

By Andries Gouws

An exceptional soya bean yield

Spray applications are combined to prevent unnecessary cultivation.

Exceptional yields are possible with soya beans, provided that you correctly attend to every facet of the cultivation process. This year, a soya bean yield of up to 8t/ha filled the combine harvester to the brim on the farm Leeubank of Gerrit Roos near Wonderfontein in Mpumalanga.

Last year he was crowned champion soya bean producer (under irrigation) in the Weigh to Win™ National Yield Competition, when a block of two hectares he entered yielded an average of 5,236t/ha. This year, the harvester measured just over 8t/ha in certain parts of his irrigated fields. Roos says careful attention to small things in every aspect of the entire cultivation process makes the difference, because he manages everything in a precision farming system.

Every year Roos plants strip trials containing the soya bean cultivars of different seed enterprises. This allows them to determine which cultivars best suit the conditions on his farm. Roos plants approximately 1 000ha maize and 450ha soya beans. He also manages a livestock branch.

Maize and soya beans are planted in a crop rotation system, which means the fields are planted with soya beans every three years. When he joined the

enterprise, Roos planted soya bean trials and although maize sets

the tone as the primary crop, the soya beans have stood their ground, especially considering their hidden benefits. Since their first soya bean planting in 1992/93, they have doubled the average yield on dryland from 1,8 to 3,6t/ha. They also plant soya beans under centre pivot irrigation and 20ha with underground drip irrigation. These fields deliver an average yield of 4 and 4,25t/ha respectively.

Strip-till system

Ortman implements are used to strip-till the land. During last year's planting season a large section of the fields was too damp for these implements, and a broad-tilling implement (Fieldspan) was used, after which the soil was compacted with a roller. The advantage of this process is that germination takes place evenly and the soil is much more even, thus reducing wear and tear on the blades of the combine harvester's soya bean table and saves a lot of money.

In the strip-till system only the soil in which the seed will be planted, is

tilled to a depth of 280mm. Every year the strips are moved slightly to eventually utilise the entire land area. The fields consist mainly of Avalon soils, and care is taken to keep the soil pH level between 6 and 6,5.

Since 2000 they have been using a precision farming system with a diamond pattern (100m × 100m) where soil samples are taken and analysed annually. If the analyses indicate a shortage of lime or other nutrients, corrections are made continuously. Every third year, lime is applied across the board and fertilisers are applied throughout according to changing needs.

Roos says he has found that soya beans react most favourably to 'old' fertilisation. For this reason a mixture of 0:1:2 fertiliser at 200kg/ha is broadcast just after the maize, which is followed by soya beans that have been harvested. This leads to a reaction between the



crop residues, fertiliser and organisms in the soil, which in turn stimulates the earthworm numbers in the soil.

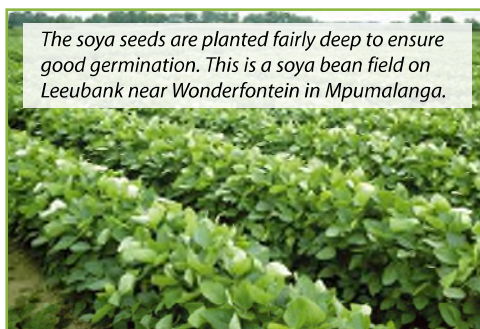
Roos plants cultivars that exhibit resistance to Roundup® herbicide. Upon planting herbicide is applied to the soil to postpone the first Roundup® application for as long as possible. Proven cultivars are planted, as are the best performers in every year's strip trials. The cultivars that grow upright are planted at approximately 300 000 plants per hectare, and the shrub-type cultivars at 260 000 to 280 000 plants per hectare in rows 90cm apart. The seeds are planted at a depth of between 4 and 5cm to ensure that there is sufficient moisture for even germination.

Fungal disease control

Around 40 days after planting, the first Roundup® application is done. Supplementary nutrients and fungicides are mixed into the herbicide to respectively lessen the shock and prevent counter fungal diseases from becoming an even greater problem. At approximately 60 days after planting, a copper spray is applied in support of the effort to control fungal diseases.

At the first flowering stage, a mixture of mono-ammonium phosphate (MAP) and diammonium phosphate (DAP), specialist fertiliser products for soya beans, are applied at 4 to 5kg/ha with a fungicide and some brown sugar (as agglutinant). Later, the cultivars with a long growth period receive another fungicide application. As soon as flowering time is over, they administer a last application of Roundup® to ensure that all weeds are eliminated.

Fungal diseases are becoming a major problem and especially *Sclerotinia* can harm the yield. Roos says his experience is that soya beans that are planted earlier, are not as severely plagued by these diseases. Producers traditionally plant soya beans after having planted maize. When using underground drip irrigation, fungal diseases are not such a big problem.



The soya seeds are planted fairly deep to ensure good germination. This is a soya bean field on Leeubank near Wonderfontein in Mpumalanga.

Drip irrigation

They installed the underground drip irrigation around a decade ago. The dripper lines are installed approximately 350mm below the ground, 200mm apart and the drippers in the lines 20mm apart. Every dripper has the capacity to apply two litres of water per hour.

The advantages of this irrigation system entail:

- That it uses 50 to 75% less water than a centre pivot.
- Irrigation can be done with precision.
- It keeps fungal diseases at bay.
- At least one less fungicide application is necessary.
- Fertiliser can be placed at the root zone.

The system also has its challenges, among others that the depth of cultivations over the pipes should be very accurate. The system must be installed in square or rectangular blocks,



This year, the combine harvester indicated a yield of just over 8t/ha on certain parts of the soya bean fields.

and the dripper lines can be 180 to 200m in length at most, to maintain the pressure for even application. Continuous maintenance is necessary and the system must be cleaned regularly to prevent the drippers from clogging.

Mice can also present a huge challenge. They would typically dig the pipes open and bite holes into them. For this reason, they have erected owl cages near the fields and planted poles with bails on the contours where owls can rest while they are hunting. Only environmentally friendly methods are used to control the mice.

The system is initially more expensive to install than a centre pivot, but in the long run (after about six years) it becomes the cheaper of the two.

Although soya beans can hold their own as a crop in a farming enterprise, its use as a rotation crop has numerous advantages. The nitrogen (N) deposits that soya beans leave behind in the soil, can lead to maize yields of at least 2t/ha higher than where soya beans were not planted the previous year.

Soya crop residues are also manna for sheep. The animals ingest the residues and pick up the kernels behind the harvester. The additional protein during mating ensures a higher lambing percentage, and in certain years there are between 10 and 15% more twins.

All soya beans are processed on farm into soya oil, soya oilcake containing 46% protein and 6% energy and full-fat soya oilcake with 37% protein and approximately 20% energy. Initially, the oil was pressed to use as fuel on the farm, but due to the huge increase in plant oil prices it is no longer a viable option. The oilcake is used in the cattle and sheep feedlots on the farm. Roos says they add value to everything that leaves the farm.

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