Farmers' Knowledge about Photovoltaic Water Pumping System in Haryana

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ABSTRACT

The study was conducted in purposively selected Hisar, Rohtak and Jhajjar districts of Haryana state with selected 61, 47 and 33 number of PWPS adopted farmers from each district, respectively and an equal number of non beneficiaries adjoining to the beneficiaries' farm were also selected. In this way a total number of 282 respondents i.e. 141 beneficiaries and 141 non-beneficiaries were included in the sample for the study. A significant majority of respondents two third (67.38 %) had medium level of technical knowledge, general knowledge (72.34 %) and overall knowledge (70.22 %) by the adopted respondents. Social participation, material possession, education, socio-economic status, extension contact, source of income, risk orientation, change proneness and fatalism / scienticism were found to be positive and having significant correlation. However, in case of non adopted farmers' only two variables viz., socio-economic status and risk orientation were found to be positive with significant correlation with knowledge about PWPS. The regression coefficient of adopted farmers' education, family type, socio-economic status, extension contact, source of income, risk orientation and change proneness were found to have positive and significant. However, in case of non adopted farmers, education, socio economic status and risk orientation had positive and significant regression coefficient with the farmers' knowledge level.

Key words : *PWPS; Knowledge*

Energy is essential for each and every living organism. It has always been the key to man's greatest goals and to his dream of better world. The history of solar energy utilization is so shrouded in antiquity that it is difficult to know the facts. The escalating price of oil since 1973 and its possible shortage has fuelled interest in the development of alternative energy sources such as solar energy. The development of solar energy applications is aimed primarily in the rural areas owing to a special feature of cost effectiveness as compared to conventional fuel. The factual position is that 85 per cent of the world power consumption goes to the rich and only 15 per cent goes to the 2.4 billion poor people. The population of India is increasing day by day. It has direct impact on ever increasing problems of food, fertilizer and energy consumption (fuel). Therefore, the need for developing renewable sources of energy has become necessary as the existing fossil fuel resources are fast depleting. Haryana State Energy Development Agency (HAREDA) has undertaken the task of popularizing the use of solar energy in the state. It is also supplying photovoltaic water pump to the farmers with subsidy, which is compensated from the funds of Rs.2, 68,000 received from Ministry of Non-Conventional Energy Sources, Govt. of India, on a 2 HPDC Monoblock pump of 1800 watt.

In a solar PV water pumping system, PV modules convert sunlight directly into electricity and this energy can be used to run an electric motor pump set for pumping water. Photovoltaic-based water pumping system is eco-friendly in nature and pollution free technology can be more appropriate to the needs of the developing countries like India than solar/thermal energy conversion (STEC). Keeping all these points in mind the present study was undertaken to assess the farmers' knowledge regarding photovoltaic water pumping system.

METHODOLOGY

The study was conducted in purposively selected Hisar, Rohtak and Jhajjar districts of Haryana state. In these districts the highest number of farmers have adopted Photovoltaic Water Pumping Systems. A list of all the beneficiaries of Photovoltaic Water Pumping System, who have installed this system at their farm up to March 2003, was prepared. All the beneficiaries from Hisar (61), Rohtak (47) and Jhajjar (33) were included in the sample and an equal number of non beneficiaries adjoining to the

beneficiaries' farm were also selected. In this way a total number of 282 respondents i.e. 141 beneficiaries and 141 non-beneficiaries were included in the sample for the study. The data were collected through pre-tested structured interview schedule from the respondents to assess the knowledge about PWPS.

RESULTS AND DISCUSSION

Knowledge of Respondents' Regarding Photovoltaic Water Pumping System (PWPS) : The data concerning the farmers' knowledge about PWPS was analyzed aspect wise i.e. technical knowledge, general knowledge and overall knowledge. The results so obtained has been presented and discussed below.

Respondents' Technical Knowledge Level Regarding PWPS : The distribution of respondents according to their technical knowledge has been presented in the Table 1 which revealed that two third (67.38 %) of adopted respondents had medium level of technical knowledge

followed by low (17.73 %) and high (14.89 %) technical knowledge, respectively in PWPS adopted respondents. In case of non adopted, as high as 81.56 per cent had low level of technical knowledge, whereas, 17.03 and 1.41 per cent were having medium and high technical knowledge, respectively. This low level of technical knowledge in non adopted respondents might be due to their non conversant with PWPS.

Respondents General Knowledge level regarding PWPS : The distribution of respondents according to their general knowledge has been presented in the Table 1 showed that a majority of respondents (72.34 %) belonged to medium level of general knowledge. Further, 21.28 and 6.38 per cent farmers belonged to high and low level of general knowledge, respectively, in PWPS adopted respondents. In case of non adopted group, (70.92 %) of farmers belonged to low level of general knowledge followed by 27.65 and 1.42 per cent farmers had medium and high general knowledge, respectively.

Table 1 Farmers' knowledge level regarding PWPS

Variables	Categories	Score Range	Adopted (N=141)		Non adopted (N=141)	
			Frequency	Per cent	Frequency	Per cent
Technical knowledge	Low	Below 9	25	17.73	115	81.56
	Medium	9 to 16	95	67.38	24	17.03
	High	Above 16	21	14.89	2	1.41
General knowledge	Low	Below 10	9	6.38	100	70.92
	Medium	10 to 18	102	72.34	39	27.65
	High	Above 18	30	21.28	2	1.42
Overall knowledge	Low	Below 18	15	10.64	105	74.46
	Medium	18 to 34	99	70.22	34	24.12
	High	Above 34	27	19.14	2	1.42

Respondents Overall Knowledge level regarding PWPS : The distribution of respondents according to their overall knowledge has been presented in the Table 1 which revealed that the majority of respondents (70.22 %) belonged to medium level of overall knowledge. Further, 19.14 and 10.64 per cent farmers belonged to high and low level of overall knowledge respectively in adopted respondents. In non adopted group, three-fourth of farmers (74.46 %) belonged to low level of overall knowledge followed by 24.12 and 1.42 per cent farmers had medium and high overall knowledge, respectively.

If we compare the technical knowledge level of both the adopted and the non adopted, it was found that there was very large difference between technical knowledge level of the two types of respondents regarding PWPS. This was because of the fact that when the farmer installed the PWPS on his farm, some technical points were told

by the installer at that time like spv panel rotation with the movement of sun and the cleaning of spv panel being essential and therefore, PWPS adopted farmers were well aware about the daily operation of it. The low level of technical knowledge in non adopted farmers might be due to lack of opportunity to use the PWPS. Hence, the use of PWPS increases the technical knowledge of the respondents.

These findings are in accordance with those of Nagpal and Yadav (1991) who found that majority of the adopters of the biogas plants had higher knowledge whereas the non adopters had less knowledge about the biogas plant.

Coefficient of Correlation between Independent Variables and Farmers' Knowledge about PWPS : The zero order correlation was computed to determine the association between the independent variables of the study and farmers knowledge about PWPS.

The results are presented in the table 2 shows that the social participation (r = 0.462), material possession (r = 0.458), education (r = 0.426), socio-economic status (r = 0.406), extension contact (r = 0.445), source of income (r = 0.419), risk orientation (r = 0.386), change proneness (r = 0.390) and fatalism / scienticism (r = 0.393) were found to be positive and significant correlation (at 0.05 level of probability) with the farmers knowledge about PWPS. These findings are in conformity with the results of Singh (2001), Bhushan et al. (2002b) and Singh and De (2003), who observed that social participation, material possession, education and socio-economic status had positive and significant correlation with knowledge of non conventional energy sources. This implies that the adopted respondents who have higher level of these variables are turned out with higher knowledge about PWPS. Whereas, age (r = 0.112), caste (r = 0.242), occupation (r = 0.167), house type (r = 0.292), land holding (r = 0.321), farm power (r = 0.148) and family type (r = 0.254) were showing positive but non-significant relationship with adopted farmers knowledge about PWPS. However, in case of non adopted farmers' only two variables viz., socio-economic status and risk orientation were found to be positive and significant relationship (at 0.05 level of probability). All the remaining independent variables, namely, age, caste, occupation, house type, social participation, material possession, education, farm power, family type, extension contact, source of income, change proneness and fatalism / scienticism were found to be positive but non-significant with non adopted farmers knowledge about PWPS.

Table 2. Coefficient of correlation between independent variables and farmers' Knowledge level towards PWPS

S. No.	Variables	Coefficient of correlation	
		Adopted	Non adopted
1	Age	0.112	0.79
2	Caste	0.242	0.104
3	Occupation	0.167	0.129
4	House Type	0.292	0.115
5	Social participation	0.462*	0.151
6	Land Holding	0.321	0.184
7	Material Possession	0.458*	0.133
8	Education	0.426*	0.9
9	Farm power	0.148	0.127
10	Family Type	0.254	0.225
11	Socio-economic status	0.406*	0.365*
12	Extension Contact	0.445*	0.121
13	Source of income	0.419*	0.118
14	Risk Orientation	0.386*	0.351*
15	Change Proneness	0.390*	0.191
16	Fatalism / Scienticism	0.393*	0.21

* Correlation is significant at 0.05 level of probability

The findings were supported by reports of Angadi et al. (1992) and Nanda and Khurana (2001) who observed

that age, caste, farm power and family type were positive but non-significant associated with the knowledge of the farmers towards non conventional energy sources.

Multiple regressions analysis of respondents' independent variables and their Knowledge bout PWPS : A perusal of multiple regression presented in Table 3 indicated that education, family type, socio-economic status, extension contact, source of income, risk orientation and change proneness were found to have positive and significant regression coefficient (at 0.05 level of probability). The results were in agreement with Dhankar et al. (2000) and Patil et al. (2005) who observed that education, family type, socio-economic status, extension contact, source of income, risk orientation and change proneness had positive and significant multiple regression with the knowledge of the respondents. Whereas, age, caste, occupation, house type, social participation, land holding, material possession, farm power and fatalism / scienticism were found to have positive but non-significant regression coefficient with the knowledge of PWPS adopted farmers.

Table 3. Multiple regression coefficient between independent variables and farmers' knowledge level towards PWPS

S. No.	Variables	Multiple regression Coefficient			
		Adopted Farmers		Non–Adopted Farmers	
		b Values	t Values	b Values	t Values
1	Age	0.622	0.671	0.573	0.633
2	Caste	0.174	0.529	0.53	0.183
3	Occupation	0.103	0.141	0.631	0.218
4	House type	0.257	0.335	0.58	0.565
5	Social participation	0.571	0.441	0.228	0.181
6	Land holding	0.463	0.666	0.377	0.134
7	Material possession	0.248	0.261	0.998	0.362
8	Education	0.738*	2.558	0.401*	2.143
9	Farm power	0.223	0.306	0.794	0.287
10	Family type	0.513*	2.138	0.517	0.189
11	socio-economic status	0.183*	2.196	0.555*	2.113
12	Extension contact	0.559*	2.411	0.176	0.332
13	Source of income	0.234*	2.516	0.385	0.484
14	Risk orientation	0.156*	2.321	0.112*	2.562
15	Change proneness	0.153*	2.212	0.111	0.453
16	Fatalism / Scienticism	0.476	0.326	0.189	0.156
	R^2	0.64		0.57	

* Significant at 0.05 level of probability

The Table 3 further showed that all the background variable jointly explained 64 per cent variation in the knowledge of adopted farmers. The calculated 'F' value was found to be significant at 0.05 level of probability. In other words, one unit change in the level of education, family type, socio-economic status, extension contact,

source of income, risk orientation and change proneness led to a corresponding change of 0.738, 0.513, 0.183, 0.559, 0.234, 0.156 and 0.153 units, respectively, in the knowledge level adopted farmers regarding PWPS. The findings of the study are in agreement with the findings of Gautam et al. (1995) and Vasavada (1998) who observed that age, caste, occupation, house type, material possession and farm power had positive but non-significant multiple regression with the knowledge of the respondents.

However, in case of non adopted farmers, education, socio economic status and risk orientation had positive and significant relationship at 0.05 level of probability whereas age, caste, occupation, house type, social participation, land holding, material possession, farm power, family type, extension contact, source of income, change proneness and fatalism were found to be positive but non-significant. The regression coefficient further showed that the entire background variable jointly explained 57 per cent variation in non adopted farmers of PWPS. The calculated 'F' value was found to be significant at 0.05 level of probability.

CONCLUSION

It can be concluded that, social participation, material possession, education, socio-economic status, extension contact, source of income, risk orientation, change proneness and fatalism / scienticism were found to be positive and having significant correlation. However, in case of non adopted farmers' only two variables viz., socio-economic status and risk orientation were found to be positive with significant correlation with knowledge about PWPS. The regression coefficient of adopted farmers' found to have positive and significant. However, in case of non adopted farmers, education, socio economic status and risk orientation had positive and significant regression coefficient with the farmers' knowledge level.

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