



Traditional Agricultural Tools used by Tribal Farmers in Chhotanagpur Plateau

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ABSTRACT

An exploratory study was conducted to enlist the traditional agricultural tools used by tribal farmers of five selected villages of Ramgarh district of Jharkhand state, which falls under Chhotanagpur plateau. 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 pre-designed schedule for data collection was employed to collect the information on commonly used tools. The majority of farmers (75%) had more than one bullock; however, few (9.33 %) farmers had a single bullock with them. Most of the farmers (71%) owned less than one ha land. The significant tools and implements used by tribal farmers were desi plough, leveler, sickle and dao. Technical specifications, dimensions merits and demerits are also discussed.

1. Introduction

The Chhotanagpur Plateau in Eastern India covers most of Jharkhand state as well as adjacent parts of Odisha, West Bengal, Bihar and Chhattisgarh. Tribal populations dominate Jharkhand state 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 rural and urban areas in the district is primarily dependent on agricultural activity. The cultivators (43.39%) and agrarian laborers (21.63%) together constitute 65.02 percent of the total workers of the district (Anonymous, 2011). The tribes in the district were namely Munda, Bedia, Santhal, Karmali and Oraon. 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.

Majority of farmers have more than one bullock (Sundaram *et al.* 2019). Traditionally farmers have been using a variety of tools which has been indigenously developed and built according to their needs (Das and Nag, 2006, 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 farming 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-harvest operations and

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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 on the verge of extinction with the coming of modern tools and technology. An inference was drawn about the major constraints in the adoption of farm machines by the farmer and also suggestions to improve farm mechanization.

2. 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.

3. Results and Discussion

Landholding and family size pattern of farmers

Landholding pattern 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% farmers are having acreage of 2-4 hectares (Figure 1). The size of a family is also an essential factor as family members work as labours in their field. Small landholding with more number of family members faces less difficulty than the small family-sized farmers. Out of surveyed households, the small family size was only 15% while the majority of the family (69%) were of medium size with 5 to 8 family numbers (Figure 2)

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

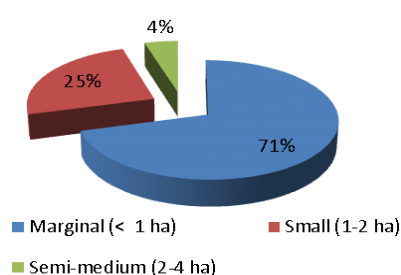


Figure 1 Landholding pattern of farmers

bullock as conventional source of power. The majority of farmers (75%) were having a pair of 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 was also having local iron/wood made leveler. Nearly 19 percent of farmers hired desi hal along with bullock with charges of between Rs. 300-400 per day (Sundaram et al., 2019).

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 <i>Dohra</i> (Wood make)	99 (66.00)
	Leveller (Iron make)	20 (13.33)
	Leveller (Karha)	9 (6.00)
	Other Traditional tools (<i>Khurpa</i> , Sickle, and <i>Dao</i>)	150 (100.00)

(Source: Sundaram et al., 2019)

In 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:

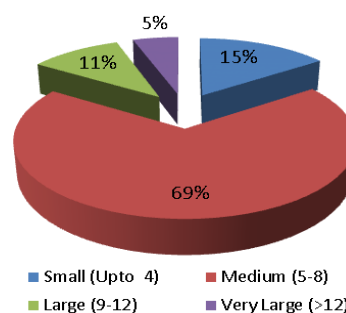


Figure 2 Family size Pattern of farmers

A. Land Preparation tools

A1) Desi Hal (Iron Make): Commonly known in the Chotanagpur plateau area as desi hal, it is mainly used for primary tillage operations (Figure 3). It weighs around 20-21 kg. Its handle is made up of hollow iron attached to the body of the plough. The length of the shaft is 160 cm and is of wooden make. Share is 30 cm long and is attached to the shoe. The shoe is hollow and is made of iron sheets put together and welded. The driving power source of desi hal is a pair of bullocks. It costs around Rs. 1500/- .

A2) Desi Hal (wooden make): It is commonly known as lakdi hal and is mainly used for primary tillage operations (Figure 4). It weighs around 17-18 kg. Its handle is made up of wood and its length is 55 cm. Its share is made up of hardened steel and measures 40 cm. The shoe is 80 cm long and is of wooden make. The beam is 220 cm long and is also made up of good quality wood. The driving power source of lakdi hal is a pair of bullocks. It costs between Rs. 900-1000/-.

A3) Wooden cum hollow angle Plough: Locally known as hal, it is made up of hollow angle and good quality wood (Figure 5). It is mainly used to cut the top pan soil (primary tillage). It weighs around 33 kg. The handle is made up of iron rod of length 60 cm. The shaft is made of wooden make and is 256 cm long. The length of the shoe is 60 cm and is made up of a hollow angle. Share is made up of hardened steel of length 26 cm and width 5 cm respectively. Driving power source of wooden cum hollow angle plough is a pair of bullocks. It costs somewhere between Rs. 1000-1200/-

A4) Pickaxe: Local name of pickaxe is gainta and is mainly used for breaking the hardpan soil (Figure 6). It has pointed edges made up of hardened mild steel. It weighs around 2.5 kg. The length of the handle is 300 cm and the length of the pointed working tool is 35 cm. Its handle diameter is 33.89 mm. It costs between Rs. 250-300/-. It is also used for digging and furrow making. It is manually operated by human power.

A5) Spade (Kodi): Spade in this part of the country is known as kodi (Figure 7). Its weight is around 1.64 kg. It is used for breaking clods, digging and making a furrow in the prepared field. The working length of the blade is 16 cm and is made up of mild steel. The handle is 76 cm long and its dia. is 3.5 cm. It is made up of bamboo. Kodi costs around Rs. 150-160/-. It is manually operated by human power.

A6) Spade (Kodal): This type of spade is commonly known as 'Kodal' (Figure 8). It is mainly used for making bunds, ridges, furrows, shallow trenches and cleaning the water flow canals in agricultural fields. The overall weight of kodal is approximately 1.2 kg. Its working length is 6 cm and the

blade is made up of mild steel. The handle is made up of bamboo and is 83 cm long having a diameter of 3.1 cm. It is generally used in all types of crops and is manually operated by human power.

A7) Hoe (Kodali): This type of spade is commonly known as 'Kodali' (Figure 9). It is used for making a mixture of soil and fertilizer. It is also used to move chunks of soil from one place to another. It weighs around 2.3 kg and its working width edge is 8.0 cm. The blade of the material is made up of mild steel. Handle is made up of good quality dried bamboo or 'sakhua wood'. Length of handle is 80 cm and its diameter is 3.2 cm. It costs between Rs.220-240 in the local market.

A8) Yoke (Junwat): It is made up of fine quality wood (Palash) and is very light in weight (Figure 10). It weighs around 4.25 kg. The yoke has a projection at the centre to which a beam of implements like plough, leveler and harrow, etc. are secured by a rope. It is put around the bullocks' neck to pull the implement. Its length is 180 cm and costs anything between Rs. 700 – 800/-.

B. Land planer tools

B1) Planer (Dohra-wooden make): Planer or Dohra is made up of good quality wood and weighs around 20 kg (Figure 11). Length, width and height of the plank are 198, 15 and 5 cm, respectively. Its handle length is 240 cm and is pulled by a pair of bullock. It helps level the field and crushes the clod. It is of wooden make.

B2) Planer (Dohra-metallic make): Planer in this part of our country is known as 'dohra' (Figure 12). The body is made up of iron and hollow metallic pipes welded together. Planer is made up of cast iron and is 198 cm long, its width is 15 cm. The handle/sandh is 250 cm long. The overall weight of the leveler is 23 kg and it costs nearly Rs. 1500/- in the local market/blacksmith shop. It is mainly used for the leveling of the tilled agricultural field. This is also helpful in the crushing of clods.

B3) Leveller (Karha): Leveller is locally known as 'karha' in the region (Figure 13). It is used to level the ploughed field to reduce water runoff and provide sufficient moisture in the area. It is also helpful in crushing of clods and is made up of metal (tin and iron) and weighs around 11 kg. The primary source of power for driving 'Karha' is a pair of bullocks. The length and width of the metallic plate are 122 and 30 cm respectively. The handle is 42 cm long and its dia. is 2 cm. It costs nearly Rs. 750/- and is made generally by the local blacksmith shop.

C. Weeding tools

C1) Khurpi (rectangular handle): Khurpi is locally known as 'Pasni' and its handle is rectangular (Figure 14). It is used mainly on agricultural farms and in kitchen gardens for weeding, planting and loosening of soil near the root of the plant. It is made up of flattening of locally available TMT (Thermo Mechanically

Treated) bars. It is 25 cm long and working width of the blade is 3 cm. It weighs around 243 grams and costs Rs. 50/-. It is locally fabricated and sold by the blacksmith shop of the village or nearby market.

C2) *Khurpi (round handle)*: Khurpi is also known as ‘Pasni’ in the local dialect (Figure 15). Its handle is round in shape and is used mainly on agricultural farms and in kitchen gardens for the planting of saplings in the main field. It is made up of flattening of locally available TMT bars. It is 28 cm long and its working blade is 2.5 cm wide. Its handle diameter is 1.48 cm. It weighs around 345 grams and costs Rs. 50/-. It is locally fabricated and sold by the blacksmith shop of the village or nearby market.

C3) *Hand hoe/ Khurpi (wooden handle)*: It is locally known as ‘pasni’ and consists of a sharp, straight-edged metallic blade with a tang embedded into a wooden handle (Figure 16). It is mainly used for planting small plants or seeds and covering their roots with soil. Total weight of hand hoe is 1.15 kg, length (overall) is 30 cm, handle is 14 cm long and width of cutting edge is 3 cm. It costs around Rs. 50-60/-.

D. Harvesting tools

D1) *Sickle (Hasua-I)*: Sickle or ‘Hasua-I’ is mainly used for cutting/harvesting paddy (Figure 17). It is also used for clearing small leafy plants and grasses. It weighs 133 grams and costs about Rs. 60/-. This sickle has a working area /blade length of 18 cm. The length of the handle is 11 cm and handle dia is 2.54 cm. The handle is made up of good quality wood or bamboo.

D2) *Sickle (Hasua-II)*: Sickle or ‘Hasua-II’ is mainly used for cutting/harvesting paddy (Figure 18). It is also used for clearing small leafy plants and grasses. It weighs 250 grams and costs about Rs. 50/-. This sickle has a wooden handle and its length is 15 cm. The total length of the sickle is 30 cm and length of cut/blade is 20 cm.

D3) *Sickle (Hasua-III)*: Sickle or ‘Hasua-III’ is used for harvesting paddy, wheat and for cutting shrubs and clearing bushes (Figure 19). It was still in use in the backward villages of the region. It weighs 210 grams and costs about Rs. 60/-. This sickle has a working area /blade length of 16 cm. The total length of the sickle is 30 cm and its handle dia. is 2.27 cm. The concavity of the sickle was found to be 4.37 cm. Its handle is made out of the curved metal of which the blade of the sickle is made.

D4) *Sickle (Hasua-IV)*: Sickle or ‘Hasua-IV’ (old design) is used for harvesting paddy, wheat and for cutting shrubs and clearing bushes (Figure 20). It was still in use in the backward villages of the region. It weighs 246 grams and costs about Rs. 60/-. This sickle has a working area/blade length of 17 cm. The total length of the sickle is 35 cm and its handle dia is 2.1 cm. The concavity of the sickle was found to be 2.52 cm. Its handle is made out of the curved metal of which the blade of the sickle is made.

E. Wood working tools

E1) *Dao*: Dao is a manually operated tool used for cutting the branches of trees and wood (Figure 21). It costs Rs. 250/- and is locally made by the blacksmith shop. Its length is 29 cm and blade length (length of cut) is 19 cm.

E2) *Dao-I*: Dao is made up of heavy metal (usually iron) used to cut wood and to give shape to small objects (Figure 22). It weighs 500 grams and its handle length is 17cm. Length of cut is 20 cm and its total length is 42 cm. It costs around Rs. 100/-.

E3) *Dao-II*: Dao is a made up of iron used to cut wood and to give shape to wooden objects (Figure 23). It weighs 740 grams and its handle length is 23cm. Length of cut is 20 cm and its total length is 43 cm. It costs around Rs. 120/-.

E4) *Dao-III*: Dao is a metallic tool used for cutting purposes and to give shape to small objects (Figure 24). It weighs 800 grams and its handle length is 17cm. Length of cutting blade is 22 cm and its total length is 40 cm. It costs around Rs. 120/-.

E5) *Hatchet*: Taangi or hatchet is a metallic tool used for cutting wood and to give shape to small objects (Figure 25). It weighs 900 grams and its handle length is 77cm. Length of cutting blade is 7 cm and its width is 15 cm. It costs around Rs. 180/-.

E6) *Axe/ Taangi*: Locally known as taangi, axe or hatchet is used for cutting wooden log or trees (Figure 26). It has a blade with cutting length 7.4 cm and has a handle of length 80 cm and diameter 27.75 cm attached to it. The weight of the taangi was 1.4 kg and costs around Rs. 200-220 available in the local market. It is also used for cutting and shaping drumstick plants. Gripping should be improved for better performance.

F. Other tools

F1) Sabbal/Dib: Dib is locally known as 'sabbal' and it is mainly used for making holes in earth crust by cutting the hard pan soil (Figure 27 a& b). It comes in two sizes viz. 70 cm and 140 cm. The smaller one has cutting edge on only one side, whereas the longer dib had cutting edges on both sides i.e., flattened and pointed, respectively. The smaller dib weighed around 1 kg, whereas the fuller sized dib weighed around 3kgs. Both have a diameter of around 1.7cms and costs Rs. 70 and 200 respectively.

F2) Farsa/Tomahawk: This is the Indian version of tomahawk also known as 'farsa' mainly used for clearing bushes and standing weeds (Figure 28). It is indigenously designed and made by local blacksmith for about Rs. 400/-. It weighs 875 grams and its handle length is 100 cm. Its handle diameter is 2.6 cm and blade length measures 25 cm.

F3) Bainsala: 'Bainsala' is a tool with sharp and heavy metallic blades with a handle fitted into it (Figure 29). It is used mainly by carpenters to polish the wooden surface. It weighs around 1.22 kg and its handle is 42 cm long the handle diameter is also 2.3 cm. The working width of the tool is 5.7 cm and its overall length is 16 cm.

F5) Local Knife/ Chhuri: Local knife is also known as 'chhuri' (Figure 30). It is used in day to day activities of cutting and chopping fruits and vegetables mainly in the kitchen. It is designed and fabricated by the local blacksmith and sold at around Rs. 40/-. It weighs 106 gm, 29 cm long and has a blade length of 20 cm.

F6) Baithi: Baithi is also known as 'pansul' or 'chilohi' and is used for mainly household purposes of cutting and chopping (Figure 31). It costs Rs. 250-270 and weighs 717 grams. Its total length is 48 cm and the length of the working blade is 28 cm.

The khurpi with round handle and wooden handle (Figure 15 & 16) as well as Sabble (Figure 27 a & b) were used for sowing of large seeds. They are used to make a small hole in the soil and seed is placed there. Mostly broadcasting of seed is practiced for sowing purposes. No specific tools/implements were used for sowing purpose.

4. Conclusion

Most of the tribal farmers have Small and fragmented land holdings and continue to use indigenous tools and

implements as it is considered to be cheaper economical, and easily available in the local market. The tribal farming is dominated by animal power. The survey concluded that more than 75 % farmers have more than one bullock. However, modern tools are penetrating the market, but large machines are unsuitable for farmers. The plateau region demands a lighter power source and implements, which can be easily carried or towed away. Power tiller and its various attachments should be more preferable in this region. Also, the indigenous tools and implements need to be standardized by blending traditional and modern scientific knowledge.

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Figure 3 Desi Hal (Iron Make)



Figure 4 Desi Hal (wooden make)



Figure 5 Wooden cum hollow angle plough



Figure 6 Pickaxe (Gainta)



Figure 7: Spade (Kodi)



Figure 8 Spade (Kodal)



Figure 9 Hoe (Kodali)



Figure 10 Yoke (Junwat)



Figure 11 Leveler (Dohra)



Figure 12 Leveler



Figure 13 Leveller (Karha)



Figure 14 Khurpi (rectangular handle)



Figure 15 Khurpi (round handle)



Figure 16 HandLoe/Khurpi (wooden handle)



Figure 17 Sickle (Hasua-I)



Figure 18 Sickle (Hasua-II)



Figure 19 Sickle (Hasua-III)



Figure 20 Sickle (Hasua-IV)



Figure 21 Dao



Figure 22 Dao-I



Figure 23 Dao - II



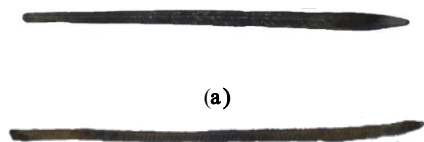
Figure 24 Dao - III



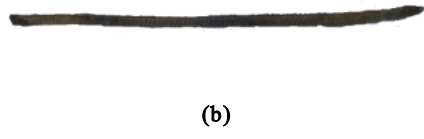
Figure 25 Hatchet



Figure 26 Axe/Taangi



(a)



(b)

Figure 27a Sabbal/Dib (Small)
b Sabbal/Dib (full sized)



Figure 28 Farsa



Figure 29 Bainsala



Figure 30 Local Knife/ Churi



Figure 31 Baithi