

# Planting Reduced-Tillage Soybeans

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Improved seeding equipment and effective, less-costly herbicides enable growers to use reduced tillage for soybean production. Planting directly into wheat stubble or into a stale seedbed saves time, conserves moisture and can provide higher soybean yields.

**Proper soybean planting depth is vital. Varying soil moisture, soil texture and amounts of plant residue affect seeding depth.**

Seeding equipment that maintains depth and covers seed uniformly attains the best stand.

**A successful reduced-tillage drill or planter:**

- 1. Cuts completely through the straw or plant residue.**
- 2. Places seed into good contact with soil.**
- 3. Covers soybeans with firm soil for maximum soybean emergence.**

## Planter or Drill Rows?

The choice between a drill or a planter depends largely on row spacing. Research data show that average yields from narrow rows are higher than those from rows spaced wider than 30 inches if planted after mid-June. Typical no-till drills have row spacings as narrow as 7½ inches. For wider row spacings, drill seeding units can be moved or seed entry to alternate tubes blocked,

depending on the metering device and frame geometry.

Rows as narrow as 12 inches can be planted with “double-toolbar” planters. These planters have adjacent row units “staggered” or attached alternately to a front and a rear toolbar. Several double-toolbar planters are available with “conservation” or “no-till” options. Certain conventional toolbar planters have narrow hoppers, appropriate seed plate drive geometry and the conservation tillage options to plant rows as narrow as 18 inches. No-till row planters have better mechanisms for seed metering accuracy and seed depth control than most drills.

Tractor and combine wheel spacings, combine header width, row cultivation and tractor tire width may influence row width selection. **The stale seedbed approach is adapted to row cultivation, thus many row planters are on 30-inch spacings. Many others use 19-inch row planters, leaving out two rows to allow room for tractor tracks. No-till into wheat stubble works well with a precision drill on narrower rows.**

## Planting Into Wheat Straw

**Coulters** are the best way to cut through loose straw for some planters and drills. Together with seed openers, they provide loose soil for cover and contact with soybeans.

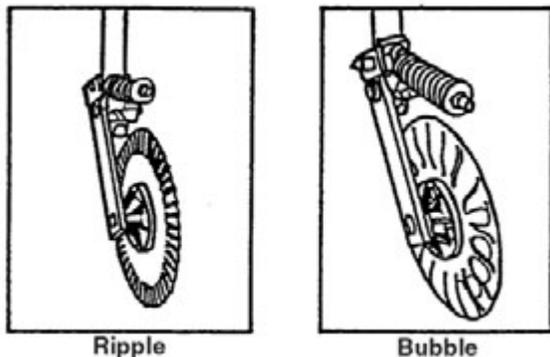
Conditions with heavy residue may require coulters ahead of the opener. Case IH Early Riser™ and

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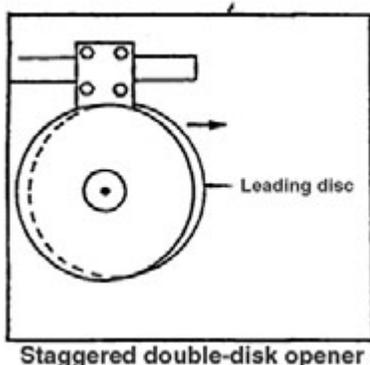
other model planters have slightly staggered disks on double-disk openers that cut well in good (includes no-till and stale) seedbeds without coulters. However, in heavy straw or residue, either “ripple” coulters (¼- to 1-inch corrugations) or “bubble” coulters (straight cutting edge around the perimeter of the disk) are recommended for drills and planters.

### Coulters



Ripple

Bubble



Staggered double-disk opener

The bubble coulters can be sharpened and generally require a bit less force to penetrate soil compared to a ripple coulters. “Fluted” (“waffle” or “wavy” in some manufacturers’ terminology) coulters have basically been replaced by ripple or bubble coulters. Coulters with 2- to 2½-inch corrugations throw soil from the furrow at speeds exceeding 5 mph. Flat coulters may not crumble enough soil to surround the soybeans, but they penetrate soil most readily.

“Vee” firming wheels, angled firming wheels or concave press wheels all obtain good soil/seed contact in mellow soils without inducing a hard crust that damages soybeans in the “crook.” However, cast-iron firming wheels for the Kinze Mfg., Inc., and John Deere Max-Emerge™ planters, and the John Deere #1560 and #750 no-till drills have advantages on hard, compacted soils. Cast-iron press wheels are now available for other planters. They have enough weight, and the sharp, beveled edges force furrows shut from the side rather than compacting surface soil directly over the seed.

## Drills

The **John Deere #1560 and #750 no-till drills** achieve unprecedented seed depth precision for a drill. Other drills, for example the Great Plains 20 series, have gauge wheels beside the openers. Soybean depth is limited by a gauge wheel alongside the opener. Cast-iron firming wheels with beveled perimeters provide cover over seed in almost any firm soil with sufficient moisture for soybean emergence. Avoid operating this drill when the soil is too wet to close and seal the furrow. This drill provides more consistent seeding depth and soil coverage than devices on other drills at the same operating speed.

### Stale Seedbed

“Stale seedbed” refers to fields where the soil has consolidated since the last tillage (rainfall, freezing, thawing, etc.). This term describes fields where tillage isn’t done before planting, as well as fields where weeds have emerged, and the last tillage was at least a month prior to planting.

Stale seedbed soybean production is successful with soils that often remain wet and form clods when tilled. When soil is mellow and plant residue is minimal, anything will plant. In other words, with ideal moisture and little residue, almost any well-maintained planter or drill can provide an excellent stand.

With heavy residue and dry soil, the options listed under “Planting Into Wheat Straw,” “Drills” and “Planters” are helpful. Coulters, gauge wheels on the disk opener and cast-iron firming wheels are “insurance” for difficult seeding situations.

Mixed-texture soils are the greatest challenge. Check for adequate seed depth and a sealed furrow in areas where heavy weed residue or dry soil restricts opener penetration. If seed doesn’t get into about ½ inch of moist soil, force the disk openers deeper with down-pressure springs and extra weight. Gauge wheels may need to be raised to allow deeper disk penetration. It is better to compromise with a few seed too deep than not getting them to moisture. Plant slowly enough to sink the seed (reducing bouncing opener effects) into moisture and obtain a uniform stand.

Great Plains Mfg., Inc., has an optional attachment, **Seed-Lok™**, that pushes soybeans into loose soil in the furrow. It is available for about \$60 per opener. This small wheel follows directly behind the double-disk opener. It improves soil/seed contact and provides a better stand than a typical Great Plains Solid Stand no-till drill. The exception is on clay soils. Seed-Lok™ attachments may pack with soil. Seed-Lok™ attachments are available for certain Great Plains end wheel drills and “Solid Stand” drills.

## Planters

John Deere Max-Emerge™, Kinze and Case IH Early Riser™ planters with double-disk openers will adapt to stubble planting. These and certain other planters with similar devices are effective in wheat stubble if they:

1. **Cut completely through loose straw.**
2. **Put soybeans in contact with loose, moist soil (not straw).**
3. **Firm sufficient soil over soybeans.**

In compacted silts or dry clays, extra force is needed to get the coulters into moisture. John Deere Max-Emerge™ planters limit coulters depth with gauge wheels beside the openers. With sufficient force, adequate seed depth is obtained, even in a fairly rough field. Each opener may require 250 to 500 pounds of force.

**Weight added to the toolbar must be transferred to the coulters and/or the double-disk openers.**

Heavy-duty down-pressure springs are necessary for planter units converted from tilled-ground use. They transfer weight from the toolbar to the coulters or double-disk openers. Check that weight is truly being transferred to seeding units, rather than being carried by the tractor hydraulics or gauge wheels. With these options, greater depth uniformity is possible, especially in dry soil or across a variety of soil textures.

Weights or other ballast often should be added to rugged drills. Both planter toolbars and drill frame members must be sturdy to carry enough weight to force each opener into moisture. Drills typically have 20 to 50 openers; some will not support extra tonnage without damage. Lift-assist wheels for drills and planters are often needed because even larger tractors are limited to 12,000 to 16,000 pounds of lift behind the toolbar.

## Good Soil Cover

Check that soil moisture at planting time is sufficient to sprout a vigorous seedling. The openers should be set about ½ inch deeper than the position used for clean-tilled soil. At full planting speed, soybeans need to be placed ½ inch into moist soil.



Most seeding equipment should be operated slower for reduced tillage. If forward speed is too fast, bouncing seed units will leave some seed near the surface. Equipment design, surface roughness and soil moisture all affect how fast one can plant. Cast-iron press wheels provide consistent seed cover and furrow closure.

**Two hundred fifty to five hundred pounds of force per opener may be needed to reach moisture.**

If an inspection reveals some soybeans are deep and others are on the surface, a poor stand is likely. Adjust planting to correct this because only ideal weather provides good germination behind seeding units that do not maintain depth.

## Straw Management

When harvesting wheat, cut just beneath the heads. Good strawspreaders distribute straw adequately, thus eliminating a need for special attachments or strawchoppers. Special strawchoppers or blowers consume extra combine power and fuel unnecessarily.

The Shelbourne Reynolds stripper is excellent for double-cropped wheat because there is almost no loose straw. The stalk isn't cut; little straw passes through the combine.

**At times, the soil or straw is too damp to cut completely through the straw. If straw is simply poked into the furrow, the stand will be poor. Experienced no-till growers consistently obtain a stand by waiting until the dew is off. It is easy to slice through straw once it is brittle.**

Plant or drill soybeans at a slight angle to the combine tracks and wheat drill. The mark is easier to see, and straw sheds off seeding units readily. If the seed opener or gauge wheel is not on top of the wheat root mass (directly over a wheat drill), soybeans will have better soil contact.

If there is little loose straw, the drill or planter choice is less critical. Eliminating straw windrows usually reduces soybean stand “skips.” Short-statured wheat varieties may help reduce lodged wheat, thus reducing straw length where it must be cut low. If other factors are equal, choose a short-statured wheat. Avoid the latest-maturing wheat varieties for soybean seeding timeliness.

## Guiding Planter or Drill

Marks for the return pass can be made with Global Position System guidance, a foam marker or a **heavy** disk marker. For visibility in stubble or in overwintering weeds, the disk mark should be centered ahead of the planting tractor. Disk marks are visible several days later if rain delays returning to the adjacent pass. Penetration through residue and hard, dry soil requires a durable, heavy marker. Adding weight and increasing caster angle on the disk marker cuts the soil better and leaves a visible mark.

### Irrigation

**Soybeans planted directly into wheat stubble or into a stale seedbed can be irrigated effectively. Data on several soil types show timely irrigation provides greater returns than changing the tillage system. Soybeans respond well to irrigation when summer soil-moisture deficits occur in stale-seedbed or no-tilled fields. Obtain information from MP197, *Arkansas Soybean Handbook*, available from your county Extension office.**

## Fertility Tips

Sufficient phosphorus and potassium for both wheat and soybeans can best be spread and tilled into the soil before sowing wheat.

For stale seedbeds, some producers till in a preplant grass herbicide with a granular fertilizer. On certain silt loams and heavy clay soils, the fertilizer is covered by a shallow operation of disk hippers during a dry period after harvest. Complete this operation prior to early March to obtain mellow

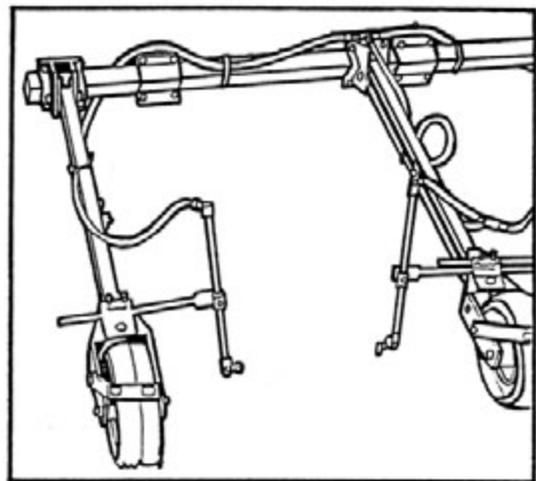
soil and avoid clods that persist until planting if rainfall is insufficient to dissolve them.

Liquid fertilizer attachments for coulters are available for planters. Existing research suggests that injecting liquid fertilizers at soybean planting is not cost-effective if fertilizer can be incorporated during earlier land preparation.

## Season-Long Weed Control

Monitor the field to head off any weed development before it becomes a disaster. Trumpet-creeper, pitted morningglory and horsenettle infestations can pose problems. Some of these can be treated inexpensively with post-directed spray equipment in row soybeans. For timely spray, aerial treatment may be essential.

TwinJet™ nozzle tips are best for thorough coverage of the foliage with a burndown herbicide in stubble. Standard 80° flat fan tips work well with adequate spray volume (at least 10 gallons per acre). Use 40 to 60 psi spray pressure to aid spray penetration into stubble or weed canopies. Pay attention to recommended spray practices, including labels, for reduced-tillage success.



Directed Sprayer made by S&N Manufacturing

Subsequent cultivation to control weeds is practical with special cultivators; some require a system approach beginning at planting. No-till planting no longer necessarily implies total dependence on herbicides for weed control. However, many growers use hooded sprayers very effectively.

Leave adequate space for wheel tracks for post-plant spraying if ground equipment will be used. If post-plant herbicides are applied with ground rigs, follow the planter tractor tracks to avoid compaction that can inhibit the soybeans. Post-directed spray applications, at least for portions of the field, can

improve control of certain weeds and reduce costs. In some cases, they can avert a weed control disaster. Monitor the entire field to avoid a late weed surprise.

## Summary

**Seeding depth control is vital. Soil moisture, texture and residue** cause soybeans to be sown at various depths. Equipment that maintains **depth**, obtains **good soil/seed contact** and **covers** the seed **uniformly** achieves the best stand. Coulters, gauge wheels on the opener, down-pressure springs, special firming wheels and proper weight are useful for reduced-tillage planting. Without these options, dry soil or residue has prevented successful seeding with a conventional planter or drill, and some soybeans fail to emerge.

Certain situations do not lend themselves to reduced tillage. Planter or drill modifications may help start reduced-tillage on acreage where it fits best. If one owns the seeding implement, these modifications for an appropriate soybean acreage may be the least costly option.

The planters and drills cited are readily available. New implements or other models that include equivalent components should perform equally well.

**For information on weed control practices, see MP 44, *Recommended Chemicals for Weed and Brush Control*.**

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Acknowledgment is given to Gary Huitink, former Extension agricultural engineer, Ford Baldwin, former Extension weed scientist, and Lanny Ashlock, former Extension agronomist - soybeans, who all contributed to the original publication.

Printed by University of Arkansas Cooperative Extension Service Printing Services.

**DR. SUBODH KULKARNI** is program associate - machinery with the University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock.

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FSA1015-PD-7-08RV