Cutworms on White Asparagus

satisfactory control achieved with an endrin oil-base bait but chemical not yet registered for use on green asparagus

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The dark-sided cutworm — *Euxoa messoria* (Harris)—causes yearly economic damage to asparagus grown in the delta area.

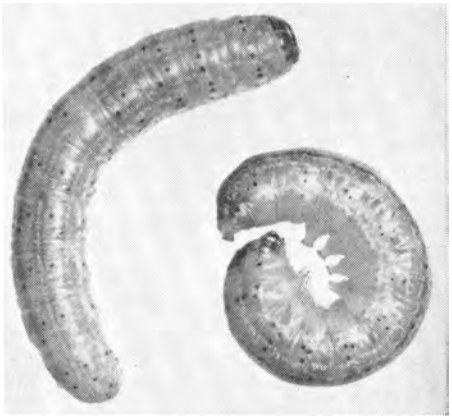
Damage to spears—of from 15% to 40%—is not unusual during late April, May, and early June. Spear injury is usually sporadic and varies with the year, area, and even portions of the same fields.

Experimental trials and commercial applications from 1955 to 1957 indicate that a 0.75%–1.0% endrin oil-base bait at 20–40 pounds per acre is effective under most conditions.

Endrin is registered for use on white asparagus—where no spears are present at the time of application—but because residue information is not available the use of endrin baits on green asparagus is not allowed.

The dark-sided cutworm feeds at night on the tender tips of the new spears where they eat out small holes. Feeding on one side may cause the spears to grow out in a curved fashion. Occasional damage may also occur to the ferns.

A widely distributed cutworm in the United States and Canada, the dark-sided cutworm is reported damaging many vegetable, field, and even tree crops. It prefers to remain in the soil during the day, feeding at night, and often climbs to considerable heights to obtain food. Damage to coniferous seedlings has been noted in certain areas of northern California during the past several years.



Mature larvae of the dark-sided cutworm, *Euxoa messoria* (Harris).

The dark-sided cutworm attains a length of about 1.5″, and is gray to greenish-gray in color, with irregular, longitudinal stripes. The white markings vary with individuals, but a white subspiracular stripe is characteristic. The head and cervical shield are brown with darker flecks. The dark setal bases and black-ringed spiracles are diagnostic. The surface of the body is not as granular as in the granulated cutworm, and the white markings and contrasting setal bases distinguish it from the greasy cutworm.

In central California larvae of this cutworm overwinter beneath debris, rocks, or other protected places. In addition, eggs probably overwinter in the soil. Damage to asparagus may start in April, and by mid-May a peak in damage is correlated with a preponderance of mature larvae. In most years damage to asparagus is over by mid-June and many larvae pupate in July. Adult emergence takes place from July to well into the fall of the year. Adults apparently lay their eggs in cultivated fields and larvae often feed on weeds. Crucifers such as wild radish are particularly selected. Some eggs hatch the same year, others overwinter.

Tests on Staten Island during 1955 involved a comparison of 12 different types of baits. Endrin, aldrin, heptachlor, dieldrin, and calcium arsenate were used in a base of bran, apple pomace, oil, and amyl acetate in comparison with a proprietary weevil bait containing 4.75% sodium fluosilicate. In replicated trials, endrin baits were found to kill more cutworms than the other baits and reduce damage from 12% to 0%. Endrin baits made at ¼%, ½%, 1%, and 2% indicated that a concentration between ½% and 1% was necessary in order to give an adequate control of cutworms. The

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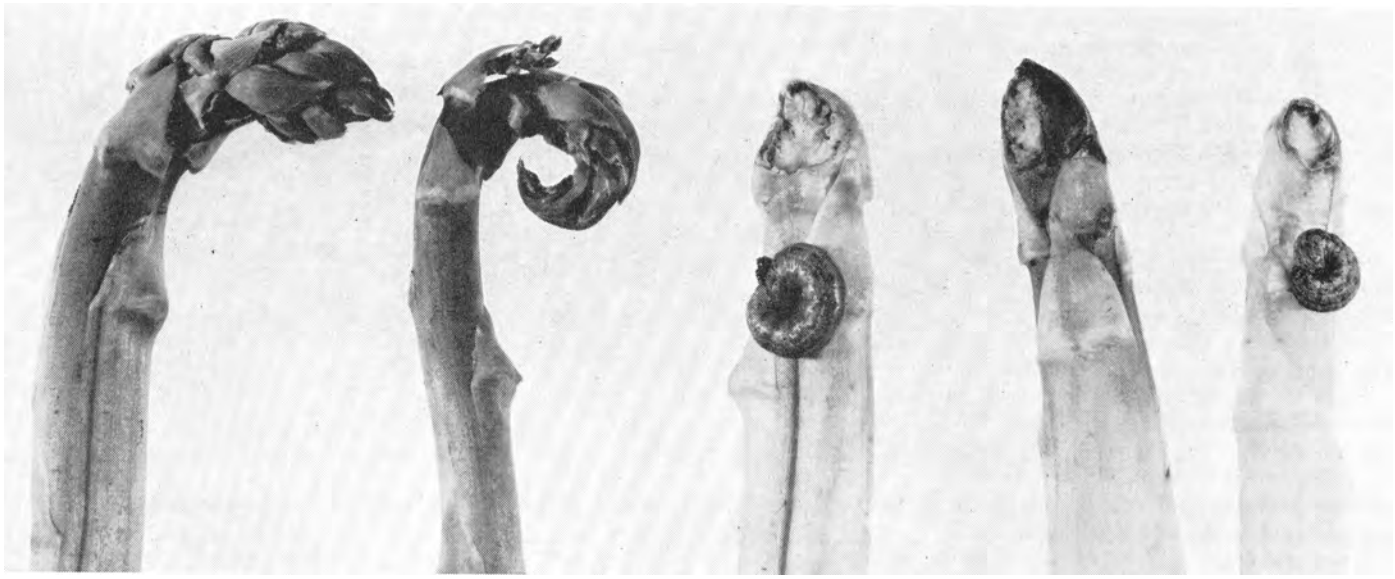
Dark-sided cutworms and damage to asparagus spears.



CUTWORMS

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effectiveness is based on contact action in addition to actual feeding.

In making the bait the apple pomace and bran were thoroughly mixed, the endrin added and mixed, then the oil and amyl acetate were sprayed into the dry ingredients as the entire mixture revolved in the mixer. When the oil was warmed a better coverage resulted.

Endrin Oil-base Bait Used in Control Experiments

Ingredients	Amounts/100 pounds bait
Endrin 75% W.P. (1% actual)	lbs. 1.33
Apple pomace	48.335
Bran	48.335
Oil (heavy grade spray oil)	2.00
Amyl acetate	50 ml

Asparagus culls dipped into a 2% endrin suspension also were effective in killing cutworms when scattered on the beds at the rate of 300 pounds per acre.

Tests on McDonald Island during 1956 indicated that baits and sprays of endrin, toxaphene, DDT, dieldrin and heptachlor were not too effective when used under cool conditions when the cutworms were not active. In other tests there were also indications that baits were not readily selected if the soil was too warm and the cutworms remained at a greater depth in the soil.

Commercial applications during 1957 demonstrated the value of a 0.75% endrin bait of the type used in the experiments. A bait was applied on May 10 at the rate of 40 pounds per acre by air to a field where 100% damage occurred. On May 16, a bed area 100′ long produced 67 dead worms, and only 1.2% damage to spears. In a second field 20 pounds per acre of the same bait was applied on May 15 in an area where 30%–40% damage occurred. On May 16 a total of 11 dead worms were found per 100′ of bed and damage dropped to 28%. Some of the damage occurred prior to use of the bait.

Apparently 20-40 pounds per acre of endrin oil-base bait will give good control and 4–5 days are necessary for complete kill.

Endrin baits are effective in controlling small darkling ground beetles—*Blapstinus* spp.—in asparagus. In addition, they have been used effectively in the control of cutworms and darkling ground beetles affecting seedling corn, sorghum, tomatoes, and other vegetable and field crops.

Endrin baits should not be used around leafy vegetables and should be used in all cases in such a way as to avoid contamination of plant parts. If used properly no residues should occur on edible portions of vegetables.

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WATER

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quantity of water used. This fundamental distinction between the price components gives rise to numerous possible lines of economic influence. The specific nature of that influence will be governed to a large extent by the relative magnitude of the components of the payment complex. Such a case may be exemplified by an instance of development activities that provide a water supply suitable for agricultural use but where there are individuals within the service area who—although they do not use directly the water provided by the developing agent—are subject to assessment. Any shift of the incidence of the total payment complex from individuals using water to those who do not use it, would represent an economic advantage to the users.

The nonprofit nature of watershed organizations and irrigation districts means that in any one season the total revenue target can be fixed on the basis of estimated expenses for the following year, capital allowance, and other pertinent financial obligations. If that part of the total revenue represented by tolls and assessments is considered as a fixed amount for a given season, increase in the total receipts from sales will reduce the total receipts from assessments.

More particular types of economic effects may be defined. For example, economic advantage for a water using group which has alternative supplies available would result from a large assessment component so long as the total payment complex was less than the variable cost of an equivalent supply. If the total complex were greater than the cost of alternative supply, however, a high fixed cost component would constitute an economic detriment in that the decision on the part of the water user will be made on the basis of the size of the relative variable costs entailed in obtaining water from both sources.

The payment complex is appropriately constituted to be used as an allocating device. Individual decisions about water use will be based on the variable costs. The relevant variable costs will depend upon the nature of the decision, the planning horizon of the individual involved, the physical relationships entailed in the water use contemplated, and their changes over time.

On the other hand, the fixed cost component of the payment complex is suited to provide a source of revenue. Assessments are designated on a property value basis and, in general, do not affect water use.

In a sense, the total payment complex has components that enable it to be purposefully used in allocating water as well as an instrument of revenue.

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LILIES

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forcing trials. The following season it was tested in the field. Two years after the first successful trials a schedule of hot water treatment and dipping in PCNB-ferbam was widespread among field growers of lilies. Approximately 90% of Easter lily bulbs planted on the northwest Pacific Coast for the 1956–1957 season were dipped, the majority in PCNB-ferbam. Where treated bulbs were planted in clean soil, the plants were more vigorous, retained their green color after flowering, basal roots survived, and the harvested bulbs were white rather than yellow.

At the end of 1956 a few bulbs derived from the treated bulb scales were large enough for a preliminary forcing trial. In a commercial greenhouse 7″ bulbs averaged more than four flowers, 8″ bulbs more than five, and 9″ bulbs more than six. The color and form of the foliage and the freedom from leaf scorch were outstanding. Commercial bulbs of equivalent sizes gave at least one flower less.

A comprehensive forcing trial is continuing to check the preliminary results. The continuing trial includes comparisons between relatively pathogen-free Croft and Ace stocks and commercial stocks, including the healthiest available and others carrying such an amount of disease as was common two or three years ago.

The improvement in field-grown Easter lilies already attained has been such that it was easier to find the better stocks for the test than it was to find stocks considered average or typical a few years ago.

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