



SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

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DEPARTMENT OF AGRICULTURAL ENGINEERING

COURSE CODE & NAME: 19AGO301 & FARM MECHANISATION

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UNIT : I SCOPE OF MECHANISATION IN INDIA

TOPIC : 1





SOURCES OF FARM POWER AND MECHANIZATION

Various types of agricultural operations performed on a farm can be broadly classified as:
Tractive work such as seed bed preparation, cultivation, harvesting and transportation, and
Stationary work like silage cutting, feed grinding, threshing, winnowing and lifting of irrigation water.

These operations are performed by different sources of power namely, human, animal, stationary engine, tractor, power tiller, electricity, solar and wind. For doing these operations different types of power available is classified as:

- Human power
- Animal power
- Mechanical power
- Electrical power
- Wind power



HUMAN POWER: The indications are that the decline in number of labourers employed for agriculture is likely to increase in future resulting a greater investment in labour saving devices and mechanical power.

Labour (Human Energy) on Farms: Labour is one of the most important sources of farm power in regions where traditional system of agriculture is practiced. On small farms, high proportion of labour is supplied by the farmer and his family. Only to meet the peak and permanent labour requirements, the hired labourers are employed.

On small farm having very little spare capital to buy appropriate type of hand tools and animal drawn equipment, both labour use **efficiency** and **productivity** are very low. Labour use efficiency can be improved by engaging labour in a group where sequence of operations demands teamwork for effective output. In the absence of the team, single man would waste other energies, which might result into higher cost of operation. For example, a power thresher operation always demands a team effort for efficient utilization of expensive resources i.e., thresher, cleaner, the prime mover, etc.



ANIMAL POWER: Animal power is the most important source of power on the farm all over the world particularly in developing countries. It is estimated that nearly 80 per cent of the total draft power used in agriculture throughout the world is still provided by animals. Different animal sources are:

- Bullocks- can pull of about 15% of its weight
- Buffaloes
- Camels
- Horses
- Donkeys-can pull 80 % of its weight for short period and 10-15% of its weight for sustainable period.
- mules
- and elephants

The average force a bullock can exert is nearly equal to one tenth of its body weight. But for a very short period, it can exert many more times the average force. Generally a medium size bullock can develop between 0.50 to 0.75 hp.



MECHANICAL POWER

The third important source of farm power is mechanical power that is available through tractors and stationary engines. The engine is a highly efficient device for converting fuel into useful work. The efficiency of diesel engine varies between 32 and 38 per cent, whereas that of the petrol engine in the range of 25 and 32 per cent. In recent years, diesel engines and tractors have gained considerable popularity in agricultural operations. Small pumping sets within 3 to 10 hp range are very much in demand. Likewise, engines of low to medium speed developing about 14 to 20 hp are successfully used for flourmills, oil expellers etc. Diesel engines of the larger size are used on tractors. Diesel engines are the main source of power in agriculture. The basic reason for their preference is the **economy** in operation.

ELECTRICAL POWER

Now-a-days electricity has become a very important source of power on farms in various countries. It is steadily becoming more and more available with the increase of various river valley projects and thermal stations. The largest use of electric power in the rural areas is for irrigation and domestic water supply. Besides this, the use of electric power in dairy industry, cold storage, fruit processing and cattle feed grinding has tremendously increased.

WIND POWER

The availability of wind power for farm work is quite limited. Where the wind velocity is more than 32 km/h, wind mills can be used for lifting water. The most important reason of its low use is its uncertainty. Thus the average capacity of a wind mill would be about 0.50 hp. It is one of the cheapest sources of farm power available.



MECHANIZATION

AGRICULTURAL MECHANIZATION involves the design, manufacture, distribution, use and servicing of all types of agricultural tools, equipment and machines. It includes three main power sources: human, animal and mechanical with special emphasis on mechanical (tractive power).

FARM MECHANIZATION: is technically equivalent to agricultural mechanization but refers to only those activities normally occurring inside the boundaries of the farm unit or at the farm unit level (example: village, community, co-operatives etc).

TRACTORIZATION: refers to the application of any size tractor to activities associated with agriculture.

MOTORIZATION: refers to the application of all types of mechanical motors or engines, regardless of energy source, to activities related to agriculture.

AGRICULTURAL IMPLEMENTS: are devices attached to, pulled behind, pushed, or otherwise used with human, animal or mechanical power source to carry out an agricultural operation.

AGRICULTURAL MACHINERY: is a general term used to describe tractors, combines, implements, machines and any other device more sophisticated than hand tools which are animal or mechanically powered.

AGRICULTURAL EQUIPMENT: generally refers to stationary mechanical devices such as irrigation pump-set.



SCOPE OF MECHANIZATION

It is quite true that the farmers of developing countries have the **lowest earnings per capita** because of the **low yield per hectare** they get from their **land holdings**. One of the few important means of **increasing farm production per hectare is to mechanize it**. Mechanization may have to be done at various levels. Broadly, it can be done in three different ways:

I. By **introducing the improved agricultural implements** on small size holdings to be operated by bullocks

II. By **using the small tractors, tractor-drawn machines and power tillers** on medium holdings to supplement existing sources.

III. By **using the large size tractors and machines** on the remaining holdings to supplement animal power source.

As a matter of fact, the progress of the country should be mainly judged on the basis of degree of farm mechanization (production per worker and the horsepower under his command per unit area).

Large amount of labour or draft power, which can be replaced through machines, provides a strong incentive to mechanize.

From the energy application point of view, the Indian agriculture is in the transition from:

Stage 1 (human power) and stage 2 (animal power) to Stage 3 and 4 (power tiller or four wheel tractor).



Thank You