

## TURMERIC MECHANIZATION IN MEGHALAYA— A CASE STUDY OF SHANGPUNG VELLAGE JAINTIA HILLS

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### ABSTRACT

Meghalaya turmeric, particularly the variety that is grown in Shangpung in the Jaintia Hills, is considered the best in the world, as its curcumin content is as high as 7.5%. This village, with a random sample of 25 turmeric farmers, was selected for studying the status of turmeric mechanisation in the state. It was found that all the farmers exclusively followed 'bun' method of cultivation, where a series of beds ( called *buns*) are formed along hill slopes. The bun method of cultivation was observed to be at the ' Hand Tool' level of mechanisation without any use of ' Draft Animal' or 'Mechanical Power' units. All the cultural operations were done manually by using the small local/traditional hand tools and implements like 'Dao' for jungle clearing and removing rhizomes from the stalk, ' spade' for *bun* making and harvesting. 'small hand hoe' for weeding and 'conical bamboo basket' for transporation after harvesting. Thus, almost no activity in turmeric cultivation in the state is mechanized leaving several gaps to be filled. There is a need for developing 'Hill Tractor' or 'Hill Tiller' specifically fit for working along the slope in the present method of bun cultivation, while at the same time, there is a need for proper mechanization infrastructure including land development in terms of terracing on a large scale to promote use of tractors/ power tillers and related machinery, approach roads to take them to farms and marketing infrastructure in order to prevent losses. Only the overall improvement in economy will ensure mechanization of turmeric cultivation in the state of Meghalaya.

### INTRODUCITON

India is the largest producer of turmeric with an annual production of around 4 lakh tons from 2 lakh hectares. Although, the share of Meghalaya in the country is less than 2% in terms of both the area and production in turmeric, yet it occupies important position from export point of view as the local varieties such as Lakdong

grown in Jaintia Hills district contain over 6% of curcumin. Some of the varieties grown in this area are considered the best in the world, as its curcumin content is as high as 7.5%. There is considerable demand for good quality turmeric from U.S.A., Germany, U.K. Japan, Singapore, and Middle East Countries. In the foreign markets, turmeric is valued basing on the Curcumin content (Curcumin gives colour to the turmeric). The turmeric with high Curcumin content fetches high prices. Thus there is a tremendous scope for production of high-grade turmeric in the state for export and internal consumption. Jaintia Hills occupies a unique position in the state in turmeric with 60% share in area and production out of around 1400 ha area with average annual production of over 7000 tonnes (Table 1). It is mainly grown on the eastern Meghalaya plateau of Jaintia Hills relatively lower in elevation with an average height of a little more than 1200 meter on undulating and rolling topography, loamy textured surface soil and average annual rainfall around 3000 mm.

Table 1. District-wise area and production of Turmeric in Meghalaya

District	Area (ha)	Production (Tonnes)
Ri-Bhoi	34	153
East Khasi Hills	55	360
West Khasi Hills	15	96
Jaintia Hills	820	4076
East Garo	100	556
West Garo	313	1565
South Garo Hills	64	320
<b>Total</b>	<b>1401</b>	<b>7126</b>

Source : Directorate of Economics & Statistics, Meghalaya.

In the era of export-oriented growth, the timeliness of operation, product quality, better processing, etc. has its effect on the complete chain of grower to consumer. In this chain, the first link is on farm production and processing followed by post harvest handling and value addition, marketing, etc. Efficient machineries specifically suited to the on farm production have been proved to increase production and reduce losses. The future interventions or research and development needs are to be based on the cultural practices followed by farmers. Therefore, the present practices of turmeric cultivation needs to be studied in order to identify the suitable technological interventions required for proper exploitation of the potential. The identified mechanization gaps will serve as a base line for development of new tools/machinery, modification or popularization of already existing tools/machinery elsewhere in the country.

#### METHODOLOGY

A random sample of about 25 farmers to represent all land holding, strata including marginal (<1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha) and large (>10 ha) were selected in consultation with village headman as there are no land

revenue records in the state. The data was collected in the structured questionnaires 'farmers' schedule' and 'village schedule' specially prepared for the purpose. The information collected through various schedules was digitised with the help of a computer and analysed by using standard statistical techniques and tools. The various activities considered for studying the status of farm mechanisation include only the on farm operations listed in Table 2. The level of mechanisation of different categories of farmers is determined on the basis of use of farm tools and machinery as per the criteria given in the Table 3. The different farm power sources were categorised into human (male & female), animal (bullocks & buffaloes) and mechanical (tractor, power tiller, electric and engine). The farm tools and equipment were studied for particulars of size and design as well as for their use in different operations.

Table 2 Farm Operations and activities involved

Operation		Activities
1. Land clearing	<input type="checkbox"/>	Cutting of trees, bushes and grass
2. Land development	<input type="checkbox"/>	Leveling, terracting, making of buns (ridges), etc.
3. Land preparation	<input type="checkbox"/>	Ploughing, Puddling, etc.
4. Planting or seeding	<input type="checkbox"/>	Seed distribution, dibbling, drilling, etc.
5. Transplanting	<input type="checkbox"/>	Establishment of seedlings
6. Crop husbandry	<input type="checkbox"/>	Weeding, Irrigation, spraying, etc
7. Harvesting	<input type="checkbox"/>	Cutting or removing crop produce
8. Threshing	<input type="checkbox"/>	Removing ear heads, shelling, etc.
9. Handling	<input type="checkbox"/>	Carrying farm produce

Table 3 Criteria for defining mechanisation categories

Category	Criteria
1. Hand tool	Traditional or Improved hand tools like spade, hoe, etc.
2. Draft Animal	Animal drawn equipment like plough, harrow, etc.
3. Mechanical Power	Tractor / power tiller / engine / electric power driven equipment

## RESULTS AND DISCUSSION

It was found that more than one third of the farmers belonged to the category of marginal farmers with less than a hectare of land, next 30% were small farmers (1-2 ha) and 27% semi-medium (2-4 ha) while very few (9%) belonged to the category of more than 4ha (Figure 1). Average size of land holding was 1.7 ha while the area under turmeric cultivation with a farmer varied between 0.2 - 1.4 ha. Almost all the turmeric was taken in bun method of cultivation under rain fed conditions without any kind of irrigation. The production varied between 2-4 tonnes/ha out of which 5-10% was retained by the farmers for seed purpose during the consequent season

and personal use, while rest was sold in open markets nearby. For majority of farmers, agriculture was the main source of income while few (12%) earned their primary income from Govt/Private service. All the farm operations were done by the members of the family in most of the cases (76%) while rest hired labour to supplement family labour. All the hired labour came from within the village itself and only sometimes from neighbourhoods. They normally did not face any problem with the hired labour. The labour charges varied between 70-80 Rs/day for men and 50-60 Rs/day for women.

### Cultural Practice

Turmeric was taken in extended kharif season during March/April - December/January on an around 50 ha in the Shangpung village under rain fed conditions without any kind of irrigation. All the farmers exclusively followed the 'bun' method of cultivation, where a series of raised beds (called buns) are formed along hill slopes (Figure 2). This system involves; cutting of shrubs and grasses, putting them together in lines along slope and covering the same with a layer of soil so collected from the surroundings as to form 'buns' along the slopes. Later on the dry biomass is slow-burned beneath the layer of soil. Turmeric rhizomes are planted on these buns after/ around middle of March and harvesting is done in December. Other minor cultural operations before harvesting include weeding and spraying as and when required depending upon weed and pest intensity. Harvesting, like bun making, is again the high labour consuming operation, involving activities of digging and detaching rhizomes from the stalk. It is followed by collecting, transportation, drying and storage before further processing and marketing, and so on.

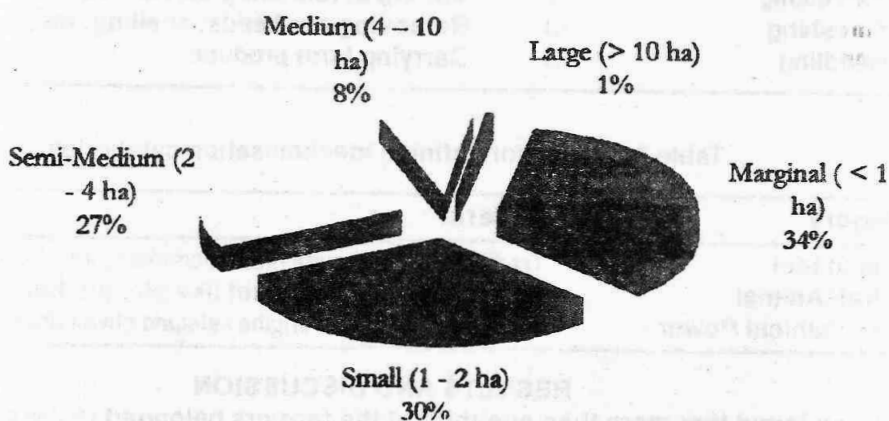


Figure 1 Land holding pattern of farmers

### Tools & Implements

All the cultural operations are done manually by using only the small local/traditional hand tools and implements like Dao for jungle clearing and removing, rhizomes from the stalk, spade for bun making and harvesting, small hand hoe for weeding and conical bamboo basket for transportation after harvesting (Table 4).

'Dao' is the most common hand tool used for cutting & clearing forest vegetation, erecting farm structure, cutting weeds, bushes, making wooden tools and storage structures, etc. It is a chopping knife consisting of a bamboo/wooden handle and a sharp curve blade-the size and shape of the blade varies according to their uses. The 'spade' (*Mohkhiew*) is a common soil-working tool with a triangular or heart shaped blade of different sizes-small, medium & large. They are fabricated locally using junk materials like old vehicles leaf springs, rods, etc. Their weights vary from 100 gm to 700 gm and cost about Rs. 75/- to Rs. 150/- per unit. Bamboo made conical shape baskets are used for transportation purposes. Their bottom section, shape and size vary as per requirement from place to place. All kinds of farm produce/building materials are usually transported in these baskets. The baskets are carried on backs supported by a head strap while transporting the material.

No 'Draft Animal' (bullocks) or 'Mechanical Power' (power tillers) units were used for any cultural operation in bun cultivation by any farmer. However, it was found that there were a number of power tiller and bullocks used for ploughing the lowland paddy fields in the same area. The use of tractors and power tillers in turmeric crop is restricted due to the prevalent practice of along-the-slope method of bun cultivation, as none of the existing tractors/power tillers has the capacity of riding more than 16% slopes. Hence, there is a need to develop a new design of tractor (Hill Tractor) or a power tiller (Hill Tiller) with greater riding abilities to work along slopes in bun cultivation, or else, bun method should be given away for terraced cultivation to promote use of existing power equipment and their attachments to ensure mechanization of turmeric cultivation.

Table 4 Cultural practices and level of mechanisation of turmeric cultivation in Meghalaya

OPERATION	PERIOD	ACTIVITIES	LEVEL OF MEGHANISATION		
			HAND TOOL	DRAFT ANIMAL	MECHANICAL POWER
Land Clearing	January/February	Cutting of	Dao	-	-
			trees, bushes, shrubs and grasses		
Land Preparation	March	Making of Buns	Spade	-	-
Planting	March/April	Planting Rhizomes on	Spade	-	-
			the buns		
Interculture	May-Sep	Weeding,	Small spraying	-	-
				spade/hand hoe	
Harvesting	December	Digging out	Spade & stalks	-	-
			Detaching rhizomes	and	Dao
Post-Harvest	January	Collecting,	Conical transportation, storage, etc.	-	-
				Bamboo Basket	



Thus almost no activity in turmeric cultivation in the state is mechanized leaving, several gaps to be filled. There are no processing facilities available in the state for enhancing the quality of Turmeric. The improved technology packages for cultivation as well as processing are available in the scientific and research institutes which can be successfully dovetailed to the advantage of the cultivators. The overall improvement in economy will ensure mechanization of turmeric cultivation in the state of Meghalaya. The along-the-slope method of bun cultivation has unique challenge from the mechanization point of view as the present tractors/power tillers have poor riding ability, which restricts their use on slopes. There is a need for proper mechanization infrastructure including land development in terms of terracing on a large scale to promote use of tractors/power tillers and related machinery, approach roads to take them to farms lest a special equipment (hill tractor/hill tiller) is designed/developed that can work along slopes.

#### REFERENCES

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