

Maize Seed Production Manual



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Produced by
IYA Cassava Value Chain Members

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Maize (*Zea mays*)

Maize or corn is a cereal crop that is grown widely throughout the world in a range of agroecological environments. More maize is produced annually than any other grain. About 50 species exist and consist of different colors, textures, and grain shapes and sizes. White, yellow, and red are the most common types. The white and yellow varieties are preferred by most people depending on the region.

Maize was introduced into Africa in the 1500s and has since become one of Africa's dominant food crops. Like many other regions, it is consumed as a vegetable although it is a grain crop. The grains are rich in vitamins A, C, and E, carbohydrates, and essential minerals, and contain 9% protein. They are also rich in dietary fiber and calories which are a good source of energy.

Importance

Maize is the most important cereal crop in sub-Saharan Africa (SSA) and an important staple food for more than 1.2 billion people in SSA and Latin America. All parts of the crop can be used for food and non-food products. In industrialized countries, maize is largely used as livestock feed and as a raw material for industrial products.

Maize accounts for 30–50% of low-income household expenditure in eastern and southern Africa. A heavy reliance on maize in the diet, however, can lead to malnutrition and vitamin deficiency diseases such as night blindness and kwashiorkor.



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Site selection

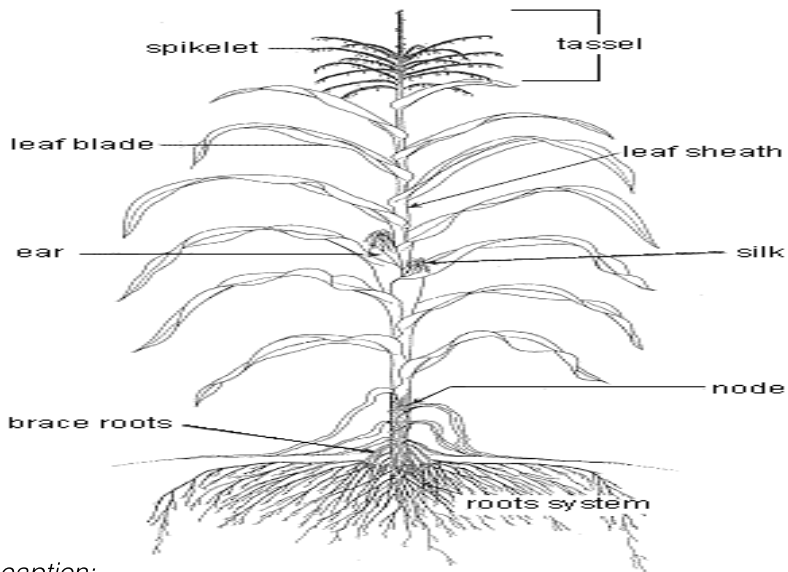
- Site selection is crucial in seed production. A bad choice reduces the potential yield of seeds.
- It is very important to consider rainfall, soil type, and topography (slope) of the area.

For some producers, easy access to postharvest processing and other facilities is also important, therefore:

- Poor soils give poor yields and good soils give good yields.
- Ideally, soil should be fertile, well drained, and also have good water holding capacity.
- Avoid sandy and clayey soils.

Avoid!!!

- Areas with steep slopes, and sandy and clayey soils.
- Planting in fields previously planted to the same crop or crops from the same family.
- Planting in known “hot spots” for diseases, insects, and troublesome weeds.
- Areas that have large shady trees, ant hills, and termite colonies.



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**Maize seed production requires proper ecological location.
Desirable characteristics of a production site include:**

- A well-drained fertile soil, avoid water logged areas.
- Reliable and sufficient rainfall at least 1000 mm per year.
- Abundant sunshine during the cropping season.
- Low incidence of diseases and pests.
- Dry weather at harvest.

Land clearing and preparation

- Land preparation is an important determinant of yield because it influences seed germination, seedling establishment, and plant vigor.
- Poor land preparation can lead to soil erosion, poor weed control, water logging conditions, diseases, and poor yields.
- It is important to prepare land such that the seed bed or soil is loose to ensure good aeration, has good moisture holding capacity, and is free from weeds.

Land clearing must be carried out with minimal displacement of the topsoil. It requires judicious use of heavy machinery coupled with good soil conservation measures that will preserve the soil fertility status, which varies under long-term fallow vegetation. Minimum tillage is a feasible way of sustaining high soil fertility under intensive maize farming.

Land preparation includes the following

- Mowing
- Ploughing
- Harrowing
- Marking



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Planting time: the sowing date is an essential component of crop management. Yield declines with lateness of planting after an optimum time, usually at the start of the rains.

Date of planting:

April–June	A season
July–Sept	B season
Nov–Feb	C season (under irrigation)

Types of varieties

- Late maturing varieties, mature in 110-120 days and are good for zones with a long rainy season.
- Intermediate-maturing varieties, mature in 100-110 days. They can be planted after late-maturing varieties in zones with two seasons of rainfall.
- Early-maturing varieties, mature in 90-100 days. They can be planted after intermediate-maturing varieties in zones with two seasons of rainfall.
- Extra-early varieties, mature in 80–90 days and can be planted in zones with a very short rainy season (2-3months).
- **Open-pollinated varieties**
Suwan-1-white, late; suwan-2-yellow, intermediate;
BR- 9928-DMR-SR-Y-intermediate, BR-9943-DMR-SR-white, late;
TZL-COMP.4C3DTF2-white, late; ACR-91 SUWAN-1-SR C1-late

The best maize varieties

These grow fast, are high yielding, mature earlier than the local varieties, are rich in zinc, iron, vitamin A, and quality protein, utilize soil nitrogen efficiently, are resistant to major pests and diseases, e.g., stem borers, downy mildew, maize streak virus, *Striga* etc , and in some cases, are drought tolerant.

Selecting healthy seeds

Avoid buying maize seeds from the local/open market. Do not choose broken seeds, avoid seeds that are rotten. Treat the seeds with appropriate insecticide and fungicide, e.g., Fernalan D and Apron plus, Homai, Topisin M, and Luxan. For example a 10-g sachet of Apron plus can treat 3 kg of maize.

Maize seeds treatment

Put half of the seeds you want to treat in a container. Pour half of the Apron plus with a small quantity of water on the seeds, pour in the remaining half of the seeds. Seal the mouth of the container, and then shake very hard for about 3 minutes until the seeds are well coated with the chemical.

Wash your hands with soap and water after treating the seeds. The treated seeds are ready for planting. Test seed viability before planting.

Method of planting

Hand sowing with a spacing of 50 cm × 75 cm, use of jab-planters method, machine sowing method. Row spacing: 75 cm and hill spacing: 50 cm, 2-3 maize seeds per hole and thin to 2 seeds per hole at the depth of 2-3 cm. Twenty-five (25) kg of maize seeds are required to plant 1 ha of land.

Plant population: An optimum plant population is essential for maximum yield in maize. Farmers grow maize with very irregular and wide spacing, due to the fact that most farmers intercrop maize with other crops. A direct relationship between plant population and final yield to some extent is obvious because total grain yield is positively and significantly correlated with the number of harvestable plants. A plant population of 53,333plants/ha is recommended. This is obtainable with a 75 cm × 50 cm spacing at 2 plants per hill or a 75 cm × 25 cm spacing at 1 plant per hill, farmers are known to prefer wide spacing so as to afford easy movement for weeding and other operations.

Plant nutrient and fertilizer application

For good growth and high yield, the maize plant must be supplied with adequate nutrients particularly nitrogen, phosphorus, and potassium. N:P:K 15:15:15 is applied 2 weeks after planting (knee height stage: 6-7 leaves), 4-6 weeks after planting 150 kg of urea (3 bags) per hectare can be applied, approximately one teaspoon per plant. Band application in dry

soil is 10 cm away from the plants, fertilizers must be placed into the soil and additional NPK can be applied one week before flowering.

Nutrient deficiency symptoms

Nitrogen (N): yellowish along mid-leaf and tip.

Phosphorus (P₂O₅): purplish along the edge of leaf

Potash (K₂O): yellowish along the edge of leaf

Sulphur (S): pale buds and yellowish top leaves

Magnesium (Mg): white-yellowish stripes between the veins

Zinc (Zn): white-yellow stripes and pale buds usually combined with Mg deficiency.

- Leaf color of healthy plants must be dark green until flowering.
- N deficiency at flowering can reduce maize yield drastically.
- P and K uptake by maize occurs at early growing stage only.

Herbicide application

Herbicides are used 2 days after planting (pre- emergence)—Primextra (5 L/ha) plus Grammaxone (4 L/ha)

Grammaxone (paraquat) 4 L /ha can be sprayed with a knapsack sprayer about 2 weeks before flowering time (post-emergence), herbicide should be sprayed when soil moisture is adequate.

Thinning

If more than two seeds are planted in a stand and they reach a certain maturity level, the extra plants are removed to reduce competition for space and nutrients. This is to ensure that there are a given number of plants per stand.

Roughing

This is a practice done to remove off-types that are genetically different and diseased plants from the field. This practice is done from the early practice period till harvest. The first rouging must be done before flowering and shed of pollen. Those plants with physiological features that do not conform to that of other plants are regarded as suspect and should be removed to avoid contamination.

Weeds control

Good weed control is essential for good maize yield and weeding is done 2-3 times before harvesting. Weeds cause yield reduction in maize because they compete with the crop for water and light. Weed control is the most expensive operation in traditional maize farming since it is done manually. Often the labor is too expensive causing many farmers to abandon weeding thereby resulting in very low yields.

Disease control

Although several diseases have been identified on maize in Nigeria, only a few of them significantly reduce maize yield. They are maize rust, leaf spot, leaf blight, maize streak virus (MSV), downy mildew, maize mottle/chlorotic stunt, curvularia leaf spot, stalk, and ear rots. In order to make farming economically feasible, resistant lines have been bred.

Diseases can cause 20-40% losses during cultivation and 30-90% losses postharvest and during storage. Other pests in sub-Saharan Africa (SSA) include ear borers, armyworms, cutworms, grain moths, beetles, weevils, grain borers, rootworms, and white grubs. The parasitic *Striga* weed is another maize pest. In fact, weed-related yield losses ranging from 65 to 92% have been recorded in the Nigerian savanna.

Insect pest control

Stem borers armyworms, silkworms, grasshoppers, termites, and weevils are the economically important insect pests of maize in Nigeria and can be controlled by use of insecticides.

Harvesting

The optimum time for harvesting maize is when the stalks have dried and the moisture of grains is about 17-20%. Seeds can be dried at temperatures of 35-45 °C.



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Processing

Seed processing includes:

- Cob selection
- Shelling
- Testing seed viability
- Grading and packing
- Seed treatment



Processing machine

Storage

A maize seed should be dry at a moisture content of 14 percent and must be taken to the fumigation chamber to be free of weevils and other insects. After 7 days in the fumigation chamber the seed should be taken immediately to the cold store for proper storage at a temperature of 2 degrees.