Fourth European Workshop on

Standardized Procedure for the Inspection of Sprayers in Europe

-SPISE 4-

27 to 29 March 2012 – Lana (Italy)
After Dinner Speech:
Are sprayer calibration, adjustment related to the canopy structure and drift reduction technologies added values for the orchard/vine growers?

P. Balsari, D. Bondesan & E. Gil
Structure of Session After Dinner Speech

- Opening the session
- Introduction paper of the chairman
- Presentations from the speakers
  - Herbst, E. et al.: Measurement devices for the inspection and adjustment...
  - Knoll, M., Lind, K., Triloff, P.: “Low-Loss spraying”
  - Bondesan, D. et al. Towards integration of inspection procedures, calibration
  - Doruchowski, G. et al. Calibration of orchard sprayers – the parameters and ...
- Discussion of the
  - presentations
  - relevant experiences of MS & Experts
- Listing of subjects to be dealt with by SWG.

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Introduction

Calibration procedure, whatever method is chosen represents great benefits when it is developed prior the application task.

- Increase of efficiency/efficacy of pesticide application process
- Less investment (pesticide, water, fuel, time,...)
- Less risk of contamination (TOPPS, TOPPS-PROWADIS,...)

Adequate calibration  optimal adjustment  less drift losses
Are sprayer calibration, adjustment related to the canopy structure and drift reduction technologies added values for the orchard/vine growers?

Official inspection of Sprayers (acc. article 8) (Basis)

- 1) Calibration
- 2) Adjustment related to the canopy structure
- 3) Drift reducing Technology

Procedure is **obligate** for MS (128/2009/CE)

Tools are **voluntary**
- Tools on which growers are mainly interested (e.g. schema of Beratungs-Ring)
- Tools can be implemented step by step

The supplementation of the official inspection by additional tools will lead to a win-win situation with benefits for public and growers / added values!

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Calibration & adjustment according canopy structure

CHAPTER II
TRAINING, SALES OF PESTICIDES, INFORMATION AND AWARENESS-RAISING

Article 5
Training

1. Member States shall ensure that all professional users, distributors and advisors have access to appropriate training by bodies designated by the competent authorities. This shall consist of both initial and additional training to acquire and update knowledge as appropriate.

The training shall be designed to ensure that such users, distributors and advisors acquire sufficient knowledge regarding the subjects listed in Annex I, taking account of their different roles and responsibilities.

CHAPTER III
PESTICIDE APPLICATION EQUIPMENT

Article 8
Inspection of equipment in use

5. Professional users shall conduct regular calibrations and technical checks of the pesticide application equipment in accordance with the appropriate training received as provided for in Article 5.

Being not mandatory, is widely recommended and explicitly cited on the EU Directive. So...
Calibration & adjustment according to canopy structure

After dinner speech: Sprayer calibration, adjustment to canopy...

- **FARM CHARACTERISTICS**
- **SPRAYER EQUIPMENT**
- **FARMER ATTITUDE**
- **TRAINING INFORMATION**

**Control of technical characteristics** *(ISO 16122-X)*

**INSPECTED SPRAYER**

**IMPROVED PPP APPLICATION**

**INCREASE EFFICACY**
**INCREASE EFFICIENCY**
**COST REDUCTION**
**LESS ENVIRONMENTAL PROBLEMS**

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Calibration & adjustment according canopy structure

Calibration & adjustment is **important**

Calibration & adjustment is **absolutely necessary**

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Calibration & adjustment according canopy structure

After dinner speech: Sprayer calibration, adjustment to canopy...

(P. Balsari: TOPPS-PROWADIS 2011)
Calibration & adjustment according canopy structure

(P. Balsari: SPISE 2007)

Inspection and calibration are equally important and they should be made at the same time.
### Calibration & adjustment according canopy structure

<table>
<thead>
<tr>
<th>Simple &amp; Easy</th>
<th>Complex &amp; Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V (\text{l/ha}) = \frac{Q (\text{l/min}) \times 600}{a (\text{m}) \times v (\text{km/h})}$</td>
<td>$TRV (\text{m}^3/\text{ha})$</td>
</tr>
<tr>
<td>$V (\text{l}/10,000 \text{ m}^2) = \frac{Q (\text{l/min}) \times 600}{h (\text{m}) \times v (\text{km/h})}$</td>
<td>$TRD (\text{m}^2/\text{m}^3)$</td>
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<td>$LAI (\text{m}^2/\text{m}^2)$</td>
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#### After dinner speech: Sprayer calibration, adjustment to canopy structure...

Whatever adopted method must be “realistic and directly applicable” by the user.
Calibration & adjustment according canopy structure

$$Q = k \times \sqrt{P}$$

$$2 \times Q = k \times \sqrt{4 \times P}$$

Wide offer of calibration tools. But in all cases, success of the process implies an adequate user’s training.
Calibration & adjustment according canopy structure

Adjustment according canopy structure implies:

- Adequate selection of air flow characteristics (velocity, air flow rate, ...)
- Precise orientation of air outlets
Using Simple Technology To Improve Spray Deposition and Reduce Drift at Dalrymple Vineyards

Bill Dalrymple
Dalrymple Farms, Ovid, NY

Reprinted from Sustainable Viticulture in the Northeast, Issue 5

I first saw Andrew Landers demonstrate his spray patternator at a field day demonstration in 2004. It inspired me to build my own. The unit I built cost me less than $50, and as you can see is made mostly out of old window screens I had laying around. Each screen has a channel in the bottom that funnels the water into the seven gallon-sized jugs, so I can run my sprayer for 15 minutes and find out how evenly the water is being distributed in the canopy.

When I first tried it out with my standard sprayer settings, it was throwing spray way up to the top, which obviously wasn’t making it into the vine canopy. I was able to change the direction that nozzles were pointing to adjust for the direction of air coming out of the fan - downward canopy, instead of having half of it shoot into the air. It greatly reduced drift.

I worked with Andrew and Emilio Gil on using the “Dosavina” program on my farm. It uses vine dimensions, growth stage, spray material, variety, and spray conditions to calculate an optimum amount of water to deliver per acre. Early in the season, I was able to mix my fungicides in the appropriate concentration for 50 GPA, but actually apply much lower volume - down to as low as 17 GPA in some cases. I feel we got the same coverage while applying much less material per acre. We didn’t need so much water to cover the relatively small leaf area present before bloom, and we figure we’ve saved around $2000 - $3000 on spray materials annually on our farm.

The user’s opinion... the most important “impact factor”

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Field crops
Vineyard
Fruit crops
Olive trees
Citrus trees
Horticulture
Greenhouses
...

Training on calibration process
Nozzle replacement
Dose reduction
Control of operative parameters

GREAT AND CHEAP BENEFITS

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Drift reduction technologies

Air adjustment ... the key point

After dinner speech: Sprayer calibration, adjustment to canopy...

Measurements with LIDAR

35.000 m³/h

27.000 m³/h

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Drift reduction technologies

Potential spray drift measurement for field crop sprayers by the use of a test bench

ISO/DIS 22369-3

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Drift reduction technologies

ISO/NWIP 22369-4
"Crop protection equipment – Drift classification of spraying equipment – Part 4: Potential spray drift measurement for sprayers for bush, trees and similar crops"

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AI nozzles for orchard sprayers achieve the same values on deposition/coverage, with similar efficacy level on pest/disease control, while reduce greatly the risk of drift.
1. Why did you come to the inspection workshop?

Because it is mandatory for IPM and I need the sticker for subsidies.

2. What is, according your opinion, the most interesting aspect conducted during the inspection?

Aspects related with calibration and adjustment: how to select nozzles, how to adjust pressure. It has been very profitable for me.
Farmers recalled that incentives are preferred to penalties, which are difficult to accept for farmers. They prefer voluntary approaches. Hence skill development and knowledge/technology transfer are important elements to be developed in the thematic strategy. (Hind, 2002)

Use inspections as a platform to increase users' awareness (Stakeholder’s Conference, 2004)

The government (Belgium) always stressed that the mandatory inspection of spraying equipment should not be repressive but educative and beneficial for the user. (Braekman and Sonck, 2005)

The farmers were more willing to "accept" information when given personally and adjusted to site specific conditions than when received through general letters and pamphlets. (Kreuger and Nilsson, 2001)
Remarks

High technology ✗
Penalties ✗
Obligation ✗
Environmental requirements ✗

Training ✔
Information ✔

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Remarks

Calibration & adjustment can be done in parallel to inspection procedure: during nozzle flow rate check, during pressure gauge control, explanations can be added. Limited additional time

Sprayers calibration/adjustment MUST be done with the presence of the farmer and this activity has an important impact on farmer training

1. Could orchard sprayer adjustment be always done into the inspections workshop?

2. Which are the minimum workshop device and orchard parameters knowledge necessary to make an appropriate orchard sprayer adjustment?
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