Performance Evaluation of Newly Designed Solar Powered Ornamental Hedge Trimmer

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In landscaping sector, hedge trimming is one of the essential tasks. Several categories of trimming equipments are used which powered by several power sources such as manual and fossil fuel. Manual operation is laborious with poor efficiency whilst the cost of fuel and the effect of emission of gases from the burnt fuel into the atmosphere, this forced the use of the non-conventional energy sources like wind, solar, tidal and biogas. Among these sources, solar energy is widely striking in nature throughout the year. A domestic multipurpose ornamental hedge trimmer, driven by solar power was designed and fabricated. The designed ornamental hedge trimmer comprises of direct current (D.C) motors {(12V/1.12A), (12V/800mA), (12V/600mA)}, stainless steel single blade action linear cutting section, adjustable blade section, iron machine body and such additional components of a rechargeable battery (Sealed lead acid, 12V/7.2Ah), solar panel (12V/20W), power supply system, battery level indicators and mobile charging system. Trimming is achieved by the D.C motor which provides the required torque needed to drive the stainless steel blade which is directly coupled to the turning shaft of the D.C motor. The linear blades were operated in both horizontal and vertical direction with a maximum angle of 90° in both sides. Adjustable blades can adjust according to the required shapes of cone, cylindrical, round etc. Both blades operations can be controlled by dual-switch system. The battery recharges through the solar panel and domestic power. Performance evaluation of the developed trimmer was carried out statistically (three plants, three stem diameter and three speeds) at the same time economical evaluation also was carried out. The linear blade of the hedge trimmer was found to have a trimming capacity around 105 m^2/h and diameter of the cutting branches significantly affects the trimming efficiency ($p \leq 0.05$). Adjustable blade requires around 5 second as maximum time for complete action of one rotation. At the same time, working time by single battery with linear blade 6.4 hrs, working time by single battery with adjustable blade 4.2 hrs.

Key words: Fabricated, Non-conventional, Single action, Trimming