Efficient use of sprinkler systems against frost damage

Polish farmer finds way to protect his apple orchard from frost damage

In EU orchards, there are more economic losses due to frost damage than to any other weather-related phenomenon. Due to the effects of climate change, the growing season is becoming longer and fruit trees are starting to grow and flower earlier in the year. Spring frosts are therefore particularly dangerous when trees are in flower or have just set fruit. Polish Farmer Piotr Domasiewicz is finding ways to protect his apple orchard from frost damage.

In the Grójec area of Poland, Piotr Domasiewicz decided to use his sprinkler system to protect his fruit from Spring frosts. He has one of the biggest apple orchards in the area, covering 16 ha. He says: “In the past I tried other systems, but they were not that successful. Using artificial fogs was problematic as it reduced visibility for the cars on the roads nearby and wind machines were not optimal for the type of crop or the shape of the parcels. Nets reduced the apple colouring and heat candles were costly and not very effective.”

“I started using sprinkler systems for frost protection a few years ago. The sprinklers that I’m using can rotate 360°, with a spraying radius up to 13m. First, I tested the system on a 2 ha area. Luckily, the profits from the first season were sufficient enough for me to reinvest in more sprinklers. Now, sprinklers cover 10 ha of my farm - the areas most prone to frost damage. The other part is on a higher slope and therefore doesn’t need protection - the cold air tends to flow downwards.”

To efficiently prevent frost damage, the sprinklers have to start working at just the right moment. Piotr: “As soon as the temperature drops to 0°C I start the sprinklers. To protect the fruit from frost at a temperature of -3°C to -5°C, I use 40m³ of water per hour per hectare. Sprinkling must continue until the ice cover on the plants is completely dissolved; this can sometimes take several hours. To prevent the plant tissue temperature from dropping too low between pulses of water, the water should be applied continuously. For water supplies I’m using rain and groundwater and there is a pond in the orchard. The sprinklers are very effective for frost protection in temperatures from 0°C to -4°C, but I have also used this method for a temperature of -8°C.”

“Water shortage during frost episodes has not been a problem so far. I’m currently monitoring the weather forecast myself via radio and television and thermometers in different places around the farm, switching the sprinklers on manually. The system may improve in the future, with automatic stations to monitor the weather and turn on the system when the temperature drops.”

Piotr finds the system highly effective and it proved economically very beneficial: “Sprinklers are multipurpose and can also be used for irrigation or fertigation. I would definitely recommend this method to other fruit farmers, despite the high initial installation cost. If your farm is in an area prone to Spring frost, it’s worth considering. During severe frost damage years, like 2017, it really benefited us. We managed to protect almost all of our orchard and therefore had hardly any loss in yield compared to a normal year.”
Press article short article

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Background information

Project information

Company/ project: Agricultural Advisory Center in Brwinów Branch Office in Radom (Poland)
Website: http://www.cdr.gov.pl
Contact person: Mateusz Sękowski (senior advisor): m.sekowski@cdr.gov.pl

Pictures

Pictures below were taking during the field trip of the EIP-AGRI Focus group on frost damage. The pictures are free for use. Click on the picture to download the high resolution version
Spring frosts are particularly dangerous when the trees are in flower.

More information on frost damage

The EIP-AGRI Focus Group ‘Protecting fruit production from frost damage’ visited Piotr’s orchard during their first meeting in June 2018. The 20 experts held their second meeting end November. They will continue to work on the minipapers and the Focus Group report is scheduled to be published in 2019.

Horizon 2020 Thematic Network on frost damage

- EUFRUIT (MAA) - EU Fruit Network: website - CORDIS (2015)
- INNOSETA (MAA) - Accelerating Innovative practices for Spraying Equipment, Training and Advising in European agriculture through the mobilization of Agricultural Knowledge and Innovation Systems: website - CORDIS (2017)

Thematic networks are multi-actor projects which collect existing knowledge and best practices on a given theme to make it available in easily understandable formats for end-users such as farmers, foresters, advisers etc. More information on www.eip-agri.eu

EIP-AGRI

The European Innovation Partnership ‘Agricultural Productivity and Sustainability’ (EIP-AGRI) is one of five EIPs which have been launched by the European Commission in a bid to promote rapid modernisation of the sectors concerned, by stepping up innovation efforts.

The EIP-AGRI aims to foster innovation in the agricultural and forestry sectors by bringing research and practice closer together – in research and innovation projects as well as via the EIP-AGRI network.
EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives, and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI: the EU Research and Innovation framework, Horizon 2020, as well as the EU Rural Development Policy.

- **EIP-AGRI Brochure on Thematic Networks under Horizon 2020** (EN – BG – FR – HU – SP)
- **EIP-AGRI Brochure Horizon 2020 multi-actor projects** (EN – BG)
- **EIP-AGRI Brochure on Funding opportunities under Horizon 2020 - 2018 Calls** (EN)

**EIP-AGRI Operational Groups**

EIP-AGRI Operational Groups are groups of people who work together in an innovation project funded by Rural Development Programmes (RDPs). Operational Groups are the EIP-AGRI’s main tool for turning innovative ideas into real solutions for the field.

An Operational Group consists of several partners with a common interest in a specific, practical innovation project. The people involved in the Operational Group should bring in different types of practical and, where necessary, scientific expertise. They may include farmers, scientists, agri-business representatives and many others. Every country or region has the possibility to define specific national demands or restrictions on how to put together an Operational Group.

- Visit the [Operational Groups page](#) on the [EIP-AGRI website](#)

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