IMPROVED IRRIGATION EFFICIENCY AND EROSION PROTECTION BY MECHANICAL FURROW MULCHING SUGAR BEETS

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INTRODUCTION

This study sought to measure the potential of mechanically applied wheat straw mulch to reduce nutrient, pesticide and sediment losses from furrow irrigated sugar beets and increase water use efficiency. Nitrogen and phosphorus losses were of particular interest, both because of their economic importance as farm inputs and their roles as environmental contaminants.

Measured losses of phosphorus included phosphate-P dissolved in runoff water, phosphate-P present in the sediment, and total P in the sediment. Measured nitrogen losses included ammonium and nitrate in runoff and on the sediment and total reduced N in the sediment.

ABSTRACT

Sediment, water, nitrogen, and phosphorus losses and sugar beet yield, quality, and recoverable sugar were measured for the WS-PM9 variety grown on a Nyssa silt loam soil at 3 percent slope with and without wheat straw mulch mechanically applied to irrigation furrows. Water inflow, water outflow, and sediment loss were measured over time on each of 24 plots for all thirteen irrigations. Infiltration was calculated after each irrigation and irrigation durations were managed so that total water infiltration would be the same in strawed and non-strawed sugar beets. Runoff water and sediment from each plot were independently analyzed for nitrate, ammonium, total N, phosphate and total P during one irrigation. Mechanically applied straw mulch increased the beet yield by 2.5 t/ac and recoverable sugar by 866 lb/ac. Furrow mulching decreased the loss of sediment from 78.8 to 6.7 tons per acre, decreased estimated total P loss from 133 to 12 lb/ac, and decreased total estimated N loss from 334 to 75 lb/ac. Most N losses were in the form of organic N in the sediment and most P losses were in the form of insoluble P in the sediment.