Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(5): 213-215
Received: 04-07-2020
Accepted: 06-08-2020

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Performance of papaya (*Carica papaya* L.) under integrated crop management practices

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Abstract

The technological gap between existing and recommended technologies of papaya crop was studied during 2015-16 and 2016-17. The study in total 10 integrated crop management (ICM) demonstrations was conducted on farmers' fields. The findings of the study revealed that Integrated Crop Management (ICM) practices recorded a mean yield of 64.85 t/ha which was 22.20 per cent higher than obtained with farmers' practice (53.85 t/ha). The study exhibited mean extension gap of 11 t/ha, technology gap of 10.2 t/ha with mean technology index of 13.53 per cent. An additional investment coupled with recommended nutrient, water management, plant protection measures, scientific monitory and non-monetary factors resulted in additional mean returns of Rs.93450/ha. Higher mean net income of Rs. 349800/ha with a BC ratio of 3.54 was obtained with improved technologies in comparison to farmers' practices (Rs. 256350/ha). The ICM demonstrations conducted on papaya at the farmers' field revealed that the adoption of improved technologies significantly increased the fruit yield and also the net returns to the farmers.

Keywords: Papaya, ICM, technology, production

Introduction

Cultivation of fruits played a pivotal role in diversification of agriculture along with food and nutritional security of ever growing population. Papaya (*Carica papaya*) is a tropical fruit having commercial importance because of its high nutritive and medicinal value. India leads the world in papaya production with an annual output of about 3.6 million tonnes (Anon., 2013) [1]. Raichur is among the top districts in papaya cultivation in Karnataka. Presently, papaya is an important fruit crop of the district and cultivated in 1200 ha. It is used as ripened fruit and vegetable and easy to digest. Papain prepared from dried latex of its raw fruits is used in meat tendering, manufacturing chewing gum, and cosmetics, for degumming silk and to give shrink resistance to wool. In addition, it is also used in pharmaceutical, textile and garment industries, cleaning paper and adhesive manufacturing, sewage disposal and so on. Papaya fruit is a rich source of vitamin A and C with different minerals. It has a high nutritive and medicinal value, so provide nutritional security to the rural and tribal families (Mohanty, 2012 and Nayak *et al.* 2012) [10, 11]. The average yield of papaya is 550 q /ha, but the farmers were facing some problems in papaya cultivation like availability of quality seed and seedling, pollination problems due to single sex plant, lower shelf-life of fruit, fruit marketing, lack of advance knowledge about papaya production, resulting in poor plantation and lowered economic return. So, AEEC, Lingsugur has provided technical guidance and conducted demonstration in farmers fields. The Taiwan Red-Lady variety of papaya fruit has brought smile on the faces of several papaya farmers in Raichur district. The imported variety of the fruit has brought wonders owing to its great quality, long shelf life, hermaphrodite nature, fruit taste and, of course, profitability.

The extent of adoption of improved agricultural technologies is a crucial aspect under innovation diffusion process and the most important for enhancing agricultural production at a faster rate. Large number of technologies evolved in the field of agriculture is not being accepted and adopted to its fullest extent by the farmers. The gap between recommendations made by the scientists and actual use by farmers is frequently encountered. Looking into the situation AEEC, Lingsugur has conducted integrated crop management (ICM) practices through large scale demonstrations.

Materials and Methods

The ICM demonstrations were conducted at AEEC, Lingsugur in Raichur district in Karnataka state in farmer's fields during 2015-16 and 2016-17 with objective to popularize improved technologies for productivity enhancement of papaya through ICM demonstrations. Ten ICM demonstrations were conducted in farmer's field. To diffuse papaya productivity enhancement technologies on campus and off campus trainings were conducted. Then improved practices were demonstrated with the following technologies

1. Improved variety- RED LADY 786
2. Application of biofertilisers (PSB) and biopesticides (Trichoderma, *Pseudomonas fluorescence*)
3. Balanced nutrient application (FYM 30 t/ha, 434 kg N, 434 kg P_2O_5, 868 kg K_2O)
4. Integrated pest and disease management(Timely spray of pesticides)

The crop was harvested at maturity stage. For the study, technology gap, extension gap and technology index were calculated as suggested by Samui *et.al.* (2000) [14].

Technology gap= Potential yield – Demonstration yield

Extension gap = Demonstration yield – Farmers yield

Technology index (%) = (Potential yield – Demonstration yield /Potential yield) * 100

Results and Discussion

The data were subjected to analysis, technology gap, extension gap and technology index were calculated as per the formula and economic analysis was done as per procedure and data were presented in the table 1 and 2.

The average two years of fruit yield of papaya was 64.85 t per ha as against 53.85 in farmers field which is 22.20 per cent higher. The higher fruit yield of papaya in demonstration plot was mainly attributed to the adoption of improved technologies. Application of bio-inputs enabled to mobalise nutrients from native soil nutrients and Trichoderma helped the crop to resist against diseases. The technology gap in the demonstration yield over potential yield was 10.2 t per ha. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions (Vikram *et al.*, 2018, Anuja *et al.*, 2014, Balai *et al*, 2012, Berjesha *et al.*, 2013) [18, 2, 3, 4]. The extension gap of 11 t per ha was noticed. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap (Rupesh, 2015) [13]. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology. The technology index shows the feasibility of the evolved technology at the farmer's fields and lower value of technology index more is the feasibility of the technology. In this demonstration noticed 13.53 per cent technologies index, which indicates proper adoption of improved technologies. Similar results were also recorded by Mitra (2017) [9], Eduardo *et al.* (2016) [6], Raju *et al.* (2015) [12], Bisht *et al.* (2010) [5] in papaya, Keshavareddy *et al.* (2018) [7] in mango, Shalini *et al.* (2016) [15] in tomato, Renbomo Ngullie and Pijush (2016) [16] in chilli.

The inputs and outputs prices of commodities prevailed during the study demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit cost ratio (Table 2). The cultivation of papaya with improved technologies gave higher net return of Rs 349800/ha as compared to farmer's practices (Rs 256350/ha), which gave additional returns of Rs 93450 /ha. The benefit cost ratio of papaya in ICM was 3.54. This may be due to attributed higher yields obtained under improved technologies compared to farmers plot as local check.

Table 1: Fruit yield of papaya, technology gap, extension gap and technology index as influenced by improved practices

Year	Fruit yield (t/ha)		% increase in yield in ICM over FP	Technology gap (t/ha)	Extension gap (t/ha)	Technology index (%)
	ICM	FP				
2015-16	61.00	45.60	33.77	14.0	15	18.67
2016-17	68.70	62.10	10.63	6.3	7	8.40
Average	64.85	53.85	22.20	10.2	11	13.53

Table 2: Economic analysis of papaya demonstration

Sl. No	Net returns (Rs/ha)		Additional returns (Rs /ha)	B:C	
	ICM	FP		ICM	FP
2015-16	285000	171400	113600	3.01	2.16
2016-17	414600	341300	73300	4.07	3.19
Average	349800	256350	93450	3.54	2.68

Conclusion

The study has shown that the ICM demonstration programme was found useful in enhancing the knowledge and adoption level of farmers in various aspects of papaya production technologies. ICM practices created great awareness and motivated the other farmers to adopt appropriate papaya production technologies. The area of high yielding seedling material of papaya has increased which will spread in the taluk including the adjoining area. The selection of critical input and participatory approach in planning and conducting the demonstration definitely help in the transfer of technology to the farmers.

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