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PROFILE CHARACTERISTICS AND ATTITUDE OF FARMERS TOWARDS DRIP IRRIGATION IN NAINITAL DISTRICT OF UTTARAKHAND, INDIA

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ABSTRACT

Drip irrigation is the application of water through emitter (pointer line source) on the above and below source surface. The systematic research and analysis of the profile characteristics of the farmers provides insight into extension activities to be carried out to improve the knowledge, attitude and skill of the farmers of Nainital district. One block namely Ramgarh block was selected and from four villages were selected purposively sampling based on majority of the framers had adopted drip irrigation and also aware of this technology. 120 farmers were selected from the selected villages through PPS sampling method. Descriptive research design was used in this research study. The study revealed that majority of the respondents belonged to middle age category, were males, had small family, belonged to joint family, general category, educated up to high school, major occupation was agriculture had low annual income, belonged to small farmers, all famers had mixed farming, medium cropping density were using tanks for irrigation, medium pass media exposure, economic motivation, medium risk orientation. Further, majority of the respondents had neutral attitude towards drip irrigation. Age, education, family size and economic motivation of the respondents had positive and non-significant relationship with their attitude towards drip irrigation, caste, size of land holding, total annual income, mass media exposure and risk had positive and highly significant positive relationship with their attitude towards drip irrigation and cropping intensity of the respondents had negative relationship with their attitude towards drip irrigation.

Key words : Profile characteristics, Attitude, Relationship, Drip irrigation, Farmers and Farm women.

Introduction

Water is the most valuable natural resource and plays an important role in agricultural production. Water is vital to global food security. India agriculture depends primarily on two types of agricultural practices such as irrigated and rainfed agriculture. Rainfed crop land is less productive than irrigated land. Drip irrigation technology is very effective in rainfed areas.

Drip irrigation system is an efficient method of supply water directly into soil at root zone of plants and thus, minimizes conventional losses such as soil erosion, runoff and deep percolation (Swrtha *et al.*, 2017). It is a modern type of irrigation technique that not only resolves obstacles for farmers but also plays an important role in the efficient and correct use of water in agriculture (Karki *et al.*, 2023). There are many advantages of drip irrigation such as increases yield, improve quality, save water and helps in effective application of chemicals and fertilizers. This technology is rapidly spread in the world, especially rainfed and water scares areas of developed countries. However, since Uttarakhand has a large rainfed area compared to other state such as Maharashtra, Rajasthan, Madhya Pradesh, the adoption rate of drip irrigation is very low. Now it is important to analyze the reasons for low adoption rate of the useful technology. Therefore, it is always

important to find out the current situation of farmers and the factors responsible in creating their attitude towards drip irrigation. So technical and practical knowledge, skills and positive attitude towards technology are the necessary condition for adopting any types of technology in agriculture field (Gulkari and Chauhan, 2019). Therefore, keeping in view the above situation, it is important to identify profile characteristics and attitude of farmers towards drip irrigation in Nainital district of Uttarakhand.

Materials and Methods

The present study was conducted in Ramgarh block of Nainital district of Uttarakhand was selected purposively on the basis of most of the farmers had used drip irrigation in their filed. Four villages namely; Losgyani, Jhutia, Naikana and Boharakot were selected purposively sampling out of 130 villages of the block, based on majority of the framers had adopted drip irrigation and also aware of this technology. 120 farmers were selected from the selected villages through Probability Proportionate to Size (PPS) sampling method. Descriptive research design was used to meet out the objectives of the study.

Table 1 : Distribution of respondents on the basis of Probability Proportionate to Size (PPS) sampling method.

District	Block	Village	Population	Respondents for study
Nainital	Ramgarh	Loshgyani	193	29
		Bohracoat	202	30
		Jutiya	206	31
		Nainkana	203	30
Total			**799**	**120**

(15% of the total households were selected from each village)

Selection of Variables

The focus of the study was to study the attitude of farmers towards drip irrigation and factors which could possibly be responsible for it. Thus, the profile characteristics of farmers selected for the study on the basis of conducted a comprehensive review of the literature related to farmers and drip irrigation, completely consult with experts. The socio-personal, economic, communication and psychological characteristics of the farmers were taken for the study.

Statistical Tools and Techniques used

Data was collected pre-tested interview schedule. The collected data was analyzed classified and tabulated and statistical tools such as frequency, percentage, mean, standard deviation and coefficient of correlation were used to interpret findings and draw conclusions.

Co-efficient correlation

It is the extent to which variables have been observed to interact with one another. Co-efficient correlation is a number computed from a set of data that summaries that extent to which variation in the other measures exists. It was used in order to determine the relationship between independent and dependent variables. The following formula is used to calculate the co-efficient of correlation.

$$r = \frac{Cov.(x_1 x_2)}{\sqrt{Var(x_1)\,Var(x_2)}}$$

Test of significance

t- test was used to test the significance of correlation coefficient. The formula used for the coefficient of correlation is as follows:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

Results and Discussion

Socio-Economic, Psychological and Communication characteristic of Farmers

Age : In terms of experience and responsibility, age is taken into account as a significant variable. The degree of an individual's social and economic participation within a social system can be significantly influenced by it. The results has been presented in Table 3 indicated that majority of respondents (55%) belonged to middle age category (40-57 years) followed by 27.50 per cent of those who belonged to young age category (<39 year) and rest of the respondents (17.50%) belonged to old age category (>57 year), respectively. The results of the study show that middle aged respondents predominated among those who were farmers and engaged in agricultural farming. This might be due to the reason middle-aged group farmers actively participated in agricultural farming and domestic activities, most of the young aged population migrated to other plain areas for search job or higher study. The findings of the present study are similar to Raghunandan (2004), Kumar (2012) and Badole (2014) who reported that high percentage of respondents were noticed in middle age group.

Sex : The gender distribution of the respondents has been presented in Table 3. It is indicated that majority of the respondents (80%) were men and only 20 per cent of the respondents were women. This situation might be due to the reason in the study area, most of agriculture farming activities are carried by women and men were

Table 2 : Variables and their measurements.

S. no.	Variables	Measurements	Category	Scoring/ Range/ Quantification
		Socio-economic variables		
1.	Age	In Year	Young	Up to 39 year
			Middle	In between 40-57 year
			Old	More than 57 year
2.	Sex	Male/Female	Male	2
			Female	1
3.	Family Size	Number of family member	Small family	Upto 8 member
			Medium	9-14 member
			Large	More than 14 member
4.	Family Type	Nuclear/Joint	Nuclear	1
			Joint	2
5.	Caste	General /OBC/SC/ST	General	3
			OBC	2
			SC/ST	1
6.	Education	Highest formal qualification	Illiterate	1
			Can read only	2
			Can read and write only	3
			Primary school	4
			Junior school	5
			High school	6
			Intermediate	7
			Graduate	8
7.	Occupation	Open ended question	**Major occupation:**Agriculture	0
			Subsidiary occupation: Labour	1
			Caste occupation	2
			Business	3
			Service	4
			Dairy	5
8.	Total Annual Income	In rupees	Low	Up to 2,32,000
			Medium	In between 2,32,001 - 4,46,000
			High	More than 4,46,000
9.	Size of Land Holding	Acres	Small farmer	Up to 2.48 acres
			Medium farmer	In between 2.49 – 4.94 acres
			Large farmer	More than 4.94 acres
10.	Type of Farming	Open ended question	Specialized farming	1

Table 2 continued...

Table 2 continued...

			Diversified farming	2
			Mixed farming	3
			Dry farming	4
11.	Cropping Intensity	Pushpa (1996) with some modification	Low	Upto 66.21
			Medium	In between 66.22 – 108.37
			High	More than 108.37
12.	Source of irrigation	Open ended question	Canal	1
			Rivers	2
			Tank	3
			Tube well	4
			Pond	5
			Drip	6
			Sprinkler	7
13.	Mass Media Exposure	Sawant (1999) with some modification	Low	Up to 1.11
			Medium	In between 1.12 – 4.95
			High	More than 4.95
14.	Economic motivation	Supe (2007) with some modification	Low	Up to 13.52
			Medium	In between 13.53 – 15.38
			High	More than 15.38
15.	Risk orientation	Supe (2007) with some modification	Low	Up to 15.52
			Medium	In between 12.53 – 15.66
			High	More than 15.66

primarily engaged within household and other activities. The findings of the study are similar to Badole (2014), who reported the majority of the respondents were men.

Family size : Data regarding family size is presented in below Table 3 which clearly reported that ninety per cent of the respondents (90.83%) had small family size (<8 members) followed by 7.50 per cent of the respondents had medium family size (9-14 members) and remaining 1.67 per cent of the respondents had large family size (>14 members). Similar findings were reported that in studies of Praihar (2017), who reported that majority of the respondents had small family size.

Family Type : Data pertaining to family type of the respondents has been presented in Table **3** indicates that majority of the respondents (56.67%) belonged to joint family followed by 43.33 per cent of the respondents belonged to nuclear family. During the investigation, it was found that nuclear family is gradually replacing joint family in the study areas. The reason behind this might be due to the changing cultural environment. Similar results were found in the study of Chauhan (2018), who noted that majority of the respondents had joint family.

Caste : Data regarding the distribution of the respondents on the basis of their caste has been presented in Table 3. The caste of the respondents indicated that nearly seventy five per cent of the respondents (73.33%) belonged to the general category followed 26.67 per cent of the respondents belonged to SC/ST category. None of the respondents belonged to OBC category. The highest per cent of the farmers in general caste (upper caste) category might be due to the reason that Brahmins and Thakurs constitutes major part of in the study area, while other lower caste such as Harijjans were in minor

Table 3 : Profile characteristics of farmers (n=120).

Profile Characteristics	Category	Frequency	Percentage
1. Age	Young (up to 39 year)	33	27.50
	Middle (40 – 57 year)	66	55.00
	Old (above 57)	21	17.50
2. Gender	Male	96	80
	Female	24	20
3. Family Size	Small family (upto 8 members)	109	90.83
	Medium family (9-14 members)	9	7.50
	Large family (more than 14)	2	1.67
4. Family Type	Nuclear family	52	43.33
	Joint family	68	56.67
5. Caste	General	88	73.33
	OBC	00	00
	SC/ST	32	26.67
6. Education Level	Illiterate	2	1.67
	Can read only	1	0.83
	Can read and write only	8	6.67
	Primary School	19	15.83
	Junior high School	36	30.00
	High School	43	35.83
	Intermediate	5	4.17
	Graduate	6	5.00
7. Occupation	**A. Major Occupation**		
	Agriculture	120	100
	B. Subsidiary Occupation		
	Labour	23	19.17
	Caste business	00	00
	Business	13	10.83
	Other (poultry farming)	4	3.34
8. Total Annual Income	Lower income (up to 2,32,00)	89	74.17
	Medium income (2,32,01-4,46,00)	28	23.33
	Higher income (more than 4,46,00)	3	2.50
9. Size of Land Holding	Small farmers (up to 2.48 acres)	118	98.34
	Medium farmers (2.49-4.94 acres)	1	0.83
	Large farmers (more than 4.94 acres)	1	0.83
10. Types of Farming	Mixed	120	100
11. Cropping Intensity	Low (up to 66.21)	18	15
	Medium (66.22–108.36)	102	85

Table 2 continued...

Table 2 continued...

	High (more than108.36)	0	0
12. Source of Irrigation	Canals	29	24.17
	Rivers	42	35
	Tanks	60	50
	Tube wells	00	00
	Ponds	00	00
	Sprinkler	4	3.33
	Drip	2	1.67
13. Mass Media Exposure	Low (upto1.11)	28	23.33
	Medium (1.12-4.95)	69	57.50
	High (more than 4.95)	23	19.17
14. Economic Motivation	Low (up to 13.52)	8	6.67
	Medium (13.53-15.38)	89	74.16
	High (more than 15.38)	23	19.17
15. Risk Orientation	Low (up to 12.52)	18	15
	Medium(12.53-15.66)	77	64.17
	High (more than 15.66)	25	20.83

proportion. The findings of the study are line with the Praihar (2017), who found that majority of the respondents belonged to general category.

Education : The education status of the respondents has been presented in Table 3. The education status of farmers is indicted that maximum number of respondents (35.83%) were educated upto high school followed by those who were educated junior high school (30%), primary school (15.83%) and only 6.67 per cent of the respondent could only read and write. It was also found that 5 per cent of the respondents were graduates, intermediate (4.17%), illiterates (01.67%) and rest of 0.83 per cent of respondents were only can read. It further shows that considerable number of respondents had educated up to high school. It was also reported that majority of these farmers belonged to middle aged group. The reason might be due to lack of availability of higher education facilities, financial difficulties and inadequate transportation facilities in the study areas. Similar findings are in line with Charan (2005) and Chandran and Surendran (2007), Umamaheshwara (2009) who reported that majority of the respondents had qualification up to high school level.

Occupation : Data regarding occupation of the respondents has been presented in Table 3. It was found that all of the respondents had agriculture as a primary occupation. Maximum number of the respondents (33.34%) had some income generation venture as secondary occupation. The secondary occupations adopted by respondents such 19.17 per cent were labour, 10.83 per cent had own business and only 3.34 per cent of the respondents were engaged in other occupations *viz*.; poultry and construction. The findings of the occupation reveals that all the respondents were basically engaged in agricultural activities and possessed as a primary occupation and maximum number of respondents had secondary or subsidiary occupation too. Similar observation were made by Chauhan (2018).

Total Annual Income : Data regarding total annual income of the respondents has been presented in Table 3 indicated that majority of the respondents (74.17%) had lower annual income followed by 23.33 per cent of those who had middle annual income and only 2.50 per cent of the respondents had higher annual income. During the study, it was found that nearly seventy five per cent of the farmers were dependents on agriculture as their sole medium of income. On the other hand, farmers who hold small sized landholding. The findings of the present study are contrary to Chauhan (2018), who found that the majority of the respondents had medium annual income.

Size of Landholding : Data regarding the distribution of the respondents on the basis of their size of landholding has been presented in Table 3. It can be inferred that almost all of the respondents (98.34%) belonged to small

farmers category (<2.48 acres) followed by equal per cent *i.e.*; 0.83 per cent of the respondents were large (>4.94 acres) and medium farms (2.49-4.94), respectively. Similar results were reported in the studies of Sengar (2003), Ningareddy (2005), Patel (2012), Saad (2012) and Badole (2014) who stated that most of the respondents belonged to small farmer category.

Types of Farming : Types of farming describes in terms of specialized, diversified, dry farming and mixed farming. Data regarding types of farming has been presented in the Table 3 reveals that all of the respondents (100%) had mixed farming or intercropping farming system. None of the respondents go for d specialized, diversified and dry farming. All of the farmers had adopted mixed farming or intercropping in the study area. The possible reason of the adoption of mixed farming is that farmers can be earned more profit by selling the variety of the produce get from their farming field. The findings of the study were supported by Chauhan (2018), who reported that all the farmers were engaged in mixed farming.

Cropping Intensity : Data regarding cropping intensity has been presented in the Table 3. It was reported that most of respondents (85%) had medium cropping intensity followed by 15 per cent of the respondents who had low cropping intensity and none of the respondents had high cropping intensity. The findings of the present study are similar to Chauhan (2011), who found that majority of the respondents had medium cropping intensity.

Mass Media Exposure : Data regarding mass media exposure of the respondents has been presented in Table 3 revealed that majority of the respondents (57.50%) had medium mass media exposure followed by the 23.33 per cent of the respondents who had low and only 19.17 per cent of the respondents had high mass media exposure. The results can be concluded that majority of the farmers had medium mass media exposure which indicates growing trend of possessing variety of media by rural people and were utilizing media like radio, television, mobile, newspaper, computer for gathering of information. The findings are in line with Chauhan (2011), who reported that majority of the respondents had medium mass media exposure.

Economic Motivation : Data regarding economic motivation of the respondents has been presented in Table 3 indicated that majority of the respondents (74.16%) had medium economic motivation level followed by the 19.17 per cent of the respondents who had high level of economic motivation level and remaining of respondents (6.67%) had low level of economic motivation. It can be concluded that majority of the farmers want to improve their economic condition. The findings of the present study are similar to Patidar (2015), who reported that highest proportion of the respondents had medium economic motivation.

Risk Orientation : Data regarding risk orientation of the respondents has been presented in Table 3 recorded that majority of the respondents (64.17%) had medium risk orientation followed by the 20.83 per cent of the respondents who had high-risk orientation and only 15 per cent of the respondents had low risk orientation, respectively. Finding of the results can be concluded that majority of the farmers had moderate risk in their life. The reason behind the involvement of the farmers in various activities such as cooperatives, grouping etc. as well as frequently visit farmer fair, agriculture universities, agricultural development office to providing information or training of new technologies, which had created some confidence among the farmers. But most of the farmers were unwilling to take much risk to install new technology in their farms. These findings are in line with those of and Chauhan (2018), who reported that majority of the respondents had medium risk orientation.

Attitude of farmers towards drip irrigation

Table 4 indicated that majority of the respondents (67.50%) had neutral attitude towards drip irrigation followed by the 17.50 per cent of the respondents who had negative attitude towards drip irrigation and only 15 per cent of the respondents had positive attitude towards drip irrigation. The above findings are in line with Yuwraj (2009), who found that the majority of the respondents had neutral attitude towards drip irrigation.

Relationship between selected profile characteristics of the farmers and their attitude towards drip irrigation

Age with Attitude : The value of coefficient of correlation at 5% level of significance (r=0.006) and t_{cal} (t=0.65) was less than t_{tab} value. It was observed that there was a positive and non-significant relationship between age and attitude of farmers towards drip irrigation. It shows that as people become older, their unfavorable attitude towards drip irrigation. The findings are similar to Muni (2006).

Education with Attitude : The value of coefficient of correlation at 5% level of significance (r=0.02) and t_{cal} (t=0.217) was less than t_{tab} value. It was observed that there was a positive and non-significant relationship between education and attitude of farmers towards drip irrigation. It means that farmers, who had high level of

education to form positive attitude. These findings are contrary to Prasad and Sundaraswamy (2000).

Size of land holding with Attitude : The value of coefficient of correlation at 5% level of significance (r=0.225) and t_{cal} (t=2.507) was more than t_{tab} value. It was observed that there was a positive and significant relationship between size of land holding and attitude of farmers towards drip irrigation. It can conclude that increasing the size of land holding of respondents had more favourable attitude towards drip irrigation. The findings are in line with Patel *et al.* (2016).

Total family income with Attitude : The value of coefficient of correlation at 5% level of significance (r=0.180) and t_{cal} (t=1.987) was more than t_{tab} value. It was observed that there was a positive and significant relationship between total family income and attitude of farmers towards drip irrigation. It can be concluded that increasing annual income of the respondents had favourable attitude towards drip irrigation. The findings of the present study are supported by Patel *et al.* (2016).

Cropping intensity with Attitude : The value of coefficient of correlation at 1% level of significance (r= -0.64) and t_{cal} (t= -9.046) was greater than t_{tab} value. It was observed that there was a positive and significant relationship between cropping intensity and attitude of farmers towards drip irrigation. The findings are contrary with Patel *et al*. (2016).

Mass media exposure with Attitude : The value of coefficient of correlation at 1% level of significance (r=0.272) and t_{cal} (t=3.069) was greater than t_{tab} value. . It was observed that there was a positive and significant relationship between mass media exposure and attitude of farmers towards drip irrigation. it indicated that the farmers who are actively exposed to modern mass media have better knowledge of drip irrigation, which led to favorable attitude towards drip irrigation. The result was supported by Muni (2006).

Economic motivation with Attitude : The value of coefficient of correlation at 5% level of significance (r=0.016) and tcal (0.173) was less than tcal value. This indicated a positive and non-significance relationship between the economic motivation of farmers and their attitude towards drip irrigation. Hence, hull hypothesis (H_0) was accepted. There is no relationship between economic motivation of the farmers and their attitude towards drip irrigation. Therefore, it can be concluded that economic motivation of the respondents had not played significant influence on their attitude towards drip irrigation technology. Most likely, this was due to the fact that all of the respondents were from low to medium income families. The findings are contrary to Patel, *et al.* (2016), who reported that economic motivation of the farmers had positive and significant relationship with their attitude towards drip irrigation.

Table 4 : Distribution of respondents on the basis of attitude towards drip irrigation (n=120).

S. no.	Category	Frequency	Percentage
1.	Negative (up to 65.90)	21	17.50
2.	Neutral (65.91 – 76.72)	81	67.50
3.	Positive (more than 76.72)	18	15

Table 5 : Correlation between independent and dependent variables.

S. no.	Variables	Attitude of farmers	
		r_{value}	t_{cal}
1.	Age	0.006^{NS}	0.065
2.	Education	0.02^{NS}	0.217
3.	Family size	0.009^{NS}	0.097
4.	Size of land holding	0.225*	2.507
5.	Total family income	0.180*	1.987
6.	Cropping intensity	-0.64**	-9.046
7.	Mass media exposure	0.272**	3.069
8.	Economic motivation	0.016^{NS}	0.173
9.	Risk orientation	0.190*	2.14

*Significance at 0.05 per cent level of significance, **Significance at 0.01 per cent level of significance, t_{tab}= 1.96 (5% level of significance), t_{tab} = 2.57 (1% level of significance).

Risk orientation with Attitude : The value of coefficient of correlation at 5% level of significance (r=0.190) and t_{cal} (t=2.14) was more than t_{tab} value. It was observed that there was a positive and significant relationship between risk orientation and attitude of farmers towards drip irrigation. It can be concluded that high level of risk orientation of the respondents had favorable or positive attitude towards drip irrigation. It means that farmers with high level state of mind to take calculated risk had positivism towards drip irrigation Hence, H_{j0} null hypothesis is rejected. The findings are in line with Gulkari1 and Chauhan (2019).

Conclusion

The present study was focused on to study the socio-personal, economic, communication characteristics of the farmers which could affect the attitude of farmers towards drip irrigation. The findings indicate that neutral attitude towards drip irrigation. The findings of the study will be helpful for block development officers,

administration, researcher, and extension workers to bridge the knowledge gap in drip irrigation for farmers and also assist extension workers in developing effective appropriate strategies for promoting drip irrigation in any farming community.

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