FUMIGATION OF WESTERN FLOWER THRIPS USING BANANA BAGS (POLYETHYLENE-D) DURING SIMULATED SHIPMENT OF CUT FLOWERS

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Presently U. S. flowers are receiving premium prices on the Japanese market relative to domestic U. S. prices. Yet flower importation is restricted by the Japanese government, which demands that all plant material entering Japan be free of insects, either live or dead.

For California flower growers, controlling all of the insects on flower crops is very difficult. Western flower thrips, in particular, is difficult to control because it feeds in protected areas, such as partially opened buds or unfolded leaves. This complicates control due to the inaccessibility of those hiding sites. Furthermore, insecticides used to control thrips are not completely effective due to resistance and other factors.

This study attempted to determine the effectiveness of controlling thrips during stimulated shipment by wrapping the flowers with a commercially available polyethylene bag (banana bag) containing 1% chlorpyrifos (Polyethylene-D). Chlorpyrifos is volatile and its fumes should penetrate the flowers and kill the thrips.

MATERIALS AND METHODS

Experiment 1. A study to determine phytotoxicity of the fumigation treatment during a simulated shipment was set up. Three treatments were used: (1) Flowers wrapped in Polyethylene-D, boxed, and stored at approximately 1°C; (2) Flowers without Polyethylene-D boxed, and stored at approximately 1°C; and (3) Flowers wrapped in Polyethylene-D, boxed, and stored at room temperature (20°C).

Each day, for three days, one flower of each variety was taken out of the boxes, examined for phytotoxicity, and placed in vases for observation. Eight varieties of carnations ('Improved New Pink Sim', 'Lena', 'Tango', 'Chianti', 'Improved White', 'Lareve', 'Lavender Lace', and 'Vanessa'), three varieties of roses ('Riva', 'Sonia', and 'Bridal White') and the gypsophila variety 'Bristol Fairy' were used in the experiment.

Experiment 2. Thrips-infested 'Improved Red Sim' carnations were harvested from a greenhouse. The average number of thrips present before treatment was determined from 20 flowers selected at random. In order to determine the effects of the fumigant, sixty carnations were wrapped in Polyethylene-D and placed in a flower box at approximately 1°C. Another sixty carnations were wrapped in an ordinary polyethylene dry-cleaning bag with 1/2 inch holes cut into it to increase air circulation (similar to the Polyethylene-D bags). These were also boxed and held at approximately 1°C.

Twenty flowers were removed every 24 hours for 3 days from each box and thrips in each flower were extracted and counted. To count thrips, each flower was removed from the stem and the calyx was removed so the petals became separated. The petals were placed in a specially designed thrips-separating can. A 5-pound coffee can was divided by a wire mesh that allowed thrips to be separated from the flower petals. A thrips irritant, iso-butyl ketone forced the thrips off the petals in one compartment of the can.

The thrips then could be collected in the other compartment, shaken out, and counted on a white sheet of paper.

RESULTS

Experiment 1. No phytotoxicity was observed throughout the experiment on any variety. Vase lives of refrigerator-stored fumigated and unfumigated flowers were identical, averaging 10 days for the carnations and gypsophila and 6 days for the roses.

Experiment 2. Thrips counts are presented in Tables 1 and 2.

Table 1. Mean number of thrips per carnation flower after 1, 2, or 3 days of treatment.

Days of Treatment	Polyethylene-D	Untreated
0 (precount)	--	3.05 --
1	0.65	1.40
2	1.70	2.80
3	1.45	2.45

Table 2. Mean number of thrips per carnation flower over entire experiment.

Treatment	Thrips numbers*
Polyethylene-D	1.28 a
Untreated	2.20 b

*Treatments significantly different at the 1% level using L.S.D. mean separation.

DISCUSSION

Polyethylene-D fumigation during refrigeration reduced the numbers of thrips present on carnation flowers, by approximately 50%. Complete control of thrips was not achieved under these conditions possibly due to the high thrips numbers at the beginning of the experiment. It is conceivable that with lower numbers of thrips, this technique may prove more efficacious.

There are several merits of this approach. First, there are no wet sprays involved or associated calibration and

mixing inconveniences. Second, the active ingredient, chlorpyrifos (Dursban), is registered for a variety of pests on a wide range of floricultural crops. Third, no phytotoxicity was observed on selected rose varieties. This is significant since other formulations of chlorpyrifos have traditionally caused phytotoxicity to roses. Lastly, the cut flowers can be wrapped with the Polyethylene-D bags at the time of boxing, thus eliminating costs for additional applications and handling.

Note: Polyethylene-D bags presently are not registered for use on flower crops.