

MILLIONS OF RANDS IN SAVINGS POSSIBLE FOR MACADAMIA INDUSTRY IN USING BATS TO CONTROL CROP PESTS

Two-season research project proves that natural pest control pays

A collaborative research project between Green Farms Nut Company (GFNC), South Africa's largest and oldest processor and marketer of macadamia nuts, four of their suppliers, the macadamia industry body, SAMAC, and the University of Venda is proving the commercial value to the industry of using bats and birds to control insects that damage the crop.



Slit-faced bat carrying a pest stink bug in flight

The project has been designed and is being managed by the University of Venda's South African Research Chair's Initiative (SARChI) Chair on Biodiversity Value & Change.

Results from the first year of the project, which covers the 2016 and 2017 macadamia growing seasons, already provide clear evidence that crop damage is increased when bats and birds are excluded from orchards. The damage is caused by stinkbugs, moths, and nut borers.

Professor Peter Taylor SARChI Chair and supervisor of the project said "Stinkbug damage to macadamia orchards in South Africa is estimated to be between R50-100 million per annum. Economic models of the "avoided costs" of bat predation on stinkbugs due to predation by bats on and around macadamia nut trees suggest that the current level of stinkbug damage would be doubled if bats populations in orchards were to become extinct. Any efforts to retain bat populations, e.g. through use of safe pesticides, retaining natural vegetation corridors and bat houses, should be strongly encouraged".



Green Farms Nut Company Director Alan Whyte discusses the bat and bird exclusion project with Prof Peter Taylor of University of Venda (centre) and PHD student, Valerie Linden (right)

Graeme Whyte, GFNC Development and Client Manager, says "Damage to the kernels that are supplied to processing factories impacts the farmer in four ways. The first is that, of the unsound kernel that is delivered for processing in the Northern Regions of Limpopo and Mpumalanga, 60-80% of the damage is due to stinkbug infestation. Areas like Natal are less affected by stinkbug but the increasing percentage of unsound kernel there, shows that their stinkbug populations are growing, too.

"The unsound kernels can be converted into macadamia oil, but the margin for farmers is far lower. Either way, there is no sensible reason to incur preventable damage.

“There is also a cost to the farmer related to the need, in the factory, to sort and eliminate the unsound kernels. If stinkbugs attack the kernels early in the season, the nut carries a dark brown mark that optical sorters can pick up automatically. Later in the season, however, the mark on the kernel is very pale. Sorting them has to be done manually (by eye), which adds cost to the production process.

“In addition, the higher the percentage of sound nuts delivered to a factory, the faster they can be cracked. In one of our factories, for instance, we can crack up to 70 tons of sound kernels a day. When we have to sort high unsound kernel, production can drop to 20 tons a day. This means that the cracking costs we are obliged to charge our suppliers increase.

“And, when factories are less productive, they’re able to take on new supply at a slower rate. So, farmers can’t bring their product in as quickly as they would like. The ultimate flow of product to market is slowed down, impacting sales and, therefore, farmers’ profits.

“When you consider that pest control via bats and birds is free – all you have to do is put up bat boxes in bat friendly areas and grow indigenous bush next to your orchards – then there really is no downside to doing the environmentally responsible thing.”

GFNC has made available to the research project orchards on two of its own farms owned by Green Farms Director, Alan Whyte, in the Levubu area. Three of its suppliers, Fritz Ahrens, Jaco Roux, Alistair Stewart and his farm manager Branden Jardim, all in the Levubu, Thohoyandou, and Louis Trichardt areas, are also participating in the project. Researchers Valerie Linden and Sina Weier have put up 48 cages around trees on the six farms.

One set of cages keeps birds and bats from feeding on all the insects on and around the trees. A second set enables both bats and birds to access the insects day and night. The third set of cages is closed in the evenings, to exclude bats and nocturnal birds. And the fourth set is closed in the day time, to exclude birds that are active in the day.

The nuts from the caged trees are then sampled to establish the percentage of damage caused by insects under these controlled conditions.

Linden and Weier have been trained at the GFNC sampling facility at its Levubu factory to identify the specific types of damage caused by the various insects.

Weier is also focusing on the feeding patterns of the bats and birds, using their droppings to establish which insects they are feeding on in the orchards that are part of the study. This information will enable farmers to provide the right

environments for encouraging specific bird and bat species to develop colonies around their orchards.



Univen PHD student Valerie Linden demonstrates the system to open and close nets daily to exclude from macadamia trees, bats and nocturnal birds (closed at night, open at day), birds (closed at day and open at night) and both birds and bats (closed permanently).

“Before we started the study, we knew that the bats were feeding on false codling moths and stinkbugs,” says Linden, whose focus is the caged trees. “We’ve since established that certain species will also feed off the stinkbugs and that the bats will both catch the insects in the air and take them off the leaves of the trees. Various species of birds have the same habits.

“Based on this behavior, the dietary analysis we’ve done on the bat and bird droppings, and the kernel damage patterns we’ve seen this season, it’s clear that the bats and birds make a definitive contribution to reducing crop damage. Where bats and birds were excluded from the trees, kernel quality dropped.

“We expect that biological control through the use of bats and birds will reduce the need for farmers to spray their trees. In turn, this will cut their production costs. And, because they will have less kernel damage, a higher percentage of their crop will be processable. Taken together, the savings on costs and the ability to market more of their crop will make their operations significantly more sustainable.

The preliminary research results have indicated that farmers can reduce kernel damage by as much as 8% by using biological pest control such as bats and birds.”

Issued by:

Department of Communications and Marketing

University of Venda

Tel: 015 962 8525

Date: 23 March 2017



University of Venda