



Maize production



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Directorate: Plant Production

Private Bag X250

PRETORIA 0001

Tel: +27 12 319 6072

Fax: +27 12 319 6372

E-mail: JosephMa@Dalrrd.gov.za

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Private Bag X144

PRETORIA 0001

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Scientific name: *Zea mays* L.

South African names: English (Maize or Corn), Afrikaans (Mielies), Sotho (Poone, Mafela, Mmidi), Zulu (Mbila), Tswana (Mmopo), Xhosa (Mbona), Venda (Mavhele).

Background

Maize is only known in its cultivated state and is believed to have originated in Mexico in prehistoric times. Africa, Asia and America are also mentioned as possible continents of origin of maize. It is distributed worldwide and grown wherever summer seasons are reasonably warm. Maize is the world's most widely grown cereal and it is ranked third among major cereal crops.

Production areas in South Africa

Maize is considered the main staple food and the most extensively grown field crop in South Africa, followed by soya bean, wheat, sunflower, groundnut, grain sorghum and other legume crops. The production of both white and yellow maize takes place in the summer rainfall areas. Local annual production for maize ranges between 4 370 000 to 7 700 000 tons for yellow maize and 7 700 000 to 16 800 000 tons for white maize. The highest production yield was 7 715 000 tons in 2021 and 18 820 000 tons in 2017, which was the highest for yellow and white maize in the last 10 years, respectively. The average yield ranges from 5,33 to 7,25 t/ha and 4,00 to 6,40 t/ha for white and yellow maize, respectively.

Province	District	Dryland or irrigation production conditions
Free State	Lejweleputswa, Motheo, Thabo Mofutsanyana	Dryland
Gauteng	Metsweding, Sedibeng, West Rand	Dryland
KwaZulu-Natal	Ugu, uMgungundlovu	Dryland
Limpopo	Waterberg	Irrigation
Mpumalanga	Gert Sibande	Dryland
Northern Cape	Francis Baard, John Taolo Gaetsewe	Irrigation
North West	Bojanala, Dr Ruth Segomotsi Mompati, Ngaka Modiri Molema	Dryland



Agronomic Requirements

Soil requirements

Maize grows in a variety of soil types. However, deep, naturally rich and easily tilled soil is preferred. The soil should be free from restrictive layers (hardpan) and soils with a pH lower than 4,5 should be avoided or can be corrected with lime application. The most suitable soil type for maize production is a soil with a good effective depth at 30 cm – 60 cm, favourable physical properties (especially texture and structure), good internal drainage and an optimal moisture regime, and sufficient and balanced quantities of plant nutrients.

Climatic requirements

Temperatures exceeding 32 °C are critical and detrimental to yield. Flowering occurs best at temperatures ranging from 19 °C to 25 °C. Low temperatures, especially in the highlands, rarely kills the crop but slows growth. Cultivar choice is crucial for the success of maize production in cooler areas such as the eastern parts of the Free State. Frost can damage maize at all growth stages and a frost-free warm period of 120 to 140 days after planting is required to prevent damage.

Rainfall

For dryland maize, an annual rainfall of 500 mm to 750 mm or more is required for adequate moisture. Water deficiency is usually the most yield-limiting factor where efficient maize cultivation practices are applied. A yield of 3 tons/ha requires between 350 mm and 450 mm of rain per annum.

Cultivar choice

The most important characteristics that aid cultivar selection include adaptability, yield potential, length of growing season, lodging, tillering, disease resistance, prolificacy and percentage of grain moisture. To fully utilise these various aspects, it is important that the producer be familiar with characteristics of each cultivar. There are various registered cultivars in the seed companies that are adapted to different maize-producing regions/areas of the country. For this reason, additional information regarding cultivar characteristics, long-term yield data and relative yields is made available to the producer by either public or private agents. The variety list can be obtained from the Office of the Registrar Plant Improvement Act, 2018 (Act No. 11 of 2018); www.dalrrd.gov.za/Branches/Agricultural-Production-Health-Food-Safety/Plant-Production. Further details on specific cultivars (updated annually) can also be obtained from the Maize Information Guide (MIG) of ARC-Grain Crops Institute (Potchefstroom) on request.



Cultural Practices

Propagation

Maize is propagated from seed. Most maize cultivars that are widely available are hybrid seeds.

Soil preparation

A deep, firm seedbed free of clods and surface irregularities should be prepared, either in the spring and preferably on moderately heavy to heavy soil, in the autumn and left rough over winter, therefore allowing for working and planting in spring. Soil should be worked and disked about three to four weeks before planting, consequently providing for partial decomposition of organic materials.

Planting

Generally, broad optimum planting dates are as follows: for the cooler eastern producing areas, from the beginning of October to the first week of November; for the central regions planting can be done from the last week in October to mid-November and for the drier western areas, from the last two weeks in November to mid-December. Planting depths of maize vary from 5 cm to 10 cm, depending on the soil type and planting date. Usually, planting should be shallower in heavier soils than in sandy soils. If plantings are made early, it can be shallower in all soil types.

Fertilisation

Fertiliser application should be based on available soil nutrients, expected yield or target yield and the type of fertiliser materials. The available soil nutrients are determined by a soil analysis. It is of utmost importance that the correct soil sampling methods be used when submitting samples for laboratory analysis. Recommended sampling methods to be used are available in the "Fertiliser Guidelines for Maize" and can be obtained from the Director, ARC-GCI, Private Bag X1251, Potchefstroom 2520. Recommendations supplied by the institute should be strictly adhered to, to obtain the required results in the field.

Irrigation

Maize is produced mostly under dryland, although there is less than 10% that is produced under irrigation. It can be regarded as an important grain crop under irrigation as it produces high yields. Yields of 80 tons/ha to 100 tons/ha green material can be achieved within a relatively short period (100 to 120 days). It is therefore one of the most efficient grain crops in terms of water usage.



Weed control

Weed control during the first six to eight weeks after planting is crucial as weeds compete vigorously with the crop for nutrients and water during this period. This suggests the importance of maintaining the field weed free during this crucial period of weed competition. The presence of weeds during harvest may hinder the harvesting process, pollute grain with seeds, transmit odours to grain causing downgrading, or incur additional costs for removal of seeds. If lands are overriden by weeds, crops will be starved of moisture and will not yield to their full potential. Make sure effective chemical or mechanical weed control programmes are in place after planting.

Disease control

Primary control strategies are the use of disease-resistant cultivars, chemical control, conservation tillage, crop rotation, planting and harvesting at the right time and biological control.

Pest control

Stalk borers are the main maize insect pest. Registered chemicals can be applied mechanically or manually. The problem can be minimised by manipulating planting dates and use of resistant varieties. Fields should be inspected on a regular basis to spot pests at an early stage.

Harvesting

The visible sign of the maturing maize plant is senescence – dying back of leaves starting from the lower leaves continuing upwards. This is the period of grain drying, which can progressively be monitored through the kernel milk-line. The disappearance of the milk-line denotes that the grain has reached physiological maturity. The appearance of the black layer at the lower tip of the kernel (detachment of kernel from the cob) denotes harvestable maturity.

Importance and uses

Human uses: White maize is a staple food in the country. It is utilised in the form of grain, meal and green mealies (i.e., the concept of growing a maize crop for sale as fresh cobs on the market, before the cobs reach the hard dough stage).

Industrial uses: It is used as raw material for industrial products such as starch, glucose and dextrose. Millers, the livestock industry, and even some snack industries rely on the planting and production of maize.

Livestock uses: Both white and yellow maize can be fed to livestock as hay or silage. Yellow maize contributes significantly as animal feed in the production of white and red meats and dairy products.



Acknowledgements

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FURTHER INFORMATION CAN BE OBTAINED FROM:

Directorate: Plant Production
Grain Crops Division
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Fax: +27 12 319 6372

Email: JosephMa@Dalrrd.gov.za

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