

MAXIMIZING CORN STAND ESTABLISHMENT AND GROWTH

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ABSTRACT

Corn plant stand is affected by soil temperature, soil moisture, soil nutrient deficiencies or toxicities, seed quality or vigor, planter calibration, soil insects and seedling diseases. The goal of planting is to have an optimum number of emerged seedlings, uniformly spaced and with uniform emergence.

This paper gives management suggestions to help obtain the most favorable corn stand.

Key Words: corn, stand establishment, growth, nutrient, planter

INTRODUCTION

In my 25 years of experience since graduating from the University of Illinois as an eager, young agronomist and soil scientist I have learned that there are management reasons why some corn growers consistently grow outstanding corn silage crops. My goal in this paper is to share some of these management tips with you.

CORN NUTRIENT MANAGEMENT

Take a complete soil test (including pH, salinity, nitrogen, phosphorus, potassium, zinc and boron) at least every three years to determine the fertility status of your fields to find out if there are any nutrient deficiencies, toxicities or amendments needed to correct a pH, sodium or salinity problem. Determine a realistic yield goal and supply nutrients to meet that yield goal. Corn silage nutrient needs are shown in Table 1. I am not saying you need to add these nutrients as fertilizer; depending on soil test levels, soils may supply most or all of the phosphorus, potassium, zinc and boron. If you apply solid or liquid manure determine the amount of nutrients in the manure you are applying per acre; this can be done by analyzing the nutrient content of the manure and determining how much of the manure is being applied per acre. In many instances manures will supply all the corn's nutrient needs.

Table 1. Corn Silage Nutrient Needs

	<u>Pounds per Ton</u>
Nitrogen	8.5
Phosphorus (P ₂ O ₅)	3.5
Potassium (K ₂ O)	8.5
Zinc & Boron	Base on soil test recommendation

HYBRID SELECTION

- Select a hybrid from a company that tests seed for warm and cold germination. The warm germination is required by law to be on the label, but the cold germination test is optional and many companies don't use it. Cold germination is a measure of seed vigor, which is important for planting early in cool as well as later in hot soils.
- Select a hybrid that has proven yield and nutritional content in your local area over at least a two-year period. I like to see summary data from at least 10 comparisons versus competitor hybrids before deciding on a hybrid's potential. Don't make a hybrid decision based on results from only one or two plot locations; any hybrid can win in any one plot. By looking at summary data, consistent high-yielding, good nutritional hybrids will come to the top.
- Ask the seed company representative for silage nutritional information for a hybrid you are considering purchasing. Pioneer tests their hybrids for % acid detergent fiber, % starch and % whole plant digestibility.
- All kernel sizes have the same genetic potential, so first choose the hybrid then select an available kernel size.

PLANTER TUNE-UP

- Gaps and uneven emergence are often the result of less-than-optimum seed delivery.
- Careful planter maintenance and calibration can improve uniformity of corn stands and yield. Improved in-row spacing of seed can routinely improve corn silage yields by ½ to 1 ton per acre.
- Planting instructions on the back of the seed bag is the starting point for planter-to-kernel size adjustment. For specific hybrid/kernel size suggestions, contact your seed dealer or company representative.

All Planters

- Check all chains for tightness and wear – loose chains may cause uneven spacing within the row. Replace worn or stiff chains.
- Lubricate all chains and grease fittings per owner's manual.
- Check tire pressure for proper inflation – low tire pressure will cause higher planting rates.
- Seed monitors should be cleaned, a bottle brush will remove dirt and seed treatment buildup.
- Check seed drop tubes to be sure they are clear, free of obstructions and not worn by disk openers. Rough edges caused by wear can alter seed drop accuracy. Any hindrance or obstruction that interferes with seed drop can result in poorly placed seeds.
- Make sure closing wheels are centered on the seed furrow. Be sure the wheels turn freely and check the down-pressure exerted on the soil to be sure it is appropriate for soil conditions.
- Check for wear on double-disk openers. As disks wear they become smaller in diameter and may no longer meet at the bottom. Worn disk openers can allow dry soil to fall into the seed furrow resulting in delayed germination, uneven emergence and reduced stands. Equipment manufacturers recommend replacement of the disk opener if more than ½ inch is worn off or disks do not measure within ¼ inch of each other across the planter. Table 2 lists the dimensions of new openers and diameters when disks should be replaced.

Table 2. Disk Opener Dimensions

<u>Brand of Planter</u>	<u>New Disk Diameter</u>	<u>Replace if less than</u>
Case/IH 400	13 ½ inches	13 inches
Case/IH 800 & 900	14 inches	13 ½ inches
JD 7000, 7100, 7200, 7300	15 inches	14 ½ inches
White 5100	13 ½ inches	13 inches
White 6000	15 inches	14 ½ inches

- Check depth-gauge wheels to be sure they turn and move up and down freely. Also be sure the wheels are properly positioned against the opening disks.
- Make sure the planter is level once it is in the ground.

Plate Planters

- Check for wear on cutoff fingers, knocker wheels and floor plate, replace if worn.
- Check tension on the knocker and cutoff springs, replace if weak.
- Replace any floor plates that are grooved or show wear. Check seed plates for wear, replace if the wear hole is visible from the top of the plate.

John Deere Finger Planter

- Remove knockoff brushes to check for wear. Worn brushes can cause up to 15% overplant.
- Check finger pickups for wear and finger tension. The clearance between the finger holder and the wear plate should be adjusted to 0.006” with a feeler gauge.
- Inspect the face plates for wear; to prevent overplanting, replace the plates when the wear is into the second layer of metal.
- Check the seed conveyer belt for wear, brittleness and cracks. Belts can become stiff and out of alignment with age. The paddles on the belts will sometimes become grooved or crooked.
- Excessive ground speed can cause over-planting and poor seed spacing.

John Deere VacuMeter

- Select the proper disk; use the regular corn disk when planting seed sizes up to 2,000 seeds/pound and the small disk for seed sizes over 2,000 seeds/pound.
- Adjust the vacuum level within the range of 6-13 inches; lower settings decrease seed drop while higher settings increase seed drop. Make sure all row units are operating at the same vacuum level.
- Check seals for vacuum leaks and brushes for wear. Replace brush when gaps are big enough to allow seed to pass through.
- Clean seed disks with soap and water; check accuracy of vacuum gauge.

White Seed Boss

- Select the proper disk; the small disk can be used to plant most kernel sizes.
- Adjust the air pressure from 1.5 to 3.0 ounces; raising the air pressure increases the drop.
- Replace the brushes when they show wear. Ground speed has little effect on seed drop.
- Clean out the reservoir periodically to eliminate bees-wing build-up. Liquid graphite sprayed into the bottom of the seed hopper will improve seed flowability and prevent seed bridging.
- Check accuracy of pressure gauge.

SOIL PREPARATION & PRE-IRRIGATION

- In California's southern San Joaquin Valley when planting before May 15, I suggest planting on beds. Pre-irrigation is nearly always needed since there is rarely enough rain moisture to get a good silage corn stand.
- Till the soil enough to get a seedbed that will provide good seed to soil contact.
- If you apply a preplant incorporated herbicide, follow label directions.

CALIBRATING PLANTER WITH SEED

- Select plate for plate planter or disk for plateless planter that will give seed drop with a minimum of doubles or skips and as uniform spacing as possible. Plateless planter vacuum or air pressure may need adjusting to get desired seed drop.
- Adjust seed drive gears for desired population and seed spacing. Contact your seed representative for suggested planting populations. An easy way to determine planting population is to count the number of seeds in 1/000 acre of row. Multiply seeds counted by 1000 to get planting population per acre. Table 3 lists distance needed for 1/000 acre for various row widths.

Table 3. Determining Planting Population

Row Spacing	10"	15"	20"	22"	30"	36"	38"
Row Length to Count	52'3"	34'10"	26'2"	23'9"	17'5"	14'6"	13'9"

PLANTING

- Minimum soil temperature for corn germination is 50 degrees F. at planting depth.
- Put talc on seed in John Deere vacuum planters.
- Check depth of planting with a minimum of 1.5 inches and a maximum of 2.5 inches. Make sure seed is placed in moist soil.
- Keep starter fertilizer at least 2 inches to the side and 2 inches below the seed.
- Do not place Thimet insecticide in the seed furrow.

- If wireworms or seed corn maggots are a problem use a planter box seed treatment such as Isotox or order seed pre-treated with Gaucho insecticide.
- Although it is possible to plant corn at 7 or 8 miles per hour, best seed drop and uniformity of depth of planting is obtained by planting no faster than 3-4 miles per hour.

SEEDLING EMERGENCE

- Corn seedlings will emerge when about 110-120 heat units have been accumulated. Depending on air temperature, this can take as little as four days or as long as two or more weeks. The longer seedlings take to emerge, the more susceptible they are to insects or seedling diseases.
- Thick crusts need to be broken up to allow seedling emergence.
- The seedling growing point is protected below ground until “knee-high” height. Corn seedlings are very tolerant of hail or frost injury. After hail or a frost wait a few days and 90% of the time seedlings will regrow. Rarely will replanting be necessary.

REPLANTING GUIDELINES

- There are circumstances where replanting may be justified; I suggest replanting if you have lost more than 25% of your desired stand.

FIRST IRRIGATION

- Apply the first irrigation before corn stresses. Depending on air temperatures make the first irrigation from 21 to 30 days after planting. Avoid stressing corn at the “knee-high” stage – this is when the number of rows of kernels on the ear is determined.

CONCLUSION

A wise, veteran corn grower gave me this advice when I was a rookie agronomist: “A great job of harvesting will not make up for a mediocre job of planting”. Planting is the most critical part of establishing a corn stand.

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