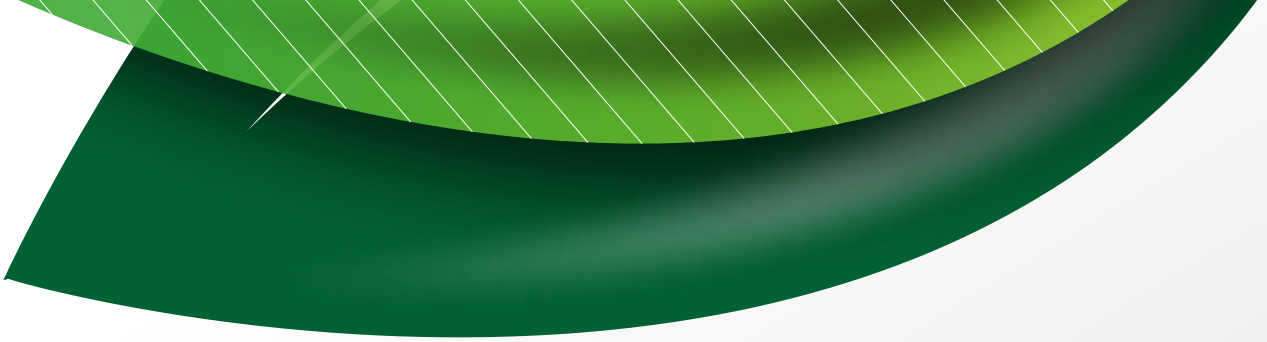


TOMATO

TUNNEL

Production & Spray Guide

80TH ANNIVERSARY
SEED·CO
EST. 1940

Tunnel Tomato Production Guide

"Integrated Crop Solution"

Varieties

This first step in tomato production is generally determined by market requirements, i.e. size, truss, shelf life and marketers will need to be consulted before you make your decision. Some good yielding varieties are:

Thomas, Birsen

Any variety chosen should ideally be an indeterminate type which means the plants will continue growing indefinitely as long as pests and diseases are kept to a minimum and they have an adequate nutrient supply. The bush or determinate type of tomatoes, traditionally grown outdoors, are not recommended for growing in tunnels.

Indeterminate varieties can last up to 8 months in a tunnel. Prime Seed recommends long shelf life tomatoes because they reduce losses incurred by growers, supermarkets, hawkers, wholesalers etc. the majority of our population has no access to fridges so long shelf tomatoes are a must for them.

Seedlings

Seedlings used for transplanting in tunnels must be strong, healthy and free from virus and diseases. Seed planted during winter months will take a minimum of 8 weeks before transplanting and those in summer months will take 5-6 weeks before they are ready for transplanting. Timing of planting is determined by when the highest prices are achieved on the fresh market. (In general it takes 10-12 weeks from transplanting to first harvest). As soon as seedlings are 12-15cm tall they are ready for transplanting.

There are several different options that may be used such as pine shavings (NOT sawdust), pine bark and cocus. The most commonly used growing media in Zimbabwe is pine bark. It is a good inert media that provides adequate aeration and due to the composting process is free of diseases.

Pre-enrichment of pine bark.

Per one m^3 of 12mm pine bark (15 x 66 litre bags) add the following:-

- 1 kg gypsum
- 0,88kg single super phosphate
- 2 kg calcitic lime

SEED·CO

Containers

Tomatoes may be grown in a variety of different containers. The ones most popular are the black grow bags (10-15 litre) and sausages.

Order them without holes and then perforate at 1.5” above the ground. This acts as a reservoir in case of electricity interruptions or other delays in irrigation.
noted for producing large numbers of tubers per plant will benefit from lower seed rates and
This is a tube of black plastic of 150-200 micron thick and diameter of 37cm. Cut into 2,1m lengths and tie at one end. Pine bark must be well compacted into the bag before tying the other end and cutting the planting holes. Seedling holes cut every 40cm apart using a jam tin will give 5 plants/sausage. Drainage holes must be placed 1 1⁄2” from the ground using a pencil or wire. These holes should only be inserted on one side of the sausage which then drains into a furrow. This prevents the pathways becoming flooded and reduces the clean-up operation required to mop up stagnant water.

Planting

The growing media should be well irrigated with stage 1 nutrient solution prior to planting in the bags. The twine should be planted under the seedlings where the roots will soon anchor it down. This is not necessary in the case of the sausages where twine can be tied around the bag.
Plant spacing in row is 40cm with 60cm between double rows. The pathway between double rows varies between 1,3 – 1,6m. In an 8m wide tunnel the maximum number of rows is 8 (4 double rows).

Fertilizer

Growing tomatoes in a soilless media requires greater management than those grown in soil. There is very little margin for error as there is no clay portion to act as a buffer or store for residual nutrients. An essential management tool is an EC meter which gives the grower an indication of fertilizer going into the bag and a measure of how much is coming out in the leachate.
Every time water is applied it must contain fertiliser. Before giving a fertiliser recommendation it is important that the irrigation water is analysed. A good laboratory to use is Analytical Laboratories 11A Downing Road, Greendale, Harare.

Fertilisation is split into 2 stages:-

1. Stage 1: Planting to 3rd flowering truss.

Target level (ppm)

Bicarb	N	P	$_2O_5$	K $_2O$	Ca	Mg + Micronutrients
61		160	100	270	130	60

2. Stage 2: Third flowering truss onwards.

	(ppm)					
Bicarb	**N**	**P**	**$_2O_5$**	**K $_2O$**	**Ca**	**Mg + Micronutrients**
Target level	61	160	90	320	130	65

Regular sprays of calcium nitrate @ 10g per litre to prevent blossom end rot will also be necessary.
These solutions can be made up from water soluble products obtainable from ImpHort and other horticultural outlets. The micronutrients are supplied in a pre-mixed state called Omnispoor @ 20g/1000 litres.
Concentrated stock solutions have to be made up in separate tanks as calcium cannot be mixed with phosphates and sulphates.

Electrical Conductivity (EC)

The EC of the fertigation solution must be checked regularly in order to monitor the fertiliser going onto the plants is correct and that there has not been a mistake in making up of stock solutions. When the leachate EC is 0,2 of a unit higher than fertigation EC, then the fertiliser must be reduced by 20%. If the leachate EC is 0,2 lower then the fertiliser must be increased by 20%.

Irrigation

There are numerous irrigation designs that may be used but the only container that lends itself to using drip tape is the sausage. The system must be able to give the plants 2,5–3 litres per day at maximum production in summer. Young plants will use 300-500mls per day. This is usually applied in two applications. As the demand for water increases so the number of applications per day will also increase.
Water usage by the plants is monitored by collecting the amount of leachate draining from the bag. The minimum quantity of leachate should be 10% of the water given to the plant. A maximum of 20% emittance is required to prevent loss of expensive fertiliser, e.g. if 500mls is applied to each plant then the quantity of leachate should be 50-100 mls.

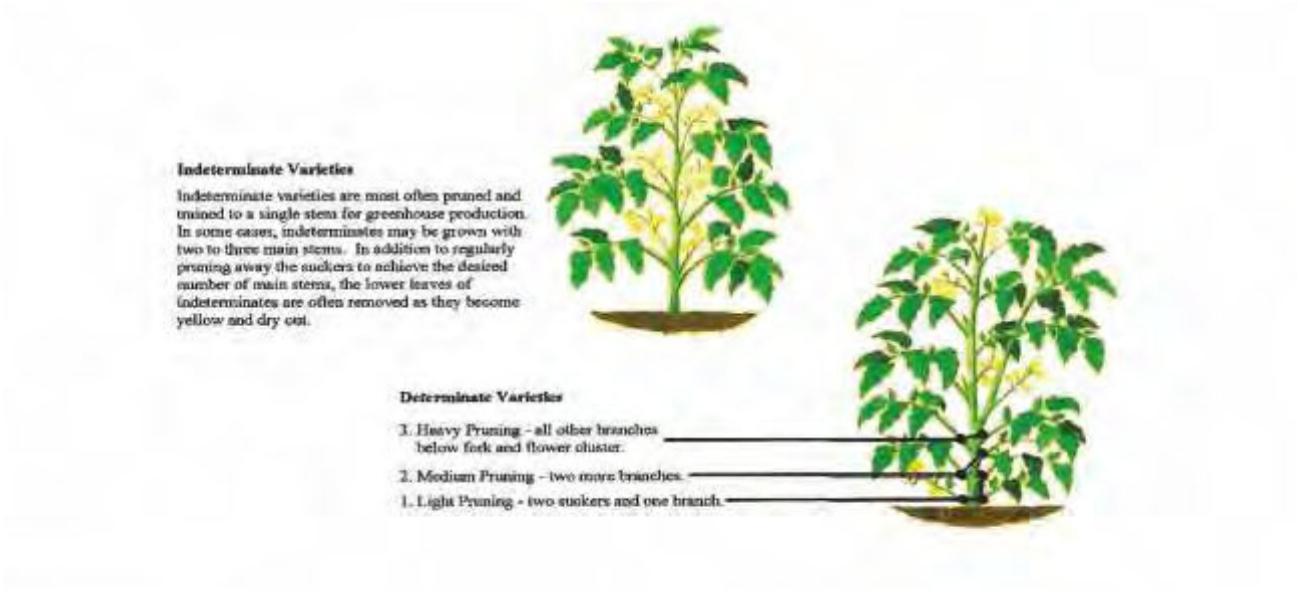
Sanitation

This is vitally important in order to maintain a healthy crop for a long period of time. Simple measures may be put in place to prevent devastation of a crop by virus and diseases.
A selection of different chemicals may be used such as Sodium Hypochlorite, Sporekill and Terminator. Personnel from Cernol Chemicals give good advice on rates and selection of chemicals.

Removal of leaves/fruit

It is important to remove leaves at the bottom of the plant as they interrupt the flow of air and are a source of infection by Botrytis. The removals should be done on a fortnightly basis and not more than 2 leaves at a time to be removed. When the first cluster shows signs of ripening, the leaves may be removed right up to the cluster. There should always be 1,5m of healthy, functioning leaves on the plant.

Some varieties of tomatoes may produce a large number of flowers per truss. It is important to prune small fruit to maintain size and quality of the remaining tomatoes. In truss tomatoes such as Ikram, normally fruit are pruned to 6 tomatoes per truss.



Pollination

Bee activity in tunnels is restricted so mechanical pollination is required. This can easily be done twice a day by tapping the overhead wire along its length. It's important not to try and pollinate too early in the morning as pollination does not readily occur below 20° C.

Picking and Post Harvest Handling

Tomatoes should be picked when the bottom tip of the fruit have turned orange-pink. The fruit will then turn light red in 2-3 days. In summer, picking will be 2 or 3 times a week but only once a week in winter. Picking should be done in the cool of the day and the tomatoes then stored at cool temperatures. Temperatures below 7oC can result in poor fruit quality with a short shelf life.

Tunnel Tomatoes Spray Guide

Stage	Nursery	Transplanting	Vegetative	First Flowers	First Fruits	Fruiting
Days:	0-35	28-36	30-60	60-65	65-70	70-125
Pest Problems						
Nematodes		Solvigo				
Soil Pests & Aphids		Actara Soil Drench / Solvigo				
Cutworms		Karate Zeon				
Leafminer		Trigard / Dynamec				
Red Spider Mites			Dynamec / Polo / Curacron			
Fruitworm & Caterpillars				Ampligo / Match / Karate Zeon / Proclaim		
Aphids & Whitefly		Actara Soil Drench		Actara / Ampligo / Polo/Polo		
Disease Problems						
Damping off	Apron Star Seed Dress					
Bacterial Complex		Bion / Copper Oxychloride				
Early Blight		Copper Oxychloride / Bravo / Amistar Top				
Late Blight			Folio Gold / Revus / Ridomil Gold			
Leaf spots; Powdery Mildew		Amistar Top				
Virus Complex	Actara Soil Drench / Dip					
Weed Problems	Below are off-labe suggestions; grower must do own tests for crop damage.					
Before planting - post emergence perennials	Touchdown					
Before planting - post emergence annuals	Gramoxone / Touchdown					
Pre-emergence: grasses		Dual Magnum				
Post-emergence: grasses			Fusllade Forte			
Post-emergence: grasses & broadleaf		Codal Gold				

SEED CO

SEED CO GROWER'S GUIDE

80TH ANNIVERSARY EST. 1940

CROP	DAYS TO MATURITY		PLANT SPACING (cm)		PLANTS/HA X1000	AVERAGE SEED PER GRAM	SEED REQUIREMENT (Kg/Ha)	COMMON PESTS	COMMON DISEASES
	WARM	COOL	IN ROW	BETWEEN					
Garden Beans	55	65	2x7*	50	285	4-5	75	Bollworm	Rust Anthracnose Halo Blight
Beetroot	80	110	10*	20	450	50-60	8	Aphids	*Ccpa* *Rzoct*
Broccoli	70	90	40	70	36	225	0.2	Diamondback Moth Aphids	Black Rot White Blister
Butternut	90	120	50	100	20	8-10	3	Fruit Fly	Gummy Stem Blight Anthracnose
Cabbage	80	110	40	50	30	300	0.2	Diamondback Moth Aphids	Black Rot Club-root *S*
Carrot	90	120	3*	15	1100	800	2	Nematodes	*ta*
Cauliflower	85	110	40	70	36	240	0.2	Diamondback Moth Aphids	Black Rot Club-root
Cucumber Field	60	85	40	150	16	40	16 000 Seeds	Red Spidermite Aphids Whitefly	*Fm* Powdery Mildew Downy Mildew
Cucumber Tunnel	65	85	45	150	16	40	3 per m²	Red Spidermite Aphids Whitefly	*Fm* Powdery Mildew Downy Mildew
Eggplant	75	90	50	75	27	220	0.15	Thrips Aphids	Powdery Mildew
Gem Squash Semi- bush	50	70	35	150	18-22	10-12	4	Pumpkin Fly	Powdery Mildew
Gem Squash Vine	55	80	50	150	14	10-12	2	Aphids	Virus Diseases
Hubbard Squash	110	130	100	150	7	6	1.5	Pumpkin Fly Aphids	Powdery Mildew
Lettuce	50	70	30	60	55	800-1000	0.05-0.07	Aphids Leafminer	Powdery Mildew Bacterial Rot
Marrows	35	55	40	150	18	8-10	2.5	Fruit Fly Whitefly	Virus Diseases Powdery Mildew
Melon	85	100	40	150	16	20	1	Fruit Fly	Anthracnose Fusarium Root Rot
Onions	170	190	8*	20	850-1000	250	3.5	Thrips	White Bulb Rot Pink Root Rot *ta*
Peppers	70	85	2x40*	150	30-35	150	0.25	Aphids Thrips	Virus Diseases Phytophthora Root Rot
Pumpkin Semi-bush	90	120	80	180	8	4	2	Pumpkin Fly Cutworm	Powdery Mildew Fruit Rots
Pumpkin Vine	120	140	100	180	5	4	1.5	Pumpkin Fly Cutworm	Powdery Mildew Fruit Rots
Sweet corn	75	100	20	90	55	8	8	Stalk Borer Bollworm	Rust NCLB
Swiss chard	60	75	20*	45	200	60	4-6	Aphids	*Ccpa*
Tomato	80	100	40	150	16	250	0.1	Bollworm Whitefly Nematodes	Blight Bacterial Wilt Viruses
Watermelon	80	90	50	180	6	20	0.3	Fruit Fly	Gummy Stem Blight Anthracnose

P O BOX 47143, PHAKALANE, BOTSWANA, +267 3911907
WEBSITE: www.seedcogroup.com/bw