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EVALUATION OF A RECYCLING TUNNEL SPRAYERS PROTOTYPE FOR VINEYARD TREATMENTS IN SALENTO-APULIA.

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Key words: pesticide application, tunnel sprayer, espalier trained vineyard, crop protection.

The recycling tunnel sprayers allow recovering and recycling most of the spray fraction that has not been retained by the canopy, so making efficient pest control possible even at reduced pesticide dose rates. Furthermore, these machines reduce both soil contamination and airborne drift. This thanks to the proximity of the jets to the vegetation and the microenvironment that allows also smaller droplets to reach the target.

Within a research program of the Ministry of Education, University and Research and the Ministry of Economic Development, on the European Fund for Apulian Regional Development (PON02 00657-00186-2866121 Project (ECO_P4)), a trained single-row air-blast tunnel recycling sprayer was developed by an Apulian Company in teamwork with the DISAAT of the University of Bari. This machine was aimed at meeting the requirements of the espaliers trained vineyards located in the Salento (Southern Apulia), where the vegetation is such greatly developed during the final growth stages as significantly reduces the size of the inter-row, so compromising the transit of the machines.

The prototype was constituted by a galvanized steel frame on which are located: the fuel tank, the axial fan, the hydraulic system for moving the shields of the tunnel. The recovery system consists of two shields each equipped with a collector at the bottom, where un ejector allows to convey the recovered mixture to the tank.

Simulated treatment tests were carried out in a espalier trained vineyard, located at Cellino San Marco (BR), with the tank filled with a solution of water and a tracer (Tartrazine E-102). The following operating parameters were assumed: volume rate 600 L / ha and travel velocity of 5 km/h.

After the tests, leaves according to a pre-established pattern were taken from the plants and then analyzed in the laboratory to evaluate the tracer deposit in μL/cm^2 of surface area.

The results show that the prototype enables good penetration and a uniform distribution of the spray inside the vegetation, but also presents some problems. Really, starting from the phenological stage of fruit set, when the development of vegetation becomes considerable, the sizes of the machine are unacceptable, because in these conditions a proper homogeneous distribution of the product on vegetation is thwarted and the shields of the tunnel may strip on the vegetation. Therefore, it was necessary to point out technical solutions aimed at to reduce the size of the frame at the front of the machine, where is located the fixed shield. According to these actions, the prototype is more suitable to the characteristics of the studied vineyards and the defined technical solutions can be considered generalizable for the tunnel sprayers employed in such trained vines of the Salento.

PROXIMAL SENSING FOR MULTISPECTRAL ANALYSIS IN VINEYARD

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Key words: proximal sensing, vineyard, NDVI.

Always the vineyard is considered homogeneous production unit, which are collected when all the product seems to have uniform characteristics. The necessary corrections to the achievement of the desired objective wine, are performed in the cellar transformation phase. In fact, fixed factors such as soil, exposure and the type of grape and variables, such as the seasons, climate and cultural practices, make the vineyard a set of uneven areas and plants that do not reach the same times the same production goals. It is therefore necessary to adopt appropriate technologies for vineyard monitoring in order to ensure a site-specific management, can detect the state of health, vigor and the physiological needs of plants. In this way it is possible to adapt to the real needs cultivation techniques, for example by agronomic targeted interventions, such as collection scalar, depending on the degree of ripening of the grapes.

Through NDVI calculation (Normalized Difference Vegetative Index) you can define the vegetative vigor, directly related to the yield of the crop. Remote sensing is one of the most powerful technologies for the collection of information on growth conditions of different areas of the vineyard. Recently proximal sensing equipments have been developed, capable of interacting with the crop from the ground and at a distance from this even less than one meter. Aim of the research was to assess whether, with these technologies proximal sensing, are detectable areas with different physiological status within the same vineyard, to obtain indications, indirect but reliable, on the state of vegetative development of individual plants, the equilibrium conditions of vegetation and production reached, the potential need for additional agronomic interventions and, finally, the degree of technological ripening of the grapes and, therefore, on different times for its collection. The proximal sensing instrumentation used is the GreenSeeker by Trimble®. It is a portable device for spectral reflectance analysis, accompanied by a handheld computer with integrated Bluetooth and high-sensitivity GPS receiver. Captured data is returned in real time, on the handheld display, in the form of a vegetative index NDVI that, with the position of the points measured with GPS, enable the construction of the map of vigor for the same field. After making the choice of the vineyards and their perimeter with the GPS instrument close-scan was performed of all rows (proximal sensing). In order to correlate the measured data with the actual data in the vineyard, have been identified, at random, ten plants, on which the following vegetative parameters: the number of outbreaks, the number of blind buds and of bunches have been detected. For each of these plants were collected, separated and weighed the clusters present. On the musts of these samples were carried out laboratory analysis covering the main indices of maturation: Brix, pH and total acidity. The measured values, both in the field and in the laboratory, showed interested responses and correlation with data obtained from the proximal sensing.