By Dr Charlie Reinhardt

WEED CONTROL IN SOYA BEANS:

Make-or-break herbicide choices

Soya bean production in South Africa is experiencing a sharp growth curve. According to the Bureau for Food and Agricultural Policy's (BFAP) Agricultural Outlook: 2012-2021, it is possible to achieve a soya yield of more than two million tons on a surface of approximately 900 000ha by 2021. This is estimated to represent about 40% of the land surface that will be planted with maize by 2021.

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The challenge for producers is to double the current average yield of less than 3t/ha in order to meet the global average, and to meet the growing domestic demand for soya bean products such as oilcake and seed oil.

Weed control is one of the most vital practices requiring effective application if we are to achieve significant growth in our soya bean yields. Even in other parts of the world such as Argentina, Brazil and the United States where soil type and climate are generally less restrictive than in South Africa, effective weed control is deemed essential.

Morning glory is a major problem in soya bean cultivation, as it is tolerant to various herbicides, and sprouts throughout the growing season.

Locally registered herbicides

In South Africa 24 herbicides (active ingredients) are registered for use on soya beans. Eleven of the 24 control mainly grass weeds, while five control broadleaved weeds, and eight control both grass and broadleaved weeds. Thirteen of the 24 herbicides are registered for pre-emergence use, nine for post-emergence and two for both pre- and post-emergence use.

At first glance it may seem as though there are more than enough herbicides to effectively manage weeds in soya beans, but it has to be taken into account that not all the herbicides within a particular chemical group or mode-of-action control the same spectrum of weeds, and there are major differences in weed types found in different climate zones, regions, districts, farms, and even between fields on the same farm.

Competitive nature of weeds

Like most other crops, soya beans are most sensitive to weed competition more or less four weeks after sprouting, and also from the onset of the reproductive phase (flower formation, pollination and seed formation). Between these growth stages the crop is capable of strongly competing with weed, provided that it is able to quickly develop a canopy. Especially grass weeds and nutsedge (*Cyperus esculentus* and *C. rotundus*) compete poorly under low-light conditions that are coupled with overshadowing.

The extent to which weeds compete with soya beans for growth factors such as water, nutrients and light, depends on the type of weed and its numbers, since weed types vary a lot in respect of competitiveness, and because large numbers favour a weed type in the competitive struggle with the crop. In addition to this, weeds will compete best when growth factors become restrictive, such as during drought and low nutritional status of soil or when the crop comes under stress due to weak cultivation practices, diseases, or as a result of under-performance by *Rhizobium* bacteria.

Treatment methods

Herbicides administered prior to planting are ideal for the reduction of weed types and numbers during the early growth stages of the crop. Popular herbicides for pre-plant administering on weeds that have emerged above-ground are

glyphosate, 2.4-D and paraquat. Precise mixing methods and succession application of these three products are registered for this purpose. (Consult product labels.) All three show little to no activity after coming into contact with soil, but for certain products containing these active ingredients, there are set waiting periods before the crop can be safely planted. (Consult and follow label directions.)

Besides pre-planting administered herbicides, there are various other registered treatments aimed at pre-emergence control (herbicides administered during planting or shortly after planting) in a large variety of weed types. Herbicides used for treatment at this critical stage include certain *acetamides* (e.g. alachlor and metolachlor), *diclosulam*, *dimethenamid-P, flumetsulam* and *imazethapyr*. The after-effect (persistence) of a pre-emergence administered herbicide should ideally be long enough to prevent or limit weed competition with the crop for as long as possible.

Development of weed resistance

No-till systems do not offer the option of mechanical weed control (hoeing), and consequently post-emergence weed control is entirely dependent on herbicides. In glyphosate-tolerant soya beans, glyphosate herbicide are the logical preferred treatment; it controls the broadest spectrum of weeds up to a relatively late growth stage. (See product label for growth stage restrictions.)

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Glyphosate use in glyphosate-tolerant soya beans controls weeds that escaped the effect of pre-emergence herbicides, as are weeds that sprout until late in the season or throughout the season, e.g. flaxleaf fleabane (*Conyza bonariensis*), morning glory (*Ipomoea purpurea*) and crabfinger grass (*Digitaria sanguinalis*).

Crops that resist glyphosate herbicides have led to a major transformation in weed control. This form of biotechnology has greatly simplified weed control in genetically modified (GM) crops such as glyphosate-tolerant soya beans and made it more economical, the result being that many other herbicides lost their market share.

Dependence or excessive use of a single herbicide, specifically if it affects a single plant enzyme, is conducive to the development of weed resistance. Avoiding this colossal problem is relatively simple, provided that the guidelines for weed resistance management is applied scrupulously. These guidelines are freely available from companies that manufacture or sell herbicides.

Be sure to report weed and herbicide-related problems to Dr Reinhardt, and read more about weed resistance research on the website *http://goo.gl/5vh4N7*.

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Good control of yellow nutsedge with post-sprout administered glyphosate in glyphosate-tolerant soya beans.