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USE OF UNMANNED AERIAL VEHICLES FOR SPRAYING PLANTS

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SUMMARY

Modern management in sustainable agriculture requires the fast information about condition of cultivated plants and the quick response to undesirable phenomena such as appearance of pests. The use of unmanned aerial vehicles for spraying plants will allow for rapid application of plant protection agents on the growing areas.

INTRODUCTION

Drones - unmanned aerial vehicles, also called systems, derelicts, created on the need and attack of a wanderer. The popularity of equipment and technological progress have made them one of the mass-produced and prime snoops of civilian users. Amateurly they are used for playing, realizing photography and filming with the heights [2]. For this purpose, a list should be drawn up to verify whether it is appropriate or not. Slowly, they also find agricultural provisional dopatrowania and monitoring of forests, the assessment of the condition of crops, and also the animals [1]. In the case of unsupported, difficult and difficult goods, they can not be removed. for carrying out field sprayers [4]. The benefit of implementation in the report on the assistance of the operator, who submitted a request in the case that the operator who made the distribution of chemicals and nature paid out for a fee. On the way to classic agro-tourism, find a way out of the aircraft that performs the operation, the operator is safe in this disaster of this ship.

Overview of drone structures used in plant protection

One of the most popular drones in the world adapted for combating weeds and pests by spraying is built and released on the In 1997, by the Yamaha Motor Company, the Yamaha R-MAX model (Fig.1). It is an unmanned helicopter driven by an internal combustion engine, cooled with water, capacity 246 cm and power 15.4 kW [8]. The drone has been designed primarily for the needs of precision agriculture and apart from spraying plant protection products, it can also be used for fertilizing liquid mineral fertilizers. Yamaha R-MAX is used to nurture agricultural in Japan, Australia and the United States [3]. Preliminary results show that the helicopter is stable in conditions of gusty wind. Liquid from helicopter sprayed with sprayers attached to the beam under the platform.



Fig. 1. Yamaha R-MAX [10]

The drones driven by electric motors are much cheaper. These are usually multi-cards that derive energy from the batteries mounted on them. They are capable of transferring liquid cargo in the range of 10 to 20 kg. The time of flight depends on the weight of the cargo and varies between 15 and 25 minutes. An example of such an agricultural drone is the latest product from DJI - the Agras MG-1 octocopter (Fig. 2). The price of this drone is about 15,000. dollars [9].



Fig. 2. DJI Agras [7]

Drilling installations mounted in drone

The drone mounted installations that spray for spraying consist of a tank, a pump driven by an electric motor, flexible hoses and sprays that can be mounted on the arms of the drone, ideally under the engines or on beam or extension arms placed below the unit, the propellers (Fig. 1). The air current of the drone generated by the propeller accelerates the speed of spraying the sprayed liquid and spreads the plant's veins to the point of reaching leaves and stalks, even those that are located near the ground. The most-variable pressure nozzles are used to spray the liquid. Rotary springs may also be used (Fig. 3) [4].



Fig. 3. Yamaha R-MAX [9]

Due to limited technical conditions and the ability of liquid tanks, treatments with drones are carried out in the range of liquid doses of LV and even UV. The simplest mounted on electric multi-spindle spraying systems resemble the installation of hand-held sprayers. There are no flow meters and devices to automatically control the flow rate of the system fluids. It is possible then to regulate it by replacing the spray nozzles. The regulation of the liquid dose in the field is done by changing the flight altitude and the speed of the platform movement. There are also prepared more advanced installations in which the pressure of the liquid is regulated by the need to change the rotational speed of the pump, and the steering system activates and deactivates spraying automatically on the basis of the previously entered numerical map of the sprayed plant [4].

CONCLUSION

Application in the future for economic and ecological reasons. Drones already enable crop monitoring, using phenomena related to the absorption and reflection of light in plants, which are possible to be operated with optical sensors through photodetection. In other countries, it is also possible to exclude, as previously used chemical agents, adequate access to sanitary plants. For the first time in air functions in the film industry. In addition, rigorous law in the European Union, with regard to agroneotropy, will allow the development of agricultural aerial work in connection with the United in the Union. It is possible that the sound and other technologies do not turn off there is no placeal.

LITERATURE

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