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Crop Guide – Sugar Beans

PLEASE REMEMBER TO ALWAYS READ THE LABEL BEFORE USING ANY CHEMICAL

Sugar Bean Production

Sugar bean is a grain legume which is very nutritious and rich in protein. The leaves, green pods, young and mature seeds are edible. The crop residues are good feed for livestock or form a good basis for compost manure. Together with bacteria, sugar bean forms root nodules. These bacteria are called rhizobia. In the root nodules, the bacteria can fix nitrogen from the air into a form that sugar bean can use for growth. Part of the fixed nitrogen is used to make protein in the grains, but some of the nitrogen is also left behind through falling leaves and roots. The nitrogen that is left behind improves soil fertility. This makes sugar bean a good crop to grow as intercrop or in rotation with other crops, because these other crops then also benefit from the nitrogen. To get a good sugar bean yield you can inoculate bean seed with rhizobium inoculant or apply initial N fertilizer at planting.

Land Selection & Preparation

Select fertile to moderately fertile land with no water logging. Sugar bean does not tolerate acidic soils. Think about the rotation scheme for the field you want to plant. To prevent diseases, do not plant beans in the same field you used for beans last season. Clear all vegetation and prepare the field manually with a hoe, or use animal power or a tractor. You can plant sugar bean on ridges or on a flat seedbed. Planting on ridges helps prevent waterlogging, which damages the sugar bean plants. Well-prepared land ensures good germination and reduces weed infestation.

Variety & Seed Selection

Select a good bean variety which suits your agro-ecological zone. Also pay attention to the maturity period. Some varieties have a relatively short maturity period and are suitable for areas with low rainfall, or when planted late in the season. Late maturing varieties are less suitable for drier environments, but often produce higher grain and biomass yields, fix more nitrogen and contribute more to soil fertility than early maturing varieties. Use only high quality seed for planting. Sort out good seeds to ensure that they are free from insects, disease infestation and weed seeds. Do not use damaged or wrinkled seeds, or seeds with holes. Do a germination test at least 10 days before time of planting. Plant 50 seeds and if at least 40 emerge, the seed is good for planting. If 30-40 emerge, plant more seeds than recommended. Get new seeds if less than 30 seeds emerge.

Inoculation

Inoculation with rhizobia can help sugar bean to form nodules and fix nitrogen. Each legume crop needs a different type of rhizobium bacteria, so always check you have the right inoculant for sugar bean. How to inoculate sugar bean with rhizobia



1. Spread 100 kg of sugar bean seed on a clean plastic sheet or in a large container.
2. Mix 100 g of inoculant and 1 litre of water in a clean bucket
3. Add 50 grams of sugar into the solution. The sugar acts as an adhesive between the seed and the inoculant.
4. Stir the solution for 30 seconds.
5. Sprinkle the inoculant mix onto the seed.
6. As you sprinkle the inoculant onto the seed, turn the seed gently to ensure that all seeds are coated with the inoculant. The coated seeds should look shiny wet.
7. Plant immediately after inoculation and protect the inoculated seed from direct sunlight by covering the container with paper or tent.
8. Sow the seeds in moist soil and cover immediately afterwards to protect the rhizobia from sunlight.

Important:

- The right inoculant must be used with the right legume. You should not apply, for instance, a soybean inoculant on sugar bean seed.
- Inoculant contains living organisms that must be protected from heat and sun. Therefore always store the package in a cool place away from direct sunlight.
- Inoculants lose their effectiveness when stored in an open package. Always store inoculants in their original package and use them quickly after opening the bag.
- Seeds should be coated with inoculant just before planting.
- Nodulation will fail if the inoculated seed is exposed to the sun for any length of time or is sown into dry soil and left for several days before irrigation/rain.
- Do not use inoculant after its sell-by date, as the inoculant may then not be effective anymore

Fertilizer

Sugar bean needs phosphorus at planting. Good fertilizer types that supply phosphorus for sugar bean are **Single Super Phosphate** or **KYNOCH 6.28.23** or **10.24.20**. Although sugar bean can fix nitrogen, it often benefits from a small starter dose of nitrogen from fertilizer.

Application - Make a furrow of 5-7 cm deep. You will also use this furrow to plant sugar bean. Place the fertilizer in the furrow and cover with 2 cm of soil. If you don't cover the fertilizer with soil, the fertilizer will 'burn' the seed. Use 150kgs/ha of the above blends. You can use fertilizer cups to measure the amount of fertilizer and apply it in the furrows. When manure has been applied recently, rates can be reduced. A top dressing of 100kgs Ammonium Nitrate can be applied to crop at 4 weeks after planting.

Planting

- Plant when the soil is moist. Planting in rows has many advantages- you use the correct plant density; weeding is easier and harvesting takes less time.
- Plant in rows which are 50-90 cm apart.
- Within a row, plant seeds at 5-7 cm apart (1 seed per stand). Plant seeds at a depth of about 5 cm. Fill gaps one to two weeks after planting when plants have emerged.
- At a row spacing of 90cms and in row spacing of 5cms gives you a plant population of 222000 plants per ha.

- At a row spacing of 50cms and an in row spacing of 7cms gives you a plant population of 285500 plants per ha.

Planting dates in Zimbabwe range from October to mid-January in areas where frost occurs. In frost-free areas, March and April are the best for planting beans.

Irrigation

Irrigation offers the potential for increasing yields and enabling production in otherwise unsuitable soils. Sprinkler irrigation is the most frequent means of irrigation for sugar beans. The sprinkler irrigation system used is determined by the size and shape of the lands, as well as available labour and capital. In areas where water is unrestricted (not merely supplementary irrigation), the soil should be wet to field capacity. The seedbed should be prepared and planted and thereafter the field should not be irrigated until seedlings have emerged. Irrigation scheduling is essential for optimum yield per unit of water. The critical moisture-sensitive growth stages are flowering and early pod set which occur at 40 to 50% and 50 to 60% of the growing season. It is important that irrigation cycles should be scheduled correctly, as excessive moisture can create conditions conducive to root rot and Sclerotinia.

Weeds

Control weeds to minimize competition for nutrients, water, sunlight and space. Weed control can be manual or chemical, or both.

Manual weed control - weed about 2 weeks after planting and again 5-6 weeks after planting. If the plants grow very well and the canopy closes early, the second weeding is not needed.

Chemical weed control - herbicides, if used properly, are safe and effective in controlling weeds. There are different types of herbicides. Which type to use depends on the predominant weed species and the availability of the herbicide.

Pests And Diseases

Pests

Common insects affecting bean plants in Zimbabwe are the CMR beetle (blister beetle), cutworm, aphids, semi-loopers, bean stem maggot, red spider mite, heliothis bollworm and rootknot nematode. Insects can damage an entire crop. Therefore, check the field regularly for insects that damage your plants. Not all insects, however, cause damage to the bean plant. For example, bees will not harm your crop and some insects such as spiders, lady birds and ants are natural enemies of harmful insects. Also the larvae of the CMR beetle are beneficial because they feed on grasshopper eggs. Bean stem maggot Aphids Always monitor your field for insects. Harmful insects can be controlled by spraying with insecticides. Larger insects can also be handpicked and destroyed. Wear gloves when picking CMR beetles because those beetles can release a liquid that burns the skin.

Diseases

Anthracnose is a fungal disease where dark red to black lesions develop on the whole plant, including the pods. On stems and pods, lesions are sunken. In moist weather the centres of lesions can become covered with pink spores. work in the field when plants are wet will spread the disease.

Angular leaf spot is a fungal disease which is usually observed at flowering. Primary leaves have round lesions and are usually larger than the lesions on trifoliolate leaves. Lesions are first grey, and then become dark brown in colour. The spots may increase in size and join together.

Rhizoctonia root rot is a fungal disease that can cause seedling death, root and stem rot, stem cankers, and pod rot. Initial symptoms include linear or circular reddish/brown sunken lesions. With age, the lesions increase in size and encircle the stems, retarding normal plant growth.

Powdery mildew is a fungal disease. A white powdery mould appears on the upper leaf surfaces. Severely affected leaves turn yellow and die. Leaf petioles, stems and pods can also be affected.

Common bacterial blight is a bacterial disease. Water-soaked spots appear on the lower surface of the leaves. The pods can show small, water-soaked, greasy looking spots. Lesions can also develop on the stem. Infected seed can have yellow lesions and become wrinkled, but sometimes does not show any symptoms.

Bean common mosaic virus is transmitted through aphids. The virus also survives in seeds. A light green-yellow and dark green mosaic pattern develops on the leaves. Often, the change in colour is accompanied by puckering, blistering, distortion and downward curling and rolling of the leaves. The disease causes stunting of plants and reduced flowering and reduced yields.

Controlling diseases

- Fungal and bacterial diseases survive in seed or in plant residues. The use of clean seed, crop rotation and proper weeding helps to control the diseases. Do not use seed from diseased plants because these seeds are also infected.
- Fungal diseases can also survive in the soil. Shallow sowing, deep ploughing, use of raised beds, and rotation can help prevent this disease spreading through infected soil.
- When fungal diseases are common, seed can be treated with fungicides before planting.
- The bean common mosaic virus can be controlled by controlling the aphids which spread the disease and by using clean seed.

Harvesting

1. Start harvesting when the leaves and pods are dry and yellow-brown.
2. Harvest by handpicking dry pods or by cutting the plants at ground level using a sickle. Leave the roots on farm to improve soil fertility.
3. Dry the pods or the plants with pods in the sun on a clean surface like a mat, plastic sheet or tarpaulin, or on a raised platform. Dry for about one day. Do not dry the pods on the soil.
4. Thresh the pods or plants with pods on a clean surface.
5. Dry the threshed grains on a clean surface for two sunny days; protect from rain and animals. Test the grain to see if it is dry enough by biting or pinching grain with your finger nails - grain should break or crack, not bend or stick between your teeth or fingernails.
6. Clean the grains. Winnow to remove chaff, dust and other rubbish. Also remove shrivelled, diseased, broken grains and grains of other varieties.
7. Place grain in clean bags or other containers; if re-using bags in which grain was previously stored, the bags must first be washed and then disinfected. Completely dry container/bag before placing grain.

8. Grain can be treated before storage to control storage pests. For example, Coating grain with edible oil or ash also reduces storage pests. (If you apply chemicals to grain before storage, do not eat or sell the grain until it is safe for consumption).
9. Clean the storage room. Stack the grain bags on a raised platform or wooden pallet away from the wall. Avoid direct contact of storage bags with the ground. Inspect and remove infested or rotting grains on a regular basis

PROBLEM	PRODUCT	RATE/HA	COMMENT
HEBICIDES			
Annual Weeds & some B/L weeds	Dual Magnum	1.1lts/ha	Pre-emergent control of grasses and broadleaf weeds and suppression of sedges
Annual Weeds & some B/L weeds	Metribuzin	1.1lts/ha	Pre-emergent control of grasses and broadleaf weeds and suppression of sedges
B/L Weeds	Basagran	225mls/ha	Post-emergent control of broadleaf weeds
Grasses Only	Fusilade Forte	1-1,5lts/ha	Post-emergent control of grasses
PESTS			
Nematodes	Abamiprid	2lts/ha	Applying in furrow at planting for control of nematodes
Bean Stem Maggot	Plesiva Star	270g/ha	Applied to furrow at planting. Controls all pests in lands for 6 weeks
	Karate Zeon	175mls/ha	Full Cover Spray at minimum of 200lts/ha
Cutworm	Karate Zeon	175mls/ha	Full Cover Spray at minimum of 200lts/ha
Aphids	Magmectin Ultra Duo	250mls/ha	Full Cover Spray at minimum of 200lts/ha
Red Spider Mite	Abamiprid	250mls/ha	Full Cover Spray at minimum of 200lts/ha
General Insects including Bollworm, grass hoppers, crickets, Loopers, Diamond back moth	Belt	75mls/ha	Full Cover Spray at minimum of 200lts/ha
	Magmectin	250mls/ha	Full Cover Spray at minimum of 200lts/ha
	Ultra Duo	1kg/ha	Full Cover Spray at minimum of 200lts/ha
	Cartap	400mls/ha	Full Cover Spray at minimum of 200lts/ha
	Magmectin		Full Cover Spray at minimum of 200lts/ha
			Full Cover Spray at minimum of 200lts/ha
Whitefly	Thunder	330mls/ha	Full Cover Spray at minimum of 200lts/ha
DISEASES			
Seed Dressing	Thiram	200g/ha	Apply dressing to seed
Anthraco nose	Thiram	200g/ha	See above

	Mancozeb	1,5kgs/ha	Full Cover Spray at minimum of 200lts/ha
Bacterial Blight	Bravo Azoxy Duo Tebuconazole	1,5lts/ha 500mls/ha 500mls/ha	Full Cover Spray at minimum of 200lts/ha Full Cover Spray at minimum of 200lts/ha Full Cover Spray at minimum of 200lts/ha
Damping Off	Thiram	200g/ha	Apply as Seed Dressing
Rhizoctonia root rot	Ridomyl Gold	2,5kgs/ha	Full Cover Spray at minimum of 200lts/ha
Angular leaf spot	Cuperdem VS-04	3lts/ha 3lts/ha	Full Cover Spray at minimum of 200lts/ha Full Cover Spray at minimum of 200lts/ha
Powdery mildew	Azoxy Duo Cuperdem VS-04	500mls/ha 3lts/ha 3lts/ha	Full Cover Spray at minimum of 200lts/ha Full Cover Spray at minimum of 200lts/ha Full Cover Spray at minimum of 200lts/ha