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Research Article

ADOPTION OF CAULIFLOWER (BRASSICA OLERACEA.VAR. BOTRYTIS) CULTIVATION PRACTICES BY THE FARMERS OF DIGLIPUR TEHSIL OF NORTH ANDAMAN

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Abstract: The farmers of N & M Andaman district especially from Diglipur tehsil practice cauliflower cultivation on a large scale for supply to other parts of Andaman and Nicobar islands and to generate income during *rabi* season from rice fallow lands for their livelihood. However, the productivity of cauliflower crop is less than mainland farmers mainly due to poor knowledge of scientific cultivation practices by farmers. Thus, the present study was conducted to understand the knowledge level of cauliflower growers in achieving optimum productivity in Diglipur tehsil. In this study, 120 respondents were selected from eight villages. The results showed that only 20 per cent of young age farmers are associated with farming and majority of farmers are middle aged (55%).It was found majority (47%) of farmer's earns medium annual income and their education level is very poor (47% illiteracy). The study also revealed that the cauliflower farmers possess medium level (46%) knowledge in cauliflower cultivation practices. The results showed that the farmers possess fair and good level of knowledge in seasonal and soil requirement, varietal selection, seed rate, spacing, FYM and fertilizer application on the other hand they their level of knowledge is poor in pest and disease management, precision farming techniques, use of weedicides, bio pesticides and post harvest handling. Even though fair knowledge about marketing, due to lack of storage and transportation facility majority farmers sells their produce at local market. The correlation analysis of farmer's socio-economic factors with level of Knowledge revealed that knowledge of respondents increases with the increase in their education and income. Thus, it can be observed from this study that age, education and income influences much on motivation for learning and knowledge level of farmers. There is a need for educating the farmers through mass media training and demonstration will help the farmers in learning and adopting new technologies, which intern help the farming community to increase productivity level and farming income on sustainable basis.

Keywords: Adoption, Cabbage, Diglipur, Technologies, cauliflower

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Introduction

India is the second largest producer of vegetables and contributes 14 percent to world vegetable production. In India vegetables are grown in an area of 9.6 million ha with an annual production of 166 million ton, and the average productivity is 17.4 ton/ha [1]. The vegetables are useful in combating the nutritional deficiency in our growing population. Vegetables serve as a good source of nutrients, dietary fibre, vitamins, and phyto-chemicals. Cultivation of vegetables ensures higher income to the farmers in a short span with a low capital investment. Unlike other parts of India, the tropical ecosystem of the A&N Islands is very unique with high rainfall, extremely humid climate, and undulating terrain, which pose greater challenges for agriculturists and technocrats. The total geographical area of Andaman and Nicobar Islands is 8249 sq km of which 85 percent area is covered under forest. Major crops grown in this Island are Paddy, Coconut, Spices, Fruits, and vegetables [2]. Among the three districts of Andaman and Nicobar Islands, North and middle Andaman is an important district wherein good farming is practiced in an area of 7538 ha. Among three tehsils of the district, Diglipur tehsil has major share of plain land where majority of farmers practice cauliflower cultivation for the main income during *rabi* season in rice fallow lands left after the harvest of *kharif* season paddy crop. The practice of cauliflower cultivation during *rabi* season in paddy land present sufficient opportunities to prepare field for next year rice crop and provide additional income, and increase the supply of cultivated land. Moreover, the second culture practices control pest especially the rice stem borer in subsequent next culture rice cultivation[3]. Amongst the vegetables, Cauliflower is well suited under island condition due to its short duration, and adaptability in slight acidic soil [4]. The Cauliflower (*Brassica oleraceae*. Var. Botrytis) is an important cool season vegetable grown in Diglipur Tehsil and most preferred vegetable by the consumers of North Andaman Islands. Further, the crop can be grown successfully in rice fallow lands with available moisture. As the cultivation of paddy is considered uneconomical in this island, it is practiced only for meeting the house hold demand by majority of farmers. Thus, the practice of planting cauliflower after rice harvest is justified economically as the cash crop has overall maximum profit curbing effect of rice yield. However, the vegetable is attacked by number of fungal bacterial, viral, insect and pests causing huge damage to crop and ultimately high economic loss to farmers. The major constraints for the Cauliflower cultivation in North Andaman Island are lack of irrigation facility during summer months(as rainwater is the only source of water available in the area), non/timely availability of quality seed and other inputs, and poor knowledge of farmers about nutrition and pest management practices. Further as the population density is low in the island (49 persons/sq.km.) demand of farm produce during glut period goes down and marketing of the produce become a major constraint. Port Blair is the capital of Andaman & Nicobar Islands where in Islands 60% population are living and is 300 kms away from Diglipur.

Lack of infrastructure facilities like cold storage and poor transportation facilities, deprive farmers to send their produce to distant markets like Port Blair and receive correct price for the produce. In mainland states, the experience, knowledge and attitude of farmers has played crucial role in transforming the shape of agriculture. Studies in rain fed areas of Telangana state showed significant difference in knowledge level between beneficiaries and non-beneficiaries for intervention on Good agricultural practices (GAP) [5]. However, it has been noticed that technological, economic, institutional, and human specific factors are important for adoption of GAP by farmers [6]. Keeping in view of this, the following study was under taken with the objective to assess the knowledge level of farmers related to crop production practices, integrated nutrient management (INM), integrated pest management (IPM)and also to study the constraints in the production and marketing of vegetables.

Table-1 Socio economic profile of Cauliflower Growers

Profile Characters	Classification	Respondents(N=120)	
		Frequency	Percentage
Age	Young (less than 30 years)	24	20.00
	Middle (31-55 years)	66	55.00
	Old (more than 56 years)	30	25.00
Education level	Illiterate	54	45.00
	Primary	39	32.50
	Secondary	15	12.50
	Graduate and above	12	10.00
Annual income	Low income (Up to Rs 50,000)	23	19.16
	Medium income (Rs50,001-Rs 1,00,000)	56	46.66
	High income (more than Rs1,00,001)	41	34.16
Income from Vegetable Cultivation	Low income (Up to Rs 25,000)	19	15.83
	Medium income (Rs 25,001-Rs 50,000)	59	49.16
	High income (more than Rs 50,001)	42	35.00

Table-3 Overall classification of Knowledge level of respondents towards basic agricultural practices

Knowledge level of respondents	Classification	
	Frequency	Percentage
No knowledge	38	31.66
Less Knowledge	55	45.83
Good knowledge	27	22.50
Total	120	100.00

Table-4 Correlation of socio economic status with Knowledge level of respondents

Socio economic parameter	Knowledge Correlation coefficient "r"
Age	0.861306*
Education	0.358404*
Annual income	0.55989*
Income from Vegetable	0.531444*

*significant at 5% level of significance using t test

Methodology

The study was conducted in the year 2017-18 in Diglipur Tehsil of North and Middle Andaman district. In this tehsil eight village representing major vegetable growing belt was selected in consultation with local line departments. A total of 120 farmers were selected randomly for the study representing 15 farmers from each village. For the study data was collected using pre-tested structural schedule through personal interview method. The data was analyzed and tabulated using frequency and percentage. During the collection of data, preliminary information regarding socio economic status, method of irrigation, important enterprises of farming, and annual income from different enterprises were collected. The knowledge of farmers was measured using three point scales. The knowledge level was assumed using different parameters. To assess the knowledge level of vegetable grower's information about market demand, seasonal requirement, knowledge about improved varieties/ hybrids seed and their cost, precision farming techniques like nursery preparation, mulching, drip irrigation were collected. Further the information about farmer's knowledge on INM and IPM practices were enquired. The farmer's knowledge levels in post harvest management practices were also collected. The knowledge was evaluated in terms no knowledge, less knowledge and good knowledge by assigning the scores of0, 1 & 2 respectively as practiced by similar researchers[7]. Each farmer knowledge was calculated by adding the scores of 26 dimensions. In addition to this the information on age, education, annual income and income from vegetable were also collected and analyzed during the study.

Results and Discussion

In this study, the majority of respondents were in the age group of 31-55 years (55%). It was observed that only 20 percent of youth (age < 30 years) are engaged in agriculture. This suggests less association/preference of youth population towards agricultural occupation. The education level of respondents showed that 45 percent farmers are illiterate and only 12.5 percent farmers studied up to secondary level. It was found that 32 percent of farmers have primary level of education on the other hand only 12 percent completed the graduation. As education contributes much for gaining knowledge so the lower knowledge levels were noticed[8]. The [Table-1] shows that vegetable cultivation contributes major proportion of income (47%) of farmers in their total annual income. The annual income of the majority farmers is categorised in medium income group (47 %), whereas 19 percent respondents fall under low income group, and 34 percent are under high income level. As the vegetable cultivation contributes around 50% of annual income of the farmers as paddy (sole crop during *Kharif*) grown is not suitable for export and thus purely utilised for self consumption, hence contribution of paddy towards family income is low. Thus the farmers are solely dependent on vegetable cultivation during *Rabi*-summer season for their family income. The better crop yields can be obtained through adoption of latest scientific technologies and good crop production practices. As shown in [Table-2], knowledge levels of respondents were analysedconsidering26 parameters. Majority of farmers were found to possess medium level of knowledge about seasonal requirement (51%), and suitable soil requirement for the crops (48%), and many farmers possess good knowledge in these aspects as this is practiced by them since long period. For growing a successful crop, seed variety, and quality plays a vital role, the study shows that 62 percent farmers do not possess sufficient knowledge about availability of pest and disease resistance varieties/ hybrids, which is very much essential to minimize the crop loss as well as reduces the cost of production through minimising the requirement of plant protection chemicals, and achieving desired yields, and income. This may be due to non-availability of good quality seeds and awareness of the farmers in the Island as the farmers are still dependent on agricultural department for the supply of seeds and the private sector sellers are very less. The majority of farmers possess fair knowledge about seed quality (51.66%), seed rate (60%), seed cost (56.66 %), nursery management (50.83%), spacing (59.16%) and land preparation (53.33%) aspects. This knowledge is gained by the farmers as they are cultivating these crops for past many years. The land preparation practices have been standardized long back and the farmers had well adopted these practices. In order to achieve higher productivity precision farming techniques like drip irrigation, mulching and fertigation should be adopted in vegetable cultivation as practiced by the farmers of mainland [9]. It was found that 88 percent of respondents do not have any knowledge/awareness about these practices, resulting in average productivity far below the mainland growers. Recent studies on Cauliflower cultivation highlight the need of micronutrients such as Mo at 30 and 45 µg/l in combination with Mg at 0.50 and 0.75% for good yield [10]. In the present study, it was observed that majority of farmers were well aware of practices like manure (FYM) application (50%), fertilizer application (56.66%) on the other hand only 30 % possess good knowledge about the use of micronutrient and bio fertilizers. Thus, the farmers failed to achieve desired productivity levels due to improper

Table-2 Knowledge level of respondents about basic agricultural practices

SN	Cultivation Practices	Level of Knowledge					
		No knowledge		Less knowledge		Good knowledge	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Seasons	12	10.00	62	51.66	46	38.33
2	Soil type	14	11.66	58	48.33	48	40.00
3	Varieties	38	31.66	63	52.50	19	15.83
4	Resistant varieties	74	61.66	32	26.66	14	11.66
5	Seed quality	47	39.16	62	51.66	11	9.16
6	Seed rate	34	28.33	72	60.00	14	11.66
7	Seed Cost	22	18.33	68	56.66	30	25.00
8	Nursery management	24	20	61	50.83	35	29.16
9	Spacing	12	10	71	59.16	37	30.83
10	Land preparation	18	15	64	53.33	38	31.66
11	precision farming	106	88.33	14	11.66	0	0
12	FYM application	9	7.50	60	50.00	51	42.5
13	Fertiliser application	11	9.16	68	56.66	41	34.16
14	Biofertiliser / Micronutrient	37	30.83	47	39.16	36	30.00
15	Irrigation management	26	21.66	48	40.00	46	38.33
16	Mechanical weeding	105	87.5	9	7.50	6	5.00
17	Pest and diseases	38	31.66	61	50.83	21	17.50
18	Pesticides'	47	39.16	49	40.83	24	20
19	waiting period	38	31.66	57	47.50	25	20.83
20	Biological control	42	35.00	54	45.00	24	20.00
21	Organic bio-control	44	36.66	56	46.66	20	16.66
22	Harvesting index	21	17.50	68	56.66	31	25.83
23	Post harvest Handling	44	36.66	62	51.66	14	11.66
24	Grading	66	55.00	46	38.33	8	6.66
25	Marketing	7	5.83	56	46.66	57	47.50
26	Marketing Cost	68	56.66	33	27.50	19	15.83
Average		38.61	32.17	53.88	44.90	27.50	22.91

nutrition management as the cauliflower crop yields are highly responsive to micronutrient application. Good numbers of respondents were found to possess enough knowledge in irrigation management. It was also observed that 87.5 percent farmers practices only manual weeding and no mechanical weeders/weedicides are employed in control of weeds, thus the cost of production increased which resulted in lowering net returns [11]. Adoption of scientific methods of plant protection plays an important role for achieving desired yield levels. The *Plutella xylostella* (DBM) is an important pest of cruciferous crops in eastern states of India, and causes significant damage to cauliflower [12], and similar problem has also been identified in the Island. However, the Island farmers were found to possess fair knowledge of practices like identification of pest and diseases (50.8%), while 31.66 percent do not had any knowledge. Further the knowledge in use of pesticides/fungicides was found poor (39.16 % no knowledge) among respondents, the farmers use available chemicals or as given by pesticide dealers for treating disease problem in crops thereby they incur monitory loss as well as loss of yield. The island farmers are still dependent on agricultural department for the supply of pesticides as the private sector pesticide dealers are few in number.

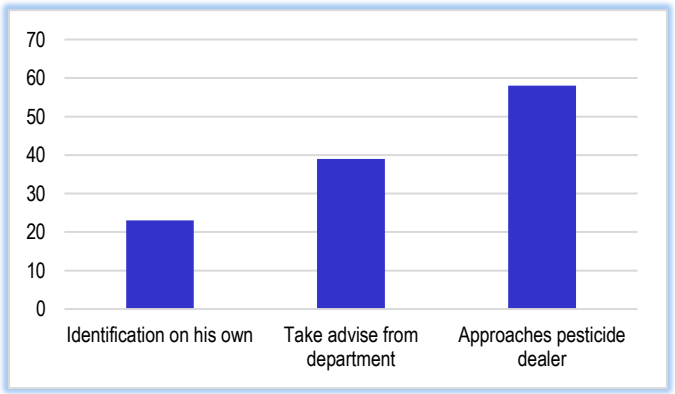

Fig-1 Knowledge level of respondents in plant protection. Percentage of farmers

As shown in [Fig-1] majority of farmers still approach pesticides dealers for control of pests and a limited number of farmer's visit Agricultural department or Krishi Vigyan Kendra for the solution. It was also noted that 47.5 percent farmers are aware about waiting period and on the other hand 36.66 percent farmers are unaware about biological method of control for Pests/diseases. In order to reap better returns in cauliflower production farmer's knowledge about marketing and post-harvest management are very important. The study showed that 56.66 per cent farmers very well aware about when to harvest their produce (harvesting Index), on the other hand only 11.66 per cent respondent possess good knowledge about post-harvest handling i.e. grading, packaging *etc.* It was found that 55 percent does not follow grading of their produce. Further it was noticed that 46.66 percent respondent's had less knowledge about marketing of their produce on the other hand 56 per cent farmers are unaware about hidden market costs. Due to lack of proper transportation facilities in the island, the farmer were compelled to sell their farm produce in local markets at lower prices. Here, also majority of farmers bring their produce to market in gunny bags (no use of crates), thus it causes considerable damage to quality of produce resulting in further lowering of rates. The data presented in [Table-3 shows knowledge level of respondents towards basic agriculture practices. It was observed that 46 percent of respondents had medium level of knowledge, only 22.5 percent possess good knowledge and on the other hand 31.61 percent farmers had poor knowledge about latest technologies/skills in vegetable cultivation. This may be mainly due to lower socio-economic status of the farmers. The knowledge adoption is a social process influenced by many factors like social networks, personal circumstances, education and economic situations [13]. Hence, the need to increase the level of knowledge through awareness training/ demonstrations in order to achieve the desirable yield levels in vegetable cultivation. The knowledge level of respondents in different dimensions of vegetable cultivation practices were put for correlation analysis with their socio-economic parameters like age, education and annual income as given in [Table-4]. The result implies that level of respondents increased with the increase in their education and annual income. It can be ascertained that educated farmers are more motivated towards learning new innovations in farming. Further, the increased annual income will make them to afford more capital investment in vegetable cultivation which intern help the farmers to achieve higher productivity and returns on sustainable basis. Similar studies by different researchers observed that socio-economic status of farmers plays a vital role in adoption behaviour [5, 6, 14].

Thus, it can be observed from the study that age, education and family income influences much on motivation for learning and adoption level of farmers.

Conclusion

The farmers in North Andaman possess medium level of knowledge in cauliflower cultivation practices. It was observed that farmers' level of knowledge is less in use of pest and disease resistance varieties/hybrids for better productivity and returns and possess poor knowledge in precision farming including integrated nutrient and pest management. Thus the average productivity and annual income is low in Island farmers. In order to increase the productivity effort should be made by the extension institutions in motivating and educating the farmers through mass media, capacity building programmes and demonstrations. This will help the farmers to learn and adopt the new innovations which intern help in achieving desirable changes in the farm income by achieving optimum yields on sustainable basis.

Application of research: Level of knowledge in agriculture practices is highly dependent on the socio-economic status of farmers in North Andaman. This finding will help line departments in designing extension programmes for increasing the Knowledge of the farmers.

Research Category: Agriculture Extension

Abbreviations: INM, IPM, GAP

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