

## EAST AFRICAN STANDARD

### Fresh tree tomatoes — Specification and grading



**EAST AFRICAN COMMUNITY**

HS 0810.90.00 [HS 0810.90.5000]

## Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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## Introduction

In the preparation of this East African Standard, the following sources were consulted extensively:

CODEX STAN 193:1995 (Rev.5:2009), *General Standard for Contaminants and Toxins in Foods*

CODEX STAN 228:2001 (Rev.1:2004), *General methods of analysis for contaminants*

CODEX STAN 230:2001 (Rev.1:2003), *Maximum levels for lead*

Codex Alimentarius website: [http://www.codexalimentarius.net/mrls/pestdes/jsp/pest\\_g-e.jsp](http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_g-e.jsp)

USDA Foreign Agricultural Service website: <http://www.mrlatabase.com>

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSv1.0/Standards>

USDA Plant Inspectorate Service website: [http://www.aphis.usda.gov/import\\_export/plants](http://www.aphis.usda.gov/import_export/plants)

European Union: [http://ec.europa.eu/sanco\\_pesticides/public](http://ec.europa.eu/sanco_pesticides/public)

Assistance derived from these sources and others inadvertently not mentioned is hereby acknowledged.

This standard has been developed to take into account:

- the needs of the market for the product;
- the need to facilitate fair domestic, regional and international trade and prevent technical barriers to trade by establishing a common trading language for buyers and sellers.
- the structure of the CODEX, UNECE, USA, ISO and other internationally significant standards;
- the needs of the producers in gaining knowledge of market standards, conformity assessment, commercial cultivars and crop production process;
- the need to transport the product in a manner that ensures keeping of quality until it reaches the consumer;
- the need for the plant protection authority to certify, through a simplified form, that the product is fit for crossborder and international trade without carrying plant disease vectors;
- the need to promote good agricultural practices that will enhance wider market access, involvement of small-scale traders and hence making fruit and vegetable production a viable means of wealth creation; and
- the need to keep unsatisfactory produce from the market by allowing the removal of unsatisfactory produce from the markets and to discourage unfair trade practices e.g. trying to sell immature produce at the beginning of the season when high profits can be made. Immature produce leads to dissatisfaction of customers and influences their choices negatively, which disadvantages those traders who have waited until the produce is mature.

## CD/K/125:2010

The Standard application scope is for Tree Tomatoes (*Cyphomandra betacea* Sent.) which are conditioned and fresh packed for merchandising and human consumption. The objective making this Standard is the consideration in a document of international covering, of the physical and chemical requirements characteristics of the tree tomatoes, taking in account the specific characteristics of this fruit, as well as the Codex guidelines for human consumption produces.

The objective of making the Standard is:

- To establish the minimum requirements for the Tree Tomatoes, which must be met independently of the product quality class.
- To define the classes in which the Tree Tomatoes may be classify according to the fruit appearance characteristics.
- To consider the classes of size in which the Tree Tomatoes may be merchandized considering the equatorial diameter of produce.
- To establish the allowed tolerances of quality and size that the Tree Tomatoes should have to be packaged.
- To include the arrangements about produce uniformity and used packaging.
- To take in account the information for marking and labelling according to guidelines of the Codex Alimentarius.
- Include the guidelines established by the Codex Alimentarius according to the contaminants affecting the fruit.
- To apply the guidelines Codex regarding to the hygiene requirements for manipulating food produces.

### **Evaluation concerning criteria to establish work priorities**

It is necessary to make the standard about tree tomatoes with the purpose of removing any impediment to international trade. This is in order to protect customer of fraudulent actions.

Besides the definition of characteristics for tree tomatoes it is also intended to protect the consumer health.

### **Opportunity according to the strategic objectives**

The purpose of making a standard for the tree tomatoes is to promote the total application of the standards taking in account the local regulations of each country in order to facilitate the international trade. In the same way, the adoption of this class of standards allows to reduce risks produced due to the transmission of agents affecting health consumer.

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*Draft for comments only — Not to be cited as East African Standard*

## Tree tomatoes — Specification and grading

### 1 Scope

This Standard applies to commercial varieties of tree tomatoes grown from *Cyphomandra* *Betacea* Sent, to be supplied fresh to consumer, after packaging, tree tomatoes for industrial processing being excluded.

This standard is also applicable to pepinos (*Solanum muricatum*) for the time being.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CAC/GL 21, *Principles for the Establishment and Application of Microbiological Criteria for Foods*

CAC/RCP 1, *Recommended International Code of Practice — General Principles of Food Hygiene*

CAC/RCP 44, *Recommended International Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables*

CAC/RCP 53, *Code of Hygienic Practice for Fresh Fruits and Vegetables*

EAS 38, *Labelling of prepackaged foods — Specification*

ISO 6561-1, *Fruits, vegetables and derived products — Determination of cadmium content — Part 1: Method using graphite furnace atomic absorption spectrometry*

ISO 6561-1, *Fruits, vegetables and derived products — Determination of cadmium content — Part 2: Method using flame atomic absorption spectrometry*

ISO 6633, *Fruits, vegetables and derived products — Determination of lead content — Flameless atomic absorption spectrometric method*

CD/K/378:2010, *Horticultural industry — Code of practice*

### 3 Definitions

For the purpose of this East African Standard, the following definitions shall apply.

#### 3.1

##### **fresh**

firm fruit with a smooth surface skin

#### 3.2

##### **woody**

small, very hard fruits with very little juice

#### 3.3

##### **clean**

Practically free from dirt, earth, insect stains or other foreign substances and material

## 3.4 disease

any unhealthy condition caused by fungus, bacterium, virus and pest and may include either or all of the following:

- 3.4.1 Brown lesions on fruit;
- 3.4.2 “Dusty” appearance on skin surface;
- 3.4.3 Whitish to pinkish masses of insects on fruit;
- 3.4.4 Sooty mould;
- 3.4.5 Holes on surface due to insect bites;

## 3.5 damage

any defect or injury which materially affects the appearance or storage quality of the fruit

## 3.6 mishapen

the fruit is so out of normal round-oval shape that its appearance is obviously affected

# 4 Provisions concerning quality

## 4.1 General

The purpose of the standard is to define the quality requirements of tree tomatoes at the export-control stage, after preparation and packaging.

However, if applied at stages following export, products may show in relation to the requirements of the standard:

- a slight lack of freshness and turgidity
- for products graded in classes other than the “Extra” Class, a slight deterioration due to their development and their tendency to perish.

The holder/seller of products may not display such products or offer them for sale, or deliver or market them in any manner other than in conformity with this standard. The holder shall be responsible for observing such conformity.

## 4.2 Minimum requirements

4.2.1 In all classes, subject to the special provisions for each class and the tolerances allowed, the tree tomatoes shall be:

- (a) whole;
- (b) free of cracks in rind;
- (c) firm in consistency;
- (d) Fresh in appearance;
- (e) Sound, produce affected by rotting or deterioration such as to make it unfit for consumption is excluded;
- (f) Clean, practically free of any visible foreign matter;

- (g) Free of abnormal external moisture, excluding condensation following removal from cold storage;
- (h) Free of any foreign smell and/or taste;<sup>1</sup>
- (i) a pedicel detached at first knot;;
- (j) practically free of pests affecting the general appearance of the produce;
- (k) practically free of damage caused by pests.

**4.2.2** The minimum contents of pulp shall be 56%.

**4.2.3** The tree tomatoes must have been carefully picked and have reached an appropriate degree of development and ripeness<sup>2</sup> in accordance with criteria proper to the variety and/or commercial variety, and to the area in which they are grown.

**4.2.4** The development and condition of the tree tomatoes must be such as to enable them:

- to withstand transportation and handling; and
- to arrive in satisfactory condition at the place of destination.

#### **4.2.5 Maturity requirements**

The tree tomatoes must be sufficiently developed and display satisfactory ripeness.

The development and state of maturity of the tree tomatoes must be such as to enable them to continue their ripening process and to reach the appropriate degree of ripeness.

### **4.3 Classification**

Tree tomatoes are classified in the classes defined below:

#### **4.3.1 “Extra” Class**

Tree tomatoes in this class must be of superior quality. They must be characteristic of the variety and/or commercial variety. They must be free defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

#### **4.3.2 Class I**

Tree tomatoes in this class must be of good quality. They must be characteristic of the variety. The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- slight skin defects not exceeding 10% of the total surface area, such as curved stalk;
- slight rind defects not exceeding 10% of the total surface, such as scars and stains;

Defects must not, in any case, affect the flesh of the produce.

#### **4.3.3 Class II**

This class includes tree tomatoes which do not qualify for inclusion in the higher classes, but satisfy the minimum requirements specified in 4.2. Tree tomatoes in this class must be of marketable quality,

<sup>1</sup> This provision admits the smell caused for preservatives used according with the corresponding regulation.

<sup>2</sup> Maturity of tree tomatoes may be measured visually according to the external colouring and confirmed exploring the contents of flash, as well as the iodine test.

suitably presented and suitable for human consumption. The following defects, however, may be allowed, provided the tree tomatoes retain their essential characteristics as regards the quality, the keeping quality and presentation:

- defects in shape and iota elongation or flattening;
- defects in colouring, blemishes, scrapings scars which not cover more than 20% of the total area;

The defects must not, in any case, affect the flesh of the produce.

## 4.4 Classification by colour

Tree tomatoes shall be classified into two groups according to colour:

- Full orange to golden yellow skin; may have darker longitudinal stripes or be lightly mottled; flesh orange to yellow; green / brown calyx and stem.
- Full red, dark red or purple skin; may have dark longitudinal stripes or be lightly mottled; flesh may be orange/yellow, or orange/red depending on variety; flesh in seed cavities darker than flesh next to skin; brown/black seeds; green calyx and stem.

## 5 Sizing

Size is determined by the number of fruits per kilogram. There are two forms of presentation: in single fruit and in bunches; the size specification is as follows:

Size Code	Diameter (mm)	Weight per Fruit (gram)
A	≥ 61	129
B	60 – 55	118
C	54 - 51	99
D	50 – 46	83
E	≤ 45	66

The difference between the largest and the smallest tree tomato diameter in any one package shall be not more than 5 mm in all classes.

## 6 Tolerances

Tolerances in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicate

### 6.1 Quality tolerances

#### 6.1.1 Extra Class

Five percent by number or weight of tree tomatoes not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

#### 6.1.2 Class I

Ten percent by number or weight of tree tomatoes not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class.

#### 6.1.3 Class II

Ten percent by number or weight of tree tomatoes satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

## 6.2 Size tolerance

For all classes, ten percent by number or weight of tree tomatoes corresponding the size immediately above and/or below that indicated on the package.

## 7 Provisions concerning presentation

### 7.1 Uniformity

The content of each package must be uniform and contain only tree tomatoes of the same origin, variety and/or commercial type, quality, size and colour. The visible part of the contents of the package must be representative of the entire contents.

### 7.2 Packaging

Tree tomatoes must be packed in such a way as to protect the produce properly. The materials used inside the package must be new<sup>3</sup>, clean, and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

The containers shall meet the quality, hygiene, ventilation and resistance characteristics to ensure suitable handling, shipping and preserving of the passion fruits. Packages must be free of all foreign matter and smell.

Tree tomatoes shall be packed in each container in compliance with CAC/RCP 44.

## 8 Marking or labelling

### 8.1 Consumer packages

In addition to the requirements of EAS 38, the following specific provisions apply:

#### 8.1.1 Nature of produce

If the produce is not visible from the outside, each package shall be labelled as to the name of the produce and, with the name of the variety and/or commercial variety.

### 8.2 Non-retail containers

Each package<sup>4</sup> must bear the particulars outlined hereafter, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside.

In the case of reused packages, all previous labels must be carefully removed or previous indications deleted.

#### 8.2.1 Identification

The exporter, packer and/or dispatcher shall be identified by name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognized by the national authority.<sup>5</sup>

<sup>3</sup> For the purposes of this Standard, this includes recycled material of food-grade quality.

<sup>4</sup> According to the Geneva Protocol, footnote 2, "Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions but shall conform to the national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units".

<sup>5</sup> The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference "packer and/or dispatcher (or equivalent abbreviations)" has to be indicated in close connection with the code mark, and the code mark should be preceded by the ISO 3166 (alpha) country/area code of the recognizing country, if not the country of origin.

## 8.2.2 Origin of produce

Country of origin (or countries, where appropriate) and, optionally, district where grown, or national, regional or local place name.

In the case of sales units containing a mixture of distinctly different colours, varieties and/or commercial types of tree tomatoes of different origins, the indication of each country of origin shall appear next to the name of the colour, variety and/or commercial type concerned.

## 8.2.3 Nature of produce

Name of produce if contents are not visible from the outside.

## 8.2.4 Commercial specifications

- Class;
- Size; (size code);
- Number of pieces (optional);
- Net weight (optionally).

## 8.2.5 Official control mark (optional)

## 9 Contaminants

### 9.1 Heavy metals

Tree tomatoes shall comply with those maximum levels for heavy metals established by the Codex Alimentarius Commission for this commodity. The current limits are as indicated below:

Metal	Unit of measurement	Maximum limit	Test method
Lead (Pb)	mg/kg wet weight	0.10	ISO 6633 (AAS)
Cadmium (Cd)	mg/kg wet weight	0.050	ISO 6561-1 or 6561-2

### 9.2 Pesticide residues

Tree tomatoes shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity. Annex E provides current MRLs for the USA, EU and Codex markets.

## 10 Hygiene

**10.1** It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of CAC/RCP 1, CAC/RCP 53, and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

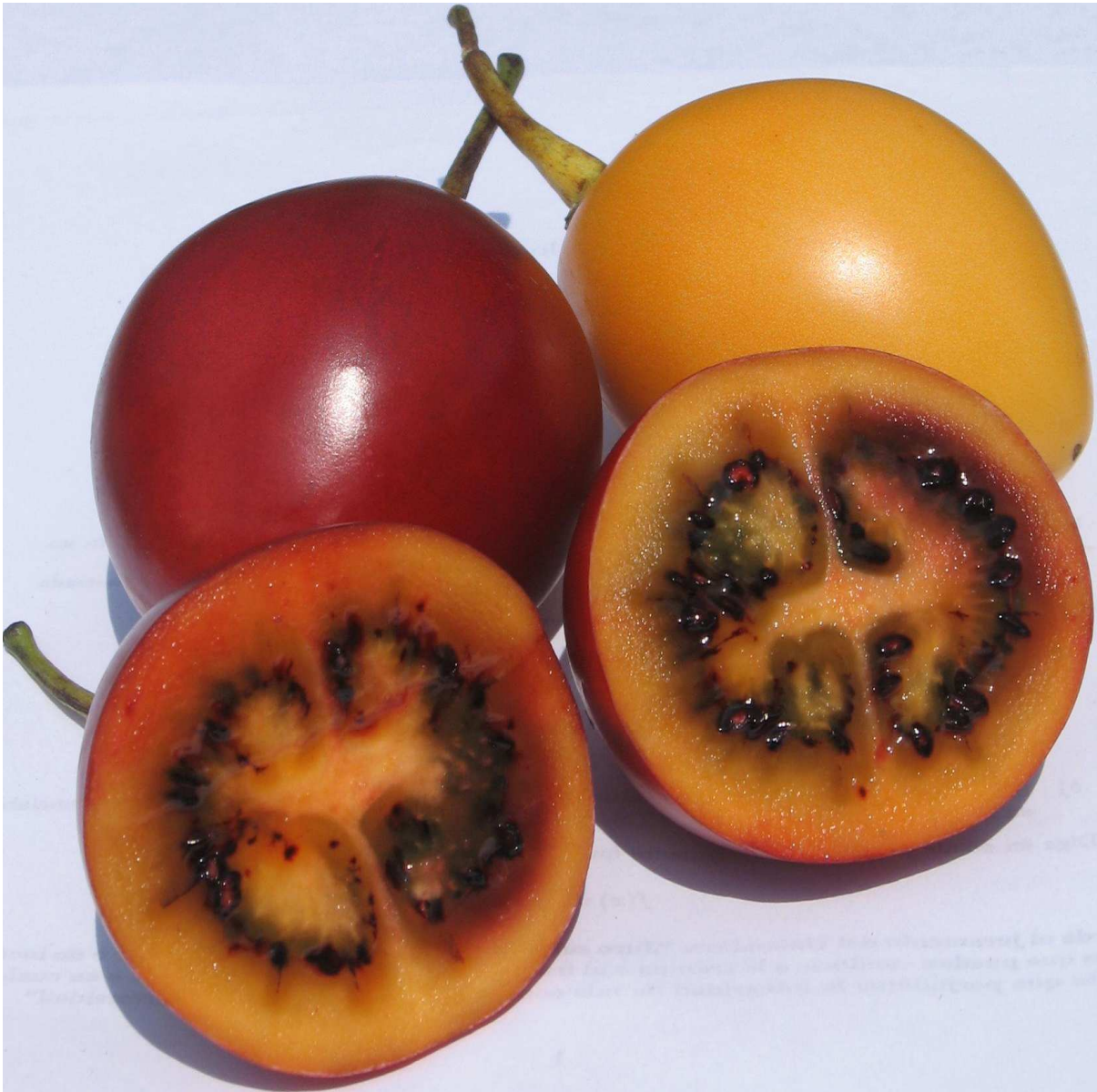
**10.2** The produce should comply with any microbiological criteria established in accordance with CAC/GL 21.



Standard

Draft for comments






Draw



**Annex C**  
(informative)

**Model certificate of conformity with standards for fresh fruits and vegetables**

1. Trader:	Certificate of conformity with the Community marketing standards applicable to fresh fruits and vegetables  No. ....  (This certificate is exclusively for the use of inspection bodies)		
2. Packer identified on packaging (if other than trader)	3. Inspection body		
	4. Place of inspection/country of origin (1)	5. Region or country of destination	
6. Identifier of means of transport	7. <input type="checkbox"/> Internal <input type="checkbox"/> Import <input type="checkbox"/> Export		
8. Packages (number and type)	9. Type of product (variety if the standards specifies)	10. Quality Class	11. Total net weight in kg
<p>12. The consignment referred to above conforms, at the time of issue, with the Community standards in force, vide:</p> <p><u>CD/K/125:2010, Fresh tree tomatoes — Specification and grading</u></p> <p>_____</p> <p>Customs office foreseen ..... Place and date of issue .....</p> <p>Valid until (date): .....</p> <p>Signatory (name in block letters): .....</p> <p>Signature <span style="margin-left: 200px;">Seal of competent authority</span></p>			
13. Observations:			
(1) Where the goods are being re-exported, indicate the origin in box 9.			

Annex D  
(informative)

Tree tomato and pepino — Fact sheets

D.1 TAMARILLO

*Cyphomandra betacea* Sent. Family of *Solanaceae*

**Common Name:** Tamarillo, Tree Tomato, Arbol de Tomate.

**Related Species:** Casana (*Cyphomandra casana*), Mountain Tomato (*C. crassifolia*), Guava Tamarillo (*C. fragrans*).

**Distant Affinity:** Tomato (*Lycopersicon lycopersicum*), Mexican Husk Tomato, Tomatillo (*Physalis ixocarpa*), Cape Gooseberry (*P. peruviana*), Pepino Dulce (*Solanum muricatum*), Naranjilla (*S. quitoense*), Cocona (*S. sessiliflorum*).

**Origin:** The tamarillo is generally believed to be native to the Andes of Peru and probably also, Chile, Ecuador and Bolivia. It is cultivated and naturalized in Argentina, Brazil, Colombia and Venezuela. It is widely grown in New Zealand as a commercial crop. Seed from Argentina were imported by the U.S. Dept. of Agriculture in 1913 and a plant was fruiting at the Plant Introduction Station at Chico, Calif. in 1915.

**Adaptation:** The tamarillo is a subtropical rather than tropical and flourishes between 5,000 and 10,000 ft. in its Andean homeland. In cooler climates it succeeds at lower elevations, but does best where the temperature remains above 50°F. The plant is grown casually in California and occasionally in Florida. Tamarillos have been successfully grown in such northern California locations as San Rafael and Santa Rosa. Frost at 28°F kills small branches and foliage of mature trees but not the largest branches and main stem. The tree will recover if such frosts are not prolonged or frequent. However, seedlings and cuttings are readily killed by frost during their first year.

Protection from wind is necessary as the tree is shallow rooted and easily blown over. It is also brittle and its branches are easily broken by gusts, especially when laden with fruit. Tamarillos have been grown as houseplants for years. They fruit satisfactorily in northern greenhouses.

**DESCRIPTION**

**Growth Habit:** The tamarillo is a small, attractive, half-woody, evergreen or partially deciduous, shrub or small tree. It is also brittle and shallow-rooted, growing to a height of 10 to 18 ft. (rarely as much as 25 ft.).

**Foliage:** The alternate, evergreen leaves are muskily odorous and more or less heart-shaped at the base and ovate, pointed at the apex. They are 4 to 13-1/2 inches long and 1-1/2 to 4-3/4 inches broad, thin, softly hairy, with conspicuous veins. The leaves are fairly easily tattered by strong winds.

**Flowers:** The fragrant 1/2 to 3/4 inch flowers are borne in small, loose clusters near the branch tips. They have 5 pale pink or lavender, pointed lobes, 5 prominent yellow stamens and green-purple calyx. Tamarillo flowers are normally self-pollinating. If wind is completely cut off so as not to stir branches, this may adversely affect pollination unless there are bees to transfer the pollen. Unpollinated flowers will drop prematurely. Flowers are usually borne in late summer or fall, but may appear at any time.

**Fruit:** The long-stalked, dangling fruit, borne singly or in clusters of 3 to 12, is smooth egg-shaped but pointed at both ends. It ranges in size from 2 to 4 inches long and 1-1/2 to 2 inches in width. Skin color may be solid deep purple, blood red, orange or yellow, or red and yellow, and may have faint

dark longitudinal stripes. Flesh color varies accordingly from orange-red or orange to yellow or cream-yellow. While the skin is somewhat tough and unpleasant in flavor, the outer layer of the flesh is slightly firm, succulent and bland, and the pulp surrounding the seed in two lengthwise compartments is soft, juicy, and sweet/tart. The yellow types are usually a little sweeter. The pulp is black in dark purple and red fruits and yellow in yellow and orange fruits. The edible seeds are thin, nearly flat, circular, larger and harder than those of the true tomato.

## CULTURE

**Location:** The tamarillo is small enough and attractive enough to fit into many parts of the home landscape as long as the site is well-drained. They grow best in full sun except in hot, dry situations, where partial shade is better. They need protection from strong winds.

**Soil:** Tamarillos require a fertile, light soil that is rich in organic matter. Perfect drainage is also necessary. Water standing for even a few days may kill the plant. Because of the shallow root system, deep cultivation is not possible, but light cultivation to eliminate weeds is acceptable.

**Irrigation:** The plant cannot tolerate prolonged drought and must have ample water during dry periods. A mulch is very beneficial in conserving moisture at such times.

**Fertilization:** Recommended fertilizer applications is 0.5 to 2 lbs. per tree of 5:6:6 NPK. Half of this should be applied in early spring and the other half in midsummer. A late winter application of superphosphate every other year at the rate of 0.5 lb. per tree is also beneficial.

**Pruning:** Newly planted tamarillos should be pruned to a height of 3 to 4 ft. to encourage branching. Yearly pruning thereafter is advisable to eliminate branches that have already fruited and to induce ample new shoots close to the main branches, since fruit is produced on new growth. Pruning also aids in harvesting, and if timed properly can extend the total fruiting period.

**Frost Protection:** Although tamarillos can tolerate a few degrees of frost, they do best (and look their best) under frost-free conditions. In areas where frost may be a problem, providing them with some overhead protection or planting them next to a wall or a building may be sufficient. The smallish plants are also fairly easy to cover during cold snaps by placing carpeting, plastic sheeting, etc. over a frame around them. Potted specimens can be moved to a frost-secure area.

**Propagation:** Seeds and cuttings may be used for propagation. Seeds produce a high-branched, erect tree, while cuttings develop into a shorter, bushy plant with low-lying branches. The tree does not always come true from seed, but is most likely to if one is careful to take seed from red fruits with black seed pulp or yellow fruits with yellow seed pulp. Germination is accelerated by placing washed and dried seed in a freezer for 24 hours before planting out. Cuttings should be of 1 to 2 year-old wood 3/8 to 1 inch thick and 18 to 30 inches long. The leaves are removed and the base cut square below a node. Cuttings can be planted directly in the ground, but should not be permitted to fruit the first year.

**Pest and Diseases:** The tamarillo is generally regarded as pest-resistant, although they are occasionally attacked by green aphids, and fruit flies will attack the fruit in areas where that is a problem. Nematodes are also a potential problem. The principal disease is powdery mildew, which may cause serious defoliation if not controlled. The plant is noted for its resistance to tobacco mosaic virus, though it is susceptible to cucumber mosaic virus and potato virus. Die-back, of unknown origin, at times is lethal to the flowers, fruit cluster, twigs and new shoots. Potted plants grown inside should be watched for the common house plant pests, such as mealybugs, cottony scale and white flies.

**Harvest:** Tamarillos are ready to harvest when they develop the yellow or red color characteristic of the particular variety. To harvest, simply pull the fruit from the tree with a snapping motion, leaving the stem attached. The fruit can be stored in the refrigerator for up to 10 weeks, but temperatures below 38°F can cause the skin to discolor. Ripe tamarillos may be merely cut in half lengthwise, sprinkled with sugar (and chilled if you like) and served for eating by scooping out the flesh and pulp. The fruit should not be cut on a wooden or other permeable surface, as the juice will make an indelible stain. For other purposes, the skin must be removed, which is easily done by pouring boiling water over the fruit and letting it stand for 4 minutes before peeling.

## CULTIVARS

### **Ecuadorian Orange**

Fruit is medium orange in color, the size of a large hen's egg. Pulp light orange, creamy in texture, less acid than the Ruby Red. Excellent for eating out of hand and also suited for culinary purposes.

### **Goldmine**

A superior cultivar originating in New Zealand and recently introduced. Very large golden-yellow fruit with golden, highly flavored flesh, less bland than Solid Gold, but not acidic. Has superb earing qualities.

### **Inca Gold**

A yellow-fruited cultivar said to be less acid than the red types. When cooked the fruit is said to resemble the apricot in flavor.

### **Oratia Red**

A large fruited red cultivar, oval to rounded in shape, with a sharp acid flavor. Good quality for eating out of hand and excellent for jams and preserves.

### **Rothamer**

Unusual large fruit, over 3 ounces. Skin bright red. Flesh golden-yellow, flavor sweet and exotic. Seeds dark red. Ripen from December to April. Delicious eaten out of hand. Vigorous and heavy bearing plant. Originated in San Rafael, Calif.

### **Ruby Red**

Large, brilliant red fruit. Pulp dark red, tart and flavorful. Fair for eating out of hand, but very good for culinary use. If allowed to ripen for one to three weeks after picking, they will become less acid. The standard cultivar grown for export in New Zealand.

### **Solid Gold**

Large, oval shaped fruit. Skin golden-orange in color. Pulp soft, less acidic in flavor than Oratia Red. Very good for eating out of hand, with acceptable culinary qualities.

### **Yellow**

Fruits the size and shape of a large plum. Skin yellowish orange. Flesh yellow, with a milder flavor than the red types. The yellow form is the oldest in cultivation in New Zealand.

## D.2 PEPINO DULCE

### ***Solanum muricatum* Ait. Family Solanaceae**

**Common Names:** Pepino Dulce, Pepino, Melon Pear, Melon Shrub, Pear Mellon

**Related Species:** Wonderberry (*Solanum X burbanikii*), Tzimbalo (*S. caripense*), Lulita (*S. pectinatum*), Lulo comun (*S. pseudolulo*), Naranjilla (*S. quitoense*), Garden Huckleberry (*S. scabrum*), Cocona (*S. sessiliflorum*),

**Distant Affinity:** Tree Tomato, Tamarillo (*Cyphomandra betacea*), Casana (*Cyphomandra casana*), Tomato (*Lycopersicon lycopersicum*), Mexican Husk Tomato, Tomatillo (*Physalis ixocarpa*), Cape Gooseberry, Poha Berry (*Physalis peruviana*) and others.

**Origin:** The pepino dulce is native to the temperate Andean regions of Colombia, Peru and Chile. The plant is not known in the wild, and the details of its origin are not known. The fruit is grown commercially in New Zealand, Chile and Western Australia. The pepino dulce was being grown in San Diego before 1889 and was listed by Francisco Franceschi of Santa Barbara in 1897. Improved cultivars were imported into California from New Zealand and elsewhere in more recent times.

**Adaptation:** The pepino dulce is a fairly hardy plant that grows at altitudes ranging from near sea level to 10,000 ft. in its native regions. However it does best in a warm, relatively frost-free climate.

The plant will survive a low temperature of 27 to 28°F if the freeze is not prolonged, but may lose many of its leaves. It can be grown in many parts of central and southern California, although it does best in locations away from the coast and is not well suited for hot, interior gardens. Pepino dulce has been grown and has fruited in the milder areas of northern California (Sunset Climate Zones 16 and 17). The plant is small enough to be grown satisfactorily in a container.

## DESCRIPTION

**Growth Habit:** Pepino dulce is a small, unarmed, herbaceous plant or bush with a woody base and fibrous roots. Growth is erect or ascending to about 3 feet high and several feet across. It is similar in these respects to a small tomato vine, and like the tomato may need staking or other support.

**Foliage:** The bright green leaves are sparsely covered with very small hairs. In appearance the pepino dulce is much like a potato plant, but the leaves may take many forms—simple and entire, lobed, or divided into leaflets.

**Flowers:** The small flowers are blue, violet-purple or white marked with purple, and are similar in form to unopened potato flowers. The pepino dulce is deemed to be parthenocarpic but a much heavier crop results from self-pollination or cross-pollination. The plants will not set fruit until the night temperatures are above 65°F.

**Fruit:** The fruit also show considerable diversity in size and shape. In the areas of its origin there are small oblong types with many seeds, while others are pear or heart-shaped with few or many seeds. Still others are round, slightly larger than a baseball and completely seedless. The colors also vary—completely purple, solid green or green with purple stripes, or cream colored with or without purple stripes. The fruit of cultivars grown in this country are usually round to egg-shaped, about 2 to 4 inches long, with some growing up to 6 inches. The skin is typically yellow or purplish green, often with numerous darker streaks or stripes. The flesh is greenish to white and yellowish-orange. Better quality fruit is moderately sweet, refreshing and juicy with a taste and aroma similar to a combination of cantaloupe and honeydew melon. In poor varieties there can be an unpleasant "soapy" aftertaste. The fruit matures 30 to 80 days after pollination.

## CULTURE

**Location:** The plant likes a sunny or semi-shaded, frost-free location, sheltered from strong winds. It does well planted next to a south-facing wall or in a patio.

**Soil:** The pepino dulce does best in a fertile (but not too fertile), free draining, neutral soil ( pH of 6.5-7.5). It is not as tolerant of salinity as the tomato. Mulching will help suppress weed growth.

**Irrigation:** The pepino dulce is quite sensitive to moisture stress as their root systems spread out and are quite shallow. Irrigation techniques are thus crucial for the health of the plants as well as for pollination, fruit set and quality of the fruit crop. Some growers feel that overhead sprinkling may even favor increased pollination. Microjets appear to deliver moisture better than trickle irrigation.

**Fertilization:** The plants should be fertilized in a manner similar to a tomato plant, mixing in some well-rotted manure to the plant site several weeks in advance and supplementing with a 5-10-10 NPK granular fertilizer as needed. Soils that are too rich produce vigorous vegetative growth which can lead to reduced fruit set and quality, plus an increase in pest problems.

**Pruning:** Pruning of the pepino dulce is not needed unless the plant is being trained to a trellis. In this case treat it as one would a tomato vine. Opening the the fruits to light increases the purple striping and improves the general appearance.

**Frost Protection:** In areas where frost may be a problem, providing the plant with some overhead protection or planting them next to a wall or a building may be sufficient protection. Individual plants are small enough to be fairly easily covered during cold snaps by placing plastic sheeting, etc. over a frame around them. Plastic row covers will also provide some frost protection for larger plantings. Potted specimens can be moved to a frost-secure area.

**Propagation:** The pepino dulce can be grown from seeds, but is usually propagated vegetatively from cuttings. Three to five inch stem cuttings are taken leaving 4 or 5 leaves at the upper end. Treatment with rooting hormones will help increase uniformity in rooting and development of heavier root systems. The cuttings are then placed in a fast-draining medium and placed under mist or otherwise protected from excessive water loss. Bottom heat also is helpful. With the right conditions most of the cuttings quickly root and are ready for potting up in individual containers. Rooted cuttings set out after the danger of frost (February to April) should be large enough to start blooming shortly after planting. The fruit will then have time to grow and ripen during the warm summer months. When planted out, a spacing of about 2 to 3 ft. between bushes is recommended.

**Pests and Diseases:** The plant is affected by many of the diseases and pests that afflict tomatoes and other solanaceous plants, including bacterial spot, anthracnose, and blights caused by *Alternaria* spp. and *Phytophthora* spp. The various pests include spider mite, cut worm, hornworm, leaf miner, flea beetle, Colorado potato beetle and others. Fruit fly is a serious pest where they are a problem. Greenhouse grown plants are particularly prone to attack by spider mites, white flies and aphids

**Harvest:** Individual fruits should not be picked until they are completely mature to assure the highest flavor and sugar content. Different cultivars vary, but the ground color of many mature fruits is somewhat yellow to light orange. Ripe fruit also bruises easily and requires careful handling. Such fruit should store well for 3 to 4 weeks at around 38°F under relatively high humidity. Fruit destined for distant markets would need to be picked earlier just before full ripeness. As it turns out this happens to be a good time to pick the fruit. Studies have shown that fruit in the middle degree of ripeness has the best performance in cold storage. Over-ripe fruit suffers most from physiological problems such as internal breakdown, discoloration and dehydration. If harvested too early, insufficient ripening and development of flavor and sweetness can result. The pepino dulce is commonly chilled and eaten fresh much like a cantaloupe or other melon.

**Commercial Potential:** The pepino dulce is a successful commercial crop in several countries such as New Zealand and Chile, and there appears to be no reason it can't find a niche in this country in Farmer's Market sales and elsewhere. The fruit is strikingly attractive and its storage capability and shelf life permit great flexibility in marketing. For good market acceptance it is important to select cultivars with the sweetest and most flavorful fruit. Additional breeding and selection is also needed to further enhance these qualities.

### CULTIVARS

#### Colossal

Very large fruit, mostly cream-colored with light markings of purple. Very juicy and sweet, free of soapiness, of good melon-like flavor, especially when vine ripened. Self-fertile, but yields larger fruit when cross-pollinated.

#### Ecuadorian Gold

A market cultivar in South America that produces good crops of pear-like fruits over a long growing season. The fruit has an attractive color, is well-marked and holds well on the plant. Self-fertile, but should be thinned for better fruit size.

#### El Camino

Released in New Zealand in 1982 from material collected in Chile. Medium to large, egg-shaped fruit with regular purple stripes. Sometimes produces off-flavored fruits identifiable by their brownish-green color. One of two leading commercial cultivars in New Zealand.

#### Miski Prolific

Fruit creamy white with a faint salmon glow, lightly striped with purple. Flesh deep salmon. Flavor rich, sweet and aromatic, with no soapiness. Seeds few or none. Matures early. Strong growing plant, bears well without pollination.

#### New Yorker

Introduced into California by Vincent Rizzo of New York state from material obtained in Chile. Medium to large, oval fruit, apex pointed. Skin smooth golden yellow when mature, prominently striped with

deep purple. Flesh firm, juicy, yellow-orange. Flavor sweet, virtually free of soapiness. Seeds few. Keeps for several weeks. Upright growth habit. Sets fruit well without cross pollination.

### **Rio Bamba**

Originated in Vista, Calif by Patrick J. Worley. Named after the city in Ecuador where the original plant was collected. Medium-sized fruit, strongly striped with purple. Flavor excellent. Vining growth habit, making an excellent climber or a hanging basket plant. Dark-green leaves with reddish-purple veins, purple stems. Flowers darker than normal, making an excellent display.

### **Temptation**

Introduced by the Nurserymen's Association of Western Australia. Large, high quality fruit.

### **Toma**

Introduced into New Zealand from Chile in 1979, released there in 1983. Medium-sized, oval fruit, 4 inches long, 3 inches in diameter, apex pointed, shoulder well rounded. Skin smooth, cream-colored when ripe, prominently striped with dark purple. Flesh firm, light cream in color, very juicy. Flavor sweet and refreshing, with no hint of soapiness. Seeds usually present. Keeping quality excellent. An important export cultivar in Chile.

### **Vista**

Originated in Vista, Calif. by Patrick J. Worley. A cross of Rio Bamba and a seedling from South America. Medium-sized fruits have good flavor and aroma. Upright, fairly compact plant of great vigor, self-fertile and heavy yielding. Bright green, 3 inch long leaves.

## **Scarring of the skin of tamarillo**

Scarring of the skin of tamarillo fruit is a cosmetic disorder (Figure 1) that presents a major problem for tamarillo fruit growers. The scars become visible as small dark marks when the young fruit are approximately 3 cm long and develop into corky lesions as the fruit expands. The disorder decreases the marketability of the fruit. It has been estimated that 10-20% of the fruit are affected, resulting in significant revenue losses. The cause of the disorder is unknown and growers are consequently unable to deal with the problem.

The cause of scarring was one of the principal questions that a recent Sustainable Farming Fund project set out to answer. The project ran from September 2003 to September 2006 and the following provides a summary of the research findings.

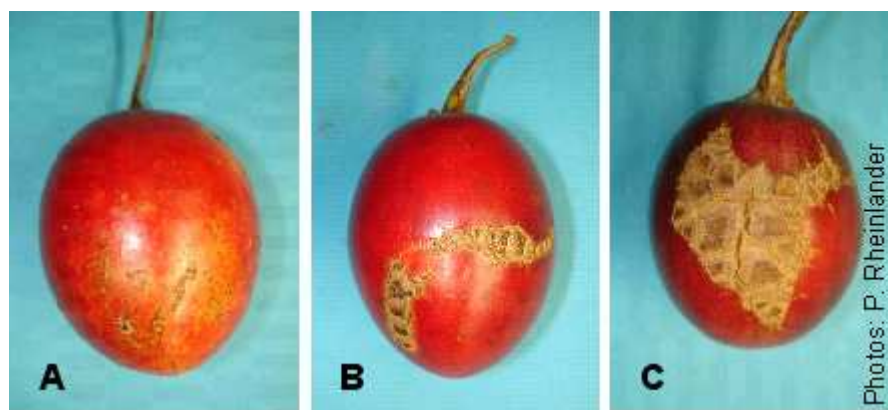
Potential causes were narrowed down to three possibilities: (1) fungal infection, (2) insect damage, and (3) physical injury. Each of these was tested experimentally.

### **1. Is scarring caused by a fungus?**

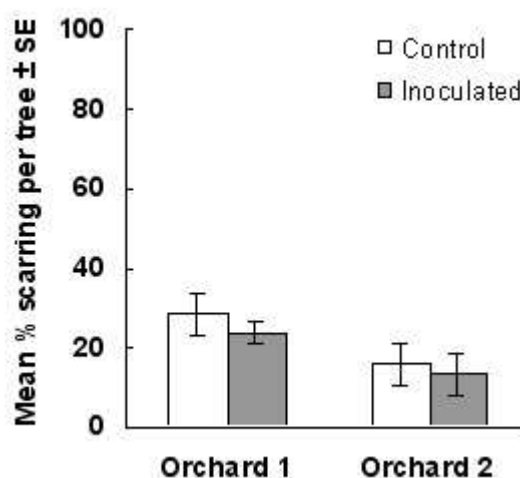
The scarring of tamarillo fruit resembles that of persimmon fruit, which is associated with the fungus *Botrytis cinerea* (Pers.). It was examined whether this fungus could also be responsible for the scarring in tamarillo.

An infection trial, where a spore suspension of *Botrytis* was applied to the flowers/young fruitlets, was conducted in two orchards (Auckland and Bay of Plenty regions).

No difference in the incidence of scarring was found between treated fruit and untreated fruit (Figure 2), indicating that the scarring in tamarillo fruit is not associated with infection by *Botrytis*.



**Figure 1.** Scarring of the skin of tamarillo fruit is a cosmetic disorder causing tamarillo growers significant revenue losses. A, B and C show various degrees of scarring on mature fruit.



**Figure 2.** Incidence of scarring in tamarillo fruit, which were inoculated (treated) with *Botrytis cinerea* at the flowering stage and in untreated control fruit. There was no statistically significant difference between the control (untreated) and inoculated fruit. Values are mean percentage scarring per tree  $\pm$  standard error (SE).

## 2. Is scarring caused by insect damage?

### What insects and mites are commonly found on tamarillo?

Scarring similar to that of tamarillo occurs in other fruits following outbreaks of mites and some insects.

Leaves, flowers and fruit of tamarillo were collected monthly from an orchard in the Auckland region and inspected for the presence of mites and insects using a stereo microscope.

Thirteen species of insects and mites were found on tamarillo leaves and fruit. Most of these were not likely to cause any damage on the fruit (e.g. spiders, lacewings ladybirds and beetles,) as they feed on other insects or on detritus and fungi growing on the plants. The species most frequently encountered were aphids and white flies. These insects pierce the plant and feed on the phloem. As they feed they produce honeydew excrements on which sooty mould grows. Their feeding does not generally result in fruit scarring such as that observed on tamarillo.

The only insects which potentially could cause scarring were greenhouse thrips (Figure 3). These insects scrape the surface of plant tissue with their mouth parts and suck out the ruptured cells. Their injury often ages into a corky scar. However, greenhouse thrips were only observed in low numbers on each monitoring occasion.



**Figure 3.** Although not observed at high abundance, the greenhouse thrips were the only potential candidates of the insects recorded to cause fruit scarring. (A) Adult greenhouse thrip. (B) Close-up of injury caused by greenhouse thrips when they scrape the surface of the fruit with their mouth parts.

### Is scarring caused by greenhouse thrips?

To examine the type of scarring caused by greenhouse thrips and whether they could be responsible for the scarring in tamarillo, a bagging experiment was conducted in an orchard in the Auckland region.

This experiment involved placing adult greenhouse thrips in fine-weave Terylene bags (~120 thrips per bag) which were tied onto trusses of developing fruit. Trusses of fruit with empty bags functioned as controls. Another set of control trusses had no bags tied onto them.

The bagging trial showed that greenhouse thrips potentially could cause extensive damage in tamarillo orchards. However, the scarring resulting from their grazing was more superficial (Figure 4) than the characteristic corky crazed scars commonly found on tamarillo fruit. No effect of fruit size on the type of scarring was observed. However, the severity of scarring tended to be worse in fruit that had been injured at a very early stage of development.

Because the type of scarring caused by greenhouse thrips is different from the typical scarring on tamarillo, and greenhouse thrips were only observed on tamarillo in low numbers, these insects are unlikely to be the major cause of scarring in tamarillo.



**Figure 4. A:** Scarring caused by greenhouse thrips on tamarillo. The scarring often covered an extensive area of the individual fruit, which was likely to be due to the high number of thrips added to the bags. Large scars appeared to inhibit fruit expansion. Typically, the scarring occurred at the upper part of the fruit around the sepals or on the sides where the fruit had been touching adjacent fruit, which were the preferred areas for the thrips to reside. **B:** Close-up of scarring caused by greenhouse thrips. The scarring caused by thrips is generally more superficial than the typical scarring on tamarillo fruit.

### Do insecticides reduce scarring?

To investigate whether the exclusion of insects and/or mites from developing fruit would decrease the incidence of fruit scarring in tamarillo, a pesticide trial was conducted in an orchard in North Auckland. This was an indirect method to investigate a possible association between insect pests and fruit scarring.

The spray programme included five treatments: (1) Diazinon® (a broad-spectrum insecticide), (2) Kelthane® (a miticide), (3) a combination of Diazinon® and Kelthane®, (4) Decis® (an insecticide with mite-promoting effects) and (5) an untreated control. The pesticides were applied to young developing fruit when they were likely to be most prone to insect damage (December 2005 and January 2006). Applications were made using a Bertolini motorized high-pressure spray pump and a hand lance. Sprays were applied to the point of run-off (full coverage). The effects of the different pesticide treatments on the incidence of scarring were compared with unsprayed control trees at fruit maturity.

There was no difference in the incidence of scarring between fruit from the different pesticide treatments and the unsprayed control trees, and all treatments showed a mean incidence of fruit scarring of approximately 15%. This result supports the earlier observations that insects were not responsible for the scarring.

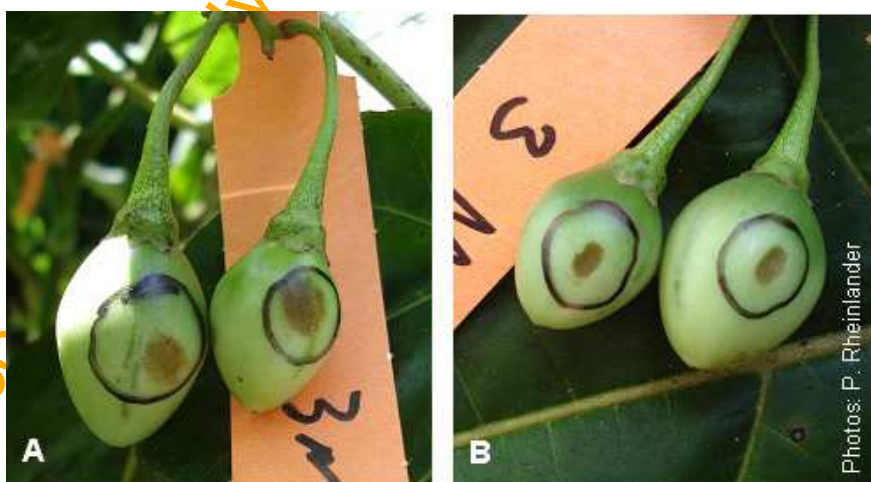
### 3. Is scarring caused by physical injury?

Young tamarillo fruit are very tender. This observation led to the hypothesis that scarring of tamarillo fruit may be caused by any type of physical injury (e.g. from an adjacent branch) during early fruit development, rather than from one specific pest. A trial was conducted to test whether artificial injury of the epidermal layer during fruit development would result in the scarring commonly found on tamarillo fruit.

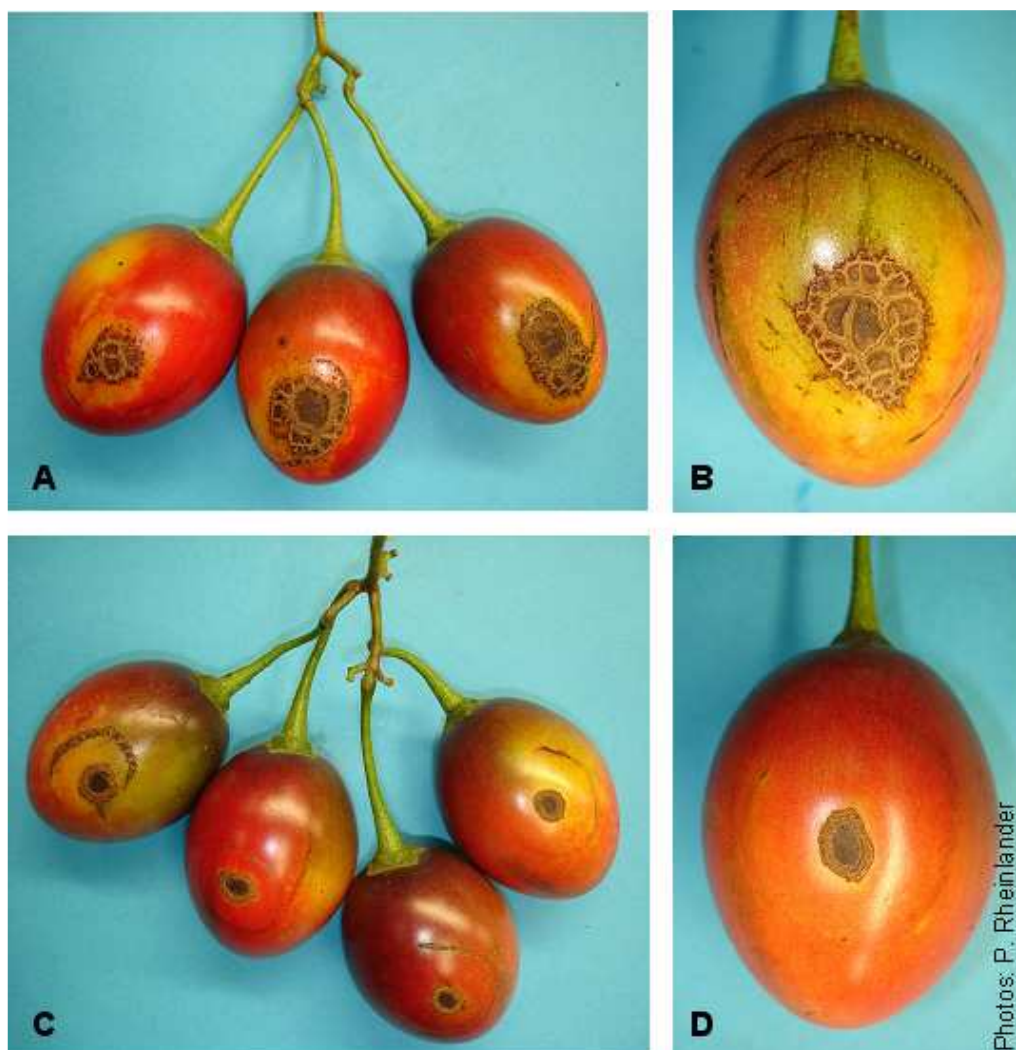
Fruit in an orchard in the Auckland region were injured in two ways: (1) by lightly scratching the epidermal layer using a tooth brush and (2) by removing a patch of epidermal cells using an emery board (Figure 5). Each treatment was applied to 30 clusters of small fruit (10-20 mm long) and medium sized fruit (>20-40 mm long). Fruit not subjected to any injury functioned as controls. In total, the trial included 180 clusters of fruit. The degree and resulting type of scarring were assessed at fruit maturity.

#### Any type of injury at an early stage of fruit development can cause scarring

Both the toothbrush and the emery board caused scarring (Figure 6) which was very similar to that typically observed on tamarillo fruit. This showed that any type of damage to the epidermis of developing fruit, be it from a branch, hail or feeding insects, may result in scarring.



**Figure 5.** Young tamarillo fruit were injured artificially using (A) a toothbrush and (B) the fine side of an emery board, to determine whether injury of the epidermal fruit tissue at an early stage of development resulted in scarring. The injured areas were encircled using a marker to ensure that the treated areas could be located at fruit maturity. Note that the effect of the toothbrush and emery board became visible immediately after wounding the fruit skin, signifying that tamarillo is extremely prone to injury.



**Figure 6.** Scarring symptoms on tamarillo fruit caused by (A and B) scratching the epidermal layer with a toothbrush and (C and D) removing a patch of epidermis using an emery board when the fruit were at an early stage of development. **A and B:** Scratching the epidermal layer with a toothbrush resulted in a brown, patchy and crazed corky scar which was more superficial (i.e. the damage to the epidermal layer was less deep) than that caused by the emery board. **C and D:** Removing a patch of epidermis using an emery board typically resulted in a dark brown scab surrounded by a lighter coloured circular ring of split tissue. The types of scars caused by these two methods of injuring the fruit skin were consistent. All fruit that had been damaged by the toothbrush developed a crazed scar and the injury from the emery board always resulted in a scab. Note that the marker outlining the area in which the epidermal layer had been artificially injured also left a scar.

### Summary

This research programme showed that:

- The scarring is not caused by the fungus *Botrytis cinerea*.
- Greenhouse thrips can potentially cause extensive damage in tamarillo orchards. However, their numbers in the orchard are typically very low and their grazing results in a more superficial scarring. These insects are unlikely to be the cause of scarring.
- Young tamarillo fruit are extremely tender and prone to injury. Any type of injury to the epidermal layer at an early stage of fruit development may result in scarring.

## Annex E (informative)

### Pepino — Codex, EU and USA pesticide residue limits

Users are advised that international regulations and permissible Maximum Residue Levels (MRL) frequently change. Although this International MRL Database is updated frequently, the information in it may not be completely up-to-date or error free. Additionally, commodity nomenclature and residue definitions vary between countries, and country policies regarding deferral to international standards are not always transparent. This database is intended to be an initial reference source only, and users must verify any information obtained from it with knowledgeable parties in the market of interest prior to the sale or shipment of any products. The developers of this database are not liable for any damages, in whole or in part, caused by or arising in any way from user's use of the database.

#### Results Key

MRL values in *{Italics}* are more restrictive than US

--- indicates no MRL value is established.

Cod, EU, etc. indicates the source of the MRL and EXP means the market defers to the exporting market.

All numeric values listed are in parts per million (ppm), unless otherwise noted

	US 1	Cod	EU
<b>Abamectin</b>	0.02	---	0.02
	1. United States does not maintain a specific MRL for the Abamectin/Pepino combination, but does maintain an MRL of 0.02 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 2	Cod	EU
<b>Acetamiprid</b>	0.2	---	<i>{0.1}</i>
	2. United States does not maintain a specific MRL for the Acetamiprid/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 3	Cod	EU
<b>Acibenzolar-S-methyl</b>	1	---	<i>{0.02}</i>
	3. United States does not maintain a specific MRL for the Acibenzolar-S-methyl /Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 4	Cod 5	EU 6
<b>Azoxystrobin</b>	2	3	2
	4. United States does not maintain a specific MRL for the Azoxystrobin/Pepino combination, but does maintain an MRL of 2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	5. Codex does not maintain a specific MRL for the Azoxystrobin/Pepino combination, but does maintain an MRL of 3 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	6. European Union does not maintain a specific MRL for the Azoxystrobin/Pepino combination, but does maintain an MRL of 2 PPM for its "Solanacea" group.		
	US	Cod	EU
<b>Benoxacor</b>	0.01	---	---
	US 7	Cod	EU
<b>Bensulide</b>	0.1	---	---
	7. United States does not maintain a specific MRL for the Bensulide/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 8	Cod	EU
<b>Beta-cyfluthrin</b>	0.5	---	---
	8. United States does not maintain a specific MRL for the Beta-cyfluthrin/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 9	Cod	EU
<b>Bifenazate</b>	2	---	<i>{0.5}</i>
	9. United States does not maintain a specific MRL for the Bifenazate/Pepino combination, but does maintain an MRL of 2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US	Cod	EU 10
<b>Bifenthrin</b>	0.5	---	<i>{0.2}</i>
	10. European Union does not maintain a specific MRL for the Bifenthrin/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Solanacea" group.		
	US 11	Cod	EU
<b>Boscalid</b>	1.2	---	<i>{1}</i>
	11. United States does not maintain a specific MRL for the Boscalid/Pepino combination, but does maintain an MRL of 1.2 PPM for its "Vegetable, Fruiting, Group 8" group.		

	<b>US 12</b>	<b>Cod</b>	<b>EU</b>
<b>Buprofezin</b>	1.3	---	{1}
	12. United States does not maintain a specific MRL for the Buprofezin/Pepino combination, but does maintain an MRL of 1.3 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 13</b>	<b>Cod</b>	<b>EU</b>
<b>Captan</b>	0.05	---	{0.02}
	13. United States does not maintain a specific MRL for the Captan/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 14</b>	<b>Cod</b>	<b>EU</b>
<b>Carbaryl</b>	5	---	{0.05}
	14. United States does not maintain a specific MRL for the Carbaryl/Pepino combination, but does maintain an MRL of 5 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 15</b>	<b>Cod</b>	<b>EU 16</b>
<b>Carfentrazone-ethyl</b>	0.1	---	{0.01}
	15. United States does not maintain a specific MRL for the Carfentrazone-ethyl/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	16. European Union does not maintain a specific MRL for the Carfentrazone-ethyl/Pepino combination, but does maintain an MRL of 0.01 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 17</b>	<b>Cod 18</b>	<b>EU</b>
<b>Chlorantraniliprole</b>	0.7	{0.6}	{0.3}
	17. United States does not maintain a specific MRL for the Chlorantraniliprole/Pepino combination, but does maintain an MRL of 0.7 PPM for its "Vegetable, Fruiting, Group 8" group.		
	18. Codex does not maintain a specific MRL for the Chlorantraniliprole/Pepino combination, but does maintain an MRL of 0.6 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	<b>US 19</b>	<b>Cod</b>	<b>EU 20</b>
<b>Chlorfenapyr</b>	1	---	{0.05}
	19. United States does not maintain a specific MRL for the Chlorfenapyr/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	20. European Union does not maintain a specific MRL for the Chlorfenapyr/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 21</b>	<b>Cod</b>	<b>EU 22</b>
<b>Chlorothalonil</b>	6	---	{2}
	21. United States does not maintain a specific MRL for the Chlorothalonil/Pepino combination, but does maintain an MRL of 6 PPM for its "Vegetable, Fruiting, Group 8" group.		
	22. European Union does not maintain a specific MRL for the Chlorothalonil/Pepino combination, but does maintain an MRL of 2 PPM for its "Solanacea" group.		
	<b>US 23</b>	<b>Cod</b>	<b>EU</b>
<b>Clethodim</b>	1	---	{0.5}
	23. United States does not maintain a specific MRL for the Clethodim/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 24</b>	<b>Cod</b>	<b>EU</b>
<b>Clothianidin</b>	0.2	---	{0.05}
	24. United States does not maintain a specific MRL for the Clothianidin/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 25</b>	<b>Cod</b>	<b>EU</b>
<b>Cyazofamid</b>	0.4	---	{0.01}
	25. United States does not maintain a specific MRL for the Cyazofamid/Pepino combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 26</b>	<b>Cod</b>	<b>EU</b>
<b>Cyfluthrin</b>	0.5	---	{0.1}
	26. United States does not maintain a specific MRL for the Cyfluthrin/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Fruiting, Group 8" group.		

	US 27	Cod	EU
<b>Cymoxanil</b>	0.2	---	{0.05}
	27. United States does not maintain a specific MRL for the Cymoxanil/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 28	Cod	EU 29
<b>d-Phenothrin</b>	0.01	---	0.05
	28. United States does not maintain a specific MRL for the d-Phenothrin/Pepino combination, but does maintain an MRL of 0.01 PPM for its "Vegetable, Fruiting, Group 8" group.		
	29. European Union does not maintain a specific MRL for the d-Phenothrin/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US 30	Cod	EU
<b>Deltamethrin</b>	0.3	---	0.3
	30. United States does not maintain a specific MRL for the Deltamethrin/Pepino combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 31	Cod	EU
<b>Dicofol</b>	2	---	{0.02}
	31. United States does not maintain a specific MRL for the Dicofol/Pepino combination, but does maintain an MRL of 2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 32	Cod	EU
<b>Difenoconazole</b>	0.6	---	{0.05}
	32. United States does not maintain a specific MRL for the Difenoconazole/Pepino combination, but does maintain an MRL of 0.6 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 33	Cod 34	EU
<b>Dimethomorph</b>	1.5	{1}	{0.05}
	33. United States does not maintain a specific MRL for the Dimethomorph/Pepino combination, but does maintain an MRL of 1.5 PPM for its "Vegetable, Fruiting, Group 8" group.		
	34. Codex does not maintain a specific MRL for the Dimethomorph/Pepino combination, but does maintain an MRL of 1 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	US 35	Cod	EU
<b>Dinotefuran</b>	0.7	---	---
	35. United States does not maintain a specific MRL for the Dinotefuran/Pepino combination, but does maintain an MRL of 0.7 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 36	Cod	EU
<b>Emamectin</b>	0.02	---	{0.01}
	36. United States does not maintain a specific MRL for the Emamectin /Pepino combination, but does maintain an MRL of 0.02 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 37	Cod	EU
<b>Famoxadone</b>	4	---	{1}
	37. United States does not maintain a specific MRL for the Famoxadone/Pepino combination, but does maintain an MRL of 4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 38	Cod	EU
<b>Fenamidone</b>	1	---	{0.02}
	38. United States does not maintain a specific MRL for the Fenamidone/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 39	Cod	EU
<b>Fenhexamid</b>	2	---	{1}
	39. United States does not maintain a specific MRL for the Fenhexamid/Pepino combination, but does maintain an MRL of 2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	US 40	Cod	EU 41
<b>Fenpropathrin</b>	1	---	{0.01}
	40. United States does not maintain a specific MRL for the Fenpropathrin/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	41. European Union does not maintain a specific MRL for the Fenpropathrin/Pepino combination, but does maintain an MRL of 0.01 PPM for its "Solanacea" group.		

	<b>US 42</b>	<b>Cod</b>	<b>EU</b>
<b>Fenpyroximate</b>	0.2	---	{0.1}
	42. United States does not maintain a specific MRL for the Fenpyroximate/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 43</b>	<b>Cod</b>	<b>EU</b>
<b>Flonicamid</b>	0.4	---	{0.05}
	43. United States does not maintain a specific MRL for the Flonicamid/Pepino combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 44</b>	<b>Cod</b>	<b>EU</b>
<b>Flubendiamide</b>	0.6	---	{0.01}
	44. United States does not maintain a specific MRL for the Flubendiamide/Pepino combination, but does maintain an MRL of 0.6 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 45</b>	<b>Cod</b>	<b>EU</b>
<b>Fludioxonil</b>	0.01	---	1
	45. United States does not maintain a specific MRL for the Fludioxonil/Pepino combination, but does maintain an MRL of 0.01 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 46</b>	<b>Cod</b>	<b>EU 47</b>
<b>Flumioxazin</b>	0.02	---	0.05
	46. United States does not maintain a specific MRL for the Flumioxazin/Pepino combination, but does maintain an MRL of 0.02 PPM for its "Vegetable, Fruiting, Group 8" group.		
	47. European Union does not maintain a specific MRL for the Flumioxazin/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 48</b>	<b>Cod</b>	<b>EU</b>
<b>Fluopicolide</b>	1.6	---	{0.01}
	48. United States does not maintain a specific MRL for the Fluopicolide/Pepino combination, but does maintain an MRL of 1.6 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 49</b>	<b>Cod</b>	<b>EU 50</b>
<b>Fluoxastrobin</b>	1	---	{0.05}
	49. United States does not maintain a specific MRL for the Fluoxastrobin/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	50. European Union does not maintain a specific MRL for the Fluoxastrobin/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 51</b>	<b>Cod 52</b>	<b>EU</b>
<b>Gamma Cyhalothrin</b>	0.2	0.3	---
	51. United States does not maintain a specific MRL for the Gamma Cyhalothrin/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	52. Codex does not maintain a specific MRL for the Gamma Cyhalothrin/Pepino combination, but does maintain an MRL of 0.3 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	<b>US 53</b>	<b>Cod</b>	<b>EU 54</b>
<b>Glyphosate</b>	0.1	---	0.1
	53. United States does not maintain a specific MRL for the Glyphosate/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	54. European Union does not maintain a specific MRL for the Glyphosate/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Fruiting vegetables" group.		
	<b>US 55</b>	<b>Cod</b>	<b>EU 56</b>
<b>Halosulfuron-methyl</b>	0.05	---	{0.01}
	55. United States does not maintain a specific MRL for the Halosulfuron-methyl/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Fruiting, Group 8" group.		
	56. European Union does not maintain a specific MRL for the Halosulfuron-methyl/Pepino combination, but does maintain an MRL of 0.01 PPM for its "Vegetables Fresh or Frozen" group.		

	<b>US 57</b>	<b>Cod</b>	<b>EU</b>
<b>Imidacloprid</b>	1	---	{0.5}
	57. United States does not maintain a specific MRL for the Imidacloprid/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 58</b>	<b>Cod</b>	<b>EU</b>
<b>Indoxacarb</b>	0.5	---	0.5
	58. United States does not maintain a specific MRL for the Indoxacarb/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 59</b>	<b>Cod 60</b>	<b>EU</b>
<b>Lambda Cyhalothrin</b>	0.2	0.3	0.5
	59. United States does not maintain a specific MRL for the Lambda Cyhalothrin/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	60. Codex does not maintain a specific MRL for the Lambda Cyhalothrin/Pepino combination, but does maintain an MRL of 0.3 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	<b>US 61</b>	<b>Cod</b>	<b>EU</b>
<b>Mandipropamid</b>	1	---	1
	61. United States does not maintain a specific MRL for the Mandipropamid/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 62</b>	<b>Cod</b>	<b>EU</b>
<b>Metalaxyl</b>	1	---	{0.05}
	62. United States does not maintain a specific MRL for the Metalaxyl/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 63</b>	<b>Cod</b>	<b>EU</b>
<b>Methoxyfenozide</b>	2	---	{0.5}
	63. United States does not maintain a specific MRL for the Methoxyfenozide/Pepino combination, but does maintain an MRL of 2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 64</b>	<b>Cod</b>	<b>EU</b>
<b>Myclobutanil</b>	4	---	{0.3}
	64. United States does not maintain a specific MRL for the Myclobutanil/Pepino combination, but does maintain an MRL of 4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 65</b>	<b>Cod</b>	<b>EU</b>
<b>Napropamide</b>	0.1	---	0.1
	65. United States does not maintain a specific MRL for the Napropamide/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 66</b>	<b>Cod</b>	<b>EU</b>
<b>Novaluron</b>	1	---	{0.01}
	66. United States does not maintain a specific MRL for the Novaluron/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 67</b>	<b>Cod 68</b>	<b>EU 69</b>
<b>Paraquat dichloride</b>	0.05	0.05	{0.02}
	67. United States does not maintain a specific MRL for the Paraquat dichloride/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Fruiting, Group 8" group.		
	68. Codex does not maintain a specific MRL for the Paraquat dichloride/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	69. European Union does not maintain a specific MRL for the Paraquat dichloride/Pepino combination, but does maintain an MRL of 0.02 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 70</b>	<b>Cod</b>	<b>EU 71</b>
<b>Pendimethalin</b>	0.1	---	{0.05}
	70. United States does not maintain a specific MRL for the Pendimethalin/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	71. European Union does not maintain a specific MRL for the Pendimethalin/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Fruiting vegetables" group.		

	<b>US 72</b>	<b>Cod</b>	<b>EU 73</b>
<b>Pentachloronitrobenzene</b>	0.1	---	{0.02}
	72. United States does not maintain a specific MRL for the Pentachloronitrobenzene/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	73. European Union does not maintain a specific MRL for the Pentachloronitrobenzene/Pepino combination, but does maintain an MRL of 0.02 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 74</b>	<b>Cod</b>	<b>EU 75</b>
<b>Propamocarb hydrochloride</b>	2	---	10
	74. United States does not maintain a specific MRL for the Propamocarb hydrochloride/Pepino combination, but does maintain an MRL of 2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	75. European Union does not maintain a specific MRL for the Propamocarb hydrochloride/Pepino combination, but does maintain an MRL of 10 PPM for its "Solanacea" group.		
	<b>US 76</b>	<b>Cod</b>	<b>EU</b>
<b>Pymetrozine</b>	0.2	---	0.5
	76. United States does not maintain a specific MRL for the Pymetrozine/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 77</b>	<b>Cod</b>	<b>EU</b>
<b>Pyraclostrobin</b>	1.4	---	{0.2}
	77. United States does not maintain a specific MRL for the Pyraclostrobin/Pepino combination, but does maintain an MRL of 1.4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 78</b>	<b>Cod</b>	<b>EU</b>
<b>Pyridalyl</b>	1	---	1
	78. United States does not maintain a specific MRL for the Pyridalyl/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 79</b>	<b>Cod</b>	<b>EU 80</b>
<b>Pyriproxyfen</b>	0.2	---	1
	79. United States does not maintain a specific MRL for the Pyriproxyfen/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	80. European Union does not maintain a specific MRL for the Pyriproxyfen/Pepino combination, but does maintain an MRL of 1 PPM for its "Solanacea" group.		
	<b>US 81</b>	<b>Cod</b>	<b>EU 82</b>
<b>S-metolachlor</b>	0.1	---	{0.05}
	81. United States does not maintain a specific MRL for the S-metolachlor/Pepino combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	82. European Union does not maintain a specific MRL for the S-metolachlor/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	<b>US 83</b>	<b>Cod</b>	<b>EU</b>
<b>Sethoxydim</b>	4	---	{0.5}
	83. United States does not maintain a specific MRL for the Sethoxydim/Pepino combination, but does maintain an MRL of 4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 84</b>	<b>Cod</b>	<b>EU 85</b>
<b>Spinetoram</b>	0.4	---	0.5
	84. United States does not maintain a specific MRL for the Spinetoram/Pepino combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Fruiting, Group 8" group.		
	85. European Union does not maintain a specific MRL for the Spinetoram/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Solanacea" group.		
	<b>US 86</b>	<b>Cod</b>	<b>EU</b>
<b>Spinosad</b>	0.4	---	1
	86. United States does not maintain a specific MRL for the Spinosad/Pepino combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Fruiting, Group 8" group.		

	<b>US 87</b>	<b>Cod</b>	<b>EU</b>
<b>Spiromesifen</b>	0.45	---	0.5
	87. United States does not maintain a specific MRL for the Spiromesifen/Pepino combination, but does maintain an MRL of 0.45 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 88</b>	<b>Cod 89</b>	<b>EU</b>
<b>Spirotetramat</b>	2.5	{1}	{2}
	88. United States does not maintain a specific MRL for the Spirotetramat/Pepino combination, but does maintain an MRL of 2.5 PPM for its "Vegetable, Fruiting, Group 8" group.		
	89. Codex does not maintain a specific MRL for the Spirotetramat/Pepino combination, but does maintain an MRL of 1 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	<b>US 90</b>	<b>Cod</b>	<b>EU</b>
<b>Tebufenozide</b>	1	---	{0.5}
	90. United States does not maintain a specific MRL for the Tebufenozide/Pepino combination, but does maintain an MRL of 1 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 91</b>	<b>Cod</b>	<b>EU</b>
<b>Thiamethoxam</b>	0.25	---	{0.2}
	91. United States does not maintain a specific MRL for the Thiamethoxam/Pepino combination, but does maintain an MRL of 0.25 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 92</b>	<b>Cod</b>	<b>EU</b>
<b>Trifloxystrobin</b>	0.5	---	{0.02}
	92. United States does not maintain a specific MRL for the Trifloxystrobin/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 93</b>	<b>Cod</b>	<b>EU 94</b>
<b>Trifluralin</b>	0.05	---	0.5
	93. United States does not maintain a specific MRL for the Trifluralin/Pepino combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Fruiting, Group 8" group.		
	94. European Union does not maintain a specific MRL for the Trifluralin/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Fruiting vegetables" group.		
	<b>US 95</b>	<b>Cod</b>	<b>EU</b>
<b>Uniconazole-P</b>	0.01	---	---
	95. United States does not maintain a specific MRL for the Uniconazole-P/Pepino combination, but does maintain an MRL of 0.01 PPM for its "Vegetable, Fruiting, Group 8" group.		
	<b>US 96</b>	<b>Cod</b>	<b>EU 97</b>
<b>Zeta-Cypermethrin</b>	0.2	---	0.5
	96. United States does not maintain a specific MRL for the Zeta-Cypermethrin/Pepino combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Fruiting, Group 8" group.		
	97. European Union does not maintain a specific MRL for the Zeta-Cypermethrin/Pepino combination, but does maintain an MRL of 0.5 PPM for its "Solanacea" group.		

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