How I implement IPM

Details of a holistic IPM strategy with low pesticide input in a European farm

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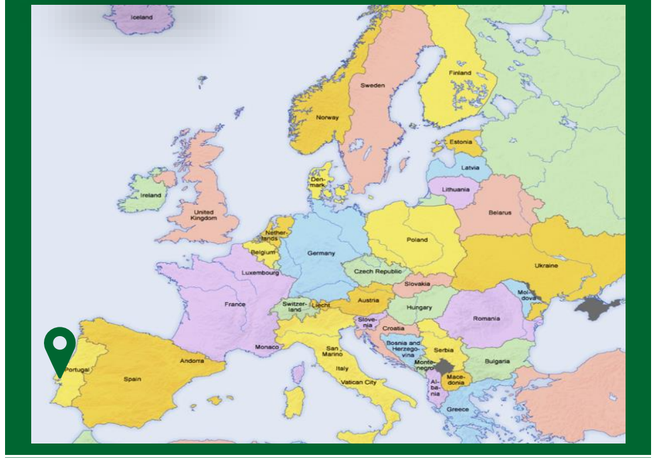
My farm

PEDO-CLIMATIC CONTEXT

- Clay soil, medium to high fertlity and high water retention capacity
- Organic matter (granulated or compost) always used before production and manure every 2 or 3 years
- Mediterranean climate, type Csb: temperate with dry and mild summers
- Average annual precipitation: 873 mm

MAIN PESTS

- Lettuce: caterpillars , thrips (*Thysanoptera*), *Botrytis cinerea*, Downy mildew and *Fusarium*
- Cabbage: caterpillars and aphids



AGRONOMICAL CONTEXT

- Open air crop rotation: lettuce with 4 plantings per year and Portuguese cabbage (only in winter)
- Selection of varieties resistant to the main diseases
- Biological control use, using fungi, bacteria and mites, and interplanting with flower strips
- Utilised Agricultural Land = 5 ha

SOCIO-ENVIRONMENTAL CONTEXT

- The company has 8 permanent employees: 2 family employees and 6 external employees. Some seasonal workers are, sometimes, hired, depending on the time of the year
- Production has no certifications, but follows the high-quality standards of its customers (supermarket chains)
- Poor soil in organic matter, essential for lettuce

OBJECTIVES AND MOTIVATIONS OF THE FARMER

- The farmer aims to achieve "zero residue" production
- The farmer focuses on the quality of production, producing for the final consumer to have a clean product with minimum impact on his health. In addition, he also focuses on the visual quality of the products, which the client (distribution chain) demands. Thus, he aims to combine three goals: a clean and "beautiful" product with reduced and minimum use of chemical pesticides

My strategy

Alternative solutions

Genetics

Physical control

Agronomical

Varietal selection resistant to: Downy mildew, aphids and fusarium

Line tillage + finger-weeder

Irrigation strips + use of plastics covering the soil

Natural vegetation cover in fallow land

Planting flowers (natural enemy shelter)

N Cover crops

Planting flowers (natural enemy shelter)

Release of natural enemies for thrips,aphids and caterpillars

~~Chromotopic and sexual traps~~

Summer Lettuce → **Autumn Lettuce** → **Winter Cabbage** → **Spring Lettuce**

Chemicals and biocontrol

Insecticides and other pesticides*

Fungicides*

Herbicides*

*In green = low risk PPPs

* In blue = biocontrol agents

Mineral fertilizer

Organic manure

Insecticides with low environmental risk: Thrips and aphids; only when necessary

Fungicides: Downy mildew and *Fusarium*; only when necessary

~~Herbicides~~

Key measures

The high pest and disease pressure is controlled with use of more and more non-chemical practices

Cabbage is only produced in winter, so there are no major pest and disease problems

Among the main practices are the selection of resistant varieties, release of natural enemies and flowers seeding

Beneficial insects release has the limitation that it only works in spring/summer

Application of mineral fertilizers and insecticides, only if there is a need

Application of bio-fungicides (e.g. *Basillus subtilis*)

Use of irrigation strips. Use of plastics on the farm to replace the use of herbicides (no longer used)

Legend N **New solution** ~~**Solution**~~ **Abandoned solution** **Non systematic solution**

My results

Evolution trend on the farm

Pests control

Very good	Medium	To improve
General weeds	Catterpillars *Botrytis cinerea*	Thrips Aphids *Downy mildew* *Fusarium*

Evolution of use of pesticides

Very good	Medium	To improve
Fungicides Insecticides	Biocontrol	

Sustainability indicators

Very good

- ↘ - Use of products that are dangerous or toxic to the environment
- ↘ - Use of chemical fertilizers
- ↗↗ - Use of conservation biological control [landscaping]
- ↗ - Establishment of grass cover or multi-annual crops
- ↘ - Use of dangerous or toxic products for the user (and the consumer)
- ↗ - Level of overall satisfaction of the farmer and his entourage
- ↗ - Real gross product with self-consumption
- ↘ - Pesticides costs

Medium

- ↗ - Workload
- ↗ - Complexity"of the cropping system
- ↗ - Labour employment
- ↘ - Drudgery of work
- = - Distribution of work over the year
- ↗↗ - Standardized operating expenses
- ↗ - Semi-net margin

To improve

- = - Use of fossil energy
- = - Use of sustainable energy
- = - Irrigation (amount of water)
- ↗ - Diversity of species in rotation
- ↘ - Equipment usage time
- = - Actual mechanization load
- = - Energy costs

Key conclusions

The producer has a high degree of mechanisation on the farm and therefore he has fossil energy use and energy costs, but he is trying to improve with some ideas to reduce the use of machines. He intends, in the future, to replant, in each season, without soil mobilization

The cultivation system has become more and more technical over time, which has added complexity

As it is practically the same crop all year and although the tasks vary from day to day, every week, the processes are repeated, which makes the work a little monotonous

There is more work in summer than in winter, which limits the distribution of work throughout the year. The problem of the lack of skilled labour is of great concern to the producer

With the major improvements at farm level, the producer can deliver a hazard-free product to customers, generating added value for his company

Legend

In green = positive trend
In red = negative trend
In black = comparable

= **Comparable**

↗ **Increase**
↘ **Decrease**

↗↗ **Significant increase**
↘↘ **Significant decrease**

Environmental indicators
Social indicators
Economical indicators

Our feedbacks

“My greatest success has been in pest control. The difficulties are related with the lack of solutions for the execution of work and for innovating and being more and more sustainable. There are no resources and solutions available, as there are in other sectors, to reduce the workload. The few that exist are very expensive and sometimes it is not worth because it is not profitable for the farmer. IPMWORKS is pivotal for sharing this knowledge and information among farmers”

Bruno Neves – Carlos Neves, Lda. (Portugal)

Main objective of the farmer

- Achieve the best quality of products: produce a clean and "beautiful" product with reduced use of PPPs

Advantages of the system

- Possibility of achieving 'zero-residue' production, whereby pesticide-free products are produced safely for the consumer and with less costs for the farmer
- Possibility of reduction of the use of machinery: reduction of energetic consumption, increasing the farm profitability.
- Preservation of the natural resources and mitigation of climate change

Disadvantages of the system

- Difficulty in large-scale production, which can limit the availability of food and thus make it more expensive for consumers
- Possibility of requiring more manual labour, a resource which is very scarce
- Lack of affordable and more sustainable production solutions and knowledge

“In a world where it is increasingly important to change production methods to minimise negative effects on crops, environment and human health, one of the main objectives of Bruno is to achieve a zero-residue production. He has this guideline very present in its production method, increasingly trying to apply practices that promote regenerative agriculture, giving special emphasis to food safety over high productivity. Faced with difficulties, Bruno is always looking for innovative and sustainable solutions to overcome them. He is a great example that should be followed by other producers in the region”

Bárbara Castro (Portugal)

Opportunities to develop in the future

- Stimulating innovation and technology through research for increasingly sustainable and efficient solutions, an advantage not only for producers, but also for consumers
- Increased knowledge sharing between farmers in European projects
- Encouraging the use of renewable energy sources, such as solar and wind power, can help reduce the carbon footprint associated with agriculture and farmers' energy costs
- Promoting precision farming, to manage crops more precisely and efficiently, reducing the use of PPPs and increasing crop productivity
- Use of soil improvement methods to control pests and diseases and reduce need for pesticides

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