

## **WEED MANAGEMENT IMPERATIVES IN ZERO-TILLAGE SYSTEMS**

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The benefits for sustainable crop production that are associated with zero-tillage practices are unequivocal. From a weed management perspective, however, it removes the important method of mechanical control from the farmer's "toolkit". This, to a large extent, makes practitioners of zero-tillage reliant on chemical control (herbicides).

The practice of cover crops for weed suppression is gaining ground in zero-tillage systems, for perfectly good reasons. It should be noted that this biological way of weed management is mainly based on chemistry – dead plant material and live plants (weeds and crops!) exude biochemicals that can inhibit the growth and development of not only plants (weeds and crops!) but also micro-organisms. The phenomenon is called "allelopathy". This means that there should be knowledge about the nature of the chemicals involved, and the extent to which they can affect not only crops but also beneficial soil micro-organisms.

Back to synthetic herbicides.....Over-reliance on a particular herbicide, in particular a specific mechanism of herbicide action, promotes not only shifts to dominant weed species that are "hard-to-control", but even more importantly promotes the evolution of weed resistance towards an herbicide, or to put it more accurately, weed resistance to a particular herbicide mechanism-of-action. Misuse (off-label usage) of herbicides has the same consequences! The hard lessons learned in the USA and in countries of South America about herbicide resistance must be taken to heart and preventative measures implemented in order to contain and even avoid the same problem from decimating profit margins of South African crop producers.

Scientific investigation the world over has proven that containment and prevention of herbicide resistance can be achieved only through combining different herbicide mechanisms-of-action, e.g., by using tank mixtures of different herbicide products, or ready-mixed herbicide formulations containing more than one active ingredient (=mechanism of action). From a practical viewpoint, tank mixtures give the best solution because it gives flexibility based on the weed spectrum occurring on a particular field, at a particular point in time.

It is imperative that crop producers confront and effectively manage herbicide resistance, because it not only poses direct financial risk, but also indirectly through the distinct possibility that herbicides that are currently highly effective could either be "lost" or at least have their utility reduced.

The five golden rules for avoiding herbicide resistance:

1. Keep weed numbers low – reduce the "1 in 1,000,000" chance that an individual weed plant in a population could, in a natural way, evolve herbicide resistance.
2. Prevent weed seed production because resistance is genetically inherited and is spread through seed.
3. Do not rely on a single herbicide, or more specifically, do not be reliant on a single mechanism-of-action; Employ more than one herbicide mechanism-of-action – is best achieved with herbicide tank-mixtures.
4. Avoid under- and over-dosing since both promote resistance.
5. Integrate different weed control methods (chemical, mechanical, cultural, biological) wherever applicable.