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## **Implementing Controlled-Drainage Technology To Reduce Nitrate Loss In Drainage Water**

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### **ABSTRACT**

Research over the past 15 years has shown that fertilizer nutrients, particularly nitrate-N, lost from agricultural cropland in subsurface drainage discharge can be reduced 35 percent or more by controlled-drainage. That is, controlling the maximum water table drawdown in the soil profile with a subsurface drain outlet control structure. For many soils it is suggested that the water table should not be drawn deeper than 0.60 to 0.75 meter with subsurface drainage during the crop season and even shallower during winter months when a crop is not grown to reduce post-harvest nutrient losses. During pre-plant and harvest periods, the water table may need to be drawn down deeper, for example to 1.0 meter, to provide for farm equipment trafficability. Nitrate-N loss is reduced in proportion to the reduction in drainage outflow controlled by the outlet structure, plus the shallow water table creates a larger reduced zone in the soil profile that promotes denitrification and lowers nitrate-N concentration in drain outflow. Controlled-drainage requires that key system design, installation, and operational procedures be followed for the practice to be effective, for both new and retrofitted existing drainage systems. Benefits for farmers and society include: Reducing the need for fertilizer inputs, thus reducing production costs and increasing profits; conserving soil-water in dry seasons by storing more infiltrated rainfall; and if the practice is widely applied in a region (such as Midwestern States), improving quality of surface waters, and reducing nitrate-N transport down the Mississippi River drainage basin that contributes to Hypoxic conditions in the Northern Gulf of Mexico. Water quality improvements from controlled-drainage may be eligible for cost-sharing on the system control components under the innovative practices provisions of the 2002 Farm Bill.

**KEYWORDS:** controlled-drainage, subsurface drainage, water table, water quality, nitrate-N

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