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Spray drift measurements in Italian vineyards and orchards

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Introduction

Also in Italy, following the indications of the EU Directive 128/2009/EC on sustainable use of pesticides, it is foreseen the introduction of mandatory buffer zones. Agrochemical companies, in the registration process of new PPP, shall evaluate also the eventually required buffer zones width and mention it in the PPP label. In this evaluation process due to the lack of national drift value references also in Italy are used procedures and models based on the “Ganzelmeier curves” (now known as Julius Kuhn Institute drift reference curves) that have been realized thanks to experimental data acquired in Germany, therefore in an agricultural and environmental context that is quite different from the Italian one.

Scope of the present study was therefore to collect a representative set of experimental drift measurements referred to the Italian context in vineyard and in orchard, using axial fan sprayer models that are the more diffuse at national level, with using conventional set-up or adopting spray drift reduction techniques (SDRT), such as air induction nozzles.

Material and Methods

Experiments following the ISO 22866 methodology for measurement of spray drift in the field were carried out in apple orchards and in vineyards located in two different Italian regions: Emilia-Romagna and Trentino Alto Adige (Tab. 1). Conventional axial fan and tower shaped air-assisted sprayers were used in trials, comparing different sprayer setups, which included the adjustment of the vertical spray profile, of the air flow rate and the selection of the nozzles (conventional vs. air induction hollow cone nozzles). Tests were made at two different growth stages (end of flowering, BBCH 69 and fully developed vegetation, BBCH 81-91). For each growth stage, 8 sprayer configurations were tested in orchard and 8 sprayer configurations were tested in vineyard. A solution of yellow Tartrazine E 102 was applied in the experiments and spray deposits collected on the artificial targets (filter clothes material and plastic Petri dishes) positioned on the ground at different downwind distances were measured by spectrophotometric analysis. Tests were carried out with air temperature ranging from 13°C to 35°C, air humidity ranging from 25% to 75% and average wind speed ranging from 1.1 to 4.8 m/s.

Region	Crop type	Cultivar	Training system	Layout
Emilia-Romagna	Vineyard	Barbera	GDC	4 x 1 m
Emilia-Romagna	Apple orchard	Golden Delicious	Vaso	4.2 x 1.1 m
Emilia-Romagna	Apple orchard	Red Chief	Vaso	4.5 x 1.2 m
Trentino	Vineyard	Muller Thurgau	Pergola semplice	2.7 x 1 m
Trentino	Apple orchard	Fuji	Spindel	3.5 x 1.1 m
Trentino	Apple orchard	Golden Delicious	Spindel	3.5 x 1.1 m

Table 1 – Main characteristics of the vineyards and apple orchards where spray drift measurements were carried out.

Results and discussion

Results pointed out that the use of an appropriate adjustment of the sprayer, in terms of spray profile and/or air flow rate, contributed to reduce the amount of spray drift with respect to the standard sprayer configuration. Most effective drift reduction however, especially at distances over 10 meters from the applied field, was achieved by the use of air induction nozzles.

Independent of the growth stage, the use of SDRT enabled to reduce spray drift in vineyard by 75% on average (Fig. 1A). The average spray drift curve obtained in Italy using the standard

sprayer configuration resulted much higher with respect to the JKI reference curve for vineyard (Fig. 1B).

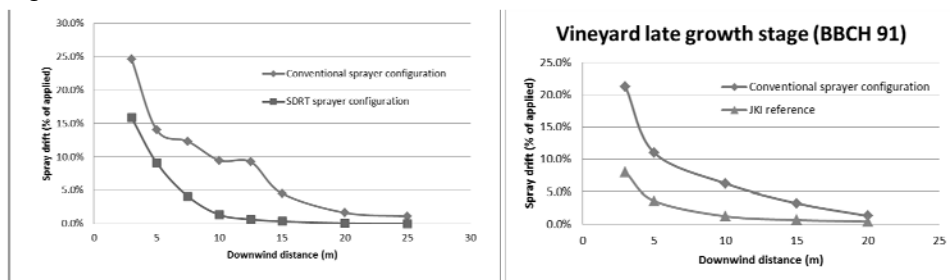


Figure 1. A) Comparison of average spray drift curves obtained in Italian vineyards using conventional sprayer configurations and sprayer configurations equipped with SDRT. B) Comparison of the average spray drift curve assessed in the Italian vineyards at late growth stage (BBCH 91) with the curve of reference JKI basic drift values.

On the other hand, in orchard, independent of the growth stage, the use of SDRT allowed to reduce spray drift by 46% on average (Fig. 2A). The average spray drift curve obtained in Italy using the standard sprayer configuration resulted much lower with respect to the JKI reference curve for orchard (Fig. 2B).

The differences registered between the amount of spray drift measured in orchard and in vineyard in the Italian context with respect to that reported in the JKI reference curves can be due to the different characteristics of the vegetation, especially in terms of layout and of training system, to the wind conditions during the execution of the trials and to the different technical features of the sprayers.

Considering the huge variety of layouts and training systems present in Italy, especially concerning vineyards, but also orchards, further drift measurements are necessary to get reference spray drift curves representative of the national context.

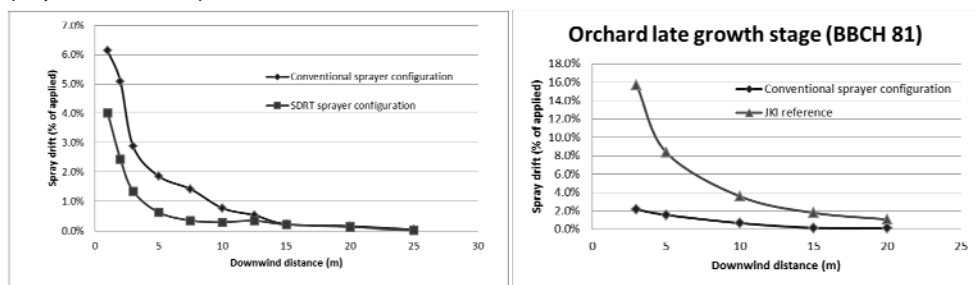


Figure 2. A) Comparison of average spray drift curves obtained in Italian orchards using conventional sprayer configurations and sprayer configurations equipped with SDRT. B) Comparison of the average spray drift curve assessed in the Italian orchards at late growth stage (BBCH 81) with the curve of reference JKI basic drift values.

Acknowledgment

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