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Ramesh Kumar
Ph.D. Research Scholar, Department of Extension Education, CCSHAU, Hisar, Haryana, India

AK Godara
Professor & Head, Department of Extension Education, CCSHAU, Hisar, Haryana, India

Nirmal Kumar
Assistant Scientist, Saina Nehwal Institute of Agricultural Technology, Training and Education, CCSHAU, Hisar, Haryana, India

Dalip Bishnoi
Assistant Scientist, Department of Agricultural Economics, CCSHAU, Hisar, Haryana, India

Pooja Dangi Arun
Ph.D. Research Scholar, Department of Extension Education, CCSHAU, Hisar, Haryana, India

Neelam Kumari
Ph.D. Research Scholar, Department of Extension Education, CCSHAU, Hisar, Haryana, India

Corresponding Author
Ramesh Kumar
Ph.D. Research Scholar, Department of Extension Education, CCSHAU, Hisar, Haryana, India

Knowledge level of farmers about direct seeded rice cultivation technology in Haryana

Ramesh Kumar, AK Godara, Nirmal Kumar, Dalip Bishnoi, Pooja Dangi Arun and Neelam Kumari

Abstract
The present study was carried out in Ambala and Kurukshetra districts of Haryana during 2020-21 to find out the knowledge level of farmers about Direct Seeded Rice (DSR) cultivation technology in eight villages of these districts for enhanced resource use efficiency and reducing the cost of paddy cultivation. Empirical data were collected personally through a well-structured and pre-tested interview schedule and analyzed with the help of appropriate statistical tools using 26th version of Statistical Package for Social Sciences (SPSS). Findings revealed that two-third of the respondents (40.00%) had low level of knowledge about DSR technology followed by medium and high. Indeed, more awareness programmes should be organized by the government and non-governmental organizations to increase level of knowledge about DSR technology to sustain rice production in Haryana. Study also revealed that variables like education, land holding, availability of farm equipments, mass media exposure, extension contact, economic motivation, risk orientation and innovativeness exhibited positive and significant correlation at 0.05 level of probability with their knowledge level about DSR technology.

Keywords: direct seeded rice technology, farmers, knowledge and variables

Introduction
As rice and wheat are major dominant food for the majority of people in India, Rice-Wheat cropping system is the pre-dominant cropping system adopted. The term 'rice is life' is most pertinent in Indian ambience as this crop plays significant role in country's food security and is the buttress of sustenance for millions of rural households (Hansra *et al.*, 2013) [1]. The demand of rice and wheat to fulfill the food requirements of the burgeoning population is increasing. Contrarily, most crucial inputs of agriculture, particularly, water and labor are depleting in the area. Farmers in India have been practicing the transplanted rice cultivation in puddled field since antiquity. Transplanting method of rice cultivation involves three basic operations, namely, puddling (a process where soil is compacted to reduce water seepage), transplanting and maintaining standing water. This conventional system of rice production is intrinsically water, labor and energy intensive, adversely affecting the ecosystem. Rising water inadequacy, water-intensive nature of rice cultivation and increasing labor costs drive the search for alternative management approaches to enhance water productivity in rice production. Direct seeded rice (DSR) has been more highlighted owing to its low-input demand.

DSR refers to the process of establishing rice crop from seeds sown in the field rather than by transplanting seedlings from the nursery. Direct seeding is of two types (1) Wet-DSR, in which, on puddled soil, sprouted rice seeds are broadcast or sown in lines and (2) Dry-DSR, in which, after dry tillage or zero tillage, dry rice seeds are drilled or broadcast on unpuddled soil. The technology substantially lessen crop water requirements, soil organic-matter turnover, nutrient relations, carbon sequestering, weed biota and greenhouse-gas emissions.

Haryana is the second largest state to contribute in central procurement pool of rice after Punjab and plays a key role in the agricultural transformation of the country (Mahajan *et al.*, 2015) [2]. In the state, rice is generally grown in 18 districts. Out of that, seven districts are in high productivity group, that is, yield more than 2,500 kg/ha, involving high amount of water use for land preparation and the growing period, which results in adverse effects on water table. Therefore, there is an urgent need to shift from traditional transplanting method of rice cultivation to DSR. Considering this facts, the present study was carried out with an objective to examine the knowledge level of farmers about DSR cultivation technology in Haryana.

Materials and Methods

The present study was conducted in Haryana during 2020-21. From the state, two districts *viz*., Ambala and Kurukshetra were selected randomly. From each district, two blocks were selected randomly *viz*., Narayangarh and Ambala-I, from Ambala and Shahabad & Ismailabad from Kurukshetra district. Further, two villages were selected randomly from each selected block. Thus, eight villages, namely, Gadouli and Ganouli from Naryangarh block and Balana and Anandpur Jalbera from Ambala-I block from Ambala and Raipur and Rai Majara from Shahabad block; Thol and Mandheri from Ismailabad block from Kurukshetra were selected randomly. Further, twenty farmers were selected, randomly from each selected village. Thus, a total number of 160 farmers were selected for the study. The data were collected through personal interview technique with the help of well-structured and pre-tested interview schedule. Empirical data were tabulated and analyzed with the help of appropriate statistical tools using 26th version of Statistical Package for Social Sciences (SPSS). The responses of farmers' were obtained on three-point continuum scale as full knowledge, partial knowledge and no knowledge and weightage was given as 3, 2 and 1, respectively. Aggregate total weightage score was calculated for each statement separately and on the basis of calculated score, total weighted score and weighted mean score were obtained.

Results and Discussion

Results of the study are presented and discussed under broad heading and sub-headings as follows:

Farmers' knowledge about DSR technology

Table 1 revealed about the practice-wise knowledge level of farmers with respect to seventeen dimensions of DSR technology as recommended by CCS Haryana Agricultural University, Hisar, Haryana. It was observed that most of the farmers had significant knowledge about suitable soil suitable soil for DSR ranked I with highest weighted mean score (WMS) 2.64, followed by laser leveling and field preparation, method of sowing, stop irrigation about a fortnight before maturity, proper fertilizer use, sowing time, DSR in wet /tar-barrar condition, calibrating the machine for recommended seed rate, suitable timing for field preparation and sowing, recommended nozzle for spray, seed treatment, irrigation, adjust for proper seed depth and spacing, suitable variety, press wheel fitted DSR machine, DSR with inclined plate mechanism and proper weed management ranked II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII and XVII with WMS 2.58, 2.50, 2.30, 2.26, 2.25, 2.24, 2.23, 2.20, 2.16, 2.15, 2.14, 2.11, 2.07, 2.06, 1.95 and 1.94, respectively. It reflected that suitable soil, field preparation and method of sowing were highly known practices by farmers than other practices, while suitable variety, press wheel fitted DSR machine, DSR with inclined plate mechanism and proper weed management needed more attention to increase regarding the knowledge of the respondents about these practices of DSR cultivation technology. Hence, there is immense need to motivate and encourage the farmers by organizing continuous trainings, lectures, campaigns and demonstrations. These findings are in conformity with Shaker *et al.*, (2020) [4].

Table 1: Farmers' knowledge about Direct Seeded Rice (DSR) technology

(n=160)

Sr. No.	Statements	Full knowledge	Partial knowledge	No knowledge	Total weighted score	Weighted mean score	Rank order
1.	Suitable soil for Direct Seeded Rice	106 (66.30)	50 (31.30)	4 (2.50)	422	2.64	I
2.	Laser leveling and Field Preparation	94 (58.80)	65 (40.60)	1 (0.60)	413	2.58	II
3.	Method of sowing	86 (53.80)	68 (42.50)	6 (3.80)	400	2.50	III
4.	Press Wheel fitted DSR machine	67 (41.90)	35 (21.90)	58 (36.30)	329	2.06	XV
5.	DSR machine with inclined plate mechanism	58 (36.30)	36 (22.50)	66 (41.30)	312	1.95	XVI
6.	Adjusting for proper seed depth and spacing	80 (50.00)	18 (11.30)	62 (38.80)	338	2.11	XIII
7.	Suitable timing for field preparation and sowing	80 (50.00)	32 (20.00)	48 (30.00)	352	2.20	IX
8.	Suitable variety	64 (40.00)	43 (26.90)	53 (33.10)	331	2.07	XIV
9.	Sowing time	58 (36.30)	85 (53.10)	17 (10.60)	361	2.25	VI
10.	Calibrating the machine for Recommended seed rate	78 (48.80)	41 (25.60)	41 (25.60)	357	2.23	VIII
11.	Seed treatment	67 (41.90)	50 (31.30)	43 (26.90)	344	2.15	XI
12.	Proper Weed Management	43 (26.87)	67 (41.87)	50 (31.25)	313	1.94	XVI
13.	Recommended Nozzle for spray	64 (40.00)	58 (36.30)	38 (23.80)	346	2.16	X
14.	Irrigation	65 (40.60)	52 (32.50)	43 (26.90)	342	2.14	XII
15.	DSR in wet/*tar-barrar** condition	72 (45.00)	56 (35.00)	32 (20.00)	360	2.24	VII
16.	Stop irrigation about a fortnight before maturity.	72 (45.00)	64 (40.00)	24 (15.00)	368	2.30	IV
17.	Proper fertilizer use	64 (40.00)	74 (46.30)	22 (13.80)	362	2.26	V

Figures in the parenthesis indicate the percentage.

Overall knowledge of farmers regarding DSR technology

From the Table 3 it is apparent that majority of the respondents (40.00%) belonged to low level of knowledge category, followed by 33.75 per cent medium level and only 26.25 per cent high level of knowledge about DSR technology. Further analysis of data reveals that most of the respondents (73.75%) possessed low to medium level of knowledge about DSR technology. It might be due to poor knowledge about DSR technology coupled with long attachments with the conventional method of cultivation. Therefore, there is an urgent need to organize need based training programme for the DSR farmers in the specific areas of concern. Similarily, Singh, *et al.* (2017) [3] revealed that knowledge regarding DSR cultivation technology among farmers was found to be comparatively quite low.

Table 2: Overall knowledge of farmers about DSR technology

(n=160)

Sr. No.	Knowledge level	Knowledge score	Frequency	Percentage
1.	Low	Up to 32	64	40.00
2.	Medium	33-41	54	33.75
3.	High	42-50	42	26.25

Relationship between farmers' personality traits with their knowledge level about DSR cultivation technology

The correlation and regression coefficient presented in Table 3 show relationship between farmers' personality traits as independent variables and knowledge level about DSR cultivation technology as dependent variable. Correlation among 12 variables, nine variables *i.e.* education, land holding, availability of farm equipments, mass media exposure, extension contact, economic motivation, risk orientation and innovativeness exhibited positive and significant correlation at 0.05 level of probability. Similarly, regression coefficient of variables; education, land holding, availability of farm equipments, extension contact and training received exhibited positive and significant effect, however age, farm power, mass media exposure, farming system, economic motivation, risk orientation and innovativeness showed non-significant effect but it was positively correlated with knowledge about DSR technology at 0.05 level of probability. These findings were partially supported by the reports of Singh *et al.,* (2017) [5].

Further, it was revealed that all the twelve independent variables included in the study jointly contributed 54.00 per cent variation in knowledge level about DSR technology when other factors were kept constant. This means that only 54.00 per cent (r^2=0.54) of the variation in the dependent variable was due to these variables and remaining 46.00 per cent variation was due to extraneous variables.

Table 3: Relationship between farmers' personality traits with their knowledge level about DSR cultivation technology

(n=160)

Sr. No.	Variable	Correlation Coefficient 'r' value	Regression Coefficient 'b' value	't' value
1.	Age	-0.120^{NS}	-0.047	0.530 ^{NS}
2.	Education	0.186*	1.109	2.081*
3.	Land holding	0.216*	0.110	2.079*
4.	Farm power	0.010 ^{NS}	0.757	0.433 ^{NS}
5.	Availability of farm equipments	0.292*	1.108	2.076*
6.	Mass media exposure	0.245*	0.096	0.650 ^{NS}
7.	Faming system	0.136 ^{NS}	0.307	0.241 ^{NS}
8.	Extension contact	0.320*	0.891	2.316*
9.	Economic motivation	0.221*	0.104	0.124 ^{NS}
10.	Training received on DSR	0.185*	2.791	2.021*
11.	Risk orientation	0.233*	0.283	0.377 ^{NS}
12.	Innovativeness	0.286*	0.351	0.697 ^{NS}

*Significant at P= 0.05 levels NS= Non-significant R^2=0.54

Conclusion

The results of the study revealed that most of the respondents had low level of knowledge about DSR technology followed by medium and high level. With regard to practice-wise knowledge, majority of them had significant knowledge about suitable soil suitable soil for DSR followed by laser leveling and field preparation, method of sowing and stop irrigation about a fortnight before maturity, etc. The study also envisaged that variables like education, land holding, availability of farm equipments, mass media exposure, extension contact, economic motivation, risk orientation and innovativeness exhibited positive and significant correlation at 0.05 level of probability with their knowledge level about DSR technology. Therefore, it may be concluded that State Agricultural Universities and State Department of Agriculture, Haryana should provide knowledge about the technology to the farmers by providing them need based trainings, which will help them to increase their production and net returns. Effective media should also be used for ranking awareness and knowledge among seed farmers about the innovation, as large numbers of farmer did not know about improved technologies recommended and released by the State Agricultural Universities.

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