TOMATO *(Solanum lycopersicum)*

The tomato is a warm season crop belonging to the *Solanaseae* family. Tomato is considered both, a fruit and vegetable and forms a staple food for many nations. Daily consumption of tomatoes provides a great boost to the health, along with improving flavor of food. They are relatively easy to cultivate and grow very fast making them a great source of food.

Tomatoes require well drained, light loam soils with high organic matter content and a PH of 5-7.5. The plant requires a total of 400-600 mls water requirement in its entire growing period. They need temperatures of 19- 25 degree C during the day and 14-18 degrees C at night.

High humidity and temperatures reduce tomato fruit size and yields while low temperature leads to delayed color formation and ripening of tomato fruit. Wet conditions increase incidences of disease attack and fruits fail to ripen.

NURSERY ESTABLISHMENT

Seedlings are raised in a nursery bed or plant trays. The seedbed or nursery should be erected under a shade or a place protected from direct sunlight. Tomatoes can be raised from seedlings and are ready for transplant four to five weeks after sowing the seeds. One should transplant healthy and strong seedlings with thick stems 100-150mm tall. Plant spacing should be 1.0-1.5m between rows and in-row spacing of 15-20cm.Tomato seedlings may take 28-35 days before transplanting depending on variety and management. Seedlings should be watered regularly and avoid water logging.

One should ensure seedlings are well protected against pests and diseases.

Drench the nursery with **Pearl @ 20mls/20L** **or** **Bio Cure F @ 5g/ltr** for the control of soil borne diseases including damping off and fusariumwilt. Use **Oshozyme @ 10mls/20L** plus **Symbion P @5ml/ltr** or **Symbion Vam** to break seed dormancy, offer protection and establishment to roots, for nutrition, boost growth and enhance uniformity. Spread Symbion Vam on the rows or mix it with farm yard manure.One should control the soil borne pests with **Dynamo @ 3-5g/20l** or **Bio Power @2ml/ltr** plus **Nimbecidine @2ml/ltr**.

Nursery bed management ensures a robust seedling for quick take off, growth and development. The solution is drenched immediately after sowing, for the seeds to imbibe the mixture and remain active in the system.

Transplanting

Transplanting is done early or late in the evening to minimize water loss through transpiration in order to reduce transplanting shocks.

Three days after transplanting, **OSHOZYME LIQUID at 10ml/20l** is sprayed to further manage cases of transplanting shock.

NUTRITION

Provision of appropriate nutrients as per the stage of development leads to a fast growth, immunity and increased yields. Apply 200 Kg/Ha of DAP or NPK at transplanting and mix well with soil. Top dressing with CAN at 100 Kg/Ha should done when plants are 25cm high or after four weeks and a second application of CAN or NPK of 200Kg/Ha done four weeks later.

(One can model the nutrient supply based on amount required by tomato plant. N-40Kg, P is 64-96kg; K is 26-44kg per acre). The Kgs are for elemental NPK. In areas where soils are poor, organic manure is applied at 4 tons per acre**. BLACKEARTH** @ 1-2kg per acre is mixed with an inorganic basal fertilizers DAP 50kg applied during transplanting.

1. **Establishment/ Nursery stage (takes 28-35days).**

One week after transplanting, apply **EASYGRO STARTER @ 40gm/20ltr** rich in Phosphorous and as such enhances early crop establishment.

2. **During vegetative stage (**20-25 days**),**

EASYGRO VEGETATIVE @ 40g/20l or **AGROFEED** @ 50ml/20l are applied during the vegetative phase. These are rich in Nitrogen encouraging foliage growth.

OSHOZYME @ 10ml/20ltr- a bio stimulant, for the management of crops' stress.

3. **At flowering and fruiting stage (takes 20-30 days).**

EASYGRO flower and fruit @ 40-50g/20l. It has high concentration of Potassium. For flower and fruit development as well as ripening.


Deficiency of potassium

OSHOBOR @ 40gm/20ltr provides high concentrations of Boron to promote flowering, control flower abortion and fruit expansion.


PLANTONE @5ml/20ltr induces flowering and prevent flower abortion.


4. **Ripening & harvesting stages (takes15-20days and continuous harvesting for 4 weeks).**

EASYGRO CALCIUM @ 40-50g/20ltr – A solution for the control of blossom end rot, a physiological disorder. This also supplies calcium to the plant and should be followed by frequent irrigation.

FIELD OPERATIONS

Tomato plants are normally staked or supported and pruned regularly to promote rapid drying of foliage for disease control, to enhance fruit yield, quality and ripening. Staking is recommended for all varieties and cultivars. Trellising and staking train the crop to a single line and allow for close cultivation or mulching under the plants and ease of weed control options near plant bases. Short varieties and processing tomatoes may or sometimes grow without support. Disbudding or removal of buds should also be done regularly or each week. If lower leaves become diseased they, should be removed immediately to prevent spread of disease.

WATER REQUIREMENTS

Studies have proved that irrigation increases annual tomato yields by an average of at least 60 percent over dry land production. Quality of irrigated tomatoes is also much better and irrigation eliminates disastrous crop losses resulting from severe drought. Tomatoes require adequate water supply which results to high yields. Inadequate water supply

or moisture stress in tomatoes causes stress and leaves wither, shedding of flowers and young fruit, sun scalding and may develop blossom end rot or dry rot of fruit. The most critical stages for watering are at transplanting, flowering and fruit development and as such, frequent water supply is key.

Drip irrigation is highly recommended due to its water use efficiency. Research indicates that drip irrigated vegetables requires 40 percent less water than sprinkler irrigated vegetables. Weeds are also less of a problem, since only the rows are watered and the middles remain dry hence ensures less survival for weeds. Studies have also proved significant yield increase with drip irrigation compared with sprinkler irrigated tomatoes which are more prone to fungal diseases.

Whenever water stress is observed, **OSHOZYME @ 10ml/20ltr**- is sprayed to act as an anti-transparent and increase utilization of moisture while **Green Miracle @20ml/20ltr** is also applied to help the plant recover from stress and minimize impact of drought and other environmental stresses on plant and reduce transpiration rate.

WEEDING

Tomato forms a deep root system, and as such can make established plants less susceptible to weed competition for soil moisture. The heavy foliage of a vigorous tomato crop can shade out weeds; however managing the crop to promote canopy closure can aggravate disease problems, leading to defoliation and yield losses.

Weeding should be done both at the nursery bed and in the fields. On the nursery beds uprooting is recommended while on the fields, a hand trowel or a hoe is used to dig out the weeds or a selective herbicide can be used. Care should also be taken not to damage the roots since this may create routes for secondary infection. Once tomatoes commence flowering, and are healthy, then weeding may not be needed due to foliage cover or stress posed to weeds. However, if need be, uprooting is done.

PESTS, DISEASES AND PHYSIOLOGICAL DISORDERS

DISEASES

Tomato Late blight

A disease favored by cool and high humidity under wet conditions. It is characterized by rapid drying of leaves, brown dry rot on fruits and brown streaks are observed on the stem. Control using **OSHOTHANE @ 50g/20L** **and** **MATCO** 50g/20Ltr or **MISTRESS** 40g/20l as a preventive & curative remedy.

Tomato Early blight

The fungus survives on the crop debris. Dark brown, irregular spots appear on the lowest, oldest leaves. As spots mature they develop concentric rings, usually surrounded by a yellow area. Infections begin as small brown spots on older leaves that quickly enlarge. The lesions, on

the old leaves, develop a “bulls-eye” pattern of concentric rings, dark brown spots leading to partial defoliation of the crop. This can also be characterized by cankers on stem.

Control using **OSHOTHANE** 50g/20l plus **Enrich BM 10GM/20L.** One should mix to prevent bacterial blight and bacterial leaf spot. Apply **MATCO 50g/20Ltr** / or **MISTRESS 40g/20l**plus **Enrich BM 10GM/20L**.

Tomato Anthracnose

Anthracnose development is promoted by cool to moderate temperatures and prolonged periods of high humidity. Anthracnose is more prevalent on poorly drained soils and the fungus can survive on contaminated seed or crop debris. The disease is characterized by dark, water soaked lesions on fruits, leaves or stem. Control by using foliar spray of **PEARL 20ml/20ltr** **or** **MATCO 50g/20Ltr** **and** **BIO CATCH 100ML/20LTR.**

Damping off of Tomato ***(Pythium, Rhizoctonia*****, and** ***Fusarium)***.

Damping off is characterized by failure of seed to emerge due to seed rot in the soil or seedlings decay before they push through the soil; stunted growth of seedlings; the seedlings may sprout, curl, wilt and eventually collapse. Soils should be well raised, drained to ensure availability of good air circulation in the nursery to eliminate chances of damping off. It can be controlled by drenching **COMPANION @ 25gm/20ltr or of PEARL 20ml/20ltror MATCO 50g/20Ltr.**

Tomato Powdery mildew

This a fungal disease favored by wet weather and occurs in all stages of crop growth. It is controlled by spraying **PEARL 20ml/20ltr or CONTROL 20gm/20ltr or KLASSIC 20ml/20ltr.**

Bacterial wilt of Tomato

Bacterial Wilt is caused by the pathogen bacterium *Ralstonia Solanacearum*. It is mainly seed borne and cultural practices such as crop rotation, rouging and planting certified seed can be used for control purposes. The pathogen can also be carried via water passing through infected

soil to healthy soils. The bacterium clogs up the stem, preventing water and nutrients from reaching the leaves and the plant dies. It can be prevented/ suppressed by drenching **ENRICH BM 10gm/20ltr** **plus** **OSHOTHANE@50GM/20ltr.**

Tomato Fusarium wilt

Is a vascular wilt fungal disease. It is controlled by the use of resistant varieties. Chemical control, drenching **COMPANION 25gm/20ltr** **or** **PEARL 20ml/20ltr**. Planting resistant varieties is also recommended.

Tomato Yellow Leaf Curl Virus

The symptoms can be found at any stage of growth and all parts of the plant may be infected. They are often seen as a general mottling or mosaic appearance on foliage and chlorotic or yellow in color. The virus is transmited by the white flies. The plant appear stunted and leaves rolled upwards. The leaves

may appear bent downwards and stiff and leatherly texture with purple color on the underside of the leaves.

Buckeye Rot of Tomato *(Phytophthora parasitica)*

The Buckeye fruit rot commonly occurs under prolonged warm, wet conditions and can affect both green and ripe fruits close to and lying on the soil. Fruits become infected when they come in contact with infested soil or when being splashed with mud containing fungal inoculum. Symptoms include brownish water-soaked spot that appears near the blossom end or at the point of contact between the fruit and soil.

Buckeye fruit rot is best controlled by ensuring proper soil drainage, avoid soil compaction and soil fumigation to disinfect heavily infested soils. One is also advised to use stakes or mulches (plastic, straw) to reduce contact of fruit- soil.

Apply fungicides **OSHOTHANE PLUS @50g/20l, MATCO@50g/20l or MISTRESS@50g/20l**).

Tomato Blossom end rot

It is a physiological disorder characterized by rotting of the blossom end part of the tomato fruit. At the initial stages, a water soaked spot at the blossom end part is observed. Occurs when the plant is unable to translocate sufficient amounts of Calcium to the fruit. Foliar spray of **EASYGRO CALCIUM @ 40-50gm/20ltr** is done followed by frequent supply of water to the crop.

PESTS

Tuta absoluta

This is the most devastating pest in tomato. Its destructive effects are mainly on leaves and fruits. The larvae bore between the epidermal layers of the leaf creating mines. At later stages, the larvae bore into the fruits. It is very challenging to control given that it rapidly develops chemical resistance. As such proper timing is needed. Chemical control is achieved by an alternation of **CYRO GOURD 10gm/20ltr** **and** **VAPCOMIC 40ml/20ltr** **PLUS** **NIMBECIDINE 50ml/20ltr.**

Cutworms


They are stout, soft bodied, smooth caterpillars which are up to 5 cm Long. They cut seedlings or young plants near the soil level mainly during morning and evening hours. When disturbed, they curl up tightly. They are controlled by drenching **OSHOTHION 40ml/20ltr** **or** **ALPHA DEGREE 10ml/20ltr.**

Red spider mites

These are tiny wingless, red sucking pests which generally live on the underside of leaves. Spider mites spin protective silk webs and are favored by hot dry conditions. They attack undersides of leaves, but cause tiny white yellowish spots on both leaf surfaces. They siphon juices out of the leaves of the plant and plants remain small and look sick. Heavily infested crops show leaves covered with fine webs, leaves become mottled and silvery, Leaves turn yellow and curl upwards and may cause death of the leaf or entire plant drying up. Control is achieved by a foliar spray **of VAPCOMIC 40ml/20ltr PLUS SEGATRON @ 50ml/20ltr, MAGNUM GOLD @ 3-5ML/20Ltr.**

American boll worm

This is a caterpillar that bores into fruit and feed on the inner part of it. It releases plenty of excreta which is noticeable. It is controlled using **ALPHA DEGREE 10ml/20ltr or SEGATRON @ 50ml/20ltr**

Tomato Whiteflies

Whiteflies are small winged sucking and piercing insects which are white in color. They will often fly whenever the leaves are handled or shaken. White flies are known to be vectors to Tomato Yellow Leaf Curl virus or Tomato Mosaic virus. Chemical control is achieved by the use of **DYNAMO @ 3gm/20ltr or SHORT GUN 5 @10gm/20ltr.**

Tomato Fruit flies

This insect causes direct damage by puncturing the fruit skin to lay eggs. Bacteria from the fly are introduced into the fruit during the egg laying causing rotting of the tissues surrounding the egg. Eggs hatch and the maggots feed on the fruit flesh leading to more entry for pathogens and increase in fruit decay, making fruits unsuitable for human consumption. **Use OSHOTHION @ 40ml/20ltr or BETAFOS @20ml/20ltr** plus **NIMBECIDINE @ 50ML/20Ltr.**

Root knot Nematodes

These are tiny pests or parasites that live in the soil. The galls and swellings on the roots cause stunting of the plants and eventual death of entire crop. They feed on tomato plants' roots and make them weak. Affected plants are stunted and yellow and have a tendency to wilt in hot weather. Very heavily infested plants appear in patches and are killed with time. If infested plants are pulled from the soil, the roots are severely distorted, swollen and have lumps known as galls or root knots.

A soil test will tell you if your soil has nematodes. Control nematodes by mixing 100ml **Nimbecidine with 100 ml Bio Nematon in 20L** of water. Drench the soil every 3 months.

Thrips

These are small, slender insects with fringed wings and unique asymmetrical mouth parts. They feed on leaves, flowers and tender fruits. Symptoms and effects include Leaf scarring, distorted growth, sunken tissues on leaf underside, silvery appearance on flowers and fruits and fruit scarring. Control achieved by using **DYNAMO @ 3gm/20ltr or FINAL FLIGHT @ 4gm/20ltr.**

Leaf miner

The Leaf miner larvae tunnel through the lamina of the tomato leaf eating the chlorophyll-rich mesophyll cells leaving an irregular track of dead tissue that causes the leaf to stop functioning. Damage on vegetable crops cause stunted growth and reduced yield. High populations of adult flies can injure leaves by producing egg-laying and feeding scars called "stipples". Control with **VAPCOMIC @ 10-15ml/20ltr PLUS SEGATRON @ 50ml/20ltr, MAGNUM GOLD @ 3-5ML/20Ltr.**

Harvest your Tomato Crop

Start to harvest 3-4 months after transplanting. Fruits should be picked depending on distance travelled. Sort them into clean plastic or wooden crates ready to sell or processed. In one season, you should be able to harvest 12-15 kg of tomatoes per plant depending on the variety.

NB: Always mix the insecticide with **AQUAWET** 10ml/20l in order to improve on its efficacy. This is a spreader, wetter and sticker.

Use **JACTO KNAPSACK sprayers** or **OSHO High pressure sprayers** ideal for plantations and orchard farms to spray your crops.