



Enhancing livelihood of small farmers

through cultivation of Arka Prajwal variety of tuberose

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Farmer FIRST Programme (FFP) of ICAR aims at enhancing the production, productivity and income of farmers through farm family approach, and by integrating various farm-based enterprises to enhance livelihood of farmers. FFP project was implemented in a cluster of 6 villages with various technological interventions. Introduction of improved tuberose variety Arka Prajwal of ICAR-IIHR has changed the complete scenario of cultivation of flower crops in the FFP villages. Mr. Mahadevaiah has medium land holding with 1.8 ha land resides in Balepura FFP village. He planted Arka Prajwal variety of tuberose in less than half an acre area as intercrop in 2 years old young mango orchard. After a four and half months planting, he started harvesting flowers on daily basis. Due to continuous yield and good quality flowers, he realized higher net returns of ₹8,98,000 per 1650 m² area in one and half years of crop. Due to regular flow of income, his investment capacity, risk bearing ability, family expenditure has increased significantly, enhancing his livelihood.

Keywords: Arka Prajwal, Income, Tuberose

FARMER FIRST Programme (FFP) aims at integrating various enterprises in the farm and ensures recycling of farm wastes and utilizing all the available resources most economically and efficiently. Multi-disciplinary scientists team of ICAR-Indian Institute of Horticultural Research, Bengaluru along with other 3 ICAR institutes (NBSS and LUP, NDRI and NIANP and UAS, GKVK, Bengaluru) implemented Farmer FIRST Project (FFP) entitled "Enriching Knowledge Integrating Technology and Institutions for Holistic Village Development in Horticulture Based Farming" since 2016–17 in a cluster of 6 villages, viz. Dasappanadoddi, Yeramgere, Balepura, Kebbedoddi, Chikkegowdanadoddi and Hosadurga of Kanakapura taluk, Ramanagara, Karnataka. Improving livelihood and holistic development of villages was the prime objective of the project, which began with understanding agro-ecological conditions and micro-climatic production situation of all the selected 800 farm families of FFP villages.

ICAR-IIHR, Bengaluru has developed large number of varieties and technologies in different horticultural crops, which are being spread across the country to enhance, yield, productivity and quality of produce and to increase income of farmers. After obtaining

basic information of the selected villages, cluster-based multiple programmes were undertaken for holistic development. Whole family approach was used for implementing all technological modules in FFP villages. Most appropriate combinations of farm enterprises, resources, practices and methods were selected for implementation of the programme. Various subsidiary enterprises like horticulture, crop husbandry, dairying, poultry, apiculture, sericulture, fisheries etc were identified and complete participation of farmers was ensured in planning, implementation and evaluation of production plans to register a significant impact in terms of enhanced and sustained income and improving the living standard of farm families.

To begin the project, complete land and soil inventory was made through soil survey work by NBSS and LUP, Bengaluru in all the selected FFP villages to understand various geo-physical and bio-chemical properties of the soil, which showed that major soil type found in all the villages is sandy loam. Soil survey also helped us in planning INM strategy in different crops and in land use planning in terms of crop suitability in different FFP villages. Large part of these villages were practicing dry land farming due to resource poor condition, less knowledge of improved varieties and technologies

in agriculture. Need-based field level trainings and demonstrations were organized in addition to introduction of critical inputs and providing technical knowledge on all aspects of scientific cultivation of field and horticultural crops. Due to continuous guidance on integrated technological know-how from sowing to harvesting of crops such as timely and right method of sowing, gap filling with seeds/transplanting, maintenance of soil moisture, proper time of irrigation (wherever it is available), proper application of fertilizers, good weed management, plant protection measures, better methods of harvesting and post-harvest management advised by FFP scientists team, all the farmers were able to reap complete benefits of the programme. These technological interventions were effectively implemented through participatory demonstrations in farmer fields. Due to continuous monitoring and evaluation of the interventions for their field performance along with sustained technical backup and institutional support, there was higher and significant socio-economic and technological impact of various technological interventions in FFP villages. Details of some of the significantly contributing technological interventions are given here.

Farming situation

Soil and climate is highly suitable for production of tuberose, due to well drained sandy loam with moderate water holding capacity and good soil fertility. There is a demand for loose flowers of tuberose in local and in distant markets at Hosur (60 km distance) and Bengaluru (80 km distance) in large quantity. Farmers preferred to cultivate this crop, as it yields the flowers throughout the year and fetches continuous income to the farmers.

Problem identified

One of the major challenges farmers encountered in production of good quality tuberose loose and cut flowers was lack of good quality planting materials (bulbs) of high yielding varieties. Large numbers of them were unaware of the importance of scientific cultivation practices and marketing of tuberose and other flower crops. The root knot nematode and wilt diseases were the major problems in successful tuberose

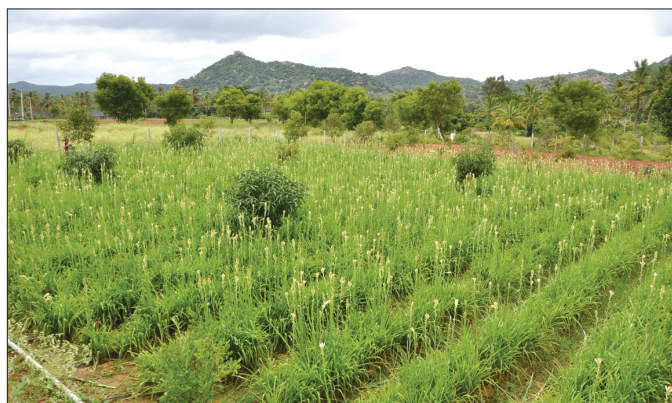
cultivation. Hence, there was a demand for resistant varieties and use of integrated approach for effective crop management.

Technological intervention

ICAR-IIHR hybrid variety Arka Prajwal of tuberose was introduced, which bears single type flowers on tall and sturdy spikes. Tuberose is generally cultivated and propagated through bulbs. The individual flowers are large in size and flowers have a better shelf-life compared to other local varieties. The spikes are also being used for cut flower purpose.

Farmers were given complete technical guidance by a team of scientists at all stages of crop production of Arka Prajwal hybrid tuberose. Critical information like treating bulbs with 0.2% captan solution and 0.2% dimethoate before planting to prevent incidence of fungal disease and mealybug respectively was given to all the farmers. These technological interventions were implemented through demonstration with farmer participation and were continuously evaluated for their performance in terms of socio-economic and technological indicators/parameters. Changes were observed in terms of enhancement of yield, quality of produce and income among all tuberose farmers.

Initially, tuberose was introduced as an intercrop in few mango orchards to enhance productivity and income of farmers. Later, it was spread among large number of farmers, who started cultivating it as mono-crop also. Along with improved variety Arka Prajwal, precision farming package was introduced, which includes raised bed cultivation, drip-irrigation, fertigation, integrated management of nutrients, pests and diseases and good post-harvest management. Due to higher yield and good market demand and price, farmers were able to increase their income substantially. After 2 years of continuous harvesting of flowers, farmers who have adopted this variety in 2016–17 and 2017–18 removed the bulbs and sold it to other farmers in FFP villages and also to the farmers of other districts in Tamil Nadu and Karnataka, which fetched them very high income. Totally (from sale of both crop and bulbs), farmers were able to earn ₹18,31,300 income/ha.



Field view of Arka Prajwal in young mango orchard



Team of scientists interacting with farmers in Arka Prajwal tuberose field

SUMMARY

The farmers have adopted new tuberose hybrid of ICAR-IIHR, Bengaluru along with precision farming package, which resulted in enhancement of production, productivity and quality of flowers. Due to ease of transport and higher price and market demand, farmers earned higher gross and net-income. Since FFP had three folded plans for doubling the income through cost reduction, production enhancement and diversification of enterprises, scientists were able to meet these objectives

through introduction of tuberose with precision farming in selected FFP villages, which also made a huge impact in terms of doubling of farmers income within two years, horizontal and vertical spreading of varieties and technologies, and ultimately sustainable livelihood to the farmers under Farmer FIRST Project.

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Success Story



Happy and successful farmer with freshly harvested flower of Arka Prajwal tuberose, packed in a bag for marketing

Mr. Mahadevaiah, aged 53 years, belongs to medium farmer category with 1.8 ha land and resides in Balepura village, Kanakapura, Ramanagara, Karnataka. He has 25 years of farming experience, mainly in cultivating field crops and vegetables. He is the FIRST farmer to introduce Arka Prajwal variety under Farmers FIRST project. Lack of knowledge on crop diversification, good agricultural practices, micro-irrigation system, nutrient, pest and disease management were the major constraints identified in many horticultural crops. Additionally, labour and resource scarcity was also higher. He was practicing flood irrigation for fruit and vegetable crops, with poor adoption of scientific cultivation practices. However, the farmer was keenly interested to use new variety of tuberose. Introduction of ICAR-IIHR, Bengaluru, Karnataka tuberose hybrid

Arka Prajwal, which is cultivated commercially for its fragrant cut and loose flowers and for supply to perfumery industry, was done based on the soil test results and in tune with micro-production situation of the farmer. About 300 kg bulbs (planting material) of Arka Prajwal were introduced as intercrop in mango orchard in 1650 m². Along with bio-nematicides like *Trichoderma viride*, *T. harzianum*, *Pachonia chlamydosporium*, *Paecilomyces lilacinus*, as a prophylactic measure to avoid the nematode infestation; critical inputs like micro-irrigation (drip-irrigation) system, fertilizers, botanical pesticides and plant protection chemicals for effective management of nutrients, pests and diseases were a part of precision farming. As a follow-up, many on-farm capacity building programmes, farmer-scientist's interaction meets on tuberose cultivation and other crops were organized along with distribution of need based critical inputs. Crop monitoring through regular and timely field visits by the team of scientists to provide crop advisory to the farmer along with SMS, WhatsApp messages, video calls etc helped him to learn and completely adopt the precision farming package.

Mr. Mahadevaiah has planted tuberose crop during July, 2017 and started harvesting flowers from November 2017 and harvested 6.7 tonnes flowers up to October 2018. Cost of cultivation was ₹78,000 and gross income was ₹4,76,000 from 1650 m² area at an average sale price of ₹70/kg, and the net income realized was ₹3,98,000 from flowers alone. Additionally, bulb yield was 5 tonnes per 1650 m², which he sold for ₹100/kg and got an income of ₹5,00,000 from. On the whole, he realized the net returns of ₹8,98,000 from 1650 m² area in one and a half years. Flowers were sent to nearby Kanakapura town (20 km from the village) by bus to the marketer and payment was collected by the farmer personally, once in a week. Apart from this income, he also earned ₹40,000/season from 4 years old mango crop. The intervention of tuberose cultivation in mango-based farming system enabled him to generate a total net income of ₹8,98,000 from less than half an acre, in a span of one and a half years.

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.