U CAN GROW AFRICA
Moving Communities from Poverty to Prosperity

Sweet Pepper - Introduction

Scientific name: Capsicum annuum
Common names: bell pepper, sweet pepper

Sweet pepper propagation is from seeds.

Most sweet peppers are bell-shaped, therefore the name bell pepper is common. However, sweet peppers come in a range of shapes from round to oblong, to tapered. The skin is smooth and shiny and can be a range of colours. Most peppers are green when immature, and red if allowed to ripen. However, new cultivars offer both mature and immature peppers in red, yellow, orange, purple, or brown.

In South Africa this crop is grown in different parts of South Africa along with a large variety of other vegetable and field crops on individual farms, namely Gauteng (in the Highveld and Lowveld areas), Northern Cape, Eastern Cape, Western Cape, Limpopo and KwaZulu-Natal.

Sweet Pepper: Testing the learning: Introduction

- Peppers ripen in green, red, yellow, orange, purple and brown? True/False
- Have you grown this crop before, if yes when? Yes/No

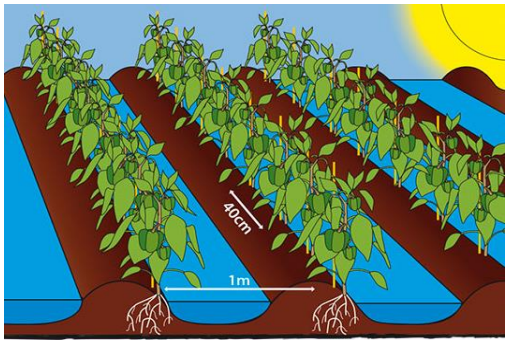
Sweet Pepper – Planting, Spacing and Sowing

Planting Method

Sweet pepper seeds can be directly sown but this is not generally the practice of commercial farmers. The seeds are sown in prepared beds or in seed trays. The seeds germinate and seedlings are made. Once the seedlings are established and about 15 cm tall and strong enough they are transplanted into the open field.

Spacing

Plants are spaced 40 to 50 cm apart in rows that are 50 cm apart in tram lines to provide a slightly wider space every two rows for implements and workers to move through.



Sowing

In protected environment like a greenhouse or where the late winter and spring temperatures are warmer sowing can begin in June or July. When making sweet pepper seedlings outside in the open, seeds are sown late August to miss the spring cool weather.

Planting Time

About five to six weeks after sowing of the sweet pepper seeds the planting out of the seedlings can commence. This will normally be late July in warm climates to mid-September. Planting can however be done till the end of December.

Growth Period

From seed to ripe fruit, being the coloured pepper (red, yellow, purple, white or orange) it can take up to five months to harvest. The green pepper which is the immature fruit can be harvested from eight weeks after planting of seedlings.

Sweet Pepper: Testing the learning: Planting, Spacing and Sowing

- Plants are spaced 40 to 50 cm apart in rows that are 50 cm apart in tram lines. True/False
- The green pepper which is the immature fruit can be harvested from eight weeks after planting of seedlings? Yes/No

Sweet Pepper – Fertilization

It is always advisable to have the plant area properly analysed by your extension agent/officer and soil nutritional advisor before planting. A general guide to fertilizing your peppers is as follows. Make sure the land is properly ploughed and levelled. During the final ploughing normally a disc plough is used apply a pre-planting application of a mixture of Nitrogen, Phosphates and Potassium into the top 20 cm of soil.

If drip irrigation is used it is better to apply the equivalent in liquid fertilizer through the water over the first 4 weeks of growth and thereafter throughout the growing period to about 3 weeks before harvesting of ripe fruit. For overhead or flood irrigation apply fertilizer at about 6 weeks after planting. This second application can be split in two at six and again eight weeks from planting.

The fertiliser programme for sweet pepper production depends on the type of soil, the nutrient status and the pH of the soil.

Sweet Pepper: Testing the learning: Fertilisation

- Have you done soil testing? True/False

Sweet Pepper – Irrigation

Irrigate between 30 and 40 mm of water per week throughout the growing period. It is advisable to install moisture tension meters to monitor soil moisture tension. As most of the roots are concentrated in the top 30 cm of soil, even a shovel can be used to check the soil.

The best system is drip irrigation under plastic mulching as this gives the farmer more control over the irrigation and fertilizing of his crop. Flood irrigation can lead to waterlogged or dry conditions as it is more difficult to manage. Overhead irrigation can cause fungal disease and rot.

Sweet Pepper: Testing the learning: Irrigation

- Overhead irrigation can cause fungal disease and rot. True/False

Sweet Pepper – Weeding

Good weed control in peppers begins similarly to any other crop, before the crop is planted. Control established perennials before planning to plant peppers in the field. Use cultural, mechanical and chemical weed control techniques in a coordinated manner to reduce the risk of interference with the crop. Plastic and organic mulches control weeds effectively. Higher density plant spacing will also smother weeds. Shallow cultivation will help to avoid root damage especially around young plants.

Sweet Pepper: Testing the learning: Weeding

- Daily checks and weeding should be done. True/False

Sweet Pepper – Diseases and Pest control

Some common pests and disease found are:

Pest	Damage	Solution
Aphids 	They suck plant sap from the leaves. The affected leaves curl and crinkle or form cups and may be completely lined with the aphids. In severe infestations, the plants wilt and die. The plants, if not killed, are dwarfed, grow slowly, and form small light heads.	• On a smaller scale, as in a vegetable garden, spray the foliage with soapy water, then rinse with clear water. • Alternatively, spray the plants with insecticidal soap.
Beet armyworm Spodoptera exigua 	Singular, or closely grouped circular to irregularly shaped holes in foliage; heavy feeding by young larvae leads to skeletonized leaves; shallow, dry wounds on fruit; egg clusters of 50-150 eggs may be present on the leaves; egg clusters are covered in a whitish scale which gives the cluster a cottony or fuzzy appearance; young larvae are pale green to yellow in colour while older larvae are generally darker green with a dark and light line running along the side of their body and a pink or yellow underside	Organic methods of controlling the beet armyworm include biological control by natural enemies which parasitize the larvae and the application of Bacillus thuringiensis; there are chemicals available for commercial control but many that are available for the home garden do not provide adequate control of the larvae
Colorado potato beetle Leptinotarsa decemlineata 	Feeding damage to foliage; if infestation is severe or if left untreated plants can be completely defoliated; adult insect is a black and yellow striped beetle; larvae are bright red with black heads when they first hatch and change color to pink; larvae have two rows of black spots	Control of Colorado potato beetle can be challenging as they have developed high levels of insecticide resistance; in the home garden planting early maturing varieties of potato allows the plants to escape from most damage; adults and larvae should be handpicked from plants and destroyed in soapy water; applications of Bacillus thuringiensis can be effective at controlling larvae but should be applied frequently; some insecticides, including spinosad, are still effective against adult beetles
Flea Beetles	Small holes or pits in leaves that give the foliage a characteristic “shothole” appearance; young plants and seedlings are	Floating row covers may have to be used prior to the emergence of the beetles to provide a physical barrier to protect young

	particularly susceptible; plant growth may be reduced; if damage is severe the plant may be killed; the pest responsible for the damage is a small (1.5–3.0 mm) dark coloured beetle which jumps when disturbed; the beetles are often shiny and metallic in appearance	plants; plant seeds early to allow establishment before the beetles become a problem - mature plants are less susceptible to damage; trap crops may provide a measure of control - cruciferous plants are best; application of a thick layer of mulch may help prevent beetles reaching surface; application on diamotecoeus earth or oils such as neem oil are effective control methods for organic growers; application of insecticides containing carbaryl, spinosad, bifenthrin and permethrin can provide adequate control of beetles for up to a week but will need reapplied
Leafminers 	Thin, white, winding trails on leaves; heavy mining can result in white blotches on leaves and leaves dropping from the plant prematurely; early infestation can cause fruit yield to be reduced; adult leafminer is a small black and yellow fly which lays its eggs in the leaf; larvae hatch and feed on leaf interior	Check transplants for signs of leafminer damage prior to planting; remove plants from soil immediately after harvest; only use insecticides when leafminer damage has been identified as unnecessary spraying will also reduce populations of their natural enemies
Leafrollers 	Leaves of plant rolled and tied together with silk webbing; feeding damage to rolled leaves; defoliation of plant; silk webbing may also be present on fruits and fruits may have substantial scarring from feeding damage; larvae wriggle vigorously when disturbed and may drop from plant on a silken thread	Monitor plants regularly for signs of infestation; remove weeds from plant bases as they can act as hosts for leafrollers; avoid planting pepper in areas where sugarbeet or alfalfa are grown nearby; Bacillus thuringiensis or Entrust SC may be applied to control insects on organically grown plants; apply sprays carefully to ensure that treatment reaches inside rolled leaves
Thrips (Western flower thrips, Onion thrips, etc.) 	If population is high leaves and buds may be distorted; leaves appear silvery and are speckled with black feces; insects will feed on and damage flowers; most damage occurs through the transmission of Tomato spotted wilt virus (TSWV); insect is small (1.5 mm) and slender and best viewed using a hand	Avoid planting next to onions, garlic or cereals where very large numbers of thrips can build up; use reflective mulches early in growing season to deter thrips; apply appropriate insecticide if thrips become problematic

	lens; adult thrips are pale yellow to light brown and the nymphs are smaller and lighter in color	
Tomato fruit worm (Corn earworm) Helicoverpa zea 	Larvae burrowing into fruit near stem end and feeding on fruit interior causing decay; fruit turn red prematurely and fall from plant causing reduced yield; young caterpillars are cream-white in color with a black head and black hairs; older larvae may be yellow-green to almost black in color with fine white lines along their body and black spots at the base of hairs; eggs are laid singly on both upper and lower leaf surfaces and are initially creamy white but develop a brown-red ring after 24 hours and darken prior to hatching	Early treatment of tomato fruitworms is necessary as once they enter the fruit they are protected from sprays; monitor plants for eggs and young larvae and also natural enemies that could be damaged by chemicals; Bacillus thuringiensis or Entrust SC may be applied to control insects on organically grown plants; appropriate chemical treatment may be required for control in commercial plantations
Pepper weevil Anthonomus eugenii 	Feeding damage to foliage, buds and tender young fruit pods; larvae feed within buds and fruit; older fruit misshapen and discoloured; buds and fruit may drop from plant; adult weevil is a small black beetle; larvae are small cream-white grubs with brown heads which can reach 0.6 cm (0.25 in) in length when mature	Remove any nightshade plants growing in close proximity to pepper; immediately remove any dropped fruit from soil surface; if pepper weevil becomes problematic, rotate crop the following year; organically acceptable control methods include sprays of pyrethrin; destroy pepper crop residue immediately after harvest
Spider mites (Two spotted spider mite) 	Leaves stippled with yellow; leaves may appear bronzed; webbing covering leaves; mites may be visible as tiny moving dots on the webs or underside of leaves, best viewed using a hand lens; usually not spotted until there are visible symptoms on the plant; leaves turn yellow and may drop from plant	In the home garden, spraying plants with a strong jet of water can help reduce build-up of spider mite populations; if mites become problematic apply insecticidal soap to plants; certain chemical insecticides may actually increase mite populations by killing off natural enemies and promoting mite reproduction

Diseases	Symptoms	Solution
Anthracnose Colletotrichum spp. 	Circular lesions on fruit which contain tan to orange to black concentric rings in the centre; lesions usually reach 3 cm in diameter but may enlarge to cover most of the fruit surface; lesions may also occur on leaves and	Always plant disease-free seeds and transplants; seeds can be freed from infection by treating with hot water at 52°C for 30 minutes; if disease is known to present, the field should be rotated with non-susceptible

	stems and appear as irregularly shaped grey spots with dark margins	crops for a period of 3 years; ploughing crop residue deeply into the soil removing crop debris can help to reduce inoculum in the soil.
Cercospora leaf spot (Frogeye leaf spot) 	Initial symptoms of infection are the formation of small, circular, water-soaked spots on leaves, stems, petioles and/or peduncles; the lesions mature to have white to brown centres surrounded by a brown to red or purple border; as the lesions expand, they may develop a water-soaked outer edge and dark outer ring which gives the lesions a concentric appearance; mature lesions are brittle and cracked in the centre; lesions may be between 0.3 and 1.3 cm in diameter	Cercospora infections are usually minor in pepper and require no treatment; crop debris should be removed and destroyed after harvest or buried in the soil; application of an appropriate fungicide can help to reduce damage if applied early on in the infection; practicing crop rotation reduces the incidence of the disease
Damping-off Pythium spp. 	Seeds did not germinate; seedlings collapsing and dying; dark stems which are shrivelled near the soil line; water-soaked lesions on the stem; water-soaked discoloured roots	Avoid planting in poorly draining, cool, wet soil; planting in raised beds will help with soil drainage; plant high quality seed that germinates quickly; treat seeds with fungicide prior to planting to eliminate fungal pathogens
Fusarium wilt Fusarium oxysporum most likely	Yellowing of foliage and wilting upper leaves; wilting spread to all parts of plant; leaves remain attached to plant and are dark green in colour; red-brown discoloration of vascular tissue; plant death	Plant pepper in well-draining soils and avoid waterlogging
Gray leaf spot Stemphylium spp.	Initial symptoms of disease appear as small, red-brown spots on leaves measuring 1–2 mm in diameter; as disease progresses, lesions expand and turn lighter in the centre; lesions expand to 3–5 mm in diameter and mature lesions have white or grey centres and red-brown margins; high numbers of lesions may form on leaves causing them to turn yellow and drop from the plant	As pepper nursery beds seem to be more susceptible to gray leaf spot infection, control relies on good management of the beds; beds should be well ventilated and all crop debris should be promptly removed; beds should not be planted next to pepper or tomato fields; if disease is present and spreading then application of appropriate fumigant fungicides should be effective at eradicating the pathogen; lesions on plants in an established field usually do not warrant treatment

Powdery Mildew 	Patches of white, powdery fungal growth on the underside of the leaves; yellow to brown discoloration of the upper leaf; edges of leaves may curl upwards exposing the underside of the leaf; leaves may begin dropping from plant	Disease can occur in both humid and dry conditions; disease spreads most rapidly in humid conditions; disease commonly affects older leaves Apply appropriate fungicide if disease is severe
Southern blight Sclerotium rolfsii 	Sudden wilting of leaves; yellowing foliage; browning stem above and below soil; browning branches; stem may be covered with fan-like mycelial mat	Remove infected plants; avoid overcrowding plants to promote air circulation; rotate crops with less susceptible plants; plow crop debris deep into soil; provide a barrier to infection by wrapping lower stems of plant with aluminium foil covering below ground portion of stem and 2-3 in above soil line

Sweet Pepper: Testing the learning: Pests and Diseases Control

- This stage of planning and growing may not be necessary if you are using natural growing program. If you are not going to use chemicals, please tell us. Using chemicals? Yes /No

Sweet Pepper – Harvesting

WHEN TO HARVEST PEPPERS

- Peppers can be harvested as soon as they are large enough to eat.
- Mild peppers and hot peppers can be harvested when they reach full size and are fully coloured, or they can be harvested as soon as they reach a usable size. Peppers can be eaten at just about any stage of development.
- Mild peppers commonly get sweeter as they mature. Hot peppers commonly get hotter as they mature.
- You can harvest peppers when they are green, yellow, orange, purple, brown, or red. Most peppers are green when they are young and red when fully mature. Harvest peppers when they are the size and colour you want.
- All peppers start out green and turn colour as they mature. Red, green, and yellow bell peppers will start out green but turn colour as they mature. Most hot peppers will turn red when mature, but can be eaten green.
- Harvest all peppers when the fruit is firm. Peppers that stay on the plant past maturity can still be used as long as the fruit is firm.
- The more often you cut fruit, the more the plant will blossom and produce.
- When a frost or freeze is forecast, harvest all of the peppers remaining on the plant. Use the large peppers and compost the small one.

HOW TO HARVEST PEPPERS

- Cut peppers from the plant with a pruning shear or knife. Leave a short stub of stem attached to the fruit. Do not pull peppers from the plant by hand; this can result in broken branches.
- Use gloves when you harvest hot peppers to protect your skin. Hot peppers contain capsaicin oil which can burn the hands, eyes, nose, and mouth.

Sweet Pepper: Testing the learning: Harvesting

- Harvest peppers when they are the size and colour you want.True/False
- Do not pull peppers from the plant by hand. True/False

Sweet Pepper – Safe Storage

- Store peppers at 13°C for up to two weeks.
- Peppers will keep in the refrigerator if it is not too cold; rinse the fruit with water, pat them dry, and place them in a perforated plastic bag in the crisper section of the refrigerator. (You can purchase perforated plastic bags or make your own by punching 20 holes in a medium-size bag; use a hole punch or sharp object.)
- Peppers should not be stored at temperatures cooler than 7°C. Peppers stored at temperatures too cool will soften or shrivel and can develop pitting, water-soaked areas, and decay.
- Harvested peppers that have begun to change colour will continue to ripen when kept at room temperature for three days. Peppers that haven't begun to change colours but are at or near full size can be eaten green
- Peppers with blossom end rot or sunscald should be used as soon as possible and should not be stored because they will decay more quickly.

Sweet Pepper: Testing the learning: Safe storage

- Peppers you can store up to two weeks. True/False
- Peppers should not be stored at temperatures cooler than 7°C. True/False

PRODUCTION SCHEDULING

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Soil sampling								X	X	X	X	X
Soil preparation	X								X	X	X	X
Planting	X	X								X	X	X
Fertilisation	X	X								X	X	X
Irrigation	X	X								X	X	X
Pest Control	X	X								X	X	X
Disease control	X	X								X	X	X
Weed control	X	X								X	X	X
Leaf sampling	X	X								X	X	X
Harvesting	X	X	X	X								X
Marketing	X	X	X	X	X						X	X

Sweet Pepper – Micro Jobbing

- What is the most important two things I need to do every day?
  - *Walk around the crop*
  - *Pull out the weeds*
  - *Look for any signs of pest or diseases (small bugs)*
  - *Ensure there is enough water.*
- How long does the crop take to grow?
- What will I use to spray the crop down?
- Take a photo of your crop every Tuesday.
- Complete the job sheet every week.

Log Book

Date	Task	Proof of task
Day 1	Prepare lands	• Take a picture of the land before you start preparing it. • Take a picture of the land once you have made it ready to start planting.
Day 2	Plant seed	Take a photo
Weekly tasks	How much water did the crop get this week?	Show us you weekly log book
	Did you add fertiliser? If yes, how much.	
	Were there lots of weeds to take out?	Take a photo
	Did you need to spray for pests? If yes, how much.	Take a photo of the spray using
	Did you need to spray for diseases? If yes, how much.	Show us by that a photo of the diseases and what spray you are using
Harvesting	After about 12th or 13th week the broccoli is ready to be harvest	Take a photo
Please log the follow at harvest time:	Date	Fill in
	Quantity	Fill in
	Grade	Fill in

The above needs to pop up every Tuesday for the full growing cycle