

WEED CONTROL IN NO-TILL

Although no till cultivation in certain areas is quite beneficial, weed control is still one of the largest challenges in these systems.

The absence of tillage disruption and the presence of the crop residue cover in no-till systems generally result in an increase in organic matter content, soil moisture, improved earthworm populations and microbiological activity, and a decrease in erosion, soil temperature, surface sealing and compaction. These in turn can have a direct or indirect effect on the weed species present, time of germination and competition, as well as herbicide selection, formulation, timing and method of application.

Tips for successful no-till weed control

1. Timely weed control. In no-till systems herbicides are applied onto a leaf surface, or into the soil, and will get the best results when the conditions are most favourable for herbicide absorption.
2. Distribute crop residue uniformly over the field. This is necessary for uniform herbicide application, good planter operation and consistent seed placement.

There are several problems associated with concentrated stubble rows:

- Labels of soil-active herbicides stated that these herbicides must be applied on a fine and even seed bed. In no-till systems, soil-active herbicides applied after harvest, can be bound by the crop residue. Foliar-active herbicides can also be intercepted by the residue without coming in contact with emerging weeds.
- The shaded, cool, moist environment under stubble rows results in a longer period of germination and emergence of weeds and volunteer crops, than in the rest of the field. This makes a single application of foliar-active herbicides less effective.
- High populations of weeds and volunteer crops in the stubble rows could require higher herbicide application rates to provide effective control.
- Drill penetration for good seed-soil contact is often inadequate in dense stubble, resulting in reduced or non-uniform crop stands. This provides less crop competition with weeds, which is an important part of effective, season-long weed control.
- Stubble also provides a favourable environment for soilborne crop dis-

eases, pests and rodents, resulting in reduced crop vigour and reduced competition with weeds.

3. Effective weed control in preceding crops: Reducing weed seed production, and thus the future weed population, before practising no-till will improve chances of a successful crop under conservation tillage.
4. Effective herbicide application is required. Using a properly equipped herbicide sprayer is essential for successful weed control in no-till farming. Consult product labels for specific recommendations.
5. Select a well-drained field with low weed density. Absence of perennial weeds is desirable when starting no-till. Careful assessment of potential weed problems will help to achieve initial success with no-till.
6. Fertilizer application should be adjusted for no-till. Banding of fertilizer for increased availability and early access by the crop roots is commonly beneficial for both crop yield potential and weed control. Banding of fertilizer can improve crop yields under given conditions and provide more vigorous crop competition with weeds. Broadcast application of nitrogen fertilizer has been shown to increase populations of some grass weeds, such as wild oats.
7. Crop rotation. Crop rotation may

be particularly helpful in controlling numerous weed and disease problems.

8. Use clean, high quality certified seed of varieties best adapted to the area. Weed-contaminated crop seed can be a significant contributor to weed problems. High quality seed is important for rapid emergence and early competition with weeds.
9. Early seeding of spring crops can often improve yield potential and ability to compete with weeds. However, planting date must also be based on soil temperature, soil moisture content, disease potential and the potential for soil compaction under wet conditions.
10. Control plant diseases, insects and rodents: Maintaining a healthy, vigorous crop, relatively free of diseases and pests, increases the crop's ability to compete with weeds.
11. Prevent weed contamination of no-till fields. No weeds should be allowed at any time of the year to seed in the field or surrounding areas. Where irrigation is practised, watercourses should be slashed to prevent seeding.

Weed control principles for no-till crop production

No-till implies that no tillage will be practice for seedbed preparation before crop planting. Herbicide appli-

cations in no-till fields may be made before planting (pre-plant), during planting, or post-emergence.

Pre-plant. With this method, herbicides are applied before planting when weed seed is ready to germinate or when a few weed seedlings have emerged from the soil. The objective is to prevent weeds from becoming established in the seedbed.

Pre-plant herbicide applications are often referred to as: 1) early pre-plant (EPP) treatments which are made 14 to 30 or more days before planting; 2) pre-plant surface applied (PPSA) treatments which are made up to 14 days before planting.

1. Early pre-plant (EPP). Field scouting needs to be done periodically to determine when weed seed is germinating. Grass weeds germinate seven to 10 days later than broad-leaf weeds. Perennial weeds (kikuyu, *Cynodon*) must be controlled about 4-6 weeks before planting, weeds should be actively growing, so that they can effectively absorb herbicides. Use the "Guide to the use of Herbicides" of the Department of Agriculture, Directorate: Agricultural Information services, for a listing of herbicides which may be applied early pre-plant. Herbicides like glyphosates and paraquat may be used.
2. Pre-plant surface applied (PPSA). Up to 14 days before planting, weeds of varying sizes may be present

in the seedbed. Therefore, pre-plant surface herbicide treatments must have foliar activity to remove emerged summer and winter annual weed seedlings. Again use the "Guide to the use of herbicides" for a list of pre-plant and foliar applied herbicides.

Time of planting. Herbicides may be applied during or after planting but before crop emergence. In this case previously emerged weeds must be removed with a foliar applied herbicide or a mixture of a non-selective plus residual herbicide.

Post-emergence. After crop emergence, producers still have several weed control options. A variety of selective herbicides, both foliar-active and soil-active, are available for on-crop application. These herbicides must be applied at the recommended rates and at the correct developmental stages of both weed and crop to achieve optimum weed control while minimizing crop injury.

Possible effects of no-till practises on weed control

1. Shift in weed spectrum to perennial broadleaf weeds and tufted grasses (wild sorghums, *Cynodon*, kikuyu) and sedges: Perennial weeds and sedges previously removed or disrupted by mechanical cultivation, often require special treatment in no-till. Weed population changes seem to favour small-seeded species compared to broadleaf species.

2. Herbicide resistance: Routine over-all sprays of herbicides may cause weeds to develop resistance to herbicides.
3. Organic matter may effect herbicide dosages: The high temperatures in most parts of South Africa prevent the accumulation of organic matter. The build-up of organic material in the soil may take at least 5 years or longer before it will have an effect on herbicide dosages.

General

Weed identification forms the foundation for effective weed control. For

weed identification the handbook "Common weeds in the crops and gardens in Southern Africa written by Mr Chris Botha" are available from the ARC-Grain Crops Institute, Potchefstroom.

Recent information regarding the most popular herbicides and control of weeds is published annually in the Maize Information Guide, obtainable from ARC-Grain Crops Institute, P/Bag X1251, Potchefstroom, 2520.

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