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Efficiency of Unmanned Aerial Spraying Systems (UASSs) for specialty crops in Greece grown under nethouse and hail protection nets

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Abstract

In Greece – a member of the European Union's group of 27 member countries- a number of very important specialty crops, mainly grapes and fruit trees (peaches, apples, pears, etc.) and new vegetable species (leafy vegetables, strawberries, etc.) are gown under light nethouse of hail-protection systems. The area of "under net" crop land covered is recently increasing significantly, due to additional risks posed by the climate change (increasing number of adverse events such as hails in the last few years) and the increasing production costs. The recent CAP (Common Agricultural Policy, period of 2023-2027) in EU heavily supports and subsidies the construction of these facilities and the Hellenic Agricultural Insurance Agency (a division of the Ministry of Rural Development and Food) pays the appropriate costs by damages. Crop protection on net covered crops takes place with conventional spraying equipment used inside and some main problems and issues are the poor protection of farmers to the exposure of chemicals and the over-dose of Plant Protection Products (PPP) used. Recent and comprehensive reports by OECD underline the future potential and issues of UASSs in the world. No literature research was found on the issue of spraying with UASSs above the net covered crops. This study was undertaken to investigate the degree of inside the net sizes droplet penetration and compared with the outside percent coverage. Two drone models were used with similar spraying settings and flights were performed above a nethouse for vegetable production covered with a white net of 25 mesh (0.74 mm X 1 mm). A simple and a double pass flight were executed and the percent coverage was measured with replicated inside and outside water sensitive papers (WSP). The results have shown no significant differences existed between the inside and outside space, in the simple pass. In the "DOUBLE – pass" flight however, there were

significant differences shown. However, there was significant higher PC% shown inside then outside. These results are not clearly explained and will demand additional flights probably under different wind conditions. A hypothesis is that drift is reduced inside the nethouse as physically was evidenced.

Overall, this study provided initial evidence and indicated that Unmanned Aerial Spraying Systems (UASSs) can be effectively used for crop protection on these special structures. This will result to higher protection of farmers from PPPs and a more sustainable production system, through the application of reduced amounts of PPPs. The study is in progress this summer for more flight settings.

Key words: UASS, specialty crops, precision spraying, horticulture, crop protection