CLEMSON EXTENSION

SL 9 March 1992 SOYBEANS

Guidelines For Drilling Soybeans

Approximately 50% of the South Carolina soybean crop is doublecropped after small grains. Potential for lower costs, higher yields, less labor/time requirement for planting, and improved soil conservation has prompted producers to examine drilling as an alternative to wide rows. Good management, however, is crucial to achieving top yields and profits with drills. This leaflet provides some guidelines for success.

WHY DRILLING?

Yield advantage? Drilling soybeans into 6 to 12 inch rows will not likely provide a yield advantage over wide rows (30 to 40 inches) when planting full-season (May 10 to June 10) under ideal weather conditions in South Carolina. After mid-June (which corresponds to most doublecropping planting dates) the potential for greater yields with drilling improves. This is due to better utilization of soil moisture and nutrients, plus greater interception of sunlight under drilled conditions since there is earlier canopy closure.

The following are research results from recent row spacing studies in some southern states. At Tifton, Georgia, research showed an average 2 bushel increase for 4 varieties representing Maturity Groups V-VIII grown in 18 inch vs. 36 inch rows under irrigation (4). Without irrigation, there were no differences. At Plains, Georgia, yield of Bragg (Group VII) variety was 17% higher in 20 inch vs. 36 inch rows when averaged over late (late June or early July), ultra-late (late July or early August), and irrigated vs. nonirrigated conditions (2). In South Carolina's Pee Dee region, USDA research at Florence (1979-81) under irrigation showed a 40-bushel average yield for Davis (Group VI) and Coker 338 (Group VIII) varieties planted late in 20 inch rows and a 38- bushel average for the same varieties planted in 40 inch rows (6).

In Mississippi, Braxton (Group VII) variety yielded 10% more in 21 inch vs. 40 inch rows at both early and late planting dates (3). In Louisiana in 1987 and 1988, research showed significantly higher yields for Forrest (Group V) and Centennial (Group VI) varieties grown in 20 inch vs. 40 inch rows at both early and late planting dates (1). In North Carolina (5), Forrest (Group V) and Ransom (Group VII) varieties yielded approximately 3 bushels better when planted in 9 and 18 inch rows than when grown in wide rows (over 30 inch). All of this research provides evidence that increased yields are possible at all planting dates, but chances are very good for increases of 10 to 15% when planting late (after mid-June).

Other advantages? The following is a list of other potential advantages of drilling soybeans.

- Quicker canopy closure allowing soybean plants to shade out and/or compete better with late-emerging weeds;

- Higher pod placement due to closer spacing of plants, resulting in improved harvest efficiency;

- Better ability to withstand drought due to less soil moisture loss from bare soil by evaporation and better root dispersion throughout soil; and

- Less soil erosion due to earlier crop canopy closure, causing less rainfall to contact soil during intense rain events in summer.

Possible disadvantages: The following are considered possible disadvantages of drilling soybeans.

- Additional equipment costs for drill, unless conventional grain drill is used for soybeans;

- Lack of mechanical cultivation option, thus more dependence on herbicides, unless crop rotation, crop competition, and good weed scouting reduce the need for herbicides; and

- Potential lodging problems, although proper seeding rate and good variety selection should reduce likelihood of this problem.

Drills

For effective soil-seed contact and optimum stands, drills should generally have the following features.

Openers: Openers are usually doubledisc units 14 to 18 inches in diameter. On conservation tillage drills, openers are mounted independently of, and track behind, the coulters (see Fig. 1).

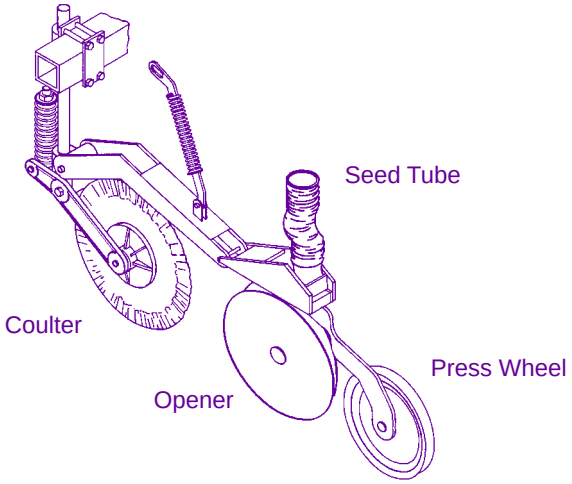

Figure 1. Typical seedbed opener for conservation tillage drill.

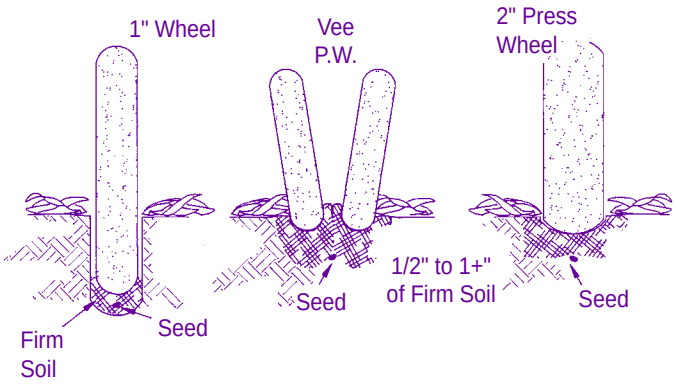

Figure 2. Press wheel types for drills.

Seed metering: A drill should have seed metering devices that will: (a) not damage the seed; (b) cause an even flow of seed to each row; and (c) be easy to adjust according to seed size and desired rate.

Depth control: The most common depth control device is a press wheel operating with spring tension and attached to the furrow opener. Recently, there have been innovations in drills in which depth bands are attached to the furrow openers for more accurate depth control.

Seed covering: The most common seed covering device is a press wheel (single or double), although some producers attach a spring tooth harrow to assist in better soil coverage. Press wheels usually have a rubber surface, although some on conservation tillage drills are metal. Drills have a single or double press wheel arrangement. The double arrangement in a "V" configuration is popular since it results in less soil compaction immediately above the seed (see Fig. 2).

Special Features For Conservation Tillage Drills

Coulters: For cutting through various types and amounts of residue, several types of coulters are available—from straight to fluted (see Fig. 3). Ripple or bubble coulters are popular on some conservation tillage drills, and perform better under a wide range of soil types and residue conditions.

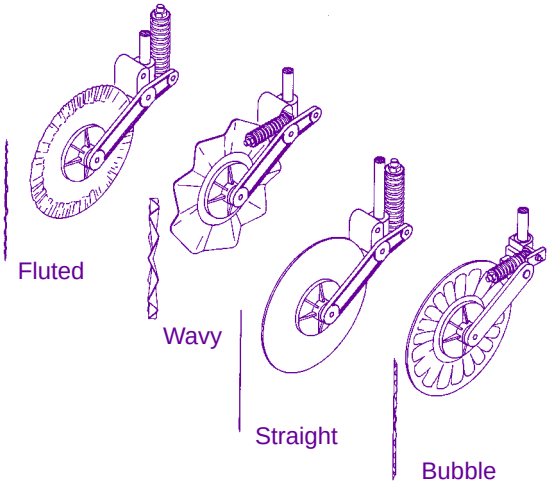

Figure 3. Four types of coulters for conservation tillage drills.

Weight: When planting soybeans in residue, about 400 to 500 lb of drill weight per row is necessary for good coulter action and optimum seeding depth. Therefore, a 12 ft conservation tillage drill which plants soybeans in 10 inch rows should weigh around 6000 lb. Most drills have brackets for adding additional weights.

Power requirement: Most pull-type conservation tillage drills require 5 to 7 hp per ft of drill width, while 3-point hitch drills require 10 to 15 hp per ft, and must have sufficient front end weight and hydraulic capacity to lift the drill.

PRODUCTION CONSIDERATIONS

Fertilization: Fertilization requirements for drilled soybeans are the same as for wide-row soybeans. It is extremely important to do a good job of soil sampling each field every year so that soil pH extremes and nutrient deficiencies do not limit yields.

Deep Tillage: When drilling soybeans in a doublecropping scheme, deep tillage should be practiced in the fall before planting small grains. If deep tillage is accomplished by chiselplow or bottomplow, it is important to prevent soil "re-compaction." Therefore, a drag tool of some kind, rather than a disc harrow or do-all, should be used to smooth the seedbed. If traffic is controlled for the small grain crop (that is, if trips for spraying and topdressing are confined to traffic lanes), and no tillage is done after harvest, deep tillage before soybean planting in most Coastal Plains soils will not be required.

Varieties: Late-maturing varieties (Maturity Groups VII and VIII) grow taller and faster than early varieties (Maturity Groups V and VI), and are generally preferred for doublecropping after small grains, as well as for conservation tillage in general. Any of the currently recommended late-maturing varieties can be used, but those which branch well and have good lodging resistance are preferred for drilling. Attention should be given to disease and nematode resistance of varieties, where applicable. Refer to Extension Circular 545, Characteristics of Soybean Varieties for S.C.

Seeding rate: Overplanting is a common problem for producers who drill soybeans. This is wasteful and can cause excessive lodging and poor harvest efficiency. The following is a good rule of thumb to follow. For 6 to 12 inch drilled rows, the producer should aim for 2 to 3 plants per row ft. If one assumes an average of 2.5 plants, and a row spacing of 10 inches, this would result in a final plant population of 131,000 plants per acre. If soybean seed germination is 80% and we assume that only 90% of the viable seed will emerge with drilling, the producer should plant 182,000 seed per acre. If the seed average 3000 seed per lb (average size seed), the producer should plant 61 lb per acre. Consider the seeding rates for different seed sizes and desired populations in Table 1.

Seeding depth and soil moisture: Seeding depth should be 0.5 to 1.25 inches in sufficient moisture for both germination and emergence. Rule of thumb: optimum soil moisture at seeding depth should cause a balling-up of the soil when squeezed by a fist. Soil too dry for good stands will fall loosely into the hand upon squeezing.

*Table 1. Seeding rate (lb/A) for different seed sizes and drilled plant populations (plants/ft)**

	Plants per row ft			
Seed size (seed/lb)	1	2**	3**	4
	lb/A			
Very large (2000)	36	73	109	145
Large (2500)	29	58	87	116
Average (3000)	24	49	73	98
Small (3500)	21	42	62	83

* assume 10 inch rows, 80% germination, and 90% emergence of viable seed
** generally desirable populations

Do not "dust-in" soybeans with the idea of waiting for rain. This is extremely risky, especially with drilling. If irrigating, apply water before planting, rather than after, for good stands.

Weed control: Weeds have traditionally been a problem in some drilled plantings, but herbicides recommended for South Carolina producers are adequate for controlling most troublesome species. The first step in a good weed management program is to know which weeds are present in each field, their location, and intensity level. If hard-to-control broadleaf weeds like sicklepod or perennials such as nutsedge or bermudagrass are intense in a particular field, drilling is not suggested.
It is very important to get a good vigorous stand of soybeans so that early crop competition becomes a viable and cost-effective weed management tool through shading.

The key to good weed control with herbicides is to use an effective base herbicide system to control annual grasses and small-seeded broadleaf weeds. Herbicides like Prowl, Dual, or Lasso tank-mixed with a broadleaf material such as Canopy, Scepter, or metribuzin (Sencor or Lexone) may be adequate for most weeds. There are also premixed materials like Turbo or Squadron which may be used preemergence. If using conservation tillage, Gramoxone Extra (paraquat) or Roundup (glyphosate) should be applied to control weeds present at planting.

For postemergence control of weed escapes, many choices are available, such as Classic, Scepter, Basagran, Blazer, Storm, Pursuit, Reflex, Cobra, and for grasses, Poast, Poast Plus, Fusilade, Whip, or Assure II. Early application on small actively growing weeds is important for cost-effective control with postemergence herbicides. Refer to the soybean weed response chart in the current *Agricultural Chemicals Handbook* for assistance in herbicide selection.

References

1. Board, J. E., B. G. Harville, and A. M. Saxton. 1990. *Narrow-row seed-yield enhancement in determinate soybean*. Agron J. 82:64-68.

2. Boerma, J. R. and D. A. Ashley. 1982. *Irrigation, row spacing, and genotype effects on late and ultra-late planted soybeans*. Agron J. 74:995-999.

3. Heatherly, L. G. 1988. *Planting date, row spacing, and irrigation effects on soybean grown on clay soil*. Agron J. 80:227-231.

4. Parker, M. B., W. H. Marchant, and B. J. Mullinix. 1981. *Date of planting and row spacing effects on four soybean cultivars*. Agron J. 73:759-762.

5. Row width and irrigation studies with soybeans. 1989. Technical Bulletin No. 289 North Carolina Agricultural Research Service. N.C. State Univ., Raleigh, N.C.

6. Sojka, R. E. 1982. Personal correspondence—unpublished data.

Other Soybean Leaflets are available from your county Extension office or from the Bulletin Room (free of charge), 82 Poole Agricultural Center, Clemson University, Clemson, SC 29634-5609.

Soybean Leaflet 1 - Soybean Insect Management
Soybean Leaflet 2 - Soybean Nematode Control
Soybean Leaflet 3 - Soybean Disease Control
Soybean Leaflet 4 - Soybean Harvest Management
Soybean Leaflet 5 - Storing Soybeans To Maintain Quality
Soybean Leaflet 6 - Soybean Weed Control
Soybean Leaflet 7 - Soybean Fertility Management
Soybean Leaflet 8 - Selecting Soybean Varieties