

Canola performance in crop rotation trials in the Western Cape

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Since 1996, canola has been an integral part of long-term crop rotation trials of the Western Cape Department of Agriculture. The crop was initially seen as a break crop to alleviate disease and weed pressure in wheat and barley production systems, but has since developed into a profitable crop that stands on its own feet. In this article, we examine the performance of canola in the Langgewens and Tygerhoek trials.

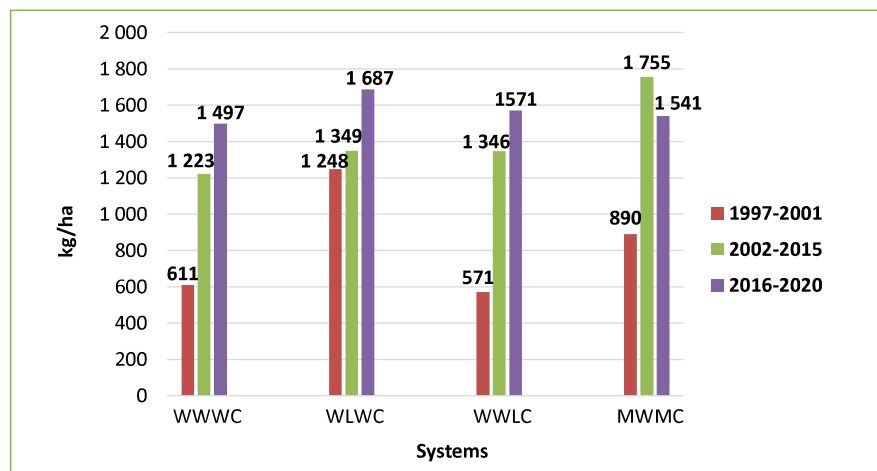
Langgewens

The trial was initiated in 1996. Canola is featured in four of the eight crop rotation systems tested. Three of these are pure cash crop systems, of which the third includes medic pastures (Table 1). The trial, which saw its 24th production season in 2020, has gone through some changes over the years, including adjustments to planting methods, fertiliser applications and pest control.

From 1996 to 2001, minimum tillage was practiced using a light tine implement that loosened the soil before planting with an adapted seed drill. From 2002 to 2015, no-till was introduced using an Ausplow tine seeder. During the last five years, a Piket double disc seeder was used to plant the different crops.

Dry seasons were experienced in 2003, 2015 and 2017. In 2015, no canola was harvested at all, while rainfall of 169 and 172mm was recorded in 2015

Figure 1: Summary of the average canola yield in the three phases of the long-term trial.



*WWWC: wheat – wheat – wheat – canola; WLWC: wheat – lupine – wheat – canola; WWLC: wheat – wheat – lupine – canola; MWMC: medic – wheat – medic – canola.

and 2017, respectively. This gave rise to a completely different picture, even though there was even lower seasonal rainfall in those two years than in 2003 (210mm). The changes in the soil due to carbon improvement and the improved water-holding capacity of the soil played a significant role in this regard.

The positive effect of canola as a preceding crop was also evident in the wheat yield of the 2015 and 2017 seasons. In 2003, only crops where wheat followed medics were harvested, resulting in an overall trial average of 500kg/ha, while the average in 2015 was 2,1 and 2,4t/ha in 2017.

There was a marked improvement in average yield over the three phases of the long-term trial in all systems, excluding a lower

average yield in systems where canola followed medics (Figure 1). This can be attributed to a single season where no canola was harvested due to germination challenges, resulting in very poor stance.

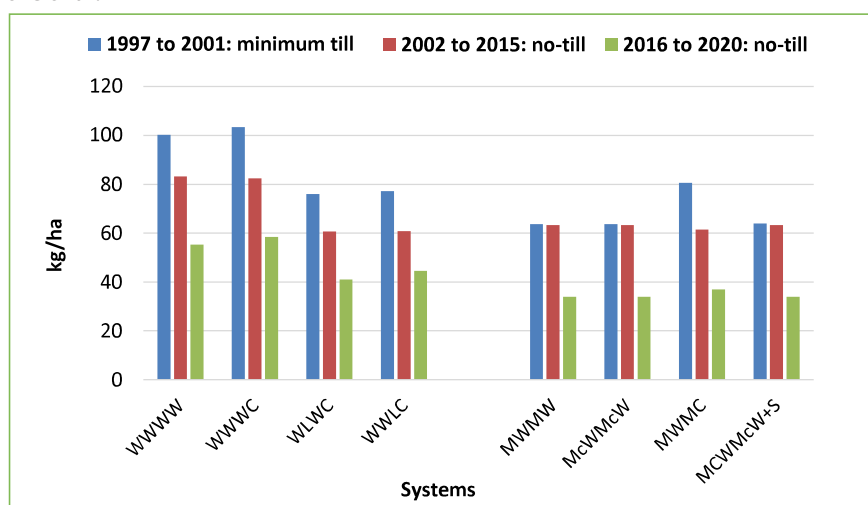
The decision was made to rather terminate the crop later in the season to control any possible weed issues the following year. In 2020, the highest canola yield of 2,95t/ha was obtained in a system where canola followed a medic pasture, on which only 14kg/ha of nitrogen was applied. This illustrates the impact of the single year without harvest.

As already mentioned, another change to the trial during the 24 years was the amount of nitrogen fertiliser applied. There was a marked lowering of nitrogen input over the three phases (Figure 2). Even though nitrogen application decreased, yields did not. Improvement in available cultivar choice also played a significant role. An even more startling observation is

Table 1: Cropping systems that include canola at Langgewens.

System	Crop sequence
WWWC	Wheat – wheat – wheat – canola
WLWC	Wheat – lupine (legume cover since 2016) – wheat – canola
WWLC	Wheat – wheat – lupine (legume cover since 2016) – canola
MWMC	Medic – wheat – medic – canola

Figure 2: Average amount of nitrogen (kg) applied during the three phases of the trial.



*WWWWW: wheat – wheat – wheat – wheat; WWWC: wheat – wheat – wheat – canola; WLWC: wheat – lupin – wheat – canola; MWWW: medic – wheat – medic – wheat; McWMcW: medic/clover – wheat – medic/clover – wheat; MWMC: medic – wheat – medic – canola; McWMcW+S: medic – canola – wheat – medic/clover – wheat + saltbush.

Table 2: Average nitrogen-use efficiency and percentage of improvement from the first to the third phase in different canola planting systems in the long-term trial.

Systems	1997 to 2001	2002 to 2015	2016 to 2020	Improvement
WWWC	5kg	16kg	24kg	351%
WLWC	11kg	17kg	27kg	147%
WWLC	6kg	19kg	27kg	382%
MWMC	12kg	29kg	44kg	273%

*WWWC: wheat – wheat – wheat – canola; WLWC: wheat – lupin – wheat – canola; WWLC: wheat – wheat – lupin – canola; MWMC: medic – wheat – medic – wheat.

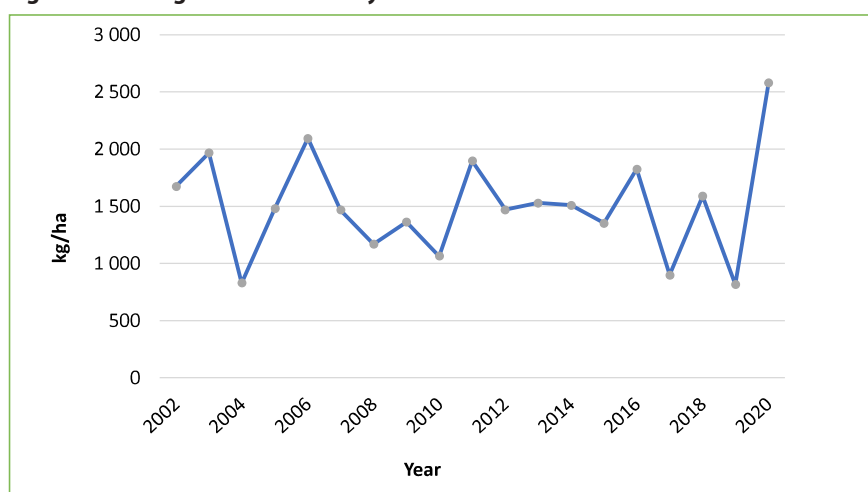
the nitrogen-use efficiency over the three phases of the trial (Table 2).

Tygerhoek

The long-term trial at Tygerhoek started in 2002 and, similar to Langgewens,

canola formed part of several short-term crop rotation systems tested. There were four main systems, namely two years of pasture followed by canola (pasture – pasture – wheat, or PPW), two years of pasture followed by two cash crops

Figure 3: Average annual canola yields from 2002 to 2020.



(pasture – pasture – canola – wheat, or PPCW), an alternating pasture cash crop (pasture – wheat – pasture – canola, or PWPC), and two cash crop systems (wheat – lupin – wheat – canola, or WLWC, and wheat – barley – lupin – wheat – barley – canola, or WBLWBC).

The average canola yield over the 19 years of the trial was 1 503kg/ha. The highest yield was achieved in 2020 at an average of 2,5t/ha. The yield was relatively stable over the period, but dry spells during the last four years played a significant role in yield realised (Figure 3).

The 2020 results were obtained from a total of 38kg of nitrogen applied per hectare. A good rule of thumb is that canola should yield 50 to 60% of what the wheat yields. At Tygerhoek, the yield ranged between 31 and 70% of the wheat yield, with an average of 40%. It must be considered that TT cultivars are used exclusively in this trial. Oil content was consistently around 40%, with an all-time high of 46% in 2020.

The average canola yield per system did not differ significantly over the 19 years. The system where canola followed two years of pasture is similar to the four-year system in terms of following on two years of pasture. These were combined to give a single result.

Canola in the systems which included legume pastures outyielded the canola in the cash crop systems by just 126kg. This difference might be attributed to the WLWC system. One of the two repetitions of this specific system is on a self-compacting soil type, which undermines active growth in both crops and weeds. There is thus constant competition between the two, resulting in poorer yields compared to the sister repetition.

Conclusion

Canola is part and parcel of the rotation systems in both the Swartland and Southern Cape and adds value by improving the overall gross margins of the rotation systems used. This is due to good commodity prices and the effect of improved wheat yield following a canola crop. 🌱

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