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Knowledge *vis a vis* Adoption of Agrithorti System in Doda District of Jammu & Kashmir State

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ABSTRACT

Raising the purchasing power of people in rural areas has largely to be achieved through agricultural sector, in which horticultural crops have to play an important role. Adoption of agri-horti system and the factors associated need to be viewed in totality which calls for the empirical evidences regarding the knowledge and adoption levels of farmers to achieve the goal of enhanced productivity and profitability. The present study conducted in Doda district of J&K state highlights that the farmers were having low to medium level of knowledge and adoption of various areas of agri-horti farming system. The study indicated that the extent of adoption of most of the scientific practices was moderate to low. The study indicated that the adoption of scientific practices in agri-horti system were associated with respective knowledge levels of farmers. Enhancement of knowledge of farmers through appropriate methods of scientific principles with description and explanation of processes and causal relationships will go a long way in addressing the problem of low adoption of scientific packages in agri-horti system.

Key words: Agri horti system, adoption, knowledge level, scientific practices, field crops, horticultural crops.

INTRODUCTION

India enjoys an enviable position in the horticultural map of the world as almost all types of fruits, vegetables, spices and condiments are grown in the country. India is the second largest producer of fruits, with a production of 57.6 million tonnes / year. The country contributes about 8.6% to the total world's fruit production. The J&K state alone covers about 133.7 thousand ha under apple with a production of 1332.8 thousand tonnes (NHB, 2009). The state of Jammu and Kashmir occupies an area of 76.30 thousand hectare under horticultural crops. To improve the domestic marketing and promote export of major commercial fruit crops-apples and walnuts, the J&K State has been declared as “Agri Export Zone for Apples and Walnuts”. Development of high yielding varieties and hybrids of fruit crops have contributed to phenomenal growth of 11.2 per cent. However, the per capita per day availability of fruits in India comes to be 60 grams only, which is less than the minimum dietary requirement of 85 gm. This all demands immediate attention to increase the production and productivity of fruits. The geographical distribution coupled with land possession patterns hardly allows farmers for commercial orchards. The Majority of the fruit and vegetable growers comprise of small and marginal farmers of the state. The State Department of Horticulture has organized the fruit growers' cooperative marketing societies at various places. Besides credit, it facilities all the required technical guidance regarding scientific packing, grading, consumer's preference *etc.* to the members of these societies. As many as 258 fruit growers' cooperative societies with about 20,000 members have been registered.

The demand for increased production through agri-horti system calls for the human resources development and other similar programmes. The adoption pattern of agri-horti system and the factors associated need to be viewed in totality to achieve the goal of enhanced productivity and profitability. Technology adoption pattern cannot be uniform and will vary from crop to crop and even from region to region. Certain degree of flexibility in research planning and research communication is therefore obvious. Development of both short term and long term strategies for modernizing agri-horti system will depend largely on the farmers' preparedness to accept and adopt the technologies. The forecasting of the technological interventions for increased production through agri-horti farming system calls for the empirical evidences regarding the adoption pattern of farmers. The presented study has been conducted with specific objectives to assess the knowledge and adoption of recommended farm practices in agri horti system.

METHODOLOGY

The Doda district was purposively selected because of its importance in temperate fruit production in the state of J&K both in terms of area and production. Although the major share of area and production of temperate fruit is contributed from Kashmir valley, but the Doda district of Jammu province of J&K state with similar agro-climatic condition holds vast potential for production of high value

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fruit crop. Multistage sampling technique was followed for the purpose of the study. Doda district comprises of eight community development blocks, out of which four blocks were selected, in which most of the villages had undertaken agri-hoti system of farming.

These blocks were; Bhaderwah, Thatri, Bhala and Marmath. From each selected block, four villages were selected randomly. The selection of the respondents in the villages was made on population proportionate basis there by making a sample size of 120 respondents from all 16 selected villages.

A pretested interview schedule was utilized to collect the data from the sampled farmers. It consisted of two separate parts devoted to field crops and horticultural crops.

The major practices related to field crops were included in the first part whereas, items related to horticulture crops were induced in the second part. The collected data were subjected to analysis and draw inferences.

RESULTS AND DISCUSSION

Knowledge of farmers regarding scientific cultivation of field crops and horticultural crops : Pursuant to Table 1, it is clear that weighted mean knowledge score of major farm practices of field crops like plant protection components, agronomic practices and manures and fertilizers were found to be at a medium level whereas, the seed components were observed ton be at its lowest ebb. Only the harvesting and storage components were highly known to farmers of agri-horti system.

The results direct to conclude that higher the technicality involved in farm practices, low was the observed knowledge of the respondents regarding scientific cultivation of field crops.

The data presented in Table 2 showed that the weighted mean knowledge score of major farm practices like selection of site, soil parameters, layout and land preparation, selection of fruit plants, intercultural operations, water management and nutrient management were known at a medium level whereas, the harvesting and storage component was highly known to the farmers.

The farm practices related to the plant protection component was known at a low level.

Table 1: Practice wise knowledge of the farmers regarding scientific cultivation of field crops

n=120

Farm Practice	Not Known	Partially Known	Fully Known	Weighted Mean Knowledge	Level of knowledge
Seed Components				0.96	Low
Variety Selection	25	68	27	1.02	
Seed rate	12	68	40	1.23	
Seed treatment	56	52	12	0.63	
Agronomic Components				1.36	Medium
Land preparation	4	55	61	1.48	
Time of sowing	2	36	82	1.67	
Spacing	41	55	24	0.86	
Method of sowing	10	25	85	1.63	
Weed control	22	41	57	1.29	
Water management	23	25	72	1.41	
Thinning and earthing	35	25	60	1.21	
Manure and Fertilizers components				1.42	Medium
Use of FYM and compost	12	15	93	1.68	
Doses of chemical fertilizers	45	26	49	1.03	
Method of application of fertilizers	12	30	78	1.55	
Plant protection components				1.05	Medium
Insect pest identification	25	56	39	1.12	
Control measure of insects	39	65	16	0.81	
Diseases identification	25	55	40	1.13	
Control measure of diseases	23	56	41	1.15	
Harvesting and storage				1.64	High
Harvesting time	2	5	113	1.93	
Threshing methods	9	30	81	1.60	
Storage	25	24	71	1.38	

Table 2: Practice-wise knowledge the farmers regarding scientific cultivation fruit crops

n=120

Farm Practice	Not Known	Partially Known	Fully Known	Weighted Mean Knowledge	Level of knowledge
Selection of site	12	56	52	1.33	Medium
Soil parameters				1.26	Medium
Soil depth	10	55	55	1.38	
Soil type	29	67	24	0.96	
Soil fertility	24	32	64	1.33	
Hard pan	2	15	103	1.84	
Soil sampling and testing	58	29	33	0.79	
Layout and land preparation				1.50	Medium
Layout plan	0	29	91	1.76	
System of planting	36	48	36	1.00	
Digging of pits	0	32	88	1.73	
Filling of pits	2	45	73	1.59	
Planting distance	18	69	33	1.13	
Planting time/season	0	22	98	1.82	
Selection of fruit plants				1.25	Medium
Selection of cultivar	29	71	20	0.93	
Selection of pollinizers	28	77	15	0.89	
Ratio of cultivar and pollinizers	39	65	16	0.81	
Criteria for selection of cultivars	25	43	52	1.23	
Age of plant	9	12	99	1.75	
Size of plant	9	12	99	1.75	
Source of supply	22	32	66	1.37	
Care of plant on arrival	21	45	54	1.28	
Health of plant	22	45	53	1.26	

Planting					1.48	Medium
Method of planting		0	56	64	1.53	
Post planting management		2	65	53	1.43	
Intercultural operations					1.44	Medium
Preparation of plant basin		3	25	92	1.74	
Training		12	28	80	1.57	
Pruning		0	28	92	1.77	
Field sanitation		25	69	26	1.01	
White washing of plants		12	32	76	1.53	
Thatching		11	43	66	1.46	
Hoeing		0	33	87	1.73	
Rearing of bee colonies		32	31	57	1.21	
Top working		32	65	23	0.93	
Nutrient management					1.36	Medium
Fertilizer Doses						
FYM	Non Bearing	0	56	64	1.53	
	Bearing	0	56	64	1.53	
Urea	Non Bearing	4	86	30	1.22	
	Bearing	4	25	91	1.73	
DAP	Non Bearing	4	75	41	1.31	
	Bearing	4	38	78	1.62	
MOP	Non Bearing	54	58	8	0.62	
	Bearing	54	58	8	0.62	
Time of application		2	22	96	1.78	
Method of application		5	32	83	1.65	
Water management					1.51	Medium
Time of irrigation		0	25	95	1.79	
Method of irrigation		0	56	64	1.53	
Total number of irrigations in a year		25	45	50	1.21	
Plant protection components					1.15	Low
Disease management					*1.08*	
Apple scab	Identification	2	55	63	1.51	
	Control measure	85	23	12	0.39	
Powdery mildew	Identification	12	56	52	1.33	
	Control measure	29	55	36	1.06	
Collor rot	Identification	29	45	46	1.14	
	Control measure	36	65	19	0.86	
Canker	Identification	25	31	64	1.33	
	Control measure	39	41	40	1.01	
Insect pest management					*1.13*	
San jose scale	Identification	23	65	32	1.08	
	Control measure	56	35	29	0.78	
Stem borer	Identification	12	34	74	1.52	
	Control measure	33	68	19	0.88	
Mites	Identification	2	65	53	1.43	
	Control measure	21	33	66	1.38	
Sooty blotch	Identification	36	55	29	0.94	
	Control measure	32	55	33	1.01	
Physiological management					*1.25*	
June drop	Identification	12	35	73	1.51	
	Control measure	33	23	64	1.26	
Alternate bearing	Identification	4	12	104	1.83	
	Control measure	35	65	20	0.88	
Pre harvesting drop	Identification	32	35	53	1.18	
	Control measure	35	65	20	0.88	
Harvesting and marketing					1.55	High
Stage of harvesting		0	25	95	1.79	
Grading		12	65	43	1.26	
Packing		10	23	87	1.64	
Storage		22	36	62	1.33	
Marketing		0	36	84	1.70	

Further, it is clear from Table 2 that the farmers were comparatively knowledgeable in identification of major diseases of apple like scab, powdery mildew, collor rotand canker, but were least knowledgeable for their control measures. Similar trend was observed in case of insect management regarding sooty blotch, mites, stem borerand san jose scale .

The nutrient management aspect although rated as moderately known but the variations in between the farm practices show that the farmers possessed moderately knowledge regarding the nutrient management of bearing plants and non-bearing plants. The knowledge regarding top working of old plants for their rejuvenation was limiting factor in intercultural operations. Regarding selection of plants/propagation material the right selection of pollinizers and their ratio and the selection of cultivars were grey areas of knowledge.

Adoption level of scientific practices in field crops and horticultural crops

The data presented in Table 3 it is clear that most of the respondent(64.2%) belonged to medium adoption level followed by low level (26.6%), whereas only 9.2 per cent fell under high level of adoption.

Table 3: Categorization of respondents on the basis of their level of adoption of scientific package in field crops

n=120

Category	Frequency	Percentage
Low (<26.72A.Q.)	32	26.6
Medium (26.72-46.4A.Q.)	77	64.2
High (> 46.4A.Q.)	11	9.2
Total	120	100

A.Q. is Adoption Quotient

It is evident from Table 4 that the broader areas of farm practices like; manure components and agronomical components were moderately adopted and seed component and plant protection component were adopted at low level, whereas, harvesting component was highly adopted. Most of the respondents fell under medium level of adoption. This may be due to the fact that the land holdings of the farmers are mostly on sloppy areas where the soils are non-responsive to the fertilization. Means of irrigation are limited and the returns are low. Farm practices in case of field crops like seed components and plant protection were adopted less; this may be due to the fact that the high quality seeds and plant protection chemical including pesticide and insecticide are hardly available to the farmers. The land holding is small and less productive and the chemical fertilizers and pesticides increase cost of production. Agronomical component and manure component were medium adopted because of the fact that these two components may require human labour which is available within the family. Mostly FYM was

applied heavily in crops as almost all the farming families' rear sufficient number of animals like cow, ox and sheep leading to the availability of FYM. The chemical fertilizers were being supplied through co-operative societies, though not on time.

Table 4: Practice wise adoption score of scientific package in field crops

n=120

Farm practice	A.Q	Category
Seed Components	21.1	Low
Agronomical components	36.38	Medium
Manure components	32.2	Medium
Plant protection components	23.75	Low
Harvesting components	63.00	High

A.Q. is Adoption Quotient

The resulted in Table 5 indicated that a majority of the respondents (65.0 %) belonged to the medium category of adoption whereas, 21.7 per cent and 13.3 per cent of the respondents fell under low and high adoption category respectively.

Table 5: Categorization of respondents on the basis of their adoption level of scientific practices in horticultural crops

n=120

Category	Frequency	Percentage
Low (<28.31AQ)	26	21.7
Medium (28.31-50.48AQ)	78	65.0
High (>50.48AQ)	16	13.3
Total	120	100

The data presented in Table 6 revealed that practices like 'selection of fruit plants', and 'intercultural operations' were adopted highly. Farm practices like 'water management' and 'planting of fruit plants' were moderately adopted whereas, farm practice like 'selection of site', 'layout and land preparation', 'plant protection measure' and 'nutrient management' was adopted at low level.

Table 6: Practice wise adoption score of scientific package in horticultural crops

n=120

Farm practice	A.Q	Category
Selection of sight	18.6	Low
Soil parameter	18.3	Low
Lay out and land preparation	18.4	Low
Selection of fruit plants	50.9	High
Planting of fruit plants	43	Medium
Intercultural operations	56.25	High
Nutrient management	26.25	Low
Water management	29.83	Medium
Plant protection measures	27.4	Low

A.Q. is Adoption Quotient

The main reason for medium level of adoption may be due to the fact that farmers perceive horticulture crop as an additional source of income and it help in the control of erosion as most of the fields are situated on the hill slope. The horticultural crops once planted manage to provide income for 15-20 years. The state horticulture department has undertaken water shed development programme on a large scale covering a large area where planting material is provided to the farmers free of cost along with barbed wire to fence the orchard. The farm practices like 'selection of site', 'soil parameters', 'layout of orchard', 'land preparation', 'plant protection' and 'nutrient management' were adopted at low level which may be due to lack of resources required to perform such activity.

Practices like planting of fruit plants and water management measures were adopted at medium level as the result of such practices are visible to them. At some of the places people have constructed ponds for rain water harvesting and utilized for the required irrigation of horticultural crops. Selection of fruit plants and intercultural operation were highly adopted as these activities affect the economic value of the fruit and their effect is visible to the farmers. Overall, the sample, technical knowledge level of farmers was co-related to the farmers' adoption level. Similar results have been earlier reported (Kashem andHussain, 1992; Wirasinghe, 1977; Mahaliyanaarchchi, 1996).

CONCLUSION

The results of the study showed that the farmers associated with agri-horti system of farming were having medium level of knowledge regarding the scientific farm practices of field crops as well as horticultural crops. With the transformation from cereals dominated agriculture to cash crops dominated agriculture, it was observed that increasing number of farmers were adjusting and intercropping the cereals with horticultural crops, but the adoption of scientific practices to boost the production and productivity in both field crops as well as horticultural crops was found to be at medium level. The adoption of plant protection measures against the major disease, insects and physiological disorders and adoption of recommendations for appropriate site selection for fruit trees were found very minimal. However, the farmers highly adopted the recommendations of harvesting and storage. On the basis of results or the study it can be concluded that the adoption of scientific practices in agri-horti system were closely associated with respective knowledge of farmers. In order to address the problem of non adoption and low adoption of scientific package in

agri-horti system. There is genuine need for enhancement of knowledge through appropriate methods in easy with supportive understanding of scientific principles with description and explanation of processes and causal relationships. Agri-horti farming system views the farm in a holistic manner and considers interactions (between components and of the components with the environment) in the system which calls for the interdisciplinary involvement of team of scientists who in association with the extension officers continuously interact with the farmers in the identification of the problems and finding appropriate solutions to accelerate agricultural growth and thereby providing leverage for transforming to a prosperous India by strengthening rural economy.

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