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# AIRBLAST SPRAYERS SPRAY DRIFT PERFORMANCE EVALUATION.

## Application of direct (ISO22866:2005) and new alternative indirect test method for spray drift assessment.

*Marco Grella*

Department of Agricultural, Forest and Food Sciences (DiSAFA), University of Turin (UNITO)

✉: Largo Paolo Braccini 2, 10095 Grugliasco (TO), Italy ☎: + 39 011 670 8610 🖷: + 39 011 670 8591 Email: marco.grella@unito.it

## INTRODUCTION

**Spray drift is defined as "the quantity of pesticides that is carried out of the sprayed area by the action of air currents during the application process".** Among the pollutants from pesticides use, **spray drift continues to be a major challenge** because the **risks to contaminate both the environment and bystander**. **Spray drift in bush/tree crops could reach values up to 30% of the applied product.** Increasing public concerns enforces EU lawmakers to adopt **Sustainable Use of Pesticide Directive (2009/128/EC)**, in order to try to limit spray drift generation through the promotion of Spray Drift Reduction Technologies (SDRT). These **SDRT and Pesticide Application Equipment (PAE) are classified**, according their drift reduction capability, **using ISO22369-1:2006 procedures** and the **classification is based on results obtained from** spray drift measurements performed following the **ISO22866:2005** test method. Nevertheless **ISO22866:2005** drift tests cannot be performed under identical environmental conditions and crop structures, so the **results are highly dependent on external factors.**

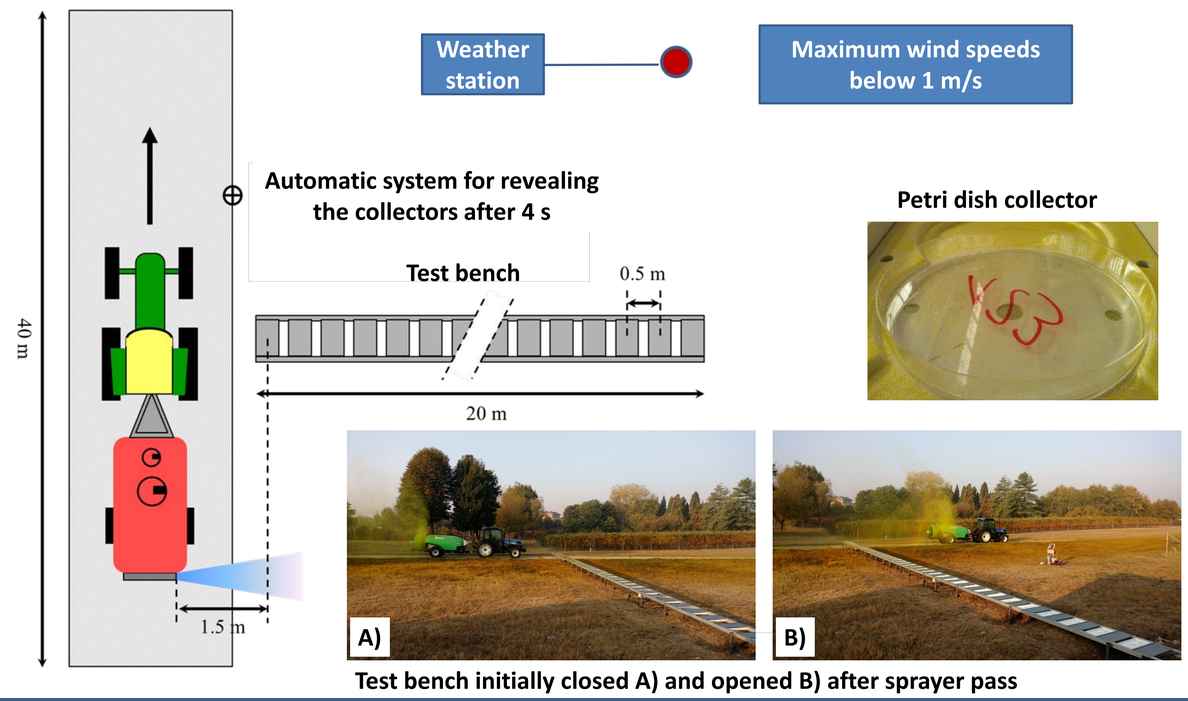
## OBJECTIVES

- **TO DEVELOP A NEW SPRAY DRIFT MEASUREMENT METHODOLOGY able to objectively classify the airblast sprayers for arboreal crop spray application, according to their POTENTIAL SPRAY DRIFT (*indirect method*), minimizing the uncontrollable variables that strongly affect results.**
- **TO VALIDATE the new methodology TROUGH A COMPARISON with spray drift measurements applying ISO22866:2005 TEST METHOD (*direct method*).**

## MATERIALS & METHODS

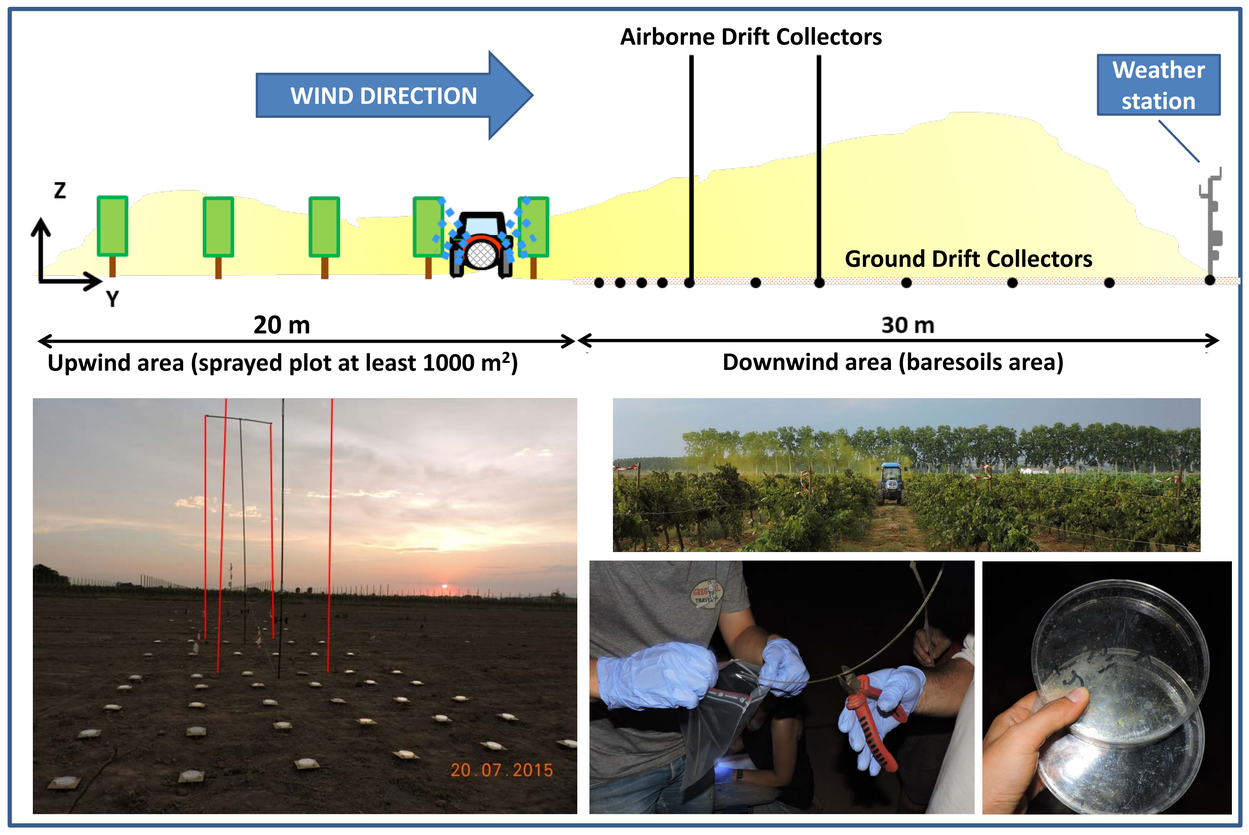
### The new methodology (test bench - *indirect method*)

**The bench purpose: to collect the spray fraction defined as the "potential drift fraction" that remains suspended over the test bench immediately after passage of the sprayer and can potentially be carried out of the target zone by environmental air currents.**




Test bench initially closed A) and opened B) after sprayer pass

### The ISO22866:2005 methodology (*direct method*)



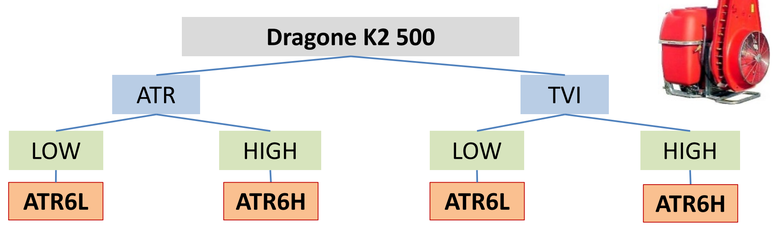

### Sprayers configurations tested applying *indirect* and *direct* test methods:

**Sprayers** (vineyard –**Dragone**- & orchard –**Fede**-) →

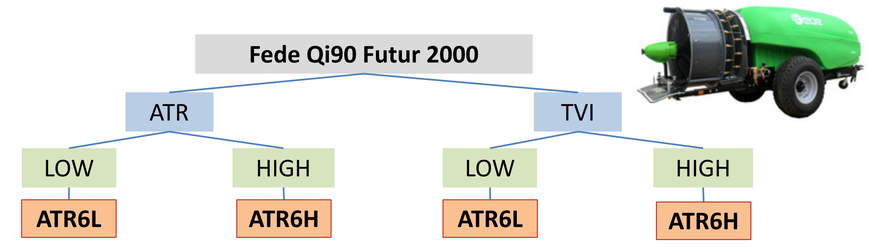
**Nozzle types** ( conventional –**ATR**- & drift reducing –**TVI**-) →

**Fan airflow rate** (**LOW** & **HIGH** according gearbox) →

**Configuration codes** →





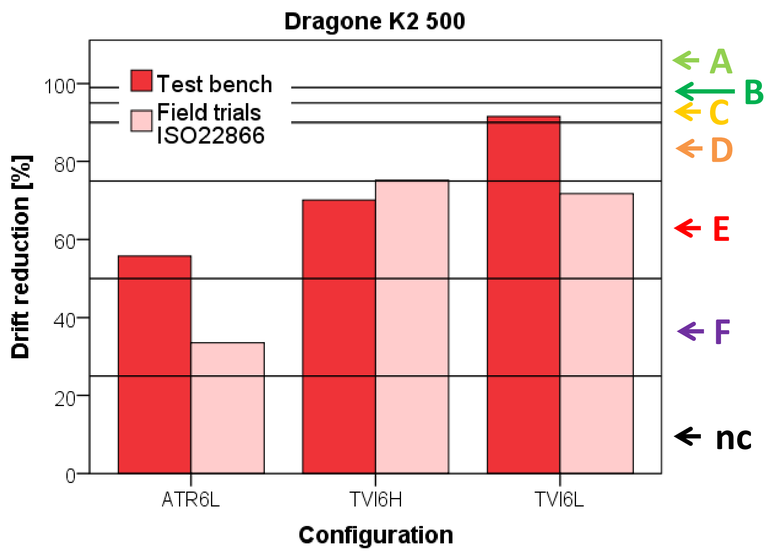


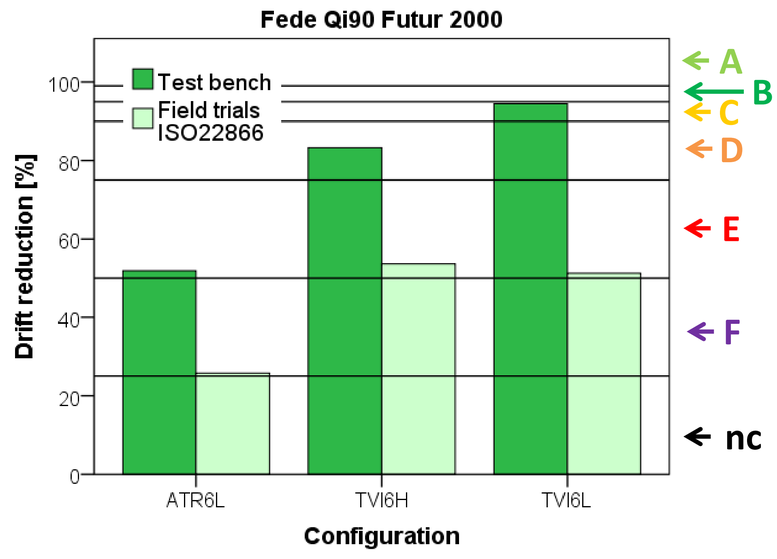

## RESULTS

- **The new developed methodology (test bench measurements) allowed discrimination among ALL the sprayer settings tested.**
- **The ISO22866:2005 allowed discrimination ONLY among the sprayer settings characterized by different nozzle type.**

**Using ISO22866:2005 RESULTS ARE LARGELY INFLUENCED BY ENVIRONOMENTAL CONDITION (wind speed and direction).**

**The results obtained from NEW INDIRECT TEST BENCH METHOD ARE LESS INFLUENCED BY UNCONTROLLABLE VARIABLE (wind speed, wind direction and crop architecture) and the trials conduct is easier and faster.**




**Potential spray drift reduction (% relative to the reference ATR6H) and classes of reduction achieved by PAE configurations tested according to ISO22369-1:2006 (A ≥ 99 %, B 95 % ≤ 99 %, C 90 % ≤ 95 %, D 75 % ≤ 90 %, E 50 % ≤ 75 % and F 25 % ≤ 50 %.)**

## CONCLUSIONS

**Sprayer drift reduction rating could be easily achieved thanks to the use of the NEW DEVELOPED METHODOLOGY…**

**…BECOMING AN USEFUL INSTRUMENT FOR FARMER, MANUFACTURERS AND LAWMAKERS.**

- **Farmers** → would be provided of practical indications for the choice of the appropriate sprayer setting solution to limit spray drift.
- **Sprayers manufacturers** → could easier and more objectively determine the potential spray drift reduction of their production.
- **Lawmakers** → could consider potential spray drift classification for the designation of appropriate mitigation measures.

For further details:

- Grella, M., Gil, E., Balsari, P., Marucco, P., & Gallart, M. (2017). Advances in developing a new test method to assess spray drift potential from air blast sprayers. *Spanish Journal of Agricultural Engineering*, 15(3), e0207.
- Grella, M., Gallart, M., Marucco, P., Balsari, P., & Gil, E. (2017). Ground deposition and airborne spray drift assessment in vineyard and orchard: the influence of environmental variables and sprayer settings. *Sustainability*, 9(5), 728.
- Grella, M., Marucco P., Manzone M., Gallart M., & Balsari, P. (2017). Effect of sprayer settings on spray drift during pesticide application in poplar plantations (*Populus* spp.). *Science of the Total Environment*, 578, 427-439.