

Three pillars: **Prevention, Observation and Treatment.**

Prevention is the **most important pillar** in organic farming, because treatment options are limited!

**Prevention!**

- **High biodiversity:** increases system resilience and slows down attacks.
- **Attract beneficial insects:** provide refuges for beneficial insects to attack crop pests.
- **Fertilize plants well:** well-nourished plants are healthier and more resistant to attack.
- **Hygiene:** remove rotten fruit and compost it separately, remove attacked plants and burn them, don't touch healthy plants after touching diseased ones.
- **Seeds:** use seeds of resistant varieties, use healthy seeds.
- **Intercropping:** some crops protect others, diversity slows down the spread of pests.
- **Crop rotation:** helps limit the establishment of pests and diseases over the long term.
- **Preventive repellent treatments:** spray biological repellants to repel potential pests.

**Observation!**

Regularly observe the condition of the field. If you discover a pest or disease, apply hygiene measures and decide whether treatment is necessary..

**Treatment!**

Are conditions conducive to rapid expansion? Is the risk of attack high? If so, apply a treatment to try to kill the pest or disease.

## Biodiversity

A wide diversity of species and varieties in the same plot helps limit the spread of pests and diseases.

### Why?

- **Discontinuity of resources:** a greater distance between two identical crops makes access to pests more complicated.
- **Attraction and conservation** of beneficial insects (auxiliaries).
- **Repulsion** of certain pests by certain plants.

### Advantages

- Harder to find a host for crop pests
- A lost crop is compensated for by the harvesting of other crops.
- The habitat created provides ample refuge for many beneficials.
- Chemical interactions between species create additional protection.

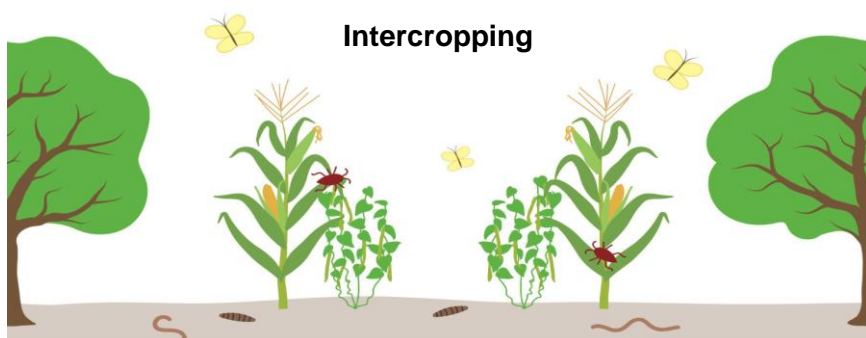
### How to do it?

- Associated crops
- Planting flowers, hedges and stone barriers
- Good soil cover and soil rich in organic matter
- Avoid the use of pesticides

### Monoculture



### Intercropping



Biodiversity =

+ Insects =

+ Beneficials =

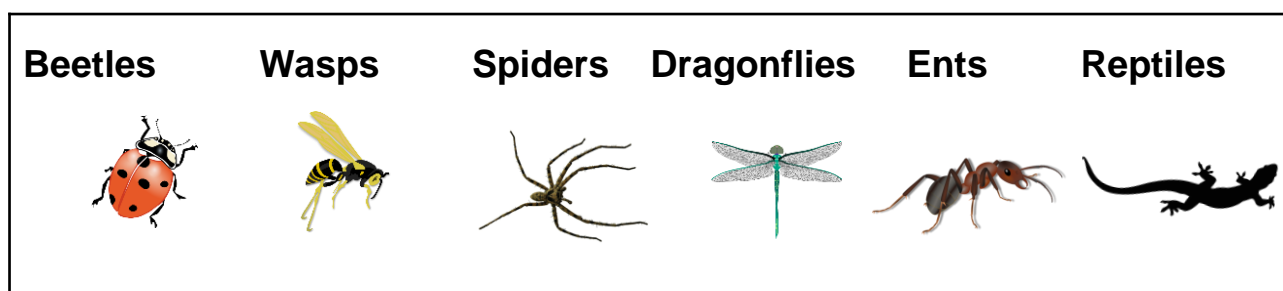
- Pests

## Beneficials

Beneficials are organisms (insects, birds, fungi, etc.) that kill pests and thus protect crops.

- **Predators** feed on pests
- **Parasitoids** lay eggs inside larvae, killing them
- **Microorganisms** infect pests (bacteria, fungi, viruses, nematodes)

What kind of beneficials?



## How can I get beneficials on my farm?

A **welcoming environment** with refuges is needed for beneficials to settle in.

### What measures need to be put in place?

- Increase biodiversity
- Set up associated crops
- Plant flowering plants
- Add organic matter: fertile soil encourages beneficial microorganisms.
- Ban pesticides
- Create refuges where beneficials can live: hedges, rocky walls, mulching, wood piles, etc.

## Crop associations

Combined cropping involves growing several crops together on the same plot or bed. This cultivation practice offers a number of advantages.

### Advantages against pests and pathogens

- Discontinuity of resources
- Increases diversity of beneficials
- Repellent effect of a crop against pests, specific (onion/carrot) or general (garlic/ginger/tagetes/etc.)

### Advantages for the farm

- Better soil coverage
- Better optimization of space and resources
- Staggered harvests
- Higher overall yields when combining different crops
- Diversification of income sources



### Associated cultivation beds

Lettuces cover the soil quickly, prevent the development of weeds and are harvested first. Onions protect carrots with repellent compounds, and while they use different soil strata, these two crops don't compete for resources.

## Treatment

Pesticides are **toxic** and dangerous for **producers, consumers** and the **environment!**

**Ensuring efficiency!**

- Apply only where pest is present.
- Apply at appropriate pest stage. Do not apply before rain.
- Spray preferably in the evening or morning.
- Observe indicated quantities.

**Vary product types to avoid causing resistance!**

**Preserve your ecosystem!**

- Do not spray outside the crop, especially not on refuges (hedges, cordons, etc.).
- Use a product specific to the pest, which will not kill other insects.

The danger of poisoning can be short-term, but also long-term (risk of cancer and other health problems)!

**Preserving the environment!**

- Do not apply in windy conditions (risk of inhalation, risk of drift).
- Spray very close to the plant (to limit drift).

The product can intoxicate humans through **ingestion, inhalation** and skin **contact**. 90% of contamination occurs through the skin.

**Protect yourself!**

- Read product instructions.
- Prepare outdoors in a ventilated area.
- Prepare only the quantity needed for your application.
- **Protect your skin! Wear long clothing, gloves, hat, goggles and mask!**

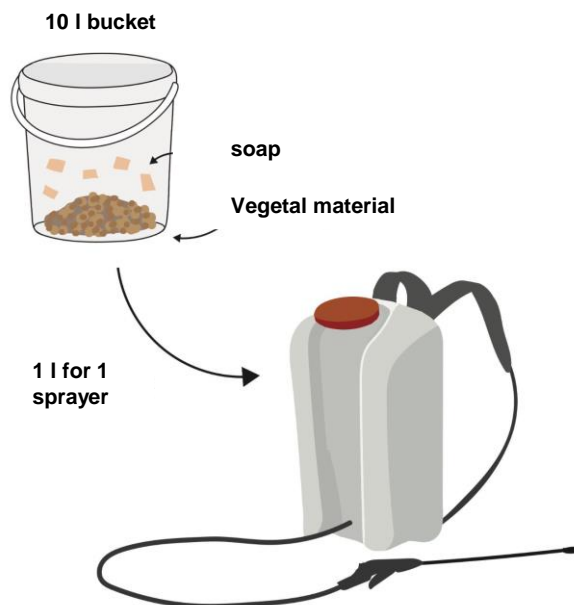


## Biological repellents

Biological repellents are **natural treatments** that, unlike pesticides, act as repellents against insects and fungal diseases.

### Why is it better than pesticides?

- Produced with resources from the farm or local market = more accessible and economical
- Don't kill beneficials! The repellent effect applies not only to pests, but also to beneficials.



Recipes to be adapted according to available equipment, use, knowledge of the terrain and experience.

### How do you make and use them?

- Maceration, trapping, mixing, etc.
- In case of heavy pressure on the plot, 1 to 3 times / week
- Apply to the entire plot of the affected crop
- Use one treatment 3 times, then change product
- Preparations can be combined for greater efficacy = Cocktail
- In the event of heavy rain after application, reapply the treatment
- Protected from light, preparations can be stored for several weeks.

## A few recipes

Product	Recipe	Dilution	Application	Efficace against
Garlic maceration	2 tablespoons garlic powder or 500g fresh garlic in 10L water. Leave to macerate for at least 12 hours.	Mix 1L of maceration with 10L of water (10%) and 3 capfuls of soap.	Spray approximately 1L for 10 m <sup>2</sup> of crop	aphids, mites, flies
Chili maceration	identical	identical	identical	Biting and sucking insects, caterpillars, crickets and locusts
Tomato leaf maceration	identical with 2kg of leaves	identical	identical	insects + fungal diseases
Papaya leaf maceration	identical with 1kg of leaves	identical	identical	fungal diseases (powdery mildew + rust)
Marygold maceration	identical with 2kg of plant leaves and flowers	identical	identical	whiteflies, noctuids, leafhoppers
Neem oil	identical with 2.5kg of seeds, also possible to buy the oil directly	identical with 2L of maceration, or with 90 to 120 ml for a 15L sprayer	identical, beware of the risk of burns when applying in direct sunlight	insects in general
Maceration of neem leaves	identical with 3kg of leaves and 24h maceration	identical with 30g soap	identical	all insects in general, treatment residues are applied to the base of the crop as a nematicide
Milk	Mix 50% water and 50% milk for infected plants, 80% water and 20% milk as a preventive measure for surrounding plants.	-	identical	powdery mildew on vegetables

## Biofumigation

**Biofumigation:** using toxic substances secreted by the roots or other parts of a plant to kill diseases in the soil.

### Brassicaceae: cabbages, radishes, turnips, rapeseed, mustard

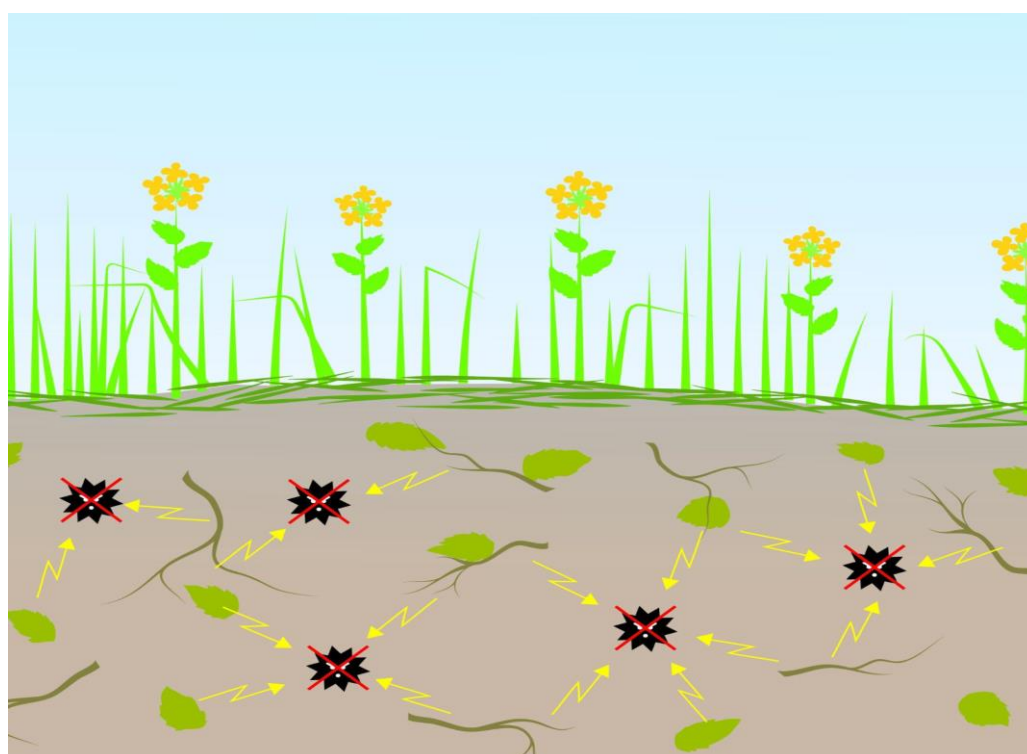
- Incorporate into associations and rotations → **reduce disease.**
- **Optimum efficiency:** cultivate a monoculture of brassicas in the rotation.
- Mustard and turnip are very effective.

→ **Flowers contain substances that kill nematodes.**

The plant is sown, then after about 2 months the plant is cut and the flowers are incorporated directly into the soil (maximum 5 minutes after being cut).

Crotalaria can also be used. It's a legume, but also has the potential to suppress soil-borne diseases.

Mow and incorporate before flowering. Short-term effect, to be grown just before high-risk crops (vegetables, yams, cowpeas).



Mustard residues kill soil-borne diseases by decomposing and secreting toxins.