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**Food and Agriculture
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Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - Fax: (+39) 06 5705 4593 - E-mail: codex@fao.org - www.codexalimentarius.net

AGENDA ITEM NO. 5(a)

CX/FL 11/39/7

JOINT FAO/WHO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON FOOD LABELLING

Thirty-ninth Session

Quebec City, Canada, May 9 - 13, 2011

JUSTIFICATION REGARDING THE USE OF ETHYLENE FOR THE RIPENING OF FRUIT

(Prepared by the Electronic Working Group led by Ghana)

BACKGROUND

1. At the 38th Session of the Codex Committee on Food Labelling, many delegations supported extending the use of ethylene to include ripening of tropical fruits citing the importance of organic tropical fruit production to their economy.
2. The Committee agreed to establish an electronic Working Group, coordinated by Ghana, working in English only to develop a justification regarding the use of ethylene for the ripening of fruit for consideration at the 39th Session of the CCFL. The justification was to be differentiated by fruit categories.
3. The EWG members include: Argentina, Australia, Brazil, Costa Rica, European Union, Philippines, Israel, Germany, Ghana, New Zealand, Norway, Thailand and the United States of America. Comments were received from Australia, European Union, Ghana, New Zealand and Norway on the two drafts which were circulated.
4. The justification for use of ethylene in ripening fruits is presented in APPENDIX I to this document.

APPENDIX I

JUSTIFICATION REGARDING THE USE OF ETHYLENE FOR THE RIPENING OF FRUIT

This justification is based on the requirements of Section 5 of the Codex Guidelines for the Production, Processing, Marketing, and Labelling of Organically Produced Foods GL 32-1999, which are used to evaluate new substances for use in organic production.

Reference is made to the original proposal from New Zealand CX/FL 06/34/11 as follows; "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 kiwi fruit as well as other fruits." This reference is being made in support of the inclusion of other fruits.

This document seeks to provide justification for the use of ethylene for ripening of "other products to be determined" (the square brackets around the text in the draft revised paragraph 82).

Ethylene is a substance naturally produced by plants to regulate many physiological processes, including flower induction, the ripening process of fruits, and sprouting in onions and potatoes. It is consistent with the principles of organic production including environmental friendliness. In terms of ethylene production by fruits, there are two classes of fresh produce. These are climacteric fruits and non-climacteric fruits.

Climacteric fruits refer to fruits that have high respiration rate during the fruit's ripening. During the ripening process of climacteric fruits, there is an abundant production of ethylene. Climacteric fruits are able to ripen after being picked. Examples of climacteric fruits are bananas, mango, papaya etc.

Tropical climacteric fruits may be harvested at the physiologically mature but unripe stage. They are harvested at this early stage to enable the industry to better control their quality during the handling, transport and final marketing of these fruits.

Non-climacteric fruits are fruits that do not increase ethylene production when they ripen.

The use of ethylene gas is therefore important as it helps regulate the ripening of tropical fruits mainly for marketing purposes. Using ethylene gas to ripen tropical fruits will result in uniform ripening at the desired period during the marketing chain.

Table 1: Examples of climacteric and non-climacteric products

Climacteric (ethylene producing fruits)	Non-climacteric (Non ethylene producing)
Apples, pears, quince	Cherry, blackberry, strawberry
Apricot, nectarine, peach	Eggplant, cucumber, pepper
Mango, avocado, banana	Lemon, orange, mandarin
Tomato, sapodilla	Water melon, honey dew melon
Rock melon, Passion fruit	Grape, lychee, loquat

The following criteria were used to develop the justification for the use of ethylene for ripening organic fruits:

- 1. Consistency with the principles of organic production** as outlined in the Codex Guidelines for the Production, Processing, Marketing, and Labelling of Organically Produced Foods (GL 32-1999).

Ethylene is a naturally occurring, gaseous organic compound and is produced in all higher plants. Production of ethylene varies with the type of tissue, the plant species, and the stage of development. The presence of this plant hormone will trigger many physiological changes in the plant, including flower induction, fruit development and ripening. It is normally produced in small quantities by fruits and responds with uniform ripening when exposed to an external source of ethylene. When administered artificially, the rate and uniformity of the ripening process can be manipulated. Since ethylene is a natural product in the ripening process of fruits, it is consistent with the principles of organic production.

The use of ethylene is permitted for specified fruits in some national and international organic standards in addition to these Guidelines, such as:

- European Council Regulation (EC) no. 889/2008 (Limited to degreening bananas, kiwifruit and persimmons; for degreening of citrus fruit only as part of a strategy for the prevention of fruit fly damage in citrus; for flower induction of pineapple; and for sprouting inhibition in potatoes and onions),
- Canadian Organic Production Systems Permitted Lists CAN/CGSB-32.311-2006 (Limited to postharvest ripening of tropical fruits and degreening of citrus only),
- IFOAM Indicative List of Substances for Organic Production and Processing (Limited to ripening of fruit only),
- Australian National Standards for Organic and Bio-Dynamic Produce (Limited to ripening of bananas only),
- Japanese Agricultural Standard for Organic Plants (Limited to be used for ripening of banana and kiwifruits only) and
- US National Organic Program (Limited to: as a plant growth regulator, for regulation of pineapple flowering; and for postharvest ripening of tropical fruit and degreening of citrus only)

2. Use of ethylene is necessary/essential for its intended use

Climacteric fruits

Many tropical fruits such as pineapple, mango, papaya, and banana are harvested at the physiologically mature but unripe stage. Climacteric fruits will naturally continue to ripen after harvest. They are harvested at this stage to enable exporters, wholesalers and retailers to better control the marketing of these fruits. If such climacteric fruits are harvested when ripe, they may be too soft to withstand the rigors of packaging and transport, and arrive in the destination market in a highly damaged condition, with an unacceptable percentage of the consignment in an unmarketable state. Climacteric fruits may therefore be picked green, packed and transported in this 'pre-ripe' stage, when they are slightly harder and more able to withstand the rigors of transport. The use of Ethylene gas is therefore important for managing the ripening process, ensuring uniform ripening and marketable fruit for consumption. This also has the potential to increase economic activity in countries which grow conventional fruits but would want to grow these crops organically.

Non-climacteric fruits

Non climacteric fruits like cashew, pineapple, citrus, strawberry, cherry and grape produce little or no ethylene. Ethylene is not used for ripening these fruits.

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

The gas used for ripening fruits referred to as ripening gas is composed of 5.5% ethylene in nitrogen. Both gases are natural components of air with Nitrogen making up 78% of the air. The nitrogen used for ripening gas is directly obtained from the air whilst the ethylene is extracted from natural gas or other sources.

Ethylene is considered to have no adverse impact on the environment or ecology. In the case of leakage or an emergency 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

Material Safety Data sheets for ripening gas produced by different companies indicate that the gas is non toxic, with no known health effects.

The concentration of ethylene required for the ripening of different fruits varies.

Ripening Gas is used in enclosed spaces hence 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. The use of ethylene therefore satisfies all the requirements of section 5 of CAC/GL 32-1999.

Proposed Amendment to the Codex Guidelines

The working group suggests that the provision for use of ethylene to ripen kiwifruit, bananas in Annex 1, Principles of Organic Production, Section C – Handling, Storage, Transportation, Processing and Packaging be amended as follows: :

C. HANDLING, STORAGE, TRANSPORTATION, PROCESSING AND PACKAGING

82. The integrity of the organic product must be maintained throughout the processing. 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 kiwifruit, bananas and other climacteric fruits.

GENERAL RECOMMENDATIONS

- The justification for use of ethylene to ripen fruits should focus on specific fruits, or possibly “well defined categories of fruits” since consideration of all fruits may be too broad and not practical. There were general suggestions to limit the justification to climacteric fruits. The eWG recommends that the committee limit the justification for the use of ethylene to climacteric fruits.
- The EWG did not have enough scientific data on the use of ethylene for ripening of **non – climacteric** fruits. Hence it was not possible to provide information **to the Committee in relation to recommendation to allow the use of ethylene** on individual fruits. It is recommended that member countries interested in including specific fruits should **be invited to** provide the necessary data to support the work.