and planting material are the backbone for the successful conventional and commercial farming. The innate genetic strength of the seed and planting material determines the response to all other inputs and climatic conditions in a specific place. In early days of farming, farmers have produced food for their families using local cultivars, landraces, and primitive types under subsistence farming. However, over the last few decades, commercial agriculture has become increasingly popular, with subsistence farming becoming less and less popular. Although there has been a steady transition in India

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He has developed farmers participatory models for Backyard kitchen gardening, Commercial fruit and vegetable nursery and Integrated aqua-horticulture based on his extensive transfer of technology activities in several districts of Odisha. He has characterized several horticultural soil microflora for specific agriculturally important attributes. He is associated with development of two vegetable varieties (Arka Neelachal Shanti-a hybrid kankad variety) and Arka Neelachal Yodha- a wilt tolerant brinjal variety) and a fruit variety (Arka Neelachal Vikram-Custard apple). Recently he has developed a raw jack peeler machine (Arka Neelachal Raw Jackfruit Peeler) to create a new avenue for utilization of abundant jackfruits in Odisha and adjoining regions.

from traditional low-yielding types to high yielding, high-quality varieties and hybrids since the era of the green revolution. The farmers in all sectors are reaping significant financial benefits due to the technological interventions. However, the transfer of these technologies is not uniform and still some of the regions of the country not yet benefitted through these innovations. At the same time, farming has become challenging due to climate change and lack of availability of climate resilient varieties. In food crops the efforts of Government and the Private Sector have made steady progress to meet the ever increasing demands for food and nutritional security of the country. But, in Horticultural Crops, the growth is not in tune with the expected demands of the farmers even after releasing improved varieties/ hybrids in various crops and the huge involvement of the Private industry. The major bottlenecks in the horticultural crop are the high cost of quality seeds and the difficulty of accessing them in distant places prevented a sizeable portion of farmers from benefiting from high-quality seeds and planting materials.

The diversity of agriculture and the improvement of nutritional security both heavily rely on horticultural crops particularly vegetables. In our economy, the horticulture sector is flourishing with the production of higher-value food from the available land. It has a lot of promise for increasing farm income. This has grown to be a key factor in the economic growth of several Indian states, adds significantly to the country's agricultural GDP, and eventually boosts the Indian economy. However, the primary focus of Indian agriculture is on vegetables, which are crucial for the health and security of farming families' diets. The consumption of veggies has become incredibly important due to shifting dietary and nutritional paradigms. India is the second-largest producer of vegetables in the world; however, the production of quality seed/ planting material is insufficient to meet the demands of the farmers. It is the seventh-largest importer of vegetable seeds worldwide in terms of volume and ranks tenth in terms of value. The top three exporters of vegetable seeds to India are Chile, Thailand, and Italy, which together account for 53% of India's total imports of vegetable seeds. Therefore, it is essential to note that the use of high-quality seeds from improved varieties of various vegetable crops has significantly increased vegetable production and productivity. However, the timely and cost-effective availability of high-quality seeds is a major concern.

Annual growth in the Indian vegetable seed sector is rapid. The seed trade is dominated by private enterprises, which collectively hold a significant market share. The recent initiatives and the continuous support from the Government, the public sector organizations like ICAR Institutes, SAUs etc. have come up with new technologies and varieties for the benefit of farming community. The quality seeds of improved varieties/ hybrids are available at affordable price. But the necessary infrastructure facilities for huge production of quality vegetable seeds in the public sector are lacking and needs the support from the NGOs, FPOs, etc. in creating/transferring the necessary know how to the farmers a=for their benefit in the form of seed production and supply of quality material at affordable price. Therefore, there is a pressing need for local communities to source high-quality seeds from the public sector.

Vegetable Seed Production in Odisha

Vegetables are an essential part of Indian agriculture and have a substantial impact on the nutritional and economic security of rural communities due to their short duration, high yield, high nutritional value, economic viability, and capacity to create both on- and off-farm employment, An in-depth analysis of the data from the Horticulture Statistics Division, Department of Agriculture, Co-operation and Farmers Welfare, Ministry of Agriculture, Government of India, revealed that the major vegetable producing states in India are West Bengal (23044.95 MT), Uttar Pradesh (18544.96 MT), Bihar (15097.77 MT), Madhya Pradesh (13019.31 MT), Gujarat (11571.24 MT) and Maharashtra (10161.83 MT). The area planted with vegetables in the state of Odisha has not changed much over the past few years.

Odisha is having very good potential to grow a wide variety of horticulture crops by the presence of diverse agro-climatic conditions and rich genetic horticultural crop flora found in Eastern India. The past regional horticulture development initiatives by the Government and other agencies have clearly highlighted that horticulture is the best option for enhancing livelihood, food security, and nutritional security with improved employment and income generation to the Odisha state. Horticultural crops require huge labour and serve a special economic function to the rural residents with work opportunities in addition to promoting biodiversity and crop diversification. Furthermore, horticultural crops

particularly, vegetable crops are known as the protective foods and are crucial for ensuring healthy diet to the people of this state.

Odisha has lower agricultural output than the rest of India, even then Eastern India makes a substantial contribution to the country's production of vegetable crops. About 34% of the nation's total territory is used for vegetable farming, and this region produces about 32% of the overall vegetable production. Odisha's vegetable-growing area was 688.14 thousand hectares in 2012–2013, however this figure decreased in the following years to 677.33, 668.53, 652.05 and 639.34 thousand hectares in 2013–2014, 2014–2015, 2015–2016, and 2016–2017, respectively. Similarly, the production was approximately 90 lakh metric tonnes during the same timeframe, peaking at 94 lakh metric tonnes during 2012–2013. During 2016–17, the production share is approximately 5%. The main regions for the vegetable cultivation in the several districts of Odisha are Keonjhar, Ganjam, Kalahandi, Mayurbhanj, and Bhadrak for Binjal; is also widely grown in Jagatsinghpur, Kandhamal, Khorda, Dhenkanal, Mayurbhanj for Cabbage, etc. The farmers of these regions are very well acquainted with various vegetable crops and know the problems, which are hampering their income. Some of the problems highlighted by the farmers of these regions during vegetable cultivation are

- Lack of awareness on the public bred varieties/ hybrids and non-availability of quality seed of these varieties/hybrids to the small and marginal farmers at community levels.
- Lack of state of the art infrastructure for production, processing and marketing quality seeds of public sector varieties and hybrids.
- Lack of quality human resources to take up the quality seed production of public sector varieties/ hybrids.

Strategies for Solving the Problems

Redefining the roles of rural youth lacking jobs and farmwomen is necessary to redirect their aspirations to become seed producers and reposition the seed supply system at the grass-roots level. These organizations may be crucial to the production of vegetable seeds, hence enhancing the regional seed network. Reorienting rural youth who are unemployed or underemployed and female farmers into groups (FPO, SHGs, Women Empowerment Groups) in order to produce and extract high-quality seeds of public sector types, hybrids, and planting materials on a large scale is crucial. In order to guarantee the availability of high-quality seeds and planting materials at community levels at lower costs, technologies like vegetable grafting and vegetative propagation of some crops can be linked with traditional seed production. Lowering input costs and achieving higher yields from the limited land resources available to small and marginal farmers, can be an effective technique for increasing agriculture's sustainability and doubling farmers' income.

To acquire the intended results, it is required to increase the capacity of the aforementioned target groups through a systematic human resource development program in tasks like pollination, seed gathering, cleaning, etc. A great biodiversity of agricultural species can be maintained at the village and block levels by preserving native cultivars, landraces, and High high-yielding varieties, which can also be taught to these groups. Training in a set of procedures for mass-produced seeds, their distribution, and marketing can help to create female seed entrepreneurs. For the production of high-quality seeds at the village level, connections with government programs for certified seed production in partnership or in PPP mode can be reinforced.

As a result, the production of vegetable seeds has a favorable impact on India's economy in terms of generating income, creating jobs, and selling products abroad to earn foreign currency. Therefore, beginning the production of vegetable seeds at the village level with the help of certain farmer groups can play a vital role in resolving the difficulties of timely availability of high-quality seeds at lower prices as well as ensuring a steady source of revenue flow to these relatively vulnerable communities. According to the Indian Seed Portal, the seed sector is currently working with a "farmer-centric" approach and is market-driven. By modifying various rules, farmers have a wide range of product options. Therefore, policymakers emphasize that stakeholders must change to be in line with the industry in terms of infrastructure, technologies, approach, and management culture in order to survive in the competitive market and to increase their contribution to the national effort to increase food production in

order to achieve food & nutritional security. Central Horticultural Experiment Station (ICAR-IIHR), Bhubaneswar, under the MIDH sponsored project entitled *"SEEDS: Social and Economic Empowerment through Dedicated Seed production clusters for vegetable crops in Odisha"* would attempt to improve the vegetable scenario in Odisha for overall strengthening of vegetable production scenario in the region through introduction of new vegetables, new varieties and production technologies

Broad Objectives

1 To diversify the type and quality of vegetable crops grown in the region through seed clusters to enhance overall economic returns of the farmers

2 To strengthen the infrastructure for production and processing of quality vegetable seeds on commercial scale.

3 To develop the human resource for production of quality vegetable seeds and planting material for catering local and regional needs.

Work Plan

Identification and selection of crops and varieties suitable for Eastern region of India with particular emphasis on Odisha agro-climatic conditions will be carried out along with the identification of suitable villages in clusters of different climatic conditions based on the availability of resources. Beneficiaries, stakeholders and entrepreneurs will be selected and capacity building programmes will be carried out for the selected groups. Mass production of popular and potential varieties and hybrid seeds, planting materials/ seedling production under protected conditions will be taken up in selected clusters based of climatic suitability. Seed produced in these regions will be centrally pooled, processed, packed and marketed at prefixed rates on profit sharing basis among the participating stakeholders. Impact assessment of the project would be made at periodic intervals with the involvement of experts and other stake holders to further improve the mechanism.

Deliverables

- Implementation of Farmer participatory seed production system for production of quality public sector varieties and hybrids in the region
- Development of state of the art infrastructure for seed quality testing i.e., genetic purity and seed health, processing and packaging.
- Human resource development followed by generation of employment, especially for rural youth and women folk through seed production, processing and marketing in the region.
- Production of seeds of high yielding notified varieties for different commercial vegetable crops will ensure sufficient quality seed to the farmers at reasonable rate.

Target beneficiaries

The project will be implemented with an aim to locally produce the pure and quality seed material by the farmers for the farmers. Primary emphasis will be given to attract the rural unemployed or underemployed youth and women farmers in the endeavour. Farmers would get hybrids/ varieties at lower price than the varieties of private sector companies. The seed testing laboratory facility will ensure the genetic purity of produced seed and ensure for further processing. The seed health infrastructure would also cater to the academic and research needs of post graduate researchers and academicians. Hence, the stakeholders like farmers belonging to different segments, entrepreneurs and seed suppliers will get the benefits from this core values of the project. Successful completion of project activities is expected to have several possible outcomes like a modern "seed hub" facility for seed production of hybrids and open pollinated varieties for vegetable crops in the region to benefit a wide range of stakeholders; capacity building for a range of farmers and other stakeholders will ensure dissemination of expertise on seed production and marketing; regular supply of the quality seed material of diverse vegetable crops through CHES (ICAR-IIHR) portal will be ensured in the region through single window sourcing and marketing for the first two years. Decentralisation of seed production and marketing by licensed vendors and entrepreneurs will be ensured for self-sustained seed production and supply system in the region.

Progressive Results

During the implementation of the ambitious project during 2019-20, many farmers and districts of Odisha were roped in directly through ground level agencies. 56 acres breeder seeds were given to

around 50 farmers for commercial seed production of eight crops. However, there was severe setback to the project as only two clusters were successful in producing desired results by following the strict seed producing procedures. In 2020-21, 44 farmers were given seeds of french bean, dolichus bean and yardlong bean for around 20 acres of land with more focus on seed production and the revised strategy worked out well to significantly improve the seed production over past year.

During 2021-22, 54 farmers were engaged in the commercial seed production activities in around 54 acres for the three crops, viz, French bean, dolichus bean and yardlong bean and during 2022-23, coriander, palak, pumpkin, amaranth and ridge gourd were added for the commercial seed production. The efforts of introducing new crops was not successful but the seed production of French bean (Arka Arjun, Arka Sharat), dolichus bean (Arka Visthar) and yardlong bean (Arka Mangala) was succeeded.

The major reasons for the partial success of seed production activities attributed to the convenience of growing French bean (Arka Arjun, Arka Sharat), dolichus bean (Arka Visthar) and yardlong bean (Arka Mangala) crops as they have relatively bold seeds. The familiarity of large scale cultivation of these crops also played an important role in seed production of these crops. However, there was a significant increase of income per unit for the successful farmers i.e., Sri Sushant Kumar Patra used to get ₹ 80,000 from his farm of 2 acres, could realise a return of ₹ 2,12,000 from the same piece of land by producing French Bean (Arka Arjun) and Yardlong bean (Arka Mangala); Sri Sudarshan Behera used to get ₹ 55,000 profit from his 1 acre of land, could get ₹ 1,08,000 as profits from same piece of land by producing seeds of French bean of Arka Arjun variety and Sri Dibyasingh Behera who used to get ₹ 4500 from his 0.25 acres of land could get ₹ 30,500 by producing dolichus bean (Arka Visthar) from his 0.5 acre land.

Thus, the results of the previous years clearly indicated the advantages of commercial seed production strategies for the wellbeing of the farming community particularly in terms of profits and employment to the rural youth and women folks of the communities. This activity also helped to incite interest in farming among the rural population and created an avenue for employment generation especially for rural youth and women folk through seed production, processing and marketing in the region.

India is the place of huge natural biodiversity in various food and horticultural crops. It offers an outstanding illustration of how to get adequate nutritional security without compromising overall food security. However, the availability of quality seeds in vegetable crops is not in tune with the demand. Hence, there is a need to create awareness on various strategies to produce quality seeds to meet the demands by involving the rural youth and various organization like the Universities, Research Institutes and FPO's. NGOs etc. Recently, public sector organizations like universities and research institutes have developed new varieties with native environmental acceptability, economically favourable features, and nutritional benefits with market acceptance at lower cost. India needs state of the art facilities to become seed-self-sufficient and to reduce its reliance on seed firms and other nations to meet the ever-increasing demand. Vegetable seed production must be prioritized by creating awareness and transfer of technologies to the rural youth and licensing the advanced breeding cultivars for their utilization in seed production programmes. Thus, beginning the production of vegetable seeds at the village level with the help of farmer groups can play a vital role in resolving the difficulties of timely availability of high-quality seeds at lower prices as well as ensuring a steady source of revenue flow to these relatively vulnerable communities. It is heartening to conclude that in Odisha commercial vegetable seed production is a viable proposition for increasing the income from the limited land holdings, and has enabled beneficiary farmers to become more prosperous and socially active.