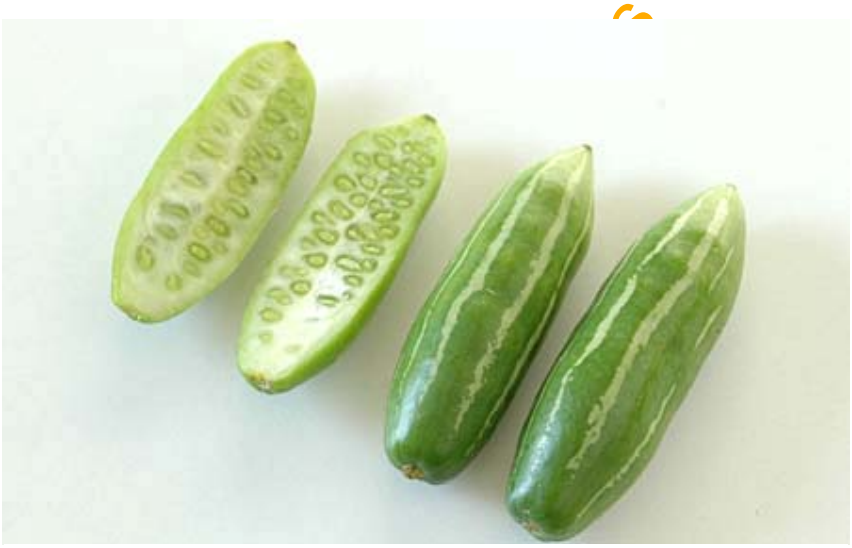
CD/K/101:2010
ICS 67.080.20



# EAST AFRICAN STANDARD

## Fresh ivy gourds (tindori) — Specification



## EAST AFRICAN COMMUNITY

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First Edition 2010

## 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.



East African Community

P O Box 1096

**Arusha**

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: eac@eachq.org

Web: www.each.int

## Introduction

To ensure good quality, tindori should be harvested when the fruits are tender and the seeds are undeveloped. The fruits should be pre-cooled or kept in a shade immediately after picking to avoid deterioration in quality.

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

KS 1301:2006, *Fresh ivy gourds (tindori) — Specification* (Second Edition)

ISO 7560:1995, *Cucumbers — Storage and refrigerated transport*

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_q-e.jsp

USDA Foreign Agricultural Service website: http://www.mrldatabase.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

European Union: 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.

## Contents

# Fresh ivy gourds (tindori) — Specification

## 1 Scope

This East African Standard applies to fresh edible fruits of ivy gourds of varieties (cultivars) grown from *Coccinia cordifolia* Cogn. */Coccinia grandis* to be supplied fresh to the consumer, ivy gourds for industrial processing being excluded.

## 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 the Packaging and Transport of Tropical Fresh Fruit and Vegetables*

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

EAS 38, *Labelling of prepackaged foods — Specification*

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

## 3 Definitions

For the purpose of this standard the following definition shall apply:

**3.1**
**clean**
ivy gourds that are practically free of any visible foreign matter

**3.2**
**damage**
any injury or defect caused by sunscald, low temperatures, yellowing, sunburn, bruises, scars and insects, which affect the appearance and eating quality of ivy gourds

**3.3**
**deformed**
the ivy gourd that is so badly misshaped that the appearance does not fit the known characteristics of the variety

**3.4**
**firm**
the ivy gourd, which is crisp and not shrivelled, limp or pliable

**3.5**
**fresh**
ivy gourds that have been recently harvested and whose quality has not deteriorated due to loss of moisture, discolouration, or injury through bruising

**3.6**
**intact**
ivy gourds with no parts removed and that have not suffered any damage making them incomplete

**3.7**
**length**
the greatest dimension of ivy gourd fruit measured from the stem end to the blossom end including the stalk

**3.8**
**moderately coloured**
ivy gourds having at least half of the surface bearing characteristic colour of the variety

**3.9**
**overgrown**
the ivy gourd that has developed beyond the best stage of utilization and is fibrous. The seeds are tough and the pulp in the seed cavity has changed from white to red and has turned watery or jelly-like

**3.10**
**uniformly coloured**
ivy gourds having at least three quarters (¾) of the surface bearing the characteristic colour of the variety

**3.11**
**superior quality**
means ivy gourds that are:

i) well developed;

ii) free from defects including all deformations particularly those caused by seed formation.

**3.12**
**good quality**
fresh ivy gourds that are reasonably developed

## 4 Minimum quality requirements

In all classes, subject to the special provisions of each class and tolerances allowed, the following shall be the minimum requirements for ivy gourds.

i) firm and intact;

ii) fresh and clean;

iii) be tender;

iv) be not overgrown;

v) be fairly well-formed;

vi) be of characteristic colour of the variety;

vii be free from pests, damage and diseases;

viii) be free from foreign smell and/or taste;

ix) be have a stalk of a maximum length of 10 mm.

## 5 Classification

All fresh ivy gourds shall meet all the requirements in Clause 4 and shall be classified as follows:

### 5.1 Extra class

This class consists of ivy gourds which are uniformly coloured and are of superior quality in shape, appearance and development. They must have the characteristic of the variety.

The difference in weight between the smallest and the largest gourd within the same package shall not exceed 10 % of the average weight of the lot.

### 5.2 Class 1

Ivy gourds in this class shall be moderately coloured and be of good quality.

**5.2.1** The difference in length between the shortest and the longest gourd within the same package shall not exceed 20 % of the average weight of the lot.

**5.2.2** The following defects shall be allowed provided that they do not affect the general appearance of the produce, i.e. the quality, the keeping quality and presentation in the package:

i) a slight deformation excluding that caused by seed formation;

ii) slight defect in colouring, especially the light coloured part of the fruit, where it touched the ground during growth;

iii) slight skin blemishes or injuries due to rubbing and handling or low temperature, provided that such blemishes have healed and do not affect the keeping quality.

### 5.3 Class II

This class includes gourds which do not qualify for inclusion in the higher classes but meet the minimum requirements.

## 6 Tolerances

The following tolerance in respect of quality shall be allowed:

### 6.1 Extra class

A maximum of 5 % by mass of ivy gourds not satisfying the requirements of this class but meet requirements of Class I.

### 6.2 Class I

A maximum of 5 % by mass of ivy gourds not satisfying the requirements of this class but satisfying those of Class II.

### 6.3 Class II

A maximum of 5 % by mass of ivy gourds not satisfying the requirements of this class but satisfying the minimum requirements.

## 8 Contaminants

### 8.1 Pesticide residues

Fresh ivy gourds shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity. The limits listed below were current as of the dates indicated. Annex E provides current MRLs for the USA, EU and Codex markets.

**Maximum pesticide residue limits and extraneous maximum residue limits in ivy gourds (current as at 2009-06-07)**

| Pesticide | Unit symbol | Limit | Method of test | Notes |
|---|---|---|---|---|
| DITHIOCARBAMATES | MRL (undef ) | 0.2 | | Source of data: mancozeb |

### 8.1 Heavy metals

Fresh ivy gourds 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 | 0.10 | ISO 6561-1 or 6561-2 |

## 9 Packaging

**9.1** Ivy gourds must be packed in such a way as to protect the produce properly. The materials used inside the package must be new[1], 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.

Ivy gourds shall be packed in each container in compliance with CAC/RCP 44.

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

**9.2** Fresh ivy gourds shall be uniformly packed by class.

**9.3** The visible part of each package shall be representative of the entire contents in the package.

**9.4** The packaging material shall allow the consumer to view part of the produce and shall provide suitable protection.

## 10 Labelling

In addition to the provisions of EAS 38, the following specific details shall be printed clearly and indelibly on the package:

i) name, address and physical location of producer/packer/distributor;

ii) name and variety of produce;

iii) country of origin;

iv) class of produce;

v) net weight, in g or kg;

vi) storage instructions;

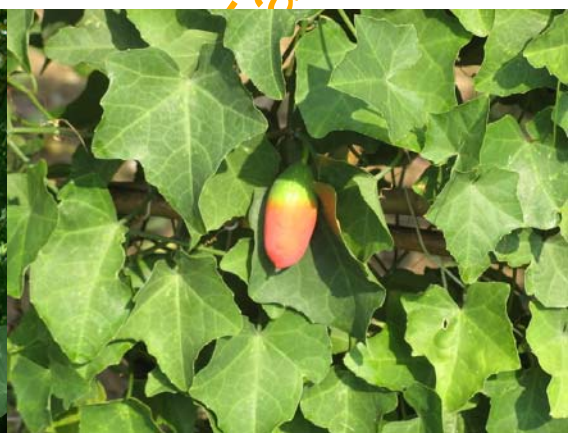
vii) code/batch number.

[1] For the purposes of this Standard, this includes recycled material of food-grade quality.

Ivy gourd/Tindori

Flowering tindori plant

Mature ivy gourd



Ripe ivy fruit

# Annex A
(informative)

## Storage and refrigerated transport

NOTE These storage requirements are designed for cucumbers. However, they are applicable to ivy gourds taking into account the relevant recommendations made in Annex B.

### A.1 Scope

This annex gives guidance on conditions for the successful storage and long-distance transport of cucumbers intended either for direct consumption or for industrial processing.

### A.2 Application

This annex provides the necessary conditions of ensuring that the requirements outlined in Clause are met when the cucumbers are transported to markets not in the immediate vicinity of the farm.

### A.3 Conditions for harvesting and storage

#### A.3.1 Harvesting

Cucumbers should be cut from the plant and handled carefully. Mechanical damage should be avoided, especially around the stalk of the fruits.

#### A.3.2 Characteristics for storage

Cucumbers intended either for consumption in the fresh state or for industrial processing should be harvested at a development stage corresponding to the quality requirements specified Clause 4 of this standard.

They should be characteristic of the variety and suitable for the intended use. Cucumbers should:

— be intact and sound;

— be free from any visible foreign matter;

— be of fresh appearance;

— be firm and free of abnormal external moisture;

— be free of any foreign odour or taste;

— have seeds which are soft and undeveloped.

Cucumbers should not be withered, senescent, yellowish or yellow ripened.

#### A.3.3 Classification

Cucumbers are classified into three classes as provided in Clause 4.

#### A.3.4 Sizing

Sizing of cucumbers shall be in accordance with Clause 5.

#### A.3.5 Packing

The methods of packing should be such as to maintain the quality of the cucumbers during storage, transportation and handling.

Medium-long salad cucumbers intended for consumption in the fresh state, and pickling cucumbers for industrial processing, may be packed in wooden crates or perforated fibreboard boxes.

Very small pickling cucumbers (from 3 cm to 6 cm long) and salad cucumbers grown under conditions of forced growth should be packed in wooden crates or perforated fibreboard boxes; the salad cucumbers should be packed in layers in the wooden crate or perforated fibreboard box, which should not contain more than 10 kg to 15 kg. Wrapping individually in film or cellophane or waxing the cucumbers is recommended.

### A.4 Optimum storage and transport conditions

For measurement of the physical quantities affecting storage, see ISO 2169.

#### A.4.1 Temperature

The optimum temperature for the storage and transport of cucumbers is between +7 °C and +10 °C. Because of the susceptibility of cucumbers to chilling, the temperature should only temporarily be allowed to fall below +7 °C. Above +10 °C, cucumbers turn yellow within 10 days, and at +15 °C even sooner, depending on the Stage of development of the cucumbers. Once yellowing has begun, the product is no longer suitable for storage and transport.

Cucumbers should be packed as soon as possible after harvesting, and put into the cold store so that they are cooled to +7 °C to +10 °C until loading.

#### A.4.2 Relative humidity

The optimum relative humidity is between 90 % and 95 %. Air with a lower relative humidity would favour wilting and loss in mass of the cucumbers. In the case of cucumbers for direct consumption, wrapping individually in film or cellophane, or waxing, serves to maintain this relative humidity.

#### A.4.3 Other conditions

During storage and transport, circulation of air should be assured so that constant temperature and relative humidity are maintained.

Yellowing of the cucumbers will be hastened by ethylene; products producing ethylene (such as apples, pears, peaches, bananas, tomatoes, melons and citrus fruits) should not be present in the same store or transport vehicle.

#### A.4.4 Duration of storage and transport

Cucumbers are highly perishable and they should therefore be stored and transported for the shortest time possible. The quality can be maintained for about 10 days at the optimum temperature of + 7 °C to + 10 °C and at 90 % to 95 % relative humidity.

If each fruit is packed separately in polyethylene film, cucumbers produced under conditions of forced growth can be stored at +12 °C to +13 °C for 2 weeks. Cucumbers stored or transported at temperatures below +7 °C should be used within 2 to 4 days, or immediately after storage, or on arrival as, at higher temperatures, fruits previously kept at low temperatures soon show signs of damage caused by chilling (shallow surface pits followed by decay, caused by microorganisms).

#### A.4.5 Putting into storage

Cucumbers packed in wooden crates or fibreboard boxes may be placed in a pre-cooled cold store in stacks, according to the load-bearing capacity of the containers.



# Annex B
(informative)

## Pumpkins and gourds — Commercial production guide

### B.1 Botanical classifications, origins and uses

Both pumpkins and gourds are members of the cucurbit family — *Cucurbitaceae.* Other vegetables in this family include watermelons, squash, cucumbers and cantaloupes. Gourds were probably one of the first plants domesticated by man and were used for utensils as early as 2400 B.C. Remains have been found in the southwestern United States, Peru and Mexico; some date back to 7000 B.C. Remains found in South America date back to 13,000 B.C. Native Americans cultivated pumpkins before the arrival of European settlers to the Americas. Although members of the same family, cultivated species of pumpkins and gourds vary widely; there is, however, some overlap.

#### B.1.1 Pumpkins

The origins of the pumpkin can be traced to the southern regions of North America and the northern regions of South America. Botanically pumpkins and squash are quite similar since varieties of both can be found in *Cucurbita pepo, C. argyrosperma,* and *C. moschata* species. *C. maxima* is also a species of pumpkin generally associated with the larger pumpkins.

Mature and immature fruit of the pumpkin are generally edible.

#### B.1.2 Characteristics of various species of pumpkins

*Cucurbita pepo* — Most of the traditional and naked-seed type pumpkins are included in this classification. Traditional varieties in this classification include most of the small to large types excluding the giant pumpkins.

*Cucurbita moschata* — Varieties such as Dickinson Field, Golden Cushaw and Kentucky Field are in this classification.

*Cucurbita maxima* — This classification is characterized by its large fruit and includes the mammoth and giant varieties including Big Max, Mammoth Prize and Atlantic Giant.

*Cucurbita argyrosperma* — Few commercial varieties are produced from these varieties which include Green-Striped Cushaw, Japanese Pie, Tennessee Sweet Potato and White Cushaw.

#### B.1.3 Gourds

There are two groups of gourds that are distinguished by a variety of botanical attributes. *Lagenaria* gourds likely originated on the African continent where the greatest diversity of gourd forms are found. However, ancient remains of gourds have been found in South America as well, and varied explanations exist as to how the species was spread to that region. *Cucurbita sp.* gourds are believed to be native to North America.

The gourd has a storied history of use in both practical as well as decorative purposes. Until the advent of indoor plumbing, most drinking wells in the United States were equipped with a long-handled dipper gourd. Gourds were used in ancient times as containers in which to bury food, as masks, as protection from the sun, and as bowls, pipes and musical instruments. Present day use of the gourd has expanded to birdhouses, and one type is used to produce a very popular natural sponge. Immature fruit of some types are edible, but the predominant use continues to be for decorative purposes or other uses mentioned above.

### B.1.4 Characteristics of various classifications of gourds

- Plants that produce yellow flowers (also produce fruits damaged by frost or cold weather). These are the *Cucurbita sp.* gourds, which are mostly thick-shelled and difficult to cure.

  — *Cucurbita pepo* var. *ovifers* — These fruits are generally small and have a variety of shapes and colors and are not edible. The leaves have prominent lobes with a prickly surface. Seeds measure ½-1 inch long, are fairly flat and cream-colored with a rounded or horizontal scar. Flowers are large but somewhat hidden by foliage. They open early in the day and whither by midday. Most of the common ornamental gourds are in this group and include:

| | | | |
|---|---|---|---|
| Egg | White Pear | Apple | Broad Striped |
| Striped Pear | Ladle or Scoop | Mock Orange | Bicolor Pear |
| Bell | Spoon | Big Bell | Miniature |

  — *Cucurbita maxima* — Fruits in this group are medium to medium large. The smaller types in this group have hard and durable shells. The leaves are rounded with irregular lobes. The flowers have a broad corolla. Seeds average $^{5}/_{8}$-1 inch in length and $^{3}/_{8}$ inch wide. Their color is creamy white with a slanting scar. Varieties in this group include Turks Turbin and Aladin.

  — *Curcurbita ficifolia* — Most fruits are melon shaped, vines are vigorous with fig-shaped leaves. Fruits are not everlasting but will keep for several months. Seeds are black, $^{5}/_{8}$ inch long. Flowers are yellow to light orange and measure 4 to 5 inches across. The Malabar Melon (also called Figleaf, Siamese or Angora gourd) is in this group.

- Plants that have white flowers (fully mature fruit not damaged by frost).

  — *Lagenaria siceraria* -- Vine growth is very vigorous. Leaves are large with a soft, velvety texture. Leaf margins are irregular but not lobed. Tendrils are long and forked. Vines have a musky scent. Flowers, which are perched on long, slender stems and have a sweet scent, bloom only at night and are pollinated by moths. Fruit size varies from medium small to very large. The mostly thin-shelled fruit can be dried to form a mostly empty shell. Seed size and color is too variable to delineate. Some forms include:

| | | |
|---|---|---|
| Bottle (Dumb-bell) | Giant African | Penguin |
| Dolphin (Maranka) | Dipper | Sugar Trough |
| Caveman's Club | Powder Horn | Kettle |
| Hercules Club | Giant Bottle | |

- **Vegetable Sponges —** Plants have yellow to white flowers, and the large staminate flowers occur in clusters while the pistillate flower occurs as a single flower. Immature fruits are green, ridged and turn a straw color when mature. Seeds are flat, similar to watermelon seed, colored black to blackish brown and are about $^{5}/_{8}$ inch long. Tendrils are branched and vines are vigorous.

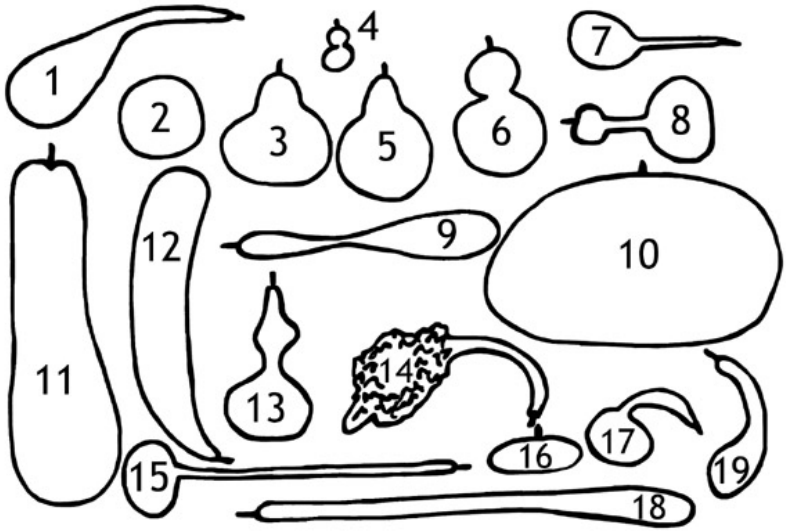
  — *Luffa acutangula* (ridged luffa) - These produce club-shaped fruit up to 12 inches long with 10 sharp ridges. They produce a fibrous sponge that has less commercial value. Fruit are generally grown to be consumed at an immature stage.

  — *Luffa aegyptiaca* (smooth luffa) - This is the vegetable sponge plant, also called rag gourd, dishcloth gourd and Chinese luffa. This species is edible in the immature stage and is also called running okra.



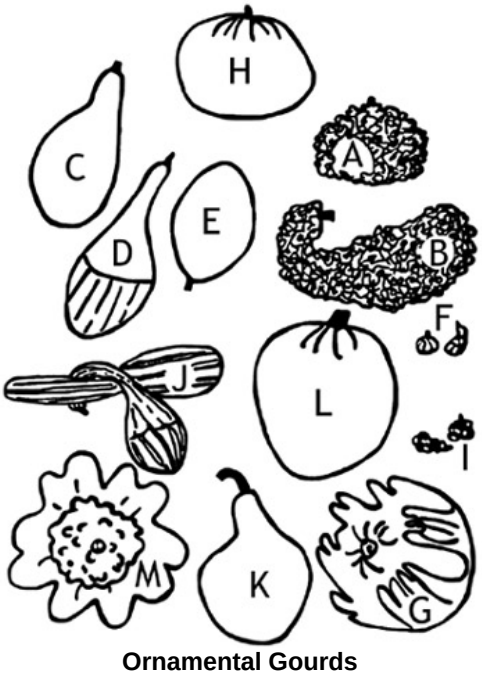
 

### B.1.5 The various shapes and sizes of gourds




**Hardshell Gourds**

1. club, cave man's club, Hercules club; 2. basketball; 3. kettle; 4. miniature bottle; 5. Mexican bottle, birdhouse gourd; 6. bottle, dumb-bell, Chinese bottle; 7. retort, siphon; 8. Indonesian bottle, Costa Rican bottle; 9. siphon, Japanese bottle, penguin; 10. bushel basket; 11. zucca; 12. Hercules club, calabash, sugar trough; 13. lump-in-the-neck bottle; 14. maranka, dolphin, cave man's club; 15. ball and chain, long-handled dipper, baton; 16. tobacco box, canteen, sugar bowl; 17. short-handled dipper; 18. baton, club, snake, longissima; 19. penguin, powder horn.




**Ornamental Gourds**

A. warted gourd; B. crooknecked warted gourd; C. pear; D. bicolor (top yellow, bottom green); E. egg; F. smooth miniatures; G. crown of thorns, finger gourd, ten commandments gourd; H. apple; I. warted miniatures; J. spoons; K. bell; L. orange; M. star.

### B.2 Variety selection and culture

#### B.2.1 Pumpkins

Choice of pumpkin varieties is based primarily on market intentions and local performance of specific varieties. Pumpkin varieties produce fruit that range in size from 0.5 kg to more than 450 kg. Selection of the variety is based primarily on the size that the intended market desires. Retail sales can include a range of sizes, but those grown for wholesale will generally be medium to large.

Other characteristics important in pumpkin variety selection include outer colour, shape, vining habit and yield. Traditional orange colours and ribbed shapes are generally preferred except for specific markets. Pumpkin varieties may have vining, semi-vining/semi-bush or bush growth habits. The selection of growth habit is important in regard to the space that the grower has on which to produce the crop. Many open-pollinated pumpkin varieties perform well. Newer hybrids may produce a higher yield, particularly of the medium-sized pumpkins. There is little disease resistance currently offered in commercially available varieties. There are varieties now available with powdery mildew resistance. Some commercial varieties are listed in Table B.1.

**Table B.1 — Varieties of pumpkins with their growth habit, size and maturity**

| Variety | Habit | Hybrid/OP | Size (lbs) | Maturity |
|---|---|---|---|---|
| Pro Gold #500 | vine | Hybrid | 20-24 | 95 days |
| Appalachian | semi-bush | Hybrid | 20-25 | 95 days |
| Aspen | semi-bush | Hybrid | 16-22 | 90 days |
| Atlantic Giant | vine | OP | 50-900* | 115-125 days |
| Big Autumn | semi-bush | Hybrid | 12-18 | 90 days |
| Casper | vine | OP | 10-20 | 90 days |
| Frosty | bush | Hybrid | 10-15 | 90 days |
| Funny Face | semi-bush | Hybrid | 10-15 | 100 days |
| Merlin | vine | Hybrid | 15-25 | 115 days |
| Magic Lantern | semi-vine | Hybrid | 16-24 | 115 days |
| Jack-Be-Little | vine | OP | < 1 | 95 days |
| Lumina | vine | OP | 10-12 | 90 days |
| Munchkin | vine | OP | < 1 | 85-100 days |
| Mystic Plus | semi-vine | Hybrid | 7-8 | 105 days |
| Prizewinner | vine | Hybrid | 100-300 | 120 days |
| Small Sugar | vine | OP | 5-6 | 110 days |
| Spirit | semi-bush | Hybrid | 10-15 | 95-100 days |
| Sweetie Pie | vine | OP | < 1 | 95 days |
| Trick or Treat | semi-bush | Hybrid | 8-16 | 105 days |
| Autumn King | vine | Hybrid | 20-25 | 105 days |
| First Prize | vine | Hybrid | 50-200 | 120 days |
| Jumpin' Jack | vine | OP | 20-24 | 120 days |
| Touch of Autumn | semi-bush | Hybrid | 2-3 | 95 days |
| Gold Bullion | semi-bush | OP | 18 | 110 days |

#### B.2.2 Gourds

Gourd varieties are almost as numerous as gourds themselves. Indeed, even within varieties there can be considerable variation among fruit produced — even those produced on the same vine. For that reason many gourd seed are sold as a mixture of seed of various varieties. Most variety names describe the general appearance of the gourd that they are supposed to produce. Like pumpkins, gourds produced commercially will have to meet the demands of the intended market. Many small gourds are produced for decoration and arrangements. Larger gourds are often used for making decorative utensils or for painting/artwork. Still others are produced for sponges. Table 2 is a partial listing of varieties of gourds that are commercially available. There are many sources of gourd seeds. Always obtain seed from a reputable source to ensure the best results. Luffa seed may benefit from scarification by scratching the seed coats with sandpaper. Whether scarified or not, Luffa seed should



be soaked in warm water for 24 hours prior to planting. Gourd variety names often describe the shape of the gourd. A diagram of several gourd shapes follows.

**Table B.2 — Varieties of gourds with their descriptions**

| Variety Name | Description |
|---|---|
| Birdhouse Gourd | long-handled neck; ball shaped bottom |
| Caveman's Club | club-shaped, wrinkled head, 15-18" long, 6" diameter |
| Calabash (Powderhorn) | short, curved neck; 12-15" long, 5" diameter, smooth, tan |
| Corsica Flat | round (6-12" diameter), flattened (3.5-5" height) |
| Cucuzzi | long and thin, edible at young stage |
| Dudhi (bottle) | round, early bottle gourd, light green |
| Harita (sponge, hybrid) | cylindrical, 9-12" long, light green, smooth |
| Italian | edible at young stage, 2-3 feet long, 4-5" diameter |
| Karela (bitter gourd) | dark green, 7" long, thick skin |
| Large Bottle | basically same as birdhouse |
| Large mix | mixture of large types such as birdhouse, snake, bottle, etc. |
| Luffa (angled, ridged) | eaten like okra at young stage; not best for sponges |
| Luffa, smooth short | tube-shaped, 6-8" long, 2-3" diameter |
| Luffa, smooth medium | tube-shaped, 10-12" long, 2-3" diameter |
| Luffa, smooth long | tube-shaped, 15-18" long, 2-3" diameter |
| Nest Egg Gourd | smooth, white, hard; similar in size and shape to ordinary eggs |
| Orange | round, smooth, bright orange; average 3" diameter |
| Pear Bicolor | pear-shaped, yellow upper half, green lower half |
| Shenot Crown or Thorns | thorn-like protuberances, round, various colors or striped |
| Small fancy mix | mixture of pear, nest egg, dipper, etc.; various colors and shapes |
| Small warted mix | mixture of color combinations and shapes, all warted |
| Spoon | curved, club-shaped, slender handle, solid or bicolor |
| Surekha (ridged hybrid) | thin-ridge gourds, 14" long; can eat raw like cucumber when young |
| Swan Gourd | necked fruit, wider near top; 14-18" long, 6-8" base (Goose gourd) |
| Turk's Turban | flattened (8-10" diameter), orange red, prominent turbans, striped |

### B.2.3 Climatic requirements

Pumpkins and gourds are produced in a similar fashion with similar requirements, since they are so closely related. Both are warm-season annuals whose vines and immature fruit are sensitive to frost and chilling injury. They require a sunny environment as well as a long growing season of 80 to 130 days.

### B.2.4 Planting and spacing

#### B.2.4.1 Pumpkins

Row width and spacing within the row can vary considerably depending on the type of equipment used, vining characteristics of the variety, and grower preference. Plant **populations** from 600 to 3,000 plants per acre are used for pumpkins. Bush type pumpkins may be planted in drills and thinned. Vining pumpkins should be planted in hills. Plant spacings and densities are shown in Table B.3.

**Table B.3 — Plant spacings and population densities for pumpkins**

| | Spacings/Populations | | |
|---|---|---|---|
| **Vine Type** | **In-row spacing** | **Between-row spacing** | **Population (plants/A)** |
| Bush | 3-5 plants/8 row feet | 5-8 feet | 2,000-3,000 |
| Semi-bush/vining | 2-3 plants/8 row feet | 8-feet | 1,500-2,000 |
| Vining | 2 plants/8 row feet | 8-12 feet | 1,000-1,200 |

The amount of seed required to plant an acre varies from 1 to 2 kg, depending on the size of the seeds, the planting distances and the type of seeder. Cover the seed to a depth of about 2.5 cm.

Slightly deeper planting may be required in light soils. Plant one or two seed per hill and thin pumpkins to the desired population when they are 10 to 15 cm tall. Direct seeded pumpkins are more vigorous and are seldom transplanted.

### B.2.4.2 Gourds

Row and hill spacing will also vary among gourd types, depending on the space required for particular varieties. Larger fruited gourds have 125-150 seed per 28 g while smaller-fruited gourds will have 300-400 seed per 28 g. The *Cucurbita sp.* vines will achieve a length of 3.6-4.5 m and hills should be spaced 1.3 m apart for larger types and 60 cm for smaller ones. *Lagenaria* vines can reach 6-10 m in length. Plant spacings for the various types are presented in Table B.4. Plant gourd seed approximately 2.5 cm deep.

**Table B.4 — Plant spacings and population densities for gourds**

| | Spacings/Populations | | |
|---|---|---|---|
| **Gourd Type** | **In-row spacing** | **Between-row spacing** | **Population (plants/A)** |
| *Cucurbita* | 2-4 feet | 6-8 feet | 1350-3500 |
| *Lagenaria* | 6-8 feet | 10-15 feet | 350-725 |
| *Luffa* | 12-18 inches | 6-8 feet | 3500-7000 |

### B.2.5 Trellising and pruning

Generally pumpkins are not trellised, but gourds can benefit from a well-constructed trellis. This can allow maximization of space by controlling vine growth as well as protecting the fruit from rot. Trellising also will allow production of fruit with more uniform shape and colour and will allow longer gourds to grow straight. The most common trellis is a single overhead wire supported every 3 m to 3.6 m with a strong post (such as a 4" x 4"). Posts should be set at least 60 m into the ground with at least 1.5 m to 1.8 m of post above ground. Vines can be trained to the trellis by tying a twine in a loose loop around the base of the plant when the plants are 30 cm to 45 cm tall. Tie the other end of the twine to the overhead wire. The vines can then be trained around the twine until they reach the wire. Secure the vines to the wire until tendrils develop to hold the vine in place. Gourds may also be grown on an arbour as long as it is no more than 1 m to 1.2 m wide.

Vines of *Lagenaria* and *Luffa sp.* can be pruned lightly to increase marketable yield per vine. The first flowers produced are generally male flowers. Appearance of female flowers is greatly influenced by weather conditions. Do not be concerned if the appearance of female flowers is delayed for several days after the first male flower appears. Most fruit are produced on the lateral branches, so pruning the main stem to encourage lateral branch growth is a good idea. For *Lagenaria* gourds, remove the end of the main stem when it reaches 3 m in length. The first three to four lateral vines can be removed on luffa gourds to increase yield. Do not prune gourds of the *Cucurbita* type. Pumpkins are generally not pruned.

### B.2.6 Pollination and seed

As with most cucurbits, gourds and pumpkins are monoecious, producing separate male and female flowers on the same plant. As a result they must have some pollinating agent present. It is a good idea to place one hive of bees for each acre of gourds or pumpkins to aid in pollination. Native bee populations are generally not prevalent enough to adequately pollinate a large planting. Avoid application of insecticides during the early and midday hours to prevent killing pollinating bees. Gourds and pumpkins require 7 to 10 bee visits per flower for complete pollination. Flowers generally only remain open for one day. Incomplete pollination produces poorly developed fruit that is often unmarketable, and reduces fruit set and thus yield. Flowers of hardshell gourds open in late afternoon and evening and require pollination by nocturnal insects. They can also be hand pollinated by using a small paintbrush to transfer pollen from the male to female flowers.

Some research has shown that in boron-deficient soils, fruit set may be enhanced by spraying 90 g pounds of boron per acre in weekly applications beginning at first bloom and continuing during flowering. Boron can be applied with regular fungicide and insecticide sprays.



Many growers prefer to save seed from the previous crop for the following year's planting. For open-pollinated varieties this can work well. However, do not attempt to save seed from hybrid varieties since the fruit produced from those likely will NOT resemble the fruit from which they were saved. Since both crops are cross-pollinated, they are subject to pollination by other related crops in the vicinity. Fruit will generally be true to type designated on the seed packet and cross-pollination with other varieties or types will not affect the fruit on the current year's crop. However, to maintain a true breeding stock, separate cross-pollinating varieties by at least 400 m. Not all varieties of pumpkins and gourds will cross pollinate with other pumpkins, gourds or squash. See Table B.5 for a reference of those varieties that are likely to cross pollinate with one another. Pumpkins and gourds will not cross pollinate with cucumbers, muskmelons or watermelons.

To save seed of non-hybrids, select mature fruit and separate seed from the pulp. Spread seed on paper or absorbent cloth until dry. Store seed in a cool dry place until time for planting. Gourd and pumpkin seed should be viable for 3-5 years when stored under proper conditions.

**Table B.5 — Cultigens of pumpkins and the cultigens of squash and gourds with which they will most readily cross ***

| Genus and Species | Gourds and Ornamentals** | Cultigen | | |
|---|---|---|---|---|
| | | **Summer squash** | **Winter squash** | **Pumpkin** |
| *Cucurbita pepo* | Apple | **Yellow Elongated Types** | **Acorn Types** | **Naked Seed** |
| | Bicolor | Butterbar | Acorn | Eat-All |
| | Bird Nest | Crookneck | Ebony | Lady Godiva |
| | Crown of Thorns | Eldorado | Table Ace | Triple Treat |
| | Miniature | Goldbar | Table King | |
| | Miniature Bottle | Golden Girl | Table Queen | Standard Type sold |
| | Orange | Golden Zucchini | | Big Tom |
| | Pear | Straightneck | **Novelty Types** | Cinderella |
| | Spoon | | Veg. Spaghetti | Connecticut Field |
| | Warted | **Flat-Shaped Types** | Veg. Gourd | Early Sweet Sugar |
| | Other Small Hard-Shelled Types | Green Tint | Edible Gourd | Funny Face |
| | | Pattie Pan | | Halloween |
| | | Scallopini | | Howden's Field |
| | | White Scallop | | Jack-O'Lantern |
| | | | | Jackpot |
| | | **Green Elongated Types** | Luxury | |
| | | Caserta | | Small Sugar |
| | | Cocozelle | | Spirit |
| | | Zucchini | | Sugar Pie |
| | | | | Tricky Jack |
| | | | | Young's Beauty |
| *Cucurbita moschata* | | | **Butternut Types** | **Standard Types** |
| | | | Butternut Hercules | Cheese |
| | | | Hybrid Butternut | Dickinson Field |
| | | | Patriot | Golden Cushaw |
| | | | Ponca | Kentucky Field |
| | | | Waltham | |
| *Cucurbita maxima* | Aladin | | Baby Blue Hubbard | **Standard Types** |
| | Turk's Turbin | | Banana | Big Max |
| | | | Boston Marrow | King of the Mammoths |
| | | | Buttercup | Mammoth Chili |
| | | | Delicious | Mammoth Prize |
| | | | Emerald | |
| | | | Gold Nugget | |
| | | | Golden Turban | |
| | | | Hubbard | |
| | | | Hybrid R | |
| | | | Kindred | |
| | | | Marblehead | |
| | | | Sweet Meat | |
| *Cucurbita argyrosperma* | | | | Green-Striped Cushaw |
| | | | | Japanese Pie |
| | | | | Tenn. Sweet Potato |
| | | | | White Cushaw |

*Cultigens within a species are most likely to cross-pollinate; interspecies cross-pollination is rare but can occur.

**Although listed as gourds and ornamentals, some of these are eaten, particularly Turk's Turbin.

Source: Adapted from Doty (1973) and Vandemark and Cutter (1978).

### B.3 Soils and fertility

#### B.3.1 Soils and location

Optimally, a site with well-drained, moderately fertile soil, free of problem weeds and nematodes is desired. Coarse to medium textured soils are best since neither pumpkins or gourds can tolerate wet or poorly aerated soils. A soil capable of retaining moisture (such as a medium textured soil) is best where rainfall is likely to be deficient. The site should be located in full sun and should have a pH between 6.0 and 6.5. If the soil test reveals a lower pH, dolomitic lime should be applied according to soil test results at least three months prior to crop establishment. Pumpkins can tolerate a soil pH as low as 5.5; avoid extremely acidic soils (<5.5pH).

Pumpkins or gourds should not be planted in rotation with other cucurbits or each other due to the potential for disease carryover. Do not grow either in rotation with peanuts, peppers, tomatoes or tobacco. Rotation with rye, wheat or other small grain crops is most ideal although other non-cucurbit crops are acceptable. Be careful not to plant pumpkins or gourds where herbicide carryover from a previous crop can be a problem.

#### B.3.2 Land preparation

Pumpkins have a large, deep root system. Pumpkin roots can penetrate in excess of 1.2 m into the soil. Pumpkin plants, however, will get most of their water and nutrients from the upper rooting zone where there is a larger concentration of roots.

Deep turn soil (20-25 cm) to bury residual litter. Then smooth the seedbed with a rototiller or tooth harrow rather than a disc harrow. Prevent compaction in the bed area by establishing a traffic pattern with the tractor during the smoothing operation. "Ripping and hipping" is an alternative method of land preparation which should be adequate.

#### B.3.3 Fertilization

Base all pumpkin and gourd fertilization programs on soil test results. Additional N may be needed if leaching rains occur. Phosphorus (P) and potassium (K) rates should be based on soil test results.

### B.4 Pumpkin and gourd diseases

Pumpkins and gourds are subject to attack by many diseases which cause serious losses. Both crops share several common diseases due to the fact that pumpkins and gourds are closely related. A clear understanding of the diseases and the strategies used to manage them is necessary for profitable pumpkin and gourd production. Each disease affecting these crops will be discussed.

#### B.4.1 Diseases caused by fungi

Diseases caused by fungi are the most damaging to most crops including cucurbits. Fungal inoculum (spores, hyphae, sclerotia, etc.) may be spread by wind, rain, infected plants and seed, and infested soil carried on machinery. As with most plant diseases, prevention is the key to disease management.

##### B.4.1.1 Alternaria leaf spot

Alternaria Leaf Spot is caused by *Alternaria* spp. and can cause serious damage under extended periods of wet weather.

***Symptoms***: The disease causes tiny brown spots on the leaves which enlarge causing a target spot with concentric rings. Older lesions will develop a dark colour in the concentric pattern. The dark colour is caused by spore production which can cause new infection sites if no protective measures are followed.

***Disease Management***: Most fungicides used in disease management will suppress *Alternaria* leaf spot, however, chlorothalonil containing products are generally the most effective. There are no resistant cultivars available.



### B.4.1.2 Anthracnose

Anthracnose, caused by the fungus *Colletotrichum lagenarium*, attacks all above ground parts of the cucurbit plant. The fungus attack may reach epidemic proportions when rainfall is above average and temperatures are between 21 and 27 °C.

***Symptoms**:* The first symptom of anthracnose is observed on the oldest leaves as round, reddish-brown spots. The centres of some spots fall out, giving the leaf a "shot-hole" appearance. Often the leaves at the centre of the plant are killed first, leaving the crown of the plant bare. Light-brown to black, elongated streaks develop on stems and petioles. Round, sunken lesions may appear on the fruit. These lesions are first water-soaked and then turn a dark green to brown. The pinkish ooze often noticed in the centre of the lesion is a mass of spores of the fungus.

***Disease Management**:* A one-year rotation and deep turning infected debris immediately after harvest are effective cultural practices for reducing inoculum levels in subsequent crops. Using disease-free seed produced from areas not known to have anthracnose is an essential disease prevention measure. There are several protectant fungicide options available as may be advised by experts.

### B.4.1.3 Gummy stem blight

Gummy stem blight, caused by *Didymella bryoniae,* attacks only the leaves and stems of cucurbits and is one of the most destructive diseases of cucurbits. This disease is driven by cool moist periods, especially extended periods of leaf wetness. Gummy stem blight fungus can easily be brought into a new area on or in the seed. Once the disease becomes established, it produces millions of sticky spores. These spores are spread over the field as man, animals and machines move through wet vines.

***Symptoms**:* It is noticeable when an individual runner or an apparently healthy plant suddenly dies. Vine cankers are most common near the crown of the plant. This disease is usually identified by finding elongated, water-soaked areas on the stems of cucurbits. These areas become light-brown cracks in the vine and usually produce a gummy ooze. On the older leaves this disease may produce brown to black spots. It spreads from the centre of the hill outward, as does anthracnose and downy mildew.

***Disease Management**:* Choosing high quality, disease free seed and transplants should be the first line of defense in preventing losses to gummy stem blight. A two-year rotation to crops other than cucurbits is another appropriate disease management tool. Protective fungicide sprays can offer the most effective disease suppression if applied in a timely manner.

### B.4.1.4 Target spot

Target spot, caused by the fungus *Corynespora cassiicola*, can defoliate and destroy an entire crop if left unchecked. It occurs very sporadically and can be confused with downy mildew and other leaf spotting diseases.

***Symptoms**:* Target spot begins on leaves as yellow leaf flecks which later become angular with a definite outline. Later spots become circular with light brown centers surrounded by dark brown margins. Lesions coalesce to produce large dead areas with dead and shedding leaves.

***Disease Management:*** Most protectant fungicides used to control other foliar pathogens will suppress target spot. Destroying infected debris or sanitizing greenhouse areas will greatly aid in reducing the spread of disease.

### B.4.1.5 Belly rot

The two fungi primarily responsible for belly rot are *Pythium* (also called "cottony leak") and *Rhizoctonia*. Belly rot can occur on fruit at any stage of growth, however, it is most noticeable when cucurbits are mature.

***Symptoms**:* Symptoms may vary from small, yellow sunken areas to large rotted spots on the undersides of fruit. *Pythium* causes a water-soaked lesion which develops into a watery soft rot. White, cottony mycelium is also generally associated with *Pythium* lesions. *Rhizoctonia* belly rot typically appears as dry, sunken cracks on the underside of cucurbit fruit.

***Disease Management:*** Rotation and deep turning are cultural practices that can reduce the amount of disease inoculum near the soil surface. Practices which ensure good drainage can also reduce losses to these fungi. Systemic fungicides such as Ridomil Gold may aid in suppression of *Pythium,* while fungicides have proven to be inconsistent in dealing with *Rhizoctonia* belly rot.

**B.4.1.6 Crown rot**

Crown rot is caused by the fungus *Phytophthora capsici* and may cause serious damage once established. The fungus infects all above ground plant parts of cucurbits.

***Symptoms**:* Symptoms on cucurbits appear as constricted, water-soaked lesions near the base of stems that are close to the soil. Infected fruit may have circular, sunken, water-soaked lesions which may contain pasty or powdery sporulation of the fungus.

***Disease Management**:* Rotation with a non-susceptible crop has been highly effective in disease prevention. It is not advisable to plant a susceptible crop in an infested field for two years. Measures that ensure good field drainage such as using crowned beds, subsoiling and avoiding over-irrigation will lessen the severity of disease. Preventive applications of some fungicides have shown some promise.

**B.4.1.7 Mildews**

Mildews are common in commercial cucurbit plantings and cause growers to spray on a regular basis. This practice alone will result in increased yields and a higher percentage of marketable fruit. There are two distinct mildew diseases, each favoured by a different weather pattern and each requiring different materials for control. Unfortunately, there is considerable overlap in the symptoms and occurrence of these diseases.

**B.4.1.8 Powdery mildew**

Powdery mildew, caused by the fungi *Sphaerotheca fuliginea* and *Erysiphe cichoracearum*, is much more widespread on cucurbits than downy mildew, especially during dry hot periods.

***Symptoms**:* This disease is characterized by a white or brownish, mealy growth found on the upper and lower sides of the leaves and young stems. If plants are severely attacked, the leaves and young stems may wither and die. In less severe cases, the plant may be weakened or stunted. Early defoliation resulting from the disease may cause premature ripening or sun scald.

***Disease management**:* The use of preventive fungicide applications is the most effective means of suppressing powdery mildew. However, some pumpkin varieties have been released which demonstrate tolerance to this disease. Fungicides used in conjunction with tolerant varieties offers the most complete disease management program for powdery mildew on cucurbits.

**B.4.1.9 Downy mildew**

Downy mildew, caused by the fungus *Pseudo-peronospora cubensis*, is an airborne fungus that causes considerable damage during wet, cool weather.

***Symptoms**:* This disease produces irregular to angular, yellow to brownish areas on the upper side of diseased leaves. The underside of the leaves may show a pale, greyish-purple mould following damp weather. The mould may vary from white to nearly black in colour. The diseased spots may enlarge rapidly during warm, moist weather, causing the leaves to wither and die. This damage may resemble frost injury since the entire vine is killed. The fruit from diseased plants is usually small and of poor quality.



***Disease Management**:* Follow the same spray program recommended for Alternaria Leaf Spot control. Fungicides containing mefenoxam are the most effective for suppressing downy mildew. However, fungal insensitivity to these fungicides has been observed and switching to chlorothalonil products has been recommended when this problem is observed.

### B.4.2 Diseases caused by bacteria

#### B.4.2.1 Angular leaf spot

Angular Leaf Spot, a bacterial disease caused by *Pseudomonas lachrymans*, attacks gourd and pumpkin leaves, stems and fruit. The bacterium which causes angular leaf spot overwinters on old plant debris and in seed. Rains splash it from the soil to the stems, leaves and later to the fruit. Once infection takes place, the organism is spread over the field on the hands of workers or by cucumber beetles. Angular leaf spot is most severe during extended rainy periods when temperatures are between 21 to 27 °C.

***Symptoms**:* Spots on the foliage are straw-coloured to light brown and angular shaped. Affected areas are first water-soaked, then gradually dry and split. After the diseased tissue splits open, portions of it tear out, leaving irregular shaped holes in the leaves. Small, circular spots develop on the fruit. These diseased areas later crack open and turn white.

***Disease management**:* The primary disease prevention tool is to use disease free seed. A 2-year rotation behind crops other than cucurbits and cultivating the soil when it is dry will decrease the ability of the bacterium to survive to infect upcoming cucurbit crops. During warm, moist periods when disease development is favourable, copper sprays may reduce the spread of the disease.

#### B.4.2.2 Fruit blotch

Fruit blotch of pumpkin caused by *Acidovorax avenae* subsp. *citrulli* is a new disease of pumpkin which can cause serious losses. It is unknown how this disease is spread but it is thought to be seedborne as watermelon fruit blotch was found to be.

***Symptoms**:* A foliar symptom associated with this disease is the appearance of a V-shaped, necrotic lesion beginning around the margin of the leaf and extends inward toward the mid-rib, which is similar in appearance to the Black-Rot disease of crucifers. Symptoms on the surface of fruit occur as round, necrotic spots or cracks a few millimeters in diameter. With age, the tissue surround-ing these lesions may become soft and appear wrinkled. A soft rot expands into the flesh of the pumpkin origi-nating from the lesions observed on the surface. In time, infected pumpkins will totally collapse.

***Disease Management**:* Using disease free seed and transplants is the best strategy for preventing losses to this disease. The use of copper sprays may help reduce the spread of disease once fruit blotch has been identified in the field.

#### B.4.2.3 Nematodes

Nematodes are small, slender, microscopic round worms that live in the soil. The root-knot nematode is the most common type attacking cucurbits. If not controlled, this pest can severely damage cucurbit crops, especially on light, sandy-textured soils.

***Symptoms*:** Root-knot nematodes enter young cucurbit feeder roots during their common feeding process, causing the roots to swell. The most common below-ground symptom is the formation of galls or knots on the roots. Because nematode injury interferes with the uptake of water and nutrients, the top portion of the plant can have an appearance which resembles a lack of moisture or a fertilizer deficiency. Stunted, yellow, irregular growth of plants in the field and rapid decline are also above-ground symptoms of nematode injury.

***Control*:** Rotating cucurbits with a grass crop, such as rye or corn, is somewhat beneficial in managing root-knot nematodes, but this practice is no substitute for soil fumigation. In the light soils of where root-knot nematodes are widespread, the use of soil fumigants is essential in most fields for

maximum yields. Fumigant nematicides are most effective against nematodes and must be applied three weeks before planting.

### B.4.3 Virus diseases

#### B.4.3.1 Mosaic

This disease is caused by one or more of four major viruses. These are Cucumber Mosaic Virus (CMV), Papaya Ringspot Virus (PRSV), Watermelon Mosaic Virus 2 (WMV-2), and Zucchini Yellow Mosaic Virus (ZYMV). Gourds and pumpkins may be affected by one or a combination of these viruses. All of these viruses are transmitted by aphids in a non-persistent manner. Aphids must acquire the virus from a host reservoir and are capable of transmitting it for 10-15 minutes in most cases.

***Symptoms**:* Symptoms of virus disease are mottling, strapping, and vein distortion. One virus may cause mild symptoms while additional viruses in the same plant cause much more dramatic symptoms. In some cases the symptoms may appear to be phytotoxic chemical damage. Fruit from infected plants may be discolored or have raised bumps or mottles.

***Disease Management**:* Stylet oil sprayed on a 2 to 3 day schedule has been shown to delay the spread of virus, particularly in the fall. Virus diseases are much worse in the late summer and fall because the aphid populations are much higher and virus carrying hosts plants are more available which result in more virus carrying aphids. Cleaning up field borders can help reduce populations. The use of reflective mulches is expensive, but has been shown to reduce infection. Yield losses are directly related to time of infection. The later the infection occurs, the less damage observed.

### B.5 Insect management

Pumpkin and gourds are subject to attack by a variety of insect pests. These attacks do not always cause economic injury, so certain insect management practices can be used to ensure cost-effective control decisions. Indiscriminate use of insecticides often creates more favourable conditions for harder-to-control insect pests, increasing production cost.

Insects cause injury to the leaves, stems, roots and fruit. The developmental stage of the plant at the time of attack often governs what plant part may be injured by different insect pests. However, some insects feed specifically on one plant structure while others may feed on several structures.

Certain cultural practices may have a dramatic effect on the potential for economic injury by certain insects. Planting during optimum growing conditions insures rapid seedling emergence and subsequent growth. This reduces the amount of time that plants are susceptible to injury from seedling insect pests.

Pumpkin and gourd are long-season crops when compared to other members of the cucurbit family. This means longer exposure to insects pests. Most insect problems can be treated as needed if detected early, but no one insecticide will adequately control all the insects that may attack pumpkins and gourds. Scouting for insects is the most efficient way to determine what problems may exist and what action should be taken. Preventive treatments may be needed for certain insect pests. Preventive treatments are used against insects that are certain to cause economic injury if they are present. Preventive treatment decisions are influenced by field history, harvest dates and insect pressure in nearby production areas.

#### B.5.1 Root maggot

The seedcorn maggot, *Hylemya platura*, attacks roots. The seedcorn maggot adult is a fly similar to the housefly, only smaller. It has many bristles on the body. The larvae or maggot is creamy white, 6.4 mm long at maturity and legless. The body tapers sharply from rear to head.

The maggot is the damaging stage. Root maggots tunnel in the seeds or the roots and stems of seedlings. Seeds usually succumb to secondary rot organisms and fail to germinate following attacks.



Seedlings often wilt and die from lack of water uptake. Seedlings that survive are weakened and more susceptible to other problems.

Cool conditions favour the development of root maggot infestations. Egg-laying adults are attracted to soils with high organic matter.

Several practices may be used to help control maggots. Previous crop litter and weeds should be turned deeply several weeks prior to planting so there is adequate time for decomposing. Plant during optimum conditions for rapid germination and seedling growth. Early plantings should be preceded by incorporation of a recommended soil insecticide. Plants should be maintained stress free until they are beyond the seedling stage. (Figure B.1)

**Figure B.1 — Root maggots**

### B.5.2 Wireworms and whitefringed beetle larvae

Wireworms, mostly *Conoderus* spp., and whitefringed (WFB) beetle larvae, *Graphognathus* spp., can reduce stands dramatically if present in even moderate numbers (one per square yard). Wireworms are less likely to affect early planting because they are relatively inactive during the early spring.

The WFB adults (weevils) do not cause any economic damage. Larvae are creamy white and legless. They grow to about 12.7 mm long and are C-shaped grubs. The mouthparts are dark brown, pincher-like structures that are highly visible. The head capsule is slightly recessed and blends so well with the rest of the body that it appears headless.

Whitefringed beetle larvae are active in warm weather. Presently, no effective insecticides are labelled for control of this insect. If WFB larvae are found (one per square yard) during land preparation, do not plant in that field. (Figure B.2)

**Figure B.2 — Wireworm (left), whitefringed beetle larvae (right)**

### B.5.2 Cucumber beetles

Several species of cucumber beetles may attack pumpkins and gourds. The spotted cucumber beetle, *Diabrotica undecimpunctata*, and the striped cucumber beetle, *Acalymma vittata* are common. The banded cucumber beetle, *Diabrotica balteata*, is occasionally found.

Cucumber beetles are sometimes mistaken for lady beetles which are beneficial predators. Cucumber beetles are more oblong than lady beetles, which are nearly hemispherical. The spotted cucumber beetle adult is about 6.4 mm long with 11 black spots on its yellowish-green to yellow wing covers. The banded cucumber beetle is slightly smaller than the spotted cucumber beetle. The banded cucumber beetle is yellow with three black stripes on the back.

The larvae of the different cucumber beetles are very similar and live underground. Larvae are creamy, yellowish-white, soft-bodied worms with three pairs of inconspicuous legs. Mature larvae of the spotted cucumber beetle may be from 12.7 to 19 mm long. The striped cucumber beetle larvae are slightly smaller. Both larvae have a dark brown head and a dark brown plate on the last body segment.

Beetles and larvae may damage pumpkin and gourds. The beetles have been responsible for most economic damage. Beetles feed on the stems, foliage and flowers of the plant. Beetles feed on the stems until the plants become less attractive due to hardening, after which more foliage damage will be apparent. Feeding begins on the undersides of the cotyledons or true leaves. If beetle populations are high during the seedling stage, stand reductions can occur.

Larvae may feed on all underground plant parts and usually cause insignificant amounts of damage. Occasionally, larvae cause direct damage to the fruit. This is more likely to occur during excessive moisture conditions when the larvae feed on that portion of the fruit in direct contact with the soil surface. The damage consists of small trail-like canals eaten out on the surface of the fruit. The most severe consequence of larval damage is the introduction of secondary disease organisms.

Cucumber beetles can be controlled with foliar applications of insecticides when 10 percent or more of the seedlings are infested. The natural feeding behaviour of cucumber beetles leads to their avoidance of insecticidal sprays, so thorough spray coverage is imperative. The most cost-effective application method is to band over-the-top and direct sprays towards the base of the plant. There are no recommendations for control of the larvae. (Figure B.3)

**Figure B.3 — From left: spotted cucumber beetle, striped cucumber beetle and stem damage, cucumber beetles and foliage damage**

### B.5.3 Aphids

The melon aphid, *Aphis gossypii*, and the green peach aphid, *Myzus persicae* are are soft-bodied, oblong insects that rarely exceed 2.4 mm long. Adults may be winged or wingless, most often wingless. Aphids have two exhaustpipe-like structures called *cornicles* located on the rear of the abdomen. Immature aphids are wingless and look like the adults, only smaller.

Aphids are slow moving insects that live in colonies on the undersides of leaves. Aphids feed on the leaves with their piercing-sucking mouthparts. As they remove plant sap the leaves curl downward, giving them a puckered appearance. Heavy populations cause plants to yellow and wilt. Aphids secrete a substance known as honeydew that collects on the surface of the lower leaves. Under favourable conditions the honeydew provides the sustenance for the growth of sooty mould, a fungus that blackens the leaf surface. This reduces photosynthesis, thereby, reducing quality and/or yield.

The greatest damage caused by aphids is indirect. Aphids vector several viruses that can reduce fruit quality. For this reason, aphid populations should be kept to a minimum. Winged aphids are the primary vectors of such diseases and should be monitored until pumpkin or gourds are full size.

Several insecticides are effective on light to moderate populations of aphids. If winged aphids are easily found (10 percent of plants infested), treatment is warranted. Thorough coverage is essential since aphids live on the underside of leaves. (Figure B.4)

**Figure 4 — Colony of aphids**

### B.5.4 Thrips

Several species of thrips may inhabit pumpkin and gourd fields, but they are not very well understood as a pest. Thrips are very small, spindle shaped insects 2.5 mm or less long. Immature thrips are wingless while the adults have wings with hair-like fringe.

The thrips that cause early foliage damage are often different from those present during the period of heavy fruit set in spring plantings. The most noticeable damage is to the foliage. Narrow bronze lesions appear on the leaf surface. The entire field may have silvery appearance from heavy feeding. This damage is caused by the thrips rasping the leaf surface prior to its expansion. The most severe damage occurs during the periods of slow growth. Damage is quickly outgrown during periods of rapid growth, and usually no treatment is required.

The western flower thrips (WFT), *Frankliniella occidentalis*, is the species most common during rapid fruit set. WFT is a large species two to three times larger than the common onion and tobacco thrips often found infesting early plantings. It is not well known if WFT or any other species causes any significant damage to pumpkin or gourd. Thrips mechanically damage plants during the feeding process. If thrips fed on pre-pollinated fruit, the damage would not be noticeable until the fruit were larger. Physical damage of this type would appear as catfacing, light russeting or other deformities on the surface of the fruit.

Thrips can be controlled with foliar insecticide applications. There are no treatment thresholds developed for thrips. As a rule-of-thumb, treatments are not generally necessary if thrips are damaging only the foliage. Treatments for thrips during early fruit development may be initiated when a majority of the blooms are found infested with large numbers of thrips, 75 or more per bloom, however, treatments are rarely justified. (Figure B.5)

**Figure B.5 — Thrips damage, seedling (left); thrips damage, mature leaf (right)**

### B.5.5 Cutworms

The granulate cutworm, *Feltia subterranea*, is the larvae of a nondescript moth. Larvae are greasy looking caterpillars that may be 38 to 45 mm long at maturity. Young larvae may be pinkish-gray while older larvae are usually dingy gray. There is a series of chevron-shaped markings along the back that are a slightly lighter gray than the body.

Cutworms feed at night and remain inactive during the day, either on the soil surface, or below ground. Cutworms may attack all plant parts, but the most severe damage occurs when they feed on young seedlings or developing fruit. Cutworms damage young plants by chewing on the stem slightly above or below ground. Stand reductions may occur. Damage to the fruit is often confined to the fruit surface. Cutworm feeding results in trails or patches of tan to russet callus tissue.

Cutworms can be difficult to control, but understanding their behavior can help. Cutworms pass the winter months in the larval stage. This means that the larvae may be present at the time of planting. In these cases stand reductions will be likely. Inspect fields during land preparation and just prior to and during the planting operation. If cutworms are found, treatments should be made either by incorporation of a soil insecticide or a directed spray if plants are already present. Foliar sprays should be made as late in the day as possible to coincide with the greatest larval activity. (Figure B.6)



**Figure B.6 — Cutworms**

### B.5.6 Pickleworm and Melonworm

The pickleworm, *Diaphania nitidalis*, and melonworm, *D. hyalinata* are migratory insects. Pumpkins are more preferred than gourd. Pickleworms bore and tunnel into the fruit and are more serious than the melonworm which feeds mainly on the foliage. Preventive sprays should be made if they are observed in the field or infestations are known to be in the other production areas. (Figure B.7)

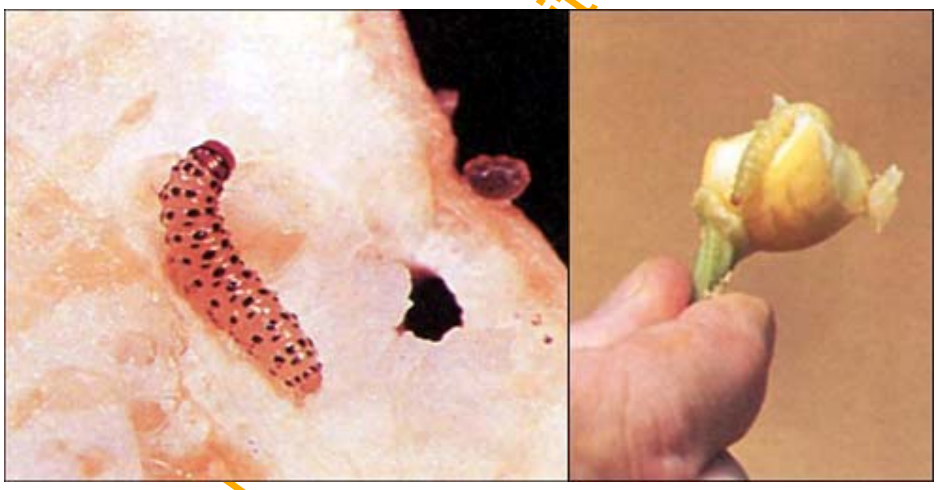


**Figure B.7 — Pickleworm, young larva (left); pickleworm, mature larva (right)**

### B.5.7 Miscellaneous insect pests

Some insects are occasional pests when other hosts are not available, populations are very high or environmental conditions are just right for rapid development. Flea beetles, spider mites, leaf miners, stink bugs, leaf hoppers, squash bugs, whiteflies and grasshoppers are just a few. These problems can be addressed on a case-by-case basis.

### B.5.8 Honey bees

Honey bees are necessary to ensure adequate pollination, and since most insecticides are toxic to honey bees, follow these practices to prevent bee kills. Honey bees may be active from dawn to dusk. Make insecticide applications late in the day, after sunset if possible, after bee activity has ceased. If it is necessary to spray large acreages during the day, remove hives from the field on the preceding day. If these precautions are followed, bee kills will be kept to a minimum. Once dried on the leaf surface, the toxic effects of most insecticides are dramatically reduced.

### B.6 Weed control in pumpkins and gourds

As with any vegetable crop, successful weed management is vital to the production of quality pumpkins and gourds. Weeds compete with the crop for light, space, nutrients and water. Excessive weed growth can contribute to disease problems, hinder disease and insect management and harbor insect and disease pests. Weeds can also interfere with harvest efficiency, reducing the quantity of marketable fruit and increasing labour costs. Pumpkins and gourds as with most crops, require early season weed control to ensure a quality crop. In addition, the vining habit of these crops makes weed control difficult once the vines begin to run.

#### B.6.1 Factors affecting weed control

Since chemical weed control materials are limited, the most important factor to consider when growing pumpkins and gourds is site or field selection. Fields with heavy infestations of hard-to-control species should be avoided. In addition, perennial weeds, such as nutsedge or bermudagrass, can cause problems since they can be extremely hard to control. With perennial weeds such as these, frequent discing or mechanical disturbance prior to planting may reduce the severity of these species. Non-selective herbicides may also be used to reduce perennial weed infestations. Crop rotation can be used to control weeds which can be managed in alternate crops. Weed identification is essential particularly at the seedling stage. Seedling weeds are generally easier to control and in many cases control can only be obtained at the seedling stage. Another important factor is crop vigour. Generally, an aggressive, healthy crop will out-compete and exclude many weeds. Proper fertilization, irrigation, disease, nematode and insect management will promote crop growth and aid in weed suppression.

#### B.6.2 Methods of weed control

There are limited methods of weed control for pumpkins and gourds. Selection of the method best suited for an individual grower will depend on several factors including: weed species, crop variety, stage of crop and/or weed development, and labour costs and availability.

#### B.6.3 Hand weeding

Hand weeding provides very effective weed control and is very safe to the crop and the environment. Weeding should be performed when the crop and weeds are small to reduce crop damage and allow the use of hoeing. Removal of large weeds with extensive root systems may damage crop roots or vines.

#### B.6.4 Mechanical control

Mechanical cultivation provides very effective weed control but is limited to small weeds that can be easily uprooted or covered. More importantly, mechanical cultivation should not be performed once the plants have begun to vine. These vines are very tender and are easily damaged by tractor wheels or cultivators. Mechanical control must be supplemented with chemical or hand weeding to remove those weeds in the rows or those that persist after the plants produce vines. Planting pumpkins at equidistant spacing (same in-row and between-row spacing) allows cultivation from any direction until the vines begin to run.

#### B.6.5 Chemical weed control

Chemical weed control is currently limited to herbicides recommended for each produce.

#### B.6.6 Stale seedbed control

The stale seedbed technique is an effective method of control. Weed control using this strategy involves chemical weed control of emerged weeds prior to crop emergence. A non-selective, contact material is primarily used. The stale seedbed method is often used in conjunction with a pre-plant incorporated herbicide treatment. If the crop is transplanted this method may be used to kill emerged



weeds before transplanting. On direct-seeded plantings, apply the herbicide to those weeds that have emerged after planting, but before the crop has emerged.

### B.6.7 Fumigation

Fumigation with some materials will provide substantial weed control but is expensive and must be performed by trained personnel. To ensure proper fumigation the soil is covered with a non-porous material such as plastic. The fumigant is placed under the plastic and the edges are sealed with soil. The length of time required before removal of the cover varies with fumigant. After this time, the cover can be removed or holes can be punched into the cover. Allow the soil to air out for 7 to 10 days before planting to avoid crop injury. Most small-seeded broadleaves and grasses will be controlled, but many larger seeds and nutsedge tubers will not. Unless fumigation is utilized for disease or nematode control, this method is generally impractical for weed control.

### B.6.8 Plastic mulch

Plastic mulch is a very effective method of weed control. Black or non-light transmitting plastic is preferred, eliminating light required for weed germin-ation and growth. This will eliminate most weeds except nutsedge. The tightly folded and pointed leaves of this species will penetrate the plastic and emerge. Plastic is used to cover the plant beds and should be tight-fitting and sealed along the edges to prevent wind disturbance. Once covered, a small hole is made in the plastic and the transplant or seeds inserted. The smallest hole possible is advantageous to eliminate weed emergence from the hole. Those areas between the beds should be treated with only a herbicide registered for the crop, since the crop roots may extend into the row middles and contact the treated soil.

## B.7 Harvesting, curing and storing pumpkins and gourds

Pumpkins and gourds are harvested at full maturity. This means a growing season of 90 to 120 days will be required. The actual amount of time to produce the crop will vary based on selected gourd or pumpkin variety grown as well as the time of year. Pumpkins are fully mature when they resist penetration with your thumbnail or when they will not scratch easily when you drag your fingernail across the outer surface. Don't try this with gourds since breaks or dents in the surface of immature gourds can destroy quality. The fruit surface can be quite hard at maturity and often turns from a shiny to a dull appearance. In gourds, the stem attached to the fruit should be completely dry. Senescing vines are also an indication of ripeness. When harvesting leave a few inches of dry stem attached to each fruit. Never pick up freshly harvested fruit by this stem since it may separate from the fruit.

Since there are several different genera and species that are considered either pumpkins or gourds, the time of harvest varies slightly. *Cucurbita* gourds should be harvested when fully mature.

Fruit colour can aid in harvest decisions. Many pumpkins and gourds have characteristic colours at maturity. For example, many pumpkin varieties will have a bright orange colour at maturity, but, depending on the variety, colour can range from green, white, or red to brown.

*Lagenaria*, or bottle gourds, are harvested at full maturity. The fruit of this genus will lose weight at maturity turning from green to brown. It is recommended that these gourds be grown on trellises to aid drying. It is preferable to leave these on the vine until the vine has died. Properly handled fruit of this genus will last for many years.

*Luffa* gourds should be harvested when brown and completely dry. Since these gourds are harvested for their dry sponge-like interiors it is recommended that they be grown on trellises to aid fruit drying. Gourds grown for ornamental purposes should be harvested as soon as maturity is reached. The bright colours in these gourds can fade if left in the sun for too long. However, gourds picked green will not colour. Most cured ornamental gourds will only last for one season.

When harvested, gourds should be washed in a non-bleaching disinfectant (such as vinegar) and wiped dry. Wiping with a vinegar-dampened cloth may be sufficient if they are only slightly dirty. If excessive dirt is present, wash in warm, soapy water and rinse with clean water; then dry with a soft cloth.

In handling gourds and pumpkins take care to avoid rough handling. Avoid excessive cuts and bruises on fruit, since this can be an entry point for decay organ-isms. At relatively high temperatures (29.4 °C) and humidity (85%), small cuts will suberize, or heal over, and fruit may then be placed in dry storage. Instruct harvesting personnel to cut fruit from the vine with a sharp knife or snips and use patience in handling and loading. Line trailers and bins used in harvesting with a soft material (straw, padding, etc.) that will help prevent bruising injury. Fruit should not be stacked so high as to cause damage to fruit on the bottom of the stack.

**Curing and storage**

Pumpkins and gourds do not generally store well and should be harvested as close to shipping as possible. Pumpkins and gourds should be well matured and free from injury and decay when placed in storage. They should be kept dry, and storage areas should have good air circulation. Curing at 80 to 85 degrees F and 80 to 85 percent relative humidity before storage is recommended for pumpkins and gourds. This period should be for 10-20 days for pumpkins, 7 to 10 days for thin-shelled gourds, and two to three weeks for fleshy gourds. Large bottle gourds can take up to six months to cure. Gourds are often placed in open wooden crates or spread on slotted shelves for curing, enabling air circulation to continue. Gourds can also be placed in mesh bags and suspended in a well-ventilated, dry area.

After curing, store pumpkins at 50-55 degrees F and 50-70 percent relative humidity. Pumpkins stored in this manner may keep two to three months. Storage temperatures above 60 degrees F maintain respiration rates at excessive levels and result in loss of weight and moisture, which reduces quality. Pumpkins and gourds stored below 50 degrees F are subject to chilling injury, which can cause rotting. Pumpkins are stored best in single layers to reduce rot and decay and encourage air circulation. Store gourds in a dry, dark place. They should never be stored in damp or unventilated places. Storage temperatures of 50-60 degrees F and relative humidity of 70-75 % are ideal for gourds.

Thin-shelled gourds are fully cured when you can hear the seeds rattling inside. They can then be carved and a coat of paint or varnish can be applied. Decorative gourds can benefit from a protective coating of paste wax and a soft buffing. This can increase their shelf life by four to six months.

For bulk sales, pumpkins are usually shipped in large bulk boxes or in bulk trucks.

## 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<br><br>No. ……..<br><br>(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.<br>☐ Internal<br>☐ Import<br>☐ Export | |
| 8. Packages (number and type) | 9. Type of product (variety if the standards specifies) | 10. Quality Class / 11. Total net weight in kg |

12. The consignment referred to above conforms, at the time of issue, with the Community standards in force, vide:

CD/K/101:2010, *Fresh ivy gourds — Specification and grading*

Customs office foreseen …….. Place and date of issue ……

Valid until (date): ……

Signatory (name in block letters): ……..

Signature Seal of competent authority

13. Observations:

([1]) Where the goods are being re-exported, indicate the origin in box 9.

# Annex E
(informative)

## Edible gourd — 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 | Cod | EU |
|---|---|---|---|
| **2,4-D** | --- | --- | --- |
| | | | |
| | **US *1*** | **Cod** | **EU** |
| **Abamectin** | 0.005 | | --- |
| | 1. United States does not maintain a specific MRL for the Abamectin/Gourd, Edible combination, but does maintain an MRL of 0.005 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *2*** | **Cod** | **EU** |
| **Acetamiprid** | 0.5 | --- | --- |
| | 2. United States does not maintain a specific MRL for the Acetamiprid/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *3*** | **Cod** | **EU** |
| **Acibenzolar-S-methyl** | 2 | --- | --- |
| | 3. United States does not maintain a specific MRL for the Acibenzolar-S-methyl /Gourd, Edible combination, but does maintain an MRL of 2 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *4*** | **Cod** | **EU** |
| **Bensulide** | 0.15 | --- | --- |
| | 4. United States does not maintain a specific MRL for the Bensulide/Gourd, Edible combination, but does maintain an MRL of 0.15 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *5*** | **Cod** | **EU** |
| **Beta-cyfluthrin** | 0.1 | --- | --- |
| | 5. United States does not maintain a specific MRL for the Beta-cyfluthrin/Gourd, Edible combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US** | **Cod *6*** | **EU** |
| **Bifenazate** | 0.75 | *{0.5}* | --- |
| | 6. Codex does not maintain a specific MRL for the Bifenazate/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Fruiting vegetables, Cucurbits" group. | | |
| | | | |
| | **US *7*** | **Cod** | **EU** |
| **Bifenthrin** | 0.4 | --- | --- |
| | 7. United States does not maintain a specific MRL for the Bifenthrin/Gourd, Edible combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *8*** | **Cod** | **EU** |
| **Boscalid** | 1.6 | --- | --- |
| | 8. United States does not maintain a specific MRL for the Boscalid/Gourd, Edible combination, but does maintain an MRL of 1.6 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *9*** | **Cod** | **EU** |
| **Buprofezin** | 0.5 | --- | --- |
| | 9. United States does not maintain a specific MRL for the Buprofezin/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |

| | | | |
|---|---|---|---|
| | **US *10*** | **Cod** | **EU** |
| **Captan** | 0.05 | --- | --- |
| | 10. United States does not maintain a specific MRL for the Captan/Gourd, Edible combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *11*** | **Cod** | **EU** |
| **Carbaryl** | 3 | --- | --- |
| | 11. United States does not maintain a specific MRL for the Carbaryl/Gourd, Edible combination, but does maintain an MRL of 3 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *12*** | **Cod** | **EU** |
| **Carfentrazone-ethyl** | 0.1 | --- | --- |
| | 12. United States does not maintain a specific MRL for the Carfentrazone-ethyl/Gourd, Edible combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *13*** | **Cod** | **EU** |
| **Chlorantraniliprole** | 0.25 | --- | --- |
| | 13. United States does not maintain a specific MRL for the Chlorantraniliprole/Gourd, Edible combination, but does maintain an MRL of 0.25 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *14*** | **Cod** | **EU** |
| **Chlorothalonil** | 5 | --- | --- |
| | 14. United States does not maintain a specific MRL for the Chlorothalonil/Gourd, Edible combination, but does maintain an MRL of 5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US** | **Cod** | **EU** |
| **Clethodim** | 0.5 | --- | --- |
| | | | |
| | **US *15*** | **Cod** | **EU** |
| **Clomazone** | 0.05 | --- | --- |
| | 15. United States does not maintain a specific MRL for the Clomazone/Gourd, Edible combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US** | **Cod** | **EU** |
| **Cyazofamid** | 0.1 | --- | --- |
| | | | |
| | **US *16*** | **Cod** | **EU** |
| **Cyfluthrin** | 0.1 | --- | --- |
| | 16. United States does not maintain a specific MRL for the Cyfluthrin/Gourd, Edible combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *17*** | **Cod** | **EU** |
| **Cymoxanil** | 0.05 | --- | --- |
| | 17. United States does not maintain a specific MRL for the Cymoxanil/Gourd, Edible combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *18*** | **Cod** | **EU** |
| **Cyprodinil** | 0.7 | --- | --- |
| | 18. United States does not maintain a specific MRL for the Cyprodinil/Gourd, Edible combination, but does maintain an MRL of 0.7 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *19*** | **Cod** | **EU** |
| **Cyromazine** | 1 | --- | --- |
| | 19. United States does not maintain a specific MRL for the Cyromazine/Gourd, Edible combination, but does maintain an MRL of 1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US** | **Cod *20*** | **EU** |
| **Deltamethrin** | 0.2 | 0.2 | --- |
| | 20. Codex does not maintain a specific MRL for the Deltamethrin/Gourd, Edible combination, but does maintain an MRL of 0.2 PPM for its "Fruiting vegetables, Cucurbits" group. | | |
| | **US *21*** | **Cod** | **EU** |
| **Dicofol** | 2 | --- | --- |
| | 21. United States does not maintain a specific MRL for the Dicofol/Gourd, Edible combination, but does maintain an MRL of 2 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US *22*** | **Cod *23*** | **EU** |
| **Dimethomorph** | 0.5 | 0.5 | --- |
| | 22. United States does not maintain a specific MRL for the Dimethomorph/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | 23. Codex does not maintain a specific MRL for the Dimethomorph/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Fruiting vegetables, Cucurbits" group. | | |

| | | | |
|---|---|---|---|
| | **US *24*** | **Cod** | **EU** |
| **Dinotefuran** | 0.5 | --- | --- |
| | 24. United States does not maintain a specific MRL for the Dinotefuran/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US** | **Cod** | **EU** |
| **Endosulfan** | 1 | --- | --- |
| | | | |
| | **US *25*** | **Cod** | **EU** |
| **Ethalfluralin** | 0.05 | --- | --- |
| | 25. United States does not maintain a specific MRL for the Ethalfluralin/Gourd, Edible combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *26*** | **Cod** | **EU** |
| **Famoxadone** | 0.3 | --- | --- |
| | 26. United States does not maintain a specific MRL for the Famoxadone/Gourd, Edible combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *27*** | **Cod** | **EU** |
| **Fenamidone** | 0.15 | --- | --- |
| | 27. United States does not maintain a specific MRL for the Fenamidone/Gourd, Edible combination, but does maintain an MRL of 0.15 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *28*** | **Cod** | **EU** |
| **Fenpropathrin** | 0.5 | --- | --- |
| | 28. United States does not maintain a specific MRL for the Fenpropathrin/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Squash/Cucumber Subgroup 9B" group. | | |
| | | | |
| | **US *29*** | **Cod** | **EU** |
| **Flonicamid** | 0.4 | --- | --- |
| | 29. United States does not maintain a specific MRL for the Flonicamid/Gourd, Edible combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *30*** | **Cod** | **EU** |
| **Flubendiamide** | 0.2 | --- | --- |
| | 30. United States does not maintain a specific MRL for the Flubendiamide/Gourd, Edible combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *31*** | **Cod** | **EU** |
| **Fludioxonil** | 0.45 | --- | --- |
| | 31. United States does not maintain a specific MRL for the Fludioxonil/Gourd, Edible combination, but does maintain an MRL of 0.45 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US *32*** | **Cod** | **EU** |
| **Fluopicolide** | 0.5 | --- | --- |
| | 32. United States does not maintain a specific MRL for the Fluopicolide/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *33*** | **Cod** | **EU** |
| **Fosetyl-Al** | 15 | --- | --- |
| | 33. United States does not maintain a specific MRL for the Fosetyl-Al/Gourd, Edible combination, but does maintain an MRL of 15 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US *34*** | **Cod** | **EU** |
| **Glyphosate** | 0.5 | --- | --- |
| | 34. United States does not maintain a specific MRL for the Glyphosate/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US** | **Cod** | **EU** |
| **Halosulfuron-methyl** | 0.5 | --- | --- |
| | **US *35*** | **Cod** | **EU** |
| **Imidacloprid** | 0.5 | --- | --- |
| | 35. United States does not maintain a specific MRL for the Imidacloprid/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US** | **Cod** | **EU** |
| **Indoxacarb** | 0.6 | --- | --- |
| | | | |
| | **US *36*** | **Cod** | **EU** |
| **Kresoxim-methyl** | 0.4 | --- | --- |
| | 36. United States does not maintain a specific MRL for the Kresoxim-methyl/Gourd, Edible combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |

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| | **US *37*** | **Cod** | **EU** |
| **Lambda Cyhalothrin** | 0.05 | --- | --- |
| | 37. United States does not maintain a specific MRL for the Lambda Cyhalothrin/Gourd, Edible combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *38*** | **Cod** | **EU** |
| **Mandipropamid** | 0.6 | --- | --- |
| | 38. United States does not maintain a specific MRL for the Mandipropamid/Gourd, Edible combination, but does maintain an MRL of 0.6 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *39*** | **Cod** | **EU** |
| **Metalaxyl** | 1 | --- | --- |
| | 39. United States does not maintain a specific MRL for the Metalaxyl/Gourd, Edible combination, but does maintain an MRL of 1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *40*** | **Cod** | **EU** |
| **Methoxyfenozide** | 0.3 | --- | --- |
| | 40. United States does not maintain a specific MRL for the Methoxyfenozide/Gourd, Edible combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *41*** | **Cod** | **EU** |
| **Myclobutanil** | 0.2 | --- | --- |
| | 41. United States does not maintain a specific MRL for the Myclobutanil/Gourd, Edible combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *42*** | **Cod *43*** | **EU** |
| **Paraquat dichloride** | 0.05 | *{0.02}* | --- |
| | 42. United States does not maintain a specific MRL for the Paraquat dichloride/Gourd, Edible combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | 43. Codex does not maintain a specific MRL for the Paraquat dichloride/Gourd, Edible combination, but does maintain an MRL of 0.02 PPM for its "Fruiting vegetables, Cucurbits" group. | | |
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| | **US *44*** | **Cod** | **EU** |
| **Permethrin** | 1.5 | --- | --- |
| | 44. United States does not maintain a specific MRL for the Permethrin/Gourd, Edible combination, but does maintain an MRL of 1.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US** | **Cod *45*** | **EU** |
| **Propamocarb hydrochloride** | 1.5 | 5 | --- |
| | 45. Codex does not maintain a specific MRL for the Propamocarb hydrochloride/Gourd, Edible combination, but does maintain an MRL of 5 PPM for its "Fruiting vegetables, Cucurbits" group. | | |
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| | **US *46*** | **Cod** | **EU** |
| **Pymetrozine** | 0.1 | --- | --- |
| | 46. United States does not maintain a specific MRL for the Pymetrozine/Gourd, Edible combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *47*** | **Cod** | **EU** |
| **Pyraclostrobin** | 0.5 | --- | --- |
| | 47. United States does not maintain a specific MRL for the Pyraclostrobin/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US *48*** | **Cod** | **EU** |
| **Pyriproxyfen** | 0.1 | --- | --- |
| | 48. United States does not maintain a specific MRL for the Pyriproxyfen/Gourd, Edible combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US** | **Cod** | **EU** |
| **Quinoxyfen** | 0.2 | --- | --- |
| | | | |
| | **US *49*** | **Cod** | **EU** |
| **Sethoxydim** | 4 | --- | --- |
| | 49. United States does not maintain a specific MRL for the Sethoxydim/Gourd, Edible combination, but does maintain an MRL of 4 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | **US *50*** | **Cod** | **EU** |
| **Spinetoram** | 0.3 | --- | --- |
| | 50. United States does not maintain a specific MRL for the Spinetoram/Gourd, Edible combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |

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| | **US *51*** | **Cod *52*** | **EU** |
| **Spinosad** | 0.3 | *{0.2}* | --- |
| | 51. United States does not maintain a specific MRL for the Spinosad/Gourd, Edible combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | 52. Codex does not maintain a specific MRL for the Spinosad/Gourd, Edible combination, but does maintain an MRL of 0.2 PPM for its "Fruiting vegetables, Cucurbits" group. | | |
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| | **US *53*** | **Cod** | **EU** |
| **Spiromesifen** | 0.1 | --- | --- |
| | 53. United States does not maintain a specific MRL for the Spiromesifen/Gourd, Edible combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *54*** | **Cod** | **EU** |
| **Spirotetramat** | 0.3 | --- | --- |
| | 54. United States does not maintain a specific MRL for the Spirotetramat/Gourd, Edible combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *55*** | **Cod** | **EU** |
| **Tebuconazole** | 0.09 | --- | --- |
| | 55. United States does not maintain a specific MRL for the Tebuconazole/Gourd, Edible combination, but does maintain an MRL of 0.09 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *56*** | **Cod** | **EU** |
| **Thiamethoxam** | 0.2 | --- | --- |
| | 56. United States does not maintain a specific MRL for the Thiamethoxam/Gourd, Edible combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
| | | | |
| | **US *57*** | **Cod** | **EU** |
| **Thiophanate-methyl** | 1 | --- | --- |
| | 57. United States does not maintain a specific MRL for the Thiophanate-methyl/Gourd, Edible combination, but does maintain an MRL of 1 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US *58*** | **Cod *59*** | **EU** |
| **Trifloxystrobin** | 0.5 | *{0.3}* | --- |
| | 58. United States does not maintain a specific MRL for the Trifloxystrobin/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | 59. Codex does not maintain a specific MRL for the Trifloxystrobin/Gourd, Edible combination, but does maintain an MRL of 0.3 PPM for its "Fruiting vegetables, Cucurbits" group. | | |
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| | **US *60*** | **Cod** | **EU** |
| **Triflumizole** | 0.5 | --- | --- |
| | 60. United States does not maintain a specific MRL for the Triflumizole/Gourd, Edible combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US** | **Cod** | **EU** |
| **Trifluralin** | 0.05 | --- | --- |
| | | | |
| | **US *61*** | **Cod** | **EU** |
| **Zeta-Cypermethrin** | 0.2 | --- | --- |
| | 61. United States does not maintain a specific MRL for the Zeta-Cypermethrin/Gourd, Edible combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group. | | |
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| | **US** | **Cod** | **EU** |
| **Zoxamide** | 1 | --- | --- |