



# **A** INTENSIVE AGRICULTURE

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**GOVERNMENT OF INDIA  
MINISTRY OF AGRICULTURE & FARMERS WELFARE  
DEPARTMENT OF AGRICULTURE & FARMERS WELFARE  
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# **INTENSIVE AGRICULTURE**

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## EDITORIAL

*The Agriculture Sector is primary source of income and employment for rural population of India. In the last two decades, Indian Agriculture has witnessed a lot of changes and advancement in the diverse cultivating techniques as well as in extension approach for wider outreach to the masses. New and advanced technologies of agriculture based information dissemination has enabled the agriculture sector in transforming towards improved methods of cultivation, nutrient management, plant protection, harvesting, post harvest management and marketing of agricultural produce.*

*In this era of digitalization, Information and Communication Technologies (ICT) such as computers and mobile phones have revolutionized the access to knowledge and information for skill enhancement and better services. The use of ICT in agriculture (e-agriculture) has accelerated the process of agricultural information dissemination in rural areas. It has helped in addressing the challenges associated with the extension of agriculture based information also. With the help of ICT, information is disseminated in no time through text messages, social media messages, mobile apps, web portals etc. and the same is accessed by large number of stakeholders in their mobile phones and computers.*

*The government has implemented use of ICT in agriculture sector and stepping forward for Digital Agriculture. The milestones in this direction are: providing extension services in local languages through Kisan Call Centres, dissemination of information through Knowledge Management Portals, AGMARKNET for updated information on various market activities, Mobile Apps for information on advanced cultivation practices, weather, crop insurance; digitization of agri markets (Mandis), online registration of beneficiary to avail benefit of schemes, Direct Benefit Transfer etc.*

*However, there are some challenges in digitalization of agriculture sector such as minimal digital skill of farmers, limited access to e-services, weak technological infrastructure and high cost of technology. Unequivocally, Indian Agriculture will excel in digitalization and achieve milestones by addressing the existing challenges.*

*Dr Sanjay Kumar Joshi*

## CONTENT

<b>Organic Crop Production</b>	3-7
<i>S. K. Yadav, D. K. Singh and Kirti Sharma</i>	
<b>QR Code Based Digital Agricultural Information Board (DAIB) for Agricultural Technology Transfer</b>	8-12
<i>Dr. L. R. Tambade</i>	
<b>Lac Cultivation - A Measure for Poverty Alleviation</b>	13-14
<i>S. Ghosal</i>	
<b>Agricultural Drainage Technologies for Enhancing Productivity of Temporary Water Logged Vertisols</b>	15-18
<i>Ramadhar Singh, K.V. Ramana Rao, K.P. Singh, and Satish Kumar Singh</i>	
<b>Seed Treatment for Managing Insect Pests and Diseases of Rabi Crops</b>	19-22
<i>Ritu Raj, Jasjinder Kaur and Parminder Singh Tak</i>	
<b>Diversification of Summer Paddy Through Sunflower Crop Value Chain</b>	23-25
<i>G.D.S Kumar, S.N. Sudhakara Babu and M. Sujatha</i>	
<b>Oyster Mushroom Cultivation: A Profitable Enterprise</b>	26-28
<i>Mousumi Gohain Das and M. Mokidul Islam</i>	
<b>Journey from Daily Wage Labourer to an Entrepreneur</b>	29-30
<i>Dr. Banwari Lal, Mohd. Anas and Sheetal</i>	

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*The views expressed in the articles are of the authors and not of the Directorate of Extension, Ministry of Agriculture and Farmers Welfare, Government of India.*



# Diversification of Summer Paddy Through Sunflower Crop Value Chain

*G.D.S Kumar, S.N. Sudhakara Babu and M. Sujatha*



**S**unflower is an efficient oilseed crop with wider adaptability to soils and seasons providing high quality edible oil within a short duration of 90-105 days. In India, it is grown over an area of 2.43 lakh ha with a production of 2.17 lakh tones. Around 48% of total sunflower area is under rabi sunflower cultivation. Area under sunflower has been declining in the country and in the state of Telangana due to its low productivity and profitability. In Telangana, the crop is grown during rabi season with an average productivity of 1698 kg/ha. The low productivity is due to traditional practice of cultivation without adoption of key agronomic practices, promising hybrid, seed treatment, thinning, balanced nutrition and biological IPM. Coupled with this, high cost of cultivation and low market rates for scattered and low volume of production are major reasons for decline in area under sunflower production.

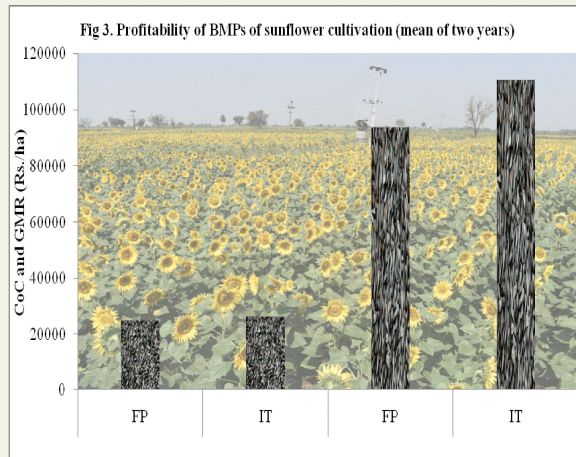
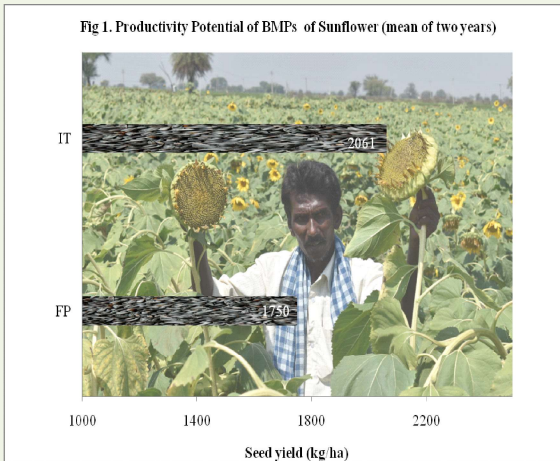
Nizamabad district in Telangana State is better endowed with fertile soil and water resources for intensive agriculture resulting in dominance of mono-cropping of rice. Maize, chickpea and sunflower are the competing crops during rabi/summer in the district. Farmers are showing less interest in cultivation of maize due to the incidence of fall army worm and chickpea due to very low yields. Sunflower crop is the most successful alternate crop due to its high productivity potential,

if grown under best management practices (BMPs).

## Demonstration of Best Management Practices (BMPs)

Identifying the potential of sunflower in the region, ICAR – Indian Institute of Oilseeds Research, Hyderabad (IIOR) along with KVK and State Department of Agriculture had demonstrated the BMPs through frontline demonstrations (FLDs) employing cluster approach in Hegdoli village of Nizamabad district during rabi seasons of 2017 to 2019. Other existing schemes of soil health cards and skill development training were converged. Based on the assessment of soil fertility, it was found that the nutrient requirement of sunflower succeeding intensively cultivated rice was low except for sulphur. The available residual fertility and moisture was effectively integrated under zero or minimal tillage cultivation of sunflower with reduced seed rate (5 kg vs traditional 10-12kg/ha) and maintaining optimum plant population through thinning. It paved the way for timely sowing of sunflower and significant reduction in cost of cultivation. Supplying the needed phosphorous through SSP and directed spray of boron @ 0.2% at ray floret opening stage, irrigation at critical stages (2 to 3 vs 6 to 8 for maize), and minimal or

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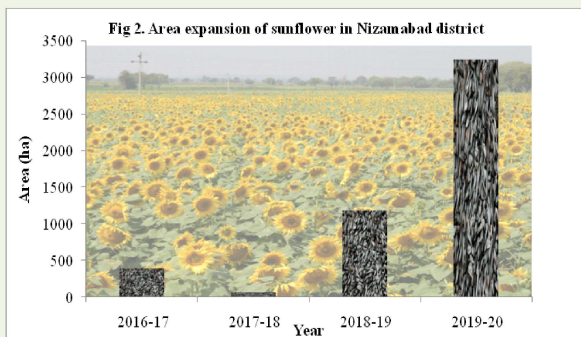
IT = Improved technologies; FP = Farmers' practice; BMPs = Best management practices

need based plant protection resulted in realizing higher seed yield of 2500 to 3000 kg/ha, which is 16-24% improvement over farmers' practices (Figure 1).

## Crop Area Expansion

As per the farmers' opinion, this practice of sunflower cultivation had also contributed for realizing higher rice yield in the succeeding season, possibly due to effect of sulphur and balanced nutrition. Thus, the area under sunflower expanded from about 400 ha during 2016 to more than 3200 ha in 2019-20 in the district (Figure 2). Consequently, the demand for quality seed also increased.

With this growth of sunflower area in Nizamabad district, better marketing was established and Government of Telangana through NAFED further supported to procure the crop at minimum support price, thereby with the high productivity and remunerative prices, the profitability



CoC = Cost of cultivation; GMR = Gross Monetary Returns; Net Monetary Returns

from sunflower was highest at Rs.45,000 to 60,000/acre (Figure 3) in 100 to 105 days. The irrigation water was also saved including expenditure on electricity.

## Initiation of bee keeping

It is well documented that low population of pollinators will adversely affect the sunflower yields. In order to increase the sunflower yield and realize complete value chain by strengthening supply chain through co-cultivation of honey bees, bee keepers association was persuaded to introduce apiary in Hegdoli village during 2020-21. About 400 ha area of sunflower crop was under cultivation contiguously and more than 3000 ha was spread across the vicinity of villages. Observing the potential of the area, the bee keeper association started apiary with 800 bee hive boxes set up during flowering period for three weeks (Figure 4).

Honey was extracted after three weeks and



Fig 4. Honey bee boxes at one of the sunflower crop cluster in Hegdoli village



Fig. 5 Pure honey marketed as 'Honey Natural' in PET bottles

the bee hives were shifted to adjacent area, where the sunflower crop was at flowering stage and together harvested 5200 kg of pure sunflower honey. Entire honey was sold out on the spot with word of mouth popularity and spread supported by ICAR-IIOR. The golden yellow, bright, pure and nutritious honey extracted on-site was sold at a modest price of Rs. 300/kg. This honey was branded as 'Honey Natural' in PET bottles of 0.50 kg and 1.0 kg capacity (Figure 5). The gross income realized was Rs. 15.6 lakhs with in a period of two months, besides realizing a net income of Rs. 5.6 lakh and Rs. 6222/day for a period of three months (Table 1).

Generally, two bee boxes are recommended per acre area of the crop, in this case, the boxes were placed based on the cluster approach in view of the foraging distance of bees, which is around 2.0 km. This resulted in savings on transportation, installation, maintenance and labour costs.

Fixed cost of each box is Rs.7500/-, which includes the wooden box, comb, queen bee, worker bees, extractor and other required items.

Table 1. Economics of apiary in Hegdoli village, Nizamabad

Item	Value in Rs./ Quantity in kg
Operational expenditure/box (Rs.)	1250=00
Total expenditure (Rs.) for 800 boxes	10,00,000=00
Honey yield/box (kg)	6 to 7
Total honey yield (kg)	5200
Sale price of honey/kg	300=00
Gross returns (Rs.)	15,60,000=00
Net income (Rs.)	5,60,000=00
Net income/day (Rs.)	6222=00

Depreciation of 10% (Rs.750/- per year) assuming the life of the box is 10 years and maintenance cost of Rs.500/- towards transportation, installation, honey extraction and three-stage physical filtration.

Apiary is a win-win situation for sunflower farmers and the village level entrepreneurs, whereby farmers perceived that the yield of sunflower increased by 20% due to honey bee activity and provided a sustainable livelihood to the local entrepreneur with additional valuable honey. This model can be replicated in rice-fallow areas of Andhra Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal and other traditional sunflower growing areas of Karnataka to increase the productivity of sunflower crop and income of farmers. This practice will also encourage agri-entrepreneurship through honey bee keeping and honey production.

In order to successfully upscale the model, timely access to quality seed for the farmers has to be ensured through collaborative efforts of the state seed production agencies, private seed companies/producers and ICAR-IIOR. Capacity building of the bee keepers, farmers, rural youth, staff of agricultural department and AICRP scientists on bee keeping is proposed to be taken up by ICAR-IIOR in collaboration with NIRD, Hyderabad.

## Conclusion

Adoption of best management practices in sunflower under minimum tillage or zero tillage conditions will improve the crop yield and economics to farmers. Apart from adoption of BMPs, co-cultivation of honey bees will further provide a win-win situation of increasing the sunflower crop yield by around 20% and gainful employment to the rural youth. Further, the study clearly indicated that pure, nutritious and healthy honey can be available locally at a modest price, which is beneficial to the rural communities. Therefore, this model can be replicated in rice-fallows and rice-rice cropping systems for sustainable crop diversification.