

Reduced Tillage in Florida Sugarcane

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In the United States, sugarcane was grown on approximately 373,000 ha in 2005 of which about 164,000 ha were produced in the state of Florida. In Florida, about 75% was grown on high organic matter (>65%) Histosols and the remainder was on low organic matter (<2%) sand soils. When drained, Histosols release high amounts of N and P due to microbial decomposition that can be utilized by crops. However, this microbial degradation also results in subsidence or loss of the Histosols. Research has indicated that frequent cultivation is one of the factors that can result in increased subsidence (Glaz, B. 1995). High amounts of organic matter in soils can have a negative impact on the duration of weed control from soil-applied herbicides (Koskinen and McWhorter 1986). Consequently, many Florida growers cultivate their fields as often as 10 times per season. In addition to the costs associated with these tillage operations, the excessive traffic in the field results in compaction and possibly increases the rate of soil subsidence.

The term “reduced tillage” can be used to describe farming systems that are completely no-till to those that in which the overall reduction in tillage is small. In the United States, reduced tillage is practiced on approximately 42 million hectares or 36.6% of planted cropland (Anonymous 2002). Conversion to reduced tillage systems in the United States has been primarily driven by concern over the long-term environmental and economic sustainability of agricultural systems. Benefits often associated with reduced tillage cropping systems include conservation of moisture, reduced compaction, reduced soil loss, and lower input costs (Colwick and Barker 1975; Dick et al. 1991; Dick and VanDoren 1985). Conversion to reduced tillage and no-till in Australia was shown to reduce soil erosion in sugarcane fields (Glanville et al.1997).

Because of their historical reliance on tillage for weed management, growers often list weed control as their largest concern when considering

adoption of reduced tillage (Koskinen and McWhorter 1986). In Florida, many growers also believe that in-row cultivation of the plant-crop promotes increased tillering and higher stand counts. Although reduced tillage is a standard practice in many U.S. cropping systems, concerns over reduced yields from increased weed pressure and lower stand counts have kept it from being adopted in Florida sugarcane. Researchers in Cuba and Australia have reported no differences in sugarcane yield between conventional and reduced tillage practices (Glanville et al. 1997, Pear et al. 1992). Research conducted in also Louisiana indicated that reduced tillage systems did not impact yields. However, they found that net profitability of a conventional vs. reduced tillage approach depended on the specific tillage practices and herbicide costs and application methods used (Judice et al. 2006).

Although many of the changes associated with reduced tillage systems are positive, removing tillage from a cropping system often has a major effect on weed populations (Buhler 1995; Gebhardt et al. 1985, Kegode et al. 1999). The severity of perennial infestations such as johnsongrass (*Sorghum halepense* L. Pers.), bermudagrass (*Cynodon dactylon* L. Pers.), and purple nutsedge (*Cyperus 5 rotundus* L.) increases after only a few years of reduced tillage (Triplett et al. 1983, Witt 1984). In order for a reduced tillage system to be sustainable, it is critical to develop herbicide programs that can successfully control problem weeds (Halvorson et al. 2002). The ultimate long-term success of reduced tillage in Florida sugarcane will depend on effectively and economically control weeds without relying on tillage.

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