

TECHNICAL NOTES

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USING CHISEL-PLANT RESIDUE MANAGEMENT SYSTEMS TO IMPROVE POTATO QUALITY AND PROTECT THE ENVIRONMENT

Most of Idaho's famous potatoes are grown on soils with high potential for soil erosion or soil compaction and water intake problems. During recent years, a number of growers have found when they maintain a blanket of crop residue on the soil surface during the potato crop they produce better quality potatoes and protect the quality of the soil, water and air resources associated with their farms.

In order to maintain crop residue on the soil surface, they have abandoned the moldboard plow and switched to Chisel-Plant Residue Management systems for potato seedbed preparation. Commonly used rotations consist of potatoes in rotation with small grains. In the Chisel-Plant Residue Management System, chisels are the primary tillage implement used to prepare the seedbed for potatoes.

Small grains generally produce four to six tons of straw per acre. Historically, small grain stubble has been fall moldboard plowed to bury the straw. Once the soil has been plowed, several additional tillage operations are needed to reduce clods and prepare the potato seedbed. It is common to use eight to ten tillage operations after plowing, leaving soils in a condition that is highly erodible and restricts water intake and plant root development.

Chisel-Plant Residue Management Systems reduce tillage, provides an improved growing environment for the potato and protects the soil against wind and water erosion. The following steps can be used to guide producers into successful implementation of a Chisel-Plant Residue Management System.

Step One

It is important that straw be well-spread before tillage begins. Windrows and large clumps of straw plug chisels and planters. Combines should be equipped with straw spreaders. If the combine doesn't spread the straw, use a field chopper or other suitable equipment that will evenly spread the straw over the field.

Step Two

Fields should be irrigated soon after grain harvest to maximize germination of volunteer grain and weeds before fall tillage begins.

Step Three

Fall tillage should be done with high clearance chisels. The chisel may be equipped with straw choppers or a light disking used when heavy residues are present. When a disk is used, it should be set to chop straw with little residue burial.

Most producers chisel twice in the fall with the second operation at right angles to the first. The object of the chisel operations is to get about half of the straw mixed into the soil to start decaying during the winter. The remaining straw should be maintained on the soil surface. The goal should be to keep about 80 percent of the soil surface covered with residue during the winter to reduce soil erosion, trap winter moisture and reduce evaporation. When conditions permit, it is best if fields are bedded in the fall.

Step Four

Fields not bedded in the fall will have to be bedded in the spring. Spring tillage should be kept to a minimum because it exposes soils to wind erosion. The best rule of thumb is, "If it is not needed, don't do it." When spring weeds are present, control with a burn down herbicide.

Step Five

Where fields have been fall bedded, most producers prefer to inject fertilizer, plant potatoes, incorporate pesticides and hill up the potatoes all in one operation. Straw plugging of the planter is generally not a problem where the straw has been properly spread. If problems are encountered, a coulter should be placed in front of the planter to cut straw and allow it to flow around the planter. It is best to maintain at least 70 percent of the soil surface covered with residue after planting.

Step Six

Cultivation during the potato growing season should be kept to a minimum to reduce residue burial. The goal should be to maintain at least 60 percent of the soil surface covered with residue during the growing period. This will moderate soil temperatures and moisture evaporation during the crop growth period, reducing plant stress and helping produce better quality potatoes.

Step Seven

While the crop is growing, fertilizers, pesticides and irrigation water should be applied through the sprinkler when possible.

Producers using Chisel-Plant Residue Management Systems claim they harvest better quality potatoes, their potatoes grow larger and more uniform in size and have significantly fewer knobs. Reducing plant stress also helps the potato resist insect and disease infestations that reduce plant growth and potato quality.

Chisel-Plant Residue Management Systems have many advantages. They control soil erosion and help growers meet the requirements of the Food Security Act (FSA). They also produce a significant change in soil organic matter and soil tilth. Soils become mellow and easier to work. Clods are softer and break down easier during harvest, resulting in cleaner potatoes and less tare. Production costs are reduced because time and machinery requirements are less than in moldboard plow systems.

Idaho growers have also found that with careful management they can maintain grain straw on the soil surface completely through the potato year to reduce soil erosion during the critical erosion period following potato harvest.

Growers not already using a Chisel-Plant Residue Management System should be encouraged to do so. It is best if they start with a small acreage. Once they experience the many benefits, they will find ways to expand Chisel-Plant Residue Management systems to the rest of the farm.