VIRGINIA

Irrigation with Balanced Fertilization Increases Corn Yields

By N.L. Powell

Water is a serious limiting factor for consistently good corn yields in southeastern Virginia. Even though the annual rainfall may average 48 inches, the rain generally does not come at the best times during the growing season to maintain optimum plant growth and development.

Coarse textured surface soils and acid subsoils are prevalent in the region, causing shallow root systems which result in plant water stress during dry weather. Consequently, rain-fed corn production is quite erratic from year to year. During an 8-year study at the Virginia Tech Tidewater Agricultural Research and Extension Center, rain-fed corn yields ranged from 50 to 160 bu/A, with a 110 bu/A average (see **Table 1**). Total fertilizer applied annually to these plots was 150 lb/A nitrogen (N), 75 lb/A P_2O_5, and 150 lb/A K_2O.

For high, efficient and consistent corn yields in southeastern Virginia, irrigation is a proven practice and must be used in conjunction with sound fertility management practices including micronutrients.

During the first four years of this same period, using subsurface microirrigation tubing buried 15-inches below each row (3 ft. spacing), between alternate rows (6 ft. spacing), or below each third row (9 ft. spacing) corn yields averaged 159, 149 and 145 bu/A for the three spacings, respectively. The total annual fertilizer applied to these plots was 250-75-150 (N-P_2O_5-K_2O). While yields were considerably better than the rain-fed corn, they were lower than desired or anticipated.

The only management change made in the second four-year period was to apply 2 lb/A boron (B)

TABLE 1. Corn yields at Tidewater Agricultural Research and Extension Center.

Year	Subsurface irrigation 3 ft.	6 ft.	9 ft.	Not irrigated
	Grain yield, bu/A			Grain yield, bu/A
1986	151	149	144	123
1987	170	149	144	50
1988	161	153	156	112
1989	155	144	136	155
4-year average	**159**	**149**	**145**	**110**
1990	195	188	188	117
1991	190	208	160	131
1992	190	169	161	160
1993	194	166	148	50
4-year average	**192**	**183**	**164**	**114**
Difference between 4-year averages	**33**	**34**	**19**	**4**

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to the irrigated treatments through the subsurface system. Boron was applied in four applications of 0.50 lb/A at weekly intervals in late May and early June. All other fertilizer and management practices remained the same. Average yields over the four years increased by 33, 34, and 19 bu/A for the three irrigated spacing treatments. This suggests that B may have been an important limiting factor in the first 4-year period. Further research is needed to confirm this response.

Subsurface microirrigated corn plots are shown here in Virginia research.

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Montana: Effect of Phosphorus Soil Test Level on Sorghum-Sudangrass Response to Phosphorus Fertilizer

Sordan 79 (sordan), an intraspecific sorghum-sudan hybrid, was the test crop in this greenhouse study. Three soils of different textures, cation exchange capacities, and calcium carbonate ($CaCO_3$) contents were used to test the response of sordan to phosphorus (P) applied to calcareous soils. Soil test P (bicarbonate-extractable) was adjusted to five initial levels, ranging from 2 to 60 parts per million (ppm). Fertilizer was applied at five rates, ranging from 0 to 80 lb/A.

Sordan response to P was linear at all soil test values below 30 ppm, but curvilinear above 30 ppm. However, soils with low soil test levels yielded less, even at the highest P rates, than those testing above 30 ppm and with no added P. Preplant and residual soil P levels increased with increasing P fertilizer rates. Researchers suggest that there are advantages associated with increasing bicarbonate-extractable P soil test values in those soils having excess $CaCO_3$ and pH values above 7.8. Maintenance applications of P appear to be necessary when P soil tests are 30 ppm or greater.

Note: A more detailed article on this subject will appear in a future issue.

Source: Bauder, J.W., S. Mahmood, B.E. Schaff, D.J. Sieler, J.S. Jacobsen, and E.O. Skogley. 1997. Agron. J. 89:9-16.