Channel. Seedsmanship At Work

Agronomy ADVICE | Tips from the Channel® Field Check Up Series

Management of Continuous Corn Systems

Key Points

- With proper management, high yields are possible in continuous corn.
- Key factors for optimum continuous corn performance include proper management of residue and nitrogen (N) fertility.
- Weed, insect, and disease issues require an even higher level of management than in rotated acres.
- Some corn products are better adapted than others to a continuous corn system.

Throughout the last four decades, research has shown that corn yield potential is at greater risk in continuous corn production systems as compared to rotated acres.[1] A six-year study at the University of Illinois documented a continuous corn yield penalty (when compared to corn following soybeans) of 9 to 42 bushels per acre and found that continuous corn systems can be at risk for up to seven years due to decreasing net soil nitrogen (N), corn residue, water, and weather.[1] Fields selected for continuous corn should have good drainage, high water holding capacity, good fertility, no compaction problems, and low insect and disease pressure.[1] This research also suggested that proper management of corn residue provides the best hope for maintenance of continuous corn productivity.

Managing Residue

Healthier, higher-yielding corn can result in increased levels of residue. Residue management at harvest and at planting is key to successful continuous corn production. Excess residue can hinder emergence, establishment, standability, and even yield potential of the next crop. Accumulated corn residues can reduce soil temperatures, reduce N availability, increase soil moisture, and favor the survival of specific insects and diseases.

To overcome these residue challenges, farmers may be required to use intense tillage or strip-tillage to aid in the burial and removal of residue. Combine attachments or post-harvest shredding may also be considered to size and spread residue uniformly during harvest. The rate of residue decomposition is influenced by soil temperatures and moisture levels, soil microbial populations, and the availability of N to support microbial degradation of residue. Using strip-tillage and row cleaners at planting can facilitate better seed-to-soil contact and allow soil to warm more quickly.

Fertility Management

One of the major hurdles in continuous corn production is N immobilization (N is tied up by microbes to decompose residue from the previous corn crop). To overcome this when planting corn following corn, a higher N application rate is often recommended. An additional 30 to 50 lbs/acre of N may be required for continuous corn acres when compared to a corn-soybean rotation.[2] The application of N at multiple times throughout the season, such as N applied preplant and sidedress, may help increase N use efficiency of continuous corn acres by improving N availability during critical stages of corn growth.

Phosphorus (P) and potassium (K) should also be maintained at optimum levels on continuous corn ground to encourage stand establishment and help minimize problems with stalk strength and stalk rots. Corn plants use more P and less K than soybean plants. Using a balanced starter fertilizer is more likely to produce a positive response in continuous corn than in a corn-soybean rotation because of the stressful early growing conditions.

Figure 1. Corn seedlings emerging through heavy corn residue.

Product Selection

Selecting the correct corn product is very important for successful continuous corn production. Products should be selected with special attention to plant characteristics including high ratings for emergence, seedling vigor, disease resistance, and root and stalk strength. Continuous corn production can increase the likelihood of certain insect pests; therefore, products with insect trait technology should be used to provide additional protection.

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Choose products with multiple modes of insect protection for above and below ground insect protection. Continuous corn systems are more susceptible to having high corn rootworm populations. Work with your local Channel Seedsman for help with recommending the best products and insect trait protection for continuous corn fields.

Disease and Insect Control

Increased disease and insect pressure is to be expected when planting the same crop the following year. Fields with heavy surface residue may not warm up or dry out as early in the spring, creating ideal conditions for seedling diseases. Seed treatments can help protect seedlings from these pathogens and insects, such as wireworms, seed corn maggots, and grubs. Fields with known corn nematode populations can benefit from seed treatments that include a nematicide.

Depending on the growing region and environmental conditions, increased disease potential in continuous corn may require the use of fungicides at VT-R2 growth stages. Fields with heavier disease pressure may require a sequential fungicide program consisting of a pre-tassel application followed by a VT-R2 application. Fields should be scouted weekly to determine if a fungicide should be considered. Timely fungicide applications can be an important tool to help limit potential yield losses. Always read and follow fungicide labels.

Weed Control Challenges

Herbicide selection is more limited when planting corn after corn. Corn residue can also reduce the efficacy of many soil applied herbicides and/or shield young weed seedlings, allowing certain species to thrive. A soil-applied residual herbicide should be applied either preplant or preemergence to decrease weed pressure and reduce selection of herbicide-tolerant weeds. Providing early-season weed control can widen the postemergence application window. For the most effective weed control, postemergence herbicide applications should be made when weeds are still small. Additional information for weed control in continuous corn systems can be found at www.roundupreadyPLUS.com. Work with your local Channel Seedsman for help with identifying best management practices for continuous corn production systems.

Control of volunteer corn is especially problematic in continuous corn cropping systems. Because options are very limited for control of volunteer corn once a new corn crop is established, a proactive management approach is key. At harvest, lodged plants, ear drop, improper combine adjustments, and poor harvest conditions can cause grain loss and increase the potential for volunteer corn the next spring. Keeping harvest losses to a minimum and tilling fields in the fall are tools that can reduce volunteer corn in the following crop. Herbicide options are limited and cultivation may be the best option for volunteer corn control in corn.

Planting Tips

Some producers planting corn after corn may feel there is a need to increase seeding rates to help establish an adequate plant population. The chance of seedling losses may be higher in continuous corn; however, other management decisions such as seed selection and quality seed treatments may help reduce seedling establishment issues. Your Channel Seedsman can help identify the recommended planting population for each product you intend to use. Because corn residue from the previous year may impede seed-to-soil contact, manage the seedbed to reduce residue interference and improve seed-to-soil contact for improved stand establishment. Continuous corn fields should not be planted too early, as the soil in these fields will take longer to warm up in the spring. It may be best to plant rotated acres first.

Sources: [1] Gentry, L.F., Ruffo, M.L., and Below, F.E. 2013. Identifying factors controlling the continuous corn yield penalty. Agronomy Journal. 105: 295-303. https://dl.sciencesocieties.org/. [2] Nielsen, R.L., Johnson, B., Krupke, C., and Shaner, G. 2007. Mitigate the downside risks of corn following corn. Corny News Network. Purdue University. https://www.agry.purdue.edu/. Owen, M. 2007. Weed management in continuous corn. Iowa State University. IC-498. http://www.ipm.iastate.edu/. Wilson, R., Sandell, L., Klein, R., and Bernards, M. 2010. Volunteer corn control. 2010 Crop Production Clinics Proceedings. University of Nebraska-Lincoln Extension. http://nlc1.nlc.state.ne.us/. Erickson, B. and C. Alexander. 2008. How are producers managing their corn after corn acres? Purdue University. https://www.agecon.purdue.edu/. Sundermeier, A., Thomison, P., Reeder, R., Dick, W., and Mullen, R. 2007. Managing tillage and crop rotation in northwest Ohio. The Ohio State University Extension. AGF-506-07. http://ohioline.osu.edu/. Web sources verified 10/09/15.

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