No-tillage production of corn and soybeans now represents a large portion of Kentucky's annual grain production. Fertilization and weed control practices associated with no-tillage grain production are well known and are being effectively used to produce consistently high yields. Auxiliary field equipment, such as broadcast fertilizer spreaders, high pressure herbicide sprayers, and straw and stalk choppers, are easily and dependably used in no-tillage production.

A variety of no-tillage planting equipment is currently on the market. Each planter has its particular way of accomplishing no-tillage planting. Also, different components are available for various planter functions. These are summarized on the following page.

The component combinations provided on commercially-available no-tillage planters will accomplish planting acceptably under ideal conditions. Where conditions differ from ideal, certain problems arise which are best handled by certain other component combinations. Here are several important considerations for the farmer selecting a no-tillage planter for Kentucky conditions.

**Soil Penetration**

The most frequently encountered problem is inadequate soil penetration. Rolling coulters are used in front of each row unit, but sufficient weight for penetration is not always provided.

A minimum of 400 pounds is required for each coulter (more for fluted coulters) for adequate soil penetration. This holds true for coulters ahead of fertilizer openers (if used). Do not consider the weight of fertilizer and planting units when estimating the weight which you will want to have bearing on the coulters. Safety note: Whenever it is necessary to add substantial weight to a planter, additional weight should be added to the front of the tractor to allow safe handling and transport.

Select a planter with larger-than-normal frame members. These are required in order to withstand the more extreme loading conditions in no-tillage planting.

**Trash Accumulation**

Shoe-type furrow openers accumulate trash and moist soil. Chisel-boot furrow openers accumulate trash and move subsurface soil up to cover surface mulch and promote weed growth.

Double-disc furrow openers are self-cleaning and thus do not accumulate trash and moist soil. Where trash accumulation is a problem, double-disc openers are required.

**Rocks and Other Obstructions**

Shoe-type and chisel-boot type openers do not operate well in soil with many obstructions. Planters with chisel-boot type openers must be operated at reduced speeds under these conditions.

Double-disc openers are better suited to such conditions as they will roll over rocks and other obstructions without causing delays in the planting operation.

**Furrow Opener Depth Control**

On planters using the rear press wheel for depth control, the furrow depth is sometimes not uniform.

Depth control gauge wheels mounted on either side of the opener will result in more uniformity of furrow depth. Depth bands on double-disc openers will also help to solve this problem. With gauge wheels or depth bands, sufficient weight can be added to the planter to accomplish proper furrow opening in the hardest soil areas without causing the furrow to be too deep in softer soil areas.

**Uniformity of Planting Depth**

When planting rough fields with multi-row units, the planting depth will sometimes vary greatly among the row units.

Planters with individually suspended planter units will function better under these conditions.
<table>
<thead>
<tr>
<th>Function</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Penetration</td>
<td>Smooth Coulter</td>
</tr>
<tr>
<td></td>
<td>Fluted Coulter</td>
</tr>
<tr>
<td></td>
<td>Sweep</td>
</tr>
<tr>
<td></td>
<td>Rotary Tiller</td>
</tr>
<tr>
<td>Depth Control</td>
<td>Depth Bands for Double-Disk Opener</td>
</tr>
<tr>
<td></td>
<td>Gauge Wheels</td>
</tr>
<tr>
<td>Furrow Opening &amp; Seed Placement</td>
<td>Double-Disk Opener</td>
</tr>
<tr>
<td></td>
<td>Shoe-Type Opener (with seed tubes)</td>
</tr>
<tr>
<td></td>
<td>Chisel-Boot Opener</td>
</tr>
<tr>
<td>Seed Imbedding</td>
<td>Seed Press Wheel</td>
</tr>
<tr>
<td></td>
<td>Seed Press Wheel With Disk Coverer</td>
</tr>
<tr>
<td></td>
<td>Disk Coverer</td>
</tr>
<tr>
<td>Furrow Closure</td>
<td>Rear Press Wheel</td>
</tr>
<tr>
<td></td>
<td>Rear Press Wheel with Seed Firming Rib</td>
</tr>
</tbody>
</table>
Seed Placement

Erratic furrow closure sometimes results in seeds not being sufficiently imbedded in the furrow. Pressing with available rear press wheels does not guarantee uniform seed implantation under varying field conditions.

A spring-loaded 1" x 10" seed firming wheel can be attached between the furrow opener and the rear press wheel. Firming wheels are available options for most planters. The seed firming wheel will press the seed into firm contact with the soil in the bottom of the furrow.

Furrow Closure

Erratic furrow closure leaves some seed uncovered. This retards germination and leaves the seeds vulnerable to bird and rodent damage.

Choose a combination of coulter, opener, and press wheel which will result in a uniformly closed furrow. Most planters, with or without semi-pneumatic press wheel tires, require some loosening of row-area soil for adequate furrow closure. Fluted coulters, narrow sweeps, and chisels are used to provide this loosened soil.

The planter should provide enough down force on the rear press wheel to close the furrow (and provide non-slip drive to the seed hopper, if applicable). This force should be in addition to the down force requirements of other components for soil penetration. You should be able to add more weight to the press wheel frame when needed to obtain proper furrow closure.

Component Tracking

On hillsides and around curves, no-tillage planter components often do not properly track. That is, the opener does not follow directly in the slit made by the coulter, and the press wheel misses or barely covers the furrow. This is due to the relatively large spacing between these units on most available planters. Tractor-mounted planters with hitch stabilizer bars do not track as well as pull-type planters.

Use pull-type planters on curved rows until planters with pivoting suspensions and more closely spaced components become available. Mounted planters will track better on curved rows without stabilizer bars.

Fertilizer Application

Side placement attachments require additional weight for soil penetration and therefore greater frame strength. This increases the machine cost and may limit the number of row units which can be transported, due to the weight.

A reasonable alternative is to broadcast the fertilizer prior to planting. “Pop-up” fertilizers can also be placed directly in the seed furrow at planting time. Research indicates that a limit of 10 pounds per acre (42" rows) of total combined N and K should be observed to avoid salt injury. With split boot application and narrower row spacings, this rate can be increased. A liquid fertilizer tank and metering pump or valve will replace the expensive side-placement attachments.

The Future

No-tillage planter selection is presently limited, in that the following features are usually not available:

1. Independently suspended rolling coulters. These would aid in attaining uniformity of furrow opening on multi-row planters.
2. Pivot-mounted, individually suspended row planting units. This would allow better tracking on curved rows and more uniformity across rows.
3. Rear press wheels which do not require row-area soil loosening for adequate furrow closure. These will allow less disturbance of mulch to accomplish no-tillage planting.

Consider using planters with these features when they become available. In the meantime, take careful consideration of the problems you are having or expect to have and select the available planter which offers the most in the way of successful operation under conditions found on your farm.

The authors express their appreciation to S. H. Phillips and M. J. Bitzer of the University of Kentucky and L. W. Larson, Assistant Chief, CPERB, USDA, ARS, AERD for their critical review of this material.