

SUPREME YIELD IN SOYA



American farmer **Kip Cullers** holds the world record for soya bean yield. On a recent lecture tour of South Africa's grain farming areas, he spoke about maximising yield. **Lloyd Phillips** reports.

Tall, lean and unassuming, with a pronounced Missouri twang, Kip Cullers could embody the archetypal American farmer.

"Farming is my job and my hobby; I'm doing what I most enjoy," he says introducing his presentation.

Kip confesses that soya bean production is his least favourite cropping enterprise, adding: "Soya beans are so forgiving, farming them is not challenging enough." However, he makes it clear that he gives 100% to every one of his many farming enterprises.

He stresses that any discussion of his farming methods would not be a great help to SA soya bean farmers as he farms halfway around the world. He prefers instead to talk about his farming philosophy. A total of 95% of his

cropping operation is no-till. "My topsoil is about 46cm deep, but there's no great difference between the A and B soil horizons. If you dig down 12 feet (3,66m) the soil is red from top to bottom," he explains.

During planting, Kip runs two 24-row John Deere planters at a 17cm inter-row spacing, 24 hours a day, until the maize and soya planting is finished. He stresses that consistent emergence in these crops is the first important step towards high yield. A planter must be set to place seed at a uniform spacing and soil depth so that all seeds germinate at almost exactly the same time.

"I have a few hundred acres of trial plots where I plant hundreds of varieties of soya bean and maize so that I can find out what works best in terms of planting methods, fertiliser and chemical

ABOVE: Kip Cullers says that he prioritises leaf area in his soya plants. The bigger the surface area of the leaf, the more the plant will photosynthesise. This ensures plant health and production.

PHOTOS: FW ARCHIVE

application, implement selection and use," he says.

Kip aims to get as much leaf area as possible in plants soon after germination.

"The greater the leaf area, the more light is captured for photosynthesis. Dark green soya leaves mean that photosynthesis is working well."

Dealing with crop residue is "not a big deal" for Kip. To promote quick utilisation by soil microbes, he applies a mixture of sugar and nitrogen over the crop residue.

"It's like feeding a kid a Hershey bar. It gets the microbes really charged up. By the next planting season, most of the crop residue has dissipated into the soil."

Kip says treating soya bean seed is essential for good germination, plant establishment, growth and yield. With plants taking 95% of their nutrient requirements from the top 10cm of the soil profile, the more feeder roots it can put out into this layer, the more nutrients are available to the plant.

"I'm a firm supporter of seed treatment," he says. "It's cheap and effective, and can significantly improve yield and farm income."

Kip points out that the commonly held notion that soya bean roots cannot be nodulated by applying nitrogen is a myth. In an on-farm experiment, he applied nitrogen at 1t/ha to a soya bean crop and achieved very good root nodulation.

"Soya beans are inefficient nitrogen users," he explains. "It takes about 2,72kg nitrogen to produce about 27,22kg soya beans – that's a ration of 1:10. Once you aim for yields of above 2,722t/ha, you will probably have to add nitrogen. Soya beans need more water and fertiliser than maize does."

Kip is trying to decrease the height of mature soya bean plants. The upper leaf canopy on tall plants prevents light from reaching the lower leaves. In attempts to limit



plant growth without compromising yield, he trialled applications of Dicamba pre-emergent herbicide and Apogee plant growth regulator. Unfortunately, Dicamba killed the young trial plants and Apogee resulted in lateral branching while the plants continued growing.

"People ask why I would want smaller soya plants as the lower pods become increasingly difficult to harvest with a combine. The answer is simple. I would just lower the combine's header and drive more slowly. This way, I'd still get a good yield," he says.

Another challenge for Kip is to prevent white mould (*Sclerotinia*) from infecting his crops. Seed that might be infected with white mould should not be retained for planting the following season.

"White mould can be controlled and even eliminated with the biological product Contans," he explains. "It attacks the spores

- Consistent emergence is the first step towards high yield.
- White mould can be biologically controlled.
- The most efficient irrigation method is to have frequent applications of water at lower volumes.

FAST FACTS

in the soil before they can infect soya plants. I find appropriate pest and disease controls and use them even if they're inconvenient or difficult to use."

Kip uses leaf colour as an indicator of plant health. Dark green leaves mean the plant is healthy and is photosynthesising well. Factors such as pests and diseases, nutrient and water shortages discolour or shrivel soya leaves, indicating that the plant may die prematurely unless it receives the correct treatment. "Foliar feeding is a good way to promote leaf growth," he says.

In soya beans, seed size is correlated to yield; the

ABOVE:

Kip Cullers in a soya bean land that is ready to harvest. He holds the world record yield of 10,36t/ha.

COURTESY OF DU PONT PIONEER

RIGHT:

Kip is experimenting with shorter plants. He says that to harvest the lower pods he would lower the combine header and drive more slowly so that yield would not drop.



bigger the seed the higher the yield. Kip uses the larger type of soya bean seed and explains that larger seeds germinate more strongly, with more leaf and bean per hectare and more uniform growth. (Agronomist Emile van den Berg says that scientists are encouraging farmers to plant in numbers of seed per hectare rather than in kg/ha.)

"In one project, I compared crop performance with fewer but higher volume irrigation against more frequent but lower volume irrigation. I found that the crop become water-stressed between irrigations and then being over-watered during irrigation.

TO GAUGE PLANT HEALTH, INSPECT PLANTS DAILY

Frequent, lower-volume irrigation uses water more efficiently," says Kip.

He uses in-field soil moisture logging probes to monitor water use and water stress.

"If you lag behind with irrigation, you'll struggle to catch up on crop growth," he warns.

"A healthy plant tolerates heat better.

So don't cut corners on fertiliser, herbicides, pesticides, fungicides and foliar feeds."

Kip kills off weeds early, saying that weeds taller than 5cm will reduce yield potential by 10%.

"If South African farms have Round-Up resistant weeds, the new BASF herbicide Kixor works," he says. "It has helped reduce volunteer weeds in my crops after initial spraying. The only way to gauge the efficiency of weed control and plant health is to inspect plants close up daily."

Kip advises soya bean farmers to conduct variety trials so they can identify varieties that yield best under each farm's production conditions. He also recommends farmers work with seed companies in on-farm trials.

"Soya bean plants are like people: if they're not feeling well they won't be productive. Plants that have their requirements met will achieve their full yield potential. But it's important that a farmer figures out the limiting factors to soya bean production on his farm and deals with each one."

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Record harvests

Kip Cullers produces maize on 1 619ha and soya beans on 243ha on his farm near Purdy, Missouri. His highly diversified farming operation includes maize for silage,

green beans, winter spinach and poultry.

Producing his first world record soya bean yield of 9,35t/ha in 2006, he followed with 10,36t/ha in 2007. In 2010, he established

the current world record of 10,80t/ha.

According to SA's Crop Estimates Committee, our country's average soya bean yield for the 2012/13 summer season was 1,52t/ha.