

**Populations of the Sweetpotato Whitefly on Cotton Grown  
in Open-top Field Carbon Dioxide-enrichment Chambers**

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Summary

Enrichment by carbon dioxide did not affect the rate of sweetpotato whitefly increase on cotton.

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Atmospheric carbon dioxide levels are rising from the current ambient level of ca 350 ul/liter to 500-600 ul/liter projected for 50- to 75-years hence. In addition, plant scientists are enhancing the CO<sub>2</sub> environment to increase photosynthesis which is currently limited by inadequate levels of CO<sub>2</sub>. There are many questions as to how increases of CO<sub>2</sub> might affect other organisms. The growth and feeding response of the soybean looper, Pseudoplusia includens (Walker), to soybeans grown in controlled carbon dioxide atmosphere was studied by Lincoln et al. (1984). Larvae fed at increasingly higher rates on plants from elevated carbon dioxide atmospheres, suggesting that the impact of herbivores on their host plants may increase as the level of atmospheric carbon dioxide rises. During 1984 we sampled sweetpotato whitefly, Bemisia tabaci (Genn.), populations in field plots of cotton with elevated levels of carbon dioxide.

Cotton (Gossypium hirsutum L., cv. Deltapine 61) was grown in 3 x 3 m field plots planted in 1 m rows at Phoenix, AZ. The treatments consisted of dry and wet irrigations each with 2 replications with an open plot and with 3 plots enclosed with 2 m high open-top chambers with ambient air or concentrations of 500 and 600 ul/liter of CO<sub>2</sub>. At weekly intervals, 10 ml Vapona in a large petri dish with a napkin wick was placed in each blower cabinet supplying air and CO<sub>2</sub> to the enclosed plots. The irrigation treatments were made at 3-week intervals for the dry treatment and at 2-week intervals for the wet. Traps of 15 x 15 cm yellow cardboard sticky coated on both surfaces were impaled on plant stakes, placed at the top of the cotton plant canopy, and exposed for 3-day periods each week.

Trapping started on June 1 and only an occasional whitefly was caught for several weeks. Populations began to increase in all plots in mid-July and the three-week over-all 3-day average went from 0.8 whitefly adults on July 20 to 296.4 for September 21 (Table 1). This rate of increase, in spite of weekly Vapona treatments, was very similar to that observed on sticky traps and in vacuum samples at several locations in 1982 (Butler and Henneberry 1983). The rates of increase for the individual treatments were similar, indicating that the CO<sub>2</sub> enrichment did not affect the rate of sweetpotato whitefly increase.

**Table 1. Three-week average number of sweetpotato whitefly adults collected in 3-day periods in cotton with different irrigation and CO<sub>2</sub> treatments, Phoenix, AZ, 1984.**

Date	W E T				D R Y				AVER
	Open	Amb	500	650	Open	Amb	500	650	
July 20	0.8	1.5	0.3	0.2	2.7	0.7	0.3	0.2	0.8
Aug. 10	7.3	5.2	5.3	5.2	9.5	4.8	6.2	4.3	6.0
Aug. 31	57.5	20.3	23.2	19.5	41.5	36.8	26.2	30.2	31.9
Sept. 21	355.8	281.8	270.7	280.7	299.0	305.2	301.5	276.2	296.4

Literature Cited

Butler, G. D., Jr., and T. J. Henneberry. 1983. Sweetpotato whitefly, Bemisia tabaci, 1982 research results. Ariz. Agr. Expt. Sta. P-59:113-116.

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