# Planting Methods and Seeding Rates for Small Grain Crops

Using the right planting methods and seeding rates helps small grain crops become established quickly and successfully. Mississippians plant wheat, oats, and other small grains for numerous purposes, including for grain production, cover or forage crops, soil stabilization, pasture overseeding, and wildlife food plots. Because small grains are grown for many purposes, in diverse environments, and with an array of resources, appropriate planting methods may vary greatly.

## Plant Stand and Seeding Rates

An ideal final small grains stand grown for any purpose in Mississippi is about 1 million to 1.3 million plants per acre (23 to 30 plants per square foot). Suggested seeding rates vary considerably for different planting methods. Specific recommendations are listed in the following sections on planting methods.

Wheat and oat seed size can range from 11,000 to 18,000 seeds per pound, so a grower should base seeding rate on the number of seeds (seeds per pound) rather than on the volume or weight of the seeds (bushels per acre). Seed sizes often vary between different varieties and seed sources. The number of seeds per pound usually is listed on the seed bag. Small grain growers can use this information to decide how many pounds of seed to buy.

As a general rule, if you plant small grains early, you can seed at more conservative rates because plants have more time to tiller. If you seed after the ideal time, when winter dormancy is likely to occur shortly after emergence, you may need to increase seeding rates by 10 to 25 percent.

## Conventional Grain Drill Method

Grain drills offer more seeding precision than other planting methods or equipment. Therefore, they are preferred for planting small grains for grain production or if achieved plant density is important. Grain drills create a furrow at a certain depth, then drop seed into the furrow, cover the seed, and firmly press soil around the seed. Growers should try to plant when there is sufficient soil moisture to stimulate seed germination, but not when it is muddy, which would compact soil and possibly leave the seed furrow uncovered.

This seed-soil-moisture-depth relationship gives a grower an excellent chance for successful stand establishment, uniform emergence, and proper root development. Planting with a grain drill should produce good emergence (80 to 90 percent of planted seed) under normal environmental conditions.

**Table 1. Suggested small grain seeding rates for grain drills with different row spacing. These seeding rates are based on 85 percent emergence of planted seed.**

| Drill spacing (inches) | Linear feet per acre | Minimum seeding rate per foot | Maximum seeding rate per foot |
|---|---|---|---|
| 6.0 | 87,120 | 14 | 18 |
| 7.0 | 74,674 | 16 | 20 |
| 7.5 | 69,696 | 17 | 22 |
| 8.0 | 65,340 | 18 | 23 |
| 9.0 | 58,080 | 20 | 26 |
| 10.0 | 52,272 | 23 | 29 |

Plant about 1.1 million to 1.6 million seeds per acre (about 75 to 125 pounds of seed per acre) with a grain drill. Table 1 lists seeding rate recommendations for drills with different row spacing.

The ideal seeding depth for small grains is 1 to 1½ inches, depending on soil moisture and soil type. If soil moisture is marginal, plant seeds deep enough to contact the moisture, but do not plant deeper than 2 inches. If little or no soil moisture is available in the top 2 inches of soil, plant about 1 inch deep and wait for a rain to germinate the seed.

## No-tillage Planting Methods

More and more producers are growing wheat and other small grains in no-tillage cropping systems because no-till systems produce major ecological and economic benefits. If growers can achieve adequate stands in no-till systems, grain yields usually are similar to conventional wheat systems.

Conventional grain drills may not work well in the heavy plant residue that normally is present in no-tillage systems. However, several manufacturers now produce no-till grain drills that are designed to plant into existing plant residue on land that has not been tilled.

With this technology, growers can establish and produce small grains in no-till systems, but need to closely manage factors that could limit planting performance and stand establishment, such as existing plant culture or residual plant debris.

Heavy plant residue in no-till systems may restrict drill penetration, seed placement, and furrow closure. Closely check the drill's performance in the field, and adjust it to make sure seeds are placed correctly.

When planting no-till, tractor operators probably will need to drive slower than they would for conventionally prepared seedbeds. You also may need to increase the seeding rate by 10 to 15 percent. These adjustments can help make up for difficult planting conditions, especially when heavy corn or sorghum residue is present, or when you are sod-seeding pastures.

### *No-tillage Method in Agricultural Fields*

Your drill will perform better in no-till production agriculture fields if you manage crop residue throughout the season. During harvest, begin preparing for the next season by adjusting combines to spread crop residue evenly. This even residue distribution improves the performance of the next planting and spreads recycled nutrients.

If you shred or mow stalks after harvest, you should spread this residue evenly, as well. If your cropping schedule does not leave enough time for the residue to decompose, you may have better luck planting into standing stalks or stubble.

Loose, tough stalk residue can collect in drill or equipment framework and drastically limit its performance. You may want to try drilling at an angle slightly different from the direction of the existing crop row. This will help reduce the amount of residue that builds up by constantly spreading out the residue along the drill's frame.

In most cases, you can apply a burndown herbicide before planting to kill existing weeds and improve seeding establishment.

### *No-tillage Method in Pastures or Sod*

You may also no-till plant small grains into warm-season perennial grass pastures. This method of seeding, commonly called sod-seeding, presents establishment problems for small grain crops because plant residues can limit the drill's performance.

Another problem is that not-yet-dormant pasture grasses will compete with young small grain seedlings, making it hard for seedlings to survive and grow. In these cases, you should use close grazing, haying, or mowing to remove most of the residue before planting. Keep warm-season grasses shorter than 4 to 5 inches until the first frost to reduce this competition with the newly seeded small grain crop.

## The Broadcast-Incorporation Method

Producers who do not have grain drills may "rough in" small grains. Do this by broadcast sowing on freshly tilled soil and lightly covering the seed with soil from a subsequent shallow-tillage operation (harrow, field cultivator, or disk).

This seeding method causes random seeding depth and typically does not firm soil around the seeds. The result normally is less emergence success (60 to 70 percent of planted seed) than with drilled seed. Use higher seeding rates (40 to 45 seeds per square foot, or 100 to 170 pounds of seed per acre) to offset this moderate emergence success.

You can use a culti-packer to firm this type of seedbed and possibly improve stand establishment. You may get the same result if you let grazing animals tread the seed into the soil.

## Broadcast Seeding Methods

Small grains also may be broadcast-seeded using aerial or ground equipment on untilled soil. This will work if excessive plant culture and/or debris do not prevent seed-soil contact. You can use this method when seeding into an unharvested crop, into pasture, or on a non-tillable site.

Aerial broadcast seeding commonly is used for late-planted small grains because muddy soils during the late fall prohibit the use of tractors and other ground equipment. Producers also use broadcast seeding when planting small grains for cover or forage crops, for soil stabilization, for pasture overseeding, and for wildlife food plots.

Overseeding warm-season perennial grass pastures often presents establishment problems. The heavy residue in these pastures may prevent the seed-soil contact that is necessary for germination. Also, warm-season pasture grasses that are not yet dormant will compete with young seedlings, reducing seedling survival and growth. Keep warm-season grasses shorter than 4 to 5 inches until the first frost to help small grain seedlings germinate and get established. Use close livestock grazing, haying, or mowing to keep grasses at the desired height.

Producers often choose the broadcast seeding method for these purposes because it does not disturb the existing ecosystem or promote soil erosion, and the achieved plant density is not particularly important. It also is economical and does not require special tillage and/or planting equipment.

Expect low emergence with broadcast seeding because surface seedling establishment depends entirely on environmental conditions you cannot control, including rainfall, moderate temperatures, and adequate soil contact. Compared with subsurface planting methods, broadcast seeding is more likely to result in roots that are poorly developed and reduced plant survival.

Seedlings with roots and growing points at or near the soil surface are at more risk for winter injury and pest damage. They also are less likely to survive. You generally should use very high seeding rates (50 to 60 seeds per square foot, or 130 to 210 pounds of seed per acre) to try to offset the low emergence and seedling survival rates (around 50 percent of planted seeds) associated with broadcast seeding.

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