

Study on tractor implement combination and optimum field capacity for some selected farms

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■ **ABSTRACT** : In this study, the optimum size of tractor and optimum field capacity requirements of implements for three different farms *i.e.*, Agricultural Engineering Farm (AEF), Adhartal Farm (AF), and Dusty Acre Farm (DAF) of Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur was analyzed. Primary data were obtained through log book, history book and field survey of the university farms. Results showed that an optimum hp requirement for AEF was maximum (138.59hp). For DAF and AF it was 101.19 and 124.92 hp, respectively. The optimum field capacity of plough for all the three farm varied between 0.23 – 0.46 ha/h, cultivator was between 0.82 - 1.40 ha/h, disk harrow was between 0.90 – 1.52 ha/h and for seed drill was 1.00 – 2.01 ha/h when the labour cost varies between Rs. 100 – 180. For the selected farms the size of plough ranged between 2bottom-30cm to 4 bottom-35cm, the size of the cultivator and seed drill varied 9 – 19 tynes and for disk harrow between 8 – 16 disk.

■ **KEY WORDS** : Farm equipment, Optimum size, Power, Tractor

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Power is needed on the farm for operating different tools, implements and machinery for various operations. Farm Power is an essential input in agriculture for timely field operations for operating different types of farm equipment for operating tillage, sowing, harvesting, threshing, shelling, cleaning, grading, and irrigation equipment. At present in India, tractors are being used for tillage of 22.78 per cent of total area and sowing 21.30 per cent of total area (Anonymous, 2012). During last 50 years the average farm power availability in India has increased from about 0.25 kW/ha in 1951 to about 1.35 kW/ha in 2001 and 1.64 kW/ha in 2010.

For an agricultural enterprise, tractors are the most expensive farming input. The primary purpose of agricultural tractors, especially those in the middle to high power range, is to perform drawbar work. The value of a tractor is measured by the amount of work accomplished relative to the cost incurred in getting the work done. Therefore, the ideal tractor converts all the energy from the fuel into useful work at the drawbar. By using accurate draft data, the operating costs of both tractors and implements can be minimized. Correct matching of implements should result in the optimum use of the tractor and the attached implement for a particular farm situation.

It is important to use the tractor of optimum size with due consideration to its economy. Because if the power

available from it is less than the required it will not be possible to cover the entire field in the stipulated time effectively, whereas, it will be under used if the power available is greater than the desired. Thus, machinery selection and management technique are of great interest to both the designer and user of farm machinery. This is necessitated in farm situations where the availability of tractors and implements are limited in number. It is rather beneficial and cost effective to select an implement for a specific tillage operation and to determine the correct size of the tractor. The object of this study was to optimize the tractor power requirement with matching implement combination for optimum field capacity at some selected farms of JNKVV Jabalpur.

Literature exists on the selection of optimum combinations of implement and tractor for performing a specified operation or for performing a limited number of operations for a single enterprise. Chancellor (1969) developed a model for optimum size of tractor of a farm. He also applied his model, for single and multiple tractor farms and concluded that, for single tractor farms, there exists an economical optimum sized tractor, and for multiple tractor farms, there exists an economically optimum level of rated horse power per hectare which applies to tractors of all sizes. Singh and Kawade (2003) they have give the different selection criteria for the tractor. According to them