



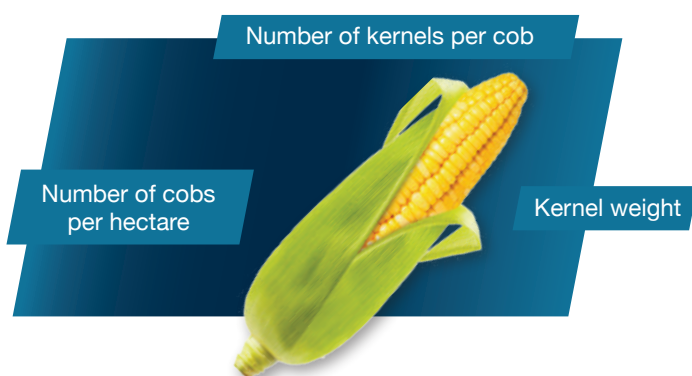
# Critical growth stages

## Critical growth stages that could influence the yield potential of your maize harvest

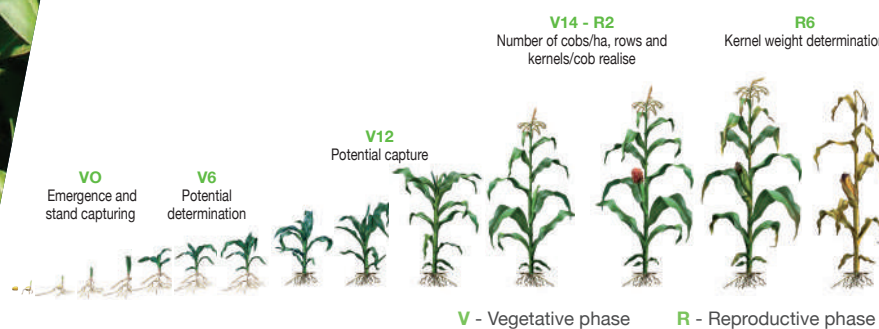
Mother Nature has a great impact on maize production; therefore, the following cultivation practices (where we have some control) should be managed:

- 1 Correct timing of herbicide applications with regards to crop growth stage.
- 2 Ensure the crop is not under stress from other external factors such as temperature.
- 3 Fertiliser should be applied timeously, before the plant goes into stress mode.
- 4 Limit unnecessary tillage, which could lead to loss of soil moisture.

The number of kernels per cob, amount of cobs per hectare and the kernel weight, contribute to the yield of a maize plant. These yield components are determined throughout the season and at different growth stages.



There are specific growth stages in maize plant development that are crucial to consider by the grower when making decisions regarding maize production.



# V0 stage

## Emergence and stand capturing

Maize are day-neutral plants, which means flowering will take place after a certain amount of heat units have built up.

Grain filling and yield are influenced and determined by the time of planting.

When seedlings emerge 10 days after the expected date, yield loss of 6 - 9 % can be expected. When they emerge 21 days after expected date, loss of 10 - 20 % may occur. Stand can also have a negative impact of up to 10% if emergence is 25 % weaker, and up to 30 % when stand loss is 50 %.

("Mielie-opbrengs: nog groot ruimte vir verbetering", Landbouweekblad, 24 March 2017)

### What happens in the plant during this stage?

- // The mesocotyl and coleoptile lengthens
- // Elongation of mesocotyl ceases when the coleoptile emerges above the soil surface
- // Growth point is still below the soil surface
- // First true leaves rupture from the coleoptile
- // The radicle and seminal roots are fully developed
- // Nodal roots develop



The coleoptile appears above the ground



The 1st true leaves appear from the coleoptile

### Risks to manage during this stage:

- // Germination and emergence are hampered when not enough moisture is present in the soil and soil temperature is below 10 °C
- // Cool temperatures could cause diseases like head smut
- // Plant depth
  - First leaves will emerge beneath the soil if the seed was planted too deep or if the soil is too cloddy or crusted
- // Herbicide damage
  - Typical deviations could include coleoptile that corkscrews and other symptoms of phytotoxicity
- // Manage pests
  - Ensure the management of nematodes, seedling wilting disease, cutworm, etc

# V4-V6

## Potential determination

At the six-leave stage the growth point is just above the soil surface. During this stage, the maize plant begins to determine the amount of cobs per plant and also the amount of rows per cob.

Note that the genetics of the cultivar have the biggest influence on the amount of cobs and rows.

### What happens in the plant during this stage?

- // All vegetative plant parts are developed
- // Growth tip and tassel appear above the soil surface
- // Stalk begins rapid elongation
- // Determination of amount of kernels per cob (influenced by specific cultivar)
- // First leaves die off
- // A new leaf emerges approximately every three days



Growth point & plume - already above the soil surface



By-root system is established, which now becomes the main functional root system of the plant

### Risks to manage during this stage:

Extreme stress conditions like weed pressure, herbicide damage, and drowning can restrict the amount of rows and reduce yield potential.

Drought during this phase will have a negative impact on the vegetative growth, which will impair yield potential.



# V12-V14

## Potential capture

During the V12 stage, the number of rows per cob is set, but the amount of kernels per row and cob size still have to be determined. This can be influenced by environmental factors - especially drought, heat, hail and herbicide damage.

Stress, especially from drought, could influence the development of the beard and pollination, which could influence the amount of kernels per cob and reduce yield potential.

### What happens in the plant during this stage?

- // Number of rows per cob is determined
- // Potential amount of kernels per cob and cob size are determined
- // A new leaf forms approximately every two days
- // Brace roots begin to develop to stabilise the plant



### Risks to manage during this stage :

This is a very sensitive stage of the maize plant and foliar applications of any sort should be avoided during this stage due to the risk of Arrested Ear Development (AED).

- // The following parameters could promote the appearance of AED:
  - Sudden climate changes i.e. warm days with cold nights and/or drought
  - Application of fungicides, herbicides, and insecticides
  - The risk of straining could be aggravated by adding adjuvants, crop oils, and foliar feeds

# V18-R2

## Realising of yield potential

### V18: Potential kernels per row is determined

*Drought together with high temperatures during this time will delay silk emergence more than pollination resulting in pollen being produced before the silks emerge.*

*When the maize plant withers in the morning (in other words the plant has not recovered from the previous day's drought strain) it is called a stress day. It should be remembered that certain hybrids react differently to stress conditions.*

### What happens in the plant during this stage?

- // All vegetative plant parts are developed
- // Accelerated cob development
- // The upper cob shoot (with multiple cob varieties) develop faster than any other shoots on the stalk

### R1: Number of kernels and potential size are determined

*This reproductive phase starts when the silks appear and normally lasts seven to ten days. During this phase, a healthy root system is crucial to provide the plant's need for water and nutrients.*

*Strain during this phase causes abnormal cob development like zipper cobs, barren cob tips and incomplete pollination with single kernels scattered over the cob.*

### What happens in the plant during this stage?

- // Silks emerge from the ear shoots
- // Pollen is shed - this can last five to eight days per plant
- // Silk emergence could take five days
  - The silk grows from the base of the cob
  - The silk will continue to lengthen until pollinated
- // Silks outside husks will turn brown
- // The plant has now reached its maximum height
- // In the first 7 - 10 days after pollination, cell division will take place within the kernels
- // The next reproductive stages will follow and the endosperm cells will fill with starch

### Risks to manage during this stage:

*Stress factors - especially drought - can lengthen the periods between vegetative phases, but shorten the period after pollination. A shortage of moisture two weeks prior to silking and two weeks after pollination could cause tremendous yield losses. Insect and disease damage could still occur and should be managed.*

# R6

## Kernel weight determination

The plant is now physiologically mature and a black layer forms at the base of the kernels against the cob. There are no further translocation of nutrients or moisture between the cobs and their kernels.

### What happens in the plant during this stage?

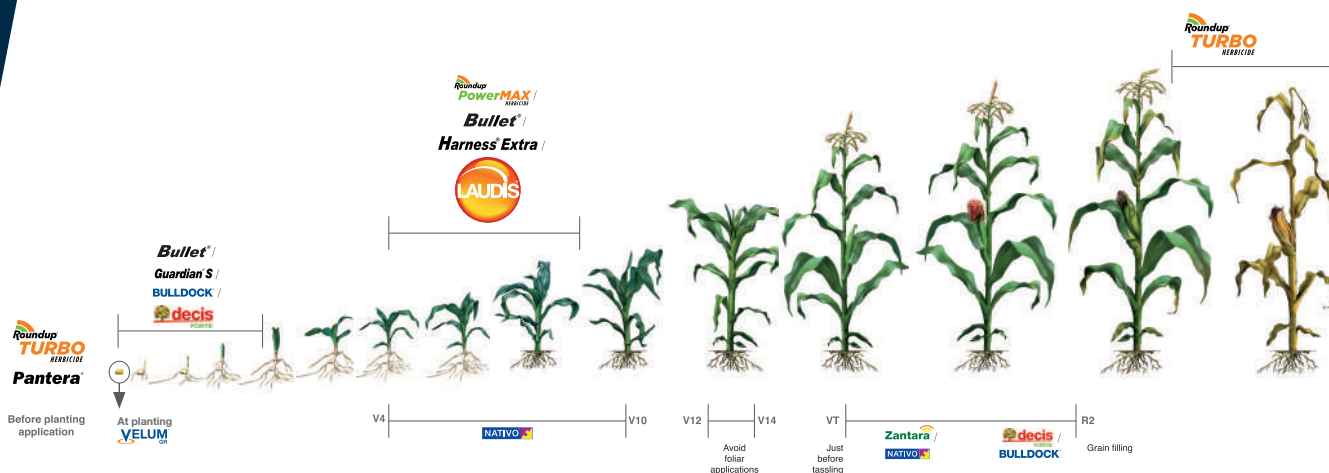
- // Physiological maturity has occurred when all kernels have reached their maximum dry capacity
- // The hard starchy layer has completely moved to the cob
- // Kernels consist of 30 - 35 % moisture and have reached 100 % of their dry weight

### Risks to manage during this stage:

Straining, especially nutrient deficiency, drought, and root diseases can limit the growth prematurely.

## Conclusion

The complete Bayer maize spray programme provides your maize plants with the necessary protection during the critical growth stages, which helps in realising their maximum yield potential.



Bayer (Pty) Ltd. Reg. No. 1968/011192/07  
27 Wrench Rd, Isando, 1601  
PO Box 143, Isando, 1600,  
Tel: +27 11 921 5002

@Bayer4Crops

[www.cropscience.bayer.co.za](http://www.cropscience.bayer.co.za)  
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Sources: Plant Physiology, Critical Stages in the Life of a Corn Plant, Heather Darby and Joe Lauer. "Waar kom opbrengs vandaan?", Hanlie Geldenhuys and Corne van der Westhuizen, Pannar.

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