ion plants in each plot from four to two before the second evaluation.

In that trial, no differences among the various treatments were evident in cabbage foliage injury by worms (table 2). Cabbage yield was again significantly depressed in all plots containing companion plants. On beans, significantly higher whitefly levels occurred on July 26 in plots planted with basil and catnip, and on August 9 in the basil and nasturtium treatments, than in other plots. Whitefly numbers were not significantly lower than those of the untreated control on either date in any of the companion plant treatments.

Conclusions

Although several species of companion plants reduced imported cabbageworm numbers by modest levels, such reductions did not necessarily result in diminished worm damage to cabbage. Any beneficial effects of companion plants were negated by substantial reductions in cabbage yields. Yield reduction probably resulted from competition for resources, such as sunlight and possibly soil moisture and nutrients.

Plant spacing different from the ones we used might well have diminished the effects of competition, yet probably would also have failed to produce the modest beneficial effects noted for several companion plant species. For beans, it is doubtful that any altered configuration of the companion plants used would have reduced whitefly levels, although the possibility must remain open that whiteflies fare better when plants are stressed than when they are vigorous. ■

Snail barriers

Koehler
Barclay

All except one barrier tested worked well.

The brown garden snail is a destructive, annoying pest to many California home gardeners. Feeding on vegetables, fruits, or ornamentals of many kinds, a relatively few of these snails, *Helix aspersa* Müller, can cause much damage, particularly if the affected plants are seedlings or the foliage nondeciduous.

Commercial snail baits, formulated in several ways, are effective when used at proper times and locations, but some gardeners prefer not to use them because of possible hazards to small children or pets, or for other reasons. Alternative control measures that have been suggested include liquid traps of stale beer or fruit juice, barriers of rough or sharp substances, such as sand or ground glass, and hand-picking.

Evaluation of barriers

To evaluate the comparative efficacy of several types of snail barriers, we conducted a series of tests in the spring of 1982 and 1983 in Kensington, Contra Costa County. Each testing arena was 3 feet square and was installed on strips of plastic sheeting approximately 10 inches wide, laid on asphalt in a shaded location. Barrier materials were applied dry in a ridge approximately 3 inches wide and 1 inch high, except for the screening, which was 6 inches high and erected vertically. A 1-square-foot board placed horizontally in each arena was elevated several inches to provide cover for the snails. No food was provided.

At the start of each replication, 25 field-collected brown garden snails, half to fully grown, were placed beneath each board. Twenty-four hours later, snails remaining in each arena were counted and discarded. Positions of the arenas (plots) were re-randomized, and the process repeated for a total of four to five replications.

Evaluation of barriers to prevent brown garden snail movement

Barrier	Snails remaining*
1982 trial (March 8-25)	%
Hardwood ashes	93 a
Softwood ashes	89 a
"Copper" screening†	87 a
Diatomaceous earth	76 a
Sand	19 b
None (control)	12 b
1983 trial (May 2-20)	
Diatomaceous earth	91 a
Snailproof‡	42 b
None (control)	15 c

* Average percentage of snails remaining in test area. Means in each trial followed by the same letter are not significantly different at 5% level, Duncan's new multiple range test.
† Although purchased in a retail outlet as copper screening, analysis indicated about 30% zinc was present also.
‡ A commercial product consisting mostly of ground incense cedar sawmill by-products.

Results

Ashes, screening, diatomaceous earth, and, to a lesser extent Snailproof, were effective as snail barriers when compared with the untreated control (see table). Snailproof might have been more effective if it had been applied as a complete ground covering, as recommended by the manufacturer, rather than as a barrier, which we did in this test for purposes of comparison. Sand was worthless as a barrier.

During these trials it became apparent that measurable rain immediately impaired performance of barriers, except the screening. Several replicates were discarded after such weather, when snails readily left the test arenas. We did not investigate any means of keeping barriers dry. Unfortunately, snails are often most troublesome during rainy weather. The plastic strips helped prevent contact of the barriers by soil moisture.

Most garden soils in California are not benefited by addition of some of these barrier substances, such as ashes. Plastic or another substrate would aid in keeping such materials from contaminating soils.

Starvation of snails for one to seven days before they were placed in the test arenas had no consistent effect on their propensity to cross the barriers to escape. A period of hot weather near the end of the 1983 trial indicated that snails do not readily move during such times. We discarded those replicates.

An effective barrier would, of course, keep snails in as well as out. Normally, the resident snail population in the garden should be reduced by means such as baiting or hand-picking before the area is enclosed by a barrier. ■