## *CHEMICAL CONTROL OF THE LEAFHOPPER* (EMPOASCA FABAE (*HARRIS*)) *ON SNAP BEANS*[1]

The leafhopper, *Empoasca fabae* (Harris), is one of the limiting factors in bean production, particularly in hot dry areas. This insect sucks out the plant juices by feeding on the lower side of bean leaves. It causes direct feeding damage to the phloem and xylem vessels, thus interrupting the effective translocation of nutrients. This damage reduces the general plant vigor, thus affecting its growth and therefore its potential production. The purpose of the experiment reported herein was to compare some of the newer insecticides for the control of this leafhopper species.

Field tests with snap beans var. Wade were conducted at the Isabela Agricultural Experiment Substation farm. The beans were planted 12 inches apart within the row and 3 feet between rows on April 26, 1973. Each plot consisted of 2 rows 20 feet long. Foliar treatments using the following insecticides were applied from May 21 to June 12, 1973: Diazinon AG-500 (1 pt/acre), Dimethoate 2.67E (Cygon) (1 pt/acre), and Azinphosmethyl 2E (Guthion) (2 pt/acre) at 4- and 8-day intervals; and Acephate 75S (Orthene) (1⅓ lb/acre) and Methamidophos 4E (Monitor) (1 pt/acre) at 4-day intervals. Carbofuran 10G (Furadan), at the rate of 20 pounds per acre, was applied by hand a week after planting as a side-dress application, 5 inches from the plants on one side of each row. The other insecticides were applied in water at the rate of 100 gallons per acre with a 5-gallon knapsack sprayer. These tests were replicated 4 times and arranged in complete randomized blocks. The plants were watered and fertilized to keep them in good growing condition.

Leafhopper nymphs were counted June 7, 1973 on 10 bean leaves per plot. General plant vigor was measured by using a 1 to 5 relative scale, where 5 represented the most vigorous plants and 1 the least. Yields were recorded weekly from June 20 on for 5 consecutive weeks, and the data statistically analyzed.

Leafhoppers were the predominant insects in the plots. Other bean insects were not present in economic numbers. Yield and value differences were assumed therefore to be due largely to the damage caused by the leafhopper *Empoasca fabae* and possibly to some growth stimulation resulting from the use of organic phosphate and carbamate systemic insecticides. All insecticidal applications resulted in excellent control of the leafhopper as compared with the untreated plots (table 1). The average rating of the plants varied from 1.25 (poor) for the untreated plots to 5 (most vigorous) for applications of Carbofuran. Methamidophos and

[1] Manuscript submitted to Editorial Board May 9, 1974.

Dimethoate followed Carbofuran in so far as the general appearance of the plants.

No phytotoxicity was observed following application of any of the chemicals tested.

Results indicate that Carbofuran was most effective in preventing reduction of snap bean yield although applied but once. Yield increases in the treated plots varied from 22 percent for Azinphosmethyl to 94 percent for Carbofuran as compared to the untreated plots. The results with Carbofuran agree with those reported by Hofmaster.[2] Acephate and Methami-

TABLE 1.—*Evaluation of insecticides for leafhopper control on "Wade" snap bean*

| Insecticide | Rate/Acre | Frequency[1] | Leafhopper nymphs per 10 leaves per plot | Rating[2] | Yield/plot | Yield and value per cuerda | |
|---|---|---|---|---|---|---|---|
| | | | *Number* | | *Pounds* | *Cwt* | *Dollars* |
| Diazinon AG-500 | 1 pt | 4 days | 0.00 | 2.25 | 24.72 | 87.15 | 1,220.10 |
| Diazinon AG-500 | 1 pt | 8 days | .00 | 3.00 | 28.65* | 101.00 | 1,414.00 |
| Dimethoate 2.67E | 1 pt | 4 days | .00 | 3.00 | 29.67* | 104.60 | 1,464.40 |
| Dimethoate 2.67E | 1 pt | 8 days | .00 | 3.75 | 29.20 | 102.94 | 1,441.16 |
| Azinphosmethyl 2E | 2 pt | 4 days | .25 | 3.00 | 26.40 | 93.07 | 1,302.98 |
| Azinphosmethyl 2E | 2 pt | 8 days | .25 | 3.00 | 22.57 | 79.57 | 1,113.98 |
| Acephate 75S | 1⅓ lb | 4 days | .00 | 3.00 | 31.25** | 110.17 | 1,542.38 |
| Methamidophos 4E | 1 pt | 4 days | .25 | 3.75 | 30.50** | 107.52 | 1,502.28 |
| Carbofuran 10G | 20 lb | 1[3] | .00 | 5.00 | 36.10** | 127.27 | 1,781.78 |
| Control | | | 21.17 | 1.25 | 18.60 | 65.57 | 917.98 |

[1] Applied from May 21 to June 12. Those at 4- and 8-day intervals received 4 and 6 applications, respectively.

[2] Five represents the most vigorous plants and 1 the least vigorous.

[3] One application one week after planting.

* Significant at the 5-percent level.

** Significant at the 1-percent level.

dophos followed Carbofuran in yield; however, permits have not been issued for use of these three insecticides for beans. Yields from the Carbofuran-treated plots were highly significant ($P < 0.01$) when compared with the yields of the Diazinon-treated plots at 4-day intervals, with those of the Guthion-treated plots at 8-day intervals, and with those of the untreated-plots. Yields from plots treated with Acephate and Methamidophos also were highly significant ($P < 0.01$) when compared with those of the untreated plots. However, all the treatments were significantly superior to the check.

[2] Hofmaster, R. N., Soil systemics for bean insect control, The Vegetable Growers News, Norfolk, Virginia, 27(10): 1, 1973.

The increase in yield value per acre fluctuated from $863.8 with the Carbofuran treatment to $196.0 with the Azinphosmethyl treatment. This exceeds the total treatment cost per acre. Although Azinphosmethyl and Diazinon were less effective in increasing yield than the other insecticides they increased the value of the yield considerably when compared with the unsprayed check.

*Carlos Cruz*
*Isabela Substation*