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Impact assessment of Farm Field School on ICM in chrysanthemum in Salem District

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Abstract
Farmers of Salem were cultivating chrysanthemum flowers year-round but were experiencing low income due to several factors including outdated technologies, excessive use of pesticides, poor adoption of growth regulators, and inadequate post-harvest operations. Mr. N. Jagadeesan, a forward-thinking farmer with experience in flower cultivation, was chosen to lead a Farmers Field School (FFS) initiative in the village of Jodukuli, located in the Kadayampatti Block of Salem District. The Salem Krishi Vigyan Kendra organized this FFS program on Integrated Crop Management of Chrysanthemum. A multidisciplinary team from KVK, Salem conducted a pilot study and Participatory Rural Appraisal (PRA) in 2018-19 in Jodukuli village. Fourteen classes were held, one each week, during which farmers were educated about identifying field problems and implementing solutions throughout the crop growth cycle. They were encouraged to adopt integrated nutrient management and integrated pest and disease management practices. Consequently, the cost of cultivation decreased due to early pest detection, preventing further infestation and managing them effectively without excessive use of fertilizers and chemicals. As a result of these practices, farmers observed increased yields and net profits during the FFS period. Even after the completion of the FFS classes, farmers remained enthusiastic about implementing integrated nutrient management and pest/disease management practices. The adoption rate among farmers was remarkable, reaching 95%, with adoption rates of specific practices ranging from 90% to 99%. This indicated the significant effectiveness of the FFS program among chrysanthemum flower growers. The technology's horizontal spread reached approximately 550 hectares over three to four years duration, showcasing its widespread acceptance and impact on the agricultural community.

Key words: Chrysanthemum flower, Farmers Field School, Impact assessment

I. Introduction

What is FFS?
Farmer Field School (FFS) is a Simple Guide and it is like a school for adults where farmers learn together in the field. It helps farmers solve problems in their fields and teaches them how to manage pests and crops better.

How Does it Work?
- Learning Together: Farmers meet regularly from planting to harvest. They observe and discuss what's happening in their fields.
- Experimenting: Farmers try out new ideas in their fields to see what works best.
- Decision Making: Through discussions and activities, farmers learn to make their own decisions about managing their crops.

Why is it Important?
At first, FFS started to help farmers use fewer pesticides in rice fields, but it grew to cover other crops too. It's now used in over 30 countries to empower farmers and improve farming practices.

What Do Farmers Learn?
- Grow a Healthy Crop: Focus on keeping plants healthy to resist pests and diseases.
- Conserve Natural Enemies: Encourage helpful bugs and animals to control pests naturally.
- Regular Crop Observation: Farmers learn to watch their crops closely to make better decisions.
- Become Experts: Farmers become experts in their own fields by learning from experience.

Key Principles of FFS:
- Adult Education: FFS assumes farmers have experience but need guidance to improve.
- Skilled Facilitators: Trainers must be confident in farming and good at helping groups learn.

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- Seasonal Learning: Sessions match the crop cycle, so farmers can use what they learn right away.
- Group Study: Farmers work in small groups to support each other and learn together.
- Local Site: FFS is held in the farmers' community for easy access and ongoing support.
- Building Community: FFS helps farmers build trust and work together even after the program ends.
- Basic Science: Focuses on simple scientific principles that farmers can use practically.
- Study Fields: Small plots are used for experiments, giving farmers a safe space to try new methods.

How Facilitators Help:

- They guide discussions and activities but let farmers make their own decisions.
- Farmers present their findings and discuss them with each other, with facilitators contributing to the conversation.
- In a nutshell, Farmer Field School is about farmers learning together in their own fields, empowering them to make better decisions and improve their crops sustainably.

The floriculture sector has become a lucrative industry in many countries as a result of scientific techniques and steady supply of improved plant material. Total value of different floricultural products at wholesale level has been estimated to be over 50 billion US$ from about two m ha area in the world. Indian floriculture industry is also fast becoming aware of the importance of offering products as per the wishes of consumers. India is known for growing of traditional flowers such as marigold, jasmine, tuberose, chrysanthemum, rose, carnation, gladiolus, gerbera etc. Chrysanthemum is one of the most important flower crops commercially grown in different parts of India. Among the flowers, annual chrysanthemum (*Chrysanthemum coronarium*) has its own importance. It is one of the most important flower crops grown in India. It has a great demand during various functions, festivals, marriages for floral decorations. In Tamil Nadu, annual loose chrysanthemum is more popular among the farmers because of easy cultivation. The growers get attracted towards annual chrysanthemum due to its short duration to product marketable attractive yellow, lavender / puprle and white colour flowers with good keeping quality.

Salem district has been receiving a rainfall of 545 mm during SW monsoon and during NE monsoon 564.2 mm of rainfall was recorded. The geographical area is 5245 sq,km. Net sown area is 22,33,70 ha and area sown more than once 81670 ha. Area under flower crops is more than 3000 ha and area under chrysanthemum is around 1800 ha in Salem District. Most of the chrysanthemum growers had a challenge of managing the damage due to thrips attack (Thrips attack resulted in reducing the flower quality and the flowers are unsuitable for marketing). They also attacked by diseases of wilt, root rot, leaf spot and rust which caused an yield loss of 20-30% in chrysanthemum. To address these problems of chrysanthemum growers in Salem district and to create awareness about the Integrated Nutrient Management Practices (INM) and Integrated Pest and Disease Management (IPDM) practices in Chrysanthemum, KVK, Salem intervened with a Farm Field School on ICM in Chrysanthemum in the year 2018- 19 in Salem District.

II. Mehtodology

Kadayampatti Block of Salem District is one of the flower growing belt and chrysanthemum is a major flower crop grown in an area of 850 ha. A multi-disciplinary team from KVK, Salem visited Jodukuli village of Kadayampatti block and conducted pilot study and PRA. The farmers were growing both chrysanthemum flowers throughout the year and they were getting poor income due to lack of improved technologies, indiscriminative use of pesticides, poor adoption of growth regulators and lack of post harvest operations. Mr. N. Jagadeesan a progressive flower growing farmer was selected as a facilitating farmer for conducting FFS at the selected village for coordinating the farmers for regular classes. For all the farmers, awareness were created on use of virus free propagating materials like terminal cuttings of 5-7 cm long or suckers and that can be planted in a spacing of 30 x 30 cm spacing on one side of ridges (1,11,000 plants/ha) during June – July. It was advised to apply basal manures and fertilizers like 2 kg each of Azospirillum and Phosphobacteria, 25t FYM and 135 :750:40 kg/ha of urea, super phosphate and murate of ptash respectively and top dressing of urea 62.5 kg/ha 30 days after planting. As an important horticultural technique, it was advised to do pinching after 4 weeks after planting for induction of lateral branches. Periodical removal of side suckers also carried out by the farmers in chrysanthemum. Application of growth regulators like spraying of GA3 @ 50 ppm on 30, 45 and 60

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days after planting was also done (https://agritech.tnau.ac.in). Two row high density planting of sorghum or maize crop around the field, maintaining blue and yellow sticky traps 10 to 12 per acre in the field at an height of 45cm above the crop height through out the crop growth period and regular monitoring of pest and disease incidence with weed free environment were important advisories to the farmers. All the farmers were instructed to adopt integrated crop management practices including integrated nutrient management (Anant Kumar *et al*., (2020)) and integrated pest and disease management practices.

FFS Process

Week	Name of the activity	Interventions	Findings
Week 1	Pilot study & Selection of farmers	FFS Basic concepts Agro Ecosystem Analysis Biology of Chrysanthemum, Nursery management	Identified the progressive farmers as members for conducting FFS, local leaders and key informants in the village.
Week 2	PRA and soil sampling	Soil sampling Importance of soil sampling & manure preparation	Demonstrated the method of soil sampling and collected the soil and water samples from the fields fellow farmers
Week 3	ICM & soil and water management	Simple experiments in Farm school – Water holding capacity, Response of Chrysanthemum varieties to day length	Explained about the irrigation frequencies and different varieties
Week 4	Nursery management & Weed management and Mulching techniques	Agro Ecosystem Analysis Nursery management and Weed management techniques in Chrysanthemum	Details on agro eco system were explained and different methods of propagation weed management were also explained. Mulching techniques used for controlling weeds and to provide required climatic condition in soil.
Week 5	Integrated Nutrient Management	Application of fertilizer based on STCR Integrated Nutrient Management Use of organic manures	Application of recommended dose of organic and inorganic fertilizers based on the soil test were explained
Week 6	Precision farming techniques	Water Management Practices Foliar application of nutrients Importance of drip and fertigation Agro Ecosystem Analysis Spraying of Panchagavya	Precision farming techniques like drip, fertigation etc., were explained.
Week 7	Integrated Pest and Disease managment	Agro Ecosystem Analysis Soil sample analysis discussion and AESA based IPDM methods	Explained the use of bio based control agents and pesticide & fungicide and need based application of chemicals for crop protection purpose
Week 8	IPDM	Plant Protection Modules Integrated Pest and Disease Management	Methods of different IPDM practices were explained
Week 9	Organic farming	Bio pesticide preparation Preparation of botanicals Spraying of NSKE /PSKE	Methods of preparing bio pesticides and application of the organic pesticides were explained
Week10	Special Horticultural	Special practices for Chrysanthemum	Special Horticultural practices like training and pruning, pinching,

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	practices	Cost Economics and Marketing	disbudding, dis shooting, desuckering, staking, etc., were explained
Week 11	Post harvest techniques	Post harvest techniques in chrysanthemum Department activities	Methods of pre cooling, storage techniques for cut flowers, post harvest techniques and marketing strategies explained.
Week 12	PDI	Explained about the calculation of ETL, percent disease index etc.,	ETL and PDI were explained for need based application of chemicals for plant protection
Week 13	Farmers feed back	Working out cost benefit ratio Marketing of chrysanthemum	Feedback workshop was organized in the field and facilitated the farmers to express their feedback about the intervention.
Week 14	Extension activity	Field day	Field day – conducted as an extension activity to familiarize the activity

III. Results and Discussion

A multidisciplinary team from KVK, Salem conducted a pilot study and Participatory Rural Appraisal (PRA) in 2018-19 in Jodukuli village. Fourteen classes were held, one each week, during which farmers were educated about identifying field problems and implementing solutions throughout the crop growth cycle. They were encouraged to adopt integrated nutrient management and integrated pest and disease management practices. Consequently, the cost of cultivation decreased due to early pest detection, preventing further infestation and managing them effectively without excessive use of fertilizers and chemicals. As a result of these practices, farmers observed increased yields and net profits during the FFS period.

When an extension program is implemented in a region, its effects are multifaceted. Understanding and attributing these effects to the intervention is a challenging yet crucial task due to their complexity. The objectives of impact assessment may vary, as well as the intended audience for the information. Typically, the program follows a structured sequence such as input, process, output, outcome and impact. Efficiency, consistency, and effectiveness are important considerations in measuring the program's success. Impact is gauged by both positive and negative, primary and secondary long-term effects resulting from the intervention, whether intended or unintended. Assessing how the intervention affects the target group is essential for evaluating its utility (Kareemulla, 2016)

The World Bank defines impact assessment as determining whether a program has achieved its desired effects on individuals, households, and institutions, and if those effects can be attributed to the intervention. Impact assessment is integral to program planning, implementation, and evaluation. It works alongside monitoring and evaluation processes to ensure that the program progresses according to its objectives and to verify if the results align with the implementing agency's goals. Impact assessment measures the attainment of project milestones, outputs, outcomes, and their impact on the targeted population. The quality of impact assessment relies on the effectiveness of the program implementation process. Basics of impact assessment were well explained by Krall (2003).

Indicators for different stages of Interventions to Impact Continuum

Input to Impact Continuum	**Indicators**
Inputs	Technologies
Activities	Demonstrations Training programmes Technology input supplies
Outputs	Increased yields Disease resistance etc.
Outcomes	Increased incomes, better crop / farm management, reduced migration etc.
Impacts	Poverty reduction, Sustainable livelihoods

Evaluation is the systematic process of assessing the operation, outcomes, and impacts of a program or project by gathering evidence to determine if certain acceptable standards have been met. It also aims to address other pertinent questions, as outlined by Suvedi and Stoep (2016), in order to enhance clarity and precision

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- Program Effectiveness: Focus is on effectiveness of an intervention (program, project, or policy) in meeting objectives.
- Resource Effectiveness: Focus is on analysis of benefits and costs of an intervention, including cost per beneficiary.
- Service to Diverse Audiences: Focus is on which programs, policies, and practices are most effective with different target groups (e.g., women, ultra-poor, ethnic minorities).
- Experiential Effectiveness: Focus is on how users of extension services perceive service quality, or their intention to use new information and/or technology

Benefit-Cost Analysis (BCA) and Return on Investment (ROI) are two common types of analysis used to determine the economic feasibility of new technology or development alternatives. BCA is a tool used to identify, express in money terms, and then compare all the costs and benefits of a policy, program, or project. ROI is a performance measure used to evaluate the financial efficiency of an investment. The impact evaluation can be done either by the team which implements the programme or by an outside or third party team. Some of the major indicators of economic impact are reduced cost, savings, increased income, increased productivity, value added, alternative opportunity cost of capital/ resources, willingness to pay.

Yield and Benefit Cost Ratio of chrysanthemum during FFS classes (2018-19)

Parameters	ICM techniques	Farmers Practice
Yield of Loose flowers	110 q/ha	85 q/ha
Yield increase	29.4 %	-
Benefit Cost Ratio	3.25	1.90
Suitability	More suitable for getting higher yield and net profit	

Yield and Benefit Cost Ratio of chrysanthemum during subsequesnt years

Parameters	ICM techniques		Farmers Practice
	Yield (q/ha)	% in yield	Yield (q/ha)
Yield – I Year (2020)	125	42	88
Yield – II Year (2021)	155	68	92
Yield – III Year (2022)	175	79	98
Yield – IV Year (2023)	225	80	125
BCR – I Year	3.26		2.45
BCR– II Year	3.45		2.48
BCR–III Year	3.55		2.50
BCR–IV Year	3.85		2.55
Increased Shelf life of flowers	24 – 36 hours		12 – 24 hours
Suitability for marketing	More suitable for marketing in city area throughout the year due to better quality and higher shelf life		

Even after the completion of the FFS classes, farmers remained enthusiastic about implementing integrated nutrient management and pest/disease management practices during the subsequent years also. The increase in yield and benefit cost ratio also notices in the subsequent years due to continuous adaptation of ICM practices and maintaining the crop properly to get the yield in ratoon crops also. Hence the yield was more increased in the ICM followed fields when compared to the farmers practices. Marketability of the flowers from ICM fields was also found to be better because of the better quality and better appearance. Due to precautionary pest and disease

management measures along with the integrated crop management practices, better crop growth along with avoiding pest and diseases and tolerability of pest and diseases, the cost of cultivation was found to be lesser which resulted in the higher cost benefit ratio.

Adoption rate among farmers was remarkable, reaching 95%, with adoption rates of specific practices ranging from 90% to 99%. This indicated the significant effectiveness of the FFS program among chrysanthemum flower growers. The technology's horizontal spread reached approximately 550 hectares over four years duration, showcasing its widespread acceptance and impact on the agricultural community.

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