CAN AUTONOMOUS VEHICLES WITH LASER TREATMENT BE THE FUTURE OF WEED CONTROL IN EUROPE? A PESTLE REVIEW AND SWOT ANALYSIS

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Abstract

Organic farming expansion is one of the main targets of the European Green Deal to "*improve the well-being and health of citizens and future generations*". Weed control can be proportionally the costliest practice in organic farming due to the requirement of manual weeding, especially with sensitive crops that cannot tolerate heavy mechanical weeders. Moreover, the disruption in seasonal labour migration exacerbated the current shortage of agricultural labour in EU countries. Hence, the need of autonomous weed control for organic farming has become increasingly pressing. Recent technical developments have shown that an autonomous laser-based weeding system (ALWS) can be a feasible solution to organic weed control. In general, this system comprises three main sub-systems namely a weed-crop recognition system, a laser treatment system, and an autonomous vehicle to mobilise the whole system. Despite being recognised with positive technical performances, little is known about ALWS implementation potential. This study aims to explore the potential of ALWS by using a PESTLE review and a SWOT analysis with 55 stakeholders in a European cross-country context. The findings pointed out that the public and private funding for sustainable agricultural practices can facilitate the initial development of ALWS. Also, cost-effectiveness is critical for farmers to consider adopting this system, hence, concrete evidence based on investment analysis should be examined for this system. Finally, this study captures regulatory barriers, safety risks, and recommendations for both machinery developers and policymakers.