Nurserymen or growers who qualify under state regulations can purchase budwood from the foundation block trees to establish a nursery increase block or certified block. Trees from these blocks that pass another rigorous testing program then can be registered and used by nurserymen as sources for growing their own certified stock. These young trees bear the desirable characteristics of their variety and are free of known virus diseases and of the stubborn disease pathogen. California's growers now can order trees derived from Lindcove propagations from several nurseries.

During 1974, more than 385 trees were maintained in the primary foundation blocks at Lindcove. The protected foundation block in the screenhouse at Riverside provides an additional backup source of prime budwood. Other field plantings maintained in the CVIP today include hybrid, nucellar, and long-term index blocks, three blocks for testing latency and field spread of stubborn disease, two blocks to evaluate virus-free Meyer lemons CVI 319 and 333, and a block for testing virus tolerance of CVIP rootstock materials. Seven new selections were added to the program during 1974. All seven of these selections previously had been infected by virus before its elimination by the heat therapy method developed through the CVIP.

Quarantine regulations recently have been revised to permit the growing of the CVIP-developed, virus-free "Improved Meyer lemon" in all parts of California. Budwood of Improved Meyer lemon was developed as a long-range protection measure for the citrus industry. It is intended to replace the Meyer lemon trees found today in backyards throughout the state. This backyard ornamental is a "Typhoid Mary" of citrus, known to carry tristeza and other diseases which pose potential threats to the state's commercial citrus industry. The CVIP is now trying to introduce the virus-free improved variety. Ultimately, as the Improved Meyer lemon becomes readily available, legislation may be enacted making it illegal to grow the virus-infected variety. That is the hope of the CVIP committee.

Most of the program's indexing or screening procedures for virus and mycoplasma diseases are conducted in the semi-isolated facilities in Riverside. In addition to this indexing work, maintenance of foundation trees, and distribution of prime budwood to the industry, CVIP scientists have conducted research aimed at increasing the efficiency of indexing procedures. Also, new methods for eliminating viruses in citrus have been developed. Use of these new and improved methods has resulted in greater program efficiency and more and better citrus budwood sources for the industry.

A recently-developed short-term greenhouse index for cachexia disease is now being used, for example, while the long-term field test is being phased out. A new leaf punch disc method of indexing for tristeza also is now being used routinely, resulting in a considerable saving in time and greenhouse space.

Citrus material produced by heat therapy, nucellus tissue culture, and shoot-tip graft techniques continue to provide virus-free clones not previously available. Recent CVIP research findings indicate that the pathogens of stubborn disease, tristeza, psorosis, and exocortis can be eliminated from citrus tissue by shoot-tip grafting. These findings are encouraging, because the CVIP researchers have found exocortis and stubborn diseases difficult to eliminate by heat therapy. Also, these techniques have made importation of foreign citrus clones practical.

Because disease prevention is never as dramatic as its cure, the CVIP and its accomplishments through the years have rarely drawn headlines or industry recognition. Yet, without the CVIP, California's citrus industry today might well be sharing the plight of several other major citrus-producing areas of the world that face disaster in the coming decade because they have no similar program under way.

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CABBAGE LOOPER CONTROL ON SEEDLING LETTUCE

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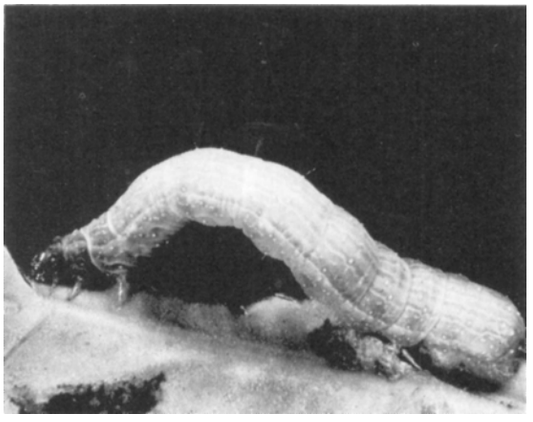

Cabbage looper

In the Imperial Valley, populations of the cabbage looper, *Trichoplusia ni* (Hubner) (photo) often build up on cotton and gradually spill into seedling lettuce in the fall. Looper infestations in lettuce are so heavy some years, that lettuce production would be in jeopardy unless efficiently controlled. Good insect control on lettuce is even more important because of increasing demands from the consumer for produce free of insect damage and debris.

Several insecticides such as parathion, malathion, Perthane and Phosdrin gave excellent control of the cabbage looper in the past. Over the years, however, resistance in the looper has been spectacular, and the control they now provide is poor. For this reason, new insecticides must be tested continuously.

During the fall of 1974 a series of tests was conducted in the Imperial Valley for cabbage looper control on seedling lettuce. The purpose of these tests was to obtain information on the performance of available insecticides and also to develop information on potential insecticide materials under Imperial Valley conditions.

All materials tested were applied with a hand sprayer equipped with a compressed CO_2 cylinder to provide a constant 40 psi. This sprayer was calibrated to discharge material at the rate of 15 gallons per acre. Each plot was two beds wide (40-inch bed spacing), 100 feet long, and replicated four times in a randomized complete block design. The rates of applications are described in tables 1 through 3 which show the comparative effectiveness of the insecticides used against cabbage looper in this test.

Of the newer experimental compounds still under development by industry, the performance of two synthetic pyrethroids, FMC 33297 and FMC 37400, was excellent at rates of 0.10 ai per acre both in terms of larval kill and persistence of activity. (See table 1.) The performance of Orthene, a new material that may be available to lettuce growers this coming season, also was excellent, exceeding 80 percent control of loopers each time it was applied. (See tables 1 and 3.) Thuricide and combinations of methomyl and thuricide — materials that now are available for use by lettuce growers — also gave excellent control of cabbage looper. (See table 2.) Phosvel, Kryocide, Thiodan, and RH 218 gave mediocre results when tested against looper larvae. (See tables 2 and 3.) Poor control was obtained with Phosdrin, Biotrol, N2596 and CGA 18808 in the same tests.

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The insecticides Orthene, Thuricide, methomyl + Thuricide and two synthetic pyrethroids, FMC 33297 and FMC 37400 yielded more than 80 per cent control of the cabbage looper in Imperial Valley.

TABLE 1. CABBAGE LOOPER CONTROL WITH PYRETHROIDS

Treatment	Formulation	Ai/Acre (lb)	Mean no. of Loopers/replicate* 2 days	8 days	14 days	22 days
FMC 33297	0.8 EC	0.025	93.0 bc	69.3 d	74.8 c	
FMC 33297	0.8 EC	0.050	105.3 bc	63.5 cd	52.8 bc	
FMC 33297	0.8 EC	0.10	96.5 bc	40.3 bc	30.5 ab	
FMC 37400	0.8 EC	0.025	113.8 cd	70.8 d	60.3c	
FMC 37400	0.8 EC	0.050	97.8 bc	38.5 b	18.8 a	
FMC 37400	0.8 EC	0.10	86.8 bc	22.0 ab	8.8 a	17.8 a
FMC 33297	4.0 EC	0.025	83.5 bc	45.3 bc	29.3 ab	
FMC 33297	4.0 EC	0.050	73.8 bc	30.8 b	24.3 a	
FMC 33297	4.0 EC	0.10	82.3 bc	38.0 b	28.8 a	
FMC 33297	25 WP	0.05	93.5 bc	74.8 d	61.0 c	
FMC 33297	25 WP	0.10	66.3 b	41.5 bc	28.8 a	
Orthene	75 WP	1.0	21.8 a	5.8 a	12.8 a	5 a
Untreated Check	—	—	148.3 d	136.5 e	134.0 d	32 3 b

*Means followed by the same letter are not significantly different at the 5 percent level (Duncan's multiple range test).

TABLE 2. CABBAGE LOOPER CONTROL ON LETTUCE

Treatment	Ai/Acre (lb)	Mean no. of loopers/replicate* 2 days	6 days	12 days
Thiodan	1.0	15.0 a	26.0 b	8.5 ab
Phosdrin	1.0	41.0 b	45.8 c	30.0 c
Methomyl (Lannate— Nudrin)	0.45	13.5 a	16.8 ab	15.5 b
Phosvel	0.50	35.5 b	23.8 ab	12.8 ab
Thuricide	0.50	49.0 b	15.3 ab	7.3 a
Methomyl + Thuricide	0.45 + 0.50	15.5 a	11.8 a	5.5 a
Untreated Check	—	41.8 b	47.8 c	36.0 c

*Means followed by the same letter are not significantly different at the 5 percent level (Duncan's multiple range test).

TABLE 3. CABBAGE LOOPER CONTROL ON LETTUCE

Treatment	Ai/Acre (lb)	Mean no. of loopers/replicate* 3 days	10 days	14 days	18 days
RH 218	0.5	22.8 ab	9.0 ab	10.8 ab	
RH 218	1.0	21.8 ab	10.3 ab	10.3 ab	
N 2596	1.0	54.0 cde	22.5 bcde	25.5 bc	
CGA 18808	0.5	68.5 e	34.0 e	33.3 c	
Kryocide	6.0	29.5 b	18.0 abcd	19.0 bc	
Phosvel	0.5	34.8 bc	16.0 abc	10.5 ab	
Orthene	1.0	4.8 a	3.3 a	0.8 a	7.3 a
Biotrol	1.0	58.8 de	28.8 cde	36.5 c	
Biotrol + Nufilm 17	1.0 + 1 pt	42.0 bcd	31.8 de	36.3 c	
Untreated Check	—	52.0 cde	26.8 cde	34.0 c	43.5 b

*Means followed by the same letter are not significantly different at the 5 percent level (Duncan's multiple range test).