Impact of Multiple Stress Factors on Corn Yield Potential

Corn plants face multiple stresses throughout the growing season which can reduce yield potential. Some stresses may be avoided by proper planning, equipment adjustments, and timing of inputs.

Study Guidelines

A demonstration was conducted during 2012 at the Monsanto Learning Center at Scott, MS to evaluate the impact of multiple stress factors on corn yield potential in the southern United States. Factors evaluated are shown in Table 1.

Two corn products with different base genetics and relative maturities (RM) of 114 and 116 days were planted on March 17th, which is in the early part of the planting cycle for the latitude of Scott, MS. Each treatment was replicated twice.

Yield comparisons for each factor with and without stress are shown in Table 2. In addition, yield comparisons based on increases in the number of stress factors per plot are shown in Figure 1.

Table 1. Normal and stress factors evaluated in the trial: plant population, planting depth, fertility, and irrigation.

Factor	Management	
Plant Population	Normal	36,000 seeds/acre
	Low	31,000 seeds/acre
Planting Depth	Normal	2 inches
	Improper	1 inch
Fertility (Nitrogen N)	Normal	with 2 splits of 120 units each
	Late	delayed 10 days past normal with 2 splits of 120 units each
Irrigation	Normal	on time, as needed
	Late	10 days late

Results & Conclusions

All stress factors caused a decrease in yield when compared to normal management, with the exception of the late irrigation application. A higher yield was reported for the late irrigation application possibly due to the timing of rainfall events, i.e. the timely irrigation treatments received rainfall shortly after irrigation events which lead to an overwatering condition. Low planting population and late fertility decreased yield potential. The normal planting population out-yielded the low planting population by 22.6 bu/acre, and the normal fertility program out-yielded the late fertility by 18.9 bu/acre. Proper planting depth had the greatest influence on yield potential with a 58.2 bu/acre yield difference between the normal planting depth (2 inches) and the shallow planting depth (1 inch).

Table 2. Average yield (bu/acre) for each factor with and without stress.

Factor	Management	Yield (bu/acre)
Plant Population	Normal	195.7
	Low	173.1
Planting Depth	Normal	213.5
	Improper	155.3
Fertility (Nitrogen N)	Normal	193.8
	Late	174.9
Irrigation	Normal	181.6
	Late	187.1

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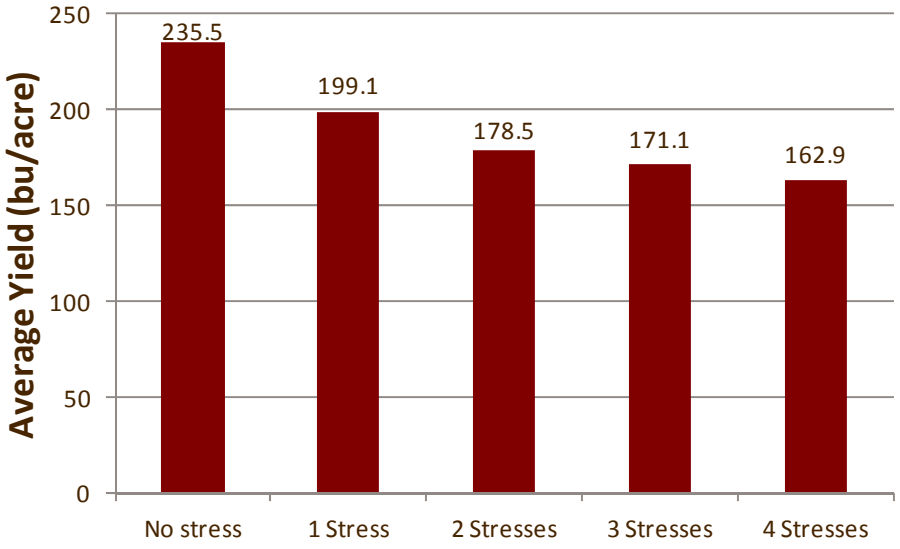
As the number of stress factors evaluated increased, the reported yield decreased (Figure 1). The plots with no stress had an average yield of 235.5 bu/acre. The addition of each stress caused incremental decreases in yield ranging from 7.4 bu/acre to 36.4 bu/acre. Plots that had 4 stress factors had the lowest average yield of 162.9 bu/acre.

This study reinforces the fact that multiple crop management decision making processes are essential to establish, maintain and preserve optimal yield potential. First, it is critical to make good, up-front decisions regarding corn product selection and plant population while setting a realistic yield goal. Second, properly adjusted equipment, that achieves the desired planting depth and consistency, along with equipment maintenance is essential to plant and establish correct populations. Third, small alterations in timing, such as late fertility applications, can have a negative impact on yield potential. If these factors do not adequately provide what is needed for optimal plant growth they can contribute to yield loss. This demonstration supports the premise that the additive effect of multiple stresses can have an additive effect on reducing corn yield potential.

Figure 1. Average yield (bu/acre) based on number of stresses.



The information discussed in this report is from a single site, one-year demonstration that was replicated twice. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

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