

Enhancement in Farmers' Income through Scientific Fish Farming

– A Case of Farmer FIRST Programme

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Farmer FIRST Programme, an innovative extension approach, focuses on the transfer of advanced technology to the farmers through regular farmers-scientists interface. ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar has implemented this project in 2016. Need-based training, on-farm demonstration and regular follow ups are the key factors which contributed towards the enhancement of knowledge and skills of the beneficiaries. Average productivity of the adopted ponds rose by 66%. The increased production has also contributed to enhanced per capita fish consumption of the farm families.

Key words: Carp culture, Farmer-scientist interface, Need-based training, On-farm demonstration, Scientific Fish Farming

THE Farmer FIRST Programme (FFP) approach considers putting the farmer in driver's seat in the matters of problem identification, prioritization, conduct of experiment and its management. This approach focuses on enriching knowledge and integrating technologies in the

farmers' conditions and to enhance farmer-scientist interface. Strong partnership with farmer for developing location specific, demand-driven and farmer friendly technology option is the guiding principle. This project is unique in its approach which creates a platform for

all the scientists irrespective of their disciplines, to get an opportunity to regularly interact with the rural farm environment and thus, collect valuable feedback on problems, priorities, opportunities and status of agriculture and agricultural technology at the ground level and

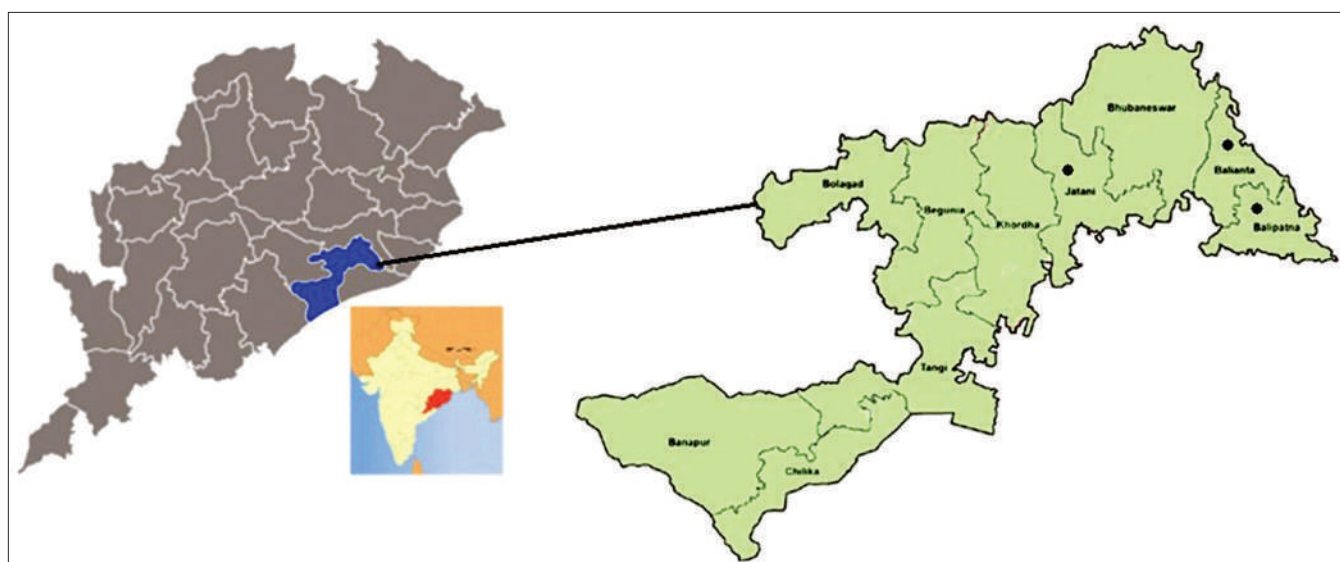


Fig. 1. Villages adopted by ICAR-CIFA under Farmer FIRST Programme

develop suitable technology modules for different farm situations. Emphasis of the project will be on farmers' farm, innovations, resources, science and technology. Small holders, landless and farm women are specially being addressed through technology integration modules.

Modules on improved technologies on Crop, Horticulture, Livestock and Fishery has been demonstrated. Skill training and technical backup are being provided to the beneficiaries. Aiming at sustainable agriculture along with profit maximization, 4 fish-based integrated farming systems were developed, where different enterprises like fishery, horticulture, poultry and vermicomposting were integrated. Improved technological modules like integrated nutrient management in paddy, green gram in rice fallow var. *TARM 1*, scientific carp culture, backyard poultry strain (*Kaveri/Vanaraja*), introduction of photo insensitive variety of cauliflower var. *Fujiyama* and introduction of bush type French bean var. *Falguni* were demonstrated and performance was recorded.

Scientific carp culture has been demonstrated in the community ponds of the villages along with some individual ponds which are under IFS. The villagers were practicing subsistence fish culture when the FFP project began in 2016-17. As all families of the village were associated with the community pond, the FFP project team decided to enhance its productivity level and took it as a challenge. Community owned ponds were adopted for scientific fish farming and required technical back up was provided by the project team and experts of ICAR-CIFA. The present study was undertaken to evaluate the increment in fish production in the community and individually owned ponds. Scientific fish farming was demonstrated and skill training provided to farmers by the FFP project team.

The project has covered 4 villages in Khordha district i.e., Kantia Talasahi, Kantia uparajahi (Block-Jatani), Jagannathpur (Block-Balianta) and Dorbanga (Block-Balipatna) (Fig). In total, the project

Table 1. Name and area of the ponds

Pond Name	Area (ha)
P1-Jagannathpur community pond	1
P2-Fish based Integrated Farming System, Jagannathpur	0.8
P3-Dorbanga Community pond-1	1
P4-Dorbanga Community pond-2	0.8
P5-Fish based Integrated Farming System, Dorbanga	0.6
P6-Kantia Talasahi community pond	1.2
P7-Kantia uparajahi community pond	0.8
Total area	6.2

has involved more than 400 beneficiaries from 2016-17.

The average production was around 1.6 t/ha, which is nearly half of the national average. Scientists of ICAR-CIFA tried to analyse the problems through interaction with the fish-farmers. Problems were prioritized and future action plan was prepared to educate the fish-farmers about the scientific fish-farming. Regular trainings and farmers-scientists interfaces were made by involving scientists of ICAR-CIFA to

transfer the advanced fish-farming technology to the beneficiaries. Recommended practices of scientific fish-farming were demonstrated in the community and individual ponds to educate the farmers about different advanced practices like pond preparation, de-weeding of pond, fertilizer application, supplementary feed application, etc.

Composite carp culture was demonstrated in 7 community ponds covering an area of 6.85 ha and 3 fish-based integrated farming systems

Integrated farming system helps farmer double his income

Shri Sanjay Kumar Swain (Age 44) operates an integrated farming system of 1 ha area in village Dorbanga. He has 2 ponds having a total water spread area of 0.6 ha. He came in contact with FFP in 2017 and was encouraged to start pond-based integrated farming system to maximize the profit through combinations of different enterprises. He was provided skill training and he took part in exposure visits organised by ICAR-CIFA, Bhubaneswar. He grows high yielding varieties of vegetables like cauliflower (var. *Fujiyama*), French bean (var. *Falguni*) and bitter gourd (VNR) in 0.2 ha and fruits plants like coconut, mango, papaya, etc. in 0.1 ha and followed advanced technological practices and advice from the experts. He earns a profit of ₹ 40,000/year from vegetables and ₹ 16,000/year from fruit plants. He added a herd of 4 milch animals (cross bred) in 2018. Daily milk output from his farm is around 30 litres. The excreta of the milch animals is used as manure for aquaculture ponds. He earns a profit of ₹ 80,000/year from this enterprise. In 2019 the project has introduced a flock of 50 poultry chicks (*Vanaraja*) in his farm. While egg and meat is sold for extra income, and manure is used in the ponds. He earns a profit of ₹ 25,000/year from this enterprise. The FFP has also provided support in establishing 2 vermicompost bed measuring (8 × 4 × 2 ft) for utilising and recycling the farm waste into compost. In one of the aquaculture ponds he raises table size fish and in another he rears fish seed (fingerlings). He earns a profit of ₹ 84,000 by selling fingerlings and table size fish. He earns a net profit of ₹ 2.45 lakhs per year from this integrated farm as compared to pre-adoption period. DD Kisan, New Delhi and DD Kisan, Bhubaneswar had prepared one episode each on the success of his farm. He receives visitors including school students on a regular basis.



Table 2. Benefit-Cost analysis of fish farming

Pond No	Production (Kg/ha)	Net profit (₹/ha)	B:C ratio	% increase in the production
P-1	3,200.00	104,870.40	1.43	77.78
P-2	3,687.50	138,797.12	1.70	84.38
P-3	2,800.00	111,274.4	1.48	75.00
P-4	2,750.00	76,528.8	1.41	71.87
P-5	3,333.33	91,728.8	1.62	85.18
P-6	2,750.00	141,020.8	1.55	61.76
P-7	2,500.00	60,332.00	1.32	56.25

having an area of 2.35 ha. Among these, 5 were community ponds and 2 were fish-based integrated farming system. Name of ponds and water area are given in the Table 1.

Indian major carps in the ratio 1:2:1 (Catla: Rohu: Mrigal) with a stocking density of 6,000/ha was stocked in the adopted ponds. Pond preparation, de-weeding of pond, fertilizer application, etc. was carried out before stocking to maintain the water quality. Pond preparation, including *liming* and weed removal were done by the members.

Supplementary feeding using floating feed (26% Protein) @ 2% of biomass was provided. Feed was applied through the broadcasting method. Periodic measurement of water pH and other hydro-biological parameters were carried out and appropriate corrective measures recommended.

Periodic sampling using cast net was done to check the health status of the fish. Harvesting was done 3-4 times in a year during social/religious festivals and the harvest was equally distributed among the members. A

part of the harvest was also sold to the traders and the proceeds were utilized for organizing *jatra* and other social functions in the village.

Pond no. 2 and 5 are under fish-based integrated farming system which gave higher production and consequently higher B:C ratio than other community ponds. Regular follow ups were made to teach the farmers about the technological practices like periodic sampling, pond preparation, fertilizer and supplementary feed application, de-weeding and periodical measurement of water pH and other hydro-biological parameters were carried out. As evident from Table 2, average productivity of the adopted ponds rose by 66%. The increased production has also contributed to enhanced per capita fish consumption of the farm families.

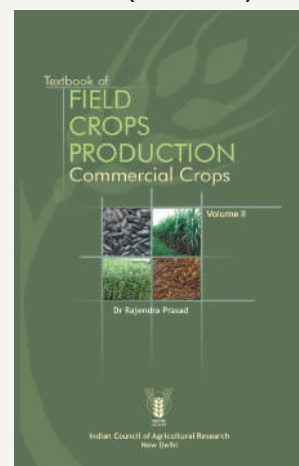
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Textbook of Field Crops Production – Commercial Crops

Availability of high-yielding varieties/hybrids and increased irrigated facilities have resulted in the development of production-intensive cropping systems in several parts of India, and this has catalyzed further agronomic research based on the cropping-system approach. Many changes have also taken place in the crop-production technologies. And this necessitated the revision of the earlier publication brought out in 2002. The revised textbook is in two volumes: First is covering Foodgrains and second is on Commercial Crops.

The discipline of Agronomy has no longer remained mere field trials without application of discoveries emanating from the related disciplines of Genetics, Soil Science and Agricultural Chemistry, Plant Biochemistry, etc. The future Agronomy Landscape will face challenges of climate change, transboundary issues, TRIPS and other trade-related barriers, biotic and abiotic stresses, consequences of biotechnology and genetic engineering and increased market demands in terms of quality assurance, customized food crops, global competition, ecosystem services on land and social equities etc. The Agronomy must measure up to these futuristic challenges with well-defined metrics and methodologies for performance. The advent of hydroponics, precision farming, bio-sensors, fertigation, landscaping, application of ICT, GPS and GIS tools and micro-irrigation is in the horizon. This revised edition in two volumes covers fundamentals of the subject and at the same time will inspire and prepare teachers and students for the emerging frontiers.

(Volume II)



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