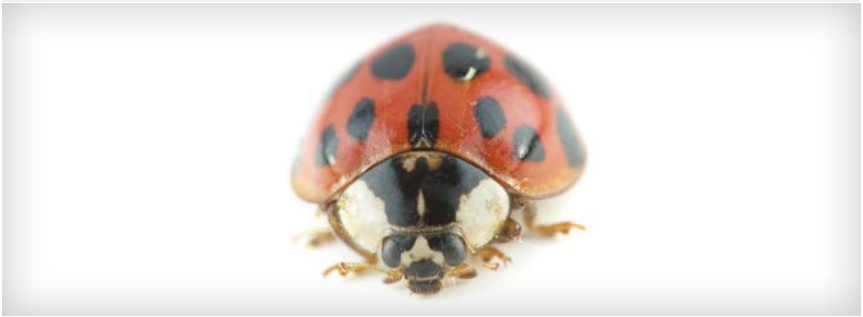
We Need To Talk About Ladybugs



© iStock | *The troublemaker Harmonia axyridis*

Gary Pickering has been on the trail of a seriously cute perp for 10 years and counting.

By Margo White | Posted Tuesday, 10-Apr-2012

Soon after Gary Pickering took up his position as professor of wine science at Brock University in the Canadian province of Ontario, local winemakers started noticing a mysterious problem. By all appearances they'd had a successful harvest, yet much of the resulting wine had an unsavory whiff about it – of peanuts, bell peppers, asparagus and other unwanted vegetal characteristics. In 2001, the vintage was so unpleasant that winemakers dumped more than a million liters of wine.

While nobody knew the cause of the stink, many had noted that that particular vintage coincided with unusual numbers of the diminutive, polka-dotted creatures many of us associate with a nursery rhyme and with good luck: the family of beetles taxonomically known as Coccinellidae and commonly called the ladybug or – depending on where you live – the ladybird or ladybeetle.

Pickering and his colleagues began to investigate, and soon identified compounds called methoxypyrazines as the likely culprits. As suspected, these compounds were produced by ladybugs and released when the beetles were caught up, and crushed, in the winemaking process.

It's unclear exactly why ladybugs produce these compounds; they could be pheromones for aggregation (translation: "Hey guys, found a great food source!"), or serve as a defense mechanism, or perhaps exist to attract a mate. They clearly serve an important biological purpose for the ladybugs, but less so for the average winemaker. "The human threshold for these things [the methoxypyrazines] is incredibly low," says Pickering. "So this is as little as a tiny drop in an Olympic-size swimming pool; our estimates converge around one beetle per vine as sufficient to taint the resulting wine."

Pickering, whose research field is wine flavor and taste genetics, has now been preoccupied with ladybugs for more than a decade, and the topic is as pertinent as ever. In 2001, when nobody knew the cause of the unsavory whiff, nobody really wanted to talk about it either – reluctant, as they were, to draw attention to faulty wine. However, as it transpired, ladybug taint had been confounding winemakers in south of the border in

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the United States for years.

It also became apparent, as Pickering began talking to colleagues, that it was an issue in Denmark, Germany, the Czech Republic and Burgundy. It now looks set to affect (if it hasn't already) vineyards in Britain, Italy, Greece, Argentina, Brazil and Champagne.

Ladybugs can be found throughout these countries and regions, but represent a threat only when their populations build up. This usually happens in grape-growing regions when there are nearby crops, such as soya beans, that provide the ladybugs' main food supply – aphids. But once these crops are harvested, the ladybugs migrate to the vineyards – often just in time for the grape harvest.

Pickering points to the multicolored Asian ladybug, or *Harmonia axyridis*, as being particularly problematic. Like most ladybugs, it was once regarded as benevolent; it was deliberately introduced into North America in 1916 (and on multiple occasions since) as a biocontrol agent. However, *Harmonia* appears to have competed against indigenous ladybugs and won, establishing something of a monopoly and flourishing without the constraints that would usually check the population.

Pickering also believes climate change is in the frame. "We suspect that in parts of Canada and in the U.S. . . . these bugs that would normally be killed over winter aren't. They're surviving, because of increased temperature, and building up populations more quickly in the springtime. My suspicion is that it's an increasing trend that nobody wants to talk about." At least in North America, climate change is a contentious issue.

What can be done about the taint? The United States has approved the use of the insecticides clothianidin, dinotefuran and permethrin, and Canada the use of cypermethrin and malathion, to control beetle populations. "But we don't want to spray more on our food unless we absolutely have to," says Pickering, "so I think there's a moral and environmental imperative to try and look at alternatives."

Also, the pre-harvest interval for these sprays is a number of days. "So we could spray on the Monday because we've seen a bucket-load of beetles, but we would have to wait for four days before harvesting and the beetles might be back by day three."

Pickering and his team are looking to develop more environmentally sustainable methods, including an approach known as "push-pull stereochemistry" – using natural pheromones to repel the bugs within the vineyard, and similar bait to draw them away from it.

Possibly a more promising solution is one that treats the actual grape juice. Traditional fining agents aren't very effective for ladybug taint, apart from perhaps oak and charcoal. But while oak "is good for the Bordeaux blends, it's not so great for your gewürztraminer or riesling," says Pickering, and charcoal tends to strip a wine of many of its desirable qualities along with those that are undesirable.

More recently, Pickering and his team have developed a protein that specifically targets the unwanted methoxypyrazines – one that is capable of locating and binding to that solitary droplet that can wreak such destruction on a vat of wine, and which can then be easily removed

through routine processing methods. The patent for this treatment was approved in March this year.

Potentially, this protein has wider benefits for winemakers. Those familiar with New Zealand sauvignon blanc will know that, in some instances, methoxypyrazines are naturally occurring and desirable; sauvignon blancs of the 1990s, in particular, were much lauded for their bell-pepper and vegetal characters due to the presence of the compounds in the grapes. “But when you taste wine from under-ripe grapes, these are also the compounds that make wine taste green and stalky,” says Pickering. “The neat thing here is that technology could be theoretically applied to any under-ripe vintage and on any variety.”

Every cloud, as they say . . .

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