

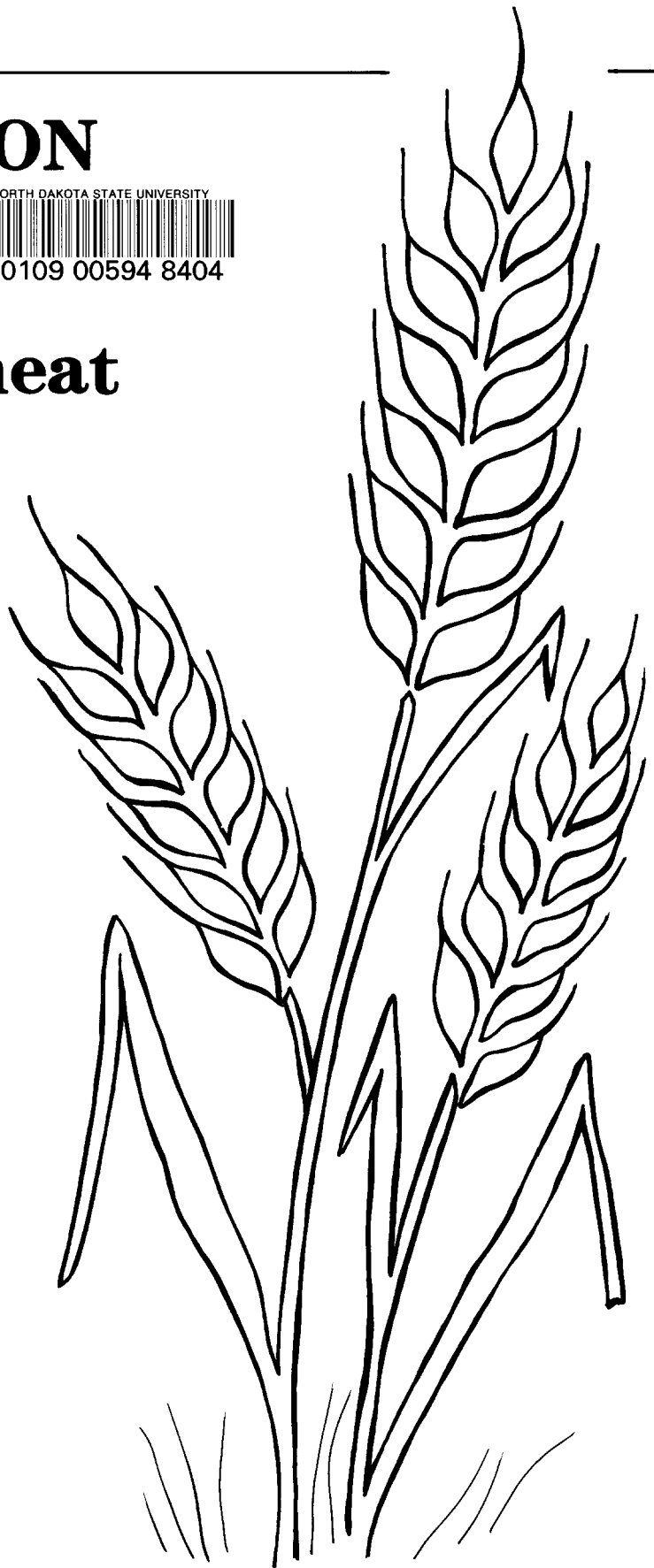
CONSERVATION TILLAGE CALENDAR



For Spring Wheat and Durum

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NDSU EXTENSION SERVICE

North Dakota State University, Fargo, ND 58105

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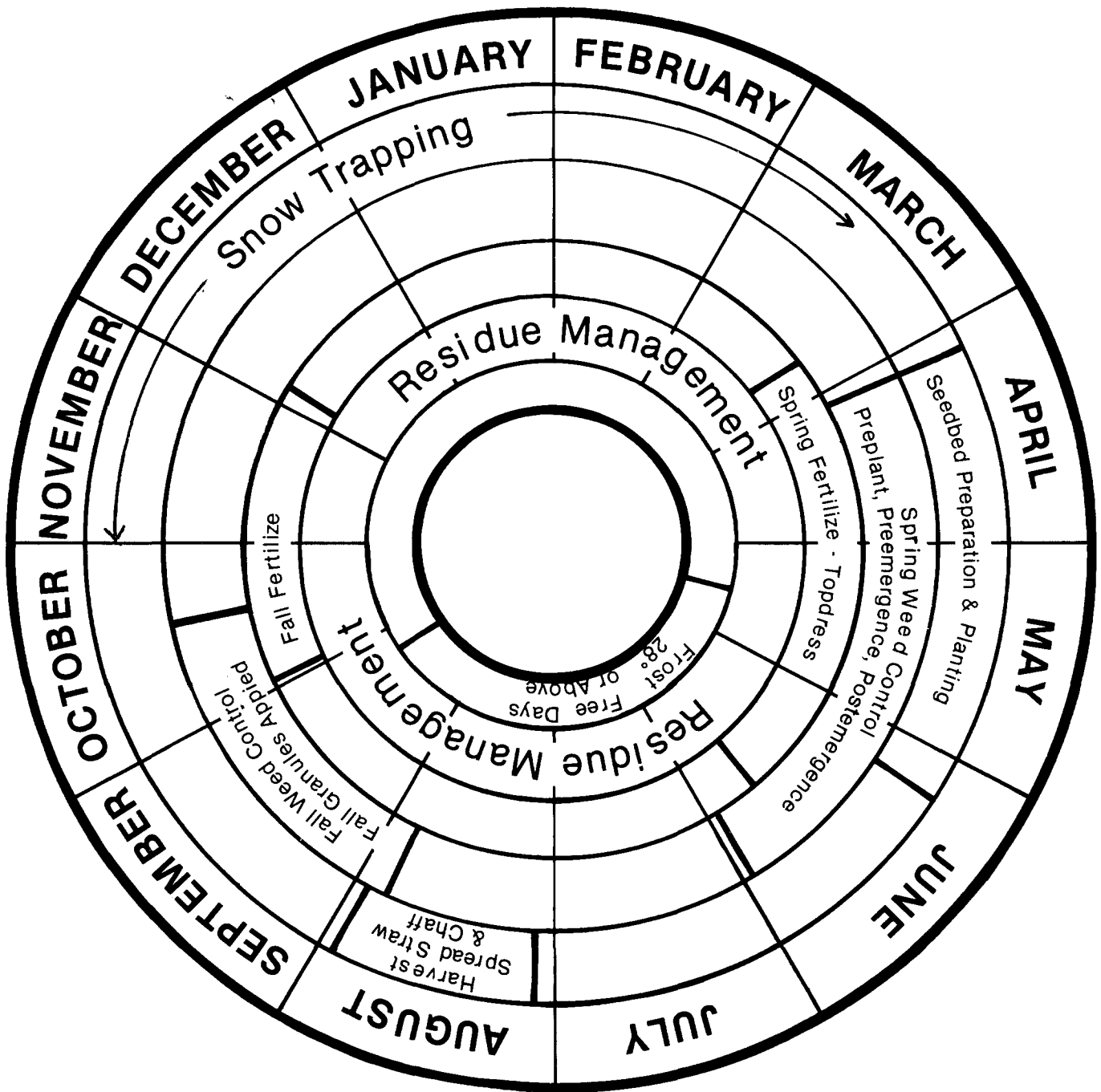


Figure 1. Conservation Tillage Calendar

North Dakota's farmers are leaders in the production of wheat and durum in the United States. The state produced 85 percent of the durum and 48 percent of other spring wheat grown in the United States in 1990. North Dakota ranks second in all wheat production, producing 14 percent of all wheat in the United States.

At a time when farmers are trying to economically produce more bushels of high quality grain, public concern over environmental issues has led to more federal conservation legislation. While some conservation provisions are specifically directed at controlling soil erosion, indirectly affected are surface and ground water quality, long term agricultural productivity and the agricultural economy.

Conservation tillage is recommended as a way to continue annual crop production on highly erodible land and yet reduce soil loss to meet conservation provisions. Conservation tillage applies to a wide variety of tillage or planting systems designed to reduce soil erosion caused by wind or water. Farmers can design their own conservation system by selecting those techniques best for their skills, production practices and land management needs.

Conservation tillage for wheat and durum provides economic advantages as well as effective soil erosion control. The calendar shown in Figure 1 provides a time table for the various management decisions needed in a conservation tillage program.

TYPES OF CONSERVATION TILLAGE FOR SMALL GRAIN PRODUCTION

NO-TILL

Definition:

Direct planting in undistributed residue from the previous crop. Weeds are controlled by herbicides.

Benefits:

- Effectively reduces wind and water erosion by maintaining all crop residue on the soil surface.
- Equipment expense is reduced because there is no need for primary and secondary tillage equipment.
- Dollars and time are saved in fewer trips made over the field.
- Crop residue left on the soil surface increases organic matter.
- Standing stubble traps snow and reduces evaporation to increase moisture availability.
- Standing stubble retards runoff and increases water infiltration.
- Standing stubble provides shelter for wildlife.

Considerations:

- Skillful and timely management must be utilized in a no-till system.
- Weed control is primarily restricted to herbicide application.
- Only surface-applied herbicides can be used.
- Fertilizers should be banded for the most efficient and economical application.
- Spring soil temperatures are a few degrees cooler in no-till because crop residue shades and protects the soil surface.

MULCH-TILL

Definition:

Planting into a previously disturbed soil surface. Tillage equipment includes disks, chisels, field cultivators, sweeps and disks.

Benefits:

- Conservation system most similar to conventional tillage.
- Maintains enough crop residue on the soil surface to reduce soil erosion even though the total field is tilled.
- Adaptable to a wide range of soil types.
- Allows tillage of some crop residue into the top few inches of soil.
- A wide variety of weed control options are available.
- Pesticide and fertilizer incorporation is possible.

Considerations:

- Uses more trips across a field than other conservation tillage systems.
- Labor, equipment and fuel cost are similar to conventional tillage.
- Erosion protection is dependent on residue management.

REDUCED-TILL

Definition:

Any other planting and tillage operation that leaves at least 30 percent of the soil surface covered with crop residue.

CONSERVATION TILLAGE PRACTICES

Harvest Residue Management

It is absolutely essential that harvest equipment include spreading devices to distribute both straw and chaff as uniformly as possible over the field. Proper distribution of crop residue at harvest time will make managing the rest of the conservation tillage program much easier.

Post Harvest Weed Control

Early weed control after harvest is important to maintain soil moisture and reduce weed populations. Several herbicides are available to kill or burn down late season weeds. Maintaining sufficient crop residue for soil erosion control and snow catchment may require herbicide use as a substitute for tillage. Use herbicides as labeled and apply with properly calibrated equipment.



Snow Trapping

Producers must maintain standing stubble and other crop residue to get maximum benefits from trapping snow. The importance of snow trapping is reflected in the following statistics:

- About 50 percent of the water trapped as snow is typically retained as stored soil water.
- Overwinter water storage of 1 to 3 inches is common where standing residues are left to trap and hold snow.
- Wheat will usually produce satisfactory yields if 8 to 10 inches of water are supplied by soil water and growing season precipitation.
- Average precipitation from May 3 through August 1 is 8.26 inches as reported from 40 selected North Dakota locations over a 38-year period (1942-79).
- North Dakota's average annual precipitation (1951-80) is 17.27 inches.
- About 4 inches of available water is required to produce any yield. Each additional inch with good management produces 5 to 6 bushels.

These statistics indicate snow trapping in North Dakota is important in recharging soil water and improving the chances of satisfactory yields. A high residue field, while trapping more snow in the winter, will warm more slowly and remain wet longer in the spring as compared to a fall cultivated or black fallow field.

Fertilizing

Good management requires accurate soil testing to determine proper fertilization rates. Fertilizer may be broadcast, banded, drilled, topdressed, plowed down or foliar applied. The method or methods selected will depend on the economics of available application equipment and fertilizer costs. The fertilizing program selected is an important component of the total conservation tillage system.

Seeding

Many farmers view seeding into crop residue as a major obstacle in conservation tillage. But new developments in high residue seeding equipment and adaptations that convert conventional seeding equipment to higher residue units makes planting in properly managed residue a simple effective operation. The start of seeding is seldom delayed in conservation tillage but any loss of time is offset by the reduced number of field trips made as compared to conventional tillage. An additional advantage of conservation tillage during a dry spring is the increase in available soil moisture.

In Season Weed Control

Crop yields can be greatly reduced by weed competition. An effective part of the total weed control program is the use of good cultural practices.

Incorporation of preemergence herbicide is possible in a reduced tillage system but not in a no-till system. Herbicide incorporation while maintaining adequate crop residue requires proper equipment selection and operation.

Early identification of weed populations causing an economic impact on production and proper application of post emergence herbicides usually brings effective control. The same herbicides used in conventional tillage systems are available for conservation tillage.

Reduced-till farming systems that do not use herbicides require additional management skills in the selection and timing of tillage operations. The use of subsurface tillage equipment like undercutters, cultivators and rodweeders is required.

SUMMARY

Public concern for environmental issues has led to national conservation legislation that affects North Dakota's small grain producers. Producers can design a conservation tillage system that meets both their individual needs and conservation requirements. Implementing a conservation tillage system requires producers to make changes and rethink production practices. The goal of conservation tillage is to reduce soil erosion and conserve soil moisture while maintaining crop yields.

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