Ergonomic Assessment of Manual Harvesting of Date Palm

A. Marzban¹ --- A. Hayati²

¹,² Ramin Agriculture and Natural Resources University, Mollasani, Iran

Abstract

Date Palm (Phoenix dactylifera L.) is major horticultural crop in Middle East region. Production of dates needs plenty of different and specific cultural operations on this plant. Most of crop is harvested manually. Manual date palm harvesting is a labor-intensive and human power demanding work despite developing agricultural mechanization. Tidious and onerous nature of traditional cultural operations like harvesting would cause a serious depression in date palm production. Therefore, for a sustainable production it is vital to improve occupational safety and health of workers. Because of information limitation in this area, an ergonomic study was conducted to investigate postural workload, workers pain and discomfort, cardiorespiratory stresses and human energy demanding during manual date palm harvesting. Manual date palm harvesting included upper-trunk operations (UTOs) and bottom-trunk operations (BTOs). Results revealed in UTOs upper body was shown in bent up to 70% of cycle time (except to trunk which was in neutral) and in contrast, in BTOs lower body was shown in neutral 100% of cycle time (except to trunk which was in bent). Neutral posture for trunk (cum pressure in back-and-belt), bent for upper legs and twisted for feet (cum pressure in feet sole-and-tree’ trunk) necessitated to worker’s balancing in UTOs which caused pain and discomfort in back and feet sole. Pain and discomfort was reported in back and feet sole by workers of UTOs. Pains for back and feet sole were “medium” and “high”. Workers of BTOs reported pain only in back which was “medium. Stooped posture in BTOs increased risk of musculoskeletal disorders in back. Cardiorespiratory evaluation revealed that heart rate in UTOs with 119.64 beats per min was significantly higher than BTOs about 29%. Human-expended energy evaluation also demonstrated energy expenditure rate (EE) at UTOs (45.06 kJ/min) was higher than relative quantity for BTOs about 89%. Cardiorespiratory stresses and human energy demanding were lower in BTOs, because in these operations workers worked longer time and more steady under tree shade. UTOs need more mobility and more hardship for gravity force dominance. UTO and BTO were respectively classified in “heavy work” and “moderate work. Manual date palm harvesting was placed in “heavy work” class. This study addressed ergonomic interventions in manual date palm harvesting.

Keywords: Date palm, Ergonomics, Postures, Workload, Human energy expenditure, Heart rate ratio, Pain assessing.