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Drought resistance of canola seedlings

Drought resistance in crops is a crucial aspect of crop farming in the Western Cape. This article focuses on canola's reaction to drought and certain observations made in this regard in 2016.

Water consumption during the growth stages of canola (plant to harvest) shows a linear increase and reaches a peak during flowering, after which it decreases rapidly until physiological ripeness occurs (Canola Council of Canada, 2008).

Canola is most sensitive to moisture stress during the flowering stage and the early to mid-pod filling stage (Wan et al. 2009). However, it is also sensitive to drought during germination. Sufficient soil moisture during germination is necessary for rapid and even germination – hence a higher germination and establishment percentage. It also results in the establishment of stronger seedlings.

However, it has long been known that canola plants can handle water shortages well during drought conditions if these shortages occur after emergence, but only in the early stages of development. This statement could hardly be better proven than during 2016 in the Swartland and parts of the Overberg.

Extreme drought

At Langgewens a total of 37,8mm rain fell during the last ten days of April. Similar rainfall occurred in large parts of the Swartland and Overberg and was utilised to establish canola. During the next 39 days, however, it was extremely dry across the entire area and the rainfall figures at Langgewens, for example, was only 6,6mm.

Canola seedlings across the entire area were subjected to severe moisture stress during 2016, shortly after emergence. Since the remainder of the 2016 rainy season was normal and temperatures were fairly low in September (*Figures 1*, *2*, *3* and *4*), the canola miraculously recovered due to its drought resistance and the highest canola yields per hectare recorded in history were attained in the Western Cape, despite the initial dry period.

Figure 1: Monthly and annual rainfall at Langgewens for 2016 and long term.

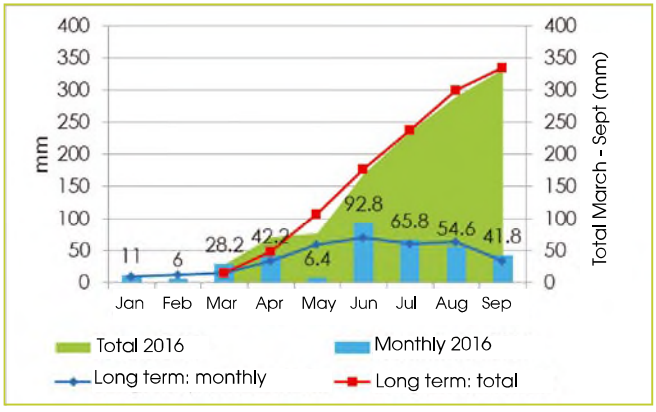


Figure 2: Monthly temperatures at Langgewens for 2016 and long term.

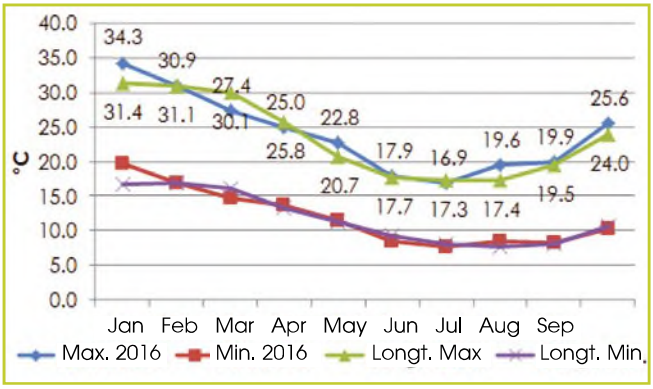


Figure 3: Monthly minimum and maximum temperatures at Tygerhoek for 2016 and long term.

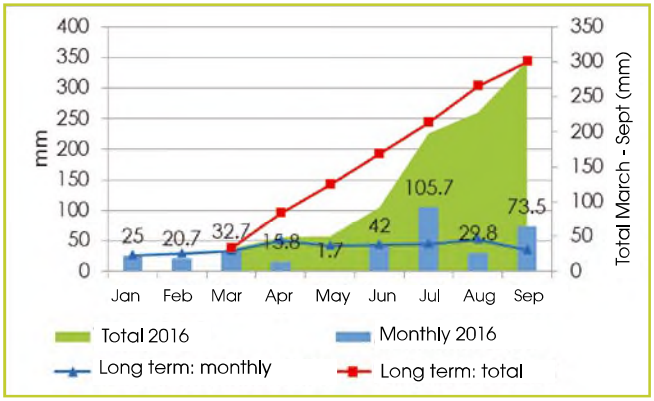
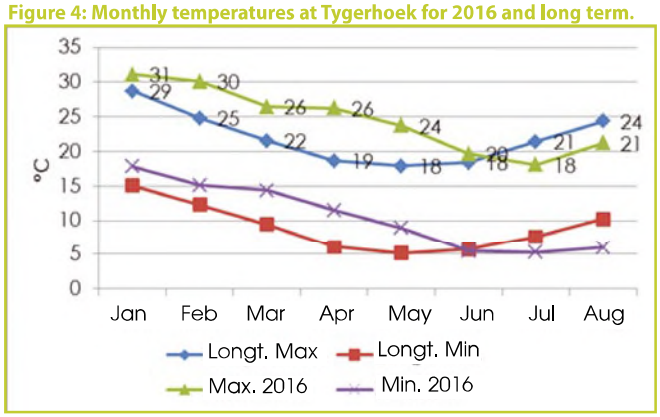


Figure 4: Monthly temperatures at Tygerhoek for 2016 and long term.



In the Swartland, no cultivar trials could previously yield more than 2,9t/ha. Two cultivar trials and a fungus treatment trial yielded an average of 3t/ha and more (Langgewens 3,7t/ha) in 2016. The drought resistance of canola is further illustrated by *Photographs 1* and *2*.

Photograph 1: A canola field in the Eendekuil area during the drought and after good follow-up rains in 2016.

Photograph 2: A canola field in the Swartland during the drought and after good follow-up rains in 2016. (Photographs supplied by J McDermott, E Burger and Philip van Schalkwyk)

Photograph 3: Eendekuil cultivar trial in 2016.

Photographs 1 and *2* illustrate the drought stress the plants were subjected to after germination in 2016. Although the plants were initially subjected to drought stress, the physiological development did not cease. This is a crucial aspect which caused clethodim damage in 2016, because applications were only possible around 46 days after the follow-up rain fell.

Sclerotinia effect on yield

Pictures in *Photograph 1* were taken on the farm De Brug in the Swartland. The cultivar was 44Y89 and the seed yield of the field was 1,98t/ha. *Sclerotinia* was a problem on this field and possibly reduced the yield potential.

The pictures in *Photograph 2* were taken in the Eendekuil area on a field where minimum tillage was applied. The field was planted with the cultivar Hyola 555 and the average yield on this farm (Baviaanskloof) was 1,85t/ha. The cultivar trial on the same field was planted on 10 May and established well. (*Photograph 3*). The average yield of the cultivar trial was 2,03t/ha and the yield of Hyola 555 was 2t/ha.

The canola plants in the Eendekuil trial took an average of 96 days until the flowering stage (50% of the plants with one flower). It took approximately 14 days longer than usual, but is attributed to the above-average temperatures in May, June and July 2016. All trials flowered later in 2016, which is characteristic of a hot growth season. The result of a longer growth season is that the crop forms more biomass, which increases yield potential if sufficient moisture and low temperatures are available late in the season, such as in 2016.

Conclusion

Canola can recover from a dry period shortly after establishment. It is, however, vital that canola is not planted in soil without sufficient moisture, as 20mm is regarded as effective rainfall (Arnon, 1992). The result of insufficient soil moisture is weak establishment and uneven germination, which are both detrimental to the harvesting process and yield.

The recommended planting date for canola in the Western Cape is from the beginning of April in the eastern parts of the Southern Cape until the end of April in the Swartland, provided that sufficient soil moisture is available.

For more information, contact the Directorate Plant Sciences, Western Cape Department of Agriculture on 021 808 5321 or email pietl@elsenburg.com. Sponsored by the Protein Research Foundation. Visit the website *www.proteinresearch.net* for newsletters and pamphlets.