Rory Mc Donnell interview: The slug hunter with a strange new weapon

Invasive slugs and snails are not only troublesome for gardeners – they cause millions of dollars' worth of damage to crops every year. Ecologist Rory Mc Donnell is on a mission to find evidence-based ways to get rid of these pesky gastropods

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SLUGS and snails may not look frightening, but don't be fooled. Poking out from beneath their slimy bodies is a tongue-like appendage called a radula, covered with thousands of tiny teeth. As gardeners know to their cost, this is a tool of extreme destructive power, which can shred stems and leaves like a grater. From dandelions to dahlias, few plants are safe.

Native slugs and snails are a vital part of ecosystems. They provide a food source to other animals, digest dead and decaying matter and eat pests. But invasive species can throw things off balance and it can be tough to control them.

Many gardeners have their own tried and trusted methods of attempting to make their plants safe from these gastropods, from the classic technique of circling the stem with crushed eggshells to the application of copper tape to flowerpots.

For professional growers, it isn't just their plants that are eaten up, but their profits too. Six years ago, grower communities in Oregon had had enough and representatives from the grass seed, vegetable and Christmas tree industries demanded the state act immediately to stop invasive slugs and snails.

In response, the state called in ecologist Rory Mc Donnell, one of the world's foremost slug and snail experts. For the past few years, Mc Donnell, now based at Oregon State University, has been looking for ways to control invasive slugs and snails and has developed an effective method.

He tells *New Scientist* about the toll of invasive slugs and snails and why the best way to control them is almost certainly already in your kitchen.

Brendan Knapp: How much damage do invasive slugs and snails cause?

Rory Mc Donnell: Without question, it is billions of dollars every year. There was a study done by the Oregon Seed Council in 2012 that showed slugs alone cost the grass seed industry about $60 million a year at the time. That is due to direct crop loss, the cost of molluscicide and the extra labour needed to sow more seeds. It's just mind-blowing to me. But that's the reason I have my position. And one thing that people often neglect about slugs and snails is that the damage they do isn't limited to just eating crops. Snail mucus or slug faeces on the crops decreases the quality rating, which in turn reduces the overall price of the produce when it goes to market.

And that's before we take into account the damage to people's gardens…

If you've got a nice vegetable garden, if you've got lettuces, carrots, potatoes, even peppers, they are definitely going to be taken out by slugs and snails.

It is coming up to spring in the northern hemisphere. Are slugs and snails going to be emerging to eat plants soon?

Over the winter, most slugs and snails hibernate and, yes, as it warms up in the spring,

they come out to feed. Then they activate a summer hibernation phase called aestivation, where they seek shelter again – slugs below ground; snails above ground. And then they come out again in the autumn. Here in Oregon, once we get the first fall rains, that activates them to come out again. This pattern is pretty typical for here in the US, western Europe, the UK and Ireland. In more tropical areas, like Hawaii or the north of Australia, slugs and snails are active all the time.

How do people generally deal with invasive slugs and snails?

No matter where you go in the world, the number one approach is to use chemical pesticides, mostly metaldehyde. The trouble with this is that it is a neurotoxin and has caused a lot of deaths in dogs and cats that eat the pellets. In the UK, metaldehyde-based pellets are going to be made illegal in early 2022, though we can still legally use them in the US. Then there's iron phosphate, which is approved for use in organic systems. It's a fertiliser that kills slugs and snails, but there's some evidence it's also lethal to earthworms, which you really want to keep in your soil.

Snails have a tongue-like appendage called a radula, covered in sharp teeth, that can damage plants
GAP Photos/Jonathan Buckley

In parts of Europe, there's a nematode species that growers can use to get rid of slugs and snails. These nematodes are microscopic parasites that live in partnership with a particular type of bacteria. The nematodes find and penetrate slugs and snails and then literally vomit up a bacterial soup that's lethal to their hosts. The bacteria reproduce on the slug or snail and the nematode feeds on those bacteria. People in Europe can buy these nematodes in packets and sprinkle them around the garden – it's a good option because they kill slugs and snails very specifically.

Why aren't the nematodes used more widely?

That nematode was thought to only be found in Europe. If you're to introduce that to an area outside of Europe, there's a chance that it could become a pest as well. But my colleagues and I actually found this exact same nematode in California in 2014. We found it again in 2017 in Oregon. We've been doing a lot of work testing the lethality of these nematodes on slugs and snails to see if we can potentially use them as a biopesticide here in the Pacific Northwest. We want to be sure that pest species are killed and native non-pest species are not harmed.

You have another idea for slug control that uses something they find hopelessly attractive.

"We collected more than 18,000 snails over two days. That was really a moment for us"

We have tested many different attractants: potatoes, lettuce, cabbage – we even had decomposing fruit and cat food extracts. We tested lots of different beers: Guinness, two IPAs, red ales and non-alcoholic beers. We found that hands down the best attractant is

bread dough. During research last year in Oregon, Hawaii and Montana, we found the dough remained attractive for at least eight days and was significantly more attractive than a widely used metaldehyde-based bait. We see bread dough as a very simple and non-toxic approach to managing slugs and snails. Most people have flour and yeast in their homes. You just mix it together with water, leave the dough balls in your garden to attract the slugs and snails and hand collect them.

How effective is it?

In Montana, there's something called an eastern heath snail. It's a European snail, first discovered in the US in 2012, that is accidentally being brought into the country on railcars and shipping containers. We previously had contact with some scientific collaborators in Montana and tested cucumber there as an attractant and it worked very well. Then we reached out to them again to test our bread mix. We were blown away by the results. My associate went back the next morning expecting to find maybe a handful of snails in each of the traps. She opened one trap and it was just full of snails. We collected and terminated more than 18,000 snails over two days. And I would say that was really a moment for us. We knew we were onto something.

Why does bread dough work so well?

We suspect it is something to do with the fermentation process. It's probably some volatile compounds being given off that are attracting the slugs and snails. Like many invertebrates, they communicate via chemicals, and have only basic vision. Chemistry rules their world. They're constantly picking up chemical signals in their environment, be it a food source, a snail or slug that's ready to mate or a predator. We don't know exactly what compounds in the dough are responsible though – we would like to get some funding to try to find out.

Can anyone use this at home?

We don't have a patent on this research. We want to make tools that people all over the world can use and help them with their pest management as well. I think bread dough is definitely a move in that direction. In places like sub-Saharan Africa, flour is widely available, as is yeast and water. Farmers can make up a batch of dough easily.

Do you have any slug and snail-hunting contraptions in your own garden?

I guess my yard looks like anybody else's, except, yes, I now use bread dough to attract the slugs. It seems to be working great, though the real test will be when spring arrives. Apart from that, one thing we have used out in the field is a camera to spot the snails in the dark. When we bought this in the early days of our research, we ended up getting it from a ghost-hunting website. That was an interesting thing to put on the expense form: a night-vision camera for ghost hunting.

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