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Research Journal of Agricultural Sciences  
An International Journal

P- ISSN: 0976-1675

E- ISSN: 2249-4538

Volume: 12

Issue: 03

Res Jr of Agril Sci (2021) 12: 985–989

# Knowledge and Adoption of Direct Seeded Rice Method Among Farmers in Haryana – A Sociological Analysis

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Received: 02 Dec 2020 | Revised accepted: 27 May 2021 | Published online: 07 Jun 2021  
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## ABSTRACT

Rice a staple food for more than half of the world population, is commonly grown by transplanting seedlings into puddled soil in Asia. Direct seeding is widely adopted and is spreading to other states of India. Haryana produces 3.5 million tonnes of rice and contributes approximately 3.7% to India's total rice production with per hectare productivity of 3.03 tonnes. The study was conducted in Kaithal district of Haryana state. From this district, two blocks namely Kaithal and Pundri were selected randomly. On the whole a total of 200 rice growing farmers were selected, who were using direct seeded rice method (100) and conventional transplanted rice method (100). The findings regarding knowledge and adoption level of respondents about various aspects of direct seeded rice method were studied like recommended seed rate used, seed variety, preparation and sowing in evening time, insect-pest control, fungicides, method of sowing, depth of sowing, Seed treatment etc. It was found that main reason for adoption of DSR method was reduced work load like labour, water saving from first to subsequent irrigation and higher net returning. Constraints in adoption were mainly DSR method did not increase the yield at all, lack of knowledge, more complex system and technical assistance required, high prices of herbicides, chemical fertilizers, pesticides and fungicides etc. It was also suggested that training should be imparted for weed management, seed treatment, disease, variety etc. to farmers regarding DSR method at cluster level.

**Key words:** Nature, Extent, Knowledge, Adoption, Socio-economic factors

Rice is one of the most widely consumed food crops in the world. It is grown on an area of 1.98 m ha with annual production of 3.64 m tones and average production in yield was 1842 kg ha<sup>-1</sup> [1]. India is the second largest producer of rice in the world with an average annual production of 94 million tonnes and fulfils 43 percent of calories requirement of more than 70 percent of the Indian population. This signifies the contribution of rice in meeting food requirements of the hungry mouth of country. But now day crop yield stagnation as well as no further increment in crop yield is emerging challenge for researchers. It accounts for approximately 21% of world's rice production. Haryana produces 3.5 million tonnes of rice and contributes approximately 3.7% to India's total rice production with per hectare productivity of 3.03 tonnes. In Haryana, rice is grown by transplanting during wet season from June to October. The demand of cereals to meet the food necessity is rising of increasing population, while on the other hand most important inputs (water, labour) of agriculture are decreasing in the area. The traditional system

of rice production (conventional tilled-transplanted rice) in this region is basically water, labour and energy intensive, adversely affecting the environment. Therefore, to sustain the long-term production of rice, more efficient alternative methods of rice productions are needed. In recent years, water table is running down at a very rapid rate throughout the globe, thus, poses alarming threats and limiting the scope for cultivation of high-water requiring crops very seriously. Therefore, there is an immense need of searching alternate method of rice cultivation and direct seeding of rice is one of the appropriate methods. Direct seeding of rice refers to the process of establishing the crop from seeds sown in the field rather than by transplanting seedlings from the nursery. In Asia, rice is commonly grown by transplanting one month-old seedlings into puddled and continuously flooded soil (land preparation with wet tillage). The TPR system leads to more losses of water through puddling, surface evaporation and percolation. DSR is a feasible alternative to conventional puddle transplanted rice with good potential to save water, reduce labour requirement, and mitigate greenhouse gas (GHS) emission. However, the DSR suffers from some constraints particularly high weed infestation. The system has been proved cost-effective but it requires further improvement in technological approach to realize greater benefits [2]. Keeping in view of the above facts and importance of this method towards crop production of rice for the country as a

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whole and Haryana in particular, the study was conducted with the objectives:

- To assess the knowledge, nature, extent and causes of adoption and non-adoption of direct seeded rice method
- To know the factors associated with adopters and non-adopters of direct seeded rice method along with constraints

## MATERIALS AND METHODS

The study was conducted in Kaithal district of Haryana during 2017-18. From this district, two blocks namely Kaithal and Pundri were selected randomly. On the whole a total of 200 rice growing farmers were selected, who were using direct seeded rice method (100) and conventional transplanted rice method (100). Interview Schedule was prepared as per objectives of the study. Farmers were surveyed with the help of Interview Schedule. Statistical techniques were used as per the nature of data. The questions were framed which clearly indicate their meaning to the respondent and cover relevant aspects of problems according to the objectives of the study. Interview schedule was prepared with the help of various books, bulletins, journals, periodicals, government publications etc. After completion of the interview schedule, data was collected regarding farmers of Haryana. The collected data were coded, tabulated, analyzed and interpreted according to the objective of the present study with the help of

appropriate statistical techniques. The descriptive statistical tools such as frequency, percentage and chi-square had been adopted to draw the inference from the study. In the end, the collected data from the field was analyzed in term of identifying various specific objectives.

## RESULTS AND DISCUSSION

### *Knowledge of farmers about DSR method*

Knowledge of respondents regarding Direct Seeded Rice method on various aspects were studied like recommended seed rate, varieties, fertilizer practices, weeds, insect-pest, disease, etc. (Table 1). It was found that three-fourth of the respondents (75.0%) were strongly agree with recommended seed rate used i.e., 8 kg/acre followed by recommended variety was used for sowing: Tarawari, CSR-30 and Pusa Basmati-1121 (72.0%) and preparation and sowing in evening time for DSR method (69.0%). Contrary to that, nearly two-fifth of the respondents (39.0%) were disagreed with recommended insecticides were used for insect-pest control followed by recommended fungicides were used for disease control (25.0) and time of fertilizers (20.0%) [3]. Considering the need of more technical knowledge for the adoption of Direct Seeded Rice technology, the government should organize training programmes for skill development of farmers in this region.

Table 1 Knowledge of farmers about DSR method (n=200)

Statements regarding knowledge of DSR Method	Level of knowledge		
	Strongly agree	Agree	Disagree
Recommended seed rate used i.e., 8 kg/acre	150 (75.0)	28 (14.0)	22 (11.0)
Recommended variety was used for sowing: Tarawari, CSR-30 and Pusa Basmati - 1121	144 (72.0)	32 (16.0)	24 (12.0)
Preparation and sowing in evening time for DSR method	138 (69.0)	36 (18.0)	26 (13.0)
Sowing time 2 <sup>nd</sup> to 3 <sup>rd</sup> week of June	120 (60.0)	46 (23.0)	34 (17.0)
Seed was placed in the most fertile zone of the soil i.e., 2-3 cm. from surface	118 (59.0)	54 (27.0)	28 (14.0)
Interval of irrigation followed as per schedule	116 (58.0)	56 (28.0)	28 (14.0)
Time of fertilizers	108 (54.0)	52 (26.0)	40 (20.0)
Recommended fungicides were used for disease control	90 (45.0)	60 (30.0)	50 (25.0)
Recommended insecticides were used for insect-pest control	84 (42.0)	38 (19.0)	78 (39.0)

Figures in parentheses denote percentage

### *Level of knowledge about DSR method among farmers*

Analysis clearly revealed that nearly three-fifth of the respondents (59.0) had high level of knowledge regarding DSR method (Fig 1). Rest 23.0% and 18.0% respondents had medium and low level of knowledge regarding DSR, respectively [4].

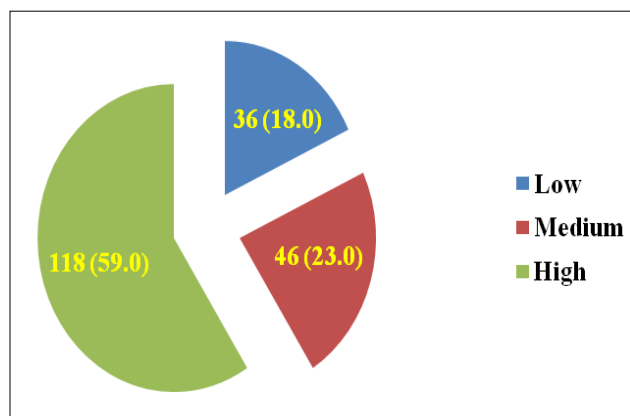


Fig 1 Level of knowledge about DSR method

### *Adoption of DSR method among farmers*

Analysis clearly revealed that more than three-fourth of the respondents (77.0%) were fully adopted method of sowing and depth of sowing followed by land preparation (71.0) and Seed treatment (70.0%). On the other hand, nearly one-fourth of the respondents (23.0%) did not adopt recommended variety sown followed by not followed Interval schedule of irrigations (19.0) and not utilized the recommended and timely dose of fertilizers (18.0%). Adoption level of direct seeded rice (DSR) by farmers and extension strategy to increase the adoption of direct seeded rice (DSR) cultivation in Haryana (India) [5]. Economic motivation of farmers was 70.83 per cent belonged to low to moderate level, whereas 67.5 per-cent of respondents belonged moderate to high innovation proneness. The overall adoption level of DSR technology was low to moderate, since 70 per-cent of respondents belonged to low to medium category.

It was found that nearly two-third of the respondents (64.0) had high level of adoption of direct seeded rice (DSR) method (Fig 2). Rest 22.0 and 14.0% had medium and low level of adoption of DSR, respectively. Adoption status of direct sowing paddy using drum seeder in puddle fields by

District Agricultural Advisory and Transfer of Technology Centre in five villages consists of 10 Frontline demonstrations and non FLD farmers for enhanced resource use efficiency and reducing the cost of paddy cultivation [6]. It was found that majority of FLD farmers (54%) had high extension

contact and medium farm holding (40%), whereas majority of non FLD farmers had (50%) medium extension contacts and small farm holding (44%). Forty percent of FLD farmers had high adoption level followed by medium (36%) and low (24%) level adoption.

Table 2 Level of adoption of DSR method among farmers (n=100)

Statements regarding adoption of DSR method	Level of adoption		
	Fully adopted	Partially adopted	Not adopted
Method of sowing and depth of sowing	77 (77.0)	18 (18.0)	5 (5.0)
Land preparation	71 (71.0)	24 (24.0)	5 (5.0)
Seed treatment	70 (70.0)	18 (18.0)	12 (12.0)
Recommended herbicides used	67 (67.0)	20 (20.0)	13 (13.0)
Disease, insect-pest control	66 (66.0)	21 (21.0)	13 (13.0)
Sowing time	66 (66.0)	19 (19.0)	15 (15.0)
Recommended variety sown	58 (58.0)	19 (19.0)	23 (23.0)
Interval schedule of irrigations followed	55 (55.0)	26 (26.0)	19 (19.0)
Recommended seed rate used	54 (54.0)	29 (29.0)	17 (17.0)
Recommended and timely dose of fertilizers	52 (52.0)	30 (30.0)	18 (18.0)

Figures in parentheses denote percentage

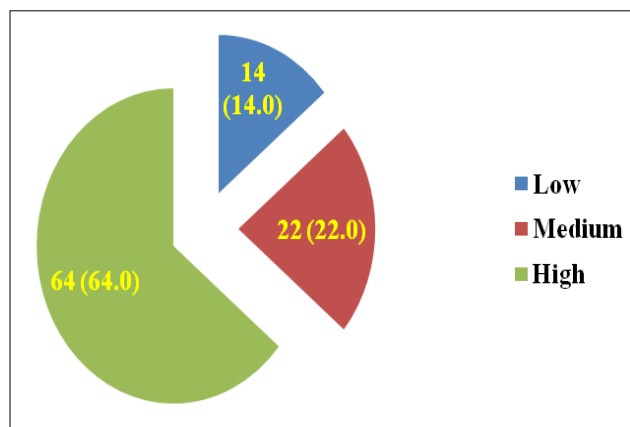


Fig 2 Level of adoption about DSR method

#### Level of adoption of DSR method of farmers as per socio-economic variables

The factors associated with level of adoption of respondents for practices of DSR method were studied in (Table 3). Education was found significantly associated with level of adoption of DSR Method. Analysis revealed that more than two-fifth of the respondents (61.5%), who were illiterate, had low level of adoption of DSR Method. On the other hand, overwhelming majority of the respondents (87.0%) who were graduate and above had high level of adoption of DSR Method. Subsidiary occupation and level of adoption of DSR Method were found significantly associated. More than three-fourth of the respondents (79.2%), who were engaged in business (small scale enterprises) and service, had high level of adoption of DSR Method. Size of land holding and level of adoption of DSR Method were found significantly associated. More than three-fourth of the respondents (76.6%), who had size of land holding between 5.1 to 10.0 acres, had high level of adoption of DSR Method. Contrary to that, 19.0% respondents, who had size of land holding between 2.51 to 5.0 acres, had low level of adoption of DSR Method. Type of family was found significantly associated with level of adoption of DSR Method. Nearly two-third of the respondents (64.8%), who belonged to nuclear family, had high level of adoption of DSR Method. Contrary to that, nearly one-fourth of the respondents (21.8%), who belonged to joint family, had low level of adoption of DSR Method. Significant association

was found between annual family income and level of adoption of direct seeded rice (DSR) Method. Overwhelming majority of the respondents (83.3%), who earned annual family income above Rs. 6,00,000, had high level of adoption of DSR Method. On the other hand, 18.2% who earned annual family income between Rs. 75,000-2,00,000, had low level of adoption of DSR Method.

Social participation was found significantly associated with level of adoption of DSR Method. Overwhelming majority of the respondents (85.3%), with medium level of social participation, had high level of adoption. On the other hand, one-third of the respondents (34.8%), with no social participation, had low level of adoption of DSR Method. Mass media exposure and level of adoption of DSR Method were found highly significantly associated. Analysis revealed that more than three-fourth of the respondents (79.1%), with high level of exposure to mass media, had high level of adoption of DSR Method. Contrary to that, 34.8% respondents, with low exposure to mass media, had low level of adoption. Highly significant association was found between socio-economic status and level of adoption of DSR Method. Analysis revealed that more than three-fifth of the respondents (76.6%), who had high socio-economic status, had high level of adoption of DSR Method. On the other hand, 45.0% respondents, who had low socio-economic status, had low level of adoption. Factors like age, caste and size of family of the respondents were found non-significantly associated with level of adoption of DSR method.

#### Reasons for adoption of DSR method

It was found that main reason for adoption of DSR method was reduced work load like labour (66.0%) followed by water saving from first to subsequent irrigation (65.0%) and higher net returning (61.0%) in (Fig 3). Adoption of direct seeded rice and mechanical transplanting of paddy technologies was more by large farmers having higher off-farm income and extension contacts than their non-adopter counterparts [7]. In the case of DSR adopter farmers, the yield was lower and variable costs were higher due to higher expenditure on weedicides and fertilizers in both common paddy and basmati, thus yielding lower gross margins. In the case of MT adopter farmers, the yield was higher and cost was lower, resulting into high gross margins for both basmati and common paddy [8-9].

Table 3 Association between socio-economic factors and level of adoption of farmers of DSR method

Variables	Level of adoption			Total
	Low	Medium	High	
Education				
Illiterate	8 (61.5)	3 (23.1)	2 (15.4)	13 (13.0)
Up to middle school level	1 (7.7)	3 (23.1)	9 (69.2)	13 (13.0)
Secondary school level	3 (10.7)	11 (39.3)	14 (50.0)	28 (28.0)
Senior secondary level	1 (4.3)	3 (13.0)	19 (82.7)	23 (23.0)
Graduation and above	1 (4.3)	2 (8.7)	20 (87.0)	23 (23.0)
Total	14 (14.0)	22 (22.0)	64 (64.0)	100 (100.0)
$\chi^2 \text{ Cal} = 39.989^*$				
Subsidiary occupation of the family				
Nil	3 (7.3)	8 (19.5)	30 (73.2)	41 (41.0)
Cattle rearing	9 (25.7)	11 (31.4)	15 (42.9)	35 (35.0)
Business (small scale enterprises) and service	2 (8.3)	3 (12.5)	19 (79.2)	24 (24.0)
$\chi^2 \text{ Cal} = 11.649^*$				
Size of land holding				
Marginal (up to 2.50 acres)	1 (14.3)	2 (28.6)	4 (57.1)	7 (7.0)
Small (2.51-5.0 acres)	4 (19.0)	12 (57.1)	5 (23.9)	21 (21.0)
Semi-medium (5.1-10.0 acres)	5 (10.6)	6 (12.8)	36 (76.6)	47 (47.0)
Medium (10.1-25.0 acres)	4 (16.0)	2 (8.0)	19 (76.0)	25 (25.0)
$\chi^2 \text{ Cal} = 23.887^*$				
Type of family				
Nuclear	4 (7.4)	15 (27.8)	35 (64.8)	54 (54.0)
Joint	10 (21.8)	7 (15.2)	29 (63.0)	46 (46.0)
$\chi^2 \text{ Cal} = 5.438^*$				
Annual family income				
Rs. 75,000-2,00,000	4 (18.2)	13 (59.1)	5 (22.7)	22 (22.0)
Rs. 2,00,000-4,00,000	6 (16.2)	4 (10.8)	27 (73.0)	37 (37.0)
Rs. 4,00,000-6,00,000	3 (13.0)	3 (13.0)	17 (74.0)	23 (23.0)
Above Rs. 6,00,000	1 (5.6)	2 (11.1)	15 (83.3)	18 (18.0)
$\chi^2 \text{ Cal} = 26.734^*$				
Social participation				
Nil	8 (34.8)	5 (21.7)	10 (43.5)	23 (23.0)
Low (1-2)	4 (9.3)	14 (32.6)	25 (58.1)	43 (43.0)
Medium (3-4)	2 (5.9)	3 (8.8)	29 (85.3)	34 (34.0)
$\chi^2 \text{ Cal} = 18.390^*$				
Mass media exposure				
Low (up to 9)	8 (34.8)	4 (17.4)	11 (47.8)	23 (23.0)
Medium (10-17)	4 (13.8)	10 (34.5)	15 (51.7)	29 (29.0)
High (above 17)	2 (4.2)	8 (16.7)	38 (79.1)	48 (48.0)
$\chi^2 \text{ Cal} = 16.65^{**}$				
Socio-economic status				
Low (12-18)	9 (45.0)	5 (25.0)	6 (30.0)	20 (20.0)
Medium (19-24)	3 (6.0)	12 (24.0)	35 (70.0)	50 (50.0)
High (25-31)	2 (6.7)	5 (16.7)	23 (76.6)	30 (30.0)
$\chi^2 \text{ Cal} = 22.373^{**}$				

Figures in parentheses denote percentage

\*Significant at 5% level

\*\*Highly significant at .01% level

#### Constraints in adoption of DSR method

Analysis revealed that constraints in adoption of DSR method were mainly: DSR method did not increase the yield at all (63.0%), lack of knowledge (59.0%), more complex system and technical assistance required (56.0%), high prices of herbicides, chemical fertilizers, pesticides and fungicides (52.0%), lack of technical guidance (47.0%), non-availability of specially designed drill (39.0%) and DSR method did not save money (36.0%) in (Fig 4) [10].

### CONCLUSION

It was concluded that nearly three-fifth of the respondents (59.0) had high level of knowledge regarding

DSR method. It was also found that nearly two-third of the respondents (64.0) had high level of adoption regarding DSR method. It was also suggested that training should be imparted for weed management, seed treatment, disease, variety, etc. to farmers regarding DSR method at cluster level.

#### Acknowledgements

This research work was undertaken as part of the Chaudhary Charan Singh Haryana Agricultural University, Hisar under the scheme of "Promotion and Impact Analysis of Direct Seeded Rice Technique of Rice cultivation on the Socio-economic Status of Farmers in Haryana". We are very grateful to Directorate of Research from Chaudhary Charan



Singh Haryana Agricultural University, Hisar with whom we had the privilege to interact during the implementation of this research. The richness of our discussions and provided some inestimable contribution to the conceptualization and writing

to the article. The authors also thank experts for constructive and helpful comments on earlier versions of the manuscript. We also thank to rural farmers who shared the actual information regarding direct seeded rice technology.

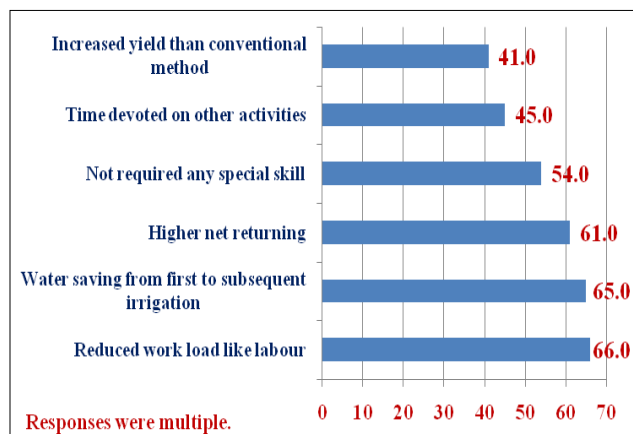


Fig 3 Reasons for adoption of DSR method

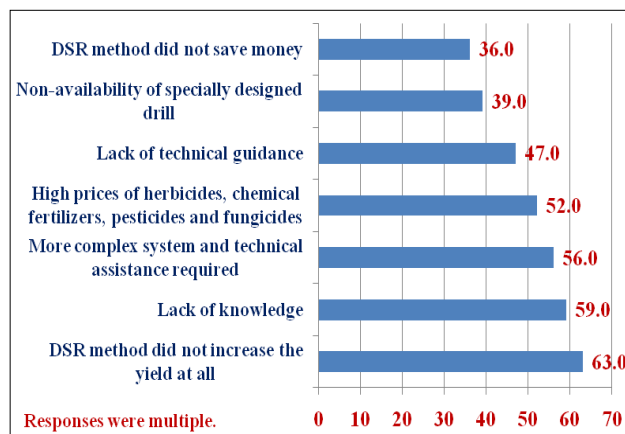


Fig 4 Constraints in adoption of DSR method

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