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RESEARCH ARTICLE

To Study the Extent of Adoption of Recommended Horticulture Technologies under the National Horticulture Mission in Krishnagiri District of Tamil Nadu

S. Mokesh* and T. Raj Pravin**

Associate Professor (Agricultural Extension), Horticultural Research Station, Tamil Nadu Agricultural University, Pechiparai, Tamil Nadu – 629101, India.
PG Scholar, Department of Agricultural Extension, Faculty of Agriculture, Annamalai University,

ABSTRACT

The study on the adoption of recommended horticulture technologies under NHM in Krishnagiri district revealed that the majority (91.66 per cent) of NHM beneficiaries adopt the recommended variety of horticulture crops in their cultivation. Regarding soil preference, about 83.33 per cent of the respondents are aware and cultivate according to the recommendations of the State Department of Horticulture. In nursery management, a high (75.00 per cent) percentage of the horticulture farmers follow the recommended methods for raising their nursery. Regarding the preparation of the field for raising floriculture crops, more than half of the respondents (66.66 per cent) adopt the recommended field preparation methods. The majority of floriculture farmers (91.66 per cent) follow the recommended planting season, as it improves flower crop production and increases profits. In pit size, three-fourths (75.00 per cent) of the respondents do not follow the recommended pit size under flower cultivation. Half (50.00 per cent) of the respondents both follow and do not follow the recommended spacing in flower crop cultivation. Regarding the recommended time of first irrigation, the majority (91.66 per cent) in this study followed it. For the first weeding, the majority (60.00 per cent) follow the recommended weed management practices, while 40.00 per cent do not. This variation in weeding practices and their management depends on the specific field conditions. The majority (75.00 per cent) follow the recommended fertiliser application. More than half (58.33 per cent) of the respondents cultivate the recommended intercrops to gain more remuneration. About micronutrient application for raising flower crops, the majority (56.66 per cent) adopt the recommended micronutrient doses in their flower cultivation. The majority (61.66%) do not follow the recommended plant protection measures. Half (53.33%) of floriculture farmers in the study area do not follow the recommended fungicide for leaf spot disease due to a lack of proper awareness. About 51.66 per cent of the respondents in this study follow the recommended fungicide for controlling powdery mildew disease in the study area. More than half of the respondents (60.00 per cent) in this study adopt the recommended harvest time.

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*Corresponding author mail: trajpravin@gmail.com

INTRODUCTION

Horticulture is considered one of the main factors addressing food security, nutritional security, and sustainable agricultural development in India (Shanker et al., 2025). The National Horticulture Mission (NHM) was introduced with the purpose of holistic development of the horticulture sector in line with the regionally varied area-based approaches of technology promotion, extension, post harvest management, processing and marketing of horticultural crops (Tuteja et al., 2014). The mission offers proper technologies towards the high-tech horticulture to the targeted farmers, especially those aimed at the protected cultivation and precision farming (Singh and Sirohi, 2020). The main aims of NHM are to enhance production of the horticulture, the farm income, and enhance the nutritional security through the implementation of the suggested technologies promoted by the central and state government development departments (Yadava et al., 2018). The mission underlines the economies of scale by addressing the need to achieve the growth of farmers income by doubling it by improvement of productivity through better germplasm, plant material stocks, and better precision technologies such as micro irrigation (Kumar, 2018). Micro irrigation technologies have proved to be 80-90 percent water use efficient because they target specific water use relative to the crop requirements (Kushwah, 2021).

Towards the development of skills and generating employment to the rural youths, NHM is working towards the establishment of cold chains, value addition centres, and warehousing facilities supported with advanced logistics (Tuteja et al., 2014). Protected cultivation that has been implemented in NHM has shown great effects on crop yields and farmers livelihoods (Datta et al., 2017).

Krishnagiri district, Tamil Nadu is one of the prospective areas that can be developed into a horticultural area with about 80,499 hectares of horticultural area (District Administration, Krishnagiri). The district is also known to produce mango (33, 679 hectares) and other horticultural products such as banana, tomato, beans, and vegetables which represent 17.05 percent of state production of mango (Ministry of MSME, 2020). The district has also introduced numerous plans under NHM that encourage hi-tech production methods that include poly-green house buildings, shade net houses, and seedling distribution enhancement methods (District Administration, Krishnagiri). Although there has been a significant investment during NHM, full evaluation of technology adoption level amongst horticulture farmers has not been undertaken. The awareness of the level of adoption is also important to assess the effectiveness of the programme and to develop strategies to increase the levels of technology dissemination (Nedumaran et al., 2019). This study was done to investigate the level of adoption of the recommended technologies of horticulture practices implemented by NHM in Krishnagiri district and factors affecting adoption decisions to enhance technology transfer practices in the district.

METHODOLOGY

This study was conducted in the Krishnagiri district of Tamil Nadu state, which is predominantly a horticultural district. Three taluks, namely Krishnagiri, Hosur and Shoolagiri, were selected for this study based on the maximum number of beneficiaries who participated in the NHM training. A list of villages was collected from the selected blocks where more NHM activities were carried out. From the list, two villages were chosen from each block based on the maximum number of trainees in the NHM training programme on specific crop cultivation practices. A total of six villages, namely Nagondapalli. Thattiganapalli, Maharajakadai, Naralapalli, Kudisadhanapalli, and Pannapalli were selected for this study. A sample size of 120 beneficiaries was selected from the selected villages. The numbers of beneficiaries for each village were selected using a proportionate random sampling technique.

FINDINGS AND DISCUSSION

The findings on the extent of adoption of recommended horticulture technology are given below. The interferences from Table 1 reveal the following.

The findings in Table 1 are presented below.

Selection of recommended varieties

The majority (91.66%) of the NHM beneficiaries in this study adopt the recommended variety of horticulture crops in their cultivation. Only a meagre 8.33 percent of the respondents do not adopt recommended varieties as they continue to use the traditional local varieties in the study area. The reason for non-adoption is that many local varieties have

Table 1: Distribution of respondents according to their adoption of NHM

N=120

S.No	TECHNOLOGIES	Number of Respondents of adoption	Percent	No. of Not Adoption	Percent
A	**Varieties**				
1	Recommended Varieties for horticulture crops	110	91.66	10	8.33
B	**Soil types**				
1	Soil preferred for horticulture crop cultivation	100	83.33	20	16.66
C	**Nursery Management**				
1	Recommended nursery	90	75.00	30	25.00
2	Recommended method of sowing	100	83.33	20	16.66
D	**Field Preparation**				
1	Recommended field preparation	80	66.66	40	33.33
2	Recommended quantity of FYM	100	83.33	20	16.66
E	**Planting Season**				
1	Proper season for planting	110	91.66	10	8.33
F	**Pit size**				
1	Recommended pit size	30	25.00	90	75.00
G	**Spacing**				
1	Recommended spacing for horticulture crops	60	50.00	60	50.00
2	Correct depth of panting	62	51.66	58	48.33
H	**Irrigation**				
1	Time of first irrigation	110	91.66	10	8.33
2	Time of life irrigation	100	83.33	20	16.67
I	**Weed Management**				
1	Recommended time for the first weeding	72	60.00	48	40.00
2	Recommended interval for weed control	80	66.66	40	33.33
J	**Application of fertilizers**				
1	Recommended quantity of urea as a basal application	90	75.00	30	25.00
2	Recommended quantity of phosphatic fertilizers	46	38.33	74	61.66
3	Methods of application	72	60.00	48	40.00
K	**Inter crop**				
1	Recommended intercrop	70	58.33	50	41.66
L	**Micronutrient application**				
1	Recommended micro nutrients for flowers	68	56.66	52	43.33
M	**Plant protection measures**				
1	Recommended insecticide for red hairy caterpillar	46	38.33	74	61.66
2	Recommended fungicide for black leaf spot disease	56	46.66	64	53.33
3	Recommended fungicide for powdery mildew disease	62	51.66	58	48.33
N	**Harvest**				
1	Optimum time of harvest	72	60.00	48	40.00

a strong local market, and their profits, combined with lower production costs, encourage the farming community to cultivate them for years.

Soil type

Regarding soil preference for horticulture crops, the majority (83.33 per cent) of respondents in this study are aware of and follow the recommendations of the State Department of Horticulture. About 16.66 per cent of farmers raise flower crops in unsuitable lands, and they feel that even the low productivity fetches them more money than raising any other agricultural or horticultural crops in their locality. Most horticulture farmers in the study area who raised crops in preferred soils have achieved greater productivity gains and profits over an extended period. This has led the majority of horticulture farmers to cultivate various flower crops in soils, based on scientific evaluations in their respective fields.

Nursery management

In nursery management, the majority (75.00%) of the horticulture farmers follow the recommended methods for raising their nursery. Currently, in nurseries recommended by development departments, extension workers must strictly follow the recommendation on greenhouse practices; otherwise, it will lead to production and economic losses. So, the majority follow the recommended method in nursery preparation. About 25.00 per cent of flower growers do not follow the recommended practices due to their low socio-economic status and traditional methods, yet they have their own tailor-made methods or farm innovations to manage their nurseries and raise floriculture seedlings.

About the recommended method of sowing, the majority of the respondents (83.33%) in this study follow the recommended sowing methods. The reason for this outcome is that the majority followed this recommended practice due to the low costs incurred during sowing and the relatively high benefits of using these productive technologies. About 16.66 per cent of farmers do not adopt the recommended method of sowing as they are not aware of the scientific methods advocated by the State Department of Horticulture under the National Horticulture Mission.

Field preparation

With regard to the preparation of fields for raising floriculture crops, more than half of the respondents (66.66%) adopt the recommended field preparation methods. About 33.33 per cent do not adopt the recommended field preparation methods, as they follow their own traditional tillage practices, which were passed down by their forefathers involved in flower cultivation.

to the application of the recommended quantity of farmyard manure, the majority of the flower growers (83.33 %) adopt the recommended quantity of farmyard manure. About 16.66 per cent do not apply the recommended FYM as they do not possess animals, nor do their villages have sufficient cattle population, and rely on chemical fertilisers, which are mostly cost-effective in flower cultivation.

Planting season

The majority of floriculture farmers (91.66%) follow the recommended planting season, as it improves flower crop production and increases profits. A meagre portion of the population (8.33%) does not adhere to the recommended planting season and instead follows their own traditional schedules based on Tamil months. Being elderly farmers and traditional in nature, they do not advocate for more scientifically recommended horticultural technologies in the study area.

Pit size

Regarding pit size, the majority (75.00 %) of the respondents in this study do not follow the recommended pit size under flower cultivation. The pits are usually dug by farm labourers who are less skilled and traditionally oriented. Due to labour scarcity, flower growers must carry out all farm operations with the available labour at their disposal. These are the possible reasons for not following the recommended pit size in the study area. About 25.00 per cent of the farmers follow the recommended pit size, having realised the benefits of achieving a good crop stand in their fields, which ensures them good profits.

Spacing

Half (50.00%) of the respondents both follow and do not follow the recommended spacing in flower crop cultivation. The unavailability of skilled labour restricts small and marginal farmers in the study area from following the recommended spacing in flower crop cultivation. On the other hand, the remaining 50 per cent do follow the recommended spacing in the study

area as they have realised its productive and economic benefits. About the correct depth of planting, more than half of the respondents (51.66%) in this study follow the recommended depth of planting. About 48.33 per cent of the respondents do not follow the spacing recommendation because they are unaware of it in the respective flower crops.

Irrigation

About the recommended time of first irrigation, the majority (91.66 per cent) of the respondents in this study adopt it. The first irrigation of floriculture crops plays a vital role in maintaining a proper crop stand in the field and promoting the crop's growth. So, the majority of the flower cultivating farmers follow the recommendation to irrigate their respective farm fields. A meagre (8.33 %) does not follow the recommendation, as they follow traditional irrigation management practices based on established conventions in their farming systems.

In life irrigation, about 83.33 per cent of respondents follow the recommended practices to save their crop from losses. About 16.67 per cent of the respondents rely on traditional life migration methods instead of following the recommended life irrigation schedules in this study area, which are relatively cheap compared to modern irrigation technologies.

Weed management

In following the recommended time for first weeding, the majority (60.00%) adhere to the recommended weed management practices, while 40.00% do not, as weeding infestation varies from field to field and its control or management also varies depending on the weeding schedule. In places of acute labour scarcity, farmers who employ labour in flower cultivation do not follow the recommended schedules for weeding.

In recommending the intervals of weeding in flower crops, the majority of the respondents (66.67%) follow these intervals at different stages of crop growth. About 33.33 per cent do not follow the recommended intervals, as weeding varies between fields based on weed infestation, labour availability, resources at their disposal.

Application of fertilizers

The majority of the respondents (75.00%) follow the recommended quantity of urea as a basal dose. Since it assists in the proper establishment of crop stands in the field, it also supports the vegetative growth stages of flower crops in the study area. However, 25.00 per cent do not follow the recommended quantity and instead use a basal application of urea in their own conventional measurements, suited to the size of their respective fields in this study.

About following the recommended quantity of phosphatic fertilisers, the majority (61.66%) of the floriculture farmers in the study area follow the recommended quantity of Phosphatic fertilizers as it aids in their improved flower cultivation in the study area. About 25.00 per cent of farmers do not follow this recommendation as they are resource-poor, belonging to small and marginal farmers in this study, and the phosphatic fertilisers are also very costly to them. Their failure to follow the proper fertiliser schedules is affecting their flower production and productivity, which they do not realise. Their poor economic status also does not allow them to purchase and use it. Further subsidising it and providing it to them at less cost will improve its usage and benefit small and marginal farmers in the study area.

In methods of application, the majority (60.00%) of the floriculture farmers in this study follow recommended practices such as basal application and fertigation. However, 40.00 per cent of the farmers do not follow the recommended methods for applying phosphatic fertilisers and instead use their own conventional and traditional methods in the study area. The reason is their resource-poor nature and the absence of fertigation devices to apply fertilisers in their respective farm fields.

Intercrop cultivation

The majority (58.33%) of the respondents cultivate the recommended intercrops to gain more remuneration. However, 41.66 per cent do not adopt the recommended intercrops but instead grow intercrops of their choice due to market needs, their animals' needs, etc. Providing more subsidies for raising intercrops will assist the farming community, particularly small and marginal farmers in the study area, to follow recommended intercrops which will be economically remunerative to them.

Micronutrient application

Regarding micronutrient application for raising flower crops, the majority (56.66%) adopt the recommended micronutrient doses in their flower cultivation. About 43.33 per cent do not follow the recommended micronutrient but do apply micronutrients in conventional established doses.

A few farmers are also not aware of micronutrient deficiency symptoms and the management measures to be followed to save production-related losses in the study area.

Plant protection measures

Regarding plant protection measures, the majority (61.66%) do not follow the recommended insecticide for red hairy Caterpillar. The remaining 38.33 per cent alone follow the recommended management measures towards controlling the red hairy caterpillar menace in the study area. The absence of proper awareness about the control measures, the absence of the

The relevance of pesticides in the nearby input shapes and the increased influence of farmers on input dealers might be the possible reasons behind this study's outcome.

More awareness campaigns on crop protection measures need to be advocated through NHM in the study area so that the farming community, mostly small and marginal farmers, can effectively utilise them and derive their economic benefits.

Recommended fungicide for leaf spot disease

The majority (53.33%) of floriculture farmers in the study area do not follow the recommended fungicide for leaf spot disease. The remaining 46.66 per cent follow the recommended fungicide in the study. The lack of proper awareness about the recommended fungicide and its unavailability at the nearby input dealer shop might be the reasons behind this study's outcome.

Recommended fungicide for powdery mildew disease

The majority (51.66%) of the respondents in this study follow the recommended fungicide for controlling powdery mildew disease in the study area. Being a persistent pest in flower cultivation, powdery mildew is responsible for many productions and productivity-linked losses. This has led the majority to follow the recommended fungicide to control this menace. However, the remaining 48.33 per cent of farmers do not follow this recommendation because the common fungal disease in the study area affects all parts of the plant but does not cause significant damage to their crops. Low levels of powdery mildew do not reduce plant growth and flowering, but severe infestation is found to affect them. Only when the powdery mildew infestation is severe. The small and marginal farmers adopt control measures by either following the recommended guidelines or relying on the advice of nearby input dealers in the study area.

Harvest

Regarding the optimum time of harvest, the Majority of the respondents (60.00 per cent) in this study adopt the recommended time of harvest. The optimum harvest time decides the marketability of the flower crops across geographies. However, 40.00 per cent of flower farmers do not follow the optimum time of harvest as the flower market prices fluctuate on a day-to-day and hour-to-hour basis. So, even if the flowers are small, the farmers derive profits based on the demand and supply situation. The farmers harvest their flowers based on market trends rather than waiting for the optimum harvest time in the study area.

CONCLUSION

The analysis showed that a large percentage (91.66 -1) of NHM beneficiaries planted the suggested horticulture varieties, compared to 83.33 -1% who adhered to soil recommendations issued by the State Department. In regard to nursery management, 75.00⁻% had the prescribed practices in place and 66.66·⁚·-1 had followed the given field-preparation protocols of floriculture. The farmers in the floriculture industry were found to be 91.66 percentage compliant to the stated planting season in a bid to enhance their production and profitability. However, 75.00 per cent of them failed to follow the recommended pit size and compliance to the guidelines on spacing was divided at half, with one out of five following it. Most (91.66 ⁻ 1) of them used the proposed initial irrigation schedule, and 60.00 □% used the recommended weeding programs. In terms of nutrient management, 75.00% used the suggested chemical fertilizers to enable establishment of crops and 58.33 percent used the suggested intercrops to produce ancillary income. In addition, 56.66% used the recommended dosage of micronutrients in floral growing. Plant protection measures were not adopted in large numbers. In particular, it is found that 61.66 89 percent did not follow the recommendation on dealing with red hairy caterpillars with only 38.33 89 percent using the right management strategies. Comparatively, 53.33 0 -percent did not use the suggested fungicides against the leaf spot disease, presumably because of the lack of awareness, and 51.66 0 -percent used the

recommended fungicides to control powdery mildew. Finally, 60.00 per cent. embraced the recommended harvest period in recognition of the fact that it greatly contributed to marketability.

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