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Status of farm mechanization of Kakching block, Kakching district, Manipur

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Abstract
Farm mechanization is an essential in modern agriculture for enhancing productivity, reducing human drudgery and cost of cultivation and improving efficiencies of other farm inputs. The following study was conducted to check the status of mechanization in Kakching bock of Kakching district in Manipur, India. It was seen that the status of farm mechanization was very low of nearly 45%. The mechanization was only present in tillage and threshing operation of paddy cultivation.

Keywords: Mechanization index, mechanization level, case study, status of farmer

1. Introduction
Farm Mechanization is the promotion and use of appropriate quality farm machinery to facilitate crop establishment, introduce modern farm machinery on individual ownership basis or custom hire service, to ensure timeliness in farm operations and to increase the productivity of land and labour and to reduce drudgery to farmers.
Agricultural implements and machines enable the farmers to employ the power judiciously for production purposes. Besides its paramount contribution to the multiple cropping and diversification of agriculture, mechanization also enables timeliness of operations, a very important aspect of agricultural production system. Cropping intensity increased with an increase in per unit power availability (Mehta *et al*., 2014) [2]. It was 120% with power availability of 0.48 kW/ha-1 during 1975-76 and increased to 139% with increase in power availability to 1.71 kW/ha-1 in 2009-10 (ICAR, 2013) [4].
FFTC (2005) [1] in its annual report on small farm mechanization systems development, adoption and utilization in Asia concluded that the barriers that impede the growth and sustainability of farm mechanization industry and programs in the region can be classified into technological constraints, socio-cultural and behavioral barriers, financial and economic problems, and environmental issues. Farm machines are likewise beyond the reach of most farmers owing to high acquisition and maintenance costs. Small-size farm is a big issue when it comes to mechanization because it is against the economies of scale. Poor rural infrastructures such as roads, bridges, canals, and power network also pose as a major obstacle to farm mechanization. Also, in developing countries, farm labour is abundant; hence, the need for machinery is seldom recognized.
So, the present study was was carried oit to know the present status of Farm Mechanization of Kakching Block, Kakching District, Manipur and to identify operation/equipments needed for improvement.

2. Methodology
Location: The area occupies the bigger portion of the southeastern half of Manipur valley. It lies between 24.64'N and 24.23' N latitude and 94.07'E and 93.82'E longitude. The valley is fertile and the topography of the district provides a good opportunity for irrigation, natural as well as artificial. Rice accounts for above 90% of the total land area under cultivation. In food grains, Kakching is a surplus district producing above 59670 MT of rice in 2019-2020 may be rightly termed as the 'rice basket of Manipur'.

2.1 Sampling Method: 2 Stage Stratified Random Sampling Method was used

2.2 Degree of Agricultural Mechanization according to Nowacki (1974) [6], the assessment of the grading of the level of mechanization was:
Hand tools (M1) = 1, animal drawn (M2) =2, Tractorized (M3) = 3.

The index of mechanization is limited to the prominent available power sources in the Western zone, Nigeria (M1 and M3). The degrees of mechanization at the two available power sources were defined as follow:
Degree of Mechanization M1 is the average energy input of work provided exclusively by human power (labour) per hectare: it is indicated as (Nowacki, 1974) [6].

LH = 0.1. NH. TH /A

Where;
LH = average energy input or work provided per hectare by human labour kWhr/ha.
NH = average number of labour employed.
TH = average rated working time devoted to manual operation
0.1= Theoretical average power of an average man working optimally. A = Area of land cultivated (ha)

Degree of Mechanization M3 represents the first degree of mechanization, motorized machinery coexisting with a high participation of operators (Nowacki, 1974) [6]. It is indicated as

LM = 0.2.NM.TM/A

where;
LM = Average energy input or work per hectare by motorized machines
0.2 = Corrector co- efficient of the tractor-powered machine.
NM = rated working power of the tractor (kW)
TM = rated working time of the motorized energy source, hr/ha
A = Area worked in hectare by motorized machines.
Mechanization index (MI), represented the percentage of work of the tractors in the total of human work and that of the machinery. It was calculated using Equation below (Nowacki, 1974) [6];

MI (%) = (LM/LT) x 100

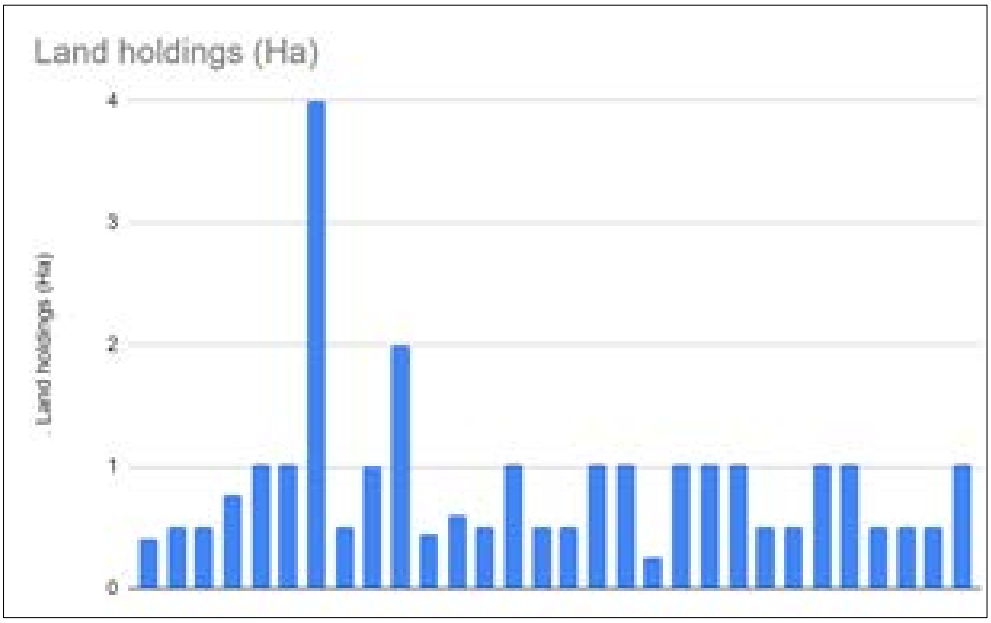
Where
MI = mechanization index, %
LM = average sum of all mechanical operation work of the machine, kWh/ha
LH = total sum of operation work done by man kWh/ha
LT = Sum of all average work outlays by human and tractor powered machines, kWh/ha LT = LM + LH

2.3 Method of Data Collection
The data were collected through personal interview of the farmers on pre-tested proforma by using recall method.

3. Results and Discussion
100% of the field was irrigated using canal irrigation system. Among the tillage operation, cultivator and rotavator were found to be used along with a few usages of power tiller. Sowing method was totally found to be traditional method. Interculture operation was found to be done manually by hand.

Table 1: Margin specifications

Margin	A4 Paper	US Letter Paper
Left	18.5 mm	14.5 mm (0.58 in)
Right	18mm	13 mm (0.51 in)



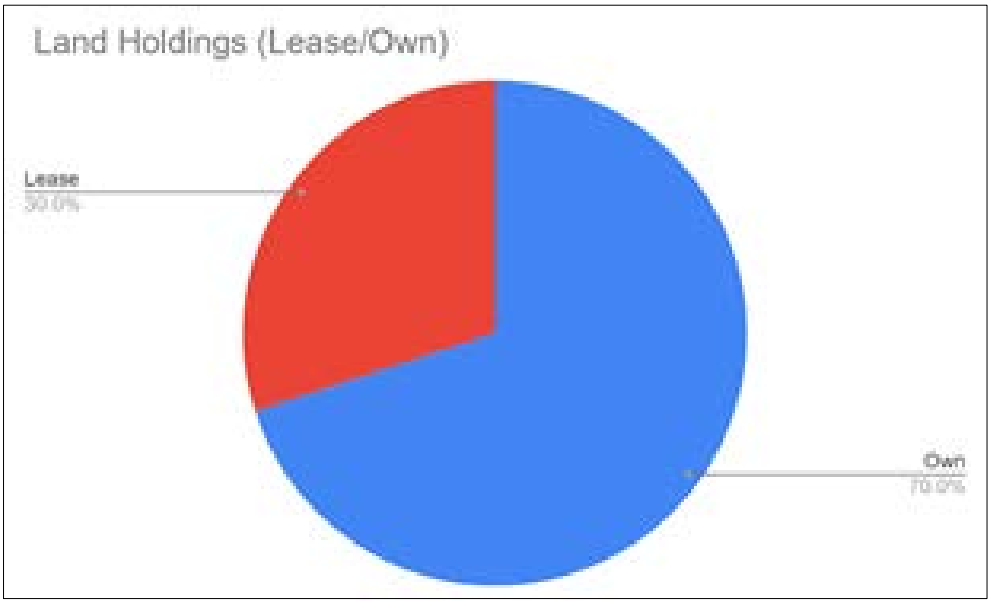


Fig 1: Land Holdings in percentage

Spraying was found to be done using knapsack sprayer only. Harvesting was found to be done totally manual. However, threshing was found to be done using mechanized Thresher Machine of 30 HP.

Among various operations, only, tillage operation and threshing operation were found to be mechanized with low mechanization index of around 45%. The lower mechanization index may be due to the fact that most of the farmers are having lesser land holdings (less than 1ha) as well as due to lack of awareness of the machineries used in agriculture. Lack of custom hiring centers may also be a factor related to lower mechanization index.

4. Conclusions

Establishment of Custom hiring centers. More awareness of agricultural machineries in electronic media and social media. Paddy cultivation may get a momentum by adoption of transplanter, mechanized nursery system for transplanter, power operated sprayer, duster for spraying/dusting and combine harvester for harvesting.

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