Snails on the move

Theba pisana **snails may gather on a fence-post in summer, but when they cluster on wheat stalks they become a pest that interferes with harvesting.**

Snails fouling pasture grass; they're not eating it, but their presence in large numbers can inhibit stock from grazing.

It may sound a little like asking why the chicken crossed the road, but learning why and when certain snails move out of pastures and into roadside verges or crops is proving to be important for many farmers in South Australia.

But these are not easy questions to answer. Dr Geoff Baker of the CSIRO Division of Entomology's Adelaide unit has studied the movements of the snails *Cernuella virgata* and *Theba pisana*, which are introduced pests of crops and pastures in coastal areas of south-eastern Australia.

The small snails (about 10–15 mm across) spend the hot dry summer stuck onto the heads and stalks of cereals, where they can literally 'gum up' the harvester, as well as causing snail remains to finish up in the final crop (see 'Up front' in *Ecos* 64). The species *Theba pisana* may also cause direct damage by feeding on crops. Furthermore, if the farmer is using his or her field for pasture, then the snails' slime on the grass, if present in sufficient quantity, may inhibit stock from grazing.

Controlling these little creatures is not easy because they 'migrate' with the seasons, albeit at a snail's pace! Dr Baker estimated snail numbers by the ecologists' standard technique of mark–release–recapture, daubing a known number of shells with bright fluorescent yellow or red paint (for more on how the procedure works see *Ecos* 54, page 16).

Upon recapturing them, he discovered that snails were moving in droves during autumn and winter from roadside vegetation into the more exposed environment of pasture, where they fed and reproduced. In spring and early summer they moved back to the roadside vegetation in search of cool above-ground sites to spend the hot days sealed in their shells.

Incidentally, he also found out what exactly a snail's pace is: average movement in a day varied from between 0·1 and 0·4 metres for *C. virgata* up to 1·1 m for *T. pisana*, although some speedsters covered more than 55 m in 1 month during the migration period.

But a question that still puzzles the scientist is 'how do the snails know where they're going?' Other researchers have suggested that smell plays the most important part in determining which way a snail moves — after humidity, naturally, for if they are not in moist conditions snails will not even venture out of their shells to move at all.

If smell is the cue, then the animals must move upwind towards the source of the aroma — be it the pasture or roadside. But the direction of the migration that Dr Baker studied did not correspond at all with the direction of the winds recorded at the time. The snails could not therefore have been orientated simply by means of wind-borne odours.

Another possibility exists. On the end of each of their two long, retractable 'antennae', snails have an eye. These 'eyes-in-the-sky' improve the view of the world that a snail, with its low profile, would otherwise have. It's known that snails can discriminate between various shapes and preferentially move towards tall, dark objects against light backgrounds. Some scientists have therefore suggested that snails move towards objects such as trees and shrubs, silhouetted against the night sky, which can be used as resting places by day.

The painted individuals of *Cernuella virgata* that Dr Baker released in pasture in the spring might have used tall weeds in the roadside vegetation as markers to aim towards in their slow migration out of the paddock. Upon coming across such a tall plant, the snails would climb up it, attach themselves to the top, withdraw into their shells and 'batten down the hatches' in preparation for a hot, dry summer.

Dr Baker found that *T. pisana* snails released in sparse vegetation moved further than those released where the vegetation was thick.

Many farmers in South Australia rotate annually between cereal cropping and

A migrating snail homes in on the shadowy outlines of tall objects as it heads towards the roadside to spend the summer, sealed in its shell, at the top of a post or tall plant.

pasture, adjacent paddocks often being kept under different regimes. In this case, the snails have no need for roadside verges, moving simply from pasture, where they reproduce, into the crop, where they spend the summer on a barley stalk rather than a tall weed.

Following harvesting, the paddock is given over to pasture — ideal for the snails' winter requirements, while the adjacent paddock is now cleared and sown. Come springtime, the snails of the new generation move back from the pasture into the other field, which now carries a crop, and the cycle continues.

What can be done? Snail pellets, such as are used in suburban gardens, are far too expensive for broad-acre farming, as well as being unfriendly to the environment. But Dr Baker's research has proved that the little pests are mainly found on the edges of crops and pastures and, knowing of the migration, we now understand why — once they have found the required pasture or crop stalk they have no need to move any further.

Therefore, a strip of strategically applied snail bait near a fenceline could well do the trick, eliminating many of the pests as they pass by on their slow migration, and costing considerably less than trying to treat whole paddocks.

Dr Denis Hopkins of the South Australian Department of Agriculture has experimented with this, and his preliminary results have suggested that it can provide effective temporary control.

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The dispersal of *Cernuella virgata* (Mollusca: Helicidae). G.H. Baker. *Australian Journal of Zoology*, 1988, **36**, 513–20.

Dispersal of *Theba pisana* (Mollusca: Helicidae). G.H. Baker. *Journal of Applied Ecology*, 1988, **25**, 889–900.