Fennel

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Scientific Name and Introduction

Fennel (*Foeniculum vulgaris* Mill.) belongs to the Umbelliferae family and originated in the Mediterranean region. There are two varieties: seed fennel is var. *sativum* and edible fennel is var. *dulce*. The edible portion is the white, enlarged basal parts of the leaf sheaths that are fleshy, turgid, and crisp. The leafy sheaths form a "grumolo" that is white, spherical, and the source of green stems and fuzzy leaves. Italian production accounts for 85% of the world market. Fennel is a source of fiber, potassium, and vitamin C.

Quality Characteristics and Criteria

There are no published quality standards, but extra fancy fennel is characterized by uniform and brilliant white leafy sheaths that are turgid and crisp, with no symptoms of cracking or darkening.

Horticultural Maturity Indices

Fennel is harvested by hand when the plant reaches a specified size by cutting the plant from the taproot. Outer leaves are removed, and the remaining leaves are trimmed to 10 to 15 cm (4 to 6 in) in length. It is harvested year-round, except in June and July.

Grades, Sizes, and Packaging

Fennel is sized by the packer and placed in plastic or cardboard boxes. Careful packing is necessary to avoid scratching the sheaths. Mechanical injury produces rapid browning of the leaves.

Precooling Conditions

Hydrocooling is needed in the summer to reduce field heat and water loss. Aqueous citrate solutions control browning of cut surfaces. Avoid excess water infiltration during packing. Forced-air cooling can be used, but only when fennel is plastic-wrapped. Vacuum cooling was tested with mixed results (Sozzi and Ilardi 1992).

Optimum Storage Conditions

Fennel can last for 2 weeks if stored at 0 °C (32 °F) and 90 to 95% RH.

Controlled Atmosphere (CA) Considerations

No CA applications have been reported.

Retail Outlet Display Considerations

Fennel must be kept refrigerated and periodically moistened with water sprays. Removal of injured

sheaths and brown cut surfaces may be needed.

Chilling Sensitivity

Fennel is not chilling sensitive.

Ethylene Production and Sensitivity

Ethylene production is low at 0 to 2 °C (32 to 36 °F)—about 0.5 to 1.0 μL kg^{-1} h^{-1}—and increases to 2.5 to 6 μL kg^{-1} h^{-1} at 20 °C (68 °F) (Mencarelli et al. 1996). No data exist on sensitivity to ethylene.

Respiration Rates

Temperature	mg CO_2 kg^{-1} h^{-1}
2 °C	18 to 20
20 °C	24 to 40

To get mL CO_2 kg^{-1} h^{-1}, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per tonne per day.

Physiological Disorders

Growth after harvest can cause the leaf sheaths to loosen and separate (Mencarelli et al. 1996). Freezing results in water-soaked spots on the outside sheaths and decay of internal young sheaths.

Postharvest Pathology

Fennel is resistant to pathogen attack after harvest. Free water inside the plant can promote bacterial growth.

Quarantine Issues

There are no quarantine issues at this time.

Suitability as Fresh-Cut Product

Browning of cut surfaces is a problem with fresh-cut fennel.

Special Considerations

Special attention must be given to mechanical harvesting and postharvest handling because fennel is highly sensitive to physical injury. Removal of the outer sheath at retail markets reduces the problem, but the process is time consuming.

References

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