

Vineyard Surveillance

Protecting Crops from Bird Damage

Measurement to Management in Vineyards

The BirdDeter system has now been in operation in Australian vineyards since 1997. Development started in 1992 and was funded with HRDC assistance. The tools and strategies developed were a logical progression of the research available at the time. Since then, through application of the technology in the field, customer feedback and the use of radar to monitor and record bird activity, the technology has evolved into the highly refined and versatile system available today.

Bird Detecting Radar

The radar consists of a microwave transmitter and receiver spaced by up to 600 meters. The diagrams below show the detection zone between the two poles as a football shape, which exists in three dimensions. The detection zone is one third as wide as it is long. It is also one-sixth the height, as the football shape is cut in half by the ground. If the radar were stretched across a valley the radar would dip into the valley. The radar antenna can be rotated from side to side to adjust the basic shape.

The radar is sensitive enough to detect a single starling or groups of smaller birds, within 0.4 seconds of entering the detection zone. Whether the bird is flying into or out of the field can also be determined. The push button control panel and LCD display allow the user to adjust the bird counts and detection time. These controls prevent the radar over reacting to resident birds such as Magpies, Butcher-birds and Kookaburras

As birds fly into the detection zone their presence within the zone is recorded each second. The time and date stamped entries into the memory indicate the presence of birds but does not specify the number or type. However by inference large numbers of birds produce long periods of bird activity.

Radio Control Eliminates Wiring Through The Vineyard

The radar has an in-built radio transmitter, which is used to activate radio controlled deterrent stations. These deterrent stations can have connected to them any 12 Volt or 240 Volt device. Some of these devices include inflatable men, electric hawks, gas cannons, flashing lights, car horns and lasers. The deterrent stations also include an audio system capable of broadcasting distress, alarm, predator and harassment calls to birds at high volumes. The sounds are programmed into digital memory and their reproduction quality exceeds that of most tape players.

Each time the deterrent station is activated by radio control, the type sequence and duration of deterrents is changed. For example the scary clown may pop up followed by distress calls, followed by a gas cannon. Next time the unit operates the gas cannon may come first and the scary clown may not appear. A different portion of the sound track will be replayed each activation and its duration will vary. The deterrent unit will also pick an entirely different section of sound track to play each day over a four-day period. Typically three speakers are used per deterrent station and these are individually switched by the on board computer to create "movement" of the sound.

Strategy

A bird's mind can be said to contain a ledger. On one side is pain and the other is pleasure. If the level of pleasure exceeds pain, an activity is reinforced. If the stress is greater than the reward then ultimately the activity is stopped. The whole process of training the birds to stay out of the vineyard is to **minimise the vineyard's association with pleasure** and **maximise the association with stress**.

Pleasure is minimised by ensuring that bird training starts early, so that birds do not get the opportunity to feed.

Ambush

Deterrents should be concealed as much as possible in the vineyard, so that when they are activated they have maximum impact. For this reason deterrent stations are powder coated green.

Keeping Birds Moving

Persistent birds through habit will try to regain entry to the vineyard through their initial entry point. As birds enter the vineyard, deterrents should be placed to move birds through the vineyard, rather than allow them to return to their initial entry point. For example if bird entry is via a tree line then speakers should face into the crop driving birds through the crop.

Once forced into the vineyard subsequent deterrent stations can be placed in the vineyard to prevent birds settling in other areas and direct them out of the vineyard. Moving the birds through the vineyard in this way also makes it difficult for them to develop alternate entry strategies.



The flight paths that birds are likely to take through the vineyard are usually determined by features such as :

- Crop ripening sequence
- Bush or alternate feeding areas
- Vantage points such as powerlines
- Dams or river courses

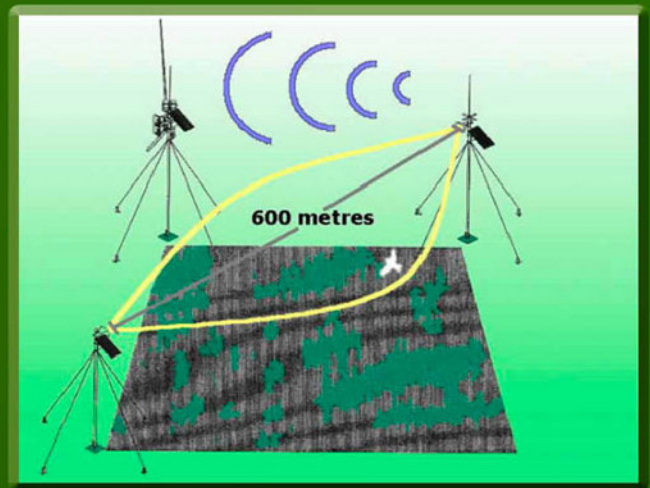
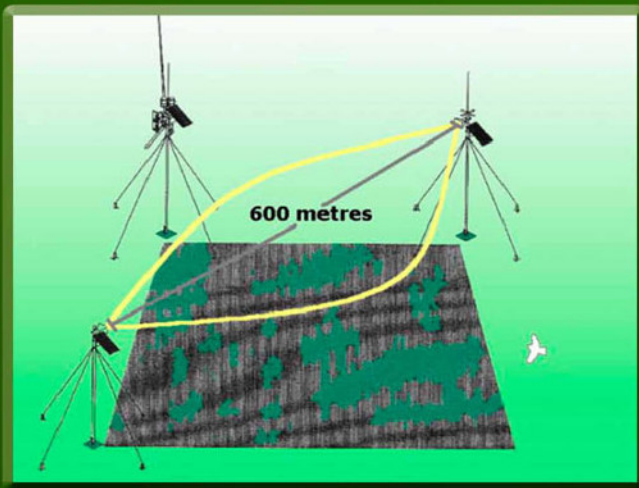
Different species will have different attractions to the above features. Therefore it is important to determine the habits of individual bird species, in that vineyard.

Pest Bird Habits

Starlings can not live on grapes alone and are attracted to grapes mainly for the moisture rather than their sugar. If conditions are dry, they can often be one of the early birds. Starlings also require insects and some grain in their diet. To this end they prefer areas in which the ground is wet so they can probe the ground for grubs. They also prefer areas in which there are cattle and flies. The greatest pressure on vineyards can be found in areas in which dairies operate and where there is an abundance of insects and grain.

Starling flight paths will be attracted to:

- The ripest most exposed part of the crop
- Low contours in the vineyard
- Power lines, water, rubbish dumps
- Cattle grazing areas, surrounding trees



“The birds enter the protected area, and are trained to stay away.”

Distress calls are used as the primary deterrent for starlings. The effect of other deterrents such as the gas gun is greatly enhanced by the effect of the distress call.

Crows and **Starlings** can often be found together as their habits are similar. The crow differs in that it has a greater use of sentries and has a stronger preference for elevated entry points. The crow is less likely to have an aversion to predators such as eagles and hawks. Crows in the initial stages will fly toward their distress call. Many other birds also exhibit this behavior. The desired effect is however created in that the birds become distressed and confused and are conditioned to leave the area.

Honey Eaters and parrots will usually swoop into a vineyard from tall trees either surrounding or in the vineyard. They are more motivated by visual deterrents than audible ones. If these species are a major problem then the inflatable man and flashing lights are a primary requirement. The visual deterrents also increase the effectiveness of audible deterrents. Honey-eaters are more likely to attack the crop in the later ripening stages. As their preference for grapes is secondary to that of nectar, their appearance from year to year will vary. Even during one season honey-eaters have been known to abandon a vineyard for no apparent reason.

Currawongs will often descend from the hills during the later part of the season, although in some areas they are there all year round.

Cockatoos respond vigorously to distress calls and as with the crow will often fly towards the call or watch the system from a safe vantage point, possibly in an attempt to evaluate the danger. The effect of the radar system is to broadcast the distress call when the Cockatoo is in close proximity and when it is least expected.

Silver-eye researchers have recently discovered that the hunting call of the Pied butcher bird may reduce Silver-eye predation.

Over the last two years, customers in areas affected by Silver-eyes and with resident Pied Butcher bird populations have been supplied with sound cards programmed with both Silver-eye distress calls and Pied butcher bird calls.

In most cases the Silver-eye populations would dramatically decrease, and Butcher bird numbers would increase.



Pied Butcher Bird

Monitoring The Results And Optimising Performance

Until now, growers rated the effectiveness of bird control systems by estimating bird damage or the number of birds in their crop. Growers can now have the facts at their fingertips by using the latest in bird detection and deterrent systems, which record the time and date of all bird activity within the crop, to an accuracy of one second.

Data Logging and Graphing

Bird activity data recorded in the field can be retrieved using a Laptop and graphed using graphing software from Vigilance Technologies. The graph below shows one day of bird activity in a vineyard being attacked by crows. While birds are in the radar detection zone, their presence is recorded at one-second intervals. Each recording is called an event. The blue line is the raw data and shows the number of events in each ten-minute interval.

Proceeding with Certainty

With deterrents switched off, morning and afternoon bird activity levels are usually the same. When the deterrents are switched on, bird activity in the afternoon is reduced, as is shown on the graph. This is an early indication that the bird detection radar settings, as well as the level and type of deterrents installed is adequate. After an initial drop, bird numbers will stabilise with occasional peaks occurring as new groups migrate in and test the system.

When the radar is placed in the area of highest vineyard bird traffic, radar densities as low as one per hundred acres can be achieved. This is possible for some species due to the high level at which their flight paths can be predicted. For other species in which the activity is more distributed throughout the crop, times of peak activity are highly coincidental. In fact it can often be seen that birds in one part of a crop will swoop in at exactly the same time as another group some distance away. The "peaky" nature of the graph, illustrates the "all or nothing" behavior of most bird species, and highlights the importance of activating deterrents at the right time.

The data logger has sufficient memory to record up to two weeks of data. This data is retrieved using a laptop in the field and then graphed using Vigilance Technologies graphing software. Up to two months of daily activation totals can also be stored and displayed at the control box in the field.

Sales and Support

As well as our agents, John Muehlebach is on the road between November and March. John travels south from Queensland, into the Hunter Valley, Mudgee and then through the major grape growing districts in NSW, Victoria and S.A. If you would like a free site assessment, or on site demonstration call John on 07 4667 0491.

For Prices And Further Information Contact Vigilance Technologies Pty Ltd

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