Effect of Temperature on Photosynthesis of Beans

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We have compared net CO_2 uptake rates during photosynthesis for several dry bean varieties. It has been found that, as compared with Perry Marrow, Red Kidney, Cornell 7-16 and Steuben, Michelite-62 exhibits approximately a 25% advantage in net CO_2 uptake at light intensities varying from 350 to 6500 foot candles. These data were obtained mostly from primary leaves but also from trifoliate leaves of young plants. Single intact leaves were sealed in a plexiglass leaf chamber and the CO_2 uptake was measured with an infrared CO_2 analyzer.

An interesting observation on the effect of temperature on photosynthesis of beans was made during the fall of 1965. Plants for the above study were growing in a quonset-type plastic greenhouse. The top of the house was covered with plastic but one end was covered only with saran screen and the steam for heating was off. Cool nights occurred frequently during late August. During the forepart of mornings subsequent to such cool nights, bean leaves were essentially incapable of performing photosynthesis. The ability to photosynthesize was slowly and gradually recovered through the course of the day so that by midafternoon CO_2 uptake rates were normal. Experiments with plants of both Michelite-62 and Red Kidney, that were kept overnight in cold storage chambers, indicate that night temperatures of 50° F are sufficiently low to drastically reduce photosynthetic activity during the forepart of the following day. Night temperatures of approximately 50° F are not uncommon for at least part of the growing season in many areas where beans are grown. If genetic variation with respect to this inhibition of photosynthesis by exposure to cool temperatures exists in beans, then it could be extremely beneficial in bean breeding to select genotypes whose photosynthesis and growth are least affected by the low temperature exposure.

Control of Halo Blight of Beans With Foliage Sprays

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Field tests were conducted in 1965 at the New York Agricultural Experiment Station, Geneva, N. Y., to determine the value of foliate sprays in controlling the spread of halo blight in plantings of infected bean seed lots and in protecting plants from disease-free seeds from the spread of halo blight from adjacent infected plots. The spray materials consisted of Agri-mycin 17 (Pfizer) at a concentration of 400 ppm of streptomycin, tribasic copper sulfate (Tennessee Corporation) at a rate of 2 pounds of Cu per acre, and NM-1 (Metalsalts Corporation), at 4 pounds per acre. The sprays were applied at a volume of 32 gallons per acre. Data on the incidence of seed-borne halo blight in the planting of infected seeds were taken before any spread of blight was observed. The spread of blight in the treatment plots was determined by counting the number of infected plants on successive dates. Yield data were taken by determining the weight of dry shelled beans from the treatment plots.