Original Research Article

Perception of mango growers towards Enhanced Freshness Formulation (EFF) technology- A study in Krishnagiri district of Tamil Nadu

ABSTRACT

Mango fruits are perishable, and as a result, they are prone to significant post-harvest losses. However, mango fruits lost roughly 35% of their value at several phases from farm to consumer level. Enhanced Freshness Formulation (EFF) is a relatively new technology that has been proven to help prolong shelf life, minimize insect problems, and improve fruit quality. To analyze the perception of mango growers towards EFF technology, Ex-post facto research design was adopted for the study. Krishnagiri district was selected purposively since it possessed the maximum number of farmers who had adopted EFF technology. The duration of the study was about 1 month, June 2022. Based on simple random sampling, the data has been collected from 120 mango growers by using pre-testing and a well-structured interview schedule. The statistical tool used was descriptive statistics. EFF users placed a higher value on shelf life (4.608) followed by uniform ripening (4.375), fruit freshness (4.083), and finally environmental repercussions (1.8) and minimal adverse health (1.7). EFF technology is considered vital in enhancing fruit quality and prolonging shelf life. These twin benefits can allow farmers to sell fruits in niche and high-value markets, reduce postharvest losses and improve economic returns for the farmers.

Keywords: Mango, Perception, Post-harvest loss, EFF technology, pre-harvest spray, post-harvest dip

1. INTRODUCTION

Mango (*Mangifera indica* L.) belonging to the family of Anacardiaceae is the most important commercially grown fruit crop in the country. It is called the king of fruits. India has the richest collection of mango cultivars and it is the prominent exporter of fresh mangoes to the world. Mango is currently ranked fifth among major fruit crops in terms of total production, with India leading the way (APEDA, 2019). Mango fruits are perishable, and as a result, they are prone to significant post-harvest losses. It lost roughly 35% of its value at several phases, including farm level, transportation, marketing, storage, retail, processing unit, and consumer level (Subramanian *et.al*., 2018). Since there is a big need for domestic consumption as well as export, technologies to improve mango production, postharvest life, and market distribution are the need of the hour. The country has exported 21,033.58 MT of fresh mangoes to the world for the worth of Rs. 271.84 crores/ 36.23 USD Millions during the year 2020-21(APEDA,).

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To minimize pre-production and post-production losses, the IDRC-TNAU-Guelph University collaboratively developed a nanotechnological intervention named EFF. It is a relatively new technology, such as pre-harvest spray or dip treatment that has been proved to help prolong shelf life, improve fruit quality, minimize insect problems and also it decreases post-harvest losses. It ensures the increased availability of nutrient-rich fruits, enhances food security, and significantly improves the economic return for the farmers.

Comment [SS3]: You should complete this section with the reason why it's important to carry out the study on EFF technology perception among ma,go growers

2. RESEARCH METHODOLOGY

In the present study, an ex-post-facto research design was adopted. The study was conducted in Krishnagiri district. In this district, four blocks namely Krishnagiri, Kaveripattinam, Mathur, and Bargur were purposively selected because maximum number of farmers who had adopted EFF technology. The list of EFF technology adopted by mango growers has been collected from the Department of Nano Science and Technology at Tamil Nadu Agricultural University. Based on the list, irrespective of villages the data has been collected from 120 mango growers who adopted EFF technology by using a simple random sampling method. The pretested and well-structured interview schedule was used to collect the data for the study. Descriptive statistics were used to analyze fruit loss estimation at different postharvest handlings at the farmer's level and the perception of farmers towards EFF technology.

Comment [SS4]: Your results should have been more interested if you have added a group of mango growers who don't use the EFF technology (control group) for comparison analysis.

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3. RESULTS AND DISCUSSION

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Table 1 showed that farmers' perceptions of EFF technology included 14 aspects of consideration. Most of the farmers had the same perception that the EFF technology can enhance the shelf life or longevity of fruits with a score of 4.608. Because spraying the trees with EFF on 30th and 15th day before harvest, the stalk of the fruit gets stronger and it doesn't come off easily. So the shelf life gets extended by an average of 12 days and after harvest, dipping the fruits at 2% EFF for 5 minutes and shade drying for 30 minutes extended the shelf-life for 13-15 days under ambient storage conditions.

Furthermore, the second perception of farmers is that the EFF technology can increase the uniform ripening of fruits with a score of 4.375. Nowadays, the lack of easier and more rapid methods for uniform ripening poses a major problem for the fruit industry and farmers. Almost all methods of ripening, either conventional or modern chemical methods, come with their own merits and demerits. But farmers feel confident that EFF technology can increase the uniform ripening of their mangoes. Uniform ripening leads to less labor cost and get a better price at a time.

The third perception is that EFF technology can enhance fruit freshness with a score of 4.083. Using the hexanal formulation of EFF technology on mango fruits' surfaces was found to have a profound effect to make the fruit fresher. At the point of purchase, the consumer uses appearance factors to indicate freshness and flavor quality. Additionally delayed harvest of the mangoes, EFF keeps the fruits fresher for 2 weeks which assists in additional income due to late arrivals in the market.

The fourth perception is that EFF technology can be easy to apply with a score of 3.95. Farmers can readily adopt this technology on their farms due to its simple application.

The fifth perception is that EFF technology can increase color intensity (attractiveness) with a score of 3.916. Colour and appearance attract the consumer to the mangoes and can help in impulse purchases. The external appearance of whole fruit is used as an indicator of

ripeness, although it can be a misleading one (Shewfelt, 2000a). Glossiness on the outside of whole fruits tends to be a desirable attribute for whole fruits.

The other perceptions of mango growers towards EFF technology are enhancing endurance (3.875), easy of formulation (3.675), ensuring stable supply (3.65), enhancing consumer appeal (3.475), affordability (3.233), enhancing market access (3.091), availability to potential users (2.84).

Minimal negative environmental repercussions and adverse health were recorded with the score of 1.8 and 1.7 respectively. Hexanal formulation of EFF technology, a plant-produced GRAS (Generally Regarded As Safe) molecule, has been shown by University of Guelph researchers and also no known or observed ill effect on the environment (Subramanian et.al 2018). Further, due to its volatile nature, the product evaporates within 24 hours leaving no trace in fruits as well as gets broken down quickly into basic molecules in the atmosphere.

The results revealed that in addition to the anticipated extension of post-harvest shelf life, fruits in the treated trees were also retained for an additional period. These results made a significant impact on the mango growers who used EFF technology, as they could generate a 10-15% additional income.

Table 1. Perception of mango growers towards EFF technology (n=120)

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S.No.	Particulars	Extent of Perception					Mean	Rank
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)		
1.	Enhancing uniform ripening	0	5	20	20	75	4.375	II
2.	Enhancing colour intensity	0	1	31	65	23	3.916	V
3.	Enhancing fruit freshness	2	7	27	27	57	4.083	III
4.	Enhancing shelf life/longevity	0	0	10	22	88	4.608	I
5.	Enhancing endurance	0	7	23	68	22	3.875	VI
6.	Enhancing consumer appeal	9	10	43	31	27	3.475	IX
7.	Ensuring stable supply	0	12	43	40	25	3.65	VIII
8.	Enhancing market access	5	31	44	28	12	3.091	XI
9.	Possibility of adverse health	45	66	9	0	0	1.7	XIV
10.	Possibility of harm to environment	33	82	1	4	0	1.8	XIII
11.	Easy of application	2	6	21	58	33	3.95	IV
12.	Easy of formulation	3	7	47	32	31	3.675	VII

13.	Affordability	8	2	77	20	13	3.233	X
14.	Availability to potential users	4	30	72	9	5	2.84	XII

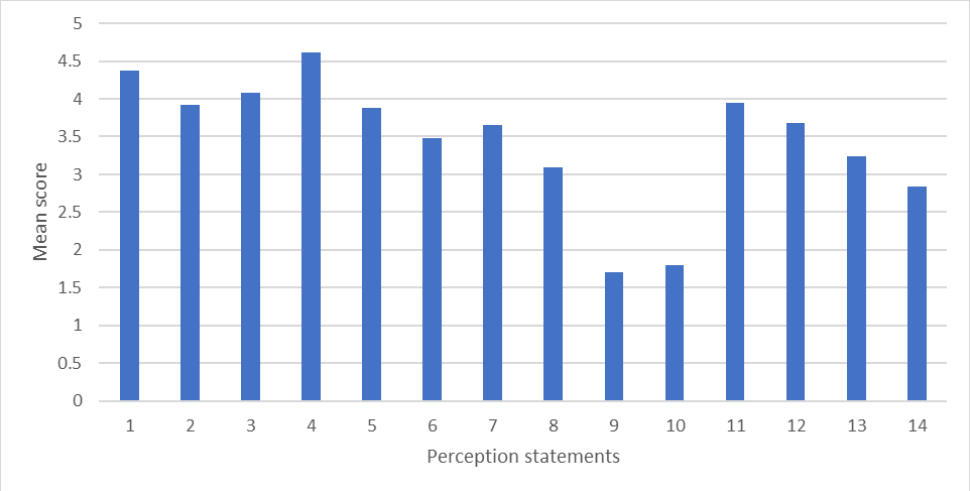

Figure 1. Perception of mango growers towards EFF technology

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4. CONCLUSION

Nanotechnology is becoming increasingly essential in the food industry, particularly for the preservation and packaging of fruits and vegetables. Preventing post-harvest losses will boost the availability of nutrient-rich fruits while also improving food security. Nowadays many technologies have been introduced to improve agricultural production, productivity, post-harvest handling methods, market access, and high farm income. EFF technology is considered vital in enhancing fruit quality and prolonging shelf life. These twin benefits can allow farmers to sell fruits in niche and high-value markets and reduce postharvest losses that are estimated to be as high as 30%**.** According to this survey, potential EFF users place a higher value on shelf-life followed by uniform ripening, color intensity (attractiveness), fruit freshness, ease of application, endurance, and finally minimal negative health and environmental repercussions. EFF technology increases domestic consumption as well as the export of mangoes. Large domestic production base, relatively long period of availability (March to August), diversity of the varieties, economic liberalization, and priority to the export of fresh products have opened up the possibility of boosting 109 Mango exports from India.

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