

The Impact of Irrigation on Powdery Mildew *Leveillula taurica*

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The powdery mildew pathogen *Leveillula taurica* which attacks both Capsicums and tomatoes, is the only powdery mildew species that is systemic. Under the right climatic conditions the fungus spores germinate on the leaf surface and the root enters the stomata where the fungus develops within the leaf.

This is a serious pest of both genera and causes widespread economic damage around the globe. Tomatoes grown under plastic or glass are very vulnerable as this is the only foliar fungus disease that is likely to develop in the absence of free water on the foliage.

Capsicums are immune to this pathogen during early development and then become vulnerable at a later stage.

All of my career I have been confused about this disease as the norm for fungus diseases is that there has to be a period of free water within the correct temperature parameters for the fungus spores to germinate. *L. taurica*, like other powdery mildew species, does not require free moisture to germinate but requires a certain level of humidity within the correct temperature range to germinate.

This information can be found in many references from journals, books and the internet and has been common knowledge to me for 50 years. However, something was missing as I would visit farmers with outdoor sprinkler irrigated peppers as well as peppers grown in Haygrove plastic covered structures. The outdoor peppers would be 100% free of mildew and those under plastic would be full of powdery mildew and cause much damage.

This did not make sense as the ambient humidity would be exactly the same, besides the outdoor peppers would be subject to morning dew and be sprinkler irrigated, both contributing to higher humidity at times. I also took note of large farmers who planted vast areas to peppers in the dry winter of sub-tropical areas. In order to reduce powdery mildew, they would use drip irrigation. It was assumed by all that by using drip there would be less chance of mildew developing. Incidentally, these regions are close to the coast where there is high humidity.

Then within two years, I found two farmers who were producing peppers under plastic with drip irrigation. In both cases, through poor water filtration, the drippers became blocked and they brought their outdoors sprinkler irrigation into their structures and used these to save the crop. As if by magic, the powdery mildew almost disappeared. This confused me even more.

Another farmer who was erecting 2 ha. of Haygrove plastic structures was also putting in place his dripper lines. I advised him to use sprinklers as well which should be turned on from time to time and explained that I had absolutely no idea why it worked but just that it did. He approached an irrigation company which placed misters under the plastic. This did not help and was perhaps even worse. I then approached him and said that I advised proper sprinklers. He then adapted these to sprinkler couplings and the mildew was dramatically better.

On the second ha. structure, he ran out of sprinklers and left one section out. This was the best thing he could have done as all areas were free of powdery mildew apart from the section with no sprinklers which was a disaster.

After this, I went back to the internet and scoured it for information which might explain these events. Eventually after many hours of searching, I found an abstract by a researcher who discovered that the spores of *L. taurica* burst when they came in contact with free water.

This explained everything perfectly. It turned out that nobody in South Africa was aware of this and by their assumptions were actually making the disease a lot worse by their irrigation practices.

This disease has a huge impact on both peppers and tomatoes around the world. At least there are some tomatoes with a resistant gene but varieties without the gene may be more suitable for one's requirements.

There are a lot of unanswered questions at present which I believe would justify research. These are:

- How often do we have to wet the foliage to keep the disease from developing?
- How long do the spores have to be wet in order to burst?
- What is the best type of sprayer for this purpose and is there an advantage in a setup which wets under the leaves as well?
- What is the best time of the day to irrigate?

Someone looking for a worthwhile research project could determine all these parameters which could be of immense value to farmers.



The peppers in the foreground were in the section without sprinklers and are half the size, full of powdery mildew, losing their leaves and a write off. In the background is the same variety planted the same day which is healthy and productive with no mildew and under sprinklers.

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