

Copper reduction strategies in tomato production

Problem

Copper is a widespread fungicide in organic plant protection. It is cheap, easy to use and effective against a variety of diseases. However, its accumulation in the soil causes adverse conditions for beneficial organisms such as earthworms. Therefore, the EU Regulation limits its use to 28 kg/ha over a period of seven years. In the case of organic vegetables, the visible spots caused by copper treatments often generate consumer mistrust.

Solution

Plant protection begins with the design of the production area and the selection of variety. The management of the plants and direct plant protection measures with alternative fungicides can decrease the need for copper.

Outcome

A copper-free plant protection strategy can prevent copper pollution of the soil and support beneficial organisms. Reducing the use of copper-containing fungicide can also prevent visible spots on the marketable products and increase the product attractiveness to the consumers.

Practical recommendations

Preventive measures that provide light and limit the level of humidity are key to create unfavourable growing conditions for fungal pathogens:

- In the case of cultivation in a greenhouse or foil tunnel, use ventilation to reduce air humidity.
- Heat at night, when the relative humidity increases, to prevent the condensation of humidity on the leaves.
- Use drip irrigation instead of sprinklers. It is much more efficient and does not wet the leaves.
- Keep the plants free from weeds. Weeds mean competition regarding water and nutrients. They can also host pests and diseases. They block the airflow and increase the humidity at the plant level as well.
- Do not plant the tomatoes too close to each other. The ideal number of plants/m² in the case of indeterminate tomatoes is around 2-4. It is also important to consider the characteristics of the cultivated variety.
- Remove the side shoots. It can help the air flow pass easier through the plant's canopy.
- Remove the infected leaves. It can prevent producing inoculants and further infections.
- Do not prune the plants or remove the side shoots when the weather is wet. The wounds must dry rapidly, otherwise, pathogens like grey mould or late blight are more likely to infect the plants.



Picture 1: Optimal row spacing results in a larger space for the plants (Photo: Bence Trugly, ÖMKi)

Picture 2: Ripening of healthy tomatoes (Photo: Bence Trugly, ÖMKi).

Applicability box

Input used

- | | |
|--|--|
| <input checked="" type="checkbox"/> Copper | <input type="checkbox"/> Anthelmintics |
| <input type="checkbox"/> Mineral oil | <input type="checkbox"/> Antibiotics |
| <input type="checkbox"/> Fertilisers | <input type="checkbox"/> Vitamins |

Geographical coverage

Continental climate

Application time

At cultivation planning, and depending on the season, several times

Required time

Depends on the production volume

Equipment

Sprayer

Best in

Indeterminate tomato growing

Available alternatives to copper, such as *Pythium oligandrum* containing products or plant extracts, can have similar efficiency against late blight compared to copper-containing fungicides, provided they are used correctly:

- In the case of biocontrol agents (e.g. *Pythium oligandrum*), special application is necessary. Most of these species naturally live in the soil and are very sensitive to UV radiation. Do not use them when the sun is shining.
- For successful use of these products, the treated surface must be wet. Irrigate the soil or the plants' surface before the application.
- Clean the sprayer before loading the microbe-containing spray into the tank.
- In the case of plant extracts, coverage is crucial. Do not leave any surface of the plants untreated.

On-farm application

Reducing the use of copper in tomato production is not just a matter of replacing copper-containing products with alternatives. Implementing copper reduction strategies requires a holistic approach to plant health, starting with proper preparation of the growing site and implementing preventive measures throughout the growing season.

Further information

Further readings

Organic cropping of tomatoes (DE/HU/RO): <https://www.fibl.org/en/shop-en/1385-tomaten>

Video

Copper replacement experiment for tomatoes: <https://youtu.be/65i1LdpGrZE>

Weblinks

Check the [Farm Knowledge Platform](#) for more practical recommendations.

About this practice abstract and RELACS

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RELACS: 'Replacement of Contentious Inputs in Organic Farming Systems' (RELACS) builds on results of previous research projects and takes far-advanced solutions forward. As a system approach to sustainable agriculture, organic farming aims to effectively manage ecological processes whilst lowering dependence on off-farm inputs. The RELACS partners will evaluate solutions to further reduce the use of external inputs and, if needed, develop and adopt cost-efficient and environmentally safe tools and technologies.

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