

Birds in the orchard, friend or foe?

By David Whyte

One of the challenges with poor mental health and anxiety is the 'shoulds', one should have done that, or should do this. We set our orchard up to provide healthy food for our whānau, for preserving for the future, and to give away. So when I see fruit left rotting on the ground, the 'I should have' comes a-knocking and with it comes the associated guilt of not harvesting the produce. Fortunately I am learning to accept a less-than-perfect performance, and also see the value that trees and windfall provide to the ecosystem.

In part this is made easier, as we have Muscovy ducks which are pretty good at cleaning up fallen fruit. I am also beginning to see and appreciate the additional bird species that inhabit the orchard, and notice we are providing life not just to whānau and the community, but also to nature itself. So when I went to pick the last Granny Smith, my favourite kind of apple, and found the birds had got to it instead, I was happy to leave it on the tree for them. This got me thinking about the ecosystem benefits of the birds, and the role they play in an orchard. Now measuring this is tricky at the best of times, and in New Zealand especially difficult, since orchards are dominated by non-native tree and bird species. We do take great pleasure from the kereru who enjoy the tree lucerne at certain times of the year. All the research I found on the subject was undertaken overseas, with many of the bird species not present in New Zealand. I have limited the research summarised in this article to Australian studies which cover a mix of indigenous and common European species, which hopefully gives a better indication of what occurs in New Zealand.

In Australian almond orchards¹, the birds present ate nearly A\$60 worth of nuts per hectare. However, they also provided a service to the orchardist of removing mummified nuts which would either have had to be removed mechanically, or by hand. The cost of removing these mummified nuts would otherwise have ranged from just over A\$80 to A\$275/ha, depending on the method used. Thus the birds were having a positive impact on the bottom line, even though they came at a cost.

Various studies have been carried out in Australian apple orchards. One showed that excluding birds resulted in a 12.8% increase in damage to apples by insects, and that bird damage across the orchard was 1.9%, thus a net benefit to the orchardist of a 10.9% increase in yield². When birds were excluded from branches and then aphids introduced, it was found that increased shoot damage occurred, compared to the controls. There was also an increase in aphid numbers, and consequently an increase in the populations of insects that predate on aphids. Overall insect numbers were lower in orchards with higher numbers of insect-eating birds.

Other studies have shown that excluding birds, as well as all other animals, results in lower levels of fruit set and higher levels of insect damage, but does not affect 'net outcome'. It seems strange to me that you can set less fruit and have more damaged fruit, yet still the same amount of production/saleable fruit. I couldn't find the answer in the paper, but wonder if thinning was required to reduce the number of fruit on the branches with higher fruit set. Or perhaps branches with higher fruit set receive more wind damage, or damage from the fruit rubbing together. Given that we personally don't do any thinning in our own orchard, are pretty hands-off when it comes to fruit management, and don't care about cosmetics I suspect that for our purposes excluding birds would result in decreased production.

Given that birds are seen as destructive pests in vineyards, I can't resist including a study from California wine country where the installation of bird boxes resulted in birds removing

2.4 times the number of beet armyworms (a caterpillar pest that chews through grape leaves, impacting the grapes' ability to produce sugars via photosynthesis) from areas with bird boxes present, and 3.6 times the number removed within 25 m of the bird boxes. The paper seemed to suggest these birds were migratory, so maybe during grape ripening and harvest they don't damage the fruit.

As our orchard has grown, I have noticed more bird droppings appearing - bird poo is basically recycled insects, grains and fruit, all made available in a highly potent form of nutrition for plants. The question I have is, having a small orchard (which I suspect birds move in and out of) are the nutrients migrating off site, or do I get a net gain?

That question is unfortunately not one that seems to have been researched. One study focused on crows which foraged in the urban landscape and inhabited and roosted in forested land. The purpose of the study was to determine if the crows transported nutrients from the urban environment to the forest environment. It found that in the forests where the crows roosted, they added 2.31 kg/ha of phosphorus and 23.2 kg/ha of nitrogen, which is 2.7 and 0.66 times respectively the addition of nutrients into the forest ecosystem - i.e. for nitrogen, there are other sources of input including nitrogen fixing by trees, lichen etc., nitrogen in rain from lightning and air pollution, hence the addition of 23.2 kg/ha compares to 35.2kg/ha of nitrogen provided by these other sources. Only 0.86 kg/ha of phosphorus was provided from other sources, so the 2.31 kg/ha here is a significant source of this nutrient.

The effect of the nutrients was greatest where the crows roosted, in areas they inhabited during the daytime, the effect was two orders of magnitude lower. This tells me that birds going about their daily business don't add many nutrients to the ecosystem, but where they roost they add a significant amounts of phosphorus and possibly nitrogen. From observation, there are thrushes that occupy a high point in the orchard in my Japanese raisin tree, and a good supply of droppings accumulate underneath it. Maybe perching locations give a positive nutrient flow, as well as roosting locations.

Lastly, I wondered if there were good birds and bad birds to have in the orchard. I understand that some bird species have diets dominated by insects, and other birds have diets dominated by seeds, fruit or other food sources. Through my own research on the subject, I discovered that birds which always have insects in their diets (both native and introduced), and that those which feed on fruit, also feed on insects, especially at breeding time. I suspect this is due to the high protein content of insects compared to say fruit or seeds and that they are easily digested by chicks. For example, the eastern rosella would be viewed as a pest species due to their ability to strip buds, blossom and fruit, even though in the breeding season they will feed on insects, a beneficial feature. Because of cases like this, I found it was therefore impossible to draw a line and divide birds up into pest and non-pest species.

To summarize, little research has been carried out investigating the role of birds in the orchard and whether they have an overall positive or negative impact. The work that has been done seems to indicate that birds are an overall net benefit to the orchard in regards to pest control and possible nutrient deposition. Let us remember this next time our favourite crop has been enjoyed by birds, much to our chagrin.

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