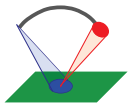

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Evaluation of a crop identification system and an environmentally dependent application system in apple orchards

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Within the European ISAFRUIT project a Crop Adapted Spray Application (CASA) system for precision crop protection has been developed. The system consists of three parts. First part is the Crop Health Sensor (CHS), the second part is the Crop Identification System (CIS), and the third part is the Environmentally Dependent Application System (EDAS). The CIS system consists of an array of six ultrasonic sensors that measures the width and density of the fruit tree canopy that is travelled alongside. This enables the automatic adjustment of spray dose according to the canopy characteristics, deviating from the required nominal dose. When no canopy is detected by the sensor array, the spray nozzles are turned off, and therefore minimizing unwanted spray drift. In addition to the CIS system, the EDAS software layer determines based on RTK-GPS position in the orchard, e.g. close to the sides of the orchard, or close to waterways or wells, whether the coarse or fine droplet nozzles are selected for spraying by the EDAS system automatically based on RTK-GPS. The sensor and positioning systems that have been combined in the CASA sprayer should minimize the environmental load of spraying crop protection chemicals in fruit tree orchards.

The CIS system and the EDAS system were tested in seasons 2008, 2009 and 2010 for their performance in apple orchards in Italy, Poland and the Netherlands. The performance was measured in terms of spray deposit, spray drift, biological efficacy and residue on fruit. In Italy, the volume applied with CIS activated (435 L/ha) was halved with respect to the nominal volume of 850 L/ha, with comparable spray deposition on leaves. The measurements in Poland showed that using drift reducing nozzles and reduced airflow on the outer rows of the orchards did not cause significantly lower deposition on the leaves of these trees. The field trials in the Netherlands showed that secure calibration of the crop identification sensors is required. Drift, deposition, residue and efficacy data of year 2010 experiments are still under analysis.

The combination of precision crop sensors and position in orchard was valuable to maintain efficacy and reduce environmental load when spraying fruit orchards.