Innovative technologies for precision application of pesticides in vineyards

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ABSTRACT

The challenge for the grape grower in the 21st century is to apply pesticides precisely to the target areas. This can be done in a number of ways, using a blend of technology and common sense. Precision application of pesticides may be carried out by selecting new sprayers which incorporate designs or modifications to direct both air and droplets into the canopy. This paper discusses current research by the Cornell University Spray Team on developing new techniques to increase deposition within the target area canopy.

On-farm trials have been conducted for the past three years on changing spray volume to the developing canopy. Assessing vine row volume, similar to tree row volume in apple trees, allows the grower to reduce pesticide use by 30 -34%, depending on the season in vinifera and hybrid varieties. A computer program has been developed to assist the grower, and this takes into account many variables, such as trellis system and canopy growth stage. Sprayer characteristics such as design, nozzle type and speed are also taken into account. Savings in pesticide reduction have amounted to $US50 per acre per season when using a correctly adjusted sprayer.

Botrytis sprays are very important and extremely expensive and can amount to 50% of the pesticide costs in a north eastern US vineyard. They should be applied to the fruit zone which requires a separate pass with the sprayer, which is expensive in terms of time, labour and fuel. Frequently growers mix botrytis fungicide in the tank with other products and apply to the whole canopy in an attempt to reduce costs. We have developed a fruit zone specific spray system comprising a tank, pump and nozzle assembly, which attaches to the existing canopy sprayer. Early results are very promising and this technique can also be used for the control of grape berry moth.

Changing airflow on-the move ensures better deposition and reduces drift. A simple louvre, fitted to the air outlet of the sprayer allows the grower to adjust airflow via an electric controller. Monitoring canopy size with ultra sonic sensors allows airflow adjustment to be controlled automatically. Monitoring wind speed across the vineyard using a tractor mounted sonic anemometer with a GPS locator, determines true windspeed and direction. In a precision fruit sprayer, the air outlet of the sprayer or fan drive system can be adjusted to increase air output on the upwind side of the sprayer to move spray into the canopy against the wind and the down-wind side could reduce airflow – all done automatically.

Reference

Landers A J. 2008. Spray drift mitigation. pp. 196–215. In: Tony K. Wolf (ed.). Wine Grape Production Guide for Eastern North America. NRAES-145. Natural Resource, Agriculture, and Engineering Service (NRAES), Ithaca, NY.