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Extent of knowledge level of off-season vegetable cultivation by tribal farmers in Koraput district of Odisha

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ABSTRACT

The study was conducted on “Extent of the knowledge level of off-season vegetable cultivation by tribal farmers in Koraput district of Odisha” to study the socio-economic profile of farmers following off-season vegetable cultivation, analyze the knowledge level of off-season vegetable growers, assess the level of the knowledge level of off-season vegetable growing in the study area and identify constraints in off-season vegetable cultivation and suggestions to overcome these problems. The study was conducted in the Koraput and Semiliguda blocks of Koraput district, Odisha. Both purposive and random sampling procedure was followed for the selection of the district, blocks, Gram panchayats, villages, and respondents. The total sample size of the study was 120. The response was obtained from each respondent in a structured interview schedule which was pretested with 10 % samples other than the respondents of the study area. To augment off-season vegetable production in the state in general and Koraput in particular, the latest proven and viable technology on off-season vegetable production needs to be diffused through various extension activities to accelerate its knowledge level. Simultaneously cold storage and suitable marketing channels are to be developed for quick disposal of their produce and to fetch a remunerative price for their farm produce.

Keywords: Off-season vegetable, tribe, knowledge level, Koraput

INTRODUCTION

Problem Area

In tribal communities, land is not only an economic commodity but also a social commodity that has extra economic, spiritual, and ideological value. From a geo-hydrological point of view, tribal people mostly possess inferior types of land in plateaus, hill slopes, and highlands, plane lands with irrigated facilities are limited. Therefore, a major portion of the tribal lands is characterized by low productivity.

In the context of the tribals of Koraput district, the economy of the region is conditioned mainly by three ecological settings

- The hills have forest cover where tribal practices mainly shift cultivation.
- The hills have almost completely denuded of forest cover where tribals cultivate such hills and foothill lands with whatever soil cover is left.
- The plateau and plains where settled agriculture is practiced. The annual average rainfall of Koraput district is 1528mm with 78 rainy days. The climate is warm and humid with a maximum summer temperature of 34.1⁰c and minimum winter temperature of 7.5⁰c. Thus, the climate is very much conducive for high-value horticulture and off-season vegetable cultivation.

Present production potential of vegetable crops has been decreased under open field condition. Production potential of vegetable can only be improved if the available technology has been effectively transferred to the farmers and its knowledge level by the tribal farmers. As the tribal farmers in Koraput grow vegetables in open condition there is strong need to devise appropriate packages of practice for open field condition so that farmers do not face any difficulty in knowledge level.

Although we are advocating for off-season vegetable cultivation, no systematic study has been taken up so far to ascertain the technological and information need of the tribal farmers and means for widespread knowledge level in production scenario. To bring about a desirable change on farming system, there is need to educate farmers regarding off-season vegetable cultivation.

The great advantage of vegetable cultivation over cereal is that it can be cultivated any time of the year. From experience, it is evident that desired results have not been yielded without considering the socio-economic situation and methods of communication. Tribal people should be developed along the line of their genius and we should avoid imposing anything on them, rather we should try to encourage them in a way linked to their tradition, art, and culture. So, there is a need to develop a calendar to reach and teach tribal farmers about off-season vegetable cultivation.

The present study is an attempt in the direction to assess and analyze the extent of knowledge level, and trends of change in cropping system in the light of need of off-season vegetable cultivation. The result thus expected to be obtained assumes greater importance in the hands of social scientists, agricultural experts, change agents, policymakers, and those who

are concerned with the overall development of the tribal population of the state in general and Koraput in particular.

Socio-economic profile of off-season vegetable growers

There is more than 50 % tribal population of the district in Koraput (Mishra *et al.* 2012). Most farmers have a secondary school level of education in the Navsari district of Gujarat (Gamit *et al.*, 2016). Most vegetable growers are middle-aged in the Indore district (Patel *et al.*, 2016) and most of them are illiterate, have big & joint families, less social participation, localities in nature and education, land holding size, family size, outward orientation, housing pattern, occupation, social participation, ownership right, holding size, savings status, and annual income are significantly correlated with knowledge level behaviour but age, family type, credit status has not significantly correlated with knowledge level behaviour as their knowledge level is generally low (Behera, 2013, Birla *et al.*, 2016). Socio-economic status, caste, ability to coordinate farming activities, and value orientation had a higher direct effect on the entrepreneurial behaviour of vegetable growers of Uttarakhand. Socio-economic status and caste emerged as the most important factors through which higher indirect effects of other factors were channeled (Kumar *et al.*, 2013). Young farmers opt for vegetable cultivation which may be due to its better return as compared to other crops for tribal farmers of North Sikkim and tribal vegetable farmers are less than 10% (Mohanty *et al.*, 2013).

Knowledge level level of off-season vegetable growers

Most growers solely depend on farming (Barik, 2013) and tribal vegetable growers follow the principle as well as the concept of IPM and IDM. They also use local varieties due to taste and cultural practices. So, their knowledge level of cultivation practices of local varieties is higher than HYV and hybrid varieties. Although a shortage of food is there, they produce and market vegetables throughout the year, which improves food security and nutrition of the local community and indirectly helpful to reach SDG 2 (Behera *et al.*, 2013). Growing off-season vegetables has not only improved access to vegetables but also established sustainable livelihoods (Adhikary, 2015) and their knowledge level of new technologies like oyster Mushroom cultivation, vermicomposting, and value addition in cereals, vegetables, and fruits gives a return of Rs. 8000/100 beds in 45 days, Rs. 10000/pit/annum and Rs. 6500/quintal/annum respectively (Acharya *et al.*, 2015). The diversification through hybrid vegetable crops and the inclusion of backyard poultry and goat rearing enhance income, provide off-farm employment, and reduce migration (Singh, 2015). Although having prior knowledge, farmers are unable to use the resources like subsidies and schemes due to the lack of information. So, the most recent, tested, and practical off-season vegetable production

technology, coupled with government supplies and promotion programmes, must be disseminated through a variety of extension activities to hasten acceptance and increase off-season vegetable production (Rout *et. al.*, 2023).

Identification of constraints and suggestions in off-season vegetable cultivation

Socio-personal, socio-economic, organizational, and technological component constraints were higher among small vegetable farmers compared to marginal, medium, and large farmers (Mohanty *et al.*, 2013). Major constraints in off-season vegetable cultivation are lack of technical knowledge, high fluctuation in market price, transportation cost, labour shortage, and high wages (Kumar, 2004, Kale *et al.*, 2018). Non-availability of disease-resistant varieties and minimum fixed support price by the Government for local mandi are also major problems for vegetable growers (Singh *et al.*, 2008). Problems are also being faced due to some extension-related lacking such as lack of effective supervision, irregular visits of extension workers, lack of timely technical advice, poor co-ordination among grass-root level workers, non-availability of production inputs timely and low credibility of Extension workers in order as the constraints in the vegetable farming system (Samantaray *et al.*, 2009, Mohanty *et al.*, 2013) which create difficulties for vegetable farmers at their knowledge level of using sophisticated technologies, marketing and storage facilities and incentives provided by different organizations (Kumar *et al.*, 2010).

Although the public sector is not in a position to deliver all the services to the farmers on its own (Singh, 2012), its ignorance and negligence of the government affect the farmers badly (Behera *et al.*, 2013). So, the need for vegetable clusters, and awareness of market intelligence using information and communication technology (ICT) tools are very much essential for the farmers (Swaminathan *et al.*, 2014).

RESEARCH METHODOLOGY

The present investigation employs an Ex-post-facto survey research design by adopting both purposive and random sampling methods while selecting the state, district, Block, gram panchayat, village, and respondents. It is conducted in Semiliguda and Koraput block of Koraput district of Odisha. A total of 120 numbers of respondents were selected for the investigation.

Three villages from Rajput gram panchayat, one village from Dalaiguda gram panchayat, and two villages from Mahadeiput gram panchayat are selected randomly from Semiliguda and Koraput block of Odisha. In consultation with line department officials, KVK scientists, and NGO personnel working in those areas, list of off-season vegetable-growing farmers is

obtained. After the pilot study, preparation of the interview schedule, and pre-testing, primary data from the respondents and secondary data from the official records and reports in respect of the district, block, gram panchayat, and other publications, journals, research papers, and previous studies are collected. The constraints in production of off-season vegetable crops in the study area elicited through open-end questions. Based on the responses obtained from the vegetable growers, frequency, percentage, mean, and rank orders are calculated for each constraint faced by them and standard deviation is measured.

RESULT AND DISCUSSION

Socio-economic profile of farmers following off-season vegetable growers

1. Age

It was evident from Table 1 that most of the respondents (64.17%) were in the middle age group, followed by 21.66% in young age and 14.17% in the old age group category. From the above findings, it was observed that most of the farmers belong to the middle age group category and are within active age of life.

Usually, middle-aged farmers were enthusiastic and had more work efficiency than younger and older ones. Normally possess more physical vigour and can shoulder more responsibility than younger. The findings are to the most extent confirmative with the findings of Patel et al. (2016).

2. Education

Data compiled in Table 2 revealed that most of the respondents (48.33%) were primary school educated followed by 22.50% high school, 20.00% illiterate, 7.50% middle school, whereas only (1.67%) were college educated. The reason attributed was that farmers believe that getting a good education will help to prosper better in the future.

3. Family type

A perusal of Table 3 revealed that the majority (64.84%) of the respondents had a nuclear family and the rest 34.16% had a joint family. The tribal community of the study area prefers separate living from parents after marriage, hence nuclear families are prevalent.

4. Family size

Compilation of data from Table 4 revealed that, majority of the respondent (65.00%) had large family with more than four family members and rest (35.00%) had small family consisting of up to four family members. The reason attributed was that as stated above sons prefer to be separate living after marriage.

5. Housing pattern

Table 5 implied that the majority (81.67%) of respondents had semi-pucca houses, followed by 12.50% tiled and the rest 5.83% pucca houses. This showed a positive indication of social status in the community.

6. Landholding

From Table 6, it could be observed that the majority (61.67%) possess medium land holding followed by 49.16% small land holding and 18.33% large land holding. Moreover, 5.00% in marginal land holding and none (0.00%) of them were in the landless category. This could be attributed to the inheritance of land from their ancestors who might have transferred from generation to generation.

7. Source of income (Occupation)

Data in Table 7 revealed that the majority (82.50%) had agriculture + off- Season vegetable cultivation as income source whereas (17.50%) had additional subsidiary business to supplement the family income. It might be due to the continuation of their ancestral occupation, less scope of employment in non-agricultural sector in the vicinity and meeting the growing family obligation.

8. Annual family income

A perusal of Table 8 revealed that the majority (48.33%) in medium annual income category, closely followed by 43.33% in the high and rest (8.34%) low average annual income category. The probable reason for varied income levels might be due to their size of landholding and subsidiary occupation undertaken by them. The findings are to the most extent confirmative with the finding of Ajotikar (2006) found that 55.00% of the respondents had medium annual income. However, 22.67% and 22.33% of the respondents have low and high annual income respectively.

9. Farm power possession

From Table 9, it was evident that (100.00%) respondents had bullocks and intercultural tools, the majority 95.53% had cow, 80.83% possessed sprayer, 74.17% iron plough, and 38.83% pump set respectively. None of the respondents (0.00%) had a tractor/power tiller and MB plough. It implies that the farmers were having inherited low-cost farm assets and gradually acquired the tendency of mechanized farming.

10. Vegetable production technology information Sources.

Table 10 revealed that personal sources of information preferred/ used by the majority (mean score=3.65) ranked 1st. This is due to the proximity of these sources to the respondent. The other sources were meetings/training, demonstration/trial, exposure visits, farm fair / exhibition, and formal sources with mean scores of 3.5, 3.43, 3.40, 3.30, 2.50 and ranked 2nd,

3rd, 4th, 5th, and 6th respectively. However, the social and print media were least preferred (mean value =1.92 and 1.77) ranked 7th, and 8th, and had less impact on off-season vegetable growers of the study area. The reason might be due to low education level and less competence in the use of technology.

11. Extent of participation

It could be observed from Table 11 that participation of respondents in the training programme ranked first with (mean score =2.66), followed by demonstration, field day/ krishi mela, field visit, participation in exhibition, discussion meeting, conducted farmers tours, with mean score 2.40, 2.26, 2.25, 2.24, 2.13 and ranked 2nd, 3rd, 4th, 5th, 6th respectively in order of preference. However, exposure visits got the lowest rank (mean score =1.75), owing to the non-availability of visit facilities to other progressive sites either by KVK, any other government organizations, or NGOs. Hence, through more exposure visits to different farms, the practical knowledge and knowledge level level of the respondents can be enhanced.

12. Cosmo politeness

A perusal of Table 12 implied that a nearby town was the most frequented place (mean score =2.77) and ranked first. The reason might be that they must sell their vegetables and make daily wage earnings. The other institutions visited include gram panchayat, LAMPS, OUAT/KVK/Agril. office, Block office, PHC, and credit institutions with mean scores of 1.75, 1.55, 1.48, 1.40, 1.12, and 1.10 ranked 2nd, 3rd, 4th, 5th, 6th, and 7th respectively. The least visited place was district HQ (mean score =1.01) ranked 8th. The reason might be the distance from villages and less involvement in government activity.

Knowledge level of off-season vegetable growers

To study the knowledge level, 6 broad aspects were considered.

1. Production aspects

Data in Table 13 revealed that knowledge level of land suitability (mean score = 2.93) ranked 1st due to experience gained through years of vegetable growing. Field preparation, improved HYV and drought-resistant variety, optimum seed rate, the skill of vegetable growing, optimum spacing & appropriate time of sowing/Transplanting with mean scores 2.90, 2.84, 2.83, 2.78, 2.75 ranked 2nd, 3rd, 4th, 5th, 6th respectively. The least adopted was FYM / Compost requirement (mean score = 2.68) ranked 7th. It was due to being the product of self so less concerned.

Again, an attempt has been made to categorize the respondents according to their knowledge level into categories such as low, medium, and high.

2. Management aspects

A perusal of Table 14 revealed crop rotation (mean score = 3.00) ranked 1st. The reason could be farmers change crops every time on the same piece of land. Commercialization of vegetable growing, major disease and control measure, major pest and control measure, timely intercultural operation, water management, major weed and control measure, use of improved farm implement, INM with mean score 2.96, 2.94, 2.93, 2.92; 2.88, 2.85, 2.79, 2.72 ranked 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th respectively. Family labour is involved in production so farmers not realizing the cost of production, hence ranked 10th with (mean score = 2.68)

3. Knowledge level of conservation measures

Table 15 revealed that across the slope ploughing was practised by one and all so (mean score of = 3.00) ranked 1st. followed soil conservation, moisture conservation, mulching, and genome conservation with mean scores of 2.83, 2.76, 2.67, 2.64 ranked 2nd, 3rd, 4th, and 5th respectively.

4. Knowledge level of market and marketing

Perusal of Table 16 revealed that knowledge level of inputs availability place (mean score = 2.87) ranked 1st followed by profit maximization and market information, produce disposal place, marketing channel, post-harvest grading/packing, and storage facility with a mean score of 2.83, 2.73, 1.67, 1.42 and 1.30 ranked 2nd, 3rd, 4th, 5th, and 6th respectively.

5. Knowledge level of training and capacity building

Perusal of Table 17 revealed that discussion meeting (mean score = 2.75) ranked 1st followed by training programme need, acclimatization needs to new venture, exhibition, farmers fair and exposure visit need with a mean score of 2.69, 2.56, 2.54, 2.53 and 2.19 ranked second, third, fourth, fifth and sixth in knowledge level of aspects of training and capacity building respectively.

6. Knowledge level of supportive facts

Data in the Table 18 revealed that support services were adopted less by respondents. Crop insurance (mean score = 1.25) ranked 1st followed by institutional credit/loan facility, Govt. incentive for vegetable cultivation, and Weather related advisory with a mean score of 1.22, 1.00 ranked 2nd and 3rd in knowledge level of aspects of supportive facts respectively.

7. Categorization of respondents based on overall knowledge level

Table 19 indicated that the majority (56.67%) had medium, 22.50% high, and (20.83%) low knowledge levels of aspects of relating supportive facts.

Constraints faced by tribal off-season vegetable growers

1. Social Constraints

Table 20 revealed the rank order of social problems faced by the tribal off-season vegetable growers. The majority opined the problems of the traditional bent of mind (mean score = 2.69) ranked 1st which might be due to less exposure followed by illiteracy & belief in superstition, hesitation of family members, lack of cosmopolitanism, lack of community awareness, low knowledge level by neighbour with mean score 2.35, 2.22, 2.15, 2.11, 2.10 ranked 2nd, 3rd, 4th, 5th, and 6th respectively. Traditional norms of society (mean score = 2.07) ranked 7th due to cosmopolitanism norms being diluted.

2. Economic constraints

It could be observed from Table 21 above that majority reported the problems of higher input cost (mean score = 2.92) ranked 1st. The reason could be that vegetable growers need to spend every time towards purchase of inputs. Poor economic condition, low risk bearing ability and exploitation by private money lenders with mean score 2.90, 2.88 ranked 2nd, 3rd. Non availability of institutional credit (mean score = 2.73) ranked 4th.

3. Production constraints

It was evident from Table 22 that the majority reported a lack of knowledge about more pest & disease infestation and their control (mean score = 2.88) ranked 1st. Grazing by stray cattle, non-availability of inputs at the required time, lack of appropriate irrigation facility, lack of knowledge in the selection of varieties, lack of incentives and support for input, early withdrawal of monsoon, lack of scientific knowledge on vegetable cultivation with mean score 2.73, 2.70, 2.61, 2.59, 2.53, 2.44, 2.38 ranked 2nd, 3rd, 4th, 5th, 6th, 7th, 8th. Lack of soil testing facility (mean score = 2.28) ranked 9th.

4. Technological constraints

Results from Table 23 revealed majority reported high cost of technology (mean score = 2.98) ranked 1st as the poor socio-economic condition of tribals hinders its knowledge level. Labour intensive technology, inadequate demonstration, inadequate follow-up services, lack of location-specific recommendation, deficiency in technical know-how with mean scores 2.96, 2.75, 2.62, 2.60, 2.54 ranked 2nd, 3rd, 4th, 5th, 6th. Inadequate availability of mass media sources of information at the village level (mean score = 2.50) ranked 7th.

5. Organizational constraints

A perusal of Table 24 revealed among farmers, the degree of information sharing was less leading to poor coordination and cooperation among farmers which ranked 1st (mean score = 2.71). Low credibility of private seed companies, non-availability of input in time, lack of market intelligence, poor coordination and cooperation among extension workers with mean

scores 2.60, 2.59, 2.53, 2.48 ranked 2nd, 3rd, 4th, 5th, and timely. Ineffective supervision by extension personnel (mean score = 2.36) ranked 6th.

4.4.6. Categorization of respondents based on overall constraints

It was evident from Table 25 that the majority (39.17%) have a medium level of constraints followed by 30.83% high and (30.00%) low levels of constraints on off-season vegetable growing.

CONCLUSION

A large proportion of the respondents belonged to the middle age group, had received college and graduate education, had agriculture as a primary occupation, had a medium size of land holding, medium income group, with medium extension participation, more cosmopolitaness to nearest town and city, more media exposure by friends and relatives, had medium farm power, medium degree of risk orientation, medium innovation proneness and medium scientific orientation. Medium level of knowledge and knowledge level had a positive significant relationship with their socio-economic profile. Most of the respondents expressed that no cold storage facility was available in the area, most of the respondents expressed that they sold directly to the consumers in the village market, most of the respondents expressed that they sold their produce to a particular agency because they have no time to engage themselves in selling directly to the consumers and most of the respondents expressed that they sold their produce because of the nearness of market. Among the suggestions majority suggested that Cold storage/Warehouse facilities should be available to respondents followed by Vegetable production and marketing-related information through mobile SMS should be made among respondents. To augment vegetable production in the state, the new proven and viable technology on vegetable production should be diffused through various extension activities to accelerate its knowledge level. Simultaneously cold storage and suitable marketing channels are to be developed for quick disposal of their produce and fetch a remunerative price for their produce.

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Authors' contributions

DSR conducted field visits and data collection. AD reviewed the final manuscript. GWB was involved in the drafting of the manuscript. PB analyzed the data. AKP performed the design of the research analysis.

Conflict of interest

The authors declare that they have no competing interests.

Ethical issues

None.

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Tables

Table 1: Distribution of respondents according to age (n=120)

11.5	Category	Frequency (f)	Percentage (%)
1	Young	26	21.66
2	Middle	77	64.17
3	Old	17	14.17
Total		120	100

Table 2: Distribution of responses according to education (n=120)

SI. No.	Category	Frequency (f)	Percentage (%)
1.	Illiterate	24	20.00
2.	Primary	58	48.33
3.	Middle	9	7.50
4.	High school	27	22.50
5.	College	2	1.67
Total		120	100

Table 3: Distribution of respondent according to family type (n=120)

SI. No.	Category	Frequency (f)	Percentage (%)
1	Nuclear	79	65.84
2	Joint	41	34.16
Total		120	100

Table 4: Distribution of family according to family size (n=120)

SI. No.	Category	Frequency (f)	Percentage (%)
1	Small (up to 4 members)	42	35.00
2	Large (>4 members)	78	65.00
Total		120	100

Table 5: Distribution of respondents according to housing pattern (n=120)

SI. No.	Category	Frequency (f)	Percentage (%)
1.	Tiled	15	12.50
2.	Semi pucca	98	81.67
3.	Pucca	7	5.83
Total		120	100

Table 6: Distribution of respondents according to land holding size (n=120)

Sl.No.	Category	Frequency (f)	Percentage (%)
1.	Landless	0	0.00
2.	Marginal	6	5.00
3.	Small	18	15.00
4.	Medium	74	61.67
5.	Large	22	18.33
Total		120	100

Table 7: Distribution of respondents according to source of income (n=120)

Sl.No.	Category	Frequency (f)	Percentage (%)
1.	Agriculture + off- Season vegetable	99	82.50
2.	Agriculture + off- Season vegetable + Subsidiary	21	17.50
Total		120	100

Table 8: Distribution of respondents according to annual family income (n=120)

Category	Frequency (f)	Percentage (%)
Low	10	8.34
Medium	58	48.33
High	52	43.33

Total	120	100
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Table 9: Distribution of respondents according to farm power possession (n=120)

Sl. No.	Types of farm power	Frequency (f)	Percentage (%)
1.	Bullock	120	100
2.	Cow	115	95.53
3.	Desi plough	120	100
4.	Iron plough	89	74.17
5.	M.B plough	79	0.00
6.	Sprayer	97	80.83
7.	Intercultural tool	120	100
8.	Pump set	37	38.83
9.	Tractor/power tiller	0	0.00

Table 10: Distribution of respondents according to information source (n=120)

Sl.No.	Media	Regularly		Sometimes		Rarely		Never		Mean score	Rank
		F	%	f	%	f	%	f	%		
1.	Personal sources (Friends/relatives/ Progressive farmer)	84	70	31	25.83	5	4.1	0	0	3.65	I
2.	Formal sources (Krishak mitra, VLW/BTM/ATM, Agriculture officer, Input dealers, OUAT/ KVK)	23	19.16	40	33.33	31	25.83	26	21.66	2.50	VI
3.	Demonstration/trial	67	55.83	42	35	7	5.83	4	3.3	3.43	III
4.	Social Media (facebook, whats app, etc.)	9	7.5	21	17.50	42	35	48	40	1.92	VII
5.	Exposure visit	77	64.16	22	18.33	14	11.66	7	5.83	3.40	IV
6.	Farm fair/exhibition	71	59.16	26	21.66	11	9.16	12	10	3.30	V

7.	Meetings/Trainings	74	61.66	36	30	7	5.83	3	2.50	3.50	II
8.	Print media (Newspapers, Farm literature)	4	3.3	16	13.33	49	40.83	51	42.50	1.77	VIII

Table 11: Distribution of respondents according to extent of participation (n=120)

Sl. No	Extension activities	Extent of participation						Mean score	Rank
		Often		Sometimes		Never			
		f	%	f	%	f	%		
1	Training programme	83	69.16	34	28.33	03	2.50	2.66	I
2	Demonstration	67	55.83	34	28.33	19	15.83	2.40	II
3	Krishi mela	64	53.33	24	20	32	26.66	2.26	III
4	Field visit	59	49.16	33	27.50	28	23.33	2.25	IV
5	Discussion meeting	36	30	63	52.50	22	18.33	2.13	VI
6	Farmers tours	11	9.16	69	57.50	40	33.33	1.75	VII
7	Exhibition Participation	51	42.50	47	39.16	22	18.33	2.24	V

Table 12: Distribution of respondents according to cosmopolitanness (n=120)

Sl. No	Institution	Daily		Weekly		Fortnightly		Never		Mean	Rank
		f	%	f	%	f	%	f	%		
a.	Panchayat	0	0	13	10.83	64	53.33	43	35.83	1.75	II

b.	LAMPS	4	3.33	2 5	20.8 3	5	4.16	86	71.6 6	1.55	III
c.	Block office	0	0	2	1.66	48	40.0 0	70	58.3 3	1.40	V
d.	District HQ	0	0	0	0.00	2	1.66	11 8	98.3 3	1.01	VIII
e.	Credit institutions	0	0	4	3.33	4	3.33	11 2	93.3 3	1.10	VII
f.	Nearest town	1 7	14.1 6	76	63.3 3	10	8.33	17	14.1 6	2.77	I
g.	PHC	0	0	4	3.33	7	5.83	10 9	89.1 6	1.12	VI
h.	OUAT/KVK/Agri l. Office	0	0	9	7.5	40	33.3 3	71	59.1 6	1.48	IV

Table 13: Knowledge level of basics of production in off-season vegetable growing (n =120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	F	%		
I.	Switch over from subsistence to commercial vegetable growing	102	85.00	15	12.50	3	2.50	2.83	IV
II.	Skill of Vegetable growing	101	84.17	12	10.00	7	5.83	2.78	V
III.	Crop Production technology								

a.	FYM / Compost requirement	87	72.50	28	23.33	5	4.17	2.68	VII
b.	Field Preparation	110	91.67	8	6.67	2	1.67	2.90	II
c.	Improved, HYV and draught draught-resistant variety	108	90.00	5	4.17	7	5.83	2.84	III
d.	Land suitability	111	92.50	9	7.50	0	0.00	2.93	I
e.	Optimum Seed rate	106	88.33	7	5.83	7	5.83	2.83	IV
f.	Optimum Spacing	102	85.00	6	5.00	12	10.00	2.75	VI
g.	Appropriate time of sowing/Transplanting	101	84.17	8	6.67	11	9.17	2.75	VI

Table 14: Knowledge level of management intervention in off-season vegetable growing (n=120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Commercialization of Vegetable growing	115	95.80	5	04.17	0	00.00	2.96	II
b.	Crop rotation	120	100	0	00.00	0	00.00	3.00	I
c.	Timely intercultural operation	111	92.50	7	05.83	3	02.50	2.92	V
d.	Major pest and control measure	113	94.17	5	04.17	2	01.67	2.93	IV
e.	Major disease and control measure	115	95.83	3	02.50	2	01.67	2.94	III
f.	Major weed and control measure	108	90.00	6	05.00	6	05.00	2.85	VII
g.	INM	98	81.67	10	08.33	12	10.00	2.72	IX
h.	Water management	110	91.67	6	05.00	4	03.33	2.88	VI
i.	Cost of Production	95	79.17	12	10.00	13	10.83	2.68	X
j.	Use of improved farm implements	106	88.33	3	02.50	11	09.17	2.79	VIII

Table 15: Knowledge level of conservation measures in off-season vegetable cultivation (n =120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	F	%		
a.	Soil Conservation	106	88.33	8	6.67	6	5.00	2.83	II
b.	Moisture Conservation	98	81.67	15	12.50	7	5.83	2.76	III
c.	Mulching	94	78.33	12	10.00	14	11.67	2.67	IV
d.	Genome Conservation	92	76.67	13	10.83	15	12.50	2.64	V
e.	Across the slope ploughing	120	100	0	00.00	0	0.00	3.00	I

Table 16: Knowledge level of market and marketing in off-season vegetable cultivation (n =120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Inputs availability Place	106	88.33	6	5.00	8	6.67	2.87	I
b.	Produce disposal place	96	80.00	8	6.67	16	13.33	2.73	III
c.	Market Information	25	20.83	85	70.83	10	8.33	2.83	II
d.	Marketing channel	10	8.33	30	25.00	80	66.67	1.67	IV
e.	Post harvest grading, packing	15	12.50	10	8.33	95	79.17	1.42	V
f.	Storage Facility	8	6.67	10	8.33	102	85.00	1.30	VI
g.	Profit Maximization	90	75.00	20	16.67	10	8.33	2.83	II

Table 17: Knowledge level of the programme on skill enhancement and exposure need (n=120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Training programme need	90	75.00	23	19.17	7	5.83	2.69	II
b.	Exposure Visit need	37	30.83	69	57.50	14	11.67	2.19	VI
c.	Acclimatization needs to new venture	83	69.17	27	22.50	4	3.33	2.56	III
d.	Farmer fair	69	57.50	46	38.33	5	4.17	2.53	V
e.	Exhibition	73	60.83	39	32.50	8	6.67	2.54	IV
f.	Discussion meeting	97	80.83	16	13.33	7	5.83	2.75	I

Table 18: Knowledge level of supportive facts/ services in off-season vegetable growing (n =120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Crop insurance	15	12.5	0	0.00	105	87.5	1.25	I
b.	Govt. incentive for vegetable cultivation	0	0.00	0	0.00	120	100	1.00	III
c.	Institutional credit / loan facility	13	10.83	0	0.00	107	89.17	1.22	II
d.	Weather related advisory	0		0	0.00	120	100	1.00	III

Table 19: Category of respondents based on overall knowledge level of off-season vegetable growing (n =120)

Sl. No	Category	Frequency (f)	Percentage (%)
1.0	Low knowledge level < (Mean - 1/2 SD)	25	20.83
2.0	Medium knowledge level + (Mean + 1/2 SD)	68	56.67

	-		
3.0	High knowledge level > (Mean + 1/2 SD)	27	22.50

Mean= 2.50 S.D.= 0.10

Table 20: Distribution of respondents according to social constraints (n =120)

Sl. No.	Statement	Fully agree		Partially agree		Disagree		Mean	Rank
		f	%	f	%	f	%		
A.	Social problems								
1.	Traditional bent of mind.	95	79.17	20	16.67	5	4.17	2.69	I
2.	Hesitation of family members	65	54.17	31	25.83	24	20.00	2.22	III
3.	Illiterate& believe in Superstition	75	62.50	23	19.17	22	18.33	2.35	II
4.	Low knowledge level by neighbour.	45	37.50	65	54.17	10	8.33	2.10	VI
5.	Lack of cosmopolitaness.	60	50.00	33	27.50	27	22.50	2.15	IV
6.	Traditional norms of society	47	39.17	56	46.67	17	14.17	2.07	VII
7.	Lack of community awareness	58	48.33	33	27.50	29	24.17	2.11	V

Table 21: Distribution of respondents according to economic constraints (n =120)

Sl. No.	Statement	Fully agree		Partially agree		Disagree		Mean	Rank
		f	%	F	%	f	%		
B.	Economic problems								
1.	High cost of hybrid seed, fertilizer, pesticide, and labour	110	91.67	10	8.33	0	00.00	2.92	I
2.	Poor economic condition of tribal farmers	108	90.00	12	10.00	0	00.00	2.90	II

3.	Non-availability of institutional credit.	98	81.67	11	09.17	11	09.17	2.73	IV
4.	Low risk-bearing ability of tribal farmers.	106	88.33	14	11.67	0	00.00	2.88	III
5.	Exploitation by private money lenders.	105	87.50	15	12.50	0	00.00	2.88	III

Table 22: Distribution of respondents according to production constraints (n =120)

Sl. No.	Statement	Fully agree		Partially agree		Disagree		Mean	Rank
		f	%	f	%	f	%		
1.	No incentives and support for vegetable crop input	69	57.50	45	37.50	6	05.00	2.53	VI
2.	Lack of scientific knowledge about off-season vegetable growing.	70	58.33	25	20.83	25	20.83	2.38	VIII
3.	Lack of Knowledge about selection of off-season variety	80	66.67	31	25.83	9	07.50	2.59	V
4.	Non-availability of inputs at the required time	94	78.33	16	13.33	10	08.33	2.70	III
5.	Lack of soil testing facility	60	50.00	33	27.50	27	22.50	2.28	IX
6.	Lack of knowledge about control of various diseases and pest	106	88.33	14	11.67	0	00.00	2.88	I
7.	Early withdrawal of monsoon	68	56.67	37	30.83	15	12.50	2.44	VII
8.	More pest & disease infestation	105	87.50	15	12.50	0	00.00	2.88	I
9.	Grazing by stray cattle	97	80.83	14	11.67	9	07.50	2.73	II
10	Lack of appropriate irrigation facility	78	65.00	37	30.83	5	04.17	2.61	IV

Table 23: Distribution of respondents according to technological constraints (n=120)

Sl. No.	Statement	Fully agree		Partially agree		Disagree		Mean	Rank
		f	%	f	%	f	%		
D.	Technological problems								
1.	Inadequate demonstration of the latest off-season vegetable varieties.	98	81.67	15	12.50	7	05.83	2.75	III
2.	Inadequate follow-up services.	87	72.50	22	18.33	11	09.17	2.62	IV
3.	Lack of location-specific result-oriented recommendation.	91	75.83	13	10.83	16	13.33	2.60	V
4.	Deficiency in technical know-how.	85	70.83	18	15.00	17	14.17	2.54	VI
5.	Inadequate availability of mass media sources of information at the village level.	86	71.67	12	10.00	22	18.33	2.50	VII
6.	High cost of technology	118	98.33	2	01.67	0	00.00	2.98	I
7.	Labour intensive technology	115	95.83	5	04.17	0	00.00	2.96	II

Table 24: Distribution of respondents according to organizational constraints (n =120)

Sl. No.	Statement	Fully agree		Partially agree		Disagree		Mean	Rank
		f	%	f	%	f	%		
E.	Organizational problems								
1.	Poor coordination and cooperation among farmers.	95	97.17	15	12.50	10	08.33	2.71	I
2.	Low credibility of private seed companies.	88	73.33	16	13.33	16	13.33	2.60	II
3.	Non-availability of production input in time.	85	70.83	21	17.50	14	11.67	2.59	III

4.	Timely and ineffective supervision by extension personnel	60	50.00	43	35.83	17	14.17	2.36	VI
5.	Poor co-ordination and cooperation among grass root level extension workers	65	54.17	47	39.17	8	06.67	2.48	V
6.	Lack of market intelligence	75	62.50	37	28.33	8	09.17	.25 3	IV

Table 25: Category of respondents based on overall constraints in off-season vegetable growing (n =120)

Sl. No	Category	Frequency (f)	Percentage (%)
1.0	Low constraints < (Mean - 1/2 SD)	36	30.00
2.0	Medium constraints + (Mean + 1/2 SD)	47	39.17
3.0	High constraints > (Mean + 1/2 SD)	37	30.83

Mean= 2.63 S.D = 0.11