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Optimization of early growth stage treatments of the vine: experimentations on the artificial vine EvaSprayViti

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Introduction

The reduction of the use of plant protection product is an important objective of research and development in the French vine sector. Improvement of spray application techniques appears to be a tangible way to achieve a significant part of this objective. It also appears that spray applications carried out during first growth stages of the vine (3 to 10 leaves unfolded) are the one offering the more important leeway. Indeed, practices of spraying are not often specifically adapted to the development of the vegetation. Actually, in most cases the same sprayer is used whatever the growth stage and the settings of this unique machine are not often done in an optimal manner according to the nature of the targeted foliage. Moreover, the French legislation do not encourage to adapt the spraying practices to the conditions of the treatment because the dose rate is defined by unit of soil area, independently of other factors.

In order to deliver advices to vine farmers concerning the adaptation of spraying practices to the vegetation features, IFV, IRSTEA and the network of Chambers of Agriculture from Hérault, Gard and Pyrénées-Orientales areas have carried out several experimental tests on the artificial vine EvaSprayViti. A focus has been made on the early growth stage treatments for which room for improvement is the widest.

Materials and methods

Spray deposition was assessed for different spray application techniques on the artificial vine EvaSprayViti at early growth stage. The row spacing implemented was 2,5meters and the leaf area index of EvaSprayViti at early growth stage was 0,24 ha/haas it is described in *Codis et al.* 2013.

The distribution of tracer deposition within the canopy of the vine row was evaluated by segmenting the vegetation structure into 4 compartments corresponding to 4vegetation depth ranges. One measure is made for each one of the four compartments. When required by the sprayer conformation, two rows were assessed. The performance of three sprayers was assessed for several settings specified in the table 1 below.

Results

The histograms below, fig. 4, 5 and 6 respectively show the deposits (per unit of leaf area) measured in each compartment of vegetation (first to fourth "curtain") for the three sprayers.

Considering that most treatments are done at full dose rate using a pneumatic arch sprayer circulating every four rows which is the main common practice, the minimal deposit (among the 2 x 4 compartments) inherent to this application technique have been considered as the minimal reference. Then dose reduction possibilities have been evaluated according to this reference. A fifty percent dose rate reduction has been advised for pneumatic arch sprayers or air blast sprayers circulating every two rows. No dose reduction has been advised for the other ways of using these two sprayers whereas it was advised to carry out treatments with the hoop early stage sprayer using the third of the dose (66% dose reduction).

During the last season, no difference in terms of epidemiologic results was observed in a monitored plot where these advices of dose reduction were tested.

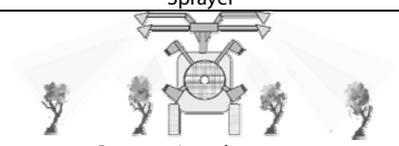
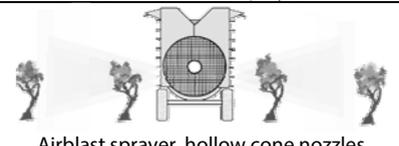
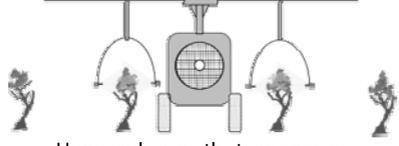
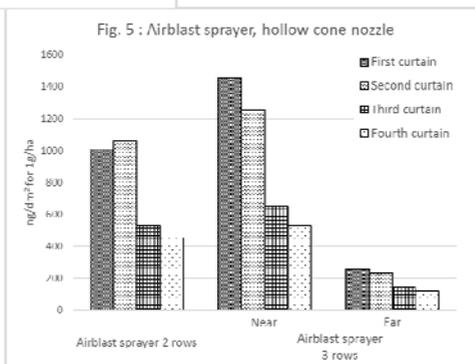
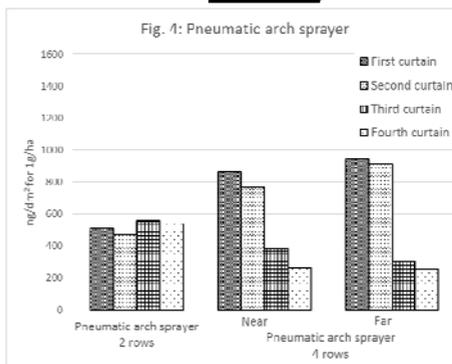
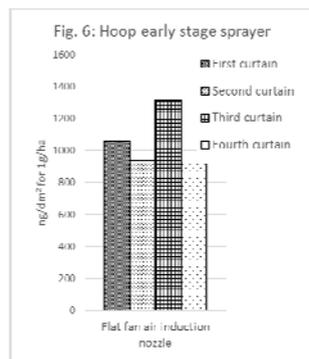
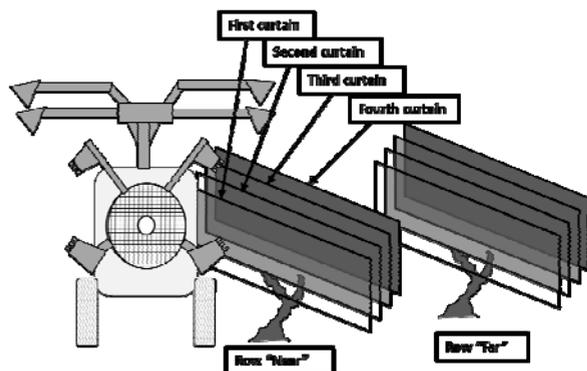
Sprayer	Settings assessed	Comment
 <p>Pneumatic arch sprayer</p>	*Circulating every two rows (specification of the machine) *Circulating every four rows (most common practice)	This kind of sprayer represents 70 to 80 % of sprayers used in the French large vineyard.
 <p>Airblast sprayer, hollow cone nozzles</p>	*Circulating every two rows *Circulating every three rows	In accordance with the most common practices, trials were carried out when the sprayer is circulating every two or three rows.
 <p>Hoop early growth stage sprayer</p>	*Circulating every two rows and associated with flat fan air induction nozzles.	This sprayer do not produce air assistance, it is composed by a hoop supporting two nozzles, one on each side of the row.

Table 1: Sprayers and settings assessed.



Acknowledgments

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References

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