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## Choosing cultivation for dry soils

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# Choosing cultivation for dry soils

## **Abstract**

More than half of Iowa's producers choose to cultivate every year. But this year, it's dry over much of the state, and predictions of a season-long drought have many producers concerned about weed control and cultivation. Regardless of moisture levels, most soil conservation plans seek to minimize cultivation and soil disturbance. But no producer should be expected to endure serious yield and income losses due to weed infestations. Cultivation results in a wide range of weed control effectiveness. Although a single cultivation cannot provide adequate weed control by itself, the use of row cultivation can reduce weed control costs and shifts in weed populations when used to supplement herbicides.

## **Keywords**

Agronomy, Agricultural and Biosystems Engineering

## **Disciplines**

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

# INTEGRATED CROP MANAGEMENT

A photograph of a person in a field, possibly a farmer or researcher, with large, stylized text overlaid on the image. The text reads 'INTEGRATED CROP MANAGEMENT' in a serif font. The background shows a field with tall grasses and a person in the distance.

## Choosing cultivation for dry soils

More than half of Iowa's producers choose to cultivate every year. But this year, it's dry over much of the state, and predictions of a season-long drought have many producers concerned about weed control and cultivation.

Regardless of moisture levels, most soil conservation plans seek to minimize cultivation and soil disturbance. But no producer should be expected to endure serious yield and income losses due to weed infestations. Cultivation results in a wide range of weed control effectiveness. Although a single cultivation cannot provide adequate weed control by itself, the use of row cultivation can reduce weed control costs and shifts in weed populations when used to supplement herbicides.

The primary reason to choose cultivation is to control emerged weeds, but cultivation also can break up a sealed crust, providing increased oxygen transfer to root systems. If weeds or crusting are not a concern, producers should probably leave the cultivator in the shed, regardless of soil moisture status.

In a dry year, cultivation should be considered only if a significant weed population is present. Dry conditions in general are very challenging in terms of managing soil, and several factors need to be considered when making the decision to cultivate dry soil.

First, consider the impact of cultivation on soil moisture loss. Cultivating when soil is dry increases soil moisture loss from the surface layer, or the cultivation depth (the top 2 inches of soil or so). Under dry conditions and when a soil crust has formed, very little soil evaporation occurs, and cultivation disturbs the soil surface and increases soil moisture loss.

A general planning guideline is that every soil disturbance causes soil moisture loss of a quarter inch, although this number varies based on soil texture, percentage of soil organic matter, and the amount of residue on the soil surface. The dry weather and soil conditions this year mean that producers should take more care in cultivating the soil to keep the moisture in the ground. But the extent to which such moisture loss affects crops depends on whether soil moisture is present at lower depths (below approximately 3 inches). Thus, if soil moisture content is low and has only been recently replenished by a quarter-inch rainfall, cultivation can rob the crop of a small amount of moisture--enough to help it through the next couple of days. However, if the soil profile has moisture below the surface layer, cultivation may not have much impact on crop available water.

Under normal conditions, cultivating for weed control would not significantly impact crop development due to depletion of available soil water. Assuming the cultivator is operating at a depth of 2 to 3 inches, by the typical time of row cultivation the crop would have a fairly good

root system established (usually around 4 to 6 inches) and thus is not very dependent on soil moisture in the first few inches of soil. Furthermore, the potential for soil erosion increases because cultivation can bury crop residue and loosen soil.

A second consideration is the possible damage to the plants and particularly their root systems that could occur with cultivation. When soil moisture is very limited, soils tend to have massive structure, and any soil disturbance could damage newly formed root systems.

Research shows that the best results in weed control (and ultimately crop yield) are obtained from faster cultivation speeds. When the crop is small, use shields and keep the tractor's speed just slow enough to avoid covering or injuring the crop. Focus on scraping small weeds up and out of the soil without disturbing the soil too deeply or without turning residues under. Hit it light, and keep soil disturbance to a minimum. Also, work to maintain residue cover while the crop firmly establishes a canopy. Once the crop has shaded the soil, weed seed germination stops, and the crop gains the edge on weeds and is less vulnerable to competition for nutrients, sunlight, and water.

For weed management in soybeans, especially narrow-row soybeans, a rotary hoe can be an effective tool. Rotary hoeing must be done just after weeds germinate, while they are still in the white-root stage.

Cultivation is an important tool for postemergence weed control. Whether moisture loss is significant to the crop depends on ambient soil moisture. If weeds are not present or a surface crust is not hindering crop growth, then the cultivator should probably stay parked to conserve soil moisture as well as labor and machinery depreciation costs.

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