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Saving oranges and lemons in Europe from devastating pests

The EU is tackling plant diseases that could put the squeeze on citrus production in Spain and other Member States.

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Many people love citrus fruits for their sweet or sour flavour, but plant diseases could leave fans with a bitter taste.

A blight called citrus greening is killing orange, lemon and other such trees worldwide and could soon do the same in Europe. Tiny infected insects known as psyllids are responsible for spreading the scourge, which turns tree leaves yellow and the citrus fruits bitter.

Spanish vigilance

The pest originated in China, where it's also known as Huanglongbing (HLB), or yellow dragon disease. While the psyllids in Asia are causing the most damage, an African variety of the insect that is another vector of HLB has been found in Spain and Portugal.

'The disease is highly destructive to the citrus,' said Leandro Peña, a biologist at the Polytechnic University of Valencia in Spain. 'A range of varieties of citrus that are available nowadays to the consumer may disappear if this disease reaches our continent.'

Citrus production plays an important economic role in Valencia, which is Peña's home region along the eastern coast of Spain, as well as in other parts of the country and elsewhere in the EU. Spain is the EU's main producer of citrus fruits, which also include tangerines, mandarins, limes and grapefruit.

When it comes to oranges alone, Spain accounts for about half of total output in the 27-nation EU. Aside from being a fresh fruit and juice, Spanish oranges go into everything from marmalades and desserts to skincare products and perfumes.

The threat posed by HLB, which is incurable, is now raising alarm among local farmers and residents.

This is where an EU-funded project called PRE-HLB could offer reassurances. The research, which started in 2019, aims to develop a comprehensive strategy to protect Europe from citrus greening.

Experts from nine countries – including the Americas and Asia – are trying to prevent the disease from coming to Europe by increasing knowledge of how it spreads.

The researchers also want to be prepared in case the disease does reach Europe, so they're developing measures to soften the impact, control it and eventually eliminate the pest if needed.

Furthermore, long-term solutions, including breeding new citrus plants resistant to the pest and coming up with methods to treat the disease such as biopesticides, are also being investigated. The project is due to end in November this year.

Florida warning

Peña has been working on citrus genetics and biotechnology for almost 30 years and already helped to manage the disease in Brazil and the US.

He said that Florida, known as the Orange State in the US, was once a major producer of sweet orange juice. Then, 20 years ago, citrus greening devastated trees in the region and caused production to drop by 70%.

'The situation is a disaster,' said Peña. 'The fruit that they produce is of low quality, almost inedible, and they need to mix it with fruits coming from other countries to make juice that is drinkable.'

He's worried that the same could happen in Europe and that the disease will destroy the economic and social culture of citrus in countries including Spain, Italy and Greece.

So far, only the African version of the psyllid insect has been found in Europe – not the bacterium that causes citrus greening.

However, the presence of psyllids means that the disease could spread rapidly were the bacterium to become invasive. Meanwhile, the Asian insect, which is more aggressive, has recently been found in eastern Mediterranean countries such as Israel.

Peña is warning people against bringing back plants or seeds from outside Europe, for instance after a holiday.

'Even if you think that a citrus tree looks beautiful and healthy, it could have a disease inside and cause a very serious problem to our way of living,' he said.

In the worst-case scenario, it could mean that European consumers can no longer enjoy local high-quality citrus fruits.

Moth menace

Other pests that can damage citrus fruits have already taken hold in Europe.

The larvae of moths and butterflies attack young flowers and leaves of citrus trees in spring. The insects have spread all around the Mediterranean, including in Spain, Italy and Greece.

'If they destroy the leaves, they destroy the tree,' said Luc Fillaudeau, a professor of bioengineering from France. 'If they destroy the flower, they destroy the fruit.'

Along with Souad Rouis, a Tunisian professor of biotechnology, Fillaudeau led a project that has developed two biopesticides to tackle these larval pests more effectively.

Their two institutions – the Toulouse Biotechnology Institute and the Centre of Biotechnology of Sfax – have been working together for more than 20 years, including on student exchanges.

This cooperation formed the building block for the EU-funded IPM-4-Citrus, according to Fillaudeau.

The project started in 2017 and wrapped up in January this year. It used two types of bacteria, one from Tunisia and another from Lebanon.

Natural protection

These tiny organisms produce a natural substance that protects against the pest – the perfect ingredient for their biopesticides.

The biopesticides are now produced on an industrial scale by German company JKI, another partner in the project.

‘We have switched from research to the market and from the lab to the field,’ said Rouis.

The researchers believe that their solutions can reduce the use of synthetic pesticides while being less harmful to humans and the environment.

IPM-4-Citrus also showed that the natural pesticides are efficient and safe. The project leaders hope for approval soon to get their products on the European market.

At the same time, a goal has been to try to keep the biopesticides affordable so they can also be used in other parts of the world such as North Africa and the Middle East.

Beyond the lab

The biopesticides could soon not only save citrus but also protect other fruits from larval pests.

The researchers are already working on a new project, called PRIMA SAFWA, to tackle more plant pests with the same bioproducts.

Valuable as these goals are, the human dimension of the research is almost equally important, according to Fillaudeau and Rouis.

These projects allow both their institutions to keep working together. That in turn enables more exchanges and training of young scientists and more cooperation with people in the field.

‘Thanks to these projects, we can think out of the box,’ said Rouis. ‘We are not just scientists in the lab, but we can collaborate with other people, like farmers, for the benefit of society.’

Watch the video

More info

- PRE-HLB
- IPM-4-Citrus
- EU-funded research and innovation in agriculture