Illinois Corn Management 2025

Corn is an important commodity crop in Illinois, with annual plantings ranging between 10.8 and 11.7 million acres over the past decade. This publication is designed as a quick reference for information on corn management in Illinois, covering topics such as hybrid selection, planting practices, and fertilizer and pest management. This guide offers advice to assist corn producers and crop consultants and should be adapted to suit specific conditions in their cropping system.

Variety Selection

Commercial corn hybrids typically show yield differences ranging from 30 to 50 bushels per acre or even more when tested under uniform conditions. Therefore, it pays to spend some time choosing the best hybrid for a field. The key factors to consider include maturity, yield potential for that maturity, standability, and resistance to disease and pests.

Because environmental conditions change from year to year, look for hybrids that perform consistently well across multiple locations and years in the local area. The University of Illinois Variety Testing Program conducts corn crop performance tests annually, including yields, grain moisture, and average yield from the previous 2 to 3 years. Results are published soon after harvest and available at go.illinois.edu/CornCropTests. Additional sources of information include tests conducted by individuals, seed companies, and neighboring producers.

Corn hybrids grown in Illinois have planting-to-harvest growing degree day, GDD, requirements ranging from 2,300 to 2,500 for early-maturing hybrids grown in the northern part of the state to 2,800 to 2,900 for late-maturing hybrids grown in the southernmost part of Illinois. Generally, hybrids that use most of the growing season to mature should produce higher yields than those that mature much earlier. However, researchers have seen limited benefits from using a very long-maturing hybrid than medium-maturing hybrids. For this, consider hybrids that would reach maturity 10 to 14 days before the average date of the first killing freeze of 32 F in the region as shown in Figure 1. Planting hybrids with different maturities also helps spread the harvest schedule and reduce the risk of the entire crop being exposed to adverse weather conditions, such as drought and heat, during pollination.

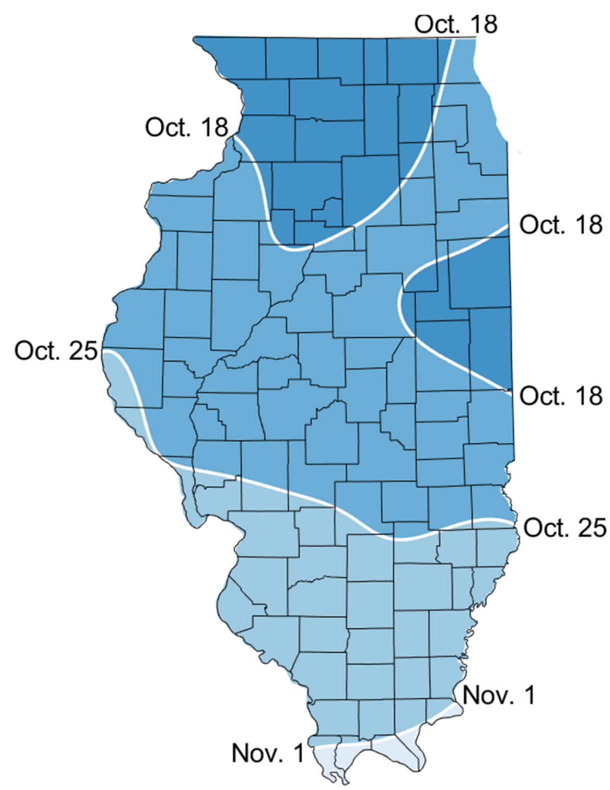

Fig. 1. Median date of first fall 32 F freeze in Illinois (1991 to 2020 normal). Map generated by Trent Ford, Illinois State Water Survey.

Resistance to insects and diseases is also important when selecting corn hybrids. For instance, corn rootworms, including the western and northern corn rootworm species, are the most economically important corn insect pests in Illinois. Further, refine the selection by considering the high-yielding hybrids with resistance or tolerance to major diseases in the area.

Planting Practices

Planting Date

Corn planting date trials from 2007 to 2024 show that the optimum planting date for corn in Illinois is between mid-to-late April (within 1% of maximum yield). Yields declined gradually with planting delays in early May, reaching around 93% of the maximum by May 15, as shown in Figure 2. However, yield losses increased rapidly thereafter, dropping to 85% of the maximum by May 31 and 79% by June 8.

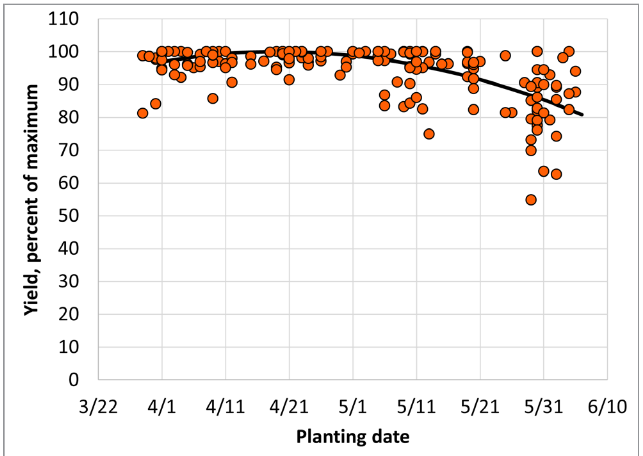

Fig. 2. Response of corn yield to planting date across 43 Illinois trials. Yields are percent of the maximum yield at the site; each trial had four planting dates. The average maximum yield across sites was 217 bushels per acre, so each percent change in yield is 2.17 bushels per acre.

Another important consideration when deciding when to start planting is the condition of the soil. Planting into wet soils or mudding in can increase the risk of sidewall compaction and poor root development, especially if the weather turns hot and dry after planting. This can result in reduced plant stand, delayed emergence, and restricted root growth, all of which can negatively affect yield.

Planting Depth

Ideal planting depth varies with soil and weather conditions. For most situations, corn should be planted 1.5 to 1.75 inches deep. Later in the season and under dry conditions, planting as much as 2.5 inches into moisture may be advantageous, especially if the forecast is for continued dry weather. Deeper planting tends to result in reduced stand due to crusting or wet soils and an increased chance of uneven emergence, which can cause yield losses.

Seeding Rate

Seeding rate trials conducted in 17 sites across Illinois between 2016 and 2018 showed that the optimum population – where the yield increase from the last seeds planted was just enough to cover the seed cost – averaged 34,000 plants per acre, ranging from approximately 30,000, in a dry year, to 40,000 plants per acre. The optimum seeding rate depends on the weather, hybrid, and practices selected.

Fertilizer Requirements

Fertilizer application is an essential component of corn production, representing about 45% of the direct costs in Illinois. Here are a few considerations for profitable corn production.

Soil Tests

Soil testing is a key starting point for an effective nutrient management program since it provides information to guide accurate fertilizer decisions. It is recommended to collect soil nutrient samples every 2 to 4 years to track nutrient levels in a field, particularly in high-yielding environments where nutrient removal is expected to be high. During periods of high fertilizer costs, such information can help guide decisions on lime, phosphorus (P), and potassium (K) applications, resulting in fertilizer savings and increased profitability.

Phosphorus and Potassium

Applications of P and K fertilizer should be guided by soil test results. The Illinois Agronomy Handbook recommends maintaining Bray P1 soil test levels between 40 and 50 pounds per acre to ensure that soil P availability will not restrict crop yield. Similarly, soil test K levels should be slightly higher than the critical levels of 260 and 300 pounds of exchangeable K per acre for soils in the low CEC (<12 meq/100 grams) and high CEC regions (>12 meq/100 grams), respectively.

Yield responses to fertilizer P and K are generally consistent in low soil testing. However, there is little to no agronomic and economic advantage in applying P when Bray P1 values are higher than 60 to 70 pounds per acre. Similarly, no K additions are suggested if test levels are above 360 pounds per acre in low CEC soils and 400 pounds per acre for high CEC soils.

Crop Removal Rates

When soil test levels are within the optimum range, apply amounts removed with harvest. Crop removal rates for Illinois were updated a few years ago based on several thousand corn and soybean samples collected over three years from 2014 to 2016. The removal number for corn is 0.37 pounds P2O5 and 0.24 pounds K2O per bushel.

Nitrogen Rates

Figure 3 shows an example of a typical corn yield response to N fertilizer rate. Generally, yield increases in a curvilinear trend with each additional pound of N applied, producing a smaller increase up to a maximum or flat line (i.e., yield does not increase with more N). The economic optimum N rate (EONR) is calculated based on mathematical equations that describe the agronomic yield response to N and the implementation of economic analysis using current N fertilizer and corn grain prices. Greater N fertilizer price relative to corn grain price will result in lower EONR values. The EONR is the N rate where the last pound of N added produces just enough extra yield to pay for itself – also called maximum return to N (MRTN).

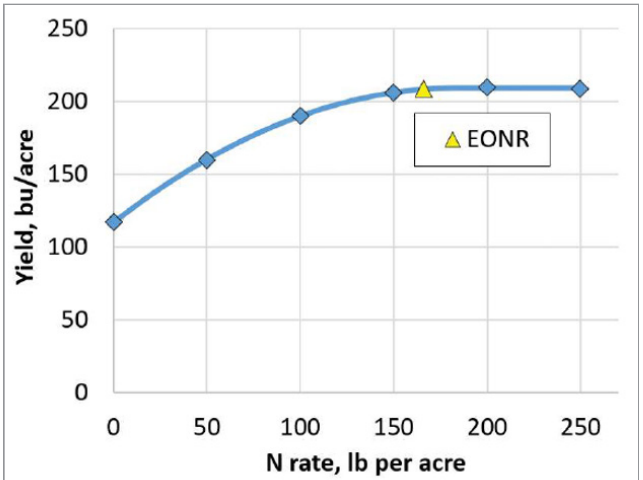

Figure 3. Example of a typical corn yield response to applied nitrogen (N) fertilizer. The line is fitted to the data points using computer software. The yellow triangle indicates the economic optimum N rate (EONR), which is 166 pounds per acre in this example.

The Corn N Rate Calculator website cornnratecalc.org calculates the EONR with different N and corn prices and profitable N rates from recent N rate research data on corn following corn and corn following soybean. The database is also grouped based on north, central, and south geographic locations in Illinois, allowing for more specific recommendations. As of 2023, there are 600 field trials in the Illinois database.

See the MRTN Guide publication for more details.

Weather, soil conditions, and other farming components, like tillage, hybrid, or crop rotation, affect ideal N timing and placement. The longer N is stored in the soil between application and corn uptake, the greater the risk for potential N loss. There is no one-size-fits-all solution for N management, as there are many sources and ways that fertilizer N can be applied in Illinois.

Therefore, consider an N management system that one supplies some N early in the season to support establishing yield potential, and two ensures that enough soil N is available during the period of rapid N uptake (growth stages V7–R1).

See Nitrogen Management for Corn in the Illinois Agronomy Handbook for more information on N rate, source, placement, and time of application.

Sulfur

Most of the sulfur (S) in soil is found in organic matter, which releases plant-available sulfur to crops as it mineralizes. Sulfur is also very mobile in the soil, and leaching is common. Therefore, S deficiency is more likely to appear in sandy or coarse-texture soils with low organic matter. Heavier soils with high organic matter tend to be cooler and wetter in April – conditions that affect mineralization – and early-season S symptoms may disappear as S availability increases during the summer and root systems develop to exploit greater soil volume. Sulfur deficiency in corn appears as interveinal striping chlorosis on the youngest leaves. The S removal rate for corn is around 0.08 lbs. per bushel.

Soil pH and Liming

Soil pH tests are measures of soil acidity or alkalinity and should be used to determine if lime should be applied. The Illinois Agronomy Handbook provides liming recommendations for soils with pH 6.0 or less for corn systems. When determining application rates, consider lime's chemical and physical quality. The effective neutralizing value (ENV) of liming material increases with higher calcium carbonate equivalence (chemical quality) and smaller particle sizes (physical quality).

Weed Management

Eliminating or reducing the deleterious effects of weeds on agronomic crops is the ultimate goal of weed management. Integrated weed management includes all practices that enhance a crop's competitive ability and decrease weeds' ability to reduce yield. Successful weed management requires identifying relevant species and understanding their biological characteristics to tailor management to the weeds in individual fields.

Weed Identification

Accurate identification is critical: identifying seedling weeds is necessary for selecting an appropriate postemergence herbicide while identifying mature weeds often indicates which species will populate a particular field the following season. Most weed species in Illinois agronomic cropping systems are either broadleaves or grasses. Broadleaf species are generally easier to differentiate than grasses, especially at early growth stages.

Most weeds of agronomic cropping systems are herbaceous, but a few species that can become established in reduced-tillage fields are woody, such as maple trees. Weeds can be categorized according to their life cycle or how long they live: annual, biennial, and perennial. Knowledge of life cycles is essential to reducing the potential for weeds to produce viable seed or vegetative structures that aid in weed dispersal.

Chemical Controls

Currently, the most common method of managing weeds is through the use of herbicides. Many options are available, each with distinct advantages and disadvantages. There are also several methods by which herbicides can be applied. Whatever the herbicide or method of application, the goal is to prevent weeds from contributing to crop yield loss by reducing the amount of competition exerted by the weeds. Other weed management practices in Illinois agronomic crops include cultural and mechanical approaches.

Cultural Controls

Cultural weed management practices allow the crop to become established without experiencing any negative effects of weed interference. Proper crop variety selection and planting date, adequate soil fertility and pH, and crop row spacing are examples of factors that can be manipulated to improve the competitive ability of the crop.

Mechanical Controls

Mechanical weed management involves physical disturbance of weeds, such as pulling weeds, tilling the soil before or after weeds emerge, and mowing.

See Weed Management in the Illinois Agronomy Handbook for more detailed information on chemical weed management.

Insect Management

Transgenic Insect-Resistant Hybrids

Many commercial field corn hybrids grown in Illinois possess biotech traits for the control of one or more groups of insect pests. Packages of these traits are classified as above-ground if they target caterpillar species that feed on the foliage, stalk, silks, and/or kernels or below-ground if they target corn rootworm. These traited hybrids express toxic proteins from the bacteria Bacillus thuringiensis (Bt), which target insects from the orders Lepidoptera (caterpillars such as European corn borer) or Coleoptera (beetles such as western corn rootworm). Recently, traits for corn rootworm control have been introduced that work via RNA interference. These traits are available as pyramids with existing Bt traits for rootworm control.

For more information on biotech traits, including which ones are present in which commercial trait packages, see the Handy Bt Trait Table provided by Extension entomologists at Michigan State University and Texas A&M University.

Seedling Pests

Several insect pests attack corn seedlings by feeding on the germinating seeds and developing roots, including wireworms, white grubs, grape colaspis, and seedcorn maggots. Others attack by feeding on the leaf and stem tissue of newly emerged plants, such as black cutworm and armyworm.

Rescue treatments are typically unavailable for those pests that feed below ground; control can be achieved using a seed- or soil-applied insecticide.

Understanding the risk factors that favor these pests can help to guide control decisions for these sporadic pests. For example, seedcorn maggot is often associated with decaying organic material, such as livestock manure or a terminated cover crop, incorporated by a tillage operation just before planting.

Black cutworm and armyworm injuries are usually associated with a stand of broadleaf (cutworm) or grass (armyworm) winter annuals that are dying, usually due to a herbicide application, during the period from corn emergence to approximately V5. Cover crop termination during this time can also lead to injury from these pests, as armyworm often injures corn where it borders winter wheat.

A broadcast insecticide as a rescue treatment can effectively control black cutworm or armyworm, but the larvae can be difficult to scout for due to their habits of hiding in residue or plant whorls during the day.

Corn Borers

The widespread use of transgenic hybrids with corn borer resistance has dramatically reduced the incidence of both European and southwestern corn borer in Illinois. European corn borer injury still occurs in non-Bt corn occasionally, particularly where non-Bt corn has been grown repeatedly in one area with minimal destruction of residue. While Bt-resistant European corn borer populations have been observed in some regions with limited, isolated areas of corn production (e.g., Nova Scotia and Manitoba, Canada), populations in Illinois and throughout the Corn Belt remain susceptible to Bt traits.

Corn Rootworm

Western and northern corn rootworms together make up the most economically important insect pest complex in Illinois corn. Several trends in rootworm management have emerged in recent years. The rotation-resistant variant population of western corn rootworm has declined in its impact, limiting most corn rootworm problems to areas where corn-after-corn production is more common, particularly in northern Illinois. Northern corn rootworm populations have increased in Illinois over the last 5 to 7 years.

Resistance to all four Bt proteins available for rootworm control has been confirmed in both species in parts of the Corn Belt, and this resistance is confirmed or suspected in much of Illinois. Resistance to the Cry3 proteins (Cry3Bb1, mCry3A, and eCry3.1Ab) is apparently widespread in Illinois western corn rootworm populations. Resistance to Cry34/35Ab1 is present in the state, but the level of resistance varies from place to place. Resistance to these toxins has resulted in increasing reports of unexpected injury at greater than half of one root node pruned to pyramided Bt hybrids or those that express multiple different Bt proteins targeting corn rootworm in Illinois. The best resistance mitigation tactic is to rotate problem fields away from corn for one or more years. Soil-applied insecticides are also available to control corn rootworm larvae.

Ear Feeders

Several species of caterpillar pests injure corn ears by feeding directly on kernels. Corn earworm is the most widespread of these pests. The migratory insect does not overwinter in Illinois, and damage is most common in the southern portion of the state when corn planting is delayed. Because feeding in field corn is mainly limited to the ear tips, compensation by the remaining kernels typically results in little to no yield impact from this insect. However, the feeding sites can facilitate ear rots, leading to quality reductions and, in some cases, mycotoxin contamination. Control with insecticides is generally not recommended in corn grown for grain. Some Bt trait packages provide effective control, though resistance to all the Bt proteins available except Vip3Aa has been documented.

Fall armyworm can also feed on kernels, but its impact in Illinois field corn is minor. Even in outbreak years, this insect arrives in Illinois too late to cause injury to most corn grown for grain. Western bean cutworm is present in parts of Illinois, particularly in areas south of Lake Michigan that have sandier soils. Unlike corn earworm, multiple western bean cutworm are often found in a single ear, and their feeding is not limited to the ear tip. Bt corn hybrids that contain the Vip3Aa protein provide effective control of western bean cutworm. In hybrids without Vip3Aa, this insect can be controlled with a broadcast insecticide application, though the timing is critical. Consider an application if 8% of plants have egg masses and/or small larvae.

See Managing Insect Pests in the Illinois Agronomy Handbook for more detailed information on identification, biology, and risk factors for these and other insect pests.

Disease Management

Environmental conditions during the 2024 corn season were conducive to epidemics of tar spot, northern corn leaf blight, and southern rust. Of course, all years are different, and producers should continue focusing on the basics of integrated plant disease management to protect yields. Important among disease management practices are choosing disease-resistant hybrids, continuing with crop rotations, maintaining balanced fertility, and using seed treatments with a mixture of active ingredients.

Tar Spot

The most challenging disease in the last few years is the new kid on the block: tar spot. The severity of this disease varies widely with minor environmental changes. It is more of a problem in the northern parts of the state but is well-established throughout the state. Significant yield losses can be observed if the disease is not managed properly. In addition to choosing hybrids that offer at least some resistance levels, it is probably a good idea to use foliar fungicides if the disease is present shortly before tasseling. The Field Prophet, developed by University of Wisconsin researchers, forecasts tar spot disease based on weather predictions. Using the tool's research findings might help avoid unnecessary applications when the environment is not conducive for tar spot.

Other Foliar Diseases

Unfortunately, tar spot is not the only foliar disease of importance. Grey leaf spot has been consistently causing issues, and there is always a chance for northern corn leaf blight and rust. If those diseases are present in the field before flowering, foliar fungicides might be the best management option.

Stalk Rot

Other diseases are always possible. For example, stalk rot caused some concerns in 2024. High-quality hybrids and balanced nutrition are our best tools against this disease.

Diagnosis

Remember that the only way to achieve proper management is with an accurate diagnosis. The University of Illinois Plant Disease Clinic can help with the appropriate identification. Upon receiving an accurate diagnosis, review the recently revised Managing Diseases section of the Illinois Agronomy Handbook for comprehensive and up-to-date Integrated Plant Disease management information for all corn diseases in Illinois.

Fungicide Selection

To learn more about the efficacy of commercial products in controlling foliar diseases, please refer to the Fungicide Efficacy Table from the Crop Protection Network.

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