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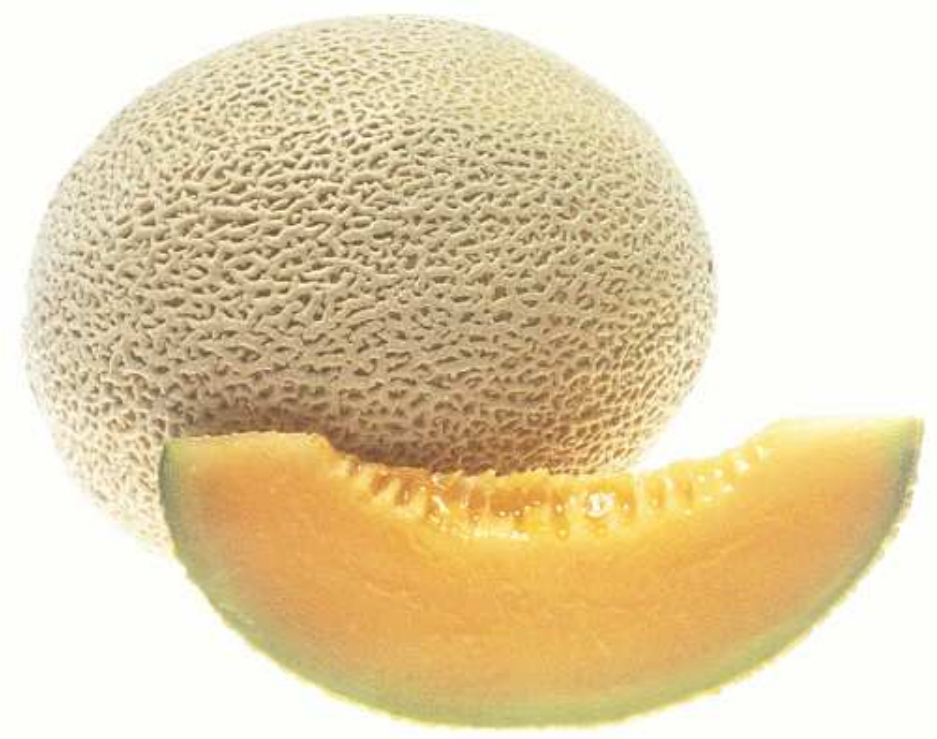
EAST AFRICAN STANDARD

Fresh cantaloupes — Specification and grading



EAST AFRICAN COMMUNITY

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Foreword

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

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

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

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

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

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Introduction

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

United States Standards for Grades of Cantaloupes, Effective March 10, 2008

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 cantaloupes — Specification and grading

1 Scope

This East African Standard applies to cantaloupes of varieties (cultivars) grown from *Cucumis melo* var. *cantalupensis* to be supplied fresh to the consumer, cantaloupes 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
very good internal quality
the combined juice from the edible portion of a sample of cantaloupes selected at random contains not less than 11 percent soluble solids as determined by an approved hand refractometer

3.2
uniform in appearance
not more than one-tenth of the packages in any lot contain cantaloupes which show sufficient variation in shape, size, ground colour or netting to materially detract from the appearance of the contents of the individual packages, or which are not packed according to the approved and recognized methods for the package

3.3
one type
the cantaloupes in any container are similar in colour of flesh and are not decidedly different in shape, character of netting and prominence of ribbing

3.4
mature
the cantaloupe has reached the stage of maturity which will insure the proper completion of the normal ripening process

3.5
good internal quality
the combined juice from the edible portion of a sample of cantaloupes selected at random contains not less than 9 % soluble solids as determined by an approved hand refractometer

3.6
soft
the cantaloupe yields readily to slight pressure

3.7
wilted
the cantaloupe lacks turgidity and is somewhat flabby, spongy and pliable under moderate pressure

3.8
well formed
the cantaloupe has the normal shape characteristic of the variety

3.9
well netted
to an extent characteristic of the variety the cantaloupe is well covered with fully developed, well raised netting, some portion of which is well rounded with practically no crease

3.10
decay
breakdown, disintegration or fermentation of the flesh or rind of the cantaloupe caused by bacteria or fungi

3.11
wet slip
a condition present at time of packing in which the stem scar is abnormally large, excessively wet and slippery, yields to slight pressure, and is frequently accompanied by fresh radial growth cracks at the edge of the stem scar

3.12
sunscald
discoloured or bleached, sunken areas of the surface having tough epidermis with underlying flesh leathery and usually off-colour

3.13
damage
any specific defect described in this section; or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which materially detracts from the appearance, or the edible or shipping quality of the cantaloupe. The following specific defects shall be considered as damage:

(a) Liquid in the seed cavity under the following circumstances:

(1) At shipping point when more than a slight amount of liquid is present in the seed cavity; or,

(2) En route or at destination when an objectionably large amount of liquid is present in the seed cavity, or when the flesh of the cavity wall is mushy or noticeably discoloured;

(b) Sunburn when the colour of the flesh is materially changed; when the rind is hard, tough, thin, or definitely flattened; when distinct flattening of the netting or dark yellow surface discoloration affects an aggregate area exceeding 20 percent of the surface of the cantaloupe; or when brown, gray, purple or dark green surface discoloration detracts from the appearance of the cantaloupe to a greater extent than the area of dark yellow discoloration permitted;

(c) Hail when the injury is unhealed or deep;

(d) Surface mould under the following circumstances:

(1) At shipping point when any surface mould is visible; or,

(2) En route or at destination when the colour, character, or location of the mould materially detracts from the appearance or marketing quality of the cantaloupe;

(e) Aphis when aphis honeydew is more than slightly sticky, or when resulting discolouration more than slightly detracts from the appearance of the cantaloupe;

(f) Scars when healed, shallow, smooth and light coloured and the aggregate area affected exceeds 5 percent of the surface of the cantaloupe; or when deep, rough or dark coloured and detracting from the appearance to a greater extent than the area of healed, shallow, smooth and light coloured scars permitted. Smooth scarring at the blossom end and coalesced netting should not be considered in determining damage caused by scarring unless materially detracting from the appearance of the cantaloupe;

(g) Cracks when deep or not dry. Slight, dry cracks at the ends or in the sutures of the cantaloupe shall not be considered damage;

(h) Ground spot when the rind of the affected area is thin or weak, or when the size or colour of the affected area or the character of netting on the area in relation to the remainder of the surface of the cantaloupe materially detracts from the appearance of the cantaloupe;

(i) Bruises when the surface of the cantaloupe is definitely flattened or indented, or when the underlying flesh is noticeably discoloured; and,

(j) Mechanical means when cuts or gouges are deep or when any skin break is unhealed.

3.14
serious damage
any specific defect described in this section; or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which seriously detracts from the appearance, or the edible or shipping quality of the cantaloupe. The following specific defects shall be considered as serious damage:

(a) Liquid in the seed cavity under the following circumstances:

(1) At shipping point when a large amount of liquid is present in the seed cavity or the flesh of the cavity wall is noticeably soft or discoloured or when any fermentation is present; or,

(2) En route or at destination when there is any fermentation of the liquid in the seed cavity, or when the flesh of the cavity wall shows fermentation or is badly discoloured;

(b) Sunburn when the flesh is seriously discoloured, when causing cracking of the rind, or when causing flattening of the rind which seriously detracts from the appearance of the cantaloupe;

(c) Hail when the injury is unhealed;

(d) Surface mould under the following circumstances:

(1) At shipping point when any surface mould is visible; or,

(2) En route or at destination when the colour, character, or location of the mould seriously detracts from the appearance or marketing quality of the cantaloupe;

(e) Cracks when fresh and deep;

(f) Bruises when the surface of the cantaloupe is seriously flattened or indented or when a material portion of the underlying flesh is broken down; and,

(g) Mechanical means when fresh cuts or gouges extend into the edible portion of the cantaloupe.

3.15
permanent defects
defects which are not subject to change during shipping or storage; including, but not limited to factors of shape, netting, scarring, sunscald, sunburn and injury caused by hail or insects, and mechanical injury which is so located as to indicate that it occurred prior to shipment

3.16
fairly well netted
to an extent characteristic of the variety the cantaloupe is fairly well covered with fairly good netting

3.17
condition defects
defects which may develop or change during shipment or storage; including, but not limited to decayed or soft cantaloupes and such factors as liquid in the seed cavity, surface mould, sunken areas, fresh cracks, and bruising which is so located as to indicate that it occurred after packing

4 Provisions concerning quality

4.1 General

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

4.2 Minimum requirements

4.2.1 In all classes, subject to the special provisions for each class and the tolerances allowed, the cantaloupes must be:

(a) intact[1]

(b) sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded

(c) clean, practically free of any visible foreign matter

(d) fresh in appearance

(e) practically free from pests

(f) practically free from damage caused by pests

(g) firm

(h) free of abnormal external moisture

(i) free of any foreign smell and/or taste.

4.2.2 The development and condition of the melons must be such as to enable them:

(a) to withstand transport and handling, and

(b) to arrive in satisfactory condition at the place of destination.

4.3 Classification

Cantaloupes are classified into the classes defined below:

[1] However, a small healed scar caused by automatic measurement of the refractometric index is not regarded as a defect.

4.3.1 Extra Class

Extra Class consists of cantaloupes which meet the requirements of Class I except that the cantaloupes have very good internal quality and have uniform appearance.

4.3.2 Class I

Class I consists of cantaloupes of one type which are of one variety, fairly clean and sound, mature and have good internal quality but are not overripe or soft or wilted, which are well formed, well netted, and free from decay, wet slip and sunscald, and free from damage caused by liquid in the seed cavity, sunburn, hail, dirt, surface mould or other disease, aphis or other insects, scars, cracks, sunken areas, ground spot, bruises, or mechanical or other means.

— where packed in a container, not vary in diameter by more than 38 mm;

— be free from insects, insect larvae, insect damage and disease;

— be free from cracks, hail marks, moisture damage and sunscald; and

— be free from any other damage or defect or combination thereof that affects the appearance, edibility or shipping quality of the cantaloupes.

4.3.3 Commercial class

The commercial class consists of cantaloupes of one type which are mature but not overripe or soft or wilted, which are well formed and fairly well netted, and free from decay, wet slip and sunscald, and free from damage caused by liquid in the seed cavity, sunburn, hail, dirt, surface mold or other disease, aphis or other insects, scars, cracks, sunken areas, ground spot, bruises, or mechanical or other means.

4.3.4 Class II

Class II consists of cantaloupes of one type which are mature but not overripe or soft or wilted, which are fairly well formed and fairly well netted, which are free from decay, wet slip and sunscald, and free from serious damage caused by liquid in the seed cavity, sunburn, hail, dirt, surface mold or other disease, aphis or other insects, scars, cracks, sunken areas, bruises, or mechanical or other means.

5 Provisions concerning sizing

Size is determined by the weight of one unit or by the diameter of the equatorial section.

6 Provisions concerning tolerances

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

6.1 Quality tolerances

6.1.1 Extra Class

In order to allow for variations incident to proper grading and handling the following tolerances, by count, shall be permitted, except that these tolerances shall not apply to the requirements relating to internal quality and uniformity of appearance:

(1) **At shipping point**
8 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than 4 percent shall be allowed for defects causing serious damage, including in this latter amount not more than one-half of 1 percent for cantaloupes which are affected by decay or mould.

(2) **En route or at destination**
12 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:

(i) 8 percent for cantaloupes which fail to meet the requirements of this grade because of permanent defects; or,

(ii) 6 percent for cantaloupes which are seriously damaged, including therein not more than 4 percent for cantaloupes which are seriously damaged by permanent defects and not more than 2 percent for cantaloupes which are affected by decay.

6.1.2 Class I

In order to allow for variations incident to proper grading and handling the following tolerances, by count, shall be permitted, except that these tolerances shall not apply to the requirement relating to internal quality.

(1) **At shipping point**
8 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than 4 percent shall be allowed for defects causing serious damage, including in this latter amount not more than one-half of 1 percent for cantaloupes which are affected by decay or mould.

(2) **En route or at destination**
12 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:

(i) 8 percent for cantaloupes which fail to meet the requirements of this grade because of permanent defects; or,

(ii) 6 percent for cantaloupes which are seriously damaged, including therein not more than 4 percent for cantaloupes which are seriously damaged by permanent defects and not more than 2 percent for cantaloupes which are affected by decay.

6.1.3 Commercial Class

In order to allow for variations incident to proper grading and handling the following tolerances, by count, shall be permitted:

(1) **At shipping point**
16 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:

(i) 12 percent for cantaloupes which fail to meet the requirements of this grade because of condition defects;

(ii) 4 percent for cantaloupes which are seriously damaged, including therein not more than one-half of 1 percent for cantaloupes affected by decay or mould.

(2) **En route or at destination**
24 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:

(i) 16 percent for cantaloupes which fail to meet the requirements of this grade because of permanent defects;

(ii) 12 percent for cantaloupes which fail to meet the requirements of this grade because of condition defects; or,

(iii) 8 percent for cantaloupes which are seriously damaged, including therein not more than 4 percent for cantaloupes which are seriously damaged by permanent defects and not more than 2 percent for cantaloupes which are affected by decay.

6.1.4 Class II

In order to allow for variations incident to proper grading and handling the following tolerances, by count, shall be permitted:

(1) **At shipping point**
8 percent for cantaloupes in any lot which fail to meet the requirements of this grade including therein not more than one-half of 1 percent for cantaloupes which are affected by decay or mould.

(2) **En route or at destination**
12 percent for cantaloupes in any lot which fail to meet the requirements of this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for the defects listed:

(i) 8 percent for cantaloupes which fail to meet the requirements of this grade because of defects of a permanent nature; or,

(ii) 2 percent for cantaloupes which are affected by decay.

6.2 Size tolerances

For all classes: 10 per cent by number or weight of cantaloupes whose size is greater or less than that specified.

6.3 Application of tolerances

Samples are subject to the following limitation provided that the averages for the entire lot are within the tolerances specified for the grade:

(a) Samples may contain not more than double any specified tolerance except that at least two defective specimens may be permitted in any package.

7 Provisions concerning presentation

7.1 Uniformity

The contents of each package must be uniform and contain only cantaloupes of the same origin, variety or commercial type, quality and size, and which have reached appreciably the same degree of development and maturity and are of appreciably the same colour.

7.2 Packaging

Cantaloupes must be packed in such a way as to protect the produce properly. The materials used inside the package must be new[2], 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.

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

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

7.2.1 Description of containers

The containers shall meet the quality, hygiene, ventilation and resistance characteristics to ensure suitable handling, shipping and preserving of the cantaloupes. Packages (or lot for produce presented in bulk) must be free of all foreign matter and smell.

8 Labelling or marking

8.1 Consumer packages

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

8.1.1 Nature of produce

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

8.2 Non-retail containers

Each package[3] must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

8.2.1 Identification

The exporter, packer and/or dispatcher shall be identified by name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognized by the national authority.[4]

8.2.2 Nature of produce

— “Cantaloupes” if the contents are not visible from the outside

— Name of the commercial type

— Name of the variety (optional)

8.2.3 Origin of produce

Country of origin and, optionally, national, regional or local place name.

8.2.4 Commercial specifications

— Class

— Size expressed in minimum and maximum weight or minimum and maximum diameter

— Number of units (optional).

8.2.5 Official control mark (optional)

[3] Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions but shall conform to the national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

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

9 Contaminants

9.1 Pesticide residues

Cantaloupes shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity.

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

Type	Unit symbol	Limit	Method of test	Notes
DIAZINON	MRL (mg/kg)	0.2		
ETHEPHON	MRL (mg/kg)	1		
PYRACLOSTROBIN	MRL (undef)	0.2		

9.2 Other contaminants

Cantaloupes shall comply with those maximum levels for contaminants established by the Codex Alimentarius Commission for this commodity.

10 Hygiene

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

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

Muskmelons include cantaloupes

Fresh cantaloupes

Cantaloupe in farm

Cantaloupe in farm

Fresh cantaloupes

Cantaloupes in field

Annex B
(informative)

Commercial production guide — Cantoloupes and speciality melons

B.1 Culture

B.1.1 Description

Cantaloupe and specialty melons are members of the cucurbit (Cucurbitaceae) family, which also includes several warm season vegetables such as watermelon, squash and cucumber. Cantaloupes and specialty melons grow as prostrate vines with andromonecious flowering, both perfect (with male and female flower parts) and imperfect (male flowers).

The scientific name for cantaloupes (muskmelons) and specialty melons is *Cucumis melo*. This species is subdivided into seven botanical variants: cantaloupensis, reticulatous, inodorous, flexuosus, conomon, chito and dudaim.

The fruit of the cantaloupensis variant or true cantaloupe is medium sized, warty or scaly and is more commonly found in Europe. Members of the flexuosus group are referred to as snake melons because of their long slender shape. The common type composes the oriental pickling melons. Chito melons include the mango and garden lemon melons. The dudaim variant includes the pomegranate or Queen Anne's pocket melon.

The reticulatous variant includes the cantaloupe or muskmelon. Several different types of melons are among this group. The terms "muskmelon" and "cantaloupe" are used interchangeably, with the term "cantaloupe" used more widely.

Cantaloupes or muskmelons can be placed into several different categories based on fruit type.

The terms "western" or "shipping" are used for cantaloupes that have uniformly netted rinds, orange flesh and lack any sutures. They can be harvested when sufficiently sized but not fully mature. The stem at this stage will partially pull free. This is referred to as the half-slip stage. These fruit, protected by the netted rind and still immature, ship easily.

Other less widely grown cantaloupes include Galia, Persian and Charentais. Galia types have netted rinds like typical cantaloupes but with green flesh like honeydews. Charentais have smooth rinds with sutures. The rind colour is usually grey or grey-blue in colour. The flesh is orange. Galia and Charentais both slip from the vine at maturity. Persian melons are larger than cantaloupes with dark green rinds covered with fine netting. The flesh is bright orange. Unlike others in the reticulatous group, Persian melons do not slip from the vine when mature.

The inodorous variant lacks the aromatic or musky odour of the reticulatous group and generally does not slip from the vine. This group includes the casaba, crenshaw, Christmas, canary and honeydew melons. The casabas are oblate in shape with bright yellow, ribbed rinds. The flesh is white or cream coloured. Crenshaws are similar to casabas but slightly more oblong in shape, mostly smooth and

green ripening to a yellow/green colour. The flesh of crenshaws is pale orange. Christmas melons are football shaped with yellow- and green-mottled rinds and green flesh. Canary melons are oblong with bright yellow rinds. The flesh is cream coloured and very mild—almost bland—in flavour. Canary melons are also called Spanish melons. Honeydews usually have green rinds with green or cream-colored flesh. Some honeydews may have yellow rinds.

Among the inodorous group, the honeydew melon is the most important. Honeydew melons have a fine pubescence that is not readily visible but can be felt. When this pubescence is gone, these melons are at full maturity. In particular, crenshaw, casaba, canary and Christmas melons are referred to as winter melons. These long-season melons have excellent keeping quality and can be stored at room temperature for a month or more.

Although there are many different types of melons described here, all these melons belong to the same genus and species and therefore can interbreed readily with fertile offspring. Because of this, many intermediate types are possible and these descriptions may not apply in all cases.

B.1.2 Planting

Soil should be deeply turned with previous crop residues buried at least two to three weeks prior to planting. This will allow sufficient time for previous crop residues to decompose. Any preplant fertilizer should be applied before final soil preparation (see the following section). For direct seeding, the soil should be prepared so there is a smooth debris- and clod-free surface into which the seed can be planted.

Several different planting schemes can be used to establish cantaloupes and related melons. Plant spacing can range from 4 to 6 feet between rows and 2 to 3 feet in the row. Spacing will be determined by several factors, not the least of which is the available equipment and its size. This will largely determine between-row spacing. In-row spacing also will be determined in part by available equipment. In addition to equipment, factors such as plastic mulch use, trickle irrigation installation and fertigation employment will determine in-row spacing. Plastic mulch with under-plastic trickle irrigation and fertilizer injection will allow for much closer in-row spacing (2 feet) because water and fertility can be more closely monitored and better managed.

B.2 Soils and fertilizer management

B.2.1 Soil testing

It's impossible to make a blanket lime and fertilizer recommendation that would be adequate for all cantaloupe fields. Each field is different, and every growing season seems to be unique.

In addition to crop nutrient requirements and general soil types, fertilizer recommendations are influenced by soil pH, cation exchange capacity (the ability of a soil to hold nutrients), residual nutrients, and inherent soil fertility. Fertilizer recommendations based on soil testing have the most potential for providing cantaloupes with adequate, but not excessive, nutrient levels. Application of optimum amounts of fertilizer results in the best yield and doesn't encourage luxury consumption or cause fertilizer burn. Please keep in mind, however, that recommendations based on soil test analyses are valid only if proper soil sampling procedures are used. To be beneficial, a soil sample must reliably represent the field or management unit from which it was taken. Improperly collected, compiled, handled or labelled soil samples may be detrimental.

Before each cropping season, soil tests should be taken to determine fertilizer needs.

B.2.2 Soil pH

Soil pH influences the availability of nutrients in the soil, the activities of soil microorganisms and, subsequently, plant growth, yield and cantaloupe quality. Maintaining soil pH in the 6.0 to 6.5 range is important for cantaloupe production. A soil test indicates the soil pH and recommends the amount of lime, if any, that should be applied to raise the pH to the desired level.

Because calcium is not very mobile in the soil, lime should be broadcast and thoroughly incorporated 15 cm to 20 cm deep to neutralize the soil acidity in the root zone. For best results, lime should be applied and incorporated 2 to 3 months before seeding or transplanting.

B.2.3 Foliar application of fertilizer

In general, foliar application of major nutrients is a questionable practice. It is virtually impossible for cantaloupe plants to absorb enough nitrogen, phosphorus or potassium through their leaves to correct any major deficiencies. Foliar applications of secondary and micronutrients may be helpful in alleviating deficiencies. However, they should be applied only if there is a real need for them and only in quantities recommended for foliar application.

Two to three foliar applications of water-soluble boron (28 g by weight of actual boron per application) at weekly intervals coinciding with flowering can enhance fruit set if there is a boron deficiency. Many growers prefer a commercial formulation containing both boron and calcium. Be careful when applying manganese and boron to cantaloupes. Toxicity has been observed when manganese reaches 900 parts per million or when boron reaches 150 ppm in leaf tissue. Please follow manufacturer's directions when applying any commercial foliar fertilizer formulation.

B.2.4 Tissue analysis

Fertilizer recommendations provide general guidelines for the application of fertilizers to crops. Actual amounts needed will vary depending on soil type, the amount of leaching, and crop growth. Routine tissue analysis is an excellent tool for fine tuning fertilizer management. Tissue analysis should begin early in the crop cycle.

B.3 Irrigation

Water is a critical component in the production of cantaloupes and specialty melons. Most melon crops are potentially deep-rooted (3 to 4 feet). Actual rooting depth will vary considerably depending on soil conditions and cultural practices. The restricted rooting depth and the fact that melons are commonly grown in sandy soils with a low water-holding capacity make irrigation necessary for consistently high yields.

Water deficits during the establishment of cantaloupes, etc. delay maturity and may cause gaps in production. Water stress in the early vegetative stage results in reduced leaf area and reduced yield. The most serious yield reductions result from water stress during flowering and fruit development.

B.4 Disease management

Cantaloupes and specialty melons are subject to attack by many diseases, which causes serious losses throughout the state each year. Because they are closely related, both crops share several common diseases. A clear understanding of the diseases and the strategies used to manage them is necessary for profitable cantaloupe and specialty melon production. Each disease affecting these crops will be discussed.

B.4.1 Fungal diseases

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.

Figure B.2 — Alternaria leaf spot

Alternaria Leaf Spot

Alternaria leaf spot is caused by *Alternaria* spp. and can cause serious damage under extended periods of wet weather. The occurrence of this disease in Georgia is sometimes sporadic but can be devastating if left unchecked.

The disease causes tiny brown spots that enlarge on the leaves, causing a target spot with concentric rings. Older lesions will develop a dark colour in the concentric pattern (Figure B.2). The dark colour is caused by spore production, which can cause new infection sites if no protective measures are taken.

Most fungicides used in disease management will suppress Alternaria leaf spot; products containing chlorothalonil are generally the most effective. No resistant cultivars are available.

Figure B.3 — Anthracnose

Anthracnose

Anthracnose, caused by the fungus *Glomerella cingulata* var. *orbiculare (Colletotrichum lagenarium, C. orbiculare)*, attacks all above ground parts of the cucurbit plant. The fungus causing anthracnose may reach epidemic proportions when rainfall is above average and temperatures are between 21 °C and 27 °C.

Oldest leaves exhibit the first symptom of anthracnose: round, reddish-brown spots. The centres of some spots fall out, giving the leaf a "shot-hole" appearance (Figure B.3). 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.

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. Cultivars resistant to anthracnose races 1, 2 and 3 may be used to prevent disease losses.

Figure B.4 — Gummy stem blight

Gummy Stem Blight

Gummy stem blight, caused by *Didymella bryoniae,* attacks primarily the leaves and stems of cucurbits and is one of the most destructive diseases of cucurbits in the state. This disease is driven by cool moist periods, especially extended periods of leaf wetness. The 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 people, animals and machines move through wet vines.

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 (Figure B.4). On the older leaves this disease may produce brown to black spots. It spreads from the centre of the hill outward, as do anthracnose and downy mildew.

Choosing high-quality, disease-free seed and transplants should be the first line of defence 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.

Figure B.5 — Target spot

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.

Target spot begins on leaves as yellow leaf flecks, which later become angular with a definite outline (Figure B.5). Later spots become circular with light brown centres surrounded by dark brown margins. Lesions coalesce to produce large dead areas with dead and shedding leaves.

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. Resistant cultivars, if available, should be used in conjunction with the aforementioned disease management strategies.

Figure B.6 — Fusarium wilt

Fusarium Wilt

The fungus that causes Fusarium wilt of melon, *Fusarium oxysporum* f.sp. *melonis*, specifically attacks muskmelon and occurs sporadically in the Southeast. However, it is very devastating to fields it infests.

Symptoms of Fusarium wilt differ from bacterial wilt in that a general yellowing of foliage usually precedes wilting (Figure B.6). However, sometimes a sudden wilt occurs without any yellowing of foliage occurs. Fusarium wilt is usually more severe later in the season because of the stress of fruit load. Vascular discoloration may or may not occur.

The primary means of managing Fusarium wilt is through the use of resistant cultivars. However, there are at least four races of the pathogen, and it is necessary to determine which race of the pathogen is present before choosing a cultivar. Rotation is not very effective because the chlamydospores can survive long periods in the soil and the fungus can also survive in the roots of non-crop host plants. Broad-spectrum fumigants may reduce initial inoculum levels resulting in acceptable control. Maintaining a pH of 6.5 to 7.0 and reducing nitrogen levels may also suppress wilt.

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 may vary from small, yellow sunken areas to large rotted spots on the undersides of fruit. *Pythium* causes a water-soaked lesion that 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.

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

Figure B.7 — Southern blight

Southern Blight

The soilborne fungus *Sclerotium rolfsii* causes blight of cantaloupes and melons. This disease is particularly damaging to fruit lying on moist soil during periods of warm weather.

Coarse white mycelium and reddish tan sclerotia are characteristic signs of the disease (Figure B.7). Infected tissue is usually water soaked and disintegrates rapidly. Extensively damaged fruit will collapse upon handling.

Cultural disease management practices such as deep turning and long rotations are the most feasible and effective tactics. Other methods include avoiding damaging fruit and depositing soil over runners. Fungicidal control is rarely practical or effective.

Scab

Scab, caused by the fungus *Cladosporium cucumerinum*, inflicts severe losses on melons in all areas where moisture is high and temperature is relatively low (21 °C to 24 °C). Most damage occurs in North Georgia, where weather conditions are more favorable for disease development. However, damage to fall melons in South Georgia can occur. The fungus causing scab lives over winter in old cucurbit vines and on infected seed. Early spring infection may come from either of these sources. Spots are produced soon after the fungus begins to sporulate; spores are spread by insects, clothing or tools, or are blown long distances in moist air.

Although scab can attack any above ground portion of the plant, injury to the fruit is most noticeable. Fruit can be infected at all stages of growth. Spots first appear as grey, sunken areas about 3 mm in diameter from which a sticky substance may ooze. The spots grow darker with age and gradually sink into the fruit until a cavity is formed. Several areas may run together, forming lesions 12.7 mm in diameter. The presence of pale-green water-soaked areas is the first sign of disease on the foliage. These spots gradually turn grey to white and become angular shaped. The dead leaf tissue usually splits open and falls out, leaving a ragged hole in the leaf. Under favourable weather conditions, scab can deform young leaves by shortening the internodes.

Losses to this disease can be effectively and economically reduced through a complete disease control program. The critical steps are as follows:

1. **Disease Free Seed.** Always use high quality western-grown seed obtained from a reputable seed company. Seeds obtained from this source are grown in disease-free arid conditions and must meet high standards of the trade and the government.

2. **Crop Rotation.** Never grow melons on land where other cucurbits have been grown within the past three years.

3. **Fungicide Sprays.** Several chlorothalonil-containing fungicides can reduce the severity of scab if applied on a schedule following first bloom

Figure B.8 — Crown rot

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 on cucurbits appear as constricted, water-soaked lesions near the base of stems that are in close proximity to the soil. Infected fruit may have circular, sunken, water-soaked lesions, which may contain a pasty or powdery sporulation of the fungus (Figure B.8).

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.4.2 Mildews

Mildews are a common occurrence 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. Two distinct mildew diseases exist; each favoured by a different weather pattern, and each requiring different materials for control. Unfortunately, the symptoms and occurrence of these diseases overlap considerably.

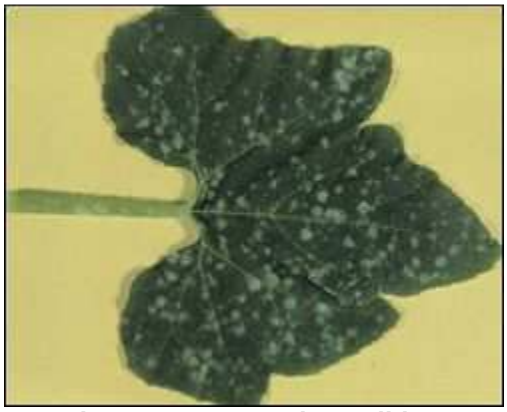

Figure B.9 — Powdery mildew

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.

This disease is characterized by a white or brownish mealy growth found on the upper and lower sides of the leaves and young stems (Figure B.9). 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.

The use of preventive fungicide applications is the most effective means of suppressing powdery mildew. Fungicides used in conjunction with resistant varieties offer the most complete disease management program for powdery mildew on cucurbits.

Figure B.10 — Downy mildew

Downy Mildew

Downy mildew, caused by the fungus *Pseudoperonospora cubensis*, is primarily an airborne fungus that can cause considerable damage during periods of moist, cool weather.

This disease produces irregular to angular yellow to brownish areas on the upper side of diseased leaves (Figure B.10). The underside of the leaves may show a pale greyish-purple mould after 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 because the entire vine is killed. The fruit from diseased plants is usually small and of poor quality.

Follow the same spray program recommended for scab control. Fungicides containing mefenoxam have been the most effective fungicides for control of 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.4.3 Bacterial diseases

Figure B.11 — Angular leaf spot

Angular Leaf Spot

Angular leaf spot, a bacterial disease caused by *Pseudomonas lachrymans*, attacks cantaloupe and melon leaves, stems and fruit. The bacterium that causes angular leaf spot hibernates on old plant debris and in seed. During rains, it splashes from the soil to the stems to the 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° and 27 °C.

Spots on the foliage are straw-coloured to light brown and angular. Affected areas are first water-soaked, then gradually dry and split (Figure B.11). After the diseased tissue splits open, portions of it tear out, leaving irregular holes in the leaves. Small, circular spots develop on the fruit. These diseased areas later crack open and turn white.

The primary disease prevention tool is using disease free seed. A two-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.

Bacterial wilt

Bacterial wilt is caused by the bacterium *Erwinia tracheiphila*. The bacterium only affects plants belonging to the cucurbit family such as cucumbers, cantaloupes, melons, pumpkins, squash, gherkins, white gourds and a number of wild plants. Watermelons are almost completely immune. The pathogen overwinters in the digestive tracts of the spotted and striped cucumber beetles. It enters the plant tissue only through wounds produced by beetles when feeding.

The most common symptom is the rapid wilting of individual runners or whole plants. Wilted runners will appear dark green at first before becoming necrotic as the wilting becomes irreversible. Symptoms are more severe early in the season when plants are growing more rapidly. Another test to detect bacterial wilt is to cut an affected stem, touch the cut ends together and pull them apart again. If the disease is present, liquid strands of bacteria will extend from one cut end to the other.

The only control for bacterial wilting in cantaloupe is controlling the cucumber beetles.

Figure B.12 — Evidence of nematodes

Nematodes

Nematodes are small, slender, microscopic roundworms 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.

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 (Figure B.12). Nematode injury interferes with the uptake of water and nutrients, thus causing the plants to appear as if they lack moisture or fertilizer. Stunted, yellow, irregular growth of plants in the field and rapid decline are also above ground symptoms of nematode injury.

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, where root-knot nematodes are widespread, the use of soil fumigants is essential in most fields if maximum yields are to be expected. Fumigant nematicides are most effective against nematodes and must be applied three weeks prior to planting.

B.4.4 Viral diseases

Mosaic

One or more of five major viruses causes this disease. The most prevalent are cucumber mosaic virus (CMV), papaya ringspot virus (PRSV, formerly called WMV-1), watermelon mosaic virus (WMV, formerly called WMV-2), and zucchini yellow mosaic virus (ZYMV). The most common virus in cucurbits is CMV. One or a combination of these viruses may affect cantaloupes and melons. The primary vectors associated with these virus diseases are aphids. Aphids must acquire the virus from a host reservoir and are capable of transmitting it for 10 to 15 minutes in most cases.

Symptoms of virus disease are mottling, strapping and vein distortion. One virus may cause mild symptoms; 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 discoloured or have raised bumps or mottles. Resistant varieties are available to some, but not all, of these viruses. Stylet oil sprayed on a two- to three-day schedule has been shown to delay the spread of virus, particularly in the fall. Viral diseases are much worse in late summer and fall because the aphid populations are much higher and virus-carrying host plants are more available, which result in more viruliferous aphids. Yield losses are directly related to time of infection. The later the infection occurs, the less damage will be observed.

B.5 Insect management

Cantaloupe and other melons are subject to attack by a variety of insect pests. These attacks do not always result in 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 the development of harder-to-control insect pests, thus increasing the cost of production.

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

Certain cultural practices may have dramatic effects on the potential for economic injury by certain insects. Planting during optimum growing conditions ensures rapid seedling emergence and subsequent growth. This reduces the amount of time that plants are susceptible to injury from seedling insect 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 melons. Scouting for insects is the most efficient way to determine what problems may exist and what action should be taken. Preventive treatments may be necessary 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.

Root Maggots

The seedcorn maggot, *Hylemya platura*, is the predominant species of root maggot found in major production areas. 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, 6.7 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 after 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. Early plantings are therefore most subject to attack. Egg-laying adults are attracted to soils with high organic matter. Dead or dying organic matter such as weeds or previous crop residue attracts the flies.

Greenhouse-grown transplants are grown in high organic soil mixtures that attract the flies in the greenhouse environment. Eggs may be laid on the soil while the plants are in the greenhouse. The eggs may hatch after the transplants are placed in the field, and the maggots attack and kill the seedlings.

Several practices may be used to help control maggots. Previous crop litter and weeds should be turned deeply several weeks before 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.13).

Figure B.13 — Root maggots

Wireworms and Whitefringed Beetle Larvae

Wireworms, mostly *Conoderus* spp., And whitefringed beetle (WFB) 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 mouth parts 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 pass the winter in the larval stage and may be active even during the milder winter months. Presently, no effective insecticides are labelled

Figure B.14 — Wireworm (above), whitefringed beetle larvae (below)

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.15 — Spotted cucumber beetle (top), Striped cucumber beetle and stem damage (middle), cucumber beetles and foliage damage

Cucumber beetles

Several species of cucumber beetles may attack melons with the most common being the spotted cucumber beetle, *Diabrotica undecimpunctata*, and the striped cucumber beetle, *Acalymma vittata*. The banded cucumber beetle, *Diabrotica balteata*, is found occasionally.

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 6.35 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 mm 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 melons. The beetles have been responsible for most economic damage. Beetles feed on the stems, foliage and blooms 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. Beetles also transmit bacterial wilt disease in cantaloupe. For this reason, beetles should not be allowed to continuously infest cantaloupe. Maintaining a zero population of beetles all season long is difficult. During peak population migrations, treatments should occur if beetles infest more than 15 percent of the plants.

Larvae may feed on all underground plant parts and usually cause insignificant amounts of damage. Occasionally, larvae cause direct damage to the melon. 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 into 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 insecticide sprays, so thorough spray coverage is imperative. The most cost-effective application method is to band over-the-top and direct sprays to the base of the plant. There are no recommendations for control of the larvae (Figure B.15).

Aphids

The melon aphid, *Aphasia gossypii*, and the green peach aphid, *Myzus persicae,* are soft-bodied, oblong insects that rarely exceed 2.4 mm long. Adults may be winged or wingless, most often wingless. Aphids have two exhaust-pipe-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 mouth parts. As they remove plant sap, the leaves curl downward, taking on a puckered appearance. Heavy populations cause plants to yellow and wilt. Aphids secrete a substance known as honeydew, which 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 melons are full size.

Several insecticides are effective on light to moderate populations of aphids. If winged aphids are found easily (10 percent of plants infested), treatment is warranted. Thorough coverage is essential because aphids live on the underside of leaves (Figure B.16).

Figure B.16 — Colony of aphids

Thrips

Several species of thrips may inhabit melon fields, but they are not very well understood as pests. Thrips are very small, spindle-shaped insects 2.5 mm or less long. Immature thrips are wingless; 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 slightly larger species than the common onion and tobacco thrips often found infesting early plantings. Thrips rarely cause significant damage to the melons. Thrips mechanically damage plants during the feeding process. If thrips fed on pre-pollinated fruit, the damage would not be noticeable until the melons were larger. Physical damage of this type would appear as catfacing, light russetting or small specks on the surface of the melon.

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.17).

Figure B.17 — Thrips damage, seedling (top); thrips damage, mature leaf

Figure B.18 — Cutworms

Cutworms

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

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. Cutworms damage young plants by chewing on the stem slightly above or below ground. Stand reductions may occur.

Cutworms can be difficult to control, but understanding their behaviour 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 before and during the planting operation. If cutworms are present, make treatments either by incorporation of a soil insecticide or by a directed spray if plants are already present. Foliar sprays should occur as late in the day as possible to coincide with the greatest larval activity (Figure B.18).

Pickleworms and melonworms

The pickleworm, *Diaphania nitidalis*, and melonworm, *D. hyalinata,* are migratory insects. Pickleworms bore and tunnel in the fruit and are more serious than the melonworm, which feeds mainly on the foliage. They can be particularly troublesome during fall production. Make preventive sprays if they are observed in the field or if infestations are known to be in adjacent production areas (figures B.19 and B.20).

Figure B.19 — Pickleworm, young larva (above); pickleworm, mature larva (below)

Figure B.20 — Melonworm

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, leafhoppers, squash bugs, whiteflies and grasshoppers are just a few. These problems can be addressed on a case-by-case basis.

Honeybees

Honeybees are necessary to ensure adequate pollination; most insecticides are toxic to honey bees, so follow certain practices to prevent bee kills. Honeybees may be active from dawn to dusk. Insecticide applications should be made 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 management

Weed control is one of the most serious concerns for commercial cantaloupe and specialty melon growers. Weeds compete with the melon crop for light, nutrients, water and physical space. In addition, weeds can harbour insects, diseases and nematodes harmful to the crop. This can be especially true of many wild type melons, including gherkin, small melon, citron melon and others. Furthermore, many weed control measures will be ineffective against these weeds because of their similarity to cantaloupes and other commercial melons.

B.6.1 Factors affecting weed control

Site selection is the first, and often the most important, step in weed management for these crops. Avoid areas with heavy infestations of perennial weeds such as Bermuda grass, Johnson grass, and purple and yellow nutsedge. Other problem weeds can include sicklepod, beggarweed, morning glories, cocklebur, panicum and the wild type melons mentioned previously. If these areas cannot be avoided, techniques such as stale seedbed should be employed to reduce the levels of infestations prior to planting. In the stale seedbed technique, the land is prepared as normal before planting, weeds are allowed to germinate, and then a nonselective herbicide is used to eliminate this "first flush." The crop is then planted without disturbance to the soil, because this will cause more weed seeds to germinate. In addition, many weeds will germinate before melon emergence and can be eliminated using a nonselective herbicide.

Weed identification is essential because many weed control techniques are only effective on certain weeds. Crop rotation is also important to maintain a minimum infestation of troublesome weeds. During the process of rotation, land treated with herbicides to which melons may be sensitive should be avoided. Many of the herbicides used for weed control in agronomic crops (e.g., peanuts, soybeans, corn, cotton, grain sorghum) have residual activity in the soil and may damage melons. Keeping a record of the herbicides used on fields to be planted is imperative, and the herbicide labels must be checked for crop rotation guidelines.

An essential component to weed management for cantaloupes and other specialty melons is the growing of a good crop. Proper fertility, water, row spacing, pest control and other cultural factors that promote a rapid-growing, high-quality crop will allow the crop to outcompete many weeds. Therefore, early season weed control is essential to maintain good growing conditions. Research has shown that weed pressure in the first five weeks of melon growth will cause at least a 20 percent loss in yield. On the other hand, melons are extremely competitive, as anyone who has tried to control wild melons in other crops can attest. In fact, research has shown that melons require a weed-free period of five weeks. After that, any amount of weed infestation does not affect yield.

B.6.2 Methods of weed control

Several weed control methods are employed in melon production, but factors such as cost, size of crop, size and type of weed infestation, and available control measures will need to be considered in establishing a weed control strategy.

Hand weeding or hoeing is often the safest and least damaging to the crop; however, only growers with small acreage and abundant labour can depend on this approach. Hand weeding or hoeing is used in many cases at a last ditch effort; however, the weeds have already damaged the crop.

Mechanical control is very effective during early growth; once plants begin to produce runners, mechanical cultivation is not practical. Tractor wheels and cultivators easily damage crops. Mechanical cultivation usually requires supplementary hand weeding for removing weeds in the rows.

A pre-emergence herbicide is recommended to provide early season weed control of many grasses and broadleaf weeds. Very few compounds exist for post-emergence weed control in cantaloupes; therefore, weed control from a pre-emergence treatment is very beneficial.

Weed control using the stale seedbed technique involves chemical weed control of emerged weeds before crop emergence. A nonselective, contact material is used primarily. The stale seedbed method often is coupled with a preplant 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.

Plastic mulch with trickle irrigation is expanding rapidly for melon production and will provide very good weed control. However, many growers will use a narrow plastic band and overhead irrigation. Any holes in the plastic that will allow light penetration will be an area for weed germination, so a small hole for transplanting or seedling is advantageous. Black plastic is the most effective mulch because it prevents light penetration for weed seed germination and/or growth. However, plastic mulches, even black plastic, are not effective for nutsedge control. It is important to remember that

only the area covered with plastic will provide weed control. Areas between mulched beds should be treated only with a pre-emergence or post-emergence herbicide registered for these crops, because the root systems of these plants have the capability of extending into the treated zone.

B.7 Good agricultural practices in the harvest, handling and packing of cantaloupes

B.7.1 Introduction

An abundance of research during the last decade had demonstrated that fresh fruits and vegetables play an important dietary and medical role in promoting good health. Threatening to overshadow this significant benefit is the fact that foodborne disease traced to fresh produce has increased in recent years. Cantaloupes have a relatively high pH: 6.0 to 6.5. Cantaloupe growers and shippers are urged to take a proactive role to ensuring the safety of their crops by Good Agricultural Practices.

B.7.2 Quality and safety

Cantaloupe quality and safety often are perceived by consumers to mean the same thing. Good quality cantaloupe may be visually appealing and smell delicious, yet may contain pathogens or toxins that can cause illness in the consumer. Safe product, in contrast, may be discoloured, overmature and unappealing, yet present no hazard to the consumer. Unfortunately, the safety of fresh cantaloupe cannot be determined by its outward appearance or condition.

B.7.3 Field sanitation program

Raw Product Safety: Ensuring cantaloupe safety begins with preventing hazards in the field. The best guarantee of a safe raw product is a proactive food safety program that has been designed and implemented to identify and prevent hazards during production and postharvest handling of these vegetables. Growers and shippers should familiarize themselves with safe production practices so they might be viewed as qualified suppliers among potential buyers. Some issues of concern during production are summarized in Table 4.

B.7.4 Land use history

Grazing animals on or near cropland can introduce pathogenic (to humans) bacteria to the soil. Growers should ensure that land has not been used for animal husbandry and that it is not in proximity to animal feedlots or water runoff from grazing lands. Past improper use of pesticides can result in hazardous residues on raw product. Buyers might insist on letters of guarantee from grower/shippers that the land is suitable and safe for the crops being produced. Before planting, soil residue levels of pesticides and heavy metals should be determined.

B.7.5 Fertilizer use

Incompletely composted organic fertilizers may contain pathogenic (to humans) bacteria derived from animal or human faeces. If organic fertilizers are used, they must be certified that they have been completely composted so no pathogens are present. Composted sewage sludge should not be used as it may contain pathogens as well as heavy metal contamination.

B.7.6 Irrigation

Natural surface water (e.g., canal, lake, pond) provides enough organic matter to support the growth of bacterial pathogens. Surface water may be used but should be tested for the presence of the bacterium *Escherichia coli* (*E. coli*), which is an indicator of faecal contamination. Groundwater is less likely to harbour human pathogens but should be analyzed for heavy metal and pesticide contamination.

Overhead irrigation is more likely to spread contamination to above ground plant parts than is root-zone irrigation. Growers must be able to document answers to the following questions:

— Are irrigation practices safe?

— What is the water source?

— How is water stored?

— Are animals being raised nearby?

— What tests are performed to ensure the purity and safety of the water?

Table 4 — Potential hazards during cantaloupe production

Location	Source of Problem	Solution	Documentation
Land use	Faecal contamination (source of pathogens) from animals	Prevent grazing animals or feedlots on/near production land.	Grower certification of no recent animal husbandry on land used
	Toxic pesticide residues in soil	Review pesticide history for plant back restrictions.	Pesticide selection/ application records
Fertilizers	Pathogenic bacteria from organic fertilizers	Use inorganic fertilizer.	Certified test results
	Heavy metal toxicity from sewage sludge	Use certified organic fertilizers or tested and approved sludge.	Certified test results
Irrigation water	Pathogenic bacteria from surface water	Test/monitor water supply.	Water test results
	Heavy metal/pesticide residues in ground water	Test/monitor water supply.	Water test results
Pesticide use	Illegal/hazardous residues on product	Employ only professional, licensed applicators and monitor pesticide use.	Applicator records review; residues test
Hand harvesting	Faecal contamination of product	Monitor field worker personal hygiene; provide field washing/sanitizing facilities.	Training programs on worker hygiene
Field wagons/ trucks/harvest aids	Soil and human pathogens	Clean/sanitize frequently.	Field sanitation records

B.7.7 Post-harvest handling

B.7.7.1 *Harvest quality*

Field maturity of cantaloupe is based on three external quality factors: the degree of slip, condition of net and background colour. Cantaloupe should be harvested at the firm-ripe stage—or three-fourths to full slip—to be commercially acceptable.

Full slip is the condition in which an abcession layer has formed that will allow the whole stem of the vine to separate or slip off cleanly from the melon with a slight tug. At three-fourths slip, a fourth of the stem usually adheres and breaks rather than slipping free.

Cantaloupes will ripen after harvest but do not increase in sugar content. Cantaloupes should always be at one-half to three-quarters full slip when harvested because almost half of the final sugar concentration is accumulated a few days before this condition. A raised, well-rounded netting should be prominent and cover the entire melon, with the exception of the vein tracts.

Although cultivars vary somewhat in their colour at commercial maturity, a deep uniform green indicates physiological maturity and a light yellowish tan indicates full ripeness. Avoid harvesting melons with a brown under colour or browning of the vein tracts, which are signs of aging and internal softness.

Melons displaying less than three-fourths slip should not be harvested. They have not developed enough sugar to be attractive to consumers. Additionally, they are more susceptible to bruising and scuffing and subsequent decay.

B.7.7.2 Harvesting and handling

At the peak of the season, cantaloupe must be harvested daily to reduce the number of overripe fruit. Cantaloupes are hand harvested by field crews, often with the help of several types of harvesting aids.

One type is a transverse conveyor system that allows workers to place harvested melons on a moving belt that feeds directly into a loading vehicle.

Another type is a tractor-mounted three-point hitch to which is attached an open metal trough called a sink. Workers follow along behind it, placing harvested melons into the trough as it is pulled through the field between rows. Once loaded, pickers typically hurl melons on the ground to waiting loaders who straddle the side of a flatbed wagon or truck. After catching, melons are dropped onto a hard wooden or metal surface.

Field research has demonstrated that cantaloupe bruising and cracking can occur if the drop height is greater than 20 cm onto these hard surfaces. Growers should pad these areas with insulated carpet or hard foam materials to reduce impact damage.

Cantaloupes are subject to sun scald when left unprotected in the sun after harvest. Early morning harvesting and shading with a tarpaulin will help prevent this injury. Some growers have resorted to harvesting at night using floodlights mounted on equipment.

Pressure bruising, which causes discoloured internal flesh, results when cantaloupe are stacked in bulk over six to eight layers deep or when they are transported over rough roads.

Packinghouse operations

Loaded field vehicles should be parked in the shade while waiting to be dumped at the packinghouse. This will prevent melons from warming and sunburning.

Cantaloupe can be unloaded by hand, dry-dumped onto sloping wooden ramps or wet-dumped into tanks of water to reduce physical injury. Dump tank water needs to be chlorinated at a rate of 150 PPM free chlorine. Considerable mechanical damage occurs in dry-dumping operations, including bruising, scratching, abrading and splitting. The drop height between the loaded vehicle and ramp surface should be minimized and the surface padded with insulated carpet or hard foam. In dry-dump operations, cantaloupes are sorted (to remove culls and melons showing mechanical damage), graded (based on quality grade standards or buyer's specifications), sized (using diverging metal rollers) and packed into bulk bins or shipping boxes. Alternately, some cantaloupes are elevated onto a metal roller conveyor from a dry-dump pit, then past spray washers allowing wet brushes to remove field debris. This water should be kept clean by chlorinating at 75-100 PPM free chlorine. Next, melons are graded, pass through a hot water sanitizer, diverging roll sizers and finally to pack-out bins. Water temperature in the sanitizing tank is maintained at 60 ℃. This system allows the melon rind to be surface sanitized to reduce the number of plant and human pathogens that may be present.

Quality defects and pack specifications

External indices of quality for cantaloupe include a well-shaped, nearly spherical melon, uniform in appearance, with an absence of physical injuries (e.g., scars, sunburn, bruising, abrasions). Melons should be firm, feel heavy for their size, and exhibit a smooth stem end with no adhering peduncle (stem attachment), which suggests premature harvest.

The concentration of soluble solids (sugars) is the most reliable index to internal quality (sweetness and flavour). The current acceptable standard for determining soluble solids is a calibrated refractometer that measures ℃Brix (equal to percent sugar).

Cooling and storage

Cantaloupes must be precooled shortly after harvest to maintain sugar levels and flavor intensities. Traditionally, cantaloupe have been cooled using cold air, cold water or ice. The most practical means to use in Georgia is forced air or tunnel cooling. To prevent quality loss due to dehydration, the refrigeration system of the forced air cooling unit should be designed with a large evaporator coil surface to ensure high relative humidity (90 percent to 95 percent) in the moving cold air.

Under most circumstances, cantaloupe cannot be properly cooled by merely placing palletized shipping containers in a room cooler with circulating fans only. Cantaloupe boxes cannot be cooled by placing them directly on a refrigerated truck. Optimum storage requirements for cantaloupe are 36° to 41℉ and 95 percent relative humidity. Under these conditions, shelf life is approximately 14 days. Storage at a temperature of 35.6℉ or less will result in chilling injury seen after several days. Sensitivity to chilling injury decreases as melon maturity and ripeness increase. Full slip melons can tolerate 35℉ for up to 14 days before signs of chilling injury appear. Symptoms of chilling injury include pitting or sunken areas, failure to ripen, off flavours and increased surface decay.

Mixed load and storage compatibility

Cantaloupe produce high levels of ethylene (10 to 100 PPM per hour) per kilogram. Although there are several vegetables (e.g., snap beans, squash, peppers) that have approximately the same storage temperature requirements as cantaloupe, these are ethylene sensitive and therefore cannot be stored with melons. Because cantaloupe produce moderate amounts of exogenous ethylene, even at low temperature, over ripening may be a problem during distribution and short-term storage.

Postharvest decay

Disease can be an important source of postharvest loss in cantaloupes. Postharvest decay organisms normally do not enter the product through healthy exterior tissue. These organisms require mechanical damage (e.g., abrasion, cracking) or weakening of tissue (bruising) before they can enter. Pathogens in other infected tissue or in contaminated water may enter the fruit. Field research has demonstrated that treatment of the rind using hot water immersion (55 ℃ for 0.5 to 1 minute) can be effective in preventing surface mould and other pathogen presence. Use of this technique, however, has not gained extensively in commercial operations.

B.7.8 Sanitary guidelines for packinghouse operations

Receiving incoming product

Harvest crews should remove as much dirt and mud from the product as is possible before the produce leaves the field. An area should be set aside in the receiving yard so pallets can be cleaned before dumping in bins or cooling.

Water sanitation

Water used in cleaning and cooling should be chlorinated at a concentration of 75 to 150 PPM of free chlorine. Chlorination can be accomplished using a gas injection system, adding bleach or using calcium hypochlorite tablets. Chlorination levels in the water should be monitored frequently during operation through the use of chlorine litmus paper or, more accurately, with a chlorine test kit. Water pH should be maintained between 6.5 and 7.5 to avoid having to use excess chlorine in order to maintain recommended free chlorine levels. Excessive use of chlorine can result in excess chlorine gas, which can irritate a worker's skin and respiratory tract, is corrosive to equipment, and increases sanitation cost.

Employee hygiene

Good employee hygiene is very important. Employee training, health screening and constant monitoring of packinghouse sanitation practices (hand washing, personal hygiene) are important in reducing contamination by employees.

Packinghouse equipment
Packinghouse equipment should always be maintained in clean condition. The remnants of product left on belts, tables, lines and conveyors could provide a source for microbial growth; therefore, cleaning by scrubbing to remove particles should be part of the cleaning procedure.

If it is deemed appropriate, sanitizing with a chlorine solution could be accomplished, especially on belt conveyors and equipment, by spot spraying with hand sprayers. Knives, blades, boots, gloves, smocks and aprons should be cleaned or replaced as needed.

Pest control
A pest control program should be in place to reduce, as much as possible, the risk of contamination by rodents or other animals. In an open or exposed packinghouse operation, the best control is constant vigilance and elimination of any discovered animals and their potential nesting locations. Product and product remnants will attract pests; therefore, the daily cleaning of the packinghouse to eliminate the attractive food source should help in reducing pest activity.

Facility sanitation
Packinghouse facilities have the potential for developing microbial growth on walls, tunnels, ceilings, floors, doors and drains. Scheduled wash down and/or sanitizing of the facility will reduce the potential for microbial growth. The cooling system should be monitored and cleaned as necessary depending on the type of system.

Temperature control
Maintenance of proper holding room temperature could affect product quality and could be a factor in reducing microbial growth. Temperature should be monitored to ensure maintenance at established product temperature parameters.

B.8 Cantaloupe

In addition to longer shelf life, markets are demanding more produce be packed and palletized. Growers who can consistently provide premium quality melons and full marketing services (including grading, forced-air cooling, custom packing and sales direct to retail buyers) can stabilize seasonal prices and maximize their market position throughout the entire marketing period.

Annex C
(informative)

Model certificate of conformity with standards for fresh fruits and vegetables

1. Trader:	Certificate of conformity with the Community marketing standards applicable to fresh fruits and vegetables No. …….. (This certificate is exclusively for the use of inspection bodies)	
2. Packer identified on packaging (if other than trader)	3. Inspection body	
	4. Place of inspection/country of origin ([1])	5. Region or country of destination
6. Identifier of means of transport	7. ☐ Internal ☐ Import ☐ 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/071:2010, *Fresh cantaloupes — 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)

Cantaloupes — Codex, EU and US MRLs

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 *2***	**EU**
Abamectin	0.005	0.01	---
	1. United States does not maintain a specific MRL for the Abamectin/Cantaloupe combination, but does maintain an MRL of 0.005 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	2. Codex does not maintain a specific MRL for the Abamectin/Cantaloupe combination, but does maintain an MRL of 0.01 PPM for its "Melons, except Watermelon" group.		
	US *3*	**Cod**	**EU**
Acetamiprid	0.5	---	---
	3. United States does not maintain a specific MRL for the Acetamiprid/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *4*	**Cod**	**EU**
	2	---	---
Acibenzolar-S-methyl	4. United States does not maintain a specific MRL for the Acibenzolar-S-methyl /Cantaloupe combination, but does maintain an MRL of 2 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *5*	**Cod**	**EU**
Bensulide	0.15	---	---
	5. United States does not maintain a specific MRL for the Bensulide/Cantaloupe combination, but does maintain an MRL of 0.15 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *6*	**Cod**	**EU**
Beta-cyfluthrin	0.1	---	---
	6. United States does not maintain a specific MRL for the Beta-cyfluthrin/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod *7***	**EU**
Bifenazate	0.75	*{0.5}*	---
	7. Codex does not maintain a specific MRL for the Bifenazate/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *8*	**Cod**	**EU**
Bifenthrin	0.4	---	---
	8. United States does not maintain a specific MRL for the Bifenthrin/Cantaloupe combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *9*	**Cod**	**EU**
Boscalid	1.6	---	---
	9. United States does not maintain a specific MRL for the Boscalid/Cantaloupe combination, but does maintain an MRL of 1.6 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *10*	**Cod**	**EU**
Buprofezin	0.5	---	---
	10. United States does not maintain a specific MRL for the Buprofezin/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		

	US *11*	**Cod *12***	**EU**
Captan	0.05	10	---
	11. United States does not maintain a specific MRL for the Captan/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	12. Codex does not maintain a specific MRL for the Captan/Cantaloupe combination, but does maintain an MRL of 10 PPM for its "Melons, except Watermelon" group.		
	US *13*	**Cod**	**EU**
Carbaryl	3	---	---
	13. United States does not maintain a specific MRL for the Carbaryl/Cantaloupe combination, but does maintain an MRL of 3 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *14*	**Cod**	**EU**
Carfentrazone-ethyl	0.1	---	---
	14. United States does not maintain a specific MRL for the Carfentrazone-ethyl/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *15*	**Cod**	**EU**
Chlorantraniliprole	0.25	---	---
	15. United States does not maintain a specific MRL for the Chlorantraniliprole/Cantaloupe combination, but does maintain an MRL of 0.25 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *16*	**Cod *17***	**EU**
Chlorothalonil	5	*{2}*	---
	16. United States does not maintain a specific MRL for the Chlorothalonil/Cantaloupe combination, but does maintain an MRL of 5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	17. Codex does not maintain a specific MRL for the Chlorothalonil/Cantaloupe combination, but does maintain an MRL of 2 PPM for its "Melons, except Watermelon" group.		
	US	**Cod**	**EU**
Clethodim	2	---	---
	US *18*	**Cod**	**EU**
Clomazone	0.05	---	---
	18. United States does not maintain a specific MRL for the Clomazone/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Cyazofamid	0.1	---	---
	US *19*	**Cod**	**EU**
Cyfluthrin	0.1	---	---
	19. United States does not maintain a specific MRL for the Cyfluthrin/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *20*	**Cod**	**EU**
Cymoxanil	0.05	---	---
	20. United States does not maintain a specific MRL for the Cymoxanil/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *21*	**Cod**	**EU**
Cyprodinil	0.7	---	---
	21. United States does not maintain a specific MRL for the Cyprodinil/Cantaloupe combination, but does maintain an MRL of 0.7 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *22*	**Cod *23***	**EU**
Cyromazine	1	*{0.5}*	---
	22. United States does not maintain a specific MRL for the Cyromazine/Cantaloupe combination, but does maintain an MRL of 1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	23. Codex does not maintain a specific MRL for the Cyromazine/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Melons, except Watermelon" group.		
	US	**Cod**	**EU**
DCPA	1	---	---

	US	**Cod *24***	**EU**
Deltamethrin	0.2	0.2	---
	24. Codex does not maintain a specific MRL for the Deltamethrin/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *25*	**Cod *26***	**EU**
Dicofol	2	*{0.2}*	---
	25. United States does not maintain a specific MRL for the Dicofol/Cantaloupe combination, but does maintain an MRL of 2 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	26. Codex does not maintain a specific MRL for the Dicofol/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Melons, except Watermelon" group.		
	US *27*	**Cod *28***	**EU**
Dimethomorph	0.5	0.5	---
	27. United States does not maintain a specific MRL for the Dimethomorph/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	28. Codex does not maintain a specific MRL for the Dimethomorph/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *29*	**Cod**	**EU**
Dinotefuran	0.5	---	---
	29. United States does not maintain a specific MRL for the Dinotefuran/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod *30***	**EU**
Endosulfan	1	2	---
	30. Codex does not maintain a specific MRL for the Endosulfan/Cantaloupe combination, but does maintain an MRL of 2 PPM for its "Melons, except Watermelon" group.		
	US *31*	**Cod**	**EU**
Ethalfluralin	0.05	---	---
	31. United States does not maintain a specific MRL for the Ethalfluralin/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Ethephon	2	*{1}*	---
	US *32*	**Cod**	**EU**
Etoxazole	0.2	---	---
	32. United States does not maintain a specific MRL for the Etoxazole/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Melon Subgroup 9A" group.		
	US *33*	**Cod**	**EU**
Famoxadone	0.3	---	---
	33. United States does not maintain a specific MRL for the Famoxadone/Cantaloupe combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *34*	**Cod**	**EU**
Fenamidone	0.15	---	---
	34. United States does not maintain a specific MRL for the Fenamidone/Cantaloupe combination, but does maintain an MRL of 0.15 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *35*	**Cod**	**EU**
Fenpropathrin	0.5	---	---
	35. United States does not maintain a specific MRL for the Fenpropathrin/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Melon Subgroup 9A" group.		
	US	**Cod *36***	**EU**
Fenvalerate	1	*{0.2}*	---
	36. Codex does not maintain a specific MRL for the Fenvalerate/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Melons, except Watermelon" group.		
	US *37*	**Cod**	**EU**
Flonicamid	0.4	---	---
	37. United States does not maintain a specific MRL for the Flonicamid/Cantaloupe combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *38*	**Cod**	**EU**
Flubendiamide	0.2	---	---
	38. United States does not maintain a specific MRL for the Flubendiamide/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group.		

	US *39*	**Cod *40***	**EU**
Fludioxonil	0.03	0.03	---
	39. United States does not maintain a specific MRL for the Fludioxonil/Cantaloupe combination, but does maintain an MRL of 0.03 PPM for its "Melon Subgroup 9A" group.		
	40. Codex does not maintain a specific MRL for the Fludioxonil/Cantaloupe combination, but does maintain an MRL of 0.03 PPM for its "Melons, except Watermelon" group.		
	US *41*	**Cod**	**EU**
Flumioxazin	0.02	---	---
	41. United States does not maintain a specific MRL for the Flumioxazin/Cantaloupe combination, but does maintain an MRL of 0.02 PPM for its "Melon Subgroup 9A" group.		
	US *42*	**Cod**	**EU**
Fluopicolide	0.5	---	---
	42. United States does not maintain a specific MRL for the Fluopicolide/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *43*	**Cod**	**EU**
Fosetyl-Al	15	---	---
	43. United States does not maintain a specific MRL for the Fosetyl-Al/Cantaloupe combination, but does maintain an MRL of 15 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *44*	**Cod**	**EU**
Glyphosate	0.5	---	---
	44. United States does not maintain a specific MRL for the Glyphosate/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Halosulfuron-methyl	0.1	---	---
	US *45*	**Cod *46***	**EU**
Imidacloprid	0.5	*{0.2}*	---
	45. United States does not maintain a specific MRL for the Imidacloprid/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	46. Codex does not maintain a specific MRL for the Imidacloprid/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Melons, except Watermelon" group.		
	US	**Cod *47***	**EU**
Indoxacarb	0.6	*{0.1}*	---
	47. Codex does not maintain a specific MRL for the Indoxacarb/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Melons, except Watermelon" group.		
	US	**Cod**	**EU**
Inorganic bromide resulting from fumigation	20	---	---
	US *48*	**Cod**	**EU**
Kresoxim-methyl	0.4	---	---
	48. United States does not maintain a specific MRL for the Kresoxim-methyl/Cantaloupe combination, but does maintain an MRL of 0.4 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *49*	**Cod**	**EU**
Lambda Cyhalothrin	0.05	---	---
	49. United States does not maintain a specific MRL for the Lambda Cyhalothrin/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *50*	**Cod**	**EU**
Mandipropamid	0.6	---	---
	50. United States does not maintain a specific MRL for the Mandipropamid/Cantaloupe combination, but does maintain an MRL of 0.6 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *51*	**Cod *52***	**EU**
Metalaxyl	1	*{0.2}*	---
	51. United States does not maintain a specific MRL for the Metalaxyl/Cantaloupe combination, but does maintain an MRL of 1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	52. Codex does not maintain a specific MRL for the Metalaxyl/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Melons, except Watermelon" group.		

	US *53*	**Cod *54***	**EU**
Methomyl	0.2	0.2	---
	53. United States does not maintain a specific MRL for the Methomyl/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Cucurbits" group.		
	54. The MRL is established for the sum of methomyl and thiodicarb. Codex does not maintain a specific MRL for the Methomyl/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Melons, except Watermelon" group.		
	US *55*	**Cod**	**EU**
Methoxyfenozide	0.3	---	---
	55. United States does not maintain a specific MRL for the Methoxyfenozide/Cantaloupe combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Mevinphos	0.5	---	---
	US *56*	**Cod**	**EU**
Myclobutanil	0.2	---	---
	56. United States does not maintain a specific MRL for the Myclobutanil/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Naptalam	0.1	---	---
	US	**Cod**	**EU**
O-phenylphenol	10	---	---
	US	**Cod *57***	**EU**
Oxamyl	2	2	---
	57. Codex does not maintain a specific MRL for the Oxamyl/Cantaloupe combination, but does maintain an MRL of 2 PPM for its "Melons, except Watermelon" group.		
	US *58*	**Cod *59***	**EU**
Paraquat dichloride	0.05	*{0.02}*	---
	58. United States does not maintain a specific MRL for the Paraquat dichloride/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	59. Codex does not maintain a specific MRL for the Paraquat dichloride/Cantaloupe combination, but does maintain an MRL of 0.02 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *60*	**Cod *61***	**EU**
Permethrin	1.5	*{0.1}*	---
	60. United States does not maintain a specific MRL for the Permethrin/Cantaloupe combination, but does maintain an MRL of 1.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	61. Codex does not maintain a specific MRL for the Permethrin/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Melons, except Watermelon" group.		
	US	**Cod *62***	**EU**
Piperonyl Butoxide	8	*{1}*	---
	62. Codex does not maintain a specific MRL for the Piperonyl Butoxide/Cantaloupe combination, but does maintain an MRL of 1 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US	**Cod *63***	**EU**
Propamocarb hydrochloride	1.5	5	---
	63. Codex does not maintain a specific MRL for the Propamocarb hydrochloride/Cantaloupe combination, but does maintain an MRL of 5 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *64*	**Cod**	**EU**
Pymetrozine	0.1	---	---
	64. United States does not maintain a specific MRL for the Pymetrozine/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *65*	**Cod**	**EU**
Pyraclostrobin	0.5	*{0.2}*	---
	65. United States does not maintain a specific MRL for the Pyraclostrobin/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod *66***	**EU**
Pyrethrins	1	*{0.05}*	---
	66. Codex does not maintain a specific MRL for the Pyrethrins/Cantaloupe combination, but does maintain an MRL of 0.05 PPM for its "Fruiting vegetables, Cucurbits" group.		

	US *67*	**Cod**	**EU**
Pyriproxyfen	0.1	---	---
	67. United States does not maintain a specific MRL for the Pyriproxyfen/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *68*	**Cod *69***	**EU**
Quinoxyfen	0.08	0.1	---
	68. United States does not maintain a specific MRL for the Quinoxyfen/Cantaloupe combination, but does maintain an MRL of 0.08 PPM for its "Melon Subgroup 9A" group.		
	69. Codex does not maintain a specific MRL for the Quinoxyfen/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Melons, except Watermelon" group.		
	US *70*	**Cod**	**EU**
Sethoxydim	4	---	---
	70. United States does not maintain a specific MRL for the Sethoxydim/Cantaloupe combination, but does maintain an MRL of 4 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *71*	**Cod**	**EU**
Spinetoram	0.3	---	---
	71. United States does not maintain a specific MRL for the Spinetoram/Cantaloupe combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *72*	**Cod *73***	**EU**
Spinosad	0.3	*{0.2}*	---
	72. United States does not maintain a specific MRL for the Spinosad/Cantaloupe combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	73. Codex does not maintain a specific MRL for the Spinosad/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *74*	**Cod**	**EU**
Spiromesifen	0.1	---	---
	74. United States does not maintain a specific MRL for the Spiromesifen/Cantaloupe combination, but does maintain an MRL of 0.1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *75*	**Cod**	**EU**
Spirotetramat	0.3	---	---
	75. United States does not maintain a specific MRL for the Spirotetramat/Cantaloupe combination, but does maintain an MRL of 0.3 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *76*	**Cod**	**EU**
Tebuconazole	0.09	---	---
	76. United States does not maintain a specific MRL for the Tebuconazole/Cantaloupe combination, but does maintain an MRL of 0.09 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *77*	**Cod**	**EU**
Thiamethoxam	0.2	---	---
	77. United States does not maintain a specific MRL for the Thiamethoxam/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *78*	**Cod**	**EU**
Thiophanate-methyl	1	---	---
	78. United States does not maintain a specific MRL for the Thiophanate-methyl/Cantaloupe combination, but does maintain an MRL of 1 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US *79*	**Cod *80***	**EU**
Trifloxystrobin	0.5	*{0.3}*	---
	79. United States does not maintain a specific MRL for the Trifloxystrobin/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	80. Codex does not maintain a specific MRL for the Trifloxystrobin/Cantaloupe combination, but does maintain an MRL of 0.3 PPM for its "Fruiting vegetables, Cucurbits" group.		
	US *81*	**Cod**	**EU**
Triflumizole	0.5	---	---
	81. United States does not maintain a specific MRL for the Triflumizole/Cantaloupe combination, but does maintain an MRL of 0.5 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Trifluralin	0.05	---	---
	US *82*	**Cod**	**EU**
Zeta-Cypermethrin	0.2	---	---
	82. United States does not maintain a specific MRL for the Zeta-Cypermethrin/Cantaloupe combination, but does maintain an MRL of 0.2 PPM for its "Vegetable, Cucurbit, Group 9" group.		
	US	**Cod**	**EU**
Zoxamide	1	---	---