MECHANICAL STRAW MULCHING AND RESERVOIR TILLAGE EFFECTS ON SHEPODY POTATOES IN THE TREASURE VALLEY

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Abstract

Shepody potatoes were grown under sprinkler irrigation on sloping ground (4.2 to 8.5 percent slope) with and without mechanically applied wheat straw, grass straw, or reservoir tillage. Mechanical furrow mulching used 1,000 lbs/ac of wheat straw or grass straw. Mulched, non-mulched, reservoir-tillage, and check plots were irrigated 12 times with solid set sprinklers. Compared with reservoir-tillage, furrow mulching increased average potato yields by 41 cwt (P=0.10).

Introduction

The large increase in acreage devoted to potato production in the Pacific Northwest has been possible because of the use of sprinkler irrigation on sloping ground. Since sloping topography promotes soil erosion, research was conducted by Aarstad and Miller (1973) to address the problem. They found that placing small basins or plant residues between crop rows reduced runoff from 40 percent to 1 percent and increased sugar beet and potato yields under center-pivot sprinklers. Machines and cultural practices have been developed to mechanize the construction of small basins (reservoir tillage) and apply straw mulch to furrows. Ron Yoder (1991) reported in a study of the fate of irrigation water in reservoir tillage that under sprinkler irrigation, a high percentage of the water is shed by the plant canopy and sides of the potato hill, ending up in the furrow. He also said that blue dye used in a metribuzin study clearly demonstrated that a significant portion of applied water (and chemicals in the water) ends up in the furrow instead of the root zone. Yoder observed that deep leaching below the furrow was aggravated when reservoir tillage was used. This increases the possibility of leaching materials into the aquifer.

Many machines that are used for reservoir tillage use a ripper shank in the furrow bottom that loosens the soil to make the basins. Reservoir tillage is not the only viable option to reduce runoff in potato fields. Research has shown that mechanical furrow mulching has provided reduced runoff, increased water infiltration, and increased lateral movement of the wetting front under furrow irrigation (Shock et. al. 1988, Stieber et. al. 1991). The present study sought to compare the effects of reservoir-tillage and mechanical furrow mulching using two kinds of straw with untreated soil, for potato yield and size distribution.

Procedures

Shepody potatoes were planted in beds 3 feet apart on April 20, 1993 in a silt loam soil with a 4.25 to 8.5 percent slope. The erosion control treatments were applied after herbicide application and final cultivation on June 1, 1993. The four treatments consisted of an untreated check, mechanical furrow mulching with wheat straw or grass straw, and reservoir tillage. The plots were 100 feet long and 4 beds wide. Each treatment was replicated eight times in a randomized complete block design. Potatoes from forty feet of row were harvested from the center of each plot on August 26, 1993 and the entire harvested sample was submitted to the J.R. Simplot Co. raw laboratory for yield, grade, and quality analysis.

Results and Discussion

Mechanical furrow mulching increased Shepody potato yield an average of 41 cwt/ac over reservoir-tillage (P=0.10, Table 1). There was no significant yield difference between the wheat or grass mulch.

Mechanical furrow mulching increase of large tubers compared to the untreated check did not reach statistical significance (Table

2).

Table 1. Effect of mechanical furrow mulching and reservoir tillage on Shepody potato yield and processor grade under solid set sprinkler irrigation. Bel Air farm Nyssa, Oregon, 1993.

Erosion control treatments	Total yield	Simplot processor market grade		
		Very smooth	Rougher	Undersized < 4 oz
	cwt/ac	%		
Check	453	21.6	66.9	11.5
Wheat straw	463	16.4	71.6	12.0
Grass straw	469	18.8	71.6	9.6
Reservoir-tillage	425	21.0	71.3	7.7
LSD (0.10)	372	ns	ns	ns

Table 2. Effect of mechanical furrow mulching and reservoir-tillage on tuber size distribution in Shepody potatoes under solid set sprinkler irrigation. Bel Air farm Nyssa, Oregon, 1993.

Erosion control treatments	Tuber size distribution				All tubers > 6 oz
	< 4 oz	4-6 oz	6-10 oz	> 10 oz	
	%				
Check	7	10	23	58	81
Wheat straw	7	7	24	62	86
Grass straw	5	9	20	66	86
Reservoir-tillage	6	9	24	61	85
LSD (0.05)	ns	ns	ns	ns	ns

Literature Cited

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