

Soya beans – research to your advantage

By Willem Otto and Roean Wessels, Sensako, Bethlehem

Soya bean production is currently on everyone's lips. The crop continued its growing trend in hectares planted and according to the National Crop Estimate Committee, 573 950ha were planted in the past season (www.sagis.org.za/CEC). Especially in the Free State the area planted increased.

Product price per ton, adjustment in planting time with the new cultivar series available, as well as other crop management options make the crop more attractive for placement in crop planning. The input and dedication of the Protein Research Foundation (PRF) and other role-players in this regard deserve applause. The industry expansion has come about with vision, insight and hard work.

As expected, the demand for information from producers regarding the best soya bean practices has also expanded. New cultivars have been developed and released for the growing market, responses to new production problems and difficulties have been researched and developed, and several further developments are currently under way.

Information on a wide range of soya bean cultivation aspects is available on the PRF's website (www.proteinresearch.net). This includes various videos about soya bean cultivation compiled by Wessel van Wyk.

Production considerations

What information does a producer need to consider in the decision-making process and planning phase of soya beans?

According to an investigation conducted by Blignaut and Taute (2010), the potential production areas in South Africa are divided into zones suitable for soya bean cultivation as well as the growth classes that would be recommended in these areas.

The categorisation was based on soil classification and climatic conditions that include temperature, humidity, rainfall and heat units. Are there possibilities for soya beans to form part of crop rotation in a given production area? Financial considerations such as income per hectare, operating budgets and mechanisation planning all play an important role.

Under irrigation, the plant and harvest dates of the different crops in rotation are critically important to assist in deciding when the plant window for soya beans will be



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available. The planting time in a given area determines the choice of growth class of the cultivar which will best match this and deliver optimal results.

According to Van Wyk and De Beer (2009), the soya bean cultivars' maturity grouping (MG) in South Africa is divided according to the four cultivation zones identified, namely: Cold – MG 4 and 5, Cool – MG 5 and 6, Moderate – MG 6 and Warm – MG 6 and 7.

Daylight length

The soya bean plant is a photoperiodic crop that responds to daylight length during the development stages of the season. The period from plant to flower is determined by temperature and daylight length, and a larger plant with more leaves (leaf factory) that can intercept sunlight for a longer time and translocate plant sugars during the grain-filling period, leads to the highest grain production. The transition phase to flowering and thus the reproductive phase of development is specifically initiated by shorter daylight length (longer dark phase).

Daylight length changes throughout the year for a given area according to a fixed and predictable pattern and is not as volatile as other climate factors. Cultivar selection and growth class must, therefore, be chosen to optimise the two yield factors, namely leaf factory size (length of vegetative growth phase) and grain filling period.

The planting date is an integral part of the process because the daylight length pattern for the rest of the season is linked to it. Consequently, changes in this date will necessitate the adjustment in growth class selection which will be affected least by the planting date. If the planting date is delayed, row width and planting position should also be adjusted. Under dryland production conditions, the planting time is determined by groundwater conditions influenced by rainfall and processing actions.

Production factors

The question thus is, given that the choice of the most suitable cultivar should be determined by the planting time, what are the optimal production practices that must be followed to obtain the best yield result with the cultivar selection?

From literature, several production factors can be identified that can influence returns, and the most important ones are as follows: climate, soil fertility (fertiliser included), cultivar selection, seed treatments (fungicide,



insecticide, nematode control and biological inoculation), biomass protection (fungicide and insect control) and row spacing (including planting density). These factors have always contributed positively to returns, although some variation is found.

The climate, as mentioned earlier, cannot be predicted, but daylight length and temperature during the growth season are known factors as well as the entry date for frost, especially in the Eastern Highveld. This is an important time as it may impair the development of pods, especially with cultivars with longer growth seasons. Seed treatment (for biological nitrogen bonding), plant- and biomass protection against diseases (such as Sclerotinia) and insects are important management practices.

Soil fertility, residual nutrients and fertilisation play a major role in the success story of soya beans, along with the importance of management practices. An important factor that must also be considered is the use of germinating seed sources.

Research on plant condition and plant loss during the growth season from plant to harvest, indicated that greater losses in plant condition and potential yield can be expected if poor seed resources are used. This includes seed that was not effectively stored, poorer grain quality characteristics (damaged seed husk, split kernels, green kernels and especially disease infections) and seed treatments that have not been performed optimally.

Research conducted

Research worldwide confirms that narrower rows increase yield potential of soya beans. In production articles by VKB, results are

shown on plant dates and growth classes of different cultivars of the last two production seasons in the East Free State (Steynberg and Van Zyl, 2017).

From the above as well as the research results of the Sensako soya bean programme on row widths and planting conditions, the following conclusions were made:

- Narrower rows (38 and 50cm) significantly increased the yield of soya bean cultivars compared to 76 and 91cm row widths in the past two production seasons, although the yield differences were smaller in 2016/17, which was a high rainfall season.
- The research showed that the postponement of soya bean planting, especially with MG 6 growth class cultivars, resulted in yield losses due to lower biomass development, less pod formation and also frost damage. This was compared to the MG 4 and 5 cultivars tested that still yielded good yields. The conclusion is that in the cultivation area MG 6 cultivars only come into their own during early planting times, and for the rest of the growth season the MG 4 and 5 growth class cultivars will deliver the best yield. When the planting date is delayed, narrower rows ensure that the leaf canopy covers the soil surface faster, resulting in maximum use of sunlight, optimised yield potential and reduced water evaporation and weed penetration.
- Lower plant density promote bushy side-branch development but lower pod height and irregular ripening, especially in wide rows. A higher plant density is recommended as optimal and increases pod height, but also increases the plant's potential to fall over and less pods to develop per plant. The risk of disease contamination with this practice also exists because air flow between rows is limited and a micro-climate conducive to disease development can be created.
- Be adaptable in cultivar selections depending on the plant window available. Choose the growth class and cultivar accordingly, and adjust row width and plant positions which will result in the best yield reaction. 🌱

(References available from the authors at email willem.otto@sensako.co.za.)