PROGRAMMED SLOW RELEASE SOIL FERTILIZER TO MEET COTTON 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 for cotton production. Research was established in 1996 and continued in 1997 evaluating Meister Programmed Release N (MPRN) and K (MPRK) fertilizers for cotton production to evaluate; their safeness, rates, and to compare with conventional N and K fertilizers. Field research was established in 1996 Rohwer AR and Jackson TN, evaluating both MPRN and MPRK. In 1997 MPRN was evaluated at Tifton GA, and St. Jospeh LA. The research was conducted on a Hebert silt loam in AR, a Tifton loamy sand in GA, a Mhoon loam in LA, and a Collins silt loam in TN. Application rates were established to be 100, 80, 60 and 40 percent of each state's N recommendation for cotton, except GA. MPRN application rates were 110, 88, 66, and 44 lb N/acre in AR; 90, 72, 54, and 36 lb N/acre in LA; 80, 64, 48, and 32 lb N/acre in TN; and 88 and 74 lb N/acre in GA. Conventional N fertilizers were broadcast at 100 and 60 percent the recommended rates in AR and TN. The MPRN treatments were applied in-furrow (I-F) at time of planting at AR and TN to evaluate safeness. The MPRN rates were applied as a 2x2 band in LA and GA. In LA, conventional N fertilizers were applied 2 x 2 at rates equivalent to the MPRN rates. Application rates or MPRK were 60, 48, 36, and 24 lb K_2O/acre for both AR and TN tests and were also applied I-F at planting. The experimental design at all locations was an RCB with treatments. The number of replications varied from four to six. The cultivar Suregrow 125 was planted in AR, and LA , while the cultivar D&PL 50 was planted in TN in 1996 with D&PL 5409 planted in 1997 and Suregrow 404 planted in GA. 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 and continued on a weekly basis 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 the MPRN evaluation varied with location. In AR, I-F applying 88 lb N/acre as MPRN produced higher yields than I-F applying MPRN at 44 lb N/acre or broadcasting a conventional fertilizer at 110 lb N/acre. Broadcasting either MPRN or a conventional N fertilizer at 66 lb N/acre resulted in comparable yields. In TN, I-F applying 64 lb N/acre as MPRN resulted in higher yield than I-F applying 32 lb N/acre. Broadcasting 48 lb N/acre as a conventional fertilizer or MPRN resulted in equivalent yields. In LA, MPRN banded 2 x 2 at 72 lb N/acre produced a higher yield when compared with applying MPRN at 54 lb N/acre rate or UAN at 72 lb N/acre. Yield differences in the MPRK test in AR was not evident in 1997. In TN, I-F applying MPRK at 60 lb K_2O/acre resulted in higher yields relative to I-F applying MPRK at 48, and 36 lb K_2O/acre or broadcasting MPRK at 48 lb K_2O/acre or broadcasting KCl at 60 lb K_2O/acre. Nutrient release from the MPR N and K materials was slow enough that cotton germination was unaffected from applying the materials I-F at planting. The rate of N may be reduced by applying MPRN relative to conventional N fertilizers. In AR, and TN applying MPRN at 60% the recommended rate resulted in yields equivalent to applying the recommended N rate. However, the LA yield data indicates MPRN rates can be reduced to 80% the recommended N rate. The K data indicates that rates may be reduced but additional research is needed to clarify the reduction.

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