Tillage and Fertilizer Placement Effects on N Distribution in Soil, Runoff, and Plants. (S03-gehl101916-Oral)

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Abstract:
Best Management Systems include tillage practices and placement and timing of nutrients and herbicides. One environmental goal of these systems is to minimize soil loss and nutrient and herbicide transport into surface water. The objectives of this study were to 1) quantify inorganic and organic forms of N in runoff and soil and 2) establish a relationship between runoff N, various soil N pools, and plant N uptake. Experimental watersheds separated by terraces and equipped with runoff samplers were located on a Crete silty clay loam for 2000 and 2001. The grain sorghum management systems included tillage (chisel/disk (CT) and no-till (NT)) and N fertilizer placement (broadcast (BC) and deep-banded (DB)). Apparent fertilizer N use efficiency (NUE) was lowest for NT-BC for both years (60 and 27%). Fertilizer NUE for CT-BC was 75% +/- 4, however NT-DB was more variable (91 and 46%) for the 2 y. Leaching losses were likely low since soil nitrate-N below the root zone was <5 mg N/kg soil for all treatments. No-till systems generally produced the lowest total N in runoff. Total N loss in runoff under no-till was <4 kg N/ha when N was applied at or near planting, but up to 7 kg N/ha for CT.

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