NATIONAL HORTICULTURAL RESEARCH INSTITUTE

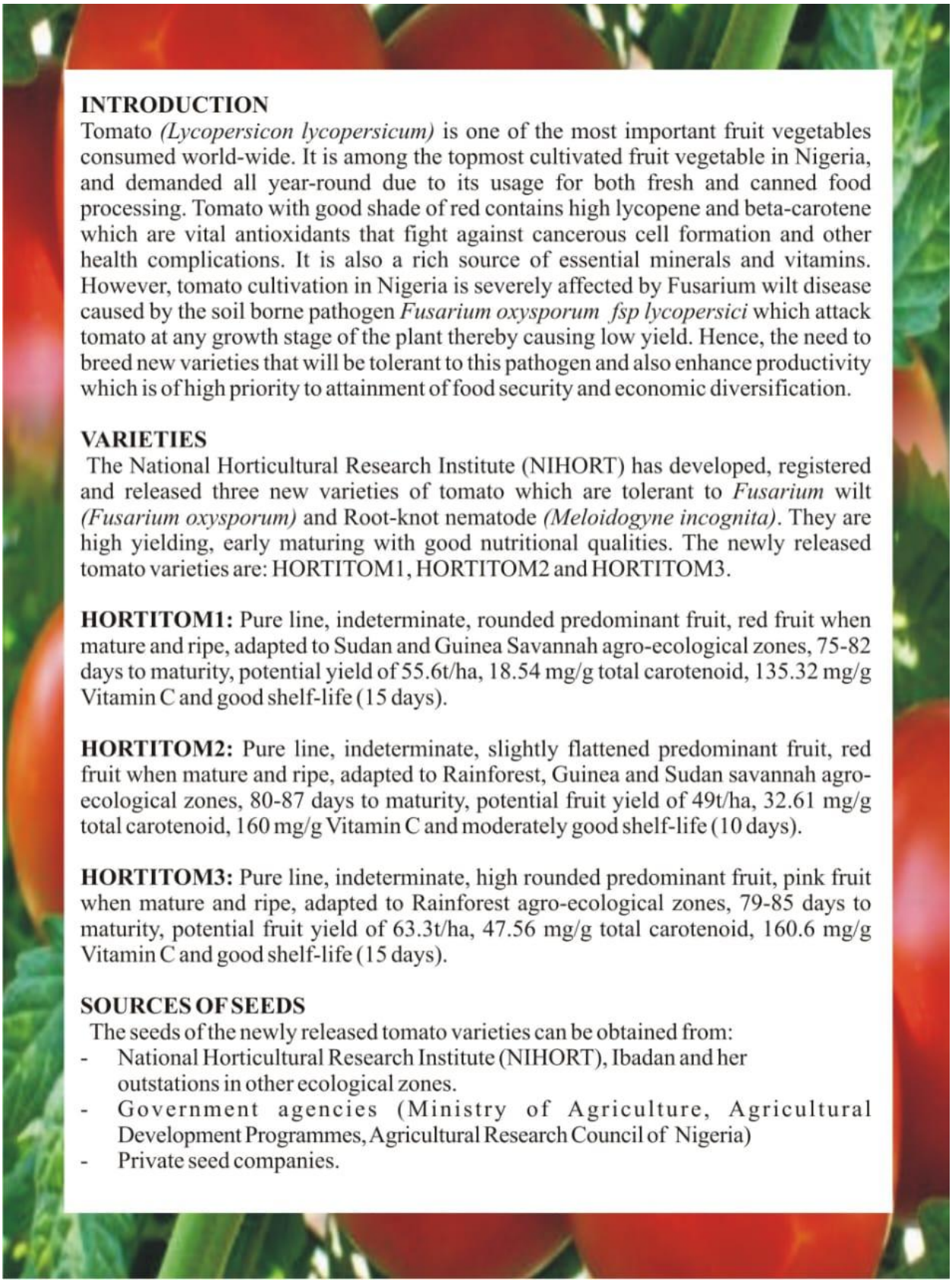
FEDERAL MINISTRY OF AGRICULTURE AND FOOD SECURITY

2023

TOMATO PRODUCTION GUIDE

MOTTO: INSTITUTIONAL PROGRESS THROUGH EXCELLENCE IN HORTICULTURAL CROPS RESEARCH

P.M.B. 5432, Jericho Reservation Area, Idi-Ishin, Ibadan Nigeria



INTRODUCTION

Tomato *(Lycopersicon lycopersicum)* is one of the most important fruit vegetables consumed world-wide. It is among the topmost cultivated fruit vegetable in Nigeria, and demanded all year-round due to its usage for both fresh and canned food processing. Tomato with good shade of red contains high lycopene and beta-carotene which are vital antioxidants that fight against cancerous cell formation and other health complications. It is also a rich source of essential minerals and vitamins. However, tomato cultivation in Nigeria is severely affected by Fusarium wilt disease caused by the soil borne pathogen *Fusarium oxysporum fsp lycopersici* which attack tomato at any growth stage of the plant thereby causing low yield. Hence, the need to breed new varieties that will be tolerant to this pathogen and also enhance productivity which is of high priority to attainment of food security and economic diversification.

VARIETIES

The National Horticultural Research Institute (NIHORT) has developed, registered and released three new varieties of tomato which are tolerant to *Fusarium* wilt *(Fusarium oxysporum)* and Root-knot nematode *(Meloidogyne incognita)*. They are high yielding, early maturing with good nutritional qualities. The newly released tomato varieties are: HORTITOM1, HORTITOM2 and HORTITOM3.

HORTITOM1: Pure line, indeterminate, rounded predominant fruit, red fruit when mature and ripe, adapted to Sudan and Guinea Savannah agro-ecological zones, 75-82 days to maturity, potential yield of 55.6t/ha, 18.54 mg/g total carotenoid, 135.32 mg/g Vitamin C and good shelf-life (15 days).

HORTITOM2: Pure line, indeterminate, slightly flattened predominant fruit, red fruit when mature and ripe, adapted to Rainforest, Guinea and Sudan savannah agro-ecological zones, 80-87 days to maturity, potential fruit yield of 49t/ha, 32.61 mg/g total carotenoid, 160 mg/g Vitamin C and moderately good shelf-life (10 days).

HORTITOM3: Pure line, indeterminate, high rounded predominant fruit, pink fruit when mature and ripe, adapted to Rainforest agro-ecological zones, 79-85 days to maturity, potential fruit yield of 63.3t/ha, 47.56 mg/g total carotenoid, 160.6 mg/g Vitamin C and good shelf-life (15 days).

SOURCES OF SEEDS

The seeds of the newly released tomato varieties can be obtained from:

- National Horticultural Research Institute (NIHORT), Ibadan and her outstations in other ecological zones.
- Government agencies (Ministry of Agriculture, Agricultural Development Programmes, Agricultural Research Council of Nigeria)
- Private seed companies.

CLIMATIC AND SOIL REQUIREMENTS

HORTITOM1, HORTITOM2 and HORTITOM3 are warm season crops which require optimum temperature of 26^0 -29^0C. Relatively high humidity might result in poor fruit quality, reduced yield and increased pest and disease incidence. A well-structured soil, loamy sand in texture with a pH range of 5.4 - 6.7 and high level of soil fertility status is required for their production.

NURSERY BED PREPARATION

- Seed beds are usually prepared with 50cm width to any convenient length.
- Sterilize the nursery soil by burning rice waste (hull/husk or straw) and/or other crop residues on top of the seed bed for close to hours to reduce incidence of damping off diseases and insect pest damage. Where this is not possible, a combination of insecticide with active ingredient of cypermethrine and Copper based fungicide could be drenched into the soil at recommended dosage.
- Pulverize and mix soil with well decomposed animal manure or plant residues.

NURSERY PRACTICES

- Sow tomato seeds on a well-prepared bed or plastic trays filled with rich top soil.
- Sow on a row when planting on a seed bed at spacing of 5cm apart and cover thinly with fine soil.
- Cover with dried palm fronds or elephant grass to reduce the rate of evaporation/water loss from the soil.
- Water the beds or trays early morning or late in the evening.
- Seeds will germinate 3-5 days after sowing depending on soil temperature.
- Harden seedlings one week before transplanting through gradual removal of shade.

LAND PREPARATION

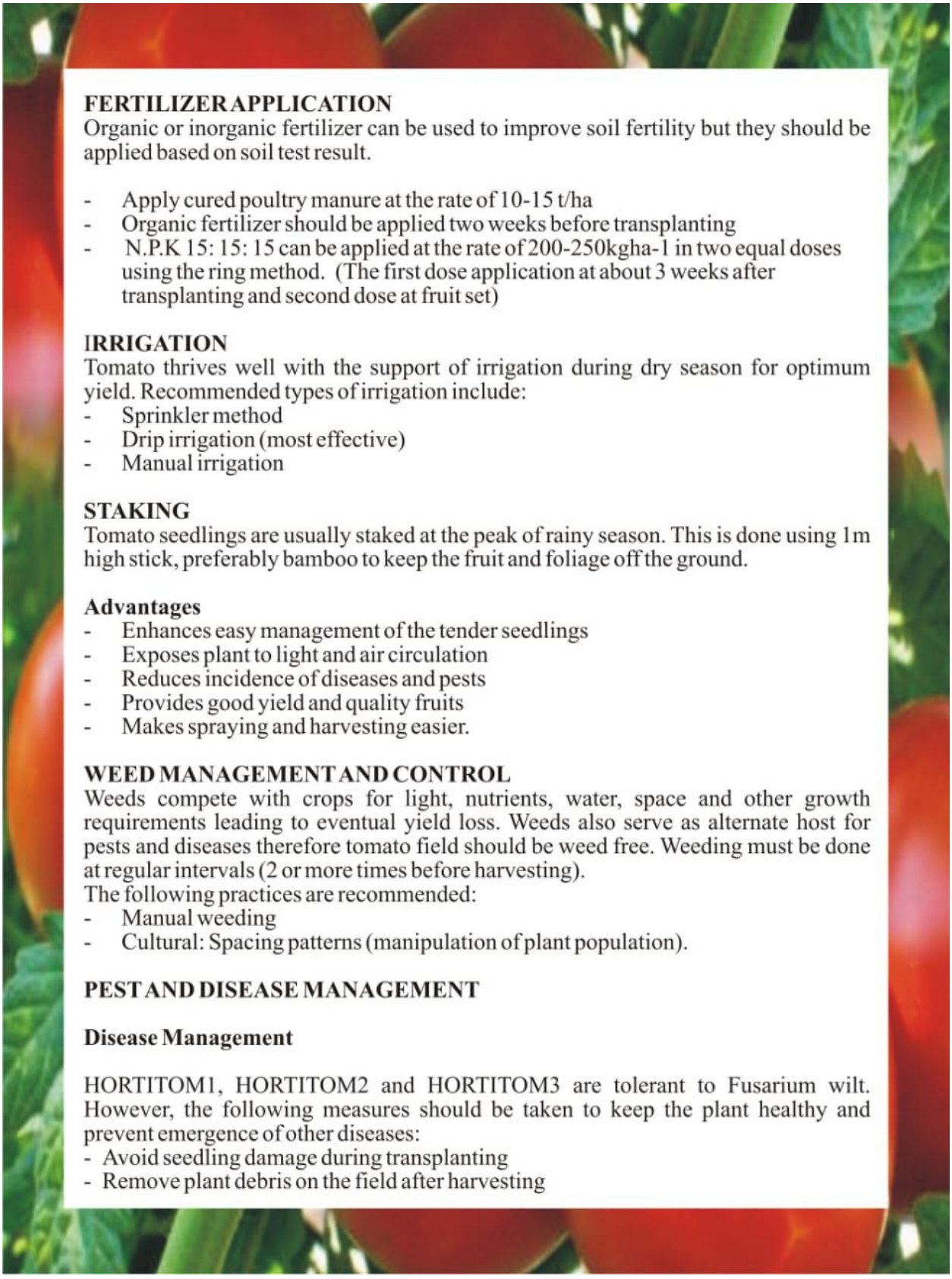
- Land should be cleared at least four weeks before planting especially if it is a virgin land (undisturbed land or land not cultivated over long period of years).
- Other operations include stumping, ploughing and harrowing (harrowing can be done one or two weeks after ploughing).
- Bedding is necessary during the rainy season for easy drainage of excess water and for prevention of water logging which may cause disease to the plant stands.

TRANSPLANTING

- Seedling should be transplanted when they are about 3-4 weeks old or 10 cm tall.
- Select vigorous and healthy seedlings.
- Transplant early in the morning or in the evening

SPACING AND PLANT POPULATION

- Use 50cm between plants and 60 cm within rows or (33,333 plants/ha) for HORTITOM1
- Use 60cm between plants and 75 cm within row (22,222 plants/ha) for HORTITOM2 and HORTITOM3.



FERTILIZER APPLICATION

Organic or inorganic fertilizer can be used to improve soil fertility but they should be applied based on soil test result.

- Apply cured poultry manure at the rate of 10-15 t/ha
- Organic fertilizer should be applied two weeks before transplanting
- N.P.K 15: 15: 15 can be applied at the rate of 200-250kgha-1 in two equal doses using the ring method. (The first dose application at about 3 weeks after transplanting and second dose at fruit set)

IRRIGATION

Tomato thrives well with the support of irrigation during dry season for optimum yield. Recommended types of irrigation include:

- Sprinkler method
- Drip irrigation (most effective)
- Manual irrigation

STAKING

Tomato seedlings are usually staked at the peak of rainy season. This is done using 1m high stick, preferably bamboo to keep the fruit and foliage off the ground.

Advantages

- Enhances easy management of the tender seedlings
- Exposes plant to light and air circulation
- Reduces incidence of diseases and pests
- Provides good yield and quality fruits
- Makes spraying and harvesting easier.

WEED MANAGEMENT AND CONTROL

Weeds compete with crops for light, nutrients, water, space and other growth requirements leading to eventual yield loss. Weeds also serve as alternate host for pests and diseases therefore tomato field should be weed free. Weeding must be done at regular intervals (2 or more times before harvesting).

The following practices are recommended:

- Manual weeding
- Cultural: Spacing patterns (manipulation of plant population).

PEST AND DISEASE MANAGEMENT

Disease Management

HORTITOM1, HORTITOM2 and HORTITOM3 are tolerant to Fusarium wilt. However, the following measures should be taken to keep the plant healthy and prevent emergence of other diseases:

- Avoid seedling damage during transplanting
- Remove plant debris on the field after harvesting

- Keep the field clean by removing weeds that may serve as alternative hosts to the pathogen
- Practice crop rotation where possible with non-host crop
- For preventive measures, apply chemical with active ingredient of Metalaxyl-M and Mancozeb twice during the period of active plant growth at 10 - 14-day interval.
- In general, good agricultural practices should be strictly adhered to for optimum productivity.

Plant-Parasitic Nematode Management

Major management measures for plant-parasitic nematodes especially root-knot nematodes *(Meloidogyne spp.)* are cultural and chemical control measures.

Cultural management measures include:
- Crop rotation with resistant crops such as sorghum, wheat, sesame, marigold, sweet corn etc.),
- Fallowing
- Soil amendments (Using NIHORT-Lyptol and NIHORT Raktin,)
- Soil solarization (Using black Polyethylene sheet).
- Uncured poultry manures at 20 t/ha incorporated into soil 3 months before planting

Chemical control measures: Nematicides with active ingredients such as *fluopyrum* can be used as need arises.

Insect Pest Management

Insect pest management is a vital component of a successful tomato production. Management of this pests on tomato starts from nursery till harvest. It is recommended to practice a preventive control than curative. Some common tomato insects are fruit borer *(Helicoverpa armigera Huebner)*, tomato leaf miner *(Tuta absoluta)*, grasshopper *(Zonocerus variegatus L.),* whitefly *(Bemisia tabaci Gennadius)*, and various species of aphids which serve as vectors that transmit viruses. They can be managed using the following:
- The NIHORT Tuta Trap Tray (NIHORT-TTT) should be placed on the field to detect early insect invasion in the nursery.
- Immediately after transplanting, yellow sticky traps should be placed at a distance of 5m apart on the field, followed by the application of NIHORT-Lyptol or NIHORT-Raktin at the rate of 125ml diluted in 625ml of water and sprayed with knapsack sprayer (1 part of biopesticide to 5 parts of water).
- In case of severe infestation, cypermethrin at the rate of 10ml in 1liter of water is recommended. Adoption of good agricultural practices is critical to pest management.

NIHORT LYPTOL

NIHORT RAKTIN

YELLOW STICKY TRAP

NIHORT TUTA TRAP TRAY

HARVESTING AND HANDLING

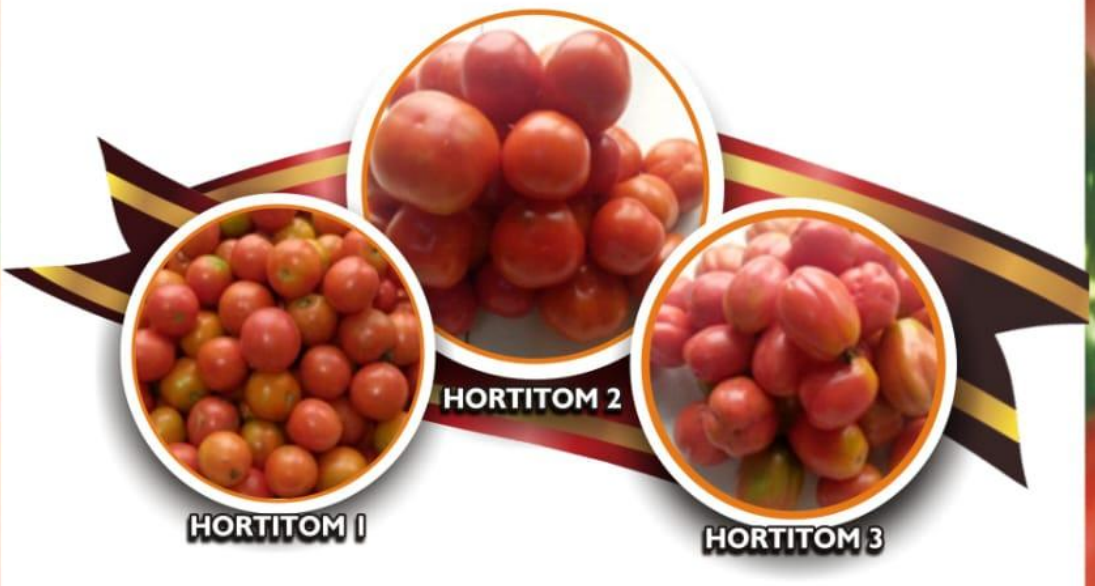
- Fruits are ready for harvest at 12-18 weeks after sowing
- Fruits are recommended for harvesting when most of the fruits are half ripened or with a tint of colour change to ensure firmness and prevent damage during transportation.
- Tomato fruits for processing must be fully ripe before it is harvested.
- Harvest at least twice a week.
- Transport harvested fruits using crates preferably.

NUTRITIONAL, CHEMICAL AND PHYSICOCHEMICAL PROPERTIES (MG/100G) OF THE TOMATO VARIETIES

Varieties	β-carotene	Vitamin C	Lycopene	Phenol	Flavonoids	Brix°
HORTITOM 1	0.441	135.32	0.956	0.102	0.07	5.833
HORTITOM 2	0.591	160.00	1.656	0.099	0.036	5.0
HORTITOM 3	0.992	160.60	2.141	0.09	0.041	5.467

- HORTITOM1 and HORTITOM2 are red and firm, making them suitable for use in salads.
- HORTITOM3 has less moisture content which makes it suitable for processing of powder and dried slices.
- All the three varieties are suitable for tomato paste processing and are more shelf-stable than many other varieties.

- NB: In case of sever infestation, the cost of inorganic insecticide can be incurred
- The costs were calculated based on the prevailing market prices. Highest total revenue was obtained for HORTITOM3 (N13,462,222.22/ha), followed by HORTITOM1 (N13,227,777.78/ha). Total cost of N1,537,733.36/ha was obtained for the 3 varieties. Highest net profit of N11,924,488.86 /ha was obtained for HORTITOM3 variety. Similarly, HORTITOM3 had the highest benefit-cost ratio (BCR) of 8.75 followed by HORTITOM1 (8.60) and HORTITOM2 (8.17). The BCR values depicts that the production of HORTITOM varieties is profitable.
- Please note that the above profit can only be realizable under Good Agricultural Practices



All correspondences should be addressed to:
The Executive Director/CEO, National Horticultural Research Institute,
Private Mail Bag 5432,
Jericho Reservation Area, Idi-Ishin, Ibadan.
E-mail: info@nihort.gov.ng Website: www.nihort.gov.ng
Tel: 08022255504