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Study the level of knowledge and extent of adoption in Niger production technology among the Niger growers

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Abstract
India is a large producer of oilseeds and a major importer of edible oils. In Chhattisgarh, Niger crops are grown in Sarguja, Jashpur, and Baster. According to the ICAR (2011-14) report, the area of Niger cultivation is (Sarguja-22.00 thousand ha, Jashpur-21.33 thousand ha; and Baster, 11.00 thousand ha), whereas Jashpur district comes on 2nd position in the area of Niger cultivation. This study was carried out in Jashpur district of Chhattisgarh state in the years 2021-2022. Jashpur district consists of 8 blocks, out of which 2 blocks were selected purposefully because they covered the largest area under the Niger crop as compared to other blocks. For this study, a total of 140 farmers were chosen. A personal interview schedule was used to gather the data, which was then properly analyzed by utilizing statistics like means, standard deviations, frequencies, percentages, and Pearson's correlation coefficients, among others, to provide an understanding of the information. The study was designed to highlight the causes responsible for the adoption of Niger production technology among the tribal framers of Jashpur district. This study will also be helpful for planners, administrators, and anyone else who is directly or indirectly associated with the cultivation of Niger. Most people have a medium level of understanding of Niger's production technology. It was determined that the knowledge needed was greatest for the techniques of harvesting and threshing, preparing the land, and sowing. The adoption rate was generally moderate, and investigations into a few activities revealed that harvesting and threshing, land preparation, and sowing time had the highest adoption rates.

Keywords: Knowledge, adoption, production technology and Niger growers

Introduction

The Niger (*Guizotia abyssinica*) is significant. It belongs to the Asteraceae family. It's an essential oil with healing powers that originated in India and Ethiopia. Niger, despite being a minor oilseed crop, is significant because it contains 32 to 40% grade oil and 18 to 24 percent protein in the seed. (Dastagiri and Jainuddin, 2017) [8]. Niger oil is a slow-drying oil that is used in foods, paints, soaps, and illuminants. It can be adulterated with rapeseed, sesame, and linseed oils and is used as a substitute for olive oil. Cooking is done with oil. The oil extracted from the seed is used to treat burns and scabies. The seed is used as a condiment and is fried. Animal feed is made from the press cake left over from oil extraction. Niger oil has a long shelf life and contains 70 percent unsaturated fatty acids that are free of contaminants. The oil is thought to be beneficial to one's health. Making the greatest use of the land that is available and using improved crop management techniques are both necessary to increase crop yield. The adoption and dissemination of contemporary agriculture technology are essential to the Indian economy. Oilseed output grew from 108.3 lakh metric tons in 1985-86 to 361.009 lakh metric tons in 2020-21 as a consequence of the TMOP's concerted efforts. This resulted in an increase in both area and productivity, which increased from 570 kg/ha in 1985-86 to 1284 kg/ha, 1224 kg/ha, and 1254 kg/ha in 2017-18, 2019-20, and 2020-21, respectively. Due to favorable weather conditions and support provided by the Government of India to the oilseed production or developmental programs and policies, the country produced the highest ever amount of oilseeds, 361.009 lakh metric tons in 2020-21, followed by 332.192 lakh metric tons in 2019-20, with a record productivity level of 1284 kg/ha in 2017-18 and 1254 kg/ha in 2020-21. It has also been recognized that only rural change agents with a high level of expertise and professionalism can modernize agriculture. This agent's crucial task is to inform the farming community of current advancements in agricultural technology and to facilitate the adoption of new technology. In Chhattisgarh, Niger crops are grown in Sarguja, Jashpur, and Baster. According to ICAR (2011-14) report, the area of Niger cultivation is (Sarguja-22.00 thousand ha, Jashpur-21.33 thousand ha and Baster-11.00 thousand ha). (Ranganatha *et al*., 2013) [21]. Jashpur district comes in second in area of Niger cultivation. Ramtil cultivation is the main crop among the oilseed crops sown in almost tribal-dominated areas. It is known as "Jatangi" in the local language. The total area under oilseed crop in the district is 3639 hectares, out of which Niger is grown on 3534 hectares. There is also buffer production of ramtil in Jashpur district. This crop is not only an important source for farmers, but it also has special importance for traders. From Jashpur district to the border areas of Jharkhand and Surguja division, the production of Ramtil was more than 50 to 60 lakh dollars and was exported every year. (Chaudhary, N,S. 2020) [1].

Methodology

The study was conducted in Jashpur district of Chhattisgarh state because this district covered the maximum area under the Niger crop. Jashpur district consists of 8 blocks, out of which 2 blocks were selected purposefully because they covered the largest area under the Niger crop as compared to other blocks. From each selected block, seven villages were selected randomly. (2*7 = 14), and then 10 farmers were selected from each village; in this way, a total of 140 respondents were considered for this study.

Results and Discussion

Table 1: Level of knowledge of Niger production technology

Sl. No.	Package of practices	Low knowledge		Partially knowledge		Fully knowledge	
		F	%	F	%	F	%
1.	Types of soil	20	14.28	70	50.00	50	35.72
2.	Land preparation	10	7.14	50	35.72	80	57.14
3.	Time of sowing	12	8.58	58	41.42	70	50.00
4.	Seed rate (kg/ha)	40	28.58	50	35.71	50	35.71
5.	Seed treatment	100	71.42	40	28.58	00	0.00
6.	Improved varieties	30	21.42	100	71.43	10	7.15
7.	Method of sowing	10	7.14	50	35.72	80	57.14
8.	Fertilizer per ha (N:P:K)	60	42.86	68	48.57	12	8.57
9.	Time of weeding	20	14.28	60	42.86	60	42.86
10.	Knowledge of insecticide	90	64.28	40	28.58	10	7.14
11.	Knowledge of disease	100	71.42	40	28.58	00	0.00
12.	Harvesting & threshing	10	7.15	30	21.43	100	71.42
13.	Yield q/ha	00	0.00	100	71.42	40	28.58

1. Types of soil

The study reveals that the majority (50%) of farmers had partial knowledge about the soil in which the Niger crops were grown, while the rest (35.72%) had full knowledge and low knowledge (14.28%) regarding soil types.

2. Land preparation

Table 1 shows that out of 140 farmers, 57.14% had full knowledge about land preparation, while 35.72 percent and 7.14 percent had partial and low knowledge, respectively. Similar findings were also reported by Chaudhary *et al.* (2013) [6].

3. Time of sowing

Majority of the farmers had fully knowledge (50%) about the sowing time of Niger, while 41.42 percent and 8.58 percent farmers had partial and low knowledge about the sowing time of Niger crops. Similar findings were also reported by Chaudhary *et al.* (2013) [6].

4. Seed rate (kg/ha)

Regarding seed rate, only 35.71 percent farmers had fully or partially knowledge about seed rate, but 28.58% did not have knowledge about seed rate (kg/ha).

5. Seed treatment

The majority (71.42%) of farmers had low knowledge about the right chemicals for seed treatment, and 28.58% of farmers had partial knowledge, which might be due to their low extension contact. A similar result was reported by Shakya *et al.* (2008) [22].

6. Improved varieties

To produce a higher yield, choosing the right variety is crucial. Majority farmers had partially (71.43%) knowledge about improved varieties of seed, while 21.42% and 715% had low and full knowledge of improved varieties of seed. A similar result was reported by Kumar and Kumawat (2019) [13].

7. Method of sowing

The majority (57.14%) of the farmers had full knowledge about sowing methods, whereas 35.72% and 7.14% had partial and low knowledge about sowing methods, which may be due to a lack of knowledge about the importance of recommended sowing methods.

8. Fertilizer per ha (N:P:K)

The data on fertilizer application indicated that the majority (48.57%) of farmers had partial knowledge, while 42.86% and 7.58% had low and high knowledge about fertilizer application, which might be due to a lack of knowledge about the importance of a balanced dose of fertilizers.

9. Time of weeding

In the case of weeding, the majority (42.86%) of farmers had full as well as partial knowledge regarding the time of weeding, while 14.28 percent had low knowledge about the time of weeding.

10. Knowledge of insecticide

64.28 percent of farmers had low knowledge about the insecticide, 28.58 percent had partial knowledge, and 7.14 percent had full knowledge about the insecticide that is used for insect control.

11. Knowledge of disease

Table 1 shows that 71.42 percent and 28.58 percent farmers had low or partial knowledge about the disease that spread or outbreaked on the Niger crops, respectively.

12. Harvesting & threshing

Majority 71.42 percent of farmers had full knowledge about harvesting and threshing, whereas 21.43% and 7.15 percent had partial and low knowledge about the time duration of weeding and threshing as well as the techniques used. The above findings were consistent with the findings of Singh *et al*. (2008) [23] and Chaudhary *et al*. (2013) [6].

13. Yield q/ha

The majority (71.42%) of farmers had partial or full knowledge (28.58%) about the amount of yield per hectare.

Table 2: Distribution of the respondents according to their overall level of knowledge. (n=140)

Sl. No.	Categories	Frequency	Percentage
1.	Low knowledge (below 21.62)	23	16.42
2.	Medium knowledge (21.66-30)	81	57.86
3.	High knowledge (above 31)	36	25.72
Total		140	100.00

Mean=26.41, S.D=4.79

Table 2 shows that out of 140 Niger growers (57.86%), had a medium level of knowledge about Niger production technology. Whereas 25.72 percent and 16.42 percent of the Niger growers had high and low levels of knowledge, respectively. A similar result was reported by Chandawat and Singh. (2013) [5], Yadav *et al*. (2014) [29].

Table 3: Extent of adoption of Niger production technology

Sl. No.	Package of practices	Not adopted		Partially adopted		Fully adopted	
		F	%	F	%	F	%
1.	Land preparation	08	5.72	50	35.71	82	58.57
2.	Time of sowing	10	7.15	60	42.85	70	50.00
3.	Seed rate	30	21.42	70	50.00	40	28.58
4.	Seed treatment	110	78.58	30	21.42	00	0.00
5.	Improved varieties	40	28.58	100	71.43	00	0.00
6.	Method of sowing	115	82.15	25	17.85	00	0.00
7.	Fertilizer per ha (N:P:K)	00	00.00	00	00.00	00	00.00
8.	Time of weeding	10	7.15	70	50.00	60	42.85
9.	Harvesting & threshing	10	7.14	20	14.28	110	78.58

1. Land preparation

The majority (58.57%) of farmers adopted fully land preparation practices, and nearly 5.72 percent did not adopt this practice at all. whereas 35.71 percent of farmers partially adopted land preparation. Similar findings were reported by Chaudhary *et al*. (2013) [6].

2. Time of sowing

The majority (50%) of farmers had adopted the proper time of sowing in Niger, whereas 42.85% and 7.15% of farmers had partially or not adopted the proper time of sowing in Niger. Similar findings were reported by Chaudhary *et al*. (2013) [6].

3. Seed rate (kg/ha)

The majority of farmers, 50 percent, had partially adopted the actual seed rate quantity, while 28.58% of farmers had fully adopted it, and 21.42 percent had not adopted the actual quantity of seed rate. Similar observations were also made by Bhimawat and Gupta (2005) [3].

4. Seed treatment

In the case of seed treatment, the data reveals that 78.58 percent of farmers do not adopt any seed treatment, and the rest (21.42%) partially adopt it.

5. Improved varieties

Majority farmers had partially adopted (71.43%) improved varieties of seed, while 28.58% farmers had not adopted improved varieties of seed, but they should adopt the improved varieties of seed because it increases the yield.

6. Method of sowing

It is a significant management factor that directly affects the need for seeds, the establishment of plants, the effectiveness of cultural activities, and the effectiveness of production inputs. In this method of sowing, 82.15% of farmers had not adopted it, whereas 17.85% had partially adopted the recommended method of sowing. Similarity results were reported by Singh *et al*. (2013) [24].

7. Fertilizer per ha (N:P:K)

The fertilizer application data indicated that not a single farmer had adopted it, which may be due to a lack of knowledge about the importance of a balanced dose of fertilizers. Observations were also made by Patra and Kense (2020) [19].

8. Time of weeding

The majority (50%) of farmers were partially adopted, 42.85% were fully adopted in the case of weeding, and 7.15

percent were not adopted in the weeding timing. Similar observations were also made by Gills *et al*. (2013) [11].

9. Harvesting & threshing
78.58 percent of farmers fully adopted harvesting and threshing on time, whereas 14.28% and 7.14% of farmers did not adopt the time duration of weeding and threshing as well as the techniques. Similar findings were identical to those of Kumbhare and Singh (2011) [14] and Chaudhary *et al*. (2013) [6].

Table 4: Distribution of the respondents according to their overall extent of adoption. (n=140)

Sl. No.	Categories	Frequency	Percentage
1.	Low adoption (<18.57)	24	17.14
2.	Medium adoption (18.58-24.76)	87	62.14
3.	High adoption (>24.77)	29	20.72
Total		140	100.00

Mean=21.67,S.D=3.10

Table 4 shows that out of 140 Niger growers, 62.14% had a medium extent of adoption of the Niger production technology, whereas 20.72 percent and 17.14 percent of the Niger growers had a low and high extent of adoption, respectively. Similar findings were also reported by Yadav *et al*. (2014) [29].

Profile of tribal farmers

Table 5: Socio-profile and socio-economic characteristics of the respondents (n=140)

Sl. No.	Characteristics	Categories	Frequency	Percentage
1.	Age	Below 35 years	61	43.58
		36 to 55 years	69	49.28
		Above 56 years	10	7.14
2.	Education	Illiterate	12	8.58
		Primary education (1st to 5th)	30	21.42
		Middle School education (6th to 8th)	30	21.42
		High School education (9th to 10th)	41	29.28
		Higher Secondary education (11th to 12th)	19	13.58
		Graduate and post graduate	8	5.71
3.	Family size	Small (up to 4 members)	35	25.00
		Medium (5-8 members)	74	52.86
		Large (above 8 members)	31	22.14
4.	Occupation	Agriculture	0	0.00
		Agriculture + Poultry	6	4.28
		Agriculture + Labour	16	11.43
		Agriculture + Fish farming	19	13.58
		Agriculture + Animal husbandry	99	70.71
5.	Farming experience	Farming experience (Up to 10 years)	62	44.28
		Farming experience (11-20 years)	71	50.72
		Farming experience (Above 20 years)	7	5.00
6.	Land holding	Marginal (up to 1.00 ha)	10	7.14
		Small (1.01-2.00 ha)	86	61.43
		Medium (2.01-4.00 ha)	40	28.58
		Large (Above 4.00 ha)	4	2.85
7.	Annual income	Less than Rs.50,000	17	12.15
		50,001-Rs.1,00,000	113	80.72
		Rs.1,00,001-1,50,000	8	5.71
		More than Rs.1,50,000	2	1.42
8.	Area covered under Niger cultivation	<0.47 ha.	33	23.57
		0.48 ha.-1.30 ha.	95	67.86
		> 1.31 ha.	12	8.57
9.	Productivity	Low (below 495.75 kg/ha)	9	6.42
		Medium (495.75 kg/ha-579.76 kg/ha)	109	77.86
		High (above 579.77 kg/ha)	22	15.72

1. Age
According to Table 5, the majority of Niger growers (49.28%) were under the age group of 36 to 55 years, followed by 43.58% in the age group of below 35 years and 7.14% in the age group of above 56 years. As a result, the majority of Niger growers were in the middle age group (35 to 55 years). The findings indicated that the majority of the Niger growers in this area belonged to the middle age groups (35 to 55 years), followed by the young age group (below 35 years) and the older age group (above 56 years). This reflected that the young age group was involved less in number as compared to the middle age group, and the old age group was not much involved in the Niger cultivation.

These findings are similar to those of Tiwari *et al*. (2007) [27], who reported that out of the total pea growers, 31.70 percent were in the young age group, 46.35 percent belonged to the middle age group, and 21.95 percent were in the old age group. And also similar findings by Chandawat and Singh (2013) [5].

2. Education
Table 5 indicates that, out of 140 Niger growers, about 29.28 percent belonged to the high school category, followed by 21.42 percent for primary and middle school, 13.58 percent for higher secondary, 8.58 percent for illiterate, and 5.71 percent for graduate and postgraduate, respectively. Similar results were revealed by Parmar and Sharma (2014) [17] and Jakkawad *et al*. (2017) [12].

3. Family size
In the case of family size, it can be revealed that the majority of the respondents (52.86%) had a medium-sized family (5-8 members), followed by 25 percent with a small-sized family (up to 4 members), and 22.14 percent of the respondents had a large-sized family (above 8 members). Similar findings were also reported by Wasula S.L. *et al*. (2014) [28].

4. Occupation
According to Table 5, the majority of the respondents (70.71%) were involved in agriculture + animal husbandry, agriculture + fish farming (13.58%), followed by agriculture + labor (11.43%), and agriculture + poultry (4.28%). It can be concluded that the majority of the respondents were involved in agriculture and animal husbandry. Similar to the findings of Dhodia *et al*. (2014) [10].

5. Farming experience
Table 5 indicates that the majority of the respondents (50.72%) had 11-20 years of Niger farming experience, whereas 44.28% had up to 10 years of Niger farming experience, and only 5% had above 20 years of Niger farming experience. Similar findings were also reported by Parmar and Sharma (2014) [17].

6. Land holding
Table 5 shows that out of 140 respondents, about 61.43 percent had small land holdings (1.1 to 2 ha.), followed by about 28.58 percent who were medium land holders (2.1 to 4 ha.), 7.14 percent who had marginal land holdings (up to 1 ha.), and only 2.85 percent who were large farmers having more than 4 ha of land. A similar result had been revealed by Patel (2008) [18].

7. Annual income
The distribution of the respondents according to their annual income is presented in Table 5, which shows that 80.72 percent of the respondents had their annual income between Rs. 50,001 to Rs. 1,00,000, whereas 12.15 percent of the respondents had annual income less than Rs. 50,000, while 5.71 percent of the respondents had their annual income between Rs.1,00,001-Rs. 1,50,000 and only 1.42 percent of the respondents had annual income more than Rs. 1,50,000. Similar findings were also reported by Singh Bhati and Ram (2014) [25].

8. Area covered
Table 5 indicates that the majority of the respondents (67.86%) were cultivating Niger in an area of 0.48-1.30 ha. where 23.57 percent were cultivating Niger in an area of less than 0.47 ha and 8.57 percent were cultivating Niger in an area of more than 1.31 ha, respectively.

9. Productivity
Table 5 shows that the majority of Niger growers had 77.86 percent of productivity that was in between (495.75kg/ha-579.76 kg/ha), whereas 15.72 percent of respondents had high productivity that was above 579.77 kg/ha and 6.42 percent had productivity below 495.75 kg/ha, respectively.

Table 6: Correlation analysis of independent variables with the level of knowledge and extent of adoption of Niger production technology.

Sl. No.	Correlation	Knowledge (r' value)	Adoption (r' value)
1.	Age	0.102 NS	0.164 NS
2.	Education	0.106 NS	0.168*
3.	Family size	0.039NS	0.048NS
4.	Occupation	0.175*	0.181*
5.	Farming experience on Niger cultivation	0.195*	0.168*
6.	Land holding	0.572**	0.441**
7.	Annual income	0.223**	0.220**
8.	Area covered under Niger cultivation	0.102 NS	0.154 NS
9.	Productivity	0.250**	0.220**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
NS-No significant

As shown in Table 6, knowledge was positively and highly significantly related to land holding, annual income, and productivity at the 0.01 percent level of significance, while occupation and farming experience were positively and significantly related to knowledge at the 0.05 percent level of significance. The strong correlation indicates that when the degree of the factors mentioned, including land holding, annual income, and productivity, improves, knowledge will also improve automatically. There is no significant relationship between age, education, family size, and area covered under Niger cultivation and their knowledge level about Niger production technologies. A similar report was filled in for age by Devarani and Bandhyopadhyay (2014) [9] and family size by Rajan *et al*. (2021) [20]. And similar results were reported by Bhoi *et al*. (2014) [4] area covered by castor cultivation. So, there will be no changes if these variables increase or decrease.

In a similar way, adoption was positively and highly significantly related to land holding, annual income, and productivity at the 0.01 percent level of significance, while education, occupation, and farming experience were positively and significantly related to adoption at the 0.05 percent level of significance. In the case of land holding, similar results were revealed by Mazumder *et al*. (2011) [15]. The significant correlation indicates that as the degree of the factors mentioned, including land holding, annual income, productivity, education, occupation, and farming experience, improves, the respondent's adoption will also improve. There is no correlation between age, family size, and area covered under Niger cultivation to extent their adoption of Niger production technologies. Similar findings were reported in the case of age and family size by Pandya *et al*. (2014) [16] and Singh *et al*. (2022) [26].

Conclusion

The study found that overall knowledge about production technology among Niger growers was medium, i.e., 57.86% and 62.14% had a medium extent of adoption, with 25.72% and 16.42% having high and low levels, respectively. The majority of respondents (49.28%) are aged 36-55, have completed high school education, have families with a median size of 5 to 8 members, and are employed in agriculture and animal husbandry. About 50.72% have 11-20 years of Niger farming experience. Most growers have small land holdings, with productivity ranging between 495.75 and 579.76 kg/ha. The study found that knowledge of Niger growers is significantly correlated with factors such as land holding, annual income, productivity, occupation, and farming experience.

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