

Research Note

EFFECT OF SOIL MULCHES ON LEAFHOPPER (*Empoasca* spp.) POPULATION AND ON DRY BEAN YIELD¹

Aluminum foil soil mulches have been found to repel aphids and to reduce the incidence of virus diseases. Toscano et al.² reported that reflective foil mulches greatly reduced the number of aphids on summer squash, and were extremely effective throughout the season in reducing the incidence of virus diseases by more than 90%. They found that the effect of mulching on yield was particularly evident in early harvest with 86% and 76% yield increases with aluminum foil and white plastic mulches respectively. Johnson et al.³ have reported similar protection of gladiolus from infection with cucumber mosaic virus. Shands and Simpson⁴ reported that aluminum foil mulches significantly reduced the number of buckthorn aphids and potato aphids on potatoes. Wolfenbarger and Moore⁵ observed that the mines caused by *Liriomyza* spp. and populations of the green peach aphid, as well as other aphid species were reduced in plots mulched with aluminum foil or with paper backed aluminum. Schoonhoven⁶ found that different types of soil mulches, except the black plastic, reduced the number of leafhopper on beans.

Leafhoppers are a major limitation for bean production in the tropics, particularly, during dry periods. Studies were undertaken to investigate the effect of different soil mulches on leafhopper population and on dry bean yield.

Treatments on carbofuran treated (2.2 kg a.i./ha) and untreated bean plots of variety Rayada (10m²) were as follows: 1) paraquat applied to weeds 14 days before planting; 2) black plastic; 3) silver plated plastic; 4) sugarcane straw and 5) clean cultivation used as check. Treatments were arranged in a randomized complete block design with four replicates. The plots were fertilized and irrigated as recommended for this crop in the area. Leafhopper nymphs were counted periodically on 10 bean leaflets

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² Toscano, N. C., Wyman, J., Kido K., Johnson, H. Jr. and Mayberry, K., Reflective mulches foil insects, California Agriculture 33 (7, 8): 17-9, 1979.

³ Johnson, G. V., Bing, A., and Smith, F. F., Reflective surfaces used to repel dispersing aphids and reduced spread of aphid-borne cucumber mosaic in gladiolus plantings. J. Econ. Entomol. 60:16-8, 1967.

⁴ Shands, W. A. and Simpson, W. G. Effects of aluminum foil mulches upon abundance of aphids on, and yield of potatoes in Northwestern Maine. J. Econ. Entomol. 65:507-10, 1972.

⁵ Wolfenbarger, D. O. and Moore, W. D., Insect abundances on tomatoes and squash mulched with aluminum and plastic sheetings. J. Econ. Entomol. 61:34-6, 1968.

⁶ Schoonhoven, A. V., Personal communication, 1977.

TABLE 1.—*Effect of soil mulches on populations of leafhoppers, Empoasca spp. and on yield of bean cv. Rayada, untreated and treated with carbofuran at 2.2 kg/ha, March–May 1977, Isabela*

Treatment	Leafhopper nymphs ¹		Yield ² (grams/plot)	
	Treated	Untreated	Treated	Untreated
Paraquat ³	1.7a ⁴	21.3ab	443.5a	346.2a
Clean soil surface	3.4a	22.8ab	732.7b	573.5b
Black plastic mulch	9.5b	24.6a	779.7b	677.7bc
Silver plated plastic mulch	4.8a	18.2b	819.0b	823.5c
Sugarcane straw	3.5a	18.2b	682.7b	678.7bc

¹ Mean (4 replicates) of all leafhopper nymphs found on 10 bean leaflets on 3 readings at different dates.

² Plot area = 10 m².

³ Applied 14 days before planting.

⁴ Values followed by one or more letters in common do not differ significantly at $P = 0.05$.

per plot. The dry bean was harvested and weighed. All the data were statistically analyzed.

Table 1 shows the results of this trial. The highest number of leafhopper nymphs was recorded on the black plastic mulch treatment. Populations in the silver plated plastic and sugarcane straw mulched plots were significantly lower than in the other treatments. Yields from the silver plated mulched plots were the highest; it was similar for both the carbofuran-treated and untreated plots, and significantly higher than yield from the clean cultivated treatment (plots not treated with carbofuran). Similar results were observed, to a lesser extent, with the sugarcane straw treatment, where yield from insecticide-treated and untreated plots was similar to the yield from clean cultivated, insecticide-treated plots. On plots mulched with silver plated plastic, factors (humidity, temperature) other than leafhopper damage apparently had a significant influence on yield of dry beans. Black plastic mulch failed to reduce leafhopper attack; nevertheless, it increased yields. Very low yield from paraquat-treated plots was probably due to heavy competition with weeds.

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