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Technology need assessment of cool season vegetable growers in Kerala

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Abstract
An investigation was undertaken with ninety cool season vegetable farmers and thirty extension professionals to assess the technology needs, extent of adoption and to identify technical constraints faced during cultivation of cool season vegetables. Component wise technology adoption was estimated and results revealed that maximum adoption was for irrigation management and pre sowing techniques. Higher percent belonging to innovator and early adopter category was a clear positive indication for upscale of adopting production technology practices in future. Technology need assessment was done using Kruskal Wallis test and maximum technology need was reported for processing, storage and value addition and using Dunns test it was clear that there is a significant difference among the pair of technologies. Climate vagaries and its effects had a serious impact on production of cool season vegetables. Interventions suitable to locality needs to be assessed prior to recommendation and there is considerable room for improvement of cool season vegetable production in Kerala.

Keywords: Technology need assessment, cool season vegetables, technology adoption, climate

1. Introduction
Cool season vegetable cultivation is gaining popularity in the recent years in Kerala due to the advent of tropical varieties. The current level of production of cool season vegetables is low in spite of immense potential for boosting its production. The productivity is low due to the reason that the farmers have not fully adopted the improved package of practices of the cool season vegetable production technology and it is mainly grown by using traditional farming practices just like other vegetables. There is a need for the full adoption of recommended cultivation practices of cool season vegetable crops by the farmers, so that the production and income level can be raised. Therefore, it is necessary to know various aspects like adoption level, technology need, and constraints responsible for non-adoption of recommended cultivation practices of cool season vegetable crops by the farmers.

Evolving new technology is an endeavor in the direction of increasing production efficiency. The rapid technology progress and the increased rate of outdated technologies necessitate technology forecasting for any planning progress especially to understand technology needs of cool season vegetable growers.

Even non farmers are getting attracted to growing these vegetables in homesteads and government is taking initiatives to encourage, promote and support such actions. When compared to other vegetables, cool season vegetables generates higher returns in shorter duration as the pest and disease are not so prevalent in the newly cultivated areas. Different institutions have developed technologies and disseminated the same for various crops. However, farmers have adopted the same in a differential manner owing to multifaceted factors.

The present study entitled "Technology need assessment of cool season vegetable growers" was conducted in Thavinhal Grama panchayath of Wayanad district. The study aims to identify the technology needs of farmers, technology adoption for cool season vegetables and also the constraints faced during cultivation of cool season vegetables.

2. Methodology
The sample size consisted of 90 cool season vegetable growers and 30 extension professionals. Thus, a total of 120 respondents were selected using simple random sampling technique. An ex-post facto research design was used for the study. A well-structured interview schedule was employed for data collection from the respondents.

Thavinjal gramapanchayth with maximum area under cool season vegetable cultivation was selected for the study. Seven components were selected and rate of adoption of individual practices were calculated and the overall adoption quotient of cool season vegetable growers were also calculated using the formula by Singh and Singh (1967) [4]. Technology need assessment of identified 13 technologies was done using the criteria developed by Thomas (2004) [5] and interpreted using Kruskal Wallis test. Technical constraints which can be intervening the efficiency of respondents in use of technology was assessed using a well developed schedule with two point continuum and then ranked in descending order on the basis of mean scores. The variables were studied and analyzed with the help of different statistical tools like mean, correlation, frequency percentage analysis.

3. Result and Discussion

3.1 Technology adoption

Component wise distribution of growers on the basis of extent of knowledge of cool season vegetable technology in the order of increasing nature was seedling treatment followed by fertilizer management, post-harvest technology, sowing technique, plant protection measures, irrigation management and pre sowing technique.

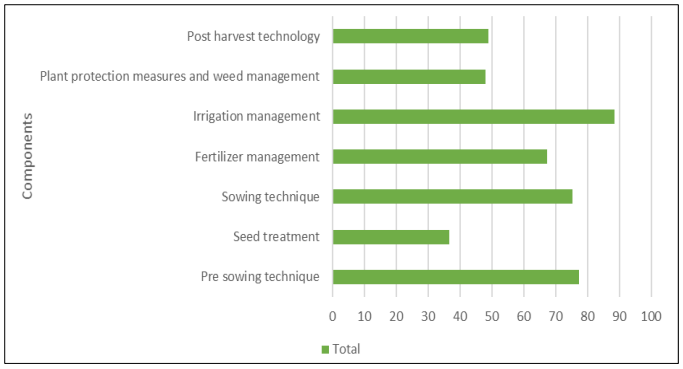

Fig 1: Adoption of cool season vegetable production technology

Technology adoption of selected cool season vegetable practices of KAU by farmers in Wayanad district was assessed using the formula developed by Singh and Singh (1967) [4]. The extent of technology adoption among the respondents in different components of cool season vegetable cultivation technology were highest in the area of irrigation management (88.46%). The cool season vegetable growers are conscious about irrigation management as flooding or water logged condition is highly detrimental to the crop. Water management practices like providing total number of irrigation and irrigating during the most critical phase of irrigation was adopted by majority and hence the adoption quotient 88.46. Other components in the decreasing order of extent of adoption are pre sowing technique (77.40%), sowing technique (75.20), fertilizer management (67.38%), post-harvest technology (48.94%), plant protection measures and weed management (48.02%) and seed treatment (36.74%). The lowest adoption of technology was observed in the area of seed treatment and this might be because of lack of awareness regarding the practice.

The findings are in line with the study by Malla (2018) [3] and Kant (2019) [2].

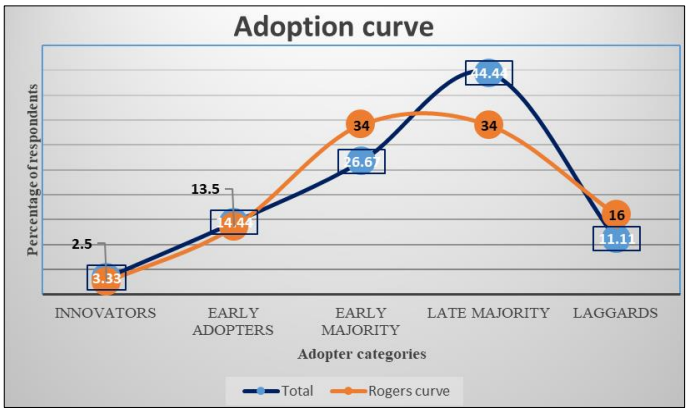

Fig 2: Adoption curve of cool season vegetable production technology by Wayanad growers

Followed by late majority, it is found that early majority (26.67%) and early adopters (14.40%) pursue cool season vegetable production technology. On comparing the results with Rogers standard curve that explains adopter category, it is evident that the percentage of growers who belong to early majority (26.67%) are lesser than the value (34.00%) ascribed in standard Rogers curve, whereas the percentage of early adopters (14.40%) is higher than that of the standard rogers value (13.50%). Only 26.67% belong to the early majority which is less than that of Rogers standard normal curve (34%). Early majority is a group of thoughtful people according to Rogers. In this study the cool season vegetable growers could be considerate and who are careful about accepting changes. This category of respondents may tend to be less affluent and require more awareness to become tech savvy. However, owing to their inherent nature of willing to take up a venture after witnessing others doing it successfully make it quite possible to change them from early majority to early adopters through technology and extension intervention. More percentage of farmers under early adopter category is a good indicator of adoption. Rogers himself considered this category as social leaders who are popular in the community and are educated. The service of early adopters who act as key players in opinion formation should be used for the benefit of educating the early majority and late majority.

Majority (44.44%) fall under late majority category against the standard (34%). Fig 2 depicts the presence of 11.11 percent laggards which is lower than that of standard Rogers curve. Majority under late majority to laggards could be due to the fact that the growers were practicing this venture for a long period of time with custom way technology in use, out of their past experience and intuition. Hence, it can be inferred that these growers will exhibit resistance to change as a result of their satisfaction from their existing venture in terms of returns from the farm, from the available lot of technologies. For this reason, it will be difficult for field level extensionists to transform them with any ordinary program. However, the use of on farm trials, extensive interventions from the extension agents and interactions with successful growers might create necessary awareness with regard to need of scientific technologies in cool season vegetable cultivation among the population.

There were 3.33 percent innovators in the adoption curve. The growers with higher percent belonging to innovator and early adopter category is a positive sign that with further

technological interventions and tailor made strategies focusing on both these categories will boost the cool season vegetable growers to develop creative and new ideas and thereby enhance the risk taking abilities of the individual in the field of cool season vegetable cultivation.

3.2 Technology Need Assessment

Table 1: Technology Need Assessment of cool season vegetable growers (N=120)

Particulars	Group mean	Std. deviation	LCL	UCL	Median
Biocontrol_agents	1.3	0.805	1.13	1.47	1
Biofertilizer	2.692	1.035	2.522	2.861	3
Biopesticides	2.667	1.048	2.497	2.836	3
Botanicals	1.8	1.074	1.63	1.97	1
Irrigation_management	1.925	1.168	1.755	2.095	1
Machinery	1.625	0.789	1.455	1.795	1
Planting_material	3.6	0.893	3.43	3.77	4
Processing	1.1	0.438	0.93	1.27	1
Resistant_variety	2.183	1.243	2.014	2.353	2
Seedling_treatment	2.158	1.283	1.989	2.328	1.5
Solarization	1.85	1.05	1.68	2.02	1
Storage	1.15	0.479	0.98	1.32	1
Value_addition	1.142	0.436	0.972	1.311	1
	chi_squared	df	p_value		
Kruskal-Wallis chi-squared	548.336	12	0		

Since the p-value is < 0.05, there is a significant difference between atleast a pair of treatments (or groups), so Dunn test is used for pairwise comparisons

Table 2: Pairwise comparison using Dunn Test

Group	Letter
Biocontrol_agents	a
Biofertilizer	b
Biopesticides	b
Botanicals	cd
Irrigation_management	cde
Machinery	c
Planting_material	f
Processing	a
Resistant_variety	e
Seedling_treatment	de
Solarization	cde
Storage	a
Value_addition	a

From table 1 it was clear that maximum technology need was reported for processing followed by storage and value addition. Technology availability was high when it comes to planting material. Hence, it could be inferred that the highest technology need was for processing, followed by storage and value addition, bio control agents, machinery implements, botanicals, soil solarization, irrigation management, seed rate and seedling treatment, resistant variety, bio pesticides, bio fertilizers and planting material. Also from Table 2, it is clear that out of 13 technologies needs, 9 were significantly different and they are biopesticides, machinery, planting material, processing, resistant variety, seedling treatment, solarization, storage and value addition.

Tones of produce are wasted at the field level itself due to lower market price, climatic variations, and perishability and perhaps due to lack of storage facilities. This might be the possible reason as to why farmers preferred processing, storage and value addition technology needs because the prevailing practices might not be helpful enough for better income generation. This is in line with the findings of Basheer (2016).

The result of technology need with special reference to the need of cool season vegetable cultivation suited implements was in line with the findings of Thomas (2015) [6]. Majority of the technology available to the farmers are for commercial crops but vegetable farmers are of strong opinion that they require friendly technologies as it can directly reduce the problems experienced and increase economic returns.

Hence it can be inferred that farmers prefer technology with low input, high benefit and high productivity.

3.3 Constraints

(N=90)

Table 3: Technical constraints

Sl. No.	Technical constraints	Total score	%	Rank over class
1	Lack of knowledge of seed treatment	55	61.11	7
2	Lack of proper knowledge about plant protection measures	60	66.67	5
3	Lack of availability of technical advice	67	74.44	4
4	Lack of knowledge of seed rate and spacing	56	62.22	6
5	Lack of knowledge of disease resistant varieties	69	76.67	2
6	Lack of knowledge about post harvest technologies	69	76.67	3
7	Lack of flower setting/incomplete flower setting/discolouring/undesired shape of flower	72	80.00	1

The major constraints faced by cool season vegetable growers were lack of flower setting/incomplete flower setting/discoloring/undesired shape of flower due to varying climatic conditions, followed by lack of knowledge of disease resistant varieties and lack of knowledge about post-harvest technologies.

Development of cool season vegetable cultivation suited implements that are farmer friendly are very much needed and demanded. Farmer participatory development and participatory training between extension unit and farmers must be ensured to improve awareness regarding various practices. The scope for poly house and other modern technologies are wide in this area and they promise better income in future, but lack of knowledge is again a pressing issue and that must be resolved. Setting up input centers near to farm would ensure availability of seed treatment and plant protection chemicals.

4. Conclusion

From the above findings the following conclusions can be drawn in general that majority of the cool season vegetable growers had medium level of adoption of cool season vegetable cultivation technology. Technology need for post-harvest handling as well as value addition is demanded by the growers. From the results obtained it can be observed that there is considerable room for improvement in production and marketing and for scaling up the production through suitable extension interventions. Tailor made strategies tare to be lined up in order to enhance the adoption of cool season vegetable growers towards taking up agriculture as a profitable farming enterprise.

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