Status of farm mechanization at Longleng district of Nagaland

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Abstract

*Considering the importance of farm mechanization a survey on agricultural tools and implements was conducted in the Longleng district using a questionnaire prepared for this purpose. A random sampling method was followed during the selection of farm family. A total 100nos. of farm family were contacted for the study. During the survey several farm tools and implements like steel dao **(Yan/Yanlou)**, sickle (**Langkoh**), saw (**Puyet**), axe (**Oa**), spade **(Hapho)**, steel folk dance spear (**Kamshou Yokjan**), Hunting spear **(Pau Yokjan),** bamboo weeder (**Pheklok)** and steel weeder (**Heijak)**, bamboo basket (**Shai or Hangtom**), wooden rice ponder (**Shungkang**), bamboo mat (**Anho**), wooden made drink container (**Yiu shouk),** Poultry basket (**Oujak),** Bamboo tukri **(Mudou),** Bamboo basket (**Shai or Hangtom),** Bamboo tokri (**Mudou**), Cane basket (**Lishai),** Wooden dao holder (**Yankong**), Bamboo made winnower (**An or Ongja),** Granary or grain storage (**Yuh toipo nangh)** etc. were recorded. Their uses were also recoded and depicted in this study. During the study very little and negligible extent of mechanization were found in the district. Keeping this in view a front line demonstration on farm mechanization was conducted in Longleng to reduce drudgery in agricultural operations. For this purpose maize sheller, adjustable row marker (ARM), wheel hoe and groundnut decorticator was introduced for the evaluation of shelling capacity, field capacity, weeding efficiency and dehusking capacity respectively. Shovel (**Belcha**), Gaiti (**Hotok yongh**) and Karahi/Tagar (**Hou-o-kong**) was also introduced for excavation work of rainwater harvesting structure-Jalkund. Study revealed that the shelling capacity of has been increased from 3-5kg/hr in manual shelling to 15-22kg/hr in shelling by maize sheller. The field capacity has been increased from 0.12 to 0.26ha/day in line sowing of mustard cultivation with the help of adjustable row marker whereas field capacity has been increased from 0.4 to 1.4ha/day in soybean cultivation. The weeding efficiency has been increased from 40% in manual weeding to 70% in Wheel hoe weeding. Decortications efficiency has been increased from 45% in manual kernel peeling to 85% with the use of groundnut decorticator.*

(Keywords: Drudgery Reduction, Farm Mechanization, Front Line Demonstration, Longleng, Traditional Tools and Implement)

Background

Longleng District is a strip of mountainous territory having no plains and situated in the northern Nagaland. Geographically, Longleng district situated under the 26°26'0" N latitude and 94°52'0"E Longitude and altitude varies from 260 to 1306m above msl. Topographically Longleng is divided into three regions, namely; a) Chingmei Range in the Northern part, b) Shemong Range in the Middle part and c) Yingnyu Range in the Southern part. Longleng district surrounded by one state and 3(three) district boundaries. On the East it shares boundary with Tuensang and Mon district. On North it has Nagaland's inter-state boundary with Assam. On the west it shares boundary with Mokokchung District. On the South it shares boundary with Tuensang district. According to the 2011 census Longleng district has a population of 50,593, roughly equal to the nation of Saint Kitts and Nevis. This gives it a ranking of 632nd in India (out of a total of 640) Longleng has a sex ratio of 903 females for every 1000 males, and a literacy rate of 73.1 %. The Longleng district is the habitat of Phom tribe. The Phom people are using very few improved hand tools and implements. They are mainly using dao, sickle, saw, axe, spade, spear, weeder, basket, spear etc. in their day to day life and agriculture. Phom people use their spear for hunting purpose as well as during folk dance and display a pair of spear in front of the community centre and their houses. Cow's and mithun's head are placed on the wall of house or traditional gate for showing bravery and socio-economic status.

Climate

Longleng district enjoys monsoon type of climate with a minimum temperature of 10° C in winter and a maximum of 28° C in summer. The district has a fairly moderate climate where days are warm and nights are cool. Rainy season sets in during the month of May and lasts till October. From November to April, the district has dry weather relatively cool and days are bright and sunny. According to classification of National Agriculture Research Project (NARP) of ICAR, Longleng comes under Mid Tropical Hill Zone (AZ52). The average annual rainfall is between 2000 to 2500 mm with 132 no. of rainy days. The district receives most of the rainfall during the south west monsoon (June-Sept.). The normal rainfall received during this period is 1246mm. The normal time of onset is 1st June and normal cessation period is 4th week of September. Post monsoon period is from 1st week of October to 4th week of November. The average rainfall during this period is 266 mm.

Agriculture

Rice is most important crop in *Jhum* field of Longleng district. About 12% of the total geographical area of the district is under *Jhum* rice. Farmers are cultivating *Jhum* rice for 2-3 years and after that field were laying fallow next the 7-8 years for restoring the soil fertility and shift from the area to another field. Rice productivity in *Jhum* is very low (1.6t) mainly due to poor cultivation practices, no input cultivation, lack of soil and water conservation measures, use of low yielding varieties etc. Rice is cultivated during February-March to July-August leaving rest of the period of the year as fallow. Whereas the rainfall in the region continues up to the end of October and residual moisture remains in the field till December. Cropping pattern of Longleng mostly based on traditional, cultural, geographical and socio-economic factors. Land of this district is mostly owned by individuals, clan and community. Mainly mixed cropping of Maize, beans, potato, orange, colocasia, pineapple *etc.* were practiced in *Jhum* field. Locally available ***rice*** varieties are Chakka youh, Meppa youh, Chinglow youh, Youngshow youh, Mobi youh, Lamchey youh (red), Nyakmok you (white more sticky), Yamcheya(white less sticky), Waalak youh (aromatic), Youchak, Engja, Shengya, Hao yoh, Namya, Teijak, Boyoh, Chali, Shao ho, Hoshong ongshow, Daolong ongshow, Ongpang, Nyakmok, oukoh, Ngakmok. Local ***maize*** varieties are Nyakmok ongpok (sticky), Shaiiehing ongpok, Yohjong ongpok (popcorn), Teipek apok, Block ongpok. The low lying areas/Foothills of the District (bordering with Assam) is fertile and has the potential for wet paddy cultivation.

Flora and fauna

Longleng District is rich in natural vegetation. It enjoys the distinction of being one of the few places in Nagaland where virgin forests are still found. Sub-Tropical Mixed Forest characterized by broad-leafed evergreen trees and deciduous trees abounds. The main/dominating species in the high altitude are such as Bonsum, Gogra, Alder, Oak species and also occurs wild cherries and wild apples, wild lemon, wild banana, wild walnut, wild fig, varieties of edible plants and leaves, and cane and reed at selected places. At the foothill, Gomari, Holloc, Koroi, Mesua, Tita-Chapa, Neem, Wild Mango, Amla and Bamboo species are the dominant species. Varieties of shrubs, herbs (medicinal values), climbers, ferns and grasses are present in the district. Varieties of bamboo are found in patches throughout the District. There also occurs a rare species of bamboo - finger size and cane - like in structure. The verdant forest of the District is also home to variety of fauna - a paradise for animals and birds lovers and researchers. Dominant wild animals includes Stag, Bear, Mithun, Sloth, Barking Deer, Mountain Deer, Wild Hog, the rare Pangolin, varieties of Monkeys, varieties of wild cats, varieties of Porcupine, Flying Fox, Flying Squirrel, Himalayan Giant Squirrel and other different varieties of squirrels, Civet Cats, snakes, Python, Otter etc. The rivulets and rivers teem with different varieties of fishes and other water creatures, of which trout is rare species. Dominant birds includes Hornbill, varieties of pigeons including royal pigeon, parrot, mama, mountain peacock, the rare and elusive Blythe's Tragopan, varieties of jungle fowls, and other varieties of smaller birds.

Aims

The main aim of the study was to make a pen picture of traditional farm tools and implements available in the Longleng district and to introduce improved implements in the district for farm mechanization and drudgery reduction.

Methodology

The objective of the study was to bring a pen picture of mechanization status of Longleng district and to introduce ergonomically efficient tools and implements to reduce drudgery in agricultural operations. A survey was conducted in the district using a questionnaire prepared for this purpose. Whole questionnaire was grouped into different subgroups namely general information, agriculture, crop varieties, flora and fauna, agricultural tools and implements, size of the implements, raw materials used etc. A random sampling method was followed during the selection of farm family. A total 100nos. of farm family were contacted for the study.

Result and Discussion

During the survey on farm mechanization in Longleng district, we have found following indigenous farm tools and implements used in day to day life and agricultural operations. The farm mechanization was very rare and negligible in the district. Keeping this in view, Front line demonstration on farm mechanization was conducted during 2013-14 and 2014-15. Mechanization was intervened in line sowing, weeding, shelling of maize and dehusking of groundnut to reduce drudgery in agricultural operations.

Dao (Yan/ Yanlou)

Phom Dao ranges from small dao - **Yan** (Fig.6), medium to large dao - **Yanlou** (Fig.6). They are generally made of mild steel. The length of large Dao generally ranges from 25 to 30 cm without handle portion. The length of medium dao ranges from 22 to 25 cm and small dao ranges from 15 to 20 cm. Handle of the Daos are made of bamboo, winded with steel wire or mild steel sheet. Dao used for wood cutting, clearing of jungle, bushes, butchering of meat, etc. Dao holder –**Yankong** (Fig.9) are mainly made of wood and used to keep / hold dao inside it during the work at field.

Spade (Hapho), Saw (Puyet)

It is resembled to modern spade; there are generally three categories of spades-**Hapho** (Fig.7), *i.e*. small, medium and large are made mild steel sheet. Average weight of large spade generally ranges from 1.4 to 1.6 kg, medium weight ranges from 0.8 to 1.0 kg and small weight ranges from 0.3 to 0.5 kg. Large and medium spade are used in field for land preparation like clearing of jungle and digging of land or seed bed preparation while small spade are used for planting of seeds and other seedling in the field. The saw (**Puyet**) and sickle (**Langkoh**) are made of iron/ steel used for cutting woods and crops respectively.

Spear (Kamshou Yokjan), Weeder, Sickle (Langkho)

Spear-**Kamshou Yokjan** (Fig.5) are made of steel and used in folk song during any cultural programme whereas hunting spear**- Pau Yokjan** are used during hunting operation only. Spade –**Hapho** (Fig.7) are made of mild steel and used for all kinds of ploughing and cleaning of field in the Jungle. Sickle –**Langkoh** (Fig.10) are made of mild steel/ iron used for cutting crops and weed in the field. Bamboo / wooden weeder –**Pheklak** (Fig.11) and iron made hand weeder - **Heijak** (Fig.12) are used for clearing and weeding of jungle. **Hand weeder -** the blade of iron weeder-**Heijak** (Fig.12) is made of mild steel and handle is made of bamboo or wood. The average length of the weeder is 25 to 30 cm. Weeder is generally used for hand weeding and all type weeding in field. Drying mat-**Anho** (Fig.18) are made of bamboo and wooden plank- **Heijak Pheklak-**(Fig.18) are used for spreading grains and crops on the mat for proper drying. Bamboo tokri **– Mudou** (Fig.15) is used as crop container made of bamboo.

Basket, Winnower, Rice Ponder and Grain Storage

Bamboo basket-**Shai or Hangtom** (Fig.13) and cane basket **Lishai** (Fig.14) are used for carrying crops, vegetables water and stones. Poultry basket-**Oujak** (Fig.16) is used for keeping and carrying chicken and duck. Bamboo made winnower-**An or Ongja** (Fig.17) is used for winnowing rice and other crops. Rice ponder- **Shungkang** (Fig.20) used for dehusking and milling of paddy and other crops. Granary or Grain storage - **Yuh toipo nangh** (Fig.19) is a house made of bamboo and thatch used for storing paddy after harvest.

Phom people are usually carry drinks in a wooden made drink container- **Yiu shouk** (Fig.21) for their wine and drinks during their cultivation work.

Intervention of Front Line Demonstration(FLD) on Farm Mechanization

Due to non availibity of improved tools and implements in the district, Krishi Vigyan Kendra (KVK), Longleng has introduced several implements like Maize Sheller (with and without stand), Adjustable row marker (ARM), Wheel Hoe (single tyne) and Groungnut decorticator under Front line demonstration of farm mechanization for evaluation of sheeling capacity, field capacity, weeding efficiency, field efficiency respectively. The ergonomical evaluation of farm women under soybean cultivation with the use of Wheel Hoe and dehusking of groundnut with the use of Groundnut decorticator was also done under Front line demostration(FLD) on farm mechanization.

Conclusion

Farm mechanization at Longleng is very little and negligible. For creating an awareness and interest in farm mechanization, implements like Maize Sheller, Adjustable Row Marker (ARM), Wheel Hoe was introduced in Longleng district. Front line demonstration (FLD) on farm implements were done for evaluation of field capacity, field efficiency, weeding efficiency and shelling capacity of Adjustable Row Marker, Wheel Hoe, and Maize Sheller respectively. Shovel (**Belcha**), Gaiti (**Hotok yongh**) and Karahi/Tagar- (**Hou-o-kong**) was also introduced for excavation work of rainwater harvesting structure-*Jalkund*. This type of FLD has created a mass awareness among the farmers of Longleng district and made them interested in introducing these implements in their field. Keeping in view of farmer's interest, some implements were distributed to reduce their drudgery in maize shelling, line sowing and weeding in Soybean, Maize, Mustard, French bean and Pea cultivation. FLD study evaluated that manual shelling capacity has increased from 3-5kg/hr to 15-22kg/hr after the intervention of Maize Sheller. The manual field capacity has increased from 0.12ha/day to 0.26ha/day and 0.40ha/day to 1.40ha/day due to intervention of Adjustable Row Marker in mustard and soybean cultivation respectively. The weeding efficiency of small kudali (Hapho) has increased from 40% to 70% due to intervention of Wheel Hoe. Decortications efficiency has been increased from 45% in manual kernel peeling to 85% with the use of groundnut decorticator.

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Figures

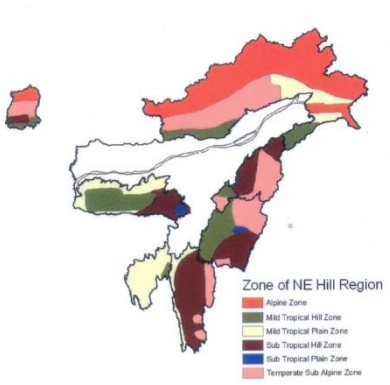

Fig.1 Agro-climatic map of north east India

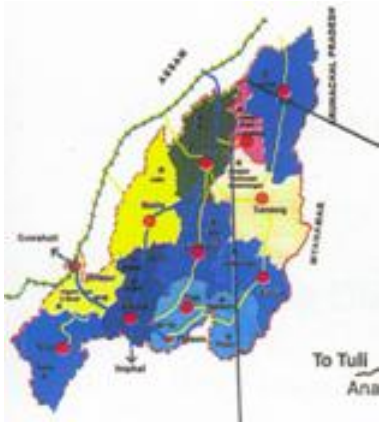

Fig.2 Longleng district map

Fig.3 Hukphang Community (**Lingh/Morung**) Centre

Fig.4 Pongo Community (**Lingh/Morung**) Centre

Fig.5 Folk dance spear (**Kamshou Yokjan**)

Traditional phom tools and implements

Fig.6 Steel Dao (**Yan and Yanlou**)

Fig.7 Steel Spade (**Hapho**)

Fig.8 Dao(Yan), saw (**Puyet**), axe(**Oa**)

Fig.9 Wooden dao holder (**Yankong**)

Fig.10 Steel sickle (**Langkoh**)

Fig.11 Bamboo / wooden weeder (**Pheklak**)

Fig.12 Steel hand weeder (**Heijak**)

Fig.13 Bamboo basket (**Shai or Hangtom**)

Fig.14 Cane basket (**Lishai**)

Fig.15 Bamboo tokri (**Mudou**)

ig.16 Poultry basket (**Oujak**)


Fig.17 Bamboo winnower (**An or Ongja**)


ig.18 Drying mat(**Anho**) & wooden plank (**Heijak Pheklak**)

ig.19 Granary (Grain storage)-**Yuh toipo nangh**

ig.20 Rice ponder (**Shungkang**)

ig.21 Drink container (**Yiu shouk**)

Improved tools / implements used in excavation of *Jalkund* hill Agriculture of Longleng

Fig.22 Shovel (**Belcha**)

Fig.23 Gaiti (Axe) – (**Hotok yongh**)

Fig.24 Karahi/Tagar- (**Hou-o-kong**)

FLD programme on Farm Implements in Longleng District of Nagaland

Fig.25 ARM at Lingtak

Fig.26 ARM at Nyang

Fig.27 Wheel hoe at Nyang

Fig.28 Maize Sheller (With and without stand)

Fig.29 Adjustable Row Marker

Fig.30 Wheel Hoe

Fig.31 Maize Sheller at Orangkong

Fig.32 Groundnut Decorticator

Fig.33 ARM at Orangkong

Table

Table 1 Evaluation results of Front Line Demonstration (FLD) on Farm Mechanization

FLD Theme	Technology demonstrated	Data on parameters		% change in parameters	Remarks
		Demonstration	Local check		
Drudgery Reduction	Maize Sheller	Shelling capacity 15-22 kg/hr	Shelling capacity 3-5 kg/hr	362.5 %	3.6 times labour saving per hectare
Drudgery Reduction	Adjustable Row marker in mustard cultivation	Field Capacity 0.26ha/day	Field capacity 0.12ha/day	116.0%	1.2times less labour per hectare
Drudgery Reduction	Adjustable Row marker in soybean cultivation	Field capacity= 1.4 ha/day	Field capacity= 0.4 ha/day	133.0 %	Less labour requirement up to 18-20 man-h/ha
Drudgery Reduction	Wheel Hoe in soybean cultivation Demo: Wheel Hoe, Local check: Small Kudali (Hapho)	Field Capacity 0.25ha/day Weeding Efficiency 70%	Field Capacity 0.10ha/day Weeding Efficiency 40%	150.0% 175.0%	1.5times less labour required per hectare
Drudgery Reduction	Groundnut Decorticator	Decortications Efficiency: 85%	Decortications Efficiency: 45%	188.8%	2times labour saving per hour