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MEASUREMENT AND INTERPRETATION OF LEAF WETNESS IN A BEAN CROP

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The initial objective of this experiment was to determine the duration of leaf wetness as a function of canopy architecture. Two dry edible bean (Phaseolus vulgaris L.) cultivars representing extreme contrasts in architecture were selected. One canopy (Great Northern Tara) was prostrate, dense, and vigorous; in contrast, a CIAT soybean type of architecture, A55, was a tall, upright canopy that left the soil between the rows exposed. Leaf wetness measurements were made in both canopies at 10 cm above the base of the plant and just above the A55 canopy. Both plots received the same amount of irriation.

Comparing visual inspections with the output from the leaf wetness sensors, it was obvious that the leaf wetness sensor (Weiss and Lukens, 1981; Weiss and Hagen, 1983) that worked well in alfalfa (Medicago sativa L.) did not work well in a row crop typified by dry edible beans. The sensor was modified by replacing the cotton cloth, which acted as an artificial leaf on the original sensor, with a real leaf. The petiole of the leaf was immersed in a sealed vial of distilled water and connected to the handle of the sensor while the leaf blade replaced the cotton cloth on the wire grid. Leaves used in this system lasted about 7 days before they had to be replaced. There was insufficient time during this field experiment to investigate different nutrient solutions or hormones that could extend the life of the leaves.

The A55 plot consistently had a greater duration of leaf wetness than the Tara plot. However, in the field, Tara has a higher probability of infection by the white mold fungus (Sclerotinia sclerotiorum [Lib.] de Bary) than the A55. Duration of leaf wetness can be a limiting factor in the infection and development of this disease. The differences in incidence of disease can be related to the leaf wetness mechanism in a canopy such as Tara. Dew forms on the leaves of the upper portion of the canopy that see the cool sky prior to sunrise under the proper conditions. As the leaves respond to the sun, they change leaf angle by approximately 180 degrees. The water on the blade of the leaf runs down the petiole and into the canopy. Measuring leaf wetness in this canopy with the sensor previously described is thus very difficult and may

lead to serious errors in estimating canopy wetness. Inside the dense canopy, water stays in the liquid state for longer periods than in an open canopy. The open A55 canopy allows many of the leaves to see the sky during periods of dew formation, as well as leaf drying. Differences in canopy architecture and leaf movement can explain the initially incongruous results of this experiment and give insight into the epidemiology of white mold disease of dry edible beans.

References

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AN APPROACH TO CONTROL OF BEAN GOLDEN MOSAIC VIRUS IN DRY BEANS (*Phaseolus vulgaris* L.)

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Bean golden mosaic virus (BGMV), transmitted by the white fly *Bemisia tabaci* (Genn.) is the main disease of dry beans in the south west of Goiás, Mato Grosso do Sul, the north of Paraná, and in some areas of Minas Gerais and São Paulo - Brazil, during the dry season plantings. The present study was conducted at the Federal Agricultural College at Rio Verde - Goiás, in 1982. The objective was to evaluate the use of tolerant cultivars and the chemical control of the white fly-vector as methods of control for BGMV.

The experiment was a split-split plot in a randomized complete block design with 3 replications. Treatments (sub-sub plots) consisted of 5 cultivars: Miranda 5 MDS/76, Carioca, Turrialba 1, G 02495 MDS/76, and G 02447 MDS/76; seed treatment (subplots): Carbofuran (Furadan 350F) at a rate of 460 ml a.i./100 kg of seed; and 0.1 or 2 foliar sprays (plots): Monocrotophos (Azodrin 60 CE) at a rate of 300 ml a.i./ha. Foliar sprays were applied at 30 and 50 days and symptoms evaluated at 60 days after planting, respectively. Symptoms were evaluated on a 0 to 5 scale (Manual de Métodos de Pesquisa em Feijão - EMBRAPA/CNPAF, 1976). The percentage of plants in each class of the scale was recorded and the disease index calculated as follow:

$$D.I.(\%) = \frac{\Sigma \text{ (Percent infected plants x Disease class)}}{5}$$