

4. Choice of cereal and legume varieties

The next step would be to identify the varieties of crops to grow and access to seeds. Availability of seeds of non-commercial legumes can be challenging as most farmers rely on informal seed sources. Therefore, it is important that decisions on varieties are made well before the onset of the crop season.

Choosing maize variety

For maize, the seed system is in place in most African countries and farmers may simply need to decide on what variety to grow.

Time to maturity, ability to tolerate moisture and heat stress, resistance to pests and diseases, grain milling quality and yield potential are some important considerations when selecting a right variety.

Long duration or late maturing maize varieties tend to have higher yields. Early maturing varieties, on the other hand, grow faster and mature early thereby perform better in the short seasons. Ability to tolerate moisture or heat stress is important specifically in arid or semi-arid conditions where temperature is high and result in severe moisture stress to the crop. Drought tolerant maize varieties are bred to cope with these adversities and often yield much higher than normal varieties. Similarly, pests and diseases resistant varieties carry more value in environments where pests and disease problems are prevalent. Newer maize varieties are often bred to resist diseases such as grey leaf spot, maize streak virus and other such diseases. Milling quality, taste, and yield are often also considered important variety characteristics when farmers choose varieties for household uses or for the market.

Open Pollinated Varieties (OPVs)

The OPVs self-pollinate, or pollinate by another plant of the same variety, resulting in seeds genetically identical to their parents. Traditional maize varieties belong to this category and yields tend to be low or modest. When several OPV genotypes are grown together and cross each other the result is an improved OPV. The main advantage of OPVs is that farmers can grow the same seed year after year, there is more genetic diversity in each seed, tastes better, stores well and can tolerate seasons with erratic rainfall. Unfortunately, the yield is lower eg 3-6 t/ha and gets poorer over time. More diversity means less uniformity and crop matures at different times and farmers need to find fresh seed after 4-5 years of growing an OPV.

Hybrids

A hybrid variety is an offspring from a deliberate mixture of two different varieties with desirable characteristics. In maize significant improvements have been made over the years in developing Hybrid seeds generally have very higher yields than OPVs. Some advantages of hybrids are greater uniformity, usually more vigorous growth, high yields

(>8t/ha) and breeding takes less time. However, hybrid seeds cannot be recycled so farmer must buy seeds every year, they are expensive and demand high fertilizers and do well with irrigation.

Drought tolerant maize

In recent years CIMMYT and its partners invested heavily in developing drought tolerant maize varieties. Some of these are white while some of them are orange in colour. The drought tolerant varieties grown in Malawi are MH30, MH31, MH34 and MH36. In SA new varieties such as PAN 3A-157 while in Ethiopia popular varieties were BH 661 and BHQPY 545.

Key characteristics of these drought tolerant varieties are as follows:

- Relatively better in dry years and yield between 20-30% more under moderate drought conditions than other non-drought tolerant commercial varieties.
- Greater yield stability – means good yields in both good and bad rainfall seasons and so
- High yield potential (no yield loss in optimal years).
- Resistance to major diseases (e.g., maize streak virus (MSV), Turicum leaf blight (TLB), and grey leaf spot (GLS) and superior milling or cooking quality.
- Very uniform.
- Seed must be purchased every season.

ProVitamin A Maize

These are orange coloured maize varieties that have been bred or biofortified with Provitamin A. These varieties are quite different but often confused with yellow maize that is usually grown as stockfeed. ProVitamin A Maize marketed in Malawi are MH43A and MH39A. Orange maize are available in the form of hybrids or OPVs and have the following characteristics:

- Orange maize varieties have enriched levels of about 6-8g/g provitamin A (carotenoids). Lack of Vitamin A can result in morbidity and blindness in humans.
- Provitamin A hybrids are high yielding, drought tolerant and often disease resistant.
- They have a high micronutrient density and hence sometimes referred to as nutrient dense maize varieties.

Quality Protein Maize varieties

These can be white in colour but are open pollinated. They are high in protein content. The nutritive value in milk protein is 90%, while the average maize variety has only about 40% protein value. In Ethiopia, for example, the variety BH QPY 545 proved to be popular with farmers

Choosing sorghum and millet varieties

Improved sorghum and millet varieties have come on the market in most countries in the last 20 to 30 years. In Malawi, for example, sorghum varieties such as Pilira 1 and Pilira 2 have been released on the market and the other popular variety in Southern Africa is Macia. Traditional varieties tend to be tall and low yielding. However, traditional varieties are usually less vulnerable to bird attack but the grain is less susceptible to weevils. It is not advisable to continuously plant a sorghum crop due to pest build-up. Recommended spacing: 75 X 5 cm, 5 – 7 kg seed/ha for small seed and up to 10 kg for large seed. Planting time is from end of November through to end of December in Southern Africa. Fields should normally be kept weed free through manual hoe weeding or the use of herbicides where appropriate. Harvesting should be done early to avoid bird damage and farmers should engage bird scares when growing susceptible varieties. Certain varieties such as Shirikure has spiky heads which keep birds away. Seed rates also vary from 5kg/ha for low rainfall environments to 15kg/ha in irrigated cropping systems (Table 4.1).

Table 4.1. Recommended seed rates for sorghum

Rainfall	<500 mm	500-650 mm	650-800mm	Irrigated
Population (plants/ha)	60 000	90 000	110 000	250 000
Seed required (kg/ha)	5 kg/ha	8 kg/ha	12 kg/ha	15 kg/ha
Row width 90 cm	15.5 cm	8.5 cm	6 cm	3 cm
Row width 75 cm	14.0 cm	10.0 cm	7.5 cm	4 cm

Source: Seed Co Sorghum Grower's Guide

Choosing legume varieties

Legume seeds are a major challenge for many smallholder farmers in ESA as many seed houses find them unattractive to market since farmers can reuse them year after year. Most legumes discussed here can be grown as intercroops or sole crops. Table 4.2 highlights recommended planting densities and seed requirements per ha when grown as intercroops or in rotation with cereals.

Cowpea

Improved cowpea varieties have been in market in the last 2 or 3 decades. These varieties are erect, determinate, early maturing and have high yielding characteristics and the grain cook easily and are tastier compared to some traditional runner type cowpeas. However, they are highly susceptible to pests such as aphids and will thus need periodic insecticide

spraying particularly during prolonged dry spells. Common newly availed cowpea varieties include IT18, CBC1 and CBC2.

Common beans

Common beans have been grown extensively as intercropped by smallholder farmers in Africa. The choice of varieties depends on the agro-ecology or expected rainfall regime of the area. Most beans drop their flowers if excessive rains are experienced during the flowering period. Therefore, farmers prefer to delay planting of beans in intercropped until



the season starts tailing off so that the beans grow on residual soil moisture. In recent years bean breeding efforts have focussed on improving yield under stress conditions and farmer taste preferences. Popular varieties in the region include SUG123, Napilira, NUA45, NUA 56, Pan 148 and others. Varieties such as Dursitu and Tinike were popular in Ethiopia for example. More recently efforts have been on biofortified high Iron and Zinc varieties such as

NUA45.

NUA45 bean variety high in Fe and Zn

Soybeans

Soybean has been grown traditionally as a commercial crop mostly for the food and feed industries in most countries. Soybean oil for example is very popular among consumers. Soybean traits to consider in selecting a variety include maturity, yield potential, disease and pest resistance, iron deficiency tolerance (chlorosis), lodging score, height, and specific soybean quality traits such as protein and oil content. Due to its commercial orientation soybean seeds are widely marketed by many seed companies in the ESA region. In most countries local seed companies distribute locally recommended varieties. In the smallholder sector promiscuous soybean varieties which have the ability to nodulate with indigenous *Bradyrhizobium* strains that do not need inoculation, are also widely promoted. Commonly grown soybean varieties include Nasoko and Sable.

Pigeon pea

Early or medium maturing varieties are often preferred by farmers due to their fast maturing characteristics.

Table 4.2 Recommended planting densities and timing of planting for various legumes

Crop	Sole crop in rotation in maize				Intercrops with maize				Recommended time of planting	Recommended popular improved varieties in ESA
	Plant density/ha	Seed requirements kg/ha	Attainable yield (kg/ha)	Days to maturity	Plant density/ha	Seed requirements kg/ha	Attainable yield (kg/ha)	Days to maturity		
Cowpea	2-300 000	20-40	2500	70-90	1-150 000	10-20	800-1000	70-90	Same time as cereal	IT18 CBC1 and CBC2 (determinate or upright varieties) IT82E16
Common beans	+/-200 000	90-100	6000 (in Ethiopia the national average is about 1.6 to 1.7 tons/ha)	95-110	+/-100 000	45-50	1000 (???)	95-110	Same time as cereal	SUG123, Napilira, NUA45, NUA 56, Pan 148, Dursitu, Tinike
Groundnuts	74 000		4-6 000	100-180	37 000		1500	100-180	Same time as cereal	CG7, MG5
Soyabeans	444 000	90	5000	100-140	222000	45	1500	100-140	Same time as cereal	Nasoko
Pigeon pea	22000	50		151-200	11 000	25	2000	151-200	Same time as maize	Medium maturing varieties eg. Mwaiwathu alimi
Mucuna	44000	40	4000		22 000	20	1500		2-3 weeks after maize	
Dolichos lab-lab	44000	20	3500		22000				1-2 weeks after maize	