

Pack 105, Item 11

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**Backgrounder on growing common bean**

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***Introduction***

Common bean (*Phaseolus vulgaris* L.) is the most popular food legume\* in the world. It was introduced to Tanzania about 300 years ago. In Tanzania and much of East Africa, common bean is grown for home consumption and for sale. East African farmers produce more than half of common beans grown in in Africa. In Tanzania, beans are most often intercropped with maize or with permanent crops such as banana or coffee.

One-quarter to one-third of households sell beans, and there is a ready market in Tanzania and neighbouring countries. The urban poor and the estimated 80% of rural Tanzanians who depend on agriculture for their livelihood eat protein- and vitamin-rich common beans daily.

Leaving common bean roots in the soil after harvest results in an extra 20-60 kg of nitrogen per hectare, which is available for the next crop. This is the equivalent of ¾-2 free bags of urea, and can give the next crop a good boost.With good agricultural practices, common bean can yield over 800 kg/acre.

This backgrounder talks about growing common beans in Tanzania, but you can adapt the information here to other sub-Saharan African countries where common bean is grown.

***What are some key facts?***

* There is a ready market for beans in Tanzania and other East African countries.
* Beans are an affordable source of protein and are rich in vitamins.
* Growing legumes like common bean can add up to the equivalent of two bags of nitrogen per hectare to your field.

***What are the big challenges of growing common bean in Tanzania?***

* Insect pests, especially whiteflies and bean stem maggot.
* Diseases, including viral diseases such as bean common mosaic virus, and bacterial diseases such as common bacterial blight.
* Uncertain weather, including drought and the uncertain onset and finish of the rainy season.
* Low soil fertility.
* Not enough good quality seed.
* Poor access to information about bean markets.

***Gender aspects of growing common bean***

* Beans are typically considered a women’s crop. But the division of labour for growing beans varies from place to place. For example, in eastern Kenya, women are more likely to select and sow seed, as well as harvest, thresh, transport, and store the crop. Men are more likely to be involved in disease and pest management. By contrast, in Kenya’s Rift Valley and in the SNNPR region of Ethiopia, men dominate all tasks involved in bean production.

***Predicted impact of climate change on common bean***

* A recent study suggests that yields of common bean may fall by 30-50% across Africa by mid-century, and even more in the Sahel.
* Breeders are working on developing heat-tolerant varieties of common bean for East Africa.

***Key information about growing common bean***

1. **Suitable land and land preparation**

Common beans need moderately fertile or fertile soil, and will not grow well in acid or alkaline soils. Where soil is acidic, farmers can lower acidity by adding lime.

Remove large vegetation from the growing area. Plough small weeds into the soil to increase soil organic matter. Break up large lumps of soil, especially in the planting row. A fine tilth\* is ideal for planting common beans. Well-prepared land ensures good germination, vigorous early growth, and reduces weed, pest, and disease problems.

If land is prone to waterlogging, consider making ridges for common beans.

For further information: See documents 2, 4 (in English and Swahili), and 5 (in Swahili), in *the Resource List* below.

1. **Choosing varieties**

There are two kinds of bean varieties: climbing varieties and bush (or non-climbing) varieties. This *backgrounder* covers only bush varieties.

*Short-maturing beans:*

* Are suitable for areas with low rainfall.
* Can be useful for farmers who must plant late because, for example, the rains failed, or an early season crop was badly affected by pests or diseases.

*Long- or late-maturing beans:*

* Often have higher yields, but are less suitable for drier environments.
* Fix more nitrogen and contribute more to soil fertility than early-maturing varieties.

In Tanzania, the following varieties are resistant to common bean diseases such as anthracnose, angular leaf spot, common bacterial blight, halo blight, and bean common mosaic virus:

* Jesca
* Lyamungu 85
* Selian 97
* Lyamungu 90
* Selian 94
* Yuole Njano

Farmers should choose varieties that have a ready market and/or meet the family’s expectations for taste and cooking. Choosing a variety may require some market research by farmers or farmers’ groups.

For further information, see documents 2 (in English for Rwanda), 4 (in English and Swahili), and 5 (in Swahili).

1. **Seed quality**

Plant only high-quality seed. Ensure that seeds are free from insects, disease, and weed seeds. Do not use damaged or wrinkled seeds. Do not save seed from diseased plants, because the seeds are also infected.

Purchased seed can be saved from season to season, but for best yields and quality, purchase new seed every three seasons.

To ensure that seed is viable, conduct a germination test 10 days before planting.

For further information, see document 4 (in English and Swahili).

1. **Soil fertility**

It is advisable to get a soil test before applying fertilizer. Soil testing is available at a few locations in Tanzania, and provides both results and recommendations. Some small-scale farmers—though not all—will find the tests affordable.

Beans fix nitrogen—but *not* other nutrients. Therefore, it’s a good idea to apply fertilizers which contain phosphorous at planting, such as TSP, SSP, DAP, NPK, or Minjingu phosphate. But because some soils in Tanzania are naturally high in phosphorus and don't need phosphorus fertilizer, soil tests are useful.

Farmyard manure can also help boost yield. Apply 2-4 tonnes per acre at planting and supplement with either DAP, NPK, or *Minjingu mazao*. Use one bag of DAP per acre, or one bag of NPK (10:30:10) per acre.

On degraded soils, it may be necessary to add nitrogen to get beans started. Farmers can use DAP, *Minjingu mazao*, or *Yara legume* at planting. No top dressing is required. Be aware that nitrogen promotes growth of foliage, and too much will result in large plants but decreased yields.

Fertilizer (either chemical or organic) also helps stop diseases from becoming established and allows plants to bounce back.

For further information, see documents 2, 4 (in English and Swahili), and 5 (in Swahili).

1. **Planting and spacing**

Planting in rows with recommended spacing may take longer at first, but it saves time later with weeding and harvesting.

If you plant bush beans as a *mono-crop*, here is the recommended spacing:

* Plant rows 50 cm apart.
* Within rows: Plant two seeds every 20 cm. Or plant one seed every 10 cm to minimize competition.

*Intercropping*:

* When intercropping with a cereal, and to avoid beans being negatively affected by shade, plant two rows of cereal then one row of beans.

*Intercropping beans with maize*:

* Plant maize at 75 cm between rows. Plant a row of beans between rows of maize.
* In improved spacing (known as the *mbili* system), sow maize at 25 cm between rows and leave one metre between maize rows and two bean rows spaced 50 cm apart. (Both spacing systems result in the same number of maize plants per hectare, and therefore the same yield.)

If you don’t have a tape measure, clip soda tops to a string at the appropriate distances.

For further information, see documents 2, 4 (in English and Swahili). and 5 (in Swahili).

1. **Weeding**

Removing weeds minimizes competition between crops and weeds for nutrients, water, sunlight, and space. Weeds are also a host for some common pests. You can manage weeds manually or chemically, or use both approaches.

*Manual weed control:*

* Plant beans in weed-free soil that has been ploughed or hoed to a fine tilth.
* Weed about two weeks after planting.
* Do a second weeding 5-6 weeks after planting.

*Chemical weed control:*

Herbicides are avalable and can be cost-effective. However, there are challenges: 1) Farmers are unfamiliar with herbicides and may not follow recommended application rates or procedures; 2) Farmers may not use safety precautions such as wearing recommended clothing.

If you wish to use herbicides, seek advice from an extension agent.

For further information, see documents 2, and 4 (in English and Swahili).

1. **Pest and disease management:**

Check the field regularly for insects that could damage your plants. The most likely pests of common beans in Tanzania are aphids, bean stem maggots, bean foliage beetles, pod borers, pod sucking bugs, and whiteflies.

*Rotating* beans with non-legume crops helps to prevent a build-up of common bean pests. *Intercropping* can help create spaces where bean pests cannot thrive.

Post-harvest tillage exposes bean foliage beetle larvae to the sun and kills them, reducing pest carry-over to the next season.

Intercropping with maize will also reduce populations of bean bruchid, the main storage pest, in the field.

### To control diseases:

### use clean seed,

### rotate crops,

### weed properly, and

### do post-harvest tillage.

### Do not use seed from diseased plants because the seeds are also infected. For viral diseases, uproot and bury infected plants off-site.



Cassava mosaic virus in common bean

For further information, see documents 1, 2, 3 (in Swahili), 4 (in English and Swahili), and 5 (in Swahili).

1. **Harvesting**

Harvest when leaves and pods are dry and yellowish-brown. Delayed harvesting can cause crop losses. Harvest early in the day to reduce shattering of pods.

For further information, see document 3, 4 (in English and Swahili), and 5 (in Swahili).

1. **Practices to deal with moisture stress and low soil phosphorus**

In much of the bean-growing land in Africa, there is a lack of soil phosphorus available for plant use. There is also a lack of soil moisture. These two issues can result in low bean yields.

To counter these problems, the following practices are recommended:

* Add organic manure to enhance soil organic matter, which preserves soil moisture and helps recruit soil phosphorus.
* Mulch with crop residues and other available vegetation to preserve soil moisture.
* Use crop rotations and minimum tillage in seedbed rows to conserve soil moisture during the dry season and during periodic droughts.

For further information, see document 7.

***Where can I find other resources on this topic?***

1. Africa Soil Health Consortium (ASHC), 2015. *Crop pests and diseases.* CABI, Nairobi. <http://africasoilhealth.cabi.org/materials/legumes-crop-pests-and-diseases/> (479 KB, in English only)
2. Africa Soil Health Consortium (ASHC), undated. *Better beans through good agricultural practices: for farmers in Rwanda*. <http://africasoilhealth.cabi.org/wpcms/wp-content/uploads/2014/10/361-N2Africa-Rwanda-common-beans-booklet.pdf> (1,901 KB, in English only)
3. Africa Soil Health Consortium (ASHC), undated. *Mbinu endelevu za kuthibiti magonjwa na wadudu wa maharage* (Common bean pests and diseases). <http://africasoilhealth.cabi.org/wpcms/wp-content/uploads/2016/11/534-Bean-pests-and-diseases-leaflet.pdf> (2,054 KB, in Swahili)
4. Africa Soil Health Consortium (ASHC), undated. Radio transcripts on various aspects of bean production. Available for download at <https://africasoilhealth.cabi.org/materials/> (In English and Swahili)
5. Africa Soil Health Consortium (ASHC), undated. *Tupande Maharage Bingwa* (Common bean manual). <http://africasoilhealth.cabi.org/wpcms/wp-content/uploads/2016/11/521-Common-bean-manual-Kiswahili-.pdf> (12,849 KB, in Swahili)
6. Ramirez-Villegas, J, Thornton, P.K., 2015. *Climate change impacts on African crop production*. CCAFS Working Paper no. 119. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. <https://cgspace.cgiar.org/bitstream/handle/10568/66560/WP119_FINAL.pdf> (3,011 KB, in English only)
7. Namugwanya Margaret, Tenywa, J.S., Otabbong, E., Mubiru, D.N., Basamba, T.S., 2014. Development of Common Bean (Phaseolus Vulgaris L.) Production Under Low Soil Phosphorus and Drought in Sub-Saharan Africa: A Review. *Journal of Sustainable Development*; Vol. 7, No. 5; 2014. Downloadable at [www.ccsenet.org/journal/index.php/jsd/article/download/38006/22352](http://www.ccsenet.org/journal/index.php/jsd/article/download/38006/22352) (in English only, 219 KB)

***Key definitions***

* *Legume*: A plant in the *Fabaceae* or *Leguminosae* family, or the fruit or seed of such a plant. Legumes are mostly grown for their grain seed, which is called a pulse, and also for livestock forage, and as a green manure. Examples of edible legumes include: dried peas, beans, lentils, soybeans, groundnuts, and tamarind.
* *Soil pH:* A measure of the relative acidity or alkalinity of soil. A soil pH below 7 is acidic and above 7 is alkaline. Most plants grow best at a pH between 5.5 and 7.0.
* *Tilth*: Tilth or soil tilth refers to the physical condition of the soil, especially its suitability for planting or growing a crop. Factors that determine soil tilth include the formation and stability of aggregated soil particles, moisture content, degree of aeration, and the rate of water infiltration and drainage.

## Acknowledgements

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