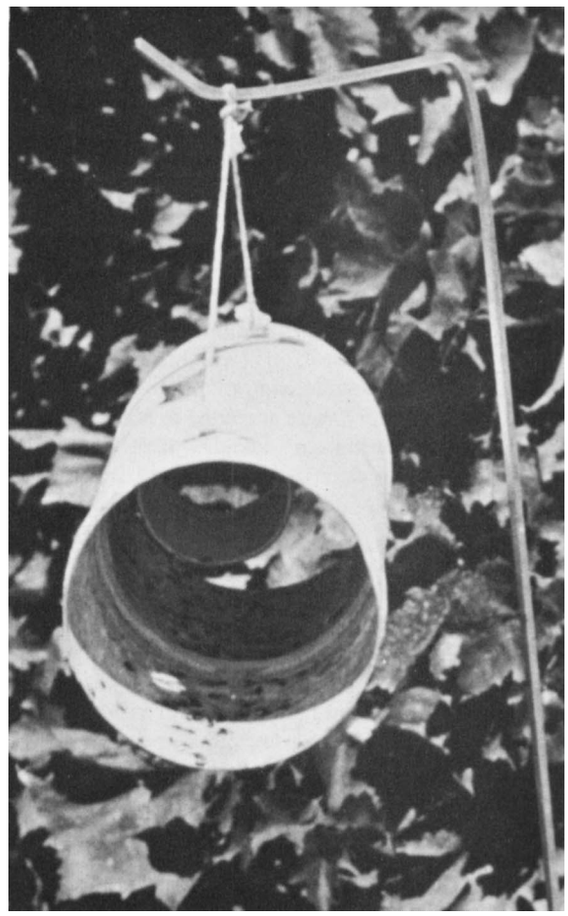
VIRGIN FEMALE TRAPS *aid control survey for* OMNIVOROUS LEAF ROLLER *in San Joaquin Valley vineyards*

M. T. ALI NIAZEE

E. M. STAFFORD



Virgin female trap for omnivorous leaf roller as placed in a vineyard.

EARLY IDENTIFICATION of pest species is essential to the successful planning and operation of integrated control and pest management programs. Growers can then minimize the damages caused by insects though timely manipulation of various control measures, including chemical treatments, cultural practices, and harvest schedules. Detection and survey methods used include the hand search for both mature and immature stages, direct collection by D-Vac (a suction insect collecting device), sweep nets, a study of the damage index, and use of various types of traps. Black light traps have usually been used for surveys; however in recent years, the pheromone trap has become more common.

Pheromone traps

The sex pheromone traps which use a specific number of adults of one sex (or an extract of the sex attractant, or a synthetic lure) to attract the opposite sex, have been used successfully by many workers. The advantage of this type of trap is that it almost always catches only one species of insect. This makes it comparatively easy to count. The black light traps attract many different kinds of insects and the desired pest species must be separated out of the mass of insects. Thus the pheromone traps have received overwhelming acceptance by researchers and are now being used to survey and detect many important insects such as the pink bollworm, the oriental fruit moth, the cabbage looper moth, the codling moth, and the gypsy moth.

AVERAGE NUMBER OF OMNIVOROUS LEAF ROLLER ADULTS CAUGHT PER NIGHT*

Month (1970)	Number caught: Light traps	Number caught: Virgin female traps	Ratio†
July	3.7	24.2	6.6
August	2.6	19.5	7.5
September	6.5	43.5	6.7
October	2.0	14.4	7.2
November	1.1	10.2	9.3

* Average of 3 traps.
† Virgin female trap counts / Light trap counts.

OLR

The omnivorous leaf roller (OLR), *Platynota stultana* is an important new pest of grapes in San Joaquin Valley vineyards. It has caused considerable damage to the fruit during the past three to four years. The problem of OLR is intensified by the lack of any effective survey technique to determine critical population levels. Early-season infestations of OLR are usually not noticed by the grower; perhaps because of the fast shoot growth and thick foliage of the vines. The feeding nests made by OLR in April and May are relatively small and inconspicuous, and do not attract the attention of many vineyardists. However, during this period, a huge OLR population build-up may occur. By mid-June the OLR shift their attack to the grape bunches. The infestation steadily increases and by mid-August the OLR feeding activities may be causing substantial damage to the fruit. It is not until this later period that many growers start noticing worms in their fruit. Unfortunately, the control of OLR at this stage is very difficult. Therefore, the early season detection and suppression of OLR population is imperative.

Light traps vs. pheromone

Black light traps (BLT) were used to survey OLR in the San Joaquin Valley vineyards during the 1968, 1969 and 1970 seasons. The counts obtained from these traps helped in determining the

peak moth flight periods, although the number of adults caught in the traps was small. During the summer of 1970, a sex pheromone trap for OLR was developed and used for the survey.

The traps (see photo) were constructed of 17 × 38 cm round cardboard cartons, each with a 1 pint 8½ × 9 cm round ice cream carton in the middle. The sides of the small carton (which served as the virgin female cage or pheromone source chamber) were screened to allow the free circulation of female attractant. The female cage carton was held in position by a stopper cork. The sides of the cardboard carton traps were left open. The inside surfaces of cardboard cartons were painted with Stickem to trap attracted males.

Comparison

Both the light traps and virgin female (VFT) traps were hung in the vineyards with a short cord 6 to 8 ft from the ground. One newly hatched virgin female was placed in the central cage of the pheromone trap. Females were changed twice a week, and fed on 10% sugar solution. The effectiveness of sex pheromone traps was compared with black light traps by placing them in the same general area, one mile apart from each other.

Results (see table) indicate that the virgin female traps (pheromone traps) were significantly more effective than the light traps. The total monthly counts indicate that during July 1970, light traps attracted an average of 3.7 moths per night, whereas pheromone traps attracted 24.2 moths per night. A similar trend was exhibited in the catches of August, September, October, and November 1970. On an average, pheromone traps attracted 6.6 to 9.3 times more moths than light traps. This indicates the remarkable effectiveness of sex pheromone trapping.

Considering the importance of OLR in the San Joaquin Valley vineyards, and the lack of information on its field biology, ecology, and overwintering habitats, it would seem that pheromone traps are an urgently needed tool. Study of OLR will not only help in detection and survey, but will also be advantageous in determining the proper timing for insecticidal applications, the number of generations, overwintering habitats, specific pattern of spread, and the damage potential of the pest.

M. T. AliNiazee is post-doctoral Research Entomologist, and E. M. Stafford is Professor of Entomology, University of California, Davis.

DAVID RIRIE

MINIMUM SPACING

TWO POSSIBILITIES exist as ways to eliminate hand thinning in lettuce production: (1) to combine precision planting with the use of a selective thinner; and (2) to plant to a stand, utilizing improved seed environment control with respect to plant protection, soil crust prevention, and moisture control. Regardless of which system the grower chooses, he must decide on a minimum spacing that can be tolerated, without sacrificing head size, quality or yield. If the thinner is used, the cutting mechanism should be set to leave plants as close as possible to that minimum spacing. If planting to a stand is practiced, then the minimum spacing will result in maximum plant population, thereby giving better yield insurance to cover any loss of stand. The purpose of this study was to determine the minimum plant spacing that could be tolerated without yield or quality loss under field conditions.

Eight experiments were conducted beginning in 1967 and concluding in 1969. Harvest dates ranged from May 10 to August 6. To guarantee that lettuce plants would be thinned to nearly exact spacings, marked strings were placed beside the rows to be thinned, and the thinning crew was instructed to leave a plant opposite each mark. At harvest time the commercial crew cut the lettuce from the variously spaced plots. Yields were reported in terms of heads cut or in cartons per acre. All plots were arranged as 5 × 5 Latin squares except one which was a 6 × 6 Latin square. Spacings ranged from 6 to 16 inches in increments of 2 inches in the first test, but in subsequent tests the 6-inch spacing was omitted.

A statistical analysis of the data showed that the percentage of the theoretical stand surviving, mean number of heads cut per plot at each spacing, and percentage of heads cut at each spacing could be represented by highly significant quadratic curves. As determined by number of heads cut, the minimum spacing giving the best yield (of two-dozen-per-carton size lettuce) was 10 inches. Stand losses were greatest at 8 inches, with some stand loss also occurring at the 10- and 16-inch spacings. The 12- and 14-inch spacings produced slightly over 100 heads per 100-ft row, suggesting that the desired stand was slightly exceeded. This may have been because plants were left exactly at both the beginning and end of each line and/or because of the presence of occasional double plants.

The lowered survival at 8- and 10-inch spacing was probably due to hand weed-

GRAPH 1. RELATIONSHIP OF TOTAL NUMBER OF LETTUC HEADS CUT PER 100-FT ROW (ALL HARVESTS) TO THINNED SPACING