New technologies for a sustainable pesticide application
Training & technology together

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Workshop on Pesticide application equipment Novi Sad (Serbia) June 2012

Dose reduction according EU Directive
Environmentally use of PPP
Operator’ s safety
Other developments for a better use
Dose reduction according EU Directive

- Environmentally use of PPP
- Operator’s safety
- Other developments for a better use

Canopy characteristics: key point

All the recommended procedures, for both dose expression and volume rate, are based in some canopy characteristic or dimensions:

- Canopy height (LWA)
- Canopy width (TRV)
- Canopy density
- Leaf surface
- …
Two options for canopy measurements

<table>
<thead>
<tr>
<th>Simple &amp; Easy</th>
<th>Complex &amp; Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{(l/ha)} = \frac{Q}{a} \cdot \frac{l}{min} \times 600 \cdot \frac{l}{m} \times \frac{v}{(km/h)}$</td>
<td>$TRV (m^3/ha)$</td>
</tr>
<tr>
<td>$V_{(l/10000 \ m^2)} = \frac{Q}{h} \cdot \frac{l}{min} \times 600 \cdot \frac{h}{m} \times \frac{v}{(km/h)}$</td>
<td>$TRD (m^2/m^3)$</td>
</tr>
</tbody>
</table>

Whatever adopted method must be “realistic and directly applicable” by the user

Canopy characterization

Two different methods have been developed for automatic/electronic canopy characterization in order to adapt the volume rate according canopy dimensions

The Optimal Coverage Method

The Wine Row Volume Method
Two methods proposed

The Optimal Coverage Method

**DOSAVIÑA**, software developed including a wide database on canopy characteristics (Leaf Area), spray typology, pesticide type and weather conditions.

The Wine Row Volume Method

A **VARIABLE RATE PROTOTYPE** has been developed for a selective application according canopy structure.
DOSAVIÑA principle

Efficiency
sprayer equipment

Target: leaf surface
Pest/disease Pesticide

Efficiency
weather conditions

Objective: impacts/cm²

\[
V_T = 2 \cdot \text{LAI} \cdot D_1 \cdot \frac{4}{3} \cdot \pi \cdot \left( \frac{\text{VMD}}{2} \right)^{\frac{3}{2}} \cdot 10^{-7} \cdot K
\]

\[
V_R = \frac{V_T}{E}
\]

Data base
Varieties
Crop stages
Zones

The user’s opinion... the most important "impact factor"

Using Simple Technology To Improve Spray Deposition and Reduce Drift at Dalrymple Vineyards

Bill Dalrymple
Dalrymple Farms, Ovid, NY

I first saw Andrew Landers demonstrate his sprayer attenuator at a field day demonstration in 2001. It inspired me to build my own. The unit I built cost me less than $10, and so you can see a photo made mostly of old window screens I had laying around. Each screen has a channel in the bottom that narrows the water into the seven gallon-sized jugs, so I can run my sprayer for five minutes and find out how evenly the water is being distributed in the canopy.

When I first tied it out with any standard sprayer settings, it was downhill more than uphill to the top. But obviously won’t shifting it into the wind canopy. I was able to change that direction that nozzle was pointing and adjust for the direction of air coming out of the tank - downward.

I worked with Andrew and Emilia Gil on using the "Dosavina" program on my farm. It uses wind direction, 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 shown to as low as 17 GPA in some cases. I feel we get the same coverage, while applying much less material per acre. We didn’t need as 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 concept of WRV

Area

Area/height

Volume/time

\[ V_1 \]

\[ V_2 \ (m^2 \cdot \text{min}^{-1}) \]

\[ V_3 \]

\[ V \ (\text{km} \cdot \text{h}^{-1}) \]

\[ C_h \]

\[ C_w \]

\[ \frac{q \ (\text{l} \ \text{min}^{-1})}{[D - d_i - e_i] \ (m) \times \frac{h}{3} (m) \times v (\text{km} \ \text{h}^{-1}) \times i (l \ \text{m}^{-1}) \times 1000}{60} \]
Variable Rate Application in vineyard
(Research project funded by Ministry of Science, Spain)

Based on the **Vine Row Volume** concept
**Canopy measurements using LIDAR**


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**ISAFRUIT Project**

Increasing fruit consumption through a trans-disciplinary approach delivering high quality produce from environmentally friendly, sustainable production methods

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**Unidad de Mecanización Agraria**

www.uma.deab.upc.edu
Crop Identification System

Important pesticide reduction in spray applications in public gardens in The Netherlands (University of Wageningen)
Dose reduction according EU Directive

**Environmentally use of PPP**

Operator’s safety

Other developments for a better use

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**GPS for identify sensible areas**
EDAS - Environmentally Dependent Application System

Control drift in orchard sprayers
Air deflectors – Drift control improvements

Variation or air section
Sprayers cleaning system – key for environment protection

Developments for boom control
Influence of boom height

Optimum boom height: 35-50 cm

Individual nozzle control – avoid overlapping

The 1 metre part-width section in conjunction with 1 GPS Switch.

GPS-Switch features savings at operating costs of 3% to 8% compared to the manual switching.

The reduction of the part-width sections from 3 metres to 1 metre may result in savings of another 1-2%.
Automatic regulation of boom height and stability

Automatic control of boom sections and boom height
Nozzle development
Continuous changes and improvements

Nozzle is responsible of most of the spray quality pattern. In the last years many new developments have been presented in order to improve efficacy and efficiency.

Air injection nozzles
Bigger droplets with the same efficacy
Doble flat fan nozzles

Well adapted for dense canopy to increase penetration (horticulture). Good filter maintenance is required

iHIGH RISK OF DRIFT due to small droplet size
Dose reduction according EU Directive
Environmentally use of PPP

**Operator’s safety**

Other developments for a better use
Sprayers cleaning system – key for environment protection

Automatic control for sprayer cleaner
Independent cleaner pump
Less water consume
Easy to use

Reduced dead volume
Easy mixing tank
Ergonomic design

Extra boom height for maize (Amazone)
Less operator’s contamination

Improvement spray technologies in greenhouses
Analysis of artificial vegetation (LWA & TRV)

<table>
<thead>
<tr>
<th>Vegetación</th>
<th>LWA</th>
<th>TRV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.000 m²/Ha</td>
<td>2.250 m³/Ha</td>
</tr>
<tr>
<td>2</td>
<td>12.500 m²/Ha</td>
<td>1875 m³/Ha</td>
</tr>
<tr>
<td>3</td>
<td>10.000 m²/Ha</td>
<td>1500 m³/Ha</td>
</tr>
<tr>
<td>4</td>
<td>15.000 m²/Ha</td>
<td>2.250 m³/Ha</td>
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Promedio de 2, 3, 4: 12.500 m²/Ha | 1875 m³/Ha

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Environmentally safe sprayers

http://prototype.topps-eos.org/?LANG=EN

Drift diagnosis tool – TOPPS PROWADIS

www.uma.deab.upc.edu
Drift diagnosis tool – TOPPS PROWADIS

www.topps-life.org

Хвала вам на пажњи