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Evaluation of the Effectiveness of Selected Farm Practices in Reducing Groundwater Nitrate

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Abstract:

Data from 25,961 producer reports and 1,935 irrigation wells were used to assess the effectiveness of management practices within 588 km2 of intensely irrigated corn production in the Platte River drainage in central Nebraska. The area has been regulated as a Phase III Ground Water Quality Management Area by the local Natural Resources District (NRD) for 19 years. The initial spatial analysis of the 1987 groundwater nitrate concentrations revealed an obvious concentration demarcation. Concentrations in the very contaminated northern area averaged 25.7 mg NO3-N/L while those in the southern portion averaged 9.4 mg NO3-N/L. Groundwater nitrate concentrations in the north are significantly correlated with time (r2 = 0.87) and decreased at an average annual rate of 0.24 mg NO3-N/L between 1987 and 2005. No significant concentration trend occurred in the southern area. During the 19 years the amount of N removed in grain increased at an average annual rate of 2 kg N/ha. In the north the association between the increase in N removed in grain and decrease in groundwater NO3-N concentrations is significant. The acreage converted from furrow to sprinkler irrigation increased threefold between 1988 and 2003. In the north the increase in sprinkler-irrigated acres is associated with the decrease in groundwater NO3-N concentrations. The NRD- recommended N-fertilizer rate for each corn field in the Phase III area is based upon a realistic yield goal and NRD-modified university N-fertilizer recommendation with credits for residual soil N and N available in irrigation water. From 1988 to 2003 N-fertilizer rates on 62 to 88% of the fields were within Â± 56 kg N/ha (50 lb N/ha) of the NRD recommendation. The remaining fields were more likely to be fertilized at rates greater than 56 kg N/ha in excess of the recommendation than receive N at rates more than 56 kg N/ha below the NRD recommendation.

Impact Statement:

An evaluation of state and local efforts to reduce groundwater nitrate contamination in a regulated groundwater quality management area in the central Platte region of Nebraska.

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