

Students Talk4Food

Alternative management of potato late blight disease through essential oils : towards more natural chemicals for crop protection

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Global context on agriculture

Since the green revolution, **intensive agricultural practices** have been destroying the environment for massive food production.

To reach ever-higher yields, agro-industry has been engaged in a fierce battle against **pests**.

The term “**bio-aggressor**” gathers all kind of living organisms eating, competing or damaging crops.



Animals

Mainly insects, small mammals, birds or nematodes damage crops by eating them



Plants

Weeds reduce yields by competing with crops for nutrients, light and water



Microbes

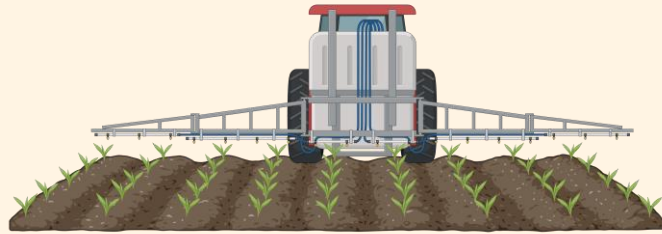
Fungi & bacteria cause plant diseases



Intensive use of pesticides

To get rid of pests, modern agriculture has been heavily relying on **pesticides**.

Pesticides are synthetic substances used to kill pests. Meanwhile, they are responsible for :



Water, air & soil pollution



Huge loss of biodiversity



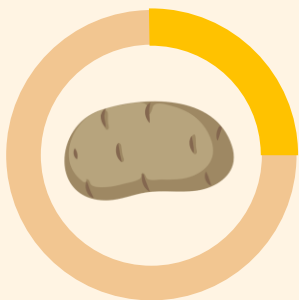
Serious health issues



Occurrence of resistant population

→ **Biopesticides**

Some numbers about potato



350 Mt

Tubers
produced
worldwide



20 million ha

Surface on Earth
dedicated
to potato crop



> 5 millions €

Losses due
to late
blight disease



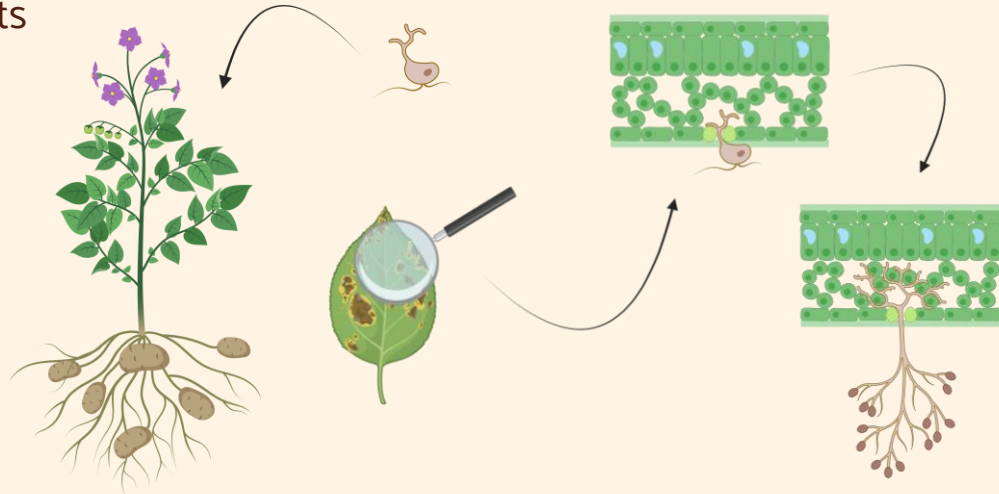
The agent of potato late blight disease

Late blight disease is caused by a microorganism called *Phytophthora infestans*.

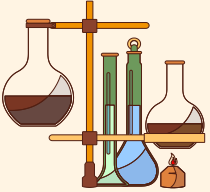
Inoculum comes from previous infected plants
OR from spores carried by wind and water.

Once on the field, the pathogen :

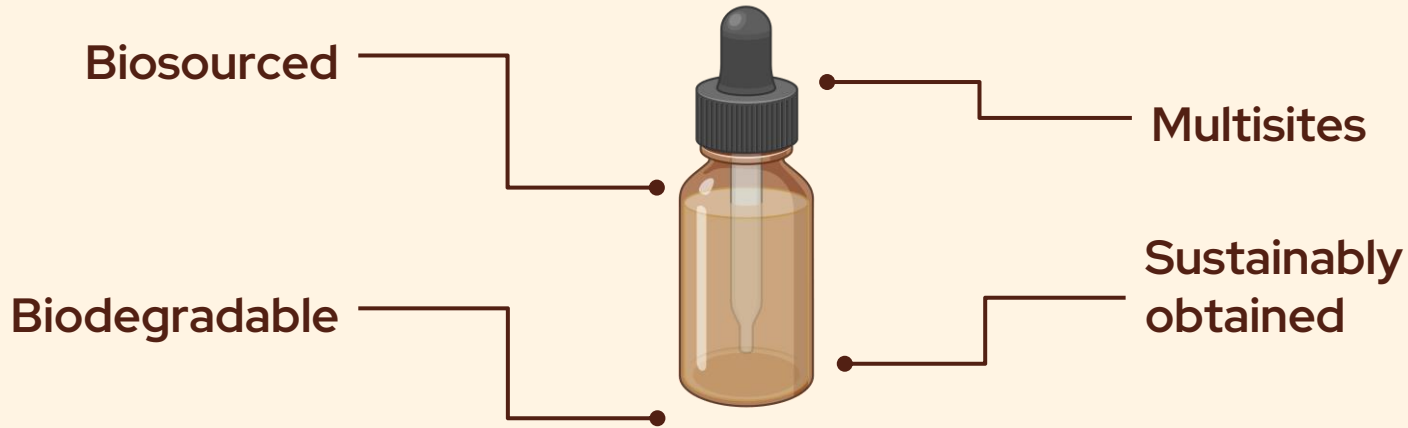
1. Germinates on the leaf
2. Penetrates into plant tissues
3. Sucks up cell content by growing its mycelium
4. Causes disease symptoms until cellular dead and tissues necrosis



Essential oils as biopesticides

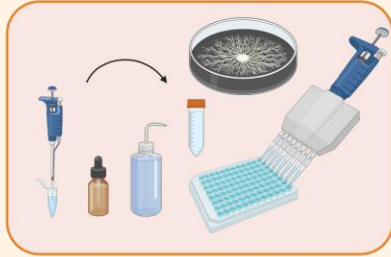


Essential oils are **complex** and **hydrophobic** mixtures of **volatile** and **aromatic** molecules extracted from **plant** biomasse by some specific extraction methods that do not require solvents



In the lab, this is what I do :

In vitro
tests



In vivo
tests



Chromatographic
analysis



Microscopic and
Spectroscopic
analysis



As a conclusion

