Making sunflower great again



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To make something truly great again usually relates to performance or relevance. In the case of sunflower, that component is grain yield.

Lacking clearly defined heterotic groups, which limits significant breeding advances, and usually planted as a catch crop in marginal areas, sunflower could be seen as a crop in decline, with marginal yield gains compared to maize and wheat. On top of that, the latest Crop Estimates Committee figures show a 5% decline in hectares planted this past season compared to the previous season.

Sunflower has, however, seen some recent technological advancements in the form of Clearfield technology, which allowed the crop to expand in areas where late season weed management has been problematic.

Third time lucky crop

Since the introduction of this non-transgenic herbicide resistance technology, growers have been able to enjoy on-par yields versus conventional hybrids. They can also fully exploit the advantages brought about by no-till production systems. Given their yield compatibility, Clearfield hybrids will become common genetic platforms for future hybrid releases even if they are planted in conventional production systems.

"Sunflower is a third time lucky crop," was the comment of a frustrated grower who had to replant several times. There are, however, some basic guidelines to eliminate luck from the production equation that could see the crop have its rightful place in a successful crop rotation system.

Perhaps the most important factor to make sunflower great again is planting date. To fully understand the value thereof, the relevance of the three distinct growth stages must be discussed. During the first growth stage, from planting to floral initiation, the first yield component (number of heads per hectare) is defined.

Environmental stress during this stage usually has limited effect on grain yield, as the plant simply has to maintain a heartbeat to keep the yield component of total heads per hectare alive.

Drought stress reduces yield

During the second growth period, floral initiation to bloom, the most critical 'greatness' component on yield is determined. During this sensitive stage, the number of seeds per head is determined as the floral parts develop into harvested grain and the bud develops into the flowering head the crop is so famous for. Drought stress during this stage, especially, will reduce yield more than any other phase of development.

In growth stage three, the final yield component of seed weight is determined between bloom and maturity. Stress could still reduce yield in this stage, but not to the same extent as in stage two as seed weight has a smaller contribution than number of seeds per head.

More consistent rainfall distribution during the critical second stage will have significant yield benefits. Early plantings will thus allow the crop to synchronise this critical stage with months that have more frequent rainfall patterns. Plantings during November up to mid-December will benefit yield significantly as opposed to late season plantings in January or even February. Early plantings also have several additional benefits – the first related to plant population – that links back to the yield component of heads per hectare as mentioned in growth stage one.

Sensitive to heat

Sunflower is renowned for being sensitive to high soil temperatures as the coleoptile makes its way to the soil surface. Due to the epigeal germination process of sunflower, in which the cotyledons are 'dragged' through to the soil surface, the final population of the crop is highly dependent on soil temperatures.

High soil temperatures after germination slows down the growth of the coleoptile. It could also decrease the rate of emergence and subsequently expose the young seedling to extended periods of high soil temperatures that will reduce the final population.

A general recommendation on planting depth is a very difficult one. In most cases, sandy soils that tend to dry out quicker will necessitate slightly deeper planting depths. In this lies the challenge as these lightly textured soils tend to crust in the top layers, especially if they are planted at high moisture levels.

Planter closing wheel pressure should be minimised to prevent crusting, and a standard rotary tine roller should follow

roughly three to four days after the planter. This serves two purposes: It breaks up the physical soil crust and lowers soil temperatures (very similar to the door of an oven being opened to allow air circulation).

Seed companies will indicate the germination percentage of the seed lot on the seed label, but soil temperature has a significant effect on seed vigour right after germination has occurred. Earlier planting dates allow farmers to capitalise on cooler soil temperatures that will boost final populations.

Additional yield benefits

Although modern-day hybrids show high self-compatibility levels, early plantings benefit pollinator activity that increases pollination and subsequent seed set. Boron application during planting or as an early-season foliar application will improve pollen viability and pollen tube development and will increase seed set.

Boron also plays a role in stalk strength, evident in the clear-cut neck breakages right below the head during flowering stages observed in boron deficient fields. Boron deficiencies might be temporary during dry spells as the plant reduces nutrient uptake. As soon as the dry spell is lifted, boron uptake will continue.

Row spacing and population is also key to unlock additional yield benefits. In reduced row widths lie the advantage of increased canopy covers that allow for better weed control late in the season. Narrowing row spacing allows more uniform stands with sunlight, water and nutrients that are better utilised.

Populations should be based on soil type, rainfall and yield potential. Final populations in the range of 32 000 to 48 000 plants per hectare in low to high potential environments, respectively, are recommended.

Although sunflower can compensate with head size in low plant populations, these oversized heads lead to underdeveloped seeds and poor seed set – particularly in the centre of the head (think stage two). In higher populations, dry-down rates are shorter and will speed up the onset of harvest as heads are smaller and more uniform.

Choice of hybrid crucial

The choice of hybrid is one of the key decisions every grower must make every season. Growers should consider not just yield, but also yield stability, technology (Clearfield) and maturity classification. Maturity is important especially if planting is delayed, keeping in mind the onset of a killing frost. Split hybrids according to their maturity to hedge against production risk and to spread the workload during the harvest.

Sunflower has the flexibility and adaptability to add value in a changing production environment, but will require farmers to rethink planting dates, populations and row widths to restore the crop to 'greatness' and to take luck out of the success factor equation.

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