Research Report

Sugar Beet Conference, Fort Collins, Colorado

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Prepared by A. D. Dotzenko, January 14, 1974

A. Location of Project: Northeastern Colorado
Colorado State University
Fort Collins, Colorado

B. Work Reporting Unit Title: Conservation Tillage as Applied to Sugar Beet Production in Northeastern Colorado

C. Work Reporting Unit No.: Not applicable

D. SMY's for Past Year at Location: Not applicable

E. Names of Scientists in Project Location: A. D. Dotzenko
S. Simmons

F. Mission of Research:

With the expansion of sugar beet production into eastern Colorado and, in particular, under irrigation where soils may be subject to blowing, stand establishment can be a major problem. Regardless of other factors involved in sugar beet production, the prime requisite is stand establishment and maintenance. Minimum tillage practices and uses of cover crops will be tested for applicability under the existing environmental conditions.

G. Objectives of Research:

To evaluate different cultural practices on lands subject to wind erosion where previous cropping systems leave no stubble or residues; to determine effectiveness of different cultural practices in reducing wind erosion and sand-blasting.

H. Research Accomplishments:

A broad comprehensive investigation of the control of wind erosion with sugarbeet production was carried out in northeastern Colorado. Effects included evaluations of small grains seeded during the late fall prior to and after harvest of sugar beets for production of residues and growth. Paraquat was used extensively for killing grain crops prior to seeding of beets. This was unsatisfactory, as most of the residue left from killing small grains blew away. Dry weight production for grains (a function of growth and potential

protection from wind) is ranked: rye (Elbon) > winter wheat (Centurk) > spring wheat (Nadadores) > winter barley (Schuyler) > spring barley (Wocus). Rye and winter wheat are the only recommended small grains, as the others winterkilled and produced little residue.

Conservation tillage, "sidewinder" minimum tillage, is a must on highly erodible soils. Measurements showed a range of 124.9 to 2,308.7 lbs. per acre of air-dry corn residue left on surface of the soil after planting with "sidewinder" tillage machine. This can be translated into a potential soil loss reduction of from 1.9 to 19.0 tons per acre assuming a fine, medium, or coarse sandy loam texture with other erodibility factors constant. One site seeded to rye prior to harvest provided protection where soil loss was reduced by about 13.3 tons per acre, assuming conditions stated above. On sites studied in Yuma County, the "sidewinder" minimum tillage system resulted not only in good stand establishment but also resulted in a reduction in number of field operations to bring a beet crop to harvest of about 61%.

Conservation tillage systems practiced under sprinkler irrigation, coupled with sound plant residue management, will allow production of sugarbeets on fields that would otherise be unable to grow beets under conventional systems.

I. Impact of Research Accomplishments on Science and General Public:

The reduction in the number of field operations to bring a beet crop to harvest of about 61% cannot be ignored in lieu of fossil fuel shortages. In addition, many beet growers have embraced the minimum tillage concept and intend to employ it exclusively, particularly those on soils subject to wind erosion.

Many growers on non-erodible soils plan to use the minimum tillage concept, especially those who must cover large acreages, due to the marked reduction in the number of field operations.

Finally, minimum tillage will allow production of sugar beets on fields that would otherwise be unsuitable.

J. Obstacles to Achieving Objectives:

Progress in this study has been excellent, but some difficulty has been encountered due to the lack of side-by-side comparison of fields used in this study.

K. Future Plans and Needs:

A more in-depth study of the economic and energy considerations of the "side-winder" minimum tillage concept needs to be investigated. Long-term evaluation needs to be established on both light and heavy textured soils to determine trends under minimum tillage as compared

to conventional tillage. At present, minimum tillage is readily adapted to center pivot sprinkler irrigation. The presence of residues makes it difficult to irrigate a crop of beets where furrow irrigation is used. The microenvironment of a conservation tillage system may be more conducive to insect and disease activity and needs to be looked into. Soil fertility and the effectiveness of chemical herbicides may also be affected by a continuous no-plow tillage system.

Information needs to be obtained to determine potential attributes and hazards of minimum tillage concepts.