DON'T CRY OVER SPILT MILK, SPRAY IT OVER YOUR PLANTS!

Powdery mildews are a scourge for organic growers, because they infect the healthiest of plants. But new research points to milk as a saving grace for growers, reports agronomic consultant Pam Pittaway.

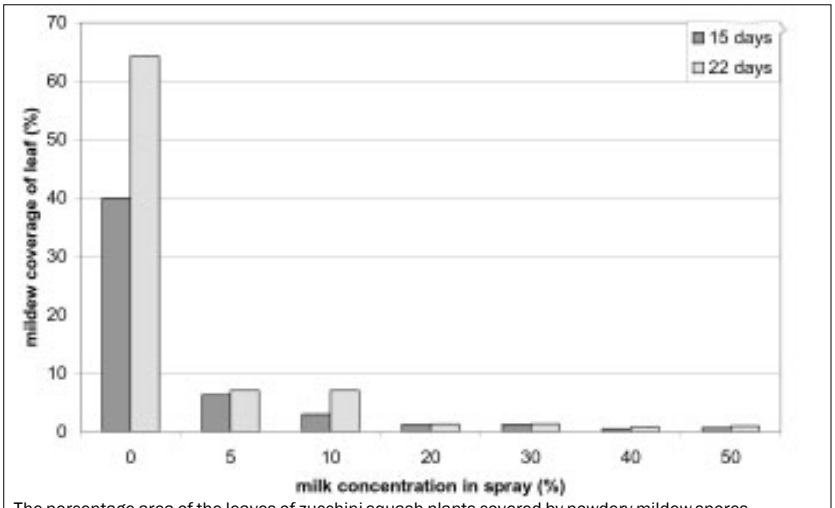
Resistant varieties are not available for peas and cucurbits - so every year, when the combination of leaf wetness and air temperature is right, your plants become covered with the fine, white spores. Like rusts, powdery mildews can only exploit living, healthy host cells. If the invaded plant cell recognises it has been infected and kills itself off, the mildew dies too. This happens in resistant varieties. However, in susceptible varieties the mildew invaders escape detection, siphoning off all the energy produced by their host cells to release billions of white spores at the surface. The end result is a totally exhausted plant, producing very little fruit!

However, help is at hand. Scientists in Brazil have found that regularly spraying cows milk onto cucurbit leaves to the point of run-off, reduces the severity and spread of powdery mildew. The Brazilian studies showed that rates of 10 or 20% by volume of milk in water sprayed onto plants at weekly intervals, effectively reduced the area of leaves covered with the powdery spores (refer to the graph below). The effect of the milk both reduced the area of leaf covered by the spores (difference between the grey bars), and the rate of spread over the 7-day interval between observations (difference between grey and spotted bars).

To be effective the spray has to be used as a **protectant**, starting the spraying regime **before** conditions are right for the mildew spores to germinate. In the example given above, spraying commenced at least a fortnight before the powdery spores were visible on the surface of the leaves. In practice, spraying would best be started when the weather conditions known to favour powdery mildew disease in your area commence. The good news is that unlike copper, milk does not accumulate in the soil. Copper-based sprays can build up copper concentrations in the soil over time, becoming toxic to beneficial bacteria and repelling earth worms.

How might the milk work? Well scientists at the Wine Research Institute in South Australia have repeated the work on grape leaves, and know that the same effect can be achieved using **powdered** milk (45g per litre of water). The Brazilian scientists suggest that it might be the salts in milk, directly killing the germinating mildew fungi. If the effect is due to mineral salts, then solutions of bicarbonate of soda or potassium salts should be equally as effective. I would like to suggest another possibility. Normally leaves are very hostile places for microbes, commonly recording temperatures of at least 10°C above ambient air temperatures, very dry, and lacking in food. However, regular sprays of milk would favour the growth of the natural **yeast** residents, building up their populations **before** conditions are right for mildews to germinate.

A similar effect may occur if fish emulsion or other sources of cell food are sprayed at concentrations equivalent to the 10 or 20% milk spray, feeding the yeast populations. Indeed, some rose growers have reported controlling black spot by using regular fish emulsion sprays. Some yeasts have **probiotic** effects when growing in animal guts, and possibly the natural foliar residents may have similar impacts at the leaf surface. They might either antagonise the developing mildew fungi, and/or trigger the defense system of the plant. The first mode of action is known as biological control, the second is known as induced systemic resistance. Either way, the result is less plant energy directed into mildew spore production, and more directed into the fruits of the farmers' labour!



The percentage area of the leaves of zucchini squash plants covered by powdery mildew spores sprayed with water only, or with increasing concentrations of cows milk. The percentage of leaf area affected was calculated at 15 and 20 days after the weekly spraying regime commenced. Raw data was taken from W. Bettiol (1999) Crop Protection 18: 489-492

ABOUT THE AUTHOR

Dr Pam Pittaway specialises in soil, plant and microbial interactions, and has published over 30 papers in scientific journals and conference proceedings.

Pam has lectured on the topics of Microbiology, Integrated Pest Management, Entomology and Agricultural Science at SA - Adelaide (Roseworthy Campus) and QLD (Gatton Campus) Universities, and at the University of Southern QLD (Toowoomba). Most recently she has been investigating the agronomic properties of composts, and their contributions to soil health.