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On Farm Testing: An use of protection cover for sucking pest management and synchronized fruit set in muskmelon at Bidar district of Karnataka

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Abstract
On Farm Testing (OFT) on use of Protection cover in Muskmelon (*Cucumis melo* L), a new approach was demonstrated along with technologies released from UHS, Bagalkot keeping the farmer's practice as the check plot by Krishi Vigyan Kendra, Bidar, Karnataka India. The OFT was conducted in farmers field of Bidar district during the year 2016-17 & 2017-18. The result showed that, the alternate practice (TO3) recorded an average higher yield 44.06 t/ha and in the farmer practice (TO1) maintained under normal cropping practices recorded an average yield of 25.13 tons per ha whereas, in recommended package of practice (TO2) recorded an average yield of 26.90 tons/ha and got the highest average net returns in alternate practice (TO3) of Rs. 563080 per ha over Rs 152544 per ha in farmer practice. Whereas, in recommended package of practice (TO2) the average net returns were Rs. 212979 per ha.

Keywords: on farm testing, yield, net returns, no. of days to fruit set, pest population

Introduction
India is the second largest producer of vegetables in the world next only to China. Presently, in Karnataka, the total area under vegetable crops is 462900.00 ha and production of 8564800 t with total productivity of 18.50 t/ha (Anon., 2017) [1]. Muskmelon *Cucumis melo* L is commonly called as sweet melon, round melon, muskmelon, casaba, cantaloupe and winter melon (Nayar and Singh, 1998) [5]. Muskmelon is a member of the family Cucurbitaceae (Bailey and Bailey, 1976) [2]. Though muskmelon is a tropical old-world species, its geographical origin is still unclear. Africa is considered to be the centre of origin of melon, though the recent data supports the view that the origin of genus Cucumis may be in Asia (Schaefer *et al.,* 2009) [9]. Melon was first domesticated in Egypt and Iran during the second and third millennium BC, (Pangalo 1929) [7].

Muskmelon is gaining lot of importance due to its short duration, high production potential with high nutritive value, taste, delicacy and also its suitability for cultivation under rain fed and irrigated conditions almost throughout the year. Though muskmelon is most nutritious, its productivity is very low as compared to other vegetable fruits in India. This may be due to pre-mature flower drop, lack of initiation of more female flowers in proportion to male flowers, inadequate source-sink relationship and poor translocation of photo-assimilates at later stages of crop growth. Although, the average potential yield of melons is 60 t/ha, the actual yield of muskmelon ranges from 12.5–20.0 t/ha depending on the management practices (Nempalsingh *et al*., 2004) [6]. Robinson and Decker Walters, 1997 described Cucumis melo as follows: "A variable, trailing, softly hairy annual. It is mainly used as a fruit but immature fruits are used as a vegetable, seeds are edible and the roots can be used in medicine.

Helbacka (2002) [3] reported that protected cultivation is a technique used to modify a plant's natural environment in order to optimize plant growth. Cucurbits viz., squash, cucumbers and melons respond well under row covers with increased yields of as much as 25 per cent. Row covers are used to enclose one or more rows of plants in order to enhance crop growth and production by increasing both air and soil temperatures and reducing wind damage. The farmers generally enquire about the enhancement of the economic returns by the adoption of low tunnel technology. Kuldeep Singh Bhullar (2016) studied the effect t of polypropylene covers on frost protection and yield of potato crop which revealed that significantly higher yield was recorded in covered potatoes (301 q/ ha) as compared to plots without covering (255 q/ ha and 225 q/ ha).

Methodology
An on farm testing was carried out at three different villages viz., Jamanagar, Gogga and Handral villages by ICAR- Krishi Vigyan Kendra, Bidar (Karnataka state) during the period 2016-17 to 2017-18.

Selection of beneficiary
The beneficiaries were selected based on two criteria (i) Who are growing Muskmelon crop, (ii) Who are willing to participate. An On-farm research trials (OFT's) on assessment

of protection cover for sucking pest management and synchronized fruit set in muskmelon. Ten demonstrations were conducted in farmer's participatory mode under scientific management practices

The investigation was carried out on assessment of protection cover for sucking pest management and synchronization of flowering in muskmelon with following three different treatments.

T1: Farmer's practice (All agronomic practices were recorded and 5 times the plant protection measures were taken).

T2: Recommended Package of Practice (Spraying at 25, 50 DAS with Acephate 75SP @ 1g /lit of water along with recommended agronomic practices) suggested by University of Horticultural Sciences, Bagalkot.

T3: Alternate practices UV stabilized (3 %) protection cover Biodegradable, non-woven polypropylene film, with thickness of 17 GSM, Moisture resistant, High tear strength and its much durable (3-4 times) and was put on seedlings up to 25 days immediately after transplanting of 20 days old healthy seedlings and their after the protection cover was removed.

The observations recorded were average thrips population per top three leaves, average active leaf miner per plant, total emerging active leaf miner after 3 days, number of days to first flower and number of days to harvest. Finally the yield and cost economics of the treatments was computed based upon prevalent prices, keeping farmer's practice as check plot.

Table 1

Sl. No.	Particulars	Particular Farmers' Practice	Technology Option-1	Technology Option-2
1	Variety/ Hybrid	Patasha	Patasha	Patasha
2	Fertilizer Dose	100:100:100 kg/ha NPK	100:75:50 kg/ha NPK	100:75:50 kg/ha NPK
3	FYM	FYM @ 10 t/ha	FYM @ 25 t/ha	FYM @ 25t/ha,
4	Plant protection measures for sucking pests	Imidacloprid 200 SL @ 0.3ml per lit of water (3 Sprays) Dimethoate 30 EC 2 ml per lit of water (2 Sprays) Acephate 75 SP @ 1g per lit of water (2 Sprays) each spray was taken at one week interval.	Imidacloprid 200 SL @ 0.3ml per lit of water (at 2nd week) Acephate 75 SP @ 1g per lit of water (2 Sprays one at 3rd and another at 7th week) based on ETL.	No Spray up to 7th week.
5	Weeding	3 times weeding	2 times weeding	No Weeding

Results and Discussions

Crop performance and yield

Observations from the study revealed that, all the yield attributes were affected by different packages of cultivation practices (Table 2). The demonstrations of technology Option-3 recorded higher yield of 43.25 and 44.78 t/ha during 2016-17 and 2017-18 respectively with an average of 44.06 tons per ha. whereas the farmer practice TO1 maintained under normal cropping practices as per farmer's choice recorded 24.14 tons and 26.11 tons during 2016-17 & 2017-18 with an average yield of 25.13 tons per ha as compared to TO2 the recommended package of practice recorded an average yield of 26.90 tons/ha.

Economic Returns

Data in table 2 revealed that the cost involved in the adoption of TO2 an alternate practice was more profitable. The cultivation of muskmelon using alternate practices with protection cover gave higher net return of Rs. 497500 and 628660 per ha respectively, as compared to farmers practices Rs 88546 and 216542 per ha and in Recommended Package of Practice (TO1) Rs 150241 and 275718 during 2016-17 and 2017-18 respectively. An average net return and B: C ratio of demonstration in alternative practice (TO3) is 563080 Rs/ha and 4.72 respectively as compared to farmers practice Rs 152544 per ha and BC ratio of 2.22. Whereas, in Recommended Package of Practice (TO2) recorded the average net return of Rs 212979.50 and B: C ratio of 3.50. Similar findings were reported by Kuldeep Singh Bhullar (2016). He reported that, an increase in the tuber yield as a result of polypropylene film covering was obtained in the potato cultivation in comparison with the traditional cultivation the mean yield of 301.1 q per ha was obtained from the covered crop which was significantly higher over the practice I and practice II, 225.2 q per ha and 255.2 q per ha respectively. The high yield under the protection was probably due to frost protection afforded by covering and creation of favourable microclimate for plant and tuber growth.

Pest Population

It is revealed from table 3 that, the technology Option- 3 with protection cover recorded the average thrips population per top 3 leaves was zero population till 25 days after transplanting of seedlings so also the average number of active leaf miner per 10 plants. Whereas, in the farmer practice TO1 the average thrips population per top 3 leaves day before spray was 5.2 and 1.95, 1.25 and 0.65 on 3rd, 7th and 10th day after spray respectively and the average no of active leaf minor per 10 plants day before spray was 95.5 and 49.5 total emerged active leaf miner were observed after 3days. However in TO 2 (Recommended Package of Practice) two sprays were done. first spray on 25th days after planting, the average thrips population per top 3 leaves day before spray was 4.0 and 1.4, 0.75 and 0.11 on 3rd, 7th and 10th day after spray respectively and the average no of active leaf minor per 10 plants day before spray was 101 and 32 total emerged active leaf miner were observed after three days and the same trend was observed during 2nd spray which was taken after 50days after transplanting.

Synchronized fruit set

To get uniform fruit maturity the synchronization of flower is important parameter (Table 3). It is achieved in the Alternate practices (TO 3), where all the vines have given the

synchronized flowering at 44.5 against the TO1 and TO2 where the synchronized fruit set were observed respectively on 33 and 34 DAT. This may be due to prevention of pollination in the early flowers which led to the dropping of female flowers under the protection cover.

Table 2: Yield attributes of Muskmelon crop in different demonstrated trials.

Year	Yields(t/ha)				Economics of Farmers practice (TO1) (Rs./ha)				Economics of POP (TO2) (Rs./ha)				Economics of Protection Cover (UV stabilized)TO3 (Rs./ha)			
	Potential yield	TO1	TO2	TO3	Gross cost	Gross returns	Net Return	B:C Ratio	Gross cost	Gross returns	Net Return	B:C Ratio	Gross cost	Gross returns	Net Return	B:C Ratio
2016-17	60.00	24.14	26.00	43.25	128750	217296	88546	1.69	83750	233991	150241	2.79	151250	648750	497500	4.29
2017-18	60.00	26.11	27.79	44.87	123150	339692	216542	2.76	85750	361468	275718	4.22	151250	779910	628660	5.16
Mean	60.00	25.13	26.90	44.06	125950	278494	152544	2.22	84750	297729.50	212979.50	3.50	151250	714330	563080	4.72

Produce Sold at Rs 9000 per ton for TO1 & TO2 produce & TO3 produce sold at price of Rs 15000 per ton during 2016-17 & Rs 14000 per ton for TO1 & TO2 produce & TO3 produce sold at price of Rs 18000 per ton during 2017-18.

Table 3: Reaction of treatments on Incidence of insect pests and days to first fruit set

Particulars		Avg. Thrips population / top 3 leaves				Avg. Number of active leaf miner /10 plants		No. of days to first fruit set
		DBS	3 DAS	7 DAS	10 DAS	DBS	Total emerging active leaf miner after 3days	
TO1 :Farmers practice		4.2	1.6	1.3	0.8	105	52	33
TO2 : POP Spraying at 25, 50 DAS	25DAS	3.9	1. 3	0.8	0.12	112	34	34
with Acephate 75SP @ 1g /lit of water	50DAS	2.1	0.8	0.5	0.15	42	12	
TO3 Protection Cover (UV stabilized)		0	0	0	0	0	0	45

Conclusion

The demonstration resulted that the use of protection cover to the crop has reduced the pesticide load by dividing the pest infestation during the initial stage of crop. The technology was eco-friendly and also contributed to the economical yield and quality of the fruit. The percent increase in the yield of muskmelon was 75.36 per cent when compared with farmers practice (TO1) and was 63.82 per cent when compared with package of practice.

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