

# codex alimentarius commission



FOOD AND AGRICULTURE  
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Agenda Item 9

CX/FL 06/34/11

## JOINT FAO/WHO FOOD STANDARDS PROGRAMME

### CODEX COMMITTEE ON FOOD LABELLING

Thirty-fourth Session  
Ottawa, Canada, 1 – 5 May 2006

#### **PROPOSAL FOR INCLUSION OF ETHYLENE TO RIPEN ORGANIC KIWIFRUIT AND OTHER FRUIT (Project Proposal is attached as Annex)**

(Proposal from New Zealand)

New Zealand wishes to propose an amendment to the *Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods*, either Annex 1, section C or Annex 2, Table 4, to allow for the use of ethylene to ripen organic kiwifruit and other fruit.

#### **Justification**

The justification below is based on the requirements of Section 5 of the Codex Guidelines for the Production, Processing, Marketing, and Labelling of Organically Produced Foods, which are used to evaluate new substances for use in organic production.

The justification refers specifically to kiwifruit, since this is the fruit on which New Zealand has data and it is the main export commodity from New Zealand that requires the ethylene ripening process. However it is well known that ethylene is used for ripening or degreening other fruit such as bananas and citrus fruit.

Since the basic principles for using ethylene for ripening are the same, New Zealand has put forward the proposal to allow for the use of ethylene to ripen organic kiwifruit as well as other fruits.

#### **1. They are consistent with principles of organic production as outlined in these Guidelines**

Ethylene is a naturally occurring, non-toxic compound. In nature the largest producers of ethylene are plants that produce ethylene within their tissues and release it into the surrounding atmosphere. In plants ethylene acts as a plant hormone and it is produced by fruit, including kiwifruit, as part of their ripening processes. As fruit mature higher levels of ethylene are produced, this in turn causes the respiration rate of the fruit to increase and in doing so ripens the fruit.

Since ethylene is a natural substance and is already a natural product in the ripening process of fruits, it is consistent with the principles of organic production.

Ethylene is commonly used for ripening or degreening fruit, and is accepted, sometimes for specified fruits, in a number of national and international organic standards, such as - National Organic Programme, USA; European Council Regulation (EEC) no. 2092/91; NZS 8410:2003; and International Federation of Organic Movements. Recently it has been included in the Japan Agricultural Standard for Organic Production.

## 2. Use of the substance is necessary/essential for its intended use

- I. Ethylene is necessary to ripen early season fruit and in order to be able to present fruit of appropriate quality. Without an ethylene treatment, early harvested fruit can display variable quality; will ripen unevenly and the flavour and aroma may be poor (Nakagawa 2005). Studies have highlighted that the maximum potential for flavour volatiles in ripe fruit was only realised in fruit that had been stored for 6 weeks or less and ripened with exogenous ethylene. Practical and effective alternatives are not currently available.
- II. In contrast to most kiwifruit cultivars, the “Hayward” kiwifruit cultivar has a relatively poor ability to generate ethylene and is often dependant on external sources of ethylene to trigger natural ethylene production and the subsequent ripening. This is a key reason why the presence of wounded or rotten fruit (which produce ethylene) during storage can induce the initiation of ripening of other fruit. In addition, kiwifruit harvested earlier in the season are at a more immature state meaning that their actual ability to ripen can be limited. The naturally low levels of ethylene produced by early harvested Hayward kiwifruit are typically insufficient to trigger the ripening processes fully (Burdon *et al.* 1998).
- III. Kiwifruit are stored at around 0°C which further lowers their fruit respiration rate. The low levels of ethylene produced at these temperatures are not sufficient to ripen kiwifruit adequately to meet customer and market requirements. Even at higher temperatures (20°C) kiwifruit can take a long time (several weeks) to begin to produce ethylene (Kim *et al.* 1995), which means that fruit quality is variable. At this temperature some fruit ripen before others, fruit losses are high and the times required to ripen are impractical. The addition of external ethylene coupled with a short period of high temperature (following storage at 0°C) has been shown to overcome any resistance to ripening within the fruit and allows the ripening processes to progress correctly and in an adequate timeframe (Burdon *et al.* 1998). After treatment with ethylene kiwifruit soften evenly, the sugars increase and fruit volatiles change. Ideal eating firmness for kiwifruit is approximately 0.8 - 1kgF and it is not possible to reach this firmness consistently in a reasonable timeframe without the use of ethylene.

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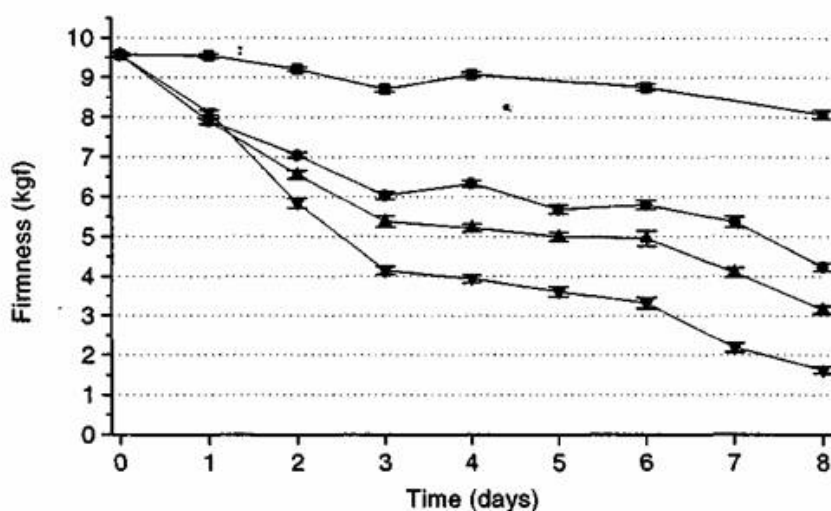


Figure 1. Firmness of fruit from 24 orchards, stored at 20°C, after treatment with ethylene for 16 hours at 20°C (■ - no ethylene, ● - 10ppm ethylene, ▲ - 100ppm ethylene, ▼ - 1000ppm ethylene). Taken from Burdon *et al.* 1998).

**3. Manufacture, use and disposal of the substance do not result in, or contribute to, harmful effects on the environment**

In New Zealand, the gas used for ripening is Ripening Gas<sup>TM</sup> RG6, produced by BOC Gases New Zealand Ltd. This gas contains a mixture of 5.5% ethylene and 94.5 % nitrogen. Both gases are found naturally in air, with nitrogen in particular making up 78% of the air. Ethylene can be extracted from natural gas or other natural sources whilst the nitrogen used in Ripening Gas is extracted directly from the air to make the final product.

Given its makeup, the release of Ripening Gas into the environment, through either use or disposal, is considered to have no adverse impact on the environment or ecology. The Material Safety Data Sheet for Ripening Gas states that in the case of leakage or an emergency that the gas can simply and safely be allowed to escape into the atmosphere.

**4. They have the lowest negative impact on human or animal health and quality of life**

The Material Safety Data Sheet for Ripening Gas identifies both gases as non-toxic and reports that there are no known health effects. The gas is not irritating to eyes or skin, and is not carcinogenic or mutagenic. It has no reproductive effects.

The maximum concentration of ethylene used to ripen kiwifruit would never exceed 200ppm. The mammal LCLo (lowest reported lethal concentration) for ethylene is identified in the Material Safety Data Sheet as 5 minutes at 950,000ppm.

Because Ripening Gas is typically used in enclosed spaces there is the potential for high concentration that can act as a simple asphyxiant if proper care is not taken.

**5. Approved alternatives are not available in sufficient quantity and/or quality.**

No approved substance that could be used in place of ethylene for ripening of fruit is available.

New Zealand therefore believes that use of ethylene satisfies all the requirements of section 5.

**Proposed Amendment to the Codex Guidelines:**

Substances for use in organic production are normally listed in Tables 1 to 4. However ethylene does not appear to fit the categories that these tables cover. Ethylene is neither a processing aid nor an additive to food products, in the sense these terms are normally used in Codex, though it seems to be close to the category. It has a unique place of its own as it only assists ripening or degreening of fruits and does not change the properties of the fruits.

New Zealand therefore suggests ethylene for ripening of kiwifruit and other fruits should be placed as a separate point under Annex 1, Principles of Organic Production, Section C – Handling, Storage, Transportation and Packaging.

Paragraph 82 of this section can be amended as follows -

**C. HANDLING, STORAGE, TRANSPORTATION, PROCESSING AND PACKAGING**

82. The integrity of the organic product must be maintained throughout the processing phase. This is achieved by the use of techniques appropriate to the specifics of the ingredients with careful processing methods limiting refining and the use of additives and processing aids. Ionizing radiation should not be used on organic products for the purpose of pest control, food preservation, elimination of pathogens or sanitation.

Ethylene may be used for ripening of kiwifruit, bananas, or other tropical fruits.

Alternatively ethylene may be listed in Annex 2, Permitted Substances for the Production of Organic Foods, Table 4, Processing Aids, where some gases (carbon dioxide, nitrogen) are already listed for use with plant products.

## **References**

Burdon *et al* (1998) *Softening rates and volatile production in response to ethylene as indicators of the capacity of KiwiStart Hayward kiwifruit to ripen*. Report by the Horticulture and Food Research Institute of New Zealand.

Kim *et al.* (1995) *Factors affecting ethylene biosynthesis in kiwifruit*. Joint report by the Horticulture and Food Research Institute of New Zealand and the Department of Plant Science, Massey University.

Nakagawa (2005) Submission to Japanese MAFF regarding ethylene usage on organic kiwifruit.

## Project Document<sup>1</sup>

Proposal for New Work – Codex Committee on Food Labelling

### PROPOSAL TO AMEND THE GUIDELINES FOR THE PRODUCTION, PROCESSING, LABELLING AND MARKETING OF ORGANICALLY PRODUCED FOODS

Prepared by: New Zealand

#### **Purposes and scope of the proposed standard.**

The purpose is to amend either Annex 1, section C or Annex 2, Table 4, to allow for the use of ethylene to ripen organic kiwifruit and other fruit.

#### **Its relevance and timeliness.**

There is increasing demand for organic fruit. Proper ripening is necessary in order to be able to present fruit of appropriate quality.

Ethylene is commonly used for ripening or degreening fruit, and is accepted, sometimes for specified fruits, in a number of national and international organic standards (USA, European Community, Japan, IFOAM). In plants ethylene acts as a plant hormone and it is produced by fruit, including kiwifruit, as part of their ripening processes. Since ethylene is a natural substance and is already a natural product in the ripening process of fruits, it is consistent with the principles of organic production.

Acceptance in the Codex Guidelines would contribute to the Codex objective of ensuring fair practices in the food trade.

#### **The main aspects to be covered.**

New Zealand proposes to include a new sentence in Annex 1, Principles of Organic Production, Section C – Handling, Storage, Transportation and Packaging, paragraph 82 to allow for the use of ethylene to ripen kiwifruit and other fruit.

#### **An assessment against the *Criteria for the Establishment of Work Priorities*.**

The proposal is consistent with the criteria as follows:

*Volume of production and consumption in individual countries and volume and pattern of trade between countries.* There is substantial trade in kiwifruit and other fruit.

*Diversification of national legislations and apparent resultant or potential impediments to international trade.* Some national standards allow for the use of ethylene to ripen fruit, but some do not. This may lead to impediments in trade.

*International or regional market potential.* There is significant potential to develop trade in organic fruit.

*Coverage of the main consumer protection and trade issues by existing or proposed general standards.* The use of ethylene is not covered at present.

*Work already undertaken by other international organizations in this field and/or suggested by the relevant international intergovernmental body(ies).* Ethylene for ripening is permitted in the IFOAM Basic Standards for Organic Production and Processing.

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<sup>1</sup> Extract from the *Procedural Manual*, page 20, Proposals to Undertake New Work or to Revise a Standard.

**Relevance to Codex Strategic Objectives.**

The proposal is consistent with:

- a. Promoting sound regulatory framework
- b. Promoting maximum application of Codex standards.

**Information on the relation between the proposal and other existing Codex documents.**

The proposal is an amendment to the *Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Food*. It does not affect existing Codex documents.

**Identification of any requirement for and availability of expert scientific advice.**

None identified.

**Identification of any need for technical input to the standard from external bodies so that this can be planned for.**

A technical justification prepared by New Zealand is attached.

**The proposed timeline for completion of the new work, including the start date, the proposed date for adoption at Step 5, and the proposed date for adoption by the Commission; the time frame for developing a standard should not normally exceed five years.**

Proposed start by CCFL in 2006. As this is a straightforward amendment it is expected that it should be completed and adopted by the Commission in 2007 or 2008.

**The decision to undertake new work or to revise standards shall be taken by the Commission on the basis of a critical review conducted by the Executive Committee.**

**Work to be led by:**

It is suggested that the work should be undertaken by the CCFL *Ad Hoc* Working Group on the organic guidelines. New Zealand is prepared to contribute.

**Members of electronic working group:**

n/a