Reducing pesticides in viticulture with Mildium innovation:

economical results and organizational consequences in wine estates

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Reducing pesticides in viticulture with Mildium innovation: economical results and organizational consequences in wine estates

• Introduction:
  - Grape growing: a strong pressure on the environment in France compared to other crops: 3% cultivated area, 20% pesticides use; Frequency Treatment Index (IFT): 7-22;
  - French government wants to obtain a 50% reduction in pesticide use by 2018: Ecophyto 2018;
  - Alternative solutions do exist to reduce the use of fungicides in grape growing: Integrated Pest Management (IPM).
  - In wine production, the environmental issue mainly concerns fungicides because they represent 70% of all the pesticides used in grape growing (Eurostat, 2007): powdery and downy mildew.
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• Introduction:
  – in grape growing, IPM is relatively recent;
  – a new decision process - developed by the French National Institute for Agronomic Research (INRA) - allows fungicide use to be reduced by 40%-70% in the case of powdery and downy mildew: Mildium process.
  – Experimented since 2007, Mildium allows now some results;
  – After presenting it and methodological way for studying, main results are presented.
1 Mildium: principles and methodology

Each step: indicators combination for deciding treatment decision and choosing date of treatment (weather, mildew pressure)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Nb mini</th>
<th>Nb Maxi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powdery mildew</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Downy mildew</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>
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1 Mildium: principles and methodology

31 parcels network in 3 main regions

- 15 parcels
- 7 parcels
- 9 parcels

Map of France highlighting three main regions:

- Northern France
- Burgundy
- Southwest France

These regions are part of the 31 parcel network for Mildium innovation.
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1 Mildium: principles and methodology

- Evaluating economic consequences of mildium: OBC

Activity Grape growing

Group of tasks linked at each other, referring to a same management action and consuming resources.

Technical procedure:
Logical and sequenced combination of many cultural operations on a species in natural land which permit to control the nature et to have a production.

CULTURAL OPERATIONS (examples):
- Preliminary pruning
- Pruning
- Chemical weeding
- Phytosanitary treatment 1
- Grape harvest
- Trimming 1

SYSTEMATIC representation of the practices in a grape farm.

TECHNICAL OPERATIONS (examples):
- Maintenance of ecological zones
- Equipment maintenance
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1 Mildium: principles and methodology

FULL COST OF THE GRAPE GROWING ACTIVITY =

Cost of the Grape growing activity after the primary flow (example) =

Cost of the technical procedure = sum of the costs of the cultural operations (examples):

Cost of preliminary pruning + Cost of pruning + Cost of chemical weeding + Cost of 1st thinning + Cost of the 1st phytosanitary treatment + ... + Cost of the harvest + Other cost of the Grape growing activity, specific to the Grape growing activity

Secondary cost of Grape growing activity = charges from the secondary flow (allocation of charges which don’t concern the Grape growing activity but supported by the farm).
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1 Mildium: principles and methodology

Example of the cost of a cultural operation: the 1st phytosanitary treatment

<table>
<thead>
<tr>
<th>PESTICIDES</th>
<th>29,29 €/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pesticides + additives</td>
<td>(29.5%)</td>
</tr>
<tr>
<td>= 29,29 €/ha</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MANUAL LABOR</th>
<th>7,78 €/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation realised by the farm leader</td>
<td>(8%)</td>
</tr>
<tr>
<td>= 7,78 €/ha</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRACTOR AND EQUIPMENT</th>
<th>61,91 €/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor (bought 1999, depreciation: 84 months)</td>
<td>(62.5%)</td>
</tr>
<tr>
<td>- depreciation = 23,59 €/ha</td>
<td></td>
</tr>
<tr>
<td>- insurance = 0,45 €/ha</td>
<td></td>
</tr>
<tr>
<td>- fuels: 6,46 €/ha</td>
<td></td>
</tr>
<tr>
<td>- maintenance: -</td>
<td></td>
</tr>
<tr>
<td>Equipment: pulverizer</td>
<td></td>
</tr>
<tr>
<td>- depreciation = 31,41 €/ha</td>
<td></td>
</tr>
<tr>
<td>- maintenance: -</td>
<td></td>
</tr>
</tbody>
</table>

Example of the evaluation of the cost of a cultural operation.
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2 Mildium: a profitable IPM

Comparison Between Mildium and Conventional (2009)
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2 Mildium : a profitable IPM

Money saved with Mildium in 2009

Source : ENITAB – Juillet 2010
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2 Mildium: a profitable IPM

Money saved with mildium by region - % (2009)
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2 Mildium: a profitable IPM

Cost Repartition - 2009

<table>
<thead>
<tr>
<th>Category</th>
<th>Mildium</th>
<th>Conventionnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matériel</td>
<td>139,67 €</td>
<td>200,49 €</td>
</tr>
<tr>
<td>Carburant</td>
<td>14,21 €</td>
<td>21,19 €</td>
</tr>
<tr>
<td>Main d'Œuvre</td>
<td>50,77 €</td>
<td>72,92 €</td>
</tr>
<tr>
<td>Intrants</td>
<td>187,26 €</td>
<td>294,46 €</td>
</tr>
<tr>
<td>Total Cost / ha</td>
<td>35,6%</td>
<td>50,0%</td>
</tr>
<tr>
<td>Total Cost / ha</td>
<td>3,6%</td>
<td>3,6%</td>
</tr>
<tr>
<td>Total Cost / ha</td>
<td>13,0%</td>
<td>12,4%</td>
</tr>
<tr>
<td>Total Cost / ha</td>
<td>47,8%</td>
<td>34,0%</td>
</tr>
</tbody>
</table>
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3 Mildium: organizational constraints

- For a better knowledge in wine estates about mildium: ex-post survey on all estates testing Mildium (2009)

- 5 domains: Monitoring, competency, information sources, work organization, risk perception
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3 Mildium : organizational constraints

- Practices not always adapted for mildium : 
  - Monitoring is modified,
  - Treatments often decoupled.

- Difficulties encountered :
  - Work organization ,
  - Risk perception ,
  - Enlargment to all wine estate
Conclusion

Mildium

POD Mildium at wine estate level

Evaluation

Reducing cost 31%

Bottlenecks:
- Monitoring,
- Risk perception,
- Work organization.

Supply chain stakeholders

knowledge, technical support, financial subsidies,..