

5-28-2001

Timing cultivation to complement conservation plans

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Recommended Citation

Al-Kaisi, Mahdi; Hanna, H. Mark; and Tidman, Michael J., "Timing cultivation to complement conservation plans" (2001). *Integrated Crop Management News*. 1887.

<http://lib.dr.iastate.edu/cropnews/1887>

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Timing cultivation to complement conservation plans

Abstract

Even with the best management, sound weed control plans in conservation tillage systems can fail, and producers may have to decide whether to head to the field with the cultivator. Although soil conservation plans in general seek to minimize tillage and soil disturbance, no producer should be expected to suffer serious yield and income loss due to weeds.

Keywords

Agronomy, Agricultural and Biosystems Engineering

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences | Bioresource and Agricultural Engineering



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Make sure there is a reason to cultivate

If a field is reasonably clean, do not cultivate. However, if there are a lot of weeds or if the soil is crusted, crops and the soil could benefit from aeration. Generally, under good conditions, cultivation can provide immediate weed control of 70 to 80 percent. But, because there is no residual effect, if growing conditions are good, weed control later in the season may fall to between 50 to 60 percent.

Conditions needed to cultivate

Timing is important. Small weeds lack deep, extensive root systems and are easier to manage with the cultivator than larger, established weeds. Therefore, cultivating is most effective when done early. Grasses are also difficult to manage with cultivation because of their fibrous root systems. Cultivating in wet soil allows weeds to reroot and keep growing but may promote soil surface compaction.

Consider the impact of cultivation on soil moisture loss

Cultivating increases soil moisture loss from the surface layer (the top 2 inches). When a soil crust has formed, very little soil evaporation occurs at the soil surface. Therefore, cultivation disturbs the soil's surface and enhances evaporation and soil moisture loss. Every soil disturbance causes a soil moisture loss of approximately 1/4 inch of moisture. The extent to which such moisture loss affects crops also depends on soil moisture status at depths below approximately 3 inches. However, soil moisture below the surface layer (3 inches and deeper) is less affected by cultivation.

Other impacts of cultivation

Cultivation also may damage plants, particularly their root systems. When soil moisture is limited, soils tend to have massive structure, and any soil disturbance could damage newly formed root systems. Furthermore, potential for soil erosion increases because cultivation can bury crop residue and loosen the soil. Typically, cultivation decreases residue cover from

5 to 10 percent.

Other disadvantages include higher fuel bills, more time spent in the fields, and the risk of ineffective weed management. Deep cultivation actually increases weed problems by pulling deeply buried weed seed to the surface where it may germinate. Cultivation also increases the air content in the soil surface and the oxidation of the organic matter.

How to cultivate

Producers generally spend a lot of time setting up other equipment. They should spend just as much time setting up cultivators. Get off the tractor, get behind the machine, and check the performance. Check for uniformity--see how deep the sweeps are going and check to see whether small weeds are being uprooted. Also, check sweeps or shovels behind rear wheels; sometimes they need to be set deeper to get acceptable penetration.

Research shows that the best results in weed control (and ultimately crop yield) are obtained from faster speeds. When the crop is small, use shields and keep tractor speed slow enough to avoid covering or injuring the crop. Focus on scraping small weeds up and out without disturbing the soil too deeply or without turning residue under. Operating depth should run about 1.5 to 2 inches (unless deeper cultivation is required for ridging). Once the crop has shaded the soil, weed seed germination stops, crops gain an edge on weeds, and crops are less vulnerable to competition for nutrients, sunlight, and water.

Conclusion

Every year, producers face decisions about cultivation. Soil conservation plans minimize tillage and manage crop residue, but post-planting cultivation is sometimes needed. If chemical weed control strategies have not worked, go ahead and cultivate. When properly implemented, cultivation can be an effective part of an overall management plan. The key is to cultivate at the right time and maintain the effectiveness of conservation plans.

This article originally appeared on pages 88-89 of the IC-486(11) -- May 28, 2001 issue.

Source URL:

<http://www.ipm.iastate.edu/ipm/icm//ipm/icm/2001/5-28-2001/timecult.html>

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