Direct Drilling Winter Wheat
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DIRECT DRILLING WINTER WHEAT

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Direct drilling is a method of planting close seeded crops in a narrow band of previously untilled soil. This method of establishment requires a grain drill specially equipped for operation in untilled soils and in moderate to heavy amounts of crop residue. Direct drilling is synonymous with no-tillage but does not imply continuous no-tillage. Rather, direct drilling is a technology that can be employed within any tillage system when conditions are right for direct establishment of the wheat crop without seedbed preparation.

The major advantage of direct drilling wheat is the timeliness of planting. Since direct drilling eliminates all tillage operations necessary for seedbed preparation, planting can immediately follow harvest operations. In addition, direct drilling winter wheat will also result in savings in the labor and energy associated with field operations, and will enhance soil conservation by managing crop residues on the soil surface.

Direct drilling of winter wheat following conventionally planted soybeans

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Yield potential:

Studies in Michigan have shown that drilled winter wheat yields are comparable to conventionally established winter wheat. In two separate experiments conducted in East Lansing, Michigan on a Capac loam soil, the four year averages for conventionally and direct drilled winter wheat following soybeans were identical (Table 1).

TABLE 1

A comparison of conventional tilled and direct drilled winter wheat yields following soybeans in East Lansing, Michigan on a Capac loam soil over two 4-year periods.

Tillage System	1985-88	1987-91
Conventional	67	62
Direct Drilled	67	62

In the 1986-87 crop season, the yields of winter wheat were compared under conventional and direct drilling seeding methods in four counties in Michigan. The results for this study show no significant yield differences between tillage system for each of the locations and their respective soil types (Table 2).

Production considerations:

Experience in Michigan has shown that direct drilling wheat is most successful following soybeans or dry beans. While direct drilled wheat can follow other crops such as corn or oats, these practices are not recommended. This is primarily due to the higher risk of disease in wheat following these crops as well as problems associated with residue management in corn. Wheat diseases are the result of complex interactions between cultural practices, wheat variety, and environmental conditions. However, most disease problems in wheat can be controlled with sound farming practices such as crop rotation, the use of resistant varieties, and seed treatment. Heavy, unmanaged crop residues of any type can affect grain drill performance and result in poor seed placement, poor seed to soil contact and potentially a reduced wheat stand. *The chaff spreader on the combine should be set to distribute residues as widely as possible.*

Winter wheat can successfully follow corn grown for silage, since crop residue and disease problems are reduced. The direct drilling of winter following a fallow period should only proceed if weeds have

TABLE 2

A comparison of winter wheat under conventional tillage and direct drilling for four counties in Michigan in 1987.

County	Soil Type	Previous Crop	CT Yield (bu/A)	NT Yield (bu/A)
Shiawassee	Parkhill Loam	soybeans	84	83
Saginaw	Parkhill Loam	soybeans	89	89
Wastenaw	Fox Sandy Loam	silage corn	65	63
Cass	Kalamazoo	soybeans	80	83

CT=conventional tillage

NT=direct drilled

been adequately managed. Excess weed growth can affect drill preformance and result in a poor wheat stand.

Weed management:

Weed control prior to planting is essential to successful establishment of winter wheat. In conventional systems, existing weeds are mechanically controlled during tillage operations for seedbed preparation. Where weed control in the previous crop was good, direct drilling can proceed without an herbicide application. The presence of perennial, biennial, or winter annual weeds in sufficient numbers may require a burndown herbicide application prior to direct drilling. When faced with a serious weed problem, the direct drilling of winter wheat may not be appropriate. Once established, wheat is a very competitive crop. Higher seeding rates (2.0 to 2.5 bushels per acre) will enhance the competitive ability of a wheat crop. However, if weed problems do still exist, the options for their control do not differ among tillage systems or planting methods.

Planting Date:

It is recommended that winter wheat be planted 10 to 15 days after the Hessian fly-free date. Early wheat establishment may result in greater insect and disease infestation the following spring due to the greater fall foliage growth. Winter wheat can be established in many regions in Michigan throughout the month of October. However, opportunities for timely establishment of winter wheat are more likely to occur if the crop is direct drilled, since no field preparation is required.

Grain Drills:

The grain drill is the key to direct drilling wheat. A conservation tillage drill, which is designed to operate under untilled conditions with moderate to heavy amounts of crop residue, is recommended for the successful establishment of direct drilled winter wheat. However, it should be noted that the cost of a conservation tillage drill is approximately twice that of a conventional drill. While it is possible to adapt a conventional drill for operation in no-till conditions, it is important that a modified drill meet the necessary requirements to achieve proper seed placement and good seed to soil contact. The Cooperative Extension Bulle-

Direct drilling of winter wheat on ridges following ridge planted soybeans

tins E-2258 "Drills and Drill Components for Conservation Tillage in Michigan" and E-2337 "Conservation Tillage Drills Available in Michigan" contain information concerning conservation tillage drills.

Direct Drilling Under Uneven Field Condition:

When fields are uneven from cultivation, windrowing, wheel traffic, or from the presence of ridges, there may concern about obtaining proper seeding depth and good seed to soil contact with direct drilling. The design of the conservation tillage drill will determine the drill performance when the soil surface is uneven. Some drills are designed so that the planter units operate independently of each other. This type of design offers the most flexibility for operation on uneven surfaces since each unit can move across the soil surface without affecting the other units. Other drills are designed so that the planter units are attached to a single rigid frame. While these drills work well on relatively even surfaces, their lack of flexibility may result in non-uniform depth of seed placement when operated in uneven conditions.

At Michigan State University, wheat has been successfully direct drilled in ridge tillage systems following soybeans. In this case, there can be as much as a 8-inch difference between the top of the ridge and the bottom of the furrow. A conservation tillage drill with flexible units can be adjusted so that units on the top of the ridge have all the tension released while the units in the furrow are adjusted for maximum down pressure.

Useful References for Wheat Production:

1. Copeland, L.O., M.L. Vitosh, F.J. Pierce, and J.J. Kells. 1989. *A Production Guide for Michigan Wheat Production.* Extension Bulletin E-2188, Michigan State University, East Lansing, Mich.

2. Harrigan, T.M., F.J. Pierce, and R.L. King. 1990. *Drills and drill components for conservation tillage in Michigan.* Extension bulletin E-2258, Michigan State University, East Lansing, Mich.

3. Pierce, F.J., J.K. Landeck, R.L. King, and T.M. Harrigan. *Conservation tillage drills available in Michigan.* Extension bulletin E-2337, Michigan State University, East Lansing, Mich.

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