ABSTRACT

The self-propelled machine's has progressed from its original primary use as a substitute for manual power on the farm to the present units designed for multiple uses. An important factor influencing the efficiency in the operation of riding type self-propelled machines is the extent to which it has been designed to meet the human capabilities and limitations. Inclusion of these factors ensures higher working efficiency, increased work output, ease of operation, and maximum operator safety.

The increasing awareness of the potential benefits of good ergonomic design has resulted in a steady improvement of operator workspace. Therefore, greater emphasis is required to be given on adopting the operating controls to the physical needs of the operator belonging to different ethnic groups. Moreover, there should be uniformity in placement of these controls on riding type self-propelled machines to accommodate the Indian female operators with a view to achieve an efficient and comfortable operation.

In order to achieve the above objectives, experiments were conducted under laboratory as well as in actual field conditions. Instruments and other facilities used include anthropometry, S-type load cell, vibration meter, Polar heart rate monitor, K_4B^2 and EMG sensor.

The actuating force required for the control levers was reduced by 35, 31, 76, 37.5 and 35% for different control levels respectively. It was observed that operator's workspace can successfully reduce the percentage load on selected hand muscles were found to be reduced by 57, 65, 72 and 68 % and 60, 65, 66 and 66 % in case of FCR, ED, BR, and MD, respectively at 1600 rpm and 2000 rpm. Total whole-body vibration reduction at seat pan was observed to be 38% and 58% at 1600 and 2000 rpm, respectively, with improved operator's workspace as compared to the operation with an existing workspace, Therefore, operator's workspace is assets for riding type self-propelled machine to provide safety, comfort and efficient operation to the operators during the actual field operation of riding type self-propelled machine The MANOVA analysis indicated significant ($P<0.01$) effect of operating conditions and engine speed on WHR, OCR, muscle fatigue and WBV acceleration of self-propelled machine operation with improved operator's workspace.

Key words: Actuating force, Postural discomfort score, Physiological cost, Working Heart rate, Work related body parts discomfort, Overall discomfort rating, EMG, Muscle fatigue, Whole body vibration