

LEAF MINERS STILL A PROBLEM IN SOME GREENHOUSES

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Leaf miners seem to be one of the most difficult insects to control in the greenhouse. They can cause severe physical as well as esthetical damage by producing tiny mines in the leaves of crops, rendering the leaves of such crops as chrysanthemums unsightly (Figure 1).



Figure 1. A bench of chrysanthemums badly infested with leaf miner.

There are four stages in the life cycle of the leaf miner. In the first stage the egg is deposited between the upper and lower leaf cells causing yellowish spots (Figure 2). The second stage, larval, (Figure 3) hatches from the eggs and feeds within the leaf, forming the unsightly mines (Figure 4). The pupal, or third stage, is the changing of the larvae to the adult stage. Finally the last stage, adult, is a small black

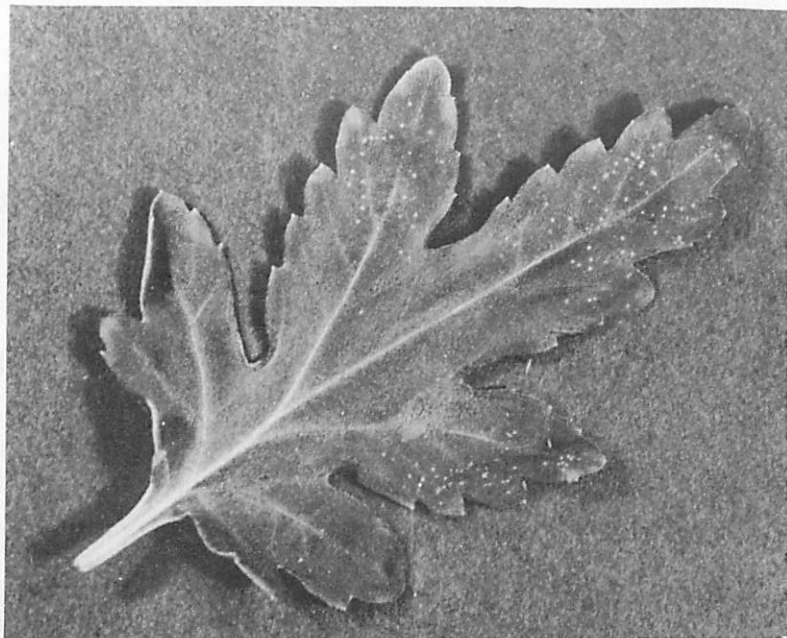


Figure 2. Leaf miner ovipositor spots.



Figure 3. A leaf miner larva exposed by removing the upper epidermis.

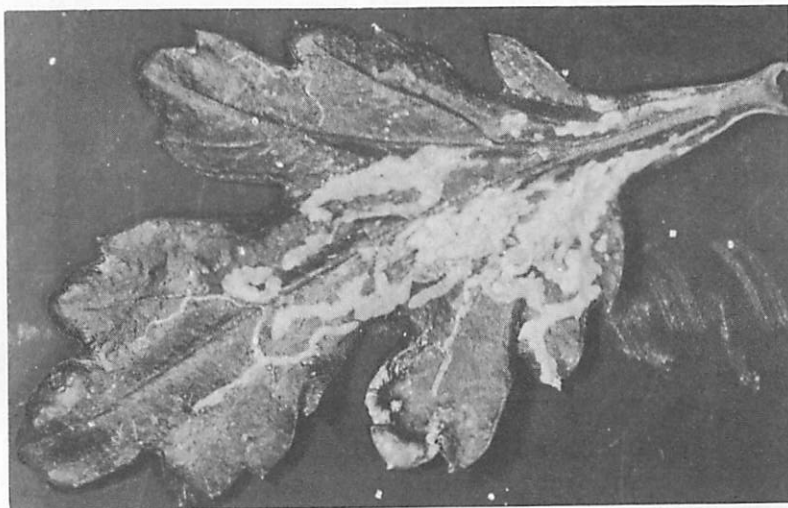


Figure 4. Extensive mines of the chrysanthemum leaf miner.

fly that is responsible for laying new eggs in the leaf, thus continuing the whole cycle. The total life cycle is approximately 28-30 days.

A persistent pesticide program should be followed if good control is to be expected. Vapona fogging and Temik used in combination have given generally complete insect control on chrysanthemums. Some growers have reported resmethrin as giving good control of the adult flies. Additional chemicals reported to give control have been: Vydate, Diazinon and a new pyrethroid called permethrin.

SPACE OCCUPIED BY POTS IN
SQUARE AND DIAGONAL PATTERNS

Spacing on Center	o o o		o o o	
	Square	o o o	Diagonal	o o o
	o o o		o o o	
	Space Occupied sq. in.	Number per 100 sq. ft.	Space Occupied sq. in.	Number per 100 sq. ft.
3 in.	9	1600	7.8	1848
4	16	900	13.9	1039
5	25	576	21.6	665
6	36	400	31.2	462
7	49	294	42.4	339
8	64	225	55.4	260
9	81	178	70.1	205
10	100	144	86.6	166
11	121	119	104	137
12	144	100	125	115
13	169	85	146	98
14	196	73	170	85
15	225	64	195	74
16	256	56	222	65
18	324	44	281	51
20	400	36	346	42
22	484	30	419	34
24	576	25	499	29

AREA OCCUPIED AND SPACING DISTANCES
BASED ON THE NUMBER OF POTS PER SQ. FT.

Pot Density per Sq. Ft.	Space Occupied Sq. In.	Distance on Center	
		Square Spacing o o o o o o o o o	Diagonal Spacing o o o o o o o o o
10	14.4	3.8"	4.4"
9	16	4	4.6
8	18	4.2	4.9
7	20.6	4.5	5.2
6	24	4.9	5.7
5	28.8	5.4	6.2
4	36	6	6.9
3	48	6.9	8
2.5	57.6	7.6	8.8
2	72	8.5	9.8
1.8	80	8.9	10.3
1.6	90	9.5	11
1.4	103	10.1	11.7
1.2	120	11	12.6
1.1	131	11.4	13.2
1	144	12	13.9
4/5	180	13.4	15.5
3/4	192	13.8	16
2/3	216	14.7	17
1/2	288	17	19.6