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Farmers' Response Towards Technological Interventions Under Assessment and Refinement

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ABSTRACT

Farmers' responses towards technology assessment and refinment were sutdied in five villages of Karge panchayat of Mandar block in Ranchi District of Jharkhand. Results revealed that all the intervened technologies assessed by the farmers' were agro-climatically more suitable, more profitable and more compatible, which contributed to their overall appropriateness in comparison to the corresponding farmers' practices. Overall reaction of the respondents on intervened technologies was found to be positive in terms of selected attributes *i.e.* socio-cultural compatibility, compatibility with existing farming system components, divisibility of technology, simplicity, compatibility with internal resources of the households, element of risk involved and visibility except their easy availability in the local markets. Majority of the farmers' felt difficulties in accepting the recommended technologies as such in respect of most of the intervened technologies and preferred the refined technologies which were suitable in their agro-ecological situation and socio-economic condition.

Keywords : Farmers' response, technological interventions, farming system, assessment and refinement

INTRODUCTION

Technology assessment and refinement is an intermediate process between formal research and formal extension. It is carried out in the framework of farmers' participatory approaches which starts and ends with farmers' perspectives. Farmers' perspective refers to on how farmers view the technologies in their circumstances. Farmers' responses towards different technological interventions were studied in terms of farmers' reaction/feedback, changes in cognitive domain, farm womens' involvement and availability of inputs *etc.* for the accepted treatments which were likely to be practiced in future.

METHODOLOGY

The study was undertaken in the five purposively selected villages of Karge panchayat in Mandar Block, namely , Karge, Rege, Hatma, Chatwal and Keskani-kumbatoli in Ranchi district of Jharkhand. The rationale behind selection of the villages was their adoption under Institution - Village Linkage Programme of Birsa Agricultural University Center, where demonstrations and on-farm trials (OFT) were conducted for assessment and refinement of technologies.

Research design and sampling procedure

A combination of research designs, namely analytical and ex- post - facto was used in the study. Three categories of respondents, namely demonstrating farmers, experimenting farmers and participating farmers were selected from each of the five adopted villages related to demonstrations, verification trials and on-farm trials of important vegetables, *viz.*, tomato, cauliflower, capsicum and brinjal. Rationale behind selecting these vegetable crops were their predominance in the study villages. All the demonstrating farmers (60) experimenting farmers (60) and 25 per cent of the participating farmers from the selected villages (150) constituted the sample for data collection. Thus, the sample size consisted of 270 respondents. Selection of demonstrating farmers and experimenting farmers was done on the basis of purposive sampling technique and selection of participating farmers was done on the basis of simple random sampling technique.

Assessment of intervened technologies

According to Ganadharappa (1996), assessment of technology refers to its relative advantage, compatibility, complexity, feasibility/divisibility and absorbability/ communicability. As it is clear from the above statement there are many criteria to assess a technology. But considering better understanding, four criteria, namely (1) agro-climatic suitability (2) operational feasibility (3) profitability and (4) compatibility were decided for assessment of the technologies by the respondents.

Agroclimatic suitability: It refers to that aspect of technology which results to enrich the environment or at least does not harm the existing agro-ecological condition.

Operational feasibility: It refers to how far agricultural technologies be it seed, fertilizer, pesticides or improved

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machinery suits the infrastructural situation of the end users and how far they bring that technology into practice.

Profitability: It refers to how much a technology adds to income level of farmers. It was measured in terms of return per rupee of investment.

Compatibility: It refers to the extent to which a technology is adaptable to existing socio-cultural and existing farming conditions of the farmers.

The four criteria were used for assessment of the intervened technologies on the basis of farmers' perceptions and experiences.

In the present study perception refers to "the mental perceptional evaluation by a respondent about designed attribute of the intervened technology". The perception on attributes of intervened technologies by the respondents was measured with the help of a well structured and pretested schedule developed for this purpose. The responses for intervened technologies on selected attributes, namely, agro-climatic suitability, operational feasibility, profitability and compatibility were obtained on a 3 - point rating scale. The points on the rating scale were most suitable, moderately suitable and least suitable quantified by giving scores of 3,2 and 1 respectively. The weighted mean scores of the individual technologies were then calculated. The technologies which were assigned mean scores above 2.5, between 2.5 to 1.5 and below 1.5 were considered to be most appropriate, moderately appropriate and least appropriate respectively.

Measurement of farmer's reaction towards intervened technologies

In the present study, reaction has been defined as the process of organising and interpreting the data on the results of intervened technologies through OFT, VT and demonstrations conducted on vegetable production technologies. The farmers' reaction to experimented and demonstrated technologies was measured with the help of scoring system developed on a 5-point rating scale on 8 selected attributes of the technologies i.e. socio-cultural compatibility, compatibility with existing farming system components, divisibility of technology, simplicity, compatibility with internal resources of the household, availability of related input/material, element of risk involved and visibility with their scores given in parantheses as most suitable (5), suitable (4), moderately suitable (3), least suitable (2) and unsuitable (1). Then the overall reaction was calculated and classified into three categories i.e. negative (< 2.5), neutral (2.5-3.5) and positive (> 3.5).

Matrix ranking of differents treatment under On-Farm Trials

Refinement refers to the validation, integration and reinnovation of agricultural technology at the local level or situation by involving all the partners of agricultural development (Gangadharappa, 1996). In order to seek the farmers' preference on refinement of the technology interventions based upon the on-farm trials conducted under the programme, matrix scoring technique of PRA was employed for eliciting the farmers' preference of technology interventions. Ranking was done by the farmers for each of the treatments of OFT on the basis of farmer's own criteria. Matrix ranking was accomplished through farmer/participatory approach..

RESULTS AND DISCUSSION

The major findings have been discussed in the following sub-heads:

i. Farmers' assessment of the interventions
ii. Farmers' reaction to different treatments of on farm trials and verification trials.
iii. Matrix ranking of different treatments under on-farm trails.

Farmers' assessment of the interventions

a. Assessment of wilt resistant varieties of tomato

The data on farmers' assessment of wilt resistant varieties of tomato have been presented in Table 1.

Table 1: Frequency distribution of respondents according to their assessment of wilt resistant varieties of tomato in small production systems

n=20

Technology Criteria	T_1=Farmers practice (Use of wilt susceptible varieties i.e. punjab keshri, punjab chohara)	T_2=Wilt resistant variety (Arka alok under farmers management)	T_3=Wilt resistant variety (Arka abha under farmer management)	Value of X^2
Agro-climatic suitability				
Most suitable	4 (20)	14 (70.00)	15 (75.00)	
Moderately suitable	3 (15)	3 (15.00)	14 !20.00)	9.66*
Least suitable	13 (65)	3 (15.00)	1 (5.00)	
Total	20 (100)	20 (100.00)	20 (100.00)	
Mean score	1.55	2.55	2.70	
Operational feasibility				
Most suitable	5 (25.00)	12 (60.00)	14 (70.00)	
Moderately suitable	4 (20.00)	6 (30.00)	4 (20.00)	10.22*
Least suitable	11 (55.00)	2 (10.00)	2 (10.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	**1.70**	**2,50**	**2.60**	
Profitability				
Most suitable	2 (10.00)	17 (58.00)	18 (90.00)	
Moderately suitable	3 (15.00)	3 (15.00)	2 (10.00)	10.68*
Least suitable	15 (75.00)	-	-	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	**1.35**	**2.85**	**2.90**	
Compatibility				
Most suitable	4 (20.00)	13 (65.00)	16 (80.00)	
Moderately suitable	6 (30.00)	4 (20.00)	2 (10.00)	25.02*
Least suitable	10 (50.00)	3 (15.00)	2 (10.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	**1.70**	**2.50**	**2.70**	
Overall appropriateness				
Most appropriate	4 (20.00)	14 (70.00)	16 (80.00)	
Moderately appropriate	4 (20.00)	4 (20.00)	3 (15.00)	24.02*
Least appropriate	12 (60.00)	2 (10.00)	1 (5.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	**1.60**	**2.60**	**2.75**	

The data presented in Table 1 showed that wilt resistant tomato varieties namly Arka Alok and Arka Abha were found to be agro-climatically more suitable, operationally more feasible, more profitable, more compatible and most appropriate compared to farmers' variety which was susceptible to wilt. However, Arka Abha variety was rated as the most appropriate variety by 80 per cent of the respondents and Arka Alok as the most appropriate by 70 per cent of the respondents.

b. Assessment of soil treatment technology

The data on assessment of technology related to soil treatment for wilt management i.e. soil application of bleaching powder and lindane dust have been presented in Table 2. As it appears from Table 2, application of 6 kg bleaching powder + 12 kg lindane dust/ha before 15 days of transplanting was found to be agro-climatically more suitable, operationally feasible, profitable, compatible and appropriate than the farmers' practice (Traditional method of land preparation without soil treatment).

Table 2: Frequency distribution of respondents according to their assessment of soil treatment technology for controlling wilt in tomato under well-endowed production systems

n=20

Technology Criteria	T_1 = Farmers' practice (Traditional method of land preparation without soil treatment	T_2 = Soil application of 6 kg bleaching powder + 12 kg lindane dust/ha before 15 days of transplanting	Value of X^2
Agro-climatic suitability			
Most suitable	4 (20.00)	15 (75.00)	
Moderately suitable	3 (15.00)	4 (20.00)	9.66*
Least suitable	13 (65.00)	1 (5.00)	
Total	20 (100)	20 (100)	
Mean score	1.55	2.70	
Operational feasibility			
Most suitable	3 (15.00)	16 (80.00)	
Moderately suitable	2 (10.00)	2 (10.00)	12.38*
Least suitable	15 (75.00)	2 (10.00)	
Total	20 (100)	20 (100)	
Mean score	1.40	2.70	
Profitability			
Most suitable	3 (15.00)	18 (90.00)	
Moderately suitable	2 (10.00)	2 (10.00)	13.64*
Least suitable	15 (75.00)	-	
Total	20 (100)	20 (100)	
Mean score	1.40	2.90	
Compatibility			
Most suitable	6 (30.00)	14 (70.00)	
Moderately suitable	4 (20.00)	5 (25.00)	11.74*
Least suitable	10 (100.00)	1 (5.00)	
Total	20 (100)	20 (100)	
Mean score	1.80	2.70	
Overall appropriateness			
Most appropriate	4 (20.00)	15 (75.00)	
Moderately appropriate	3 (15.00)	4 (20.00)	11.79*
Least appropriate	13 (65.00)	1 (5.00)	
Total	20 (100)	20 (100)	
Mean score	1.55	2.70	

Figures in parentheses indicate percentages Significant at 5% level

c. Assessment of wilt resistant varieties of brinjal

The data on farmers' assessment of wilt resistant varieties of brinjal have been presented in Table 3. It showed that brinjal wilt resistant varieties *viz*. Swarnshree and Swarnmani intervened under the treatments (T_2 & T_3) were found to be significantly superior to T_1 *i.e.* farmers' practice in relation to agro-climatic suitability, operational feasibility, profitability, compatibility and appropriateness. However, in case of variety Swarnshree majority of the respondents (70%) observed it to be agro-climatically most suitable, operationally most feasible (80%), most profitable (65%), most compatible (75%) and most appropriate (70) in their own management practices. However, Swarnmani variety under farmers' management was perceived to be climatically most suitable (80%), operationally most feasible (60%), most profitable (70%) and most compatible (80%) accounting to most appropriate (75).

Table 3: Frequency distribution of respondents according to their assessment of wilt resistant varieties of brinjal in small production systems

n=20

Technology Criteria	T_1 = Farmers' practice (use of traditional varieties)	T_2 = Wilt resistant (variety Swarnshree) under farmers management condition.	T_3 = Wilt resistant variety (Swarnmani) under farmers management	Value of X^2
Agro-climatic suitability				
Most suitable	6 (30.00)	14 (70.00)	16 (80.00)	
Moderately suitable	7 (35.00)	4 (20.00)	2 (10.00)	13.34*
Least suitable	7 (35.00)	2 (10.00)	2 (10.00)	
Total	20 (100)	20 (100.00)	20 (100.00)	
Mean score	1.95	2.60	2.70	
Operational feasibility				
Most suitable	7 (35.00)	16 (80.00)	12 (60.00)	
Moderately suitable	4 (20.00)	3 (15.00)	6 (30.00)	14.64*
Least suitable	9 (45.00)	1 (5.00)	2 (10.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.90	2.75	2.50	
Profitability				
Most suitable	4 (20.00)	13 (65.00)	14 (70.00)	
Moderately suitable	3 (15.00)	5 (25.00)	6 (30.00)	11.61*
Least suitable	13 (65.00)	2 (10.00)	-	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.55	2.55	2.70	
Compatibility				
Most suitable	4 (20.00)	15 (75.00)	16 (80.00)	
Moderately suitable	2 (10.00)	3 (15.00)	3 (15.00)	12.74*
Least suitable	14 (70.00)	2 (10.00)	1 (5.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.50	2.65	2.75	
Overall appropriateness				
Most appropriate	5 (25.00)	14 (70.00)	15 (75.00)	
Moderately appropriate	4 (20.00)	4 (20.00)	4 (20.00)	13.78*
Least appropriate	11 (55.00)	2 (10.00)	1 (5.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.70	2.60	2.70	

d. Assessment of micronutrient management in cauliflower

The major contention of this experiment was to assess and refine the micro-nutrient management practices in cauliflower. Thus an attempt was made to seek the

farmers' opinion on appropriate dose and method of application of micro-nutrients in cauliflower. The data have been presented in Table 4

Table 4: Frequency distribution of respondents according to their assessment of technology related to micro-nutrient management in cauliflower under small production systems

n=20

Technology Criteria	T_1 = Farmers' practice application of NPK 60:40:20 kg/ha without any micronutrient	T_2 = Spraying of 2 gram borax /litre of water thrice during different growth states	T_3 = Spraying of 2 gram borax/litre of water + 1 gram molybdenum/litre of water thrice during different growth stage	Value of X^2
Agro-climatic suitability				
Most suitable	3 (15.00)	12 (60.00)	14 (70.00)	
Moderately suitable	2 (10.00)	7 (35.00)	6 (30.00)	18.35*
Least suitable	15 (75.00)	1 (5.00)	-	
Total	20 (100)	20 (100.00)	20 (100.00)	
Mean score	1.40	2.55	2.70	
Operational feasibility				
Most suitable	2 (10.00)	13 (65.00)	12 (60.00)	
Moderately suitable	4 (20.00)	6 (30.00)	7 (35.00)	11.36*
Least suitable	14 (70.00)	1 (5.00)	2 (10.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.40	2.60	2.60	
Profitability				
Most suitable	2 (10.00)	18 (90.00)	17 (85.00)	
Moderately suitable	3 (15.00)	2 (10.00)	2 (10.00)	12.53*
Least suitable	15 (75.00)	-	1 (5.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.35	2.90	2.80	
Compatibility				
Most suitable	2 (10.00)	14 (70.00)	16 (80.00)	
Moderately suitable	3 (15.00)	4 (20.00)	3 (15.00)	12.68*
Least suitable	15 (75.00)	2 (10.00)	1 (5.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.35	2.60	2.75	
Overall appropriateness				
Most appropriate	2 (10.00)	14 (70.00)	15 (75.00)	
Moderately appropriate	3 (15.00)	5 (25.00)	4 (20.00)	16.80*
Least appropriate	15 (75.00)	1 (5.00)	1 (5.00)	
Total	20 (100)	20 (100)	20 (!00)	
Mean score	1.35	2.65	2.70	

As it is shown in Table 4, the two practices *i.e.* spraying of 2 gram borax/litre of water thrice during different growth stages and spraying of 2 gram borax/litre of water with 1 gram molybdenum/litre of water thrice during different growth stages, were found to be significantly agro-climatically more suitable, operationally feasible, profitable, compatible and appropriate than the farmers' practice *i.e.* application of only NPK 60:40:20 kg/ha.

However, application of 2 gram borax along with 1 gram of molybdenum/litre of water thrice during different growth stages was rated to be more appropriate than application of only 2 gram borax/litre of water.

Micro-nutrient management through soil application of boron and molybdenum in cauliflower was got assessed by the farmers on which data are presented in Table 5

Table 5: Frequency distribution of respondents according to their assessment of technology related to micro-nutrient management (soil application of boron and molybdenum) in cauliflower under well-endowed small production systems

n=20

Technology Criteria	T_1 = Farmers' practice (Application of NPK) without any micro nutrient	T_2 = Soil application of 8 kg borax + 1.5 kg molybdenum/ha during land preparation	Value of X^2
Agro-climatic suitability			
Most suitable	2 (10.00)	16 (80.00)	
Moderately suitable	3 (15.00)	3 (15.00)	20.64*
Least suitable	15 (75.00)	1 (5.00)	
Total	20 (100)	20 (100.00)	
Mean score	1.35	2.75	
Operational feasibility			
Most suitable	3 (15.00)	14 (70.00)	
Moderately suitable	6 (30.00)	3 (15.00)	18.96*
Least suitable	11 (55.00)	3 (15.00)	
Total	20 (100)	20 (100)	
Mean score	1.35	2.75	
Profitability			
Most suitable	2 (10.00)	17 (85.00)	
Moderately suitable	4 (20.00)	2 (10.00)	19.94*
Least suitable	14 (70.00)	1 (5.00)	
Total	20 (100)	20 (100)	
Mean score	1.40	2.80	
Compatibility			
Most suitable	3 (15.00)	16 (80.00)	
Moderately suitable	5 (25.00)	3 (15.00)	17.78*
Least suitable	12 (60.00)	1 (5.00)	
Total	20 (100)	20 (100)	
Mean score	1.55	2.75	
Overall appropriateness			
Most appropriate	2 (10.00)	16 (80.00)	
Moderately appropriate	4 (20.00)	3 (15.00)	1991*
Least appropriate	13 (65.00)	1 (5.00)	
Total	20 (100)	20 (100)	
Mean score	1.45	2.75	

Figures in parentheses indicate percentages
* Significant at 5% level

The data presented in Table 5 showed that soil application of 8 kg borax + 1.5 kg molybdenum/ha during land preparation was found to be significantly superior in all respects *i.e.* agro-climatic suitability, operational feasibility, profitability, compatibility and overall appropriateness compared to the farmers' nutrient management (application of NPK 60:40:20 kg/ha without any micronutrient)

e. Assessment of improved variety of capsicum

The data on farmers' assessment of capsicum variety california wonder have been presented in Table 6.

Table 6 showed that the improved variety of capsicum *i.e.* california wonder was found to be significantly agro-climatically more suitable, operationally feasible, profitable, compatible and appropriate compared to the farmers' variety that is locally available.

Table 6: Frequency distribution of respondents according to their assessment of improved variety of capsicum under small production systems

n=20

Technology Criteria	T_1 = Farmers practice (use of traditional varieties)	T_2 = Improved variety (California wonder) under farmers management	Value of X^2
Agro-climatic suitability			
Most suitable	6 (30.00)	14 (70.00)	
Moderately suitable	4 (20.00)	4 (20.00)	17.74*
Least suitable	10 (50.00)	2 (10.00)	
Total	20 (100)	20 (100.00)	
Mean score	1.80	2.60	
Operational feasibility			
Most suitable	4 (20.00)	13 (65.00)	
Moderately suitable	5 (25.00)	4 (20.00)	14.61*
Least suitable	10 (50.00)	3 (15.00)	
Total	20 (100)	20 (100)	
Mean score	1.65	2.50	
Profitability			
Most suitable	4 (20.00)	17 (85.00)	
Moderately suitable	5 (25.00)	3 (15.00)	16.71*
Least suitable	11 (55.00)	-	
Total	20 (100)	20 (100)	
Mean score	1.65	2.85	
Compatibility			
Most suitable	8 (40.00)	13 (65.00)	
Moderately suitable	3 (15.00)	5 (25.00)	18.72*
Least suitable	9 (45.00)	2 (10.00)	
Total	20 (100)	20 (100)	
Mean score	1.95	2.55	
Overall appropriateness			
Most appropriate	6 (30.00)	14 (70.00)	
Moderately appropriate	4 (20.00)	4 (20.00)	19.72*
Least appropriate	10 (50.00)	2 (10.00)	
Total	20 (100)	20 (100)	
Mean score	1.80	2.60	

Figures in parentheses indicate percentages * Significant at 5% level

ii. Farmers' reaction towards intervened technologies

Farmers reaction were elicited through scoring technique of PRA in the framework of focused group interview. The data are presented in Table 7.

The data Presented in Table 7 showed that wilt resistant tomato varieties Arka Alok and Arka Abha under farmers' management condition were rated positive in terms of socio-cultural compatibility, compatibility with farming system components, simplicity, compatibility with internal resources of households, element of risk involved and visibility. However, the two varieties in terms of divisibility and easy availability were negatively rated. The farmers' varieties Punjab Keshri and Punjab Chohara were rated positive in terms of compatibility with internal resources of households and easy availability of the seed. The intervention related to soil treatment for wilt management in tomato *i.e.* soil application of 6 kg bleaching powder + 12 kg lindane dust/ha before 15 days of transplanting farmers' reactions were positive in respect of socio-cultural compatibility, compatibility with farming system components, divisibility of technology, simplicity, compatibility with internal resources of households and visibility of the technology. Easy availability of bleaching powder and lindane dust in local markets and element of risk involved were rated negative by the respondents.

Table 7: Farmers' reaction towards intervened technologies on selected attributes

Crop	Treatment	Farmers' reaction (n=270)								
		Socio-cultural compatibility	Compatibility with exiting farming system components	Divisibility of technology	Simplicity	Compatibility with internal resource of house hold	Easy availability of related input material	Element of risk involved	Visibility	Overall reaction
Tomato	T_1 = Farmers practice (use of wilt susceptible varieties i.e. punjab keshri & punjab chohara	3.00	1.50	1.50	2.00	4.00	3.50	1.00	2.00	2.31
	T_2 = Wilt resistant variety (Arka alok) under farmers management)	4.50	4.00	1.50	4.50	4.00	1.50	1.50	3.50	3.12
	T_3 = Wilt resistant variety (Arka abha) under farmers management	4.00	4.00	1.50	4.50	4.00	1.50	4.00	4.00	3.44
Tomato	T_1 = Farmers practice (Traditional method of land preparation without soil treatment)	1.50	1.00	3.00	2.50	2.00	3.50	1.50	2.50	2.19
	T_2 = Soil application of 6 kg bleaching powder + 12 kg Lindane dust/ha before 15 days of transplanting	3.62	4.50	4.50	4.00	4.00	1.50	2.00	3.50	3.45
Brinjal	T_1 = Farmers practice (use of traditional varieties)	2.50	3.00	3.50	4.00	4.00	3.00	1.50	1.50	2.88
	T_2 = Wilt resistant variety (Swarnshree) under farmers' management condition	4.50	4.50	1.50	4.00	4.00	1.50	4.50	3.50	3.50
	T_3 = Wilt resistant variety (Swarnmani) under farmer management condition	4.00	3.50	1.0	4.00	4.00	1.50	4.50	3.50	3.25
Cauliflower	T_1 = Farmers' practice Application of NPK 60:40:20 kg/ha without any micronutrient)	2.00	1.50	2.50	3.00	4.00	2.00	1.00	2.00	2.25
	T_2 = Spraying of 2 gram borax/litre of water thrice during different growth stages	4.00	4.50	2.55	4.50	4.50	4.50	4.00	3.00	3.93
	T_3 = Spraying of 2 gram borax/litre of water + 1 gram molybdenum/litre of water thrice during different growth stages	4.00	4.50	2.60	4.00	4.50	1.0	4.50	4.50	3.70
Cauliflower	T_1 = Farmers practice (application of NPK without any micronutrient)	3.00	2.50	1.50	2.50	3.00	1.50	1.00	3.00	2.25
	T_2 = Soil application of 8 kg borax + 1.5 kg molybdenum/ha during land preparation	4.50	4.50	1.50	4.00	4.00	1.50	4.00	3.50	3.44
Cpasicum	T_1 = Farmers practice (use of traditional varieties)	2.50	3.00	1.00	2.50	1.00	1.00	1.00	3.00	1.89
	T_2 = Improved variety (california wonder) under farmers management	4.50	4.00	1.00	4.00	4.50	1.00	4.50	3.50	3.38

Overall score reflecting the degree of favourable, neutral and unfavourable reaction to the related technology interventions (Negative <2.5, Neutral = 2.6 to 3.5, Positive > 3.5

In respect of wilt resistant varieties of brinjal, Table 8 further shows that Swarnshree and Swarnmani were rated positive in all respects excepting divisibility and easy availability of related inputs in local market. The technology interventions related to micronutrient management in cauliflower *i.e.* spraying of 2 gram borax/litre of water during different growth stages and spraying of 2 gram borax/litre of water with 1 gram molybdenum of /litre of water thrice during different growth stages were rated positive in terms of socio-cultural compatibility, simplicity, compatibility with internal resources of households, element of risk involved and divisibility of the technology interventions. Both technologies were rated negative in terms of easy availability of borax and molybdenum in local market. The soil application of 8 kg borax mixed with 1.5 kg of molybdenum/ha during land preparation was rated positive in all respects except easy availability of borax and molybdenum in local market. The improved variety of capsicum (California Wonder) was rated positive in all respects except divisibility and easy availability of its seeds in local market.

iii. Matrix ranking of different treatments under on farm trials

Matrix ranking of different treatments under on farm trails conducted in small production systems was got done to seek the farmers' response on refined technology. Matrix scoring technique of PRA was employed for eliciting the farmers' preference of technology interventions. The results have been depicted in Table 8.

Table 8: Response of farmers towards overall suitability of treatments under various on-farm trials conducted for technology refinement under small production systems

Name of Technology	Treatment	Overall suitability	Rank
Wilt resistant variety of Tomato (Arka Alok & Arka Abha)	T_1 = Farmers practice (Use of wilt susceptible variety punjab keshri, punjab chora)	xx	III
	T_2 = Wilt resistant variety (Arka alok under farmers management)	xxx	II
	T_3 = Wilt resistant variety (Arka abha under farmer management)	xxxx	I
Wilt resistant variety of brinjal (Swarnashree & Swarnmani)	T_1 = Farmers' practice (use of traditional varieties)	xx	III
	T_2 = Wilt resistant (variety Swarnshree) under farmers management condition	xxxx	I
	T_3 = Wilt resistant variety (Swarnmani) under farmers management	xxx	II
➢ Spraying of 2 gram borax thrice in different growth size of cauliflower	T_1 = Farmers' practice application of NPK (60:40:20) ha without any micronutrient	xx	III
	T_2 = Spraying of 2 gram borax /litre of water thrice during different growth states	xxxx	II
➢ Spraying of 2 gram borex+1gram molybdenum trice in different growth stage of cauliflower	T_2 = Spraying of 2 gram borax/litre of water + 1 gram molybdenum/litre of water thrice during different growth stage	xxxxx	I

The data presented in Table 8 showed that wilt resistant variety of tomato (Arka Abha) under farmers' management condition was most preferred choice of the farmers. In respect of the technology related to wilt resistant varieties of brinjal under farmers' management condition, the most preferred choice was wilt resistant variety (Swarnshree). In respect of technology related to micronutrient management in cauliflower the most preferred choice was spraying of 2 gram borax/litre of water mixed with 1 gram molybdenum/litre of water thrice during different growth stages.

CONCLUSION

The findings presented in the preceding paragraphs indicated that all the intervened technologies assessed by the farmers were found to be agro-climatically more suitable, operationally more feasible, more profitable and more compatible contributing to their overall appropriateness in comparison to the corresponding farmers' practices.

When overall reaction of the respondents was taken into account, the findings revealed that all the technology interventions were found to be positive in terms of the selected attributes except their easy availability in the local markets.

The findings also revealed that the farmers felt difficulties in adoption in most of the intervened technologies and preferred the refined technologies which were suitable in their farming systems as well as socio-economic condition and bio-physical situations.

REFERENCE

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