

**PROGRAMMED SOIL FERTILIZER RELEASE TO
MEET CROP NITROGEN AND POTASSIUM
REQUIREMENTS**

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Abstract

Managing cotton nitrogen (N) and potassium (K) needs has been a major research objective for cotton (*Gossypium hirsutum* L.) production for many years. New programmed released fertilizers are potentially safer, more efficient, and more environmentally friendly than conventional fertilizers but information is lacking for their utilization on cotton. Field plots were established on the Southeast Branch Experiment Station in Rohwer, Arkansas, and at the West Tennessee Experiment Station in Jackson, Tennessee. Programmed release N and K Meister materials were applied in-furrow (I-F) at planting in separate tests. Rates of application were established to be 100, 80 and 60 percent of the current N and K recommendations for each state. The research was conducted on a Hebert silt loam at Rohwer and on a Collins silt loam at Jackson. The experimental design was an RCB with treatments replicated six times on the Hebert soil and five time on the Collins soil. Programmed N was applied I-F at 110, 88, and 66 lbs/A on the Herbert soil and at 80, 64, and 48 lbs/A on the Collins soil. Programmed K was applied at 60, 48, and 36 lbs/A at both locations. Recommended fertilizer rates were broadcast in the control plots after planting at both locations as controls. The cultivar Suregrow 125 was planted 6 May at Rohwer while the cultivar D&PL 50 was planted 16 May at Jackson. Recommended production practices for each state were applied at the respective locations. Petioles from the uppermost fully-expanded leaves were sampled weekly beginning at pinhead square until four weeks after first flower and analyzed for N, P, and K levels. High and low soil temperatures were recorded daily during the growing season.

Lint yields from both locations were unaffected by N treatment. I-F applications of the lowest rate of the programmed Meister N, 66 lbs N/A on the Hebert soil and 48 lbs N/A on the Collins, produced yields comparable to applying 110 and 80 lbs N/A of conventional fertilizers to both soils, respectively. However, I-F applications of 60 lb K₂O as the programmed Meister K reduced yields at both locations relative to broadcasting the recommended rate. The reason for the reduction is not known, but it was not the result of reduced plant populations. Applying the lowest K₂O rate, 36 lbs as programmed K produced yields equal to those produced by conventional fertilizer K rates.

Germination and seedling emergence were not reduced from I-F applications of either Meister N or K, showing no harmful effects of the programmed materials. I-F applications of 60 percent of the recommended nutrient rates at planting produced yields equal to conventional N and K fertilizer rates. This greater nutrient efficiency would have less chance of early season leaching losses thus a smaller environmental impact relative to applying conventional fertilizers at planting and at recommended rates.