EFFECTS OF CO_2 LEVEL ON FRUITING AND SHEDDING

Gene Guinn

A greenhouse test was conducted to determine the influence of CO_2 level on growth, fruiting, and shedding. Two CO_2 levels were used, ambient (about 350 ppm) and high (about 1,000 ppm). DPL 16 plants were cultured in nutrient solutions and were harvested shortly after they started blooming.

High CO_2 increased plant size and number of squares/plant and decreased shedding (Table 3). These effects may have been caused by increased photosynthesis at high CO_2 level. Leaves are currently being analyzed for starch and sugar contents. Another possibility is that CO_2 antagonized the effects of ethylene and thereby decreased shedding.

Table 3. Influence of CO_2 level on fruiting, shedding, and fresh weight of cotton plants.

	1,000 ppm CO_2	Normal CO_2*
Node number of:		
First fruiting position	5.06	5.17
First square	5.77	6.48
Squares/plant	14.0	9.7
Blooms/plant	0.21	0.79
Percent shed	15.4%	29.7%
Fresh wt./plant	151g	105g

*About 350 ppm

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EFFECTS OF SPACING ON SUGAR AND ATP CONTENTS OF SQUARES AND BLOOMS

Gene Guinn

Tests conducted during 1970 failed to show significantly lower concentrations of sugars in leaves of close-spaced than in leaves of normally-spaced plants. Greenhouse and field tests were conducted during 1971 to see if spacing affects sugar and ATP contents of squares and blooms.

Through the courtesy of Drs. Buxton and Briggs and Mr. Patterson, blooms were collected 13 and 26 July from their plant population experiment on the University Farm in Phoenix. Sugars were separated and measured by gas chromatography; ATP was estimated by measuring the light emitted when mixed with firefly extract.

Bloom weights decreased as plant population increased. However, there was no evidence that close spacing decreased sugar or ATP contents of blooms. Conversely, there was some indication that ATP content of red blooms increased with increasing plant population.

Analysis of squares from greenhouse-grown plants likewise failed to show a consistent effect of spacing on sugar and ATP contents of squares. Although one would think that photosynthesis would be limiting in close-spaced plants, analyses of leaves (in 1970), squares, and blooms have failed to substantiate this idea.

A possibility not yet investigated is that ethylene accumulates in close-spaced plants and promotes shedding.

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EFFECTS OF LEVELS OF NITROGEN AND SULFUR ON GROWTH AND FRUITING OF CLOSE-SPACED PLANTS

Gene Guinn

High levels of nitrogen stimulate growth and may thus increase self-shading of close-spaced plants. A greenhouse test was conducted to determine the effects of two levels of N and S on growth and fruiting of close-spaced Hopicala cotton plants.

Nitrogen was supplied at 4 and 9 mM and S was supplied at 1 and 3.5mM as KNO_3 or K_2SO_4. The level of K was kept constant. Plants were harvested after they had set several bolls.

The low N-high S plants showed signs of N deficiency and had nearly reached "cut-out" when harvested as indicated by a low average number of squares and blooms. The high N- low S plants were still growing and fruiting. Low N decreased the number of fruiting positions formed, increased shedding, and decreased the weight of leaves plus stems, but increased boll weight (Table 4). The results of this test indicate that low N-high S decreased vegetative growth more than fruiting. Water was not limiting in this test because the plants were grown in nutrient solutions. Nitrogen level may be more critical in areas where cloudiness and rain are common than in dry areas and may also be more critical with close-spaced than with normally-spaced plants because of differences in light intensity.

Table 4. Influence of levels of N and S on plant size and relative fruitfulness of close-spaced plants.

	High N-Low S	Low N-High S
Number per plant of:		
Squares	3.64	0.16
Blooms	0.59	0.16
Bolls	4.42	3.26
Shed fruiting positions	7.09	3.78
Total fruiting positions	15.74	7.36
Percent shed	45.0%	51.4%
Fresh weights in g:		
Leaves plus stems	170.4	91.0
Bolls	57.1	71.0
Ratio of bolls to leaves plus stems	0.34	0.78
Stem height in cm.	120.4	82.1