Benefits of using Control Flow Valves in IRS applications

Iñigo Garmendia (Olaker S.Coop.)
1. What is a low pressure CFV?
Traditional Spraying equipment (Pressure Gauge)

Pressure variation in the tank

![Pressure variation in the tank graph]

- Time (min.)
- Pressure (bar)
Low Pressure Control Flow Valve

Pressure variation in the tank

CFV type 1

CFV type 2
2. Benefits on Efficiency
2.1. Reduction of insecticide DEPOSIT VARIATION on the wall
Conclusion:
Considerable variation in the DOSAGE of insecticide (aprox. ± 25%) measured on wall surfaces
Spraying equipment with low pressure CFV

Conclusions:

1. BETTER EFFICIENCY: Uniform dosage of insecticide sprayed during all the operation
2. SAVING WATER and MORE COMFORTABLE: 25% less water is used to sprayed 250 m² (7,5 ltr. Instead of 10 ltr.)
2.2. Reduction of insecticide LOSS
There is an insecticide loss due to **rebound** and atomization.

- Fine droplets fail to reach the wall (atomization)
- Big droplets rebound or run off
Insecticide LOSS measured in Laboratory tests

<table>
<thead>
<tr>
<th>Pressure (bar/psi)</th>
<th>NON-ABSORBENT Surface</th>
<th>ABSORBENT surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 bar 55 psi</td>
<td>30 %</td>
<td>16 %</td>
</tr>
<tr>
<td>3 bar 40 psi</td>
<td>28 %</td>
<td>14 %</td>
</tr>
<tr>
<td>2 bar 30 psi</td>
<td>25 %</td>
<td>12 %</td>
</tr>
<tr>
<td>1.5 bar 20 psi</td>
<td>20 %</td>
<td>9 % 33% reduction</td>
</tr>
<tr>
<td></td>
<td>33% reduction</td>
<td>50% reduction</td>
</tr>
</tbody>
</table>

Tast conditions: 8002 nozzle, distance: 45 cm, speed: 2.5 sec/min. Galvanized iron and hard black cotton cloth surface in a close container.
3. Benefits on Spray Operation’s Safety
### Exposure of Workers to Pesticides

(William F. Durham)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Dermal (mg/man/hour)</th>
<th>Respiratory (mg/man/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRS (DDT)</td>
<td>1.755</td>
<td>7.1</td>
</tr>
<tr>
<td>Spraying house outside (DDT)</td>
<td>243</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Most Exposed parts of the body to contamination

<table>
<thead>
<tr>
<th>Body</th>
<th>mg/man/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Right arm</td>
<td>993</td>
</tr>
<tr>
<td>2. Right shoulder</td>
<td>290</td>
</tr>
<tr>
<td>3. Chest</td>
<td>126</td>
</tr>
<tr>
<td>4. Left shoulder</td>
<td>112</td>
</tr>
<tr>
<td>5. Back</td>
<td>51</td>
</tr>
<tr>
<td>6. Face</td>
<td>41</td>
</tr>
<tr>
<td>7. Left arm</td>
<td>32</td>
</tr>
</tbody>
</table>
Main factors that influences contamination RISK

1. Pressure
   - From 1.5 bar
   - to 4 bar

2. Area sprayed
   - Walls
   - Ceilings

3. Type of surface
   - Absorbent
   - Non Absorbent

4. Nozzle size
   - 8002
   - 8001
## Variation exposure by pressure

<table>
<thead>
<tr>
<th>IRS (DDT) at Pressure</th>
<th>Dermal (mg/man/hour)</th>
<th>Respiratory (mg/man/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 bar (55 psi)</td>
<td>2.760</td>
<td>11.1</td>
</tr>
<tr>
<td>3 bar (55 psi)</td>
<td>1.755</td>
<td>7.1</td>
</tr>
<tr>
<td>2 bar (55 psi)</td>
<td>719</td>
<td>2.9</td>
</tr>
<tr>
<td>1.5 bar (55 psi)</td>
<td>255</td>
<td>1</td>
</tr>
</tbody>
</table>

7 times reduction
4. Benefits on Nozzle erosion
Nozzle Erosion

MAIN EROSION FACTORS

1) Nozzle material and internal design
2) Insecticide type
3) Pressure in the nozzle (bar/psi)
Spray tip erosion

**NEW**

**NEW SPRAY TIPS**
Produce a uniform distribution when properly overlapped.

**WORN**

**WORN SPRAY TIPS**
Have a higher output with more spray concentrated under each tip.
Evolution of the erosion of a nozzle tip

% Flow rate increase

Time (hours)

HSS 8002E at 3 bar

% 20

New low erosion nozzle (3 bar)
Lower pressure LOWER EROSION..... Saving MONEY

- HSS 8002E at 3 bar % 20
- HSS 8002E at 1.5 bar % 10

New low erosion nozzle (3 bar)
5. Summary
The benefits of using CFV are ...

1. NO INSECTICIDE DEPOSIT VARIATION on the wall due to pressure variation in the tank
2. INSECTICIDE LOSS reduction of 50%
3. OPERATOR´S CONTAMINATION RISK REDUCTION (7 times)
4. NOZZLE TIP ABRASION reduction of 50 %
3.6.5 Flow Rate control device

A flow rate control device shall be fitted and its type declared. The device shall maintain a uniform output at the nozzle ±5% of the specified discharge rate, when subjected to the method outlined in section 2.10.4.
Thank you