



Extension FactSheet

Horticulture and Crop Science, 2001 Fyffe Court, Columbus, OH 43210

Tips for Cutting Corn Production Costs

Peter R. Thomison

Corn Cropping Systems Agronomist

Edwin Lentz

Northwest District Agronomist

Ohio farmers have experienced some of the lowest cash corn prices in recent times. Lower commodity prices are forcing growers to critically evaluate production inputs. A list of proven production practices and reminders to help corn growers increase their net income is presented here. Most of these involve cultural practices that can be changed without increasing the cash cost of production. Implementing some of these practices requires a higher level of management. Low or “no-cost” crop production considerations coupled with superior management skills can help crop producers survive this period of economic stress.

1. Choose High-Yielding, Adapted Hybrids.

Corn acreage, soil type, tillage practices, desired harvest moisture, and pest problems determine the need for such traits as drydown rate, disease resistance, early plant vigor, plant height, etc. End uses of corn should also be considered. Will the corn be used for grain or silage? Will it be sold directly to the elevator as shelled grain or used on the farm? Capacity to harvest, dry, and store grain should also be considered. The most important factors for hybrid selection are maturity and yield potential. Other characteristics for consideration are stalk quality, drydown, kernel characteristics, and disease and insect resistance.

Select hybrids that have produced consistently high yields across a number of locations and/or years. Hybrids of similar maturity may vary in yield potential by as much as 30 to 40 bu/acre. Choosing a hybrid because it possesses a particular trait, such as big “flex” ears, numerous kernel rows, deep kernels, or upright leaves, does not ensure high yields; instead, look for yield stability across environments.

Consult results of state, company, and county performance trials before purchasing hybrids. Because weather conditions are unpredictable, the most reliable way to select superior hybrids is to consider performance during the past one to two years over a wide range of locations and climatic conditions. When using university performance trials, choose some of the highest-yielding hybrids from the two-year, several-location average. Results

of on-farm strip tests can be used to choose high-yielding hybrids providing there are 10 or more different locations of the strip tests. Results from single on-farm strip tests should not be used to choose hybrids because they cannot predict hybrid performance across a range of environmental conditions. Nevertheless, such tests can be useful in evaluating various traits, such as stalk and root lodging, green snap, drydown, harvestability (ease of shelling, ear retention, etc.), disease resistance, and staygreen.

Results of the OSU Corn Performance Tests can be accessed on line at: <http://www.ag.ohio-state.edu/~perf/>. Corn test results are also available from local county Extension offices.

2. Plant Hybrids of Different Maturities.

To reduce damage from diseases and environmental stress at different growth stages (improving the odds of successful pollination) and to spread out harvest time and work-load, plant hybrids having different maturities. Consider spreading hybrid maturity selections between early-, mid-, and full-season hybrids — for example, a 25-50-25 maturity planting, with 25 percent in early- to mid-season, 50 percent in mid- to full-season, and 25 percent in full-season. Planting a range of hybrid maturities is probably the simplest and most effective way to diversify and broaden hybrid genetic backgrounds.

3. Complete Planting by May 10.

If soil conditions are dry, begin planting before the optimum date. (The recommended time for planting corn in northern Ohio is April 15 to May 10 and in southern Ohio, April 10 to May 10). Avoid early planting on poorly drained soils or those prone to ponding. Yield reductions resulting from “mudding the seed in” may be much greater than those resulting from a slight planting delay.

If growers have the equipment capability to plant more than half of their corn acres prior to the optimum planting date, then this should allow planting all the corn acres prior to the calendar

date when corn yields begin to decline quickly. During the two to three weeks of optimal corn planting time, there is, on the average, about one out of three days when field work can occur. This narrow window of opportunity further emphasizes the need to begin planting as soon as field conditions will allow, even though the calendar date may be before the optimal date. As a guide, calendar date is more reliable than soil temperature for making the decision on when to begin to plant corn.

Other advantages of early planted corn are earlier maturity in the fall with more time for field drying and higher test weights. Early planting dates result in earlier plant emergence and faster canopy closure in the growing season. Faster canopy closure helps reduce early-season soil losses due to erosion. Early planted corn usually has better stalk quality and may reduce the exposure to various late insect and disease pest problems, such as European corn borer and gray leaf spot.

4. Plant Full-Season Hybrids First.

Once the full-season hybrids are planted, then alternately plant early-season and mid-season hybrids, to take full advantage of maturity ranges and to give the later-maturing hybrids the benefit of maximum heat-unit accumulation. Full-season hybrids generally show greater yield reduction when planting is delayed compared with short- to mid-season hybrids. In areas with longer growing seasons, consider planting some acreage to early hybrids to have new corn for the early market (which usually commands a premium price and thus partially offsets the income effect of the lower yield associated with early hybrids). Planting early hybrids first, followed by mid-season, and lastly the full-season hybrids spreads the pollination interval for all the corn acres over a longer time period and may be a good strategy for some drought-prone areas.

5. Adjust Seeding Depth According to Soil Conditions.

Plant between 1-1/2 to 2 inches deep to provide for frost protection and adequate root development. In April, when the soil is usually moist and evaporation rate is low, seed should be planted shallower — no deeper than 1-1/2 inches. As the season progresses and evaporation rates increase, deeper planting may be advisable. When soils are warm and dry, corn may be seeded more deeply — up to 2 inches on non-crusting soils. Consider seed-press wheels or seed firmers to ensure good seed-soil contact. One risk associated with shallower planting depths is the possibility of poor development of the permanent (or secondary) root system — if the crown is at or near the soil surface, some of the permanent roots may not grow under hot, dry conditions (resulting in the “rootless” and “floppy” corn syndromes). Another potential risk from planting less than 1-1/2 inches is shoot uptake of soil-applied herbicides.

Seeding depth should be monitored periodically during the planting operation and adjusted for varying soil conditions. Irregular planting depths contribute to uneven plant emergence, which can reduce yields.

6. Adjust Seeding Rates on a Field-by-Field Basis.

When seeding, adjust the seeding rates by using the yield potential of a site as a major criterion for determining the appropriate plant population. Higher seeding rates are recommended for sites with high-yield potential with high soil-fertility levels and water-holding capacity. On productive soils, with average yields of 160 bu/acre or more, final stands of 28,000 to 30,000 plants/acre or more may be required to maximize yields. High plant populations are also warranted when irrigation is used to maximize crop performance.

Lower seeding rates are preferable when droughty soils or late planting (after June 1) limit yield potential. On soils that average 120 bu/acre or less, final stands of 20,000 to 22,000 plants/acre may be adequate for optimal yields. Under drought stress conditions, high plant populations do not cause significant yield reduction.

Planting rate or population can be cut to lower seed costs but this approach typically costs more than it saves. Most research suggests that planting a hybrid at suboptimal seeding rates is usually more likely to cause yield loss than planting above recommended rates (unless lodging becomes more severe at higher population levels). When planting occurs in cold soils, usually very early planting dates, the seeding rate should be 15% higher than the desired harvest population. Follow seed company recommendations to adjust the population for specific hybrids.

7. Improve Stand Establishment.

Uneven plant spacing and emergence can reduce yield potential. Seed should be spaced as uniformly as possible within the row to ensure maximum yields and optimal crop performance — regardless of plant population and planting date. Corn plants next to a gap in the row may produce a larger ear or additional ears (if the hybrid has a prolific tendency), compensating to some extent for missing plants. Although skips (resulting from missing plants) cause greater yield losses than doubles, under stress conditions, crowding may result in barren plants or ears too small to be harvested (nubbins), as well as stalk-lodging and ear-disease problems. Reduced plant stands will yield better if plants are spaced uniformly than if there are large gaps in the row.

As a general guideline, yields are reduced an additional 5 percent if there are gaps of 4 to 6 feet in the row and an additional 2 percent for gaps of 1 to 3 feet. Recent studies suggest that corn growers could improve grain yield from 4 to 12 bushels per acre if within-row spacing were improved to the best possible uniformity (depending on the unevenness of the initial spacing variability).

Uneven emergence affects crop performance because competition from larger, early-emerging plants decreases the yield from smaller, later-emerging plants. If the delay in emergence is less than two weeks, replanting increases yields less than 5 percent, regardless of the pattern of unevenness. However, if one-half or more of the plants in the stand emerge three weeks late or later,

then replanting may increase yields up to 10 percent. To decide whether to replant in this situation, growers should compare the expected economic return of the increased yield with both their replanting costs and the risk of emergence problems with the replanted stand.

To improve planter accuracy and enhance uniformity of emergence, consider the following:

- Keep the planting speed within the range specified in the planter's manual.
- Match the seed grade with the planter plate.
- Check planters with finger pickups for wear on the back plate and brush (use a feeler gauge to check tension on the fingers, then tighten them correctly).
- Check for wear on double-disc openers and seed tubes.
- Make sure the sprocket settings on the planter transmission are correct.
- Check for worn chains, stiff chain links, and improper tire pressure.
- Make sure seed drop tubes are clean and clear of any obstructions.
- Clean seed tube sensors if a planter monitor is being used.
- Make sure coulters and disc openers are aligned.
- Match the air pressure to the weight of the seed being planted.

8. Perform Tillage Operations Only When Necessary and Under the Proper Soil Conditions.

Deep tillage should only be used when a compacted zone has been identified and soil is relatively dry. Late summer and fall are the best times of year for deep tillage. Avoid working wet soil and reduce secondary tillage passes. Perform secondary tillage operations only when necessary to prepare an adequate seedbed. Shallow compaction created by excessive secondary tillage can reduce crop yields. Cloddy seed beds and soil compaction contribute to uneven stands.

9. Take Advantage of Rotational Benefits.

Corn grown following soybeans will typically yield 10–15% higher than corn grown following corn. Rotation benefits are most pronounced following legumes such as soybean or alfalfa, especially in reduced tillage systems on poorly drained soils.

Benefits from growing corn in rotation with soybeans include:

- Better weed control in both crops.
- Fewer difficult-to-control weeds.
- The opportunity to rotate herbicides as crops are rotated (which means that it is less likely that certain weed species will develop resistance to specific herbicides).
- Less opportunity for an increase in insect pests and disease inoculum. (Cash costs are reduced because rootworm insecticide is not needed for first-year corn.)

- Lower fertilizer nitrogen use is possible without lowering corn yields.

The spread of gray leaf spot across the Corn Belt in recent years can be directly related to continuous no-till corn production. Given the limited genetic resistance available in most corn hybrids, rotation must be used to manage this disease effectively. Tillage to bury disease inoculum may help reduce the onset of disease, but it carries the risk of greater soil erosion.

10. Determine Harvest Dates by Crop Maturity, Not by the Calendar.

Plan to harvest fields with potential lodging or harvest-loss problems (such as stalk rot or deer damage) first. All field-shelled corn with more than 15 percent moisture must be dried for safe storage. The ideal kernel moisture level at which to harvest for dry grain storage is 25 percent.

Monitoring harvest losses is an important part of the harvesting process. Ear corn losses from in front of the combine (pre-harvest losses) should be subtracted from the total harvest loss estimate. The loss of one normal-sized ear per 100 feet of row translates into a loss of more than one bu/acre. An average harvest loss of two kernels per square foot is about 1 bu/acre. Most harvest losses occur at the gathering unit. Approximately 80 percent of the total machine loss is caused by corn never getting into the combine.

Drought-induced stalk lodging and insect problems reduce the yield potential of many corn fields if harvesting is delayed much beyond maturity. Ear-drop damage may be high in some years as a result of extensive European corn borer damage. Estimates of harvest losses based on long-term average data at Purdue University indicate that losses increase by 1 to 2 percent for each week of harvest delay. Ear damage by corn borers and other insects may also increase the potential for grain quality problems caused by ear molds. Dry shelled corn to 13 to 14 percent. Maintain cool and dry storage conditions to prevent storage molds from developing.

11. Walk Your Fields Throughout the Growing Season.

Walking your fields during the growing season will allow you to observe crop conditions and diagnose potential problems as they develop. Such scouting and troubleshooting are critical steps in identifying yield-limiting factors that need to be determined before crop-management alternatives and remedies can be considered.

For more information on dealing with various field problems that occur during the growing season, consult the *OSU Crop Observation and Recommendation Network Newsletter* available on line at <http://www.ag.ohio-state.edu/~corn/agcrops.html>. This newsletter is published weekly during the growing season and can also be obtained from local county Extension offices.

12. Know the Nutrient Needs of Your Crop.

Base nitrogen (N), phosphorus (P), and potassium (K) recommendations on yield potential. Thus, a realistic yield goal is the first critical step in nutrient management. For N, observe all credits for previous crops and manure. If the previous crop was soybeans, a N credit of 30 lbs/acre may be taken. Depending on population density, perennial legumes, established more than one year, may have a N credit between 40 and 140 lbs/acre. Grass sod/pastures (set-aside program) also may receive a 40 lb/acre N credit. Manure credits may be taken, depending upon application method and time of application.

A split application of N (at planting and sidedress) is the most efficient method for N management. This system allows later adjustments to nitrogen rates depending on the growing season. Fall N applications are the least efficient for N management. For fall applications, only well-drained soils should be considered, and the N material should be anhydrous ammonia with a nitrification inhibitor. A nitrification inhibitor should also be used with anhydrous ammonia-N on early preplant applications for wet soils. Incorporating or applying N in bands may minimize losses. Fertilizers with urea-N are susceptible to volatilization losses unless incorporated.

Phosphorus and potassium are relatively immobile in the soil (what a crop has not removed will generally accumulate for

future crops). A soil test is the best way to determine if P and K levels are in excess, adequate, or deficient. Soil P levels above 40 ppm (80 lbs/acre) are in excess and should not need additional amounts. Phosphorus applications should match crop removal if soil levels are 15 to 30 ppm (30 to 60 lbs/acre). Crop removal rates equal the yield goal multiplied by 0.35. Between 30 to 40 ppm, amounts less than crop removal would be recommended depending on yield goals. If P soil levels are below 15 ppm, then applications would include crop removal and a buildup program.

Potassium recommendations follow the same philosophy as P, except consideration is given for soil cation exchange capacity (CEC). Since applied K may be held more tightly by soils with high CEC, rates increase as the soil CEC increases. Regardless of CEC and yield goals, yields would not respond to additional K at soil levels above 200 ppm (400 lbs/acre). Corn grown on soils that have a CEC < 10 would not respond to additional K when the soil test level > 150 ppm (300 lbs/acre). Tables in the *Tri-State Fertilizer Recommendations for Corn, Soybeans, Wheat, and Alfalfa* guide (Extension Bulletin E-2567 available from Michigan State University Extension, East Lansing MI 48824-1039 or from OSU Extension, Media Distribution, Communications and Technology, 385 Kottman Hall, 2021 Coffey Road, Columbus, OH 43210) provide K rates at various yield goals and soil CEC. These fertilizer recommendations are available on line at: <http://ohioline.ag.ohio-state.edu/e2567/index.html>.

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