THE DEVELOPMENT OF WILT IN A WILT-RESISTANT AND IN A WILT-SUSCEPTIBLE VARIETY OF COTTON AS AFFECTED BY N-P-K RATIO IN FERTILIZER

Abstract

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THE effect of potash applications to wilt infested soils has been shown by several workers, notably Young and others in Arkansas, to modify the development of wilt symptoms in cotton. The present experiment was designed to test under field conditions at Auburn, Alabama, the effect of various combinations of nitrogen, phosphorus, and potash on wilt-resistant and susceptible varieties of cotton. A complex factorial design involving a highly resistant and a very susceptible variety of cotton with three levels of nitrogen, three of phosphorus, and three of potash, was conducted on the same plot for 3 years. Fertilizers were applied at the rate based on 800 pounds of 6-8-4 per acre. These experiments have shown that the amount of wilt, as well as the yield of both susceptible and resistant varieties, were markedly affected by the different levels of nitrogen and phosphorus, as well as by potash, and that certain variety-fertilizer relationships are of interest and of practical agronomic importance.

In this brief discussion the effects of fertilizer upon wilt symptoms are confined largely to the amount of wilt which had developed at mid season (approximately July 15) since (1) in two of the seasons the wilt was so severe on Half and Half variety that there were few healthy plants remaining at the final count, and hence it was difficult to distinguish between certain treatments; (2) potash deficient plots had shed most of their leaves by the end of the growing season so that the detection of wilt symptoms was difficult; (3) it appeared that yield was more closely related to the amount of wilt which had developed by mid season than it was to that shown at the final count. However, it is interesting to note that the effects of certain fertilizer treatments upon wilt were accentuated as the season progressed.

The wilt was sufficiently severe in all three seasons to give excellent differentiation. It was apparent that in developing in 1938, but was especially early and severe in 1939. The amount of wilt in 1937 was high but significantly less wilt than did those receiving phosphorus. In none of the three years was there any distinction between the amount of wilt which had developed at mid season and appreciably less wilt at the final count than did the plots receiving no nitrogen. However, in 1938, the application of nitrogen gave a small but significant increase in the amount of wilt in the plots receiving nitrogen had about 50% more wilt than did those receiving none. In none of the three years was there any distinction between the amount of wilt in the 6% and 12% nitrogen treatments.

The effects of phosphorus were consistent for the three years. The plots which received none had significantly less wilt than did those receiving phosphoric acid. Peculiarly enough, the 8% phosphoric acid plots had slightly more wilt than did the 16% phosphoric acid plots in each of the three years, and this smaller difference was maintained for each of the varieties for the three years.

Potash had marked and consistent effects on the three seasons. There was a great difference in the amount of wilt between the no potash plots and the 4% potash plots. For the variety, Half and Half, potash gave continued benefits in reducing the amount of wilt over the 4% treatment. For the variety, Cook responded more readily to the intermediate 8% potash treatment than did Half and Half.

In considering a combination of any two fertilizers, the following N-P₂O₅ combinations in the order named gave the lowest amount of wilt: 0-0, 0-16, 0-4, 0-8, 6-0, 6-4, 6-8. The four combinations which gave the highest amount of wilt were 12-0, 12-8, 6-16, and 0-8. The four combinations which gave the lowest amount of wilt: 0-0, 0-16, 0-4, and 0-8. The four combinations which gave the highest amount of wilt were 12-0, 12-8, 6-16, and 0-8.