DEPHY and the IPM monitoring lessons learnt in France

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The National Action Plan following the EU SUD Directive 2009/128/EC
- Launched in 2009
- Objective: halving pesticide use by 2018 >> 2025 (ECOPHYTO 2+)

>> not a success so far!

French agricultural area: 29 Million ha
>> ≈ 3.8 standard dose of active ingredient per ha
The **ECOPHYTO** plan launched a unique tool: the DEPHY network

- **3000 volunteer farmers** all agricultural sectors arable crops, vineyards, orchards, vegetables...

- **Large agricultural partnership** chambers of agriculture, cooperatives, farming organizations, research...

- **Explicit objective:** decrease pesticide use
good way to decrease exposure to pesticide

- **Explicit approach:** cropping system re-design
holistic view of IPM
“find my own solutions adapted to local context!”

- **Role of advisors coaching farm groups**
  network engineers, 10-15 farms per group
  funded by a specific tax on pesticides

- **A shared information system to collect data**
Changes in pesticide use 2010 > 2017

Indicator: Treatment Frequency Index

-14% Arable crops
  Including mixed farming with livestock
  IFT 2017 = 2.6*

-25% Orchards
  IFT 2017 = 14.3*

-17% Vineyards
  IFT 2017 = 10.2

-38% Vegetables
  IFT 2017 = 3.4*

-43% Horticulture
  IFT 2017 = 8.5*

-37% Tropical crops
  IFT 2017 = 4.5*
Changes in pesticide use

*Indicator: Treatment Frequency Index*

with a huge diversity across farms!
The DEPHY’s communication and dissemination activities

- Leaflets describing IPM strategies
- Leaflets describing farming system trajectories: “success stories”
- Booklets describing “families” of successful adoption of IPM
- Thematic booklets e.g. glyphosate use and alternatives, biodiversity
- Local ‘open-farm’ days and dissemination events
  > 2,000 yearly
- Conferences (local, national, by agricultural sectors...)
- Videos testimonies of farmers

Everything available (in French !) on the National Portal

https://ecophytopic.fr/

Nicolas Munier-Jolain, BCPC Pests & Beneficials Review 2020
Analysed the huge diversity of DEPHY farms

Context, management strategies, reliance on pesticides
... at the network launching [2009-2011]

1012 arable cropping systems DEPHY

1. What are the technical strategies
   of farmers using little amounts of pesticides?

2. Low TFI = low productivity? Low profitability?

3. Scenario of general adoption of IPM-based systems at the country level – what consequences?

TFI: Treatment Frequency Index
Profiling management strategies with low pesticide use

Clusters of production situations

6 groups of production situation

Main factors
• Livestock
• Local markets: Industrial crops
• Climate: radiation, rain, temperatures...

Management strategies (MS) with low TFI

Ex: 21 MS profiles identified in PS2

• Profiles with low TFI always combine several management measures
• Main management measures
  ✓ Temporary grasslands
  ✓ Crop diversification: rustic crops, sowing seasons
  ✓ Cultivar diversification, disease resistant cultivars
  ✓ Cereal delayed sowing dates
  ✓ Reduced doses
  ✓ Soil tillage – alternating ploughing
  ✓ Moderate fertilisation

IPM allows reducing the reliance on pesticides
Lechenet et al., Agricultural Systems, 2016
Correlation between pesticide use and performances

*a statistical method considering explicitly the interactions with soil, climate, context...*

**Scale = Cropping system**

<table>
<thead>
<tr>
<th>Pesticide use x Productivity</th>
<th>Pesticide use x Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soils with high yielding potential sugar beets, potatoes</td>
<td>Mixed farming Medium yielding potential grasslands + maize</td>
</tr>
<tr>
<td>6%</td>
<td>39%</td>
</tr>
<tr>
<td>No antagonism for 94% of sites</td>
<td></td>
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</tbody>
</table>

| Soils with high yielding potential sugar beets, potatoes | Cereal based systems Low yielding potential |
| 22%                                             | 11%                                       |
| No antagonism for 78% of sites                  |                                           |

Lechenet et al., Nature Plants, 2017
Correlation between pesticide use and performances

a statistical method considering explicitly the interactions with soil, climate, context…

- Pesticide use x Productivity
- Pesticide use x Profitability

Scale = crop wheat

In most cases (73%), wheats with low pesticide inputs have lower yields:
- Cultivars chosen for disease resistance
- Delayed sowing
- Moderate fertilization

In most cases, reduced input costs offset reduced yield

In 24% of sites (rather soils with low potentials) wheats with low TFI have better semi-net margins
Scenario of general adoption of IPM at the country scale

**What if ??**

...all French farmers would adopt cropping systems (and performances) of the DEPHY farm with the lowest pesticide use in the same context (soil, climate, environment)?

**What consequences for French agriculture?**

- Pesticide use
- Production volumes, relocation of productions
- Trade balance, energy inputs, autonomy for plant proteins
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Pesticide use

≈ - 40 %
Scenario of general adoption of IPM at the country scale

Production volumes (country scale)

- Increase in overall productivity
- Decrease in cereal production
  - lower yields
  - lower acreage
- Increase in diversity
  - At the farm scale
  - At the regional scale
  - At the country scale

- temporary grasslands
- grain legumes
- sugar beet
- oilseed rape
- grain maize
- silage maize
- barley
- wheat
Scenario of general adoption of IPM at the country scale

Positive impact on trade balance

Production volumes (country scale)

- temporary grasslands +107%
- grain legumes +51%
- sugar beet +13%
- oilseed rape -22%
- grain maize +8%
- silage maize -32%
- barley -3%
- wheat

Current ECOPHYTO

Decrease in soybean import
Decrease in energy import
Increase in maize export
Decreased in the production of rape-based energy
Decrease in barley export
Decrease in wheat export

Average price scenario 2010-2015

Positive impacts on trade
Negative impacts on trade

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Take home messages

- Promote a holistic view of IPM / agroecology
  
  *Scale matters! Don’t think at the crop scale, but rather at the farm/landscape/region scale*

- IPM-based strategies enhance sustainability

- Transition requires education and peer-to-peer learning

- Upscaling IPM / agroecology at the country/global level would have consequences on trades
Thanks for your attention

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