Tracking insects in the bush

It's often been pointed out that the thinly populated remote north of our country offers scope for an invasion that would be hard to detect, let alone resist. This observation is particularly apt in the case of insects, which may slip unobtrusively into our realm — perhaps carrying a cargo of alien virus — and establish themselves here. But now a new weapon will at least help us to track the 'march of the midges' and other winged insects that sweep down from South-east Asia, even if we cannot prevent their entry.

It is a solar-powered insect collector — the brainchild of Mr Harry Standfast of CSIRO's Division of Tropical Animal Science in Brisbane. To understand why the device should be a boon to outback entomologists, you have to appreciate the difficulties involved in carrying out in remote areas the regular sampling necessary to obtain an accurate picture of insects and their various migrations.

To travel into the outback for a couple of days to catch a sample of insects not only is expensive and time-consuming, but also gives inaccurate results because many of the rarer or seasonal insects may not be present on the one or two nights of the sampling.

So entomologists from the Division usually set up light traps powered by batteries that last at least a week. A bulb (under the control of a light-sensitive switch) lights up automatically at dusk, and the insects thus attracted accumulate in a container of preservative.

But, of course, you still need to travel out into the bush each week to retrieve your container full of insects and insert a new battery.

Enter solar power! Mr Standfast's simple device has a small solar panel, a rechargeable battery, four insect traps, a solid-state timer, and a light-sensitive switch. Each trap consists of a small bulb and a motor to power a fan that sucks the insects through a sieve into the container of preservative.

A CSIRO technician, Mr Peter Allingham, emptying one of the traps.

A trap is active every night for a week — then the next trap is activated for a second week and so on. An entomologist need only visit once every 4 weeks and, knowing the sequence in which the traps operated, will have a weekly record to detect any fluctuations in insect numbers.

Cloudy days are no problem, as they still provide sufficient light to power the 0·45-W bulb and the small fan. On sunny days twice as much power as is necessary for 1 night's operation can accumulate. As if all this wasn't enough, the original battery has a store sufficient for 5 nights.

If insect numbers do fluctuate, a scientist will want to know why. So the collector also incorporates a data-logger developed by Mr Gunter Maywald of the Division of Entomology's Brisbane laboratories.

This has sensors for temperature, and a rain gauge, which all feed their information into a small microchip memory, again using power from the sun.

Readings can be taken at pre-set intervals and logged accordingly. The scientist simply transfers the data into a personal computer on his or her monthly visit to the site, and then correlates that information with insect species and numbers back at the laboratory.

The data-logger also stores a record of the current flow to the trap in operation, so allowing you to know if a bulb failed. This clever piece of feedback means that you can then be sure that your low figure for insect numbers in, say, week 2 is a genuine phenomenon, and not due to equipment failure.

The electronic field worker can be adapted to the differing requirements of various specialists. For example, Mr Standfast, who is studying midges, places the temperature sensors on, in, and under a dung pad because his insects breed there and the dung environment is important.

The small bulb provides enough light to attract his midges but not really enough to bring in beetles from far and wide, which is ideal as he doesn't want to clutter up his containers with them.

A stronger bulb, or a different sieve size, could be incorporated depending on the insect type under study.

Mr Standfast sees no reason why his device cannot be enlarged to accommodate six or eight traps, cutting down even further the number of arduous trips to the Never-Never. At present it seems that the only limiting factor will be the slow evaporation of the preservative from the containers.

Roger Beckmann