AGRONOMIC DESIGN

AGRONOMIC DESIGN INSIGHTS

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SEED PLACEMENT ACCURACY

Growers continually balance eight key agronomic needs: timeliness, crop residue management, soil tilth, seed bed conditions, seed placement accuracy, plant food availability, crop protection and harvest quality. This report addresses **seed placement accuracy**, barriers to proper placement, as well as agronomic considerations when purchasing planters or drills.

The term "picket fence stands" is used in the industry to describe uniform spacing between corn plants. However, research demonstrates that having "photocopy plants" actually has a greater impact on yield for corn. While other types of seed, besides corn, may be less susceptible to spacing issues, soybeans, canola, rice and other seeded crops can be very sensitive to planting depth, so producers need to be careful and get their crop off to a good start. When selecting a planter or drill, growers weigh many considerations. However, if the seed isn't planted in a way that maximizes yield potential, there will be an immediate impact on profitability.

Agronomic Needs for Successful Stands

WHAT'S INSIDE

PLANTERS

By Bill Hoeg, Case IH Planter Marketing Manager

Planting is one of the most important tasks growers undertake each year. It should result in a plant stand at the desired density that emerges quickly and uniformly. Plant spacing uniformity and emergence rate are the most common characteristics used by producers to evaluate planter performance. There is no question that initial stand establishment and early-season growth of the crop are very important in protecting the maximum yield potential. Robert Nielsen, a Purdue University agronomy professor, quotes a mentor of his who said, "The sins of planting will haunt you all season."

Planters should deliver accurate seed placement and depth control across varying soil and tillage conditions, as well as consistent seed-to-soil contact. A planter must be able to precisely place the seed in widely varying residue and soil types. In addition, the planter

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PLANTERS [cont'd]

must enable a grower to accurately plant hundreds of acres each day so planting can be completed by the optimum date.

Purdue University research says that uneven emergence can reduce corn yields by 9 to 22 percent[1]. Significant plant spacing variability is also detrimental and can reduce corn yields from 2 to 4 percent[2] (See Figure 1). Similarly, research by land grant universities indicates that planting practices, including row width, planting date and population may have a significant effect on soybean yields.

The term "picket fence stands" is commonly used to describe uniform spacing between corn plants. Many planter manufacturers focus exclusively on in-row seed spacing and accurate populations, because those two features are the easiest factors to consistently control.

However, uniform and proper seed depth, based on current soil moisture and the weather forecast, good soil-to-seed contact and uniform soil density impact "photocopy plants," or uniform plants, stalks and ears.

Growers can assess the uniformity of a plant stand shortly after emergence by digging a series of recently emerged plants and comparing the mesocotyl length (See Figure 3/Page 3). The mesocotyl is the white tubular connection between the plant's crown and the seed. Uniform plants will have uniform mesocotyl lengths.

Alternatively, producers can assess the difference in plant growth stages. According to Nielsen, a plant two leaves or more behind adjacent plants will almost always result in the smaller plant being barren at the end of the season (See Figure 2).

While both picket fence stands and photocopy plants are important, the biggest impact on yield is photocopy plants (See Figure 1).

Case IH designs equipment with these six agronomic principles in mind (See Figure 1). Every individual plant counts and Case IH equipment is designed specifically to help maximize yield potential. ■

figure 1

Six Primary Agronomic Drivers of Seed Placement Accuracy When Planting

Producers should consider six agronomic drivers of seed placement accuracy at planting time. Depending on the type of seed and field conditions, certain drivers may have more or less importance:

1. Proper seed depth
2. Uniformly correct seed depth across the planter and throughout the field
3. Good soil-to-seed contact
4. Uniformly correct soil pressure all around the seed

primary drivers of

Photocopy Plants:
potential to reduce corn yields by
9-22%[1]

5. Accurate seed population
6. Accurate in-row seed spacing

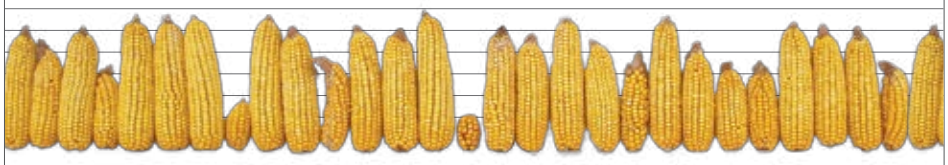
drivers of

Picket Fence Stands:
potential to reduce corn yields by
2-4%[2]

1. Yield impact statistics based upon *Purdue University Department of Agronomy Publication AGRY-91-01 "Stand Establishment Variability in Corn".*
2. Yield impact statistics based upon *Purdue University Department of Agronomy Publication AGRY-91-01 "Stand Establishment Variability in Corn".* Based on a 200-bushel yield potential and 26,000 to 30,000 seeds per acre with spacing variability with standard deviation of about 2 inches.

Yield Comparison

Competitions' Definition of Accuracy – Picket Fence Stands



Case IH Definition of Accuracy – Picket Fence Stands with Photocopy Plants

figure 2

Identifying Late Emerging Plants

Full Potential – Plants at the same growth stage, where they should be.

Partial Potential – Plants one to two leaves behind are actually half "weed." They do not add to productivity, and they take nutrients from 100% plants.

No Potential or Weeds – Any plants that are three or more leaves behind.

DRILLS

By Dale Simpson, Case IH Seeder Marketing Manager

Accurate seed placement – particularly consistent accurate depth control across varying soil and tillage conditions and consistent seed-to-soil contact – is important when seeding crops like soybeans, wheat, barley and hybrid rice. All seeding equipment, including disk drills and hoe drills, must provide accurate and uniform seed placement and seed depth as a prerequisite to better yields and larger profits.

Research throughout the Midwest indicates that for optimum soybean yields, the seed must be uniformly spaced and placed at a uniform depth. The University of Illinois *Agronomy Handbook* says soybean stand reduction often is related to nonuniform field conditions, including topography and soil type differences. Seed of marginal quality, seeding using the wrong drill settings and seeding too deep or too shallow might cause stand reduction as well (See Figure 4).

Accuracy of seed placement is important for both yield and reducing seed costs for barley, pulse crops and other crops as well. Attaining more precise placement of seed is the goal of Case IH design.

According to the Canola Council of Canada's *Grower Manual,* canola emergence is greatly influenced by seed bed conditions. Good seed bed conditions are more important for canola than cereals due to the shallow seeding depth necessary for this small-seeded crop.

A good seed bed will:

- *supply enough moisture for germination and seedling establishment*
- *provide adequate warmth and aeration*
- *have minimal physical resistance for the seedling to emerge*
- *be relatively free of weeds and disease*
- *offer some resistance to erosion*

Conditions that promote rapid germination and early, uniform stands and growth are important for weed control and yield. The seed bed should be fairly level, well-packed and moist throughout its depth. Drills should provide adequate seed placement, seed-to-soil contact and uniformity of stand.

Seed bed conditions that promote rapid germination, uniform emergence, and early stand establishment are desirable for both **barley and wheat** production. Barley requires a moderately fine but firm seed bed that maximizes contact between the seed and soil moisture for rapid, uniform germination.

The drill is critical to maximize yield potential. Seeding barley and wheat too deep is often a problem. Seeding closer to the soil surface is desirable for quick emergence and helps establish a quick stand to compete against weeds. The depth from which wheat or other small grain seed will emerge from the soil is affected by seed vigor and seed bed conditions such as temperature, moisture, soil-borne pathogens and soil conditions such as crusting.

A coleoptile (See Figure 3) is the shoot which emerges from the seed to pierce the soil surface. If the coleoptile is unable to pierce through the soil surface due to a combination of the above conditions, stand failure occurs (See Figure 4). However, a uniform emergence will produce a crop that will mature evenly. ■

figure 3

Wheat Seedling Emergence

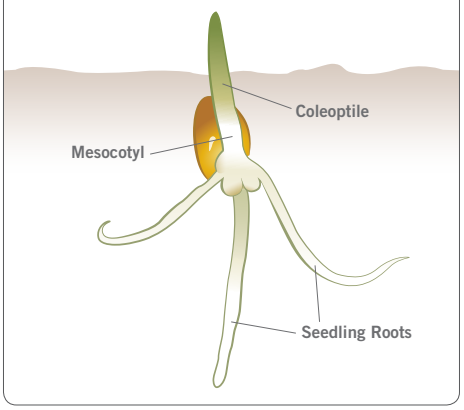
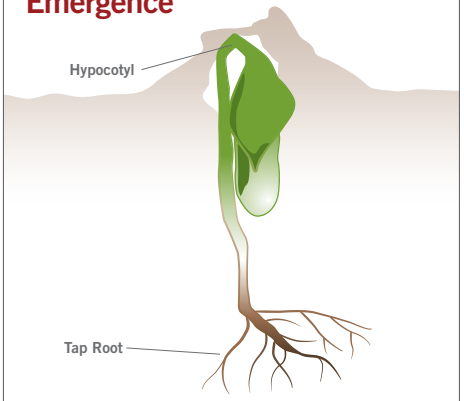


figure 4

Soybean Seedling Failed Emergence



BARRIERS TO PROPER SEED PLACEMENT

By Rob Zemenchik, Case IH Crop Production Marketing Manager

Uneven emergence affects crop performance, because competition from larger early-emerging plants decreases the yield from smaller later-emerging plants. The primary causes of delayed seedling emergence in corn include soil moisture variability within the seed depth zone, poor seed-to-soil contact resulting from cloddy soils, the inability of no-till coulters to slice cleanly through surface residues, worn disk openers and maladjusted closing wheels, according to the Ohio State University Extension. Other causes include soil temperature variability within the seed zone, soil crusting prior to emergence, the occurrence of certain types of herbicide injury, and variable insect and/or soil-borne disease pressure.

Seed depth is harder to control when planting into wet soil, a soft seed bed, or rough ground.

Both planters and drills must be able to cut and handle residue, penetrate the soil to the proper seeding depth, and establish good seed-to-soil contact. Many different soil conditions can be present when it is time to plant. Although cutting residue is easier during dry conditions, it is more difficult to penetrate hard, dry soils. Proper timing, equipment selection and adjustments, and management can overcome these difficult issues. ■

WHAT TO LOOK FOR IN PLANTERS AND AIR DRILLS

With the advances in equipment and an ever-increasing number of options designed to perfect seed placement accuracy, buying a planter or drill can be complex. Planters should be able to deliver on all six agronomic drivers of seed placement accuracy right out of the box, and it shouldn't require hundreds of dollars of additional equipment on each row to improve planter performance.

Growers also should select air drills with agronomic productivity in mind. Consider whether you'll be planting soybeans into corn stalk residue, rice into a stale seed bed, canola or winter wheat. Drills must be able to cut and handle residue, penetrate the soil to the proper seeding depth, and establish good seed-to-soil contact. Choose the features, productivity and versatility that will make every seed count and help your bottom line.

Because there are all kinds of nuances that will factor into which machine and which model with which attachments is right for your operation and your crops, local Case IH dealers are trained to help you properly configure a machine to match your needs.

Case IH offers Agronomic Design that gives farmers more advantages from technology when it is time to plant or seed your fields. ■

FIND OUT MORE

Visit **www.CaseIH.com/Agronomic Design** to learn more about agronomic considerations when planting or seeding.

Case IH Early Riser® planters are designed with agronomics in mind and have multiple, patented features. The legendary Early Riser row unit has 12 unique features that all contribute to earlier, more uniform emergence, as well as an Advanced Seed Meter for accurate in-row spacing and population control.

Case IH Precision Disk™ single-disk air drills deliver best-in-class seed placement accuracy for an array of crops grown in diverse conditions and geographies. At the heart of each Precision Disk drill is a completely new row unit with 10 unique features that all contribute to seed placement accuracy. It is engineered to help Case IH customers achieve more even emergence and improved plant stand establishment when seeding crops like soybeans, wheat, milo and hybrid rice.

Case IH Precision Hoe™ air hoe drills deliver precise seed and fertilizer placement, making it ideal for seeding high-value, small-seed crops on large acreages. It combines precise control with rugged reliability thanks to the patented, parallel-link row unit and unique single-shank design that offers good residue flow in uneven terrain and tough no-till conditions.

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