

ABSTRACT

Animals are dependable source of energy for agriculture, however, their draught power has not been fully utilized. To enhance the annual utilization of animal power, draught animal may be employed to operate different matching gadgets through rotary transmission system. For efficient use of matching gadgets proper identifications, development and selection of operating parameters play an important role. A project was undertaken on “Development and performance evaluation of animal powered matching gadgets for rotary transmission system”.

According to the local needs, four matching gadgets were identified and developed for the rotary transmission system. Electricity generation setup for battery charging, maize dehusker sheller, groundnut decorticator and air compressor were selected and modified for rotary mode transmission system. Suitable operating parameters were finalized for rotary transmission system by evaluating different performance parameters of the matching gadgets in laboratory simulation experiment.

A laboratory simulation setup of rotary transmission system was developed for systematic and technical selection of operating parameters of the matching gadgets. An electricity generation setup for battery charging was developed by using an automobile alternator. Primarily 88 Ah and 33 Ah batteries were selected for charging. On the basis of laboratory experiments a 33 Ah battery was selected for charging through animal powered rotary transmission system at an alternator speed of 1250 rpm. A manually operated maize dehusker sheller was modified for the rotary transmission system and similarly a groundnut decorticator was also modified. From the laboratory simulation experiment drum speed of 400 and 300 rpm were selected for operating maize dehusker sheller and groundnut decorticator respectively for rotary mode of operation. A small air compressor was tested in the laboratory condition and crank speed of 300 rpm was selected for operating this gadget in rotary transmission system. Power requirement of the gadgets was observed in the range of 0.4 kW to 0.8 kW.

All selected matching gadgets were tested in the camel driven rotary transmission system at different operating parameters, which were selected through laboratory simulation experiment. 6 hours of charging time was required to charge the 33 Ah battery in the rotary mode. It was found that maize dehusker sheller and groundnut decorticator could be continuously operated for 5 hours in the rotary mode with camel with an average draft of 55kgf. Average output of maize dehusker sheller and groundnut decorticator were 165 kg/h and 204 kg/h respectively in rotary transmission system. Air compressor took only 12 min for compressing the air in the rotary mode. Further comparison of performance parameters was done between laboratory simulation and rotary mode of operation.