

Adoption of relay vegetable

production in trellis for doubling farmers' income: A replicable and successful cropping system

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Vegetable farming is a lucrative agribusiness. It is one of the measures to ensure food security and tackle malnutrition in the world. For vegetable farming to be profitable, it requires a feasible business plan that is only achievable when you can estimate the cost of each unit of input and its return. Some vegetables by nature, produce vines which enable them to climb, therefore, to get maximum returns and quality products from them, there is a need to stake and trellis them. Installing a trellis is never easier and sometimes requires much more labour thereby increases the cost of cultivation. Because of this, it must be used efficiently for a long term by growing vines in the same plot.

Key words: Climber vegetable crops, Livelihood, Scientific trellis system

Technology, Intervention and Adoption

The Farmer FIRST Programme (FFP) of ICAR-NRRI, Cuttack was started in the year 2016-17 with the major objective of increasing productivity and profitability of the farmers through need-based technological interventions that were undertaken through four modules, namely Crop-based Module (rice, pulses, mechanization), Horticulture-based Module (vegetables, fruits, poly house), Animal Science-based Module (poultry, duckery & fishery) and Enterprise-based Module (mushroom, vermicomposting). Among the four modules, Horticulture-based Module played a major role among the farmers by increasing the production potential of the crops and improving their livelihood in order to enhance their social-economic status on the basis of their existing farmer's situation and available resources. Under the Horticulture-based Module, commercial vegetable cultivation is widely adopted among the farmers. As a traditional practice, farmers

grow one or two vegetables in trellis made of bamboo twigs in their backyard kitchen garden every year and uses seeds of local varieties. Therefore, under NRRI-Farmer FIRST Programme (FFP), efforts were made through the project to make the trellis more scientific and to grow 4-5 climber vegetable crops every year in relay along with the introduction of the high yielding and hybrid seed varieties. Accordingly, crop calendars were prepared and the most acceptable relay sequence of climber vegetables is like this: (1) Bitter gourd (Feb-May), (2) Cucumber (May-Aug), (3) Cowpea (Aug-Nov), and (4) Lab-lab bean/French bean (Nov-Feb). With the same trellis structure, 4-5 crops are harvested in a year. Before about one month of the first crop completes its harvesting cycle, seeds of the second crop are sown by digging at the basal ridge. By the time the second crop starts climbing the trellis, the first crop gets dried and removed carefully without damaging the succeeding crop and the trellis structure. Alternate ridges and furrows are

made for proper irrigation and drainage management. Intensive training cum demonstration programmes were conducted by the scientists in the project on scientific crop management practices for promoting scientific trellis structure and adoption of improved seed varieties to enhance the production potential of the farmers for commercial vegetable production. As critical inputs to learn and start production about 250 farm families were provided with improved vegetable seed varieties, plant chemicals (pesticides and hormones), fertilizers, etc for initial learning and awareness to start commercial vegetable production.

Case study of a Successful Adopter of Trellis System

Shri Braja Kishore Jena, aged about 39, from one of the adopted village Biswanathpur, District-Cuttack, Odisha is a marginal farmer owning less than one ha of land, which he used to cultivate *kharif* paddy in 0.8 ha mainly for domestic consumption purpose and vegetables

in 0.2 ha to sustain family livelihood round the year. He was growing one or two vegetables by using seeds of local varieties as a traditional practice, from which he was getting marginal returns to sustain his livelihood. After the implementation of NRRI-FFP in 2016-17, he attended various intensive training cum demonstration programmes conducted by the scientists and started commercial vegetable production by growing 4-5 climber vegetable crops in a relay on scientific trellis structure using high yielding and hybrid seed varieties. He was provided with improved vegetable seed varieties, plant chemicals (pesticides & hormones), fertilizers, etc. as critical inputs for initial learning and awareness to start commercial vegetable production in the first year and supported with necessary technical backstopping and market information to sell his produce.

Market and Economics

Prior to FFP interventions, Shri Jena used to cultivate only one or two vegetables in his marginal piece of land of 0.2 ha area, which gave him gross return of ₹ 96,000, with a net return of ₹ 68,430 per annum which is not sufficient to meet his family essential needs. After getting trained under NRRI-FFP, he started commercial vegetable production by growing 4-5 climber vegetable crops in relay on scientific trellis structure using high yielding and hybrid seed varieties and earned an average gross return of ₹ 2,52,000 in just 3 years of adoption. The average net return is found to be ₹ 1,95,010 per annum, while the Benefit : Cost (B:C) ratio was worked out to be 3.42 on the basis of net return and cost of cultivation. However, the net annual profit from vegetables of Shri Jena

Table 1. Comparative analysis of economic returns between pre-intervention and post-intervention period under NRRI-Farmer FIRST Programme (FFP)

Parameter	Pre-FFP period (2016-17)	Post-FFP (2019-20)
Cropping pattern/sequence	Bitter gourd - Cow pea (two vegetables with locally available seeds and traditional package of practices)	Bitter gourd - Cucumber - Cow pea-Lab-bean/ Dolichos bean (4 vegetables with hybrid/HYV seeds and scientific package of practices)
Cost of Production per ha (₹)		
Seeds	5,000	33,500
Fertilizers	12,000	19,000
Plant chemicals (pesticides & hormones)	10,850	22,450
Trellis structure	40,000	60,000
Labour	70,000	1,50,000
Total Cost	1,37,850	2,84,950
Total Value of Produce (Gross income per ha)	4,80,000	12,60,000
Net Profit per ha (₹)	3,42,150	9,75,050
Benefit: Cost ratio (B:C)	2.48	3.42

has increased almost three-fold from ₹ 68,430 to ₹ 1,95,010, which is almost 185% more net income over his pre-FFP period as given in Table.

Over 50 such farmers have adopted this scientific trellis system in Biswanathpur village alone and have formed FIGs for marketing of their produce. In view of the close proximity of the village cluster to Bhubaneswar-Cuttack twin city and other small towns, they get remunerative price and do not face any problem in marketing of their produce.

SUMMARY

The Horticulture-based Module of NRRI-FFP has improved the livelihood of the farmers through commercial vegetable production in scientific ways, which was well appreciated among both adopted and non-adopted farmers based on their production, productivity, profitability and other quality parameters. The project interventions have made significant impact in the cluster and

beyond, and have helped to spread improved vegetable cultivation along with relay cropping in trellis system to all nearby villages covering over 80% of vegetable growing area of the locality. The scientific trellis system for vegetable production is widely adopted among the farmers improving their socio-economic conditions and up scaling their livelihoods. The materials used in trellis structure are easily available in all villages and one structure supports four-five crops grown in a year. If suitable piece of lands are available for vegetable cultivation with assured irrigation facility, farmers across the country can replicate such system instead of growing cereal or pulse or other crops to multi-fold their income and sustain their livelihood.

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Know Krishi Unnati Yojana

The *Krishi Unnati Yojana*, a central sector scheme, is envisaged as umbrella programme for focusing on food security, by merging schemes on Soil-health Card, Integrated Scheme on Agricultural Co-operation and Agricultural Marketing, National Mission on Agriculture Extension, Horticulture Development, Price Stabilization Fund, National Mission on Sustainable Agriculture and other programmes.