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Crop-specific cultivating tillage

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Abstract

Now that the seed is in the ground for many producers, it's time to turn to the issues of row-crop cultivation and rotary hoeing, and the impact that both can have on soil erosion, productivity, and profitability.

Keywords

Agronomy, Agricultural and Biosystems Engineering

Disciplines

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

INTEGRATED CROP MANAGEMENT

The image shows a person in a field, likely a farmer, working in a field. The text 'INTEGRATED CROP MANAGEMENT' is overlaid on the image in a large, bold, serif font. The background is a photograph of a field with tall grasses and a person in the distance.

Crop-specific cultivating tillage

Now that the seed is in the ground for many producers, it's time to turn to the issues of row-crop cultivation and rotary hoeing, and the impact that both can have on soil erosion, productivity, and profitability.

Potential benefits

First is weed control. In good soil conditions, 70 to 80 percent of the weeds between the rows may be removed by single-row cultivation. Fewer weeds reduce the competition for water and nutrients, which can have a significant impact on crop productivity and profitability.

Other benefits include breaking the soil crust, which aerates the soil as well as the crop root environment, and allows a better initial soaking from rainfall along with lower chemical use. Most row crops do respond positively to cultivation and rotary hoeing.

The challenges

Row-crop cultivation and rotary hoeing are good options for farmers who practice minimum or reduced tillage. However, remaining crop residues (of more than 30 percent) can make cultivation and rotary hoeing difficult for producers who are using a conservation tillage plan. Cultivation, like any tillage operation, could end up turning over the crop residue and leaving the soil exposed to water and wind erosion.

Moreover, seasonal rain may prevent timely cultivation, and the temptation to go to the field as early as possible with the cultivator could lead to significant soil compaction and yield reduction.

Details such as row spacing and potential damage to crops also need attention, especially where rows are narrower than 20 inches. Drilled soybeans prohibit cultivation altogether.

So taking all the above into consideration, there are benefits of cultivation, but those benefits can be expensive to win in terms of erosion and overall productivity.

Do the benefits of cultivation outweigh the challenges?

Here are some aspects to consider when deciding to cultivate or not. First, producers have to assess the weed pressure and competition with crops in their fields. The key is to be able to establish what benefit would come from weed management. If weeds are not present and soil sealing is not a problem, cultivation isn't needed.

Second, before rotary hoeing, assess the stage of development of the crop. When hoeing, the risks to the crop are greater for soybeans than for corn. In soybeans, don't knock off the cotyledons (the first two small 'leaves' to appear). Corn is less troublesome to hoe, but stop often and make certain the stand hasn't been damaged.

Third, in order to do a good job rotary hoeing, follow this general rule: stir the soil surface and get weeds just as they emerge. Look for weeds at the white root-hair stage -- any larger than this and it is probably too late for most of them. Sun and wind are great for drying and killing exposed weed roots. Wet soils make the roots clump together, lower the effectiveness of hoeing or cultivation, and may require a second pass in the opposite direction.

Furthermore, producers need to consider how soon the crop will establish a canopy cover. This is important because canopy can reduce erosion by softening the impact of raindrops on the soil. Timing for establishing canopy depends on many, many factors, including those as simple as crop maturity and row width, but also factors such as the variety or hybrid, and varying soil conditions.

Conservation tillage results in reduced evaporation. Under dry conditions, crops can be put at risk because of loss in soil moisture from 'opening' up the soil. In times of limited soil moisture, conservation tillage systems out-yield intensive tillage systems because tillage results in moisture loss.

The final decision

In the end, the key is to have a decision tree ready that involves economic gain from weed reduction, long-term productivity loss, poor water quality that results from soil erosion, and the impact of soil moisture status on the crop.

Producers should make choices that limit residue burial and prevent soil erosion by limiting the impact of raindrops. Once soil splash starts, the soil surface can crust and become 'sealed' off, leading to surface runoff.

For more information, refer to PM 1623: [Cultivation, an Effective Weed Management Tool](#) [1].

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[1] <http://www.extension.iastate.edu/Publications/PM1623.pdf>