

## Development of a dynapod for female agricultural workers on the basis of ergonomic studies

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■ **ABSTRACT** : Dynapod is a portable pedal operated power device that consists of a stand, saddle, handlebar, chain and sprockets, cranks and pedals. A person can generate four times more power by pedaling than by hand cranking. However, continuous pedaling at this rate could be done for only short periods (about 10 min). Pedaling at about half this power (90 W) could be sustained for around 60 min. Most people engaged in delivering power continuously for an hour or more would be most efficient when pedaling in the range of 50 to 70 rpm. In respect to the objective of the study, the design parameters for dynapod and the development of dynapod, a postural dynamometer for foot operated rotary power generation was designed and developed. Experiment was conducted for optimization of flywheel, pedaling rate, power output, saddle height and crank. Heart rate, oxygen consumption rate (OCR), blood pressure (BP), pulse oxygen saturation extent, rate of perceived exertion (RPE) were taken as dependent variables. The flywheel of diameter 550 mm was found to be suitable for dynapod. The optimum pedaling rate increased from minimum of about 45 rpm at 30 W to a maximum of 52 rpm at 90 W. The rate of perceived exertion (RPE) increased with increase in pedalling rate at given power output. Crank length of 180 mm and saddle height of 0.96 trochanteric height gave the minimum physiological responses. The dynapod can be successfully used as an interface between the human worker and a hand operated stationary farm equipment in pedalling mode for getting more output from the machine with less effort and fatigue.

■ **KEY WORDS** : Anthropometry, Ergonomics, Pedaling, Dynapod, Fatigue, Oxygen consumption rate (OCR), Rate of perceived exertion (RPE)

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