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Constraints in Adoption of Modern Farm Machines by Tribal Farmers in Ramgarh District of Jharkhand

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ABSTRACT

A descriptive study of constraints faced by farmers in adopting improved tools and implements as well as suggestions to improve farm mechanization was planned. An exploratory study was conducted to enlist the major traditional and modern agricultural tools used by tribal farmers of five selected villages of Ramgarh district of Jharkhand state. Traditional tools play a crucial and dominant role in agricultural operations in tribal-dominated areas. Documentation and characterization of these tools are imperative in understanding the transition from traditional tools to modern tools. A door-to-door survey approach of randomly selected tribal farmers with a predesigned schedule for data collection was employed to collect the information on commonly used tools. Majority of farmers (75 %) had more than one bullock. However, few (9.33 %) farmers had single bullock with them. Most of the farmers (71 %) owned less than one ha land. Only 17 (11.33%) farmers owned tractor and power tiller. Only 6 (4.61 %) and 3 (2 %) farmers owned cultivator and rotavator, respectively. Tractor with cultivator was hired by most of the farmers (32.31%), followed by rotavator (19.23 %). Based on the mean values, the 'small size of the land' was ranked first among different constraints faced by farmers in adopting farm machines. Also, farmer's suggested 'Training program for skill development' as a top priority for increasing the farm mechanization status.

KEYWORDS

farm mechanization, tribal, traditional tool, constraints, Jharkhand

INTRODUCTION

Traditionally farmers are using a variety of tools which has been indigenously developed and built according to their needs (Das and Nag 2006). Jharkhand state is dominated by tribal populations and they are engaged in agriculture and wage activities.In Ramgarh district of Jharkhand, 21 percent is tribal population (Census 2011). The economic activity in the district is primarily dependent on agricultural activity. The cultivators (43.39%) and agricultural laborers (21.63%) together constitute 65.02 percent of the total workers of the district (Anonymous 2011). Tribal farmers are characterized by small and fragmented land holdings (Prasad 2012). Traditionally land occupancy status was lying with the tribal, but in the gradual process, it has been transferred to coal mining and mineral exploration firm. Human and animal power still dominates the tribal farming system and they rarely use mechanical power. Traditionally farmers are using a wide range of small tools in their day to day life for agricultural operations (Karthikeyan *et al.*, 2009). Traditional tools refer to those tools invented in ancient times, and used for a long time, until recently or still being used now to increased agricultural production (Elzubeir 2014). The traditional agricultural tools and technology of the tribal farmers are mostly made up of bamboo, wood and iron made by local artisans. Now standardized factory-made traditional implements, which are very economical, are also being used. The traditional agricultural tools of the tribals are both used by men and women. Each tool is used in connection with a particular function in a series of agricultural operations such as land preparation, sowing, weeding, irrigation, harvesting, post-harvesting operations and transportation. The purpose of the study was to gather reliable information about the traditional agricultural tools and technology of the tribals as well as document these traditional tools and technology, as these traditional tools and technology are at the verge of extinction with the coming of modern tools and technology. An inference was drawn about the major constraints in adoption of farm machines by farmer and also suggestions to improve farm mechanization.

MATERIALS AND METHODS

The study was conducted in the five tribal-dominated villages namely Aarabasti, Badka Chumba, Gandhonia, Govindpur and Gargali in Ramgarh district (Latitude: 23.6524° N, Longitude: 85.5612° E and the average altitude is 337 msl). A total of 150 households (30 in each village) were randomly selected from five villages. Information related to indigenous tools used by them for carrying out the agricultural practices and other socio-personal traits were collected through the schedule and focused group discussions. The traditional equipments were listed along with their dimensions and other parameters like working width, manufacturing materials, weight, etc.

The head of the selected household was interviewed personally through a structured interview schedule. Ten possible constraints and six suggestions of farmers for improving the farm mechanization services were enumerated after reviewing the reliable sources like nearby Krishi Vigyan Kendra, NGOs and the head of the *Panchayat*. The identified constraints were measured on a four-point scale, i.e. most serious constraint, serious constraint, less serious constraint and not a constraint with a scoring system of 4, 3, 2 and 1, respectively. The identified suggestions were measured on a three-point continuum, i.e. agree, neutral and disagree with a scoring system of 3, 2 and 1 respectively. Following the tabulation

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and necessary sorting, statistical analysis viz. frequency and percentage were used to draw the inferences. Mean score for each reason was calculated and the reasons were ranked based on the mean score.

RESULTS AND DISCUSSION

Indigenous tools and implements used by tribals in the region

A brief discussion of the most commonly used indigenous agricultural tools and implements along with a pictorial view is given in the study, which includes their name, local name, description and usages. In the plateau and hill region, farmers have been using a variety of traditional tools and implements for agricultural practices, some of which are enlisted below:

Landholding and farm mechanization pattern of farmers

Landholding patter greatly influences the adoption and effectiveness of farm machines utilization. The majority of tribal farmers (96 %) of the surveyed villages were small to marginal. Only 4% of farmers are having acreage of 2-4 hectare (Fig. 1). Size of the family is also an important factor as family members work as labours in their own field. Small landholding with more number of family members faces less difficulty than the small family-sized farmers. Out of surveyed household, small family size was only 15 % while the majority of the family (69 %) was of medium size with 5 to 8 family numbers (Fig. 2).

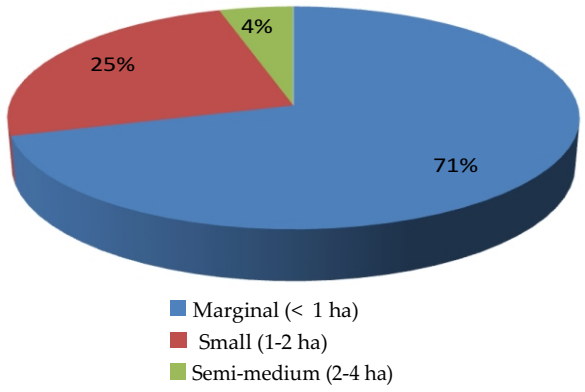

Fig.1: Landholding pattern of farmers

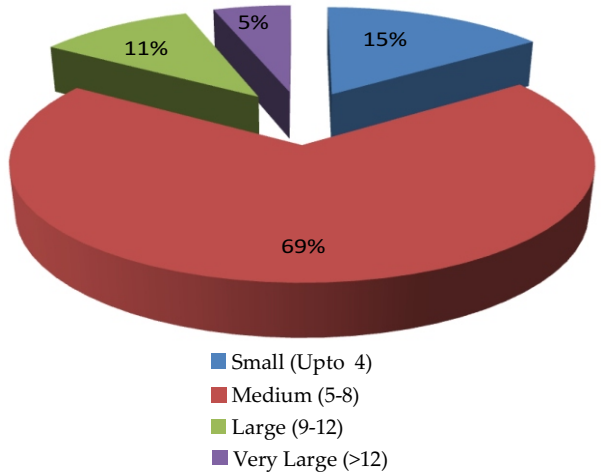

Fig. 2: Family size Pattern of farmers

The pattern of usage of traditional farm tools among farmers

Most of the tribal farmers are using traditional tools, like spade, sickle, khurpa, axe, *dao* etc. Almost 84 percent of farmers were using bullock as a traditional source of power. Majority of farmers (75 %) were having a pair of a bullock. However, few (9.33 %) farmers had single bullock with them (Table 1). They hired bullocks from nearby farmers during the cropping season. *Desi hal* (plough) drawn by a pair of bullocks was used by 86.67 % of farm families. Almost every family who had *desi hal* were also having local iron/wood made leveler.Almost 19 percent farmers hired *desi hal* along with bullock with charges of between Rs. 300-400 per day.

Table 1: Distribution pattern of farm tools and implements among farmers (N = 150)

Sl no.	Particulars	No. of Households (%)
A.	**Traditional Power source**	
	Bullocks (more than 1)	112 (74.66)
	Bullock (Single)	14 (9.33)
B.	**Traditional tools**	
	Desi Plough (Iron Make)	91 (60.67)
	Desi Plough (wood make)	27(18.00)
	Wooden cum hollow angle plough	12 (8.00)
	Leveller or *Dohra* (Wood make)	99(66.00)
	Leveller (Iron make)	20 (13.33)
	Leveller (Karha)	9 (6.00)
	Other Traditional tools (*Khurpa*, Sickle, and D *ao*)	150 (100.00)
C	**Modern Power Source**	
i)	Tractor	3 (2.00)
ii)	Power tiller	14 (9.33)
D	**Modern tools/implements**	
i)	Knapsack Sprayer	116 (77.33)
ii)	Cultivator (Tractor operated)	6 (4.61)
iii)	Rotavator	3 (2.00)
iv)	Thresher	5 (3.33)
v)	Irrigation pump	55 (36.67)

The pattern of usage of modern/improved farm machines among farmers

Modern improved tools like sprayer, cultivator, rotavator, electric motors, threshers, etc., are being used by a few farmers. According to farmers since the last five years, the use of tractor and power tillers had increased on their farms. They attributed this to the shortage of labour during crop season as well as to the efficient timeliness of the machine. However, out of 150 farmers, only 17 (11.33%) farmers had tractor and power tiller (Table 1). The tractor and power tillers were hired by most of the farmers. The hiring of farm implement was very common in the area and tractor with cultivator was hired by most of the farmers (32.31%). The hiring charges for cultivator with tractor varied from Rs. 700-800 per hour.

However, only 6 (4.61 %) and 3 (2 %) farmers owned cultivator and rotavator, respectively. The hiring of rotavator with the

tractor was also more with 19.23 percent farmers using it for tilling their field. Their hiring charges ranged from Rs. 900-1200 per h (Table 2). More than 77 percent of farmers used their owned Knapsack sprayer for spraying pesticides and insecticides. Irrigation pump was also one of the important equipment being used by farmers. Almost 37 percent of farmers owned them and 10 percent of farmers (Table 2) hired them for irrigation their crop. Their hiring charges were Rs.100-200 per hour. The charges for petrol/diesel used in power sources were included in the hiring charges. Tractor-trailer was also hired by a few farmers (4 %). However, no one owned them among the surveyed farmer. Its charges were Rs. 400-500 per trip.

Table 2: Hiring pattern of farm implements

Farm implements	No. of Households hiring implements (%)	Hiring charges (Rs)
Power tiller	29 (19.33)	350 -450 per h
Tractor with cultivator	52 (32.31)	700 -800 per h
Tractor with rotavator	18 (19.23)	900 -1200 per h
Desi plough with a pair of bullock	28 (18.66)	300 -450 per day
Thresher	16 (10.67)	500 -700 per h
Irrigation pump Tractor	15 (10.00)	100 -200 per h
trailer	06 (4.00)	400 -500 per trip

Table 3: Distribution of farmers based on constraints in adoption of farm tools and implements

Constraints	Most serious		Serious		Less serious		Not a constraint		MS	Rank
	No. of Farmers	(%)	No. of Farmers	(%)	No. of Farmers	(%)	No. of Farmers	(%)		
Small size of land	129	86.00	11	7.33	7	4.67	3	2.00	3.77	I
Scattered field	119	79.33	18	12.00	10	6.67	3	2.00	3.69	IV
Lack of approach road to farms	61	40.67	22	14.67	30	20.00	38	25.33	2.70	X
Lack of availability of machine	105	70.00	29	19.33	12	8.00	4	2.67	3.57	VI
Costly machines	118	78.67	23	15.33	6	4.00	3	2.00	3.71	III
Lack of facility of repair and maintenance	128	85.33	11	7.33	8	5.33	3	2.00	3.76	II
Unawareness about existence of machine for particular work	49	32.67	41	27.33	31	20.67	29	19.33	2.73	IX
Non availability of electricity	69	46.00	29	19.33	27	18.00	25	16.67	2.95	VIII
Poor economic conditions	103	68.67	30	20.00	8	5.33	9	6.00	3.51	VII
Lack of credit facility	118	78.67	20	13.33	8	5.33	4	2.67	3.68	V

Constraints in adoption of advance tools/implements in the region

The five major constraints which were perceived as 'most serious constraints' were the small size of land, lack of facility of repair and maintenance, scattered field, costly machine and lack of credit facility by 86.00, 85.33, 79.33, 78.67 and 78.67 percent farmers, respectively (Table 3). Unawareness about the existence of machine for particular work (27.33 %), poor

Table 4: Suggestions given by farmers for improving farm mechanization

Suggestions	Agree		Neutral		Disagree		MS	Rank
	No. of Farmers	(%)	No. of Farmers	(%)	No. of Farmers	(%)		
Training program for skill development	143	95.33	6	4.00	1	0.67	2.95	I
training programme for awareness about farm machines	135	90.00	14	9.33	1	0.67	2.89	III
Agricultural mechanization fair	136	90.67	12	8.00	2	1.33	2.89	III
Establishment of Custom hiring centers	143	95.33	2	1.33	5	3.33	2.92	II
subsidy on agricultural machines	132	88.00	16	10.67	2	1.33	2.87	IV
Easy credit facility by bank	132	88.00	15	10.00	3	2.00	2.86	V

economic conditions (20 %) and intermittent availability of electricity (19.33%) were perceived as serious constraints by tribal farmers. Whereas, 20.67, 20, and 18 percent of farmers considered unawareness about the existence of machine for particular work, lack of approach road to farms and poor economic condition as less serious.

Based on the mean values, the constraints were ranked and 'small size of land' was ranked first with the mean score of 3.77 out of a maximum possible score of 4. Small land restricts the efficient and economical use of costly farm machines. The least influential constraint was 'lack of approach road to farms' with a mean score of 2.70.

Suggestions by farmers for improvement of farm mechanization status

Most of the farmers were in agreement with the suggestions like a training program for skill development (95.33 %), the establishment of custom hiring centers (95.33%) and agricultural mechanization fair (90.67 %) and training program for awareness about farm machines (90 %).

Based on the mean values, the suggestions were ranked and 'Training program for skill development' was ranked first with a mean score of 2.95 out of a maximum possible score of 3. The least score of 2.86 was given to 'easy credit facility by bank' (Table 4).

CONCLUSIONS

Tribal farmers have Small and fragmented land holdings and continue to use indigenous tools and implements as it is cheaper, economical and easily available nearby.However, the blending of modern tools and implements has started mostly through custom hiring. Tractor with cultivator was the most hired implements among the farmers (52%).Surveyed farmers listed small size of land as the most serious constraints in adopting farm machines as they are not economical for the small land size. Also, they suggested that imparting training to farmers is the most important activity towards improving the mechanization status in the villages.

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