

Endive and Escarole

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Scientific Name and Introduction

Endive (*Cichorium endiva* L.) is an herbaceous member of the Asteraceae family, as are its relatives chicory (*Cichorium intybus* L.), lettuce (*Lactuca sativa* L., Cichorium tribe), and radicchio (*Cichorium intybus* L.). It has two forms, a narrow-leafed form called curly endive, which resembles dandelion leaves, and a broad-leafed form called escarole. The outer leaves of endive are dark green and bitter. The inner leaves are light green to creamy white and milder in flavor. It is used to spice up salads made from more blandly flavored lettuces. Endive is grown and handled like leaf lettuces.

Quality Characteristics and Criteria

High-quality endive heads should be clean, free of browning, crisp, and bright green. Young, tender leaves are preferred over tough, older leaves.

Horticultural Maturity Indices

Harvesting is usually by hand when the heads reach mature size. The plants are cut at the base when fully developed—25 to 30 cm (10 to 12 in) across and the center leaves blanched. The heads are packed into corrugated paper cartons in the field. The leafy heads should be kept clean of soil and mud. The leaves should have a spicy and mildly bitter taste. Toughness and a strong bitter taste develop if harvest is delayed and the crop becomes overmature. The product then becomes unmarketable.

Grades, Sizes, and Packaging

Similar to those of leaf lettuces.

Precooling Conditions

Vacuum cooling and hydrocooling to 0 °C (32 °F) are preferred.

Optimum Storage Conditions

These crops are not adapted to prolonged storage and will not keep more than 2 to 3 weeks even at the optimal storage temperature of 0 °C (32 °F) with 95 to 100% RH (Hardenburg et al. 1986). Storage life is halved at 5 °C (41 °F). Proper RH is essential to prevent wilting. Though endive, specialty lettuces, and other leafy greens have usually been hand harvested, some mechanical harvesters are available for product destined for bag mixes. However, the greater degree of injury produced by mechanical harvesting may shorten shelf-life unless optimal storage conditions are strictly maintained. Top ice or package ice is desirable for maintaining proper temperature and RH. Endive and escarole are often shipped in mixed loads with other produce since most orders

for these products are less than truckload lots.

Controlled Atmosphere (CA) Considerations

There are currently no recommended CA atmospheres for endive and escarole. However, a CA useful to maintain the quality of packaged fresh-cut lettuce may be beneficial for either whole or fresh-cut endive and escarole.

Retail Outlet Display Considerations

Maintain cold conditions to maximize storage and shelf-life, and minimize dehydration with periodic sprays of cold water. Conditions should be similar to those used for leaf lettuces.

Chilling Sensitivity

Endive and escarole are not chilling sensitive, but freezing at $-0.1\text{ }^{\circ}\text{C}$ ($31.8\text{ }^{\circ}\text{F}$) must be avoided.

Ethylene Production and Sensitivity

Production is very low, but exposure can result in leaf yellowing.

Respiration Rates

Temperature	mg CO ₂ kg ⁻¹ h ⁻¹
0 °C	45
5 °C	52
10 °C	73
15 °C	100
20 °C	133
25 °C	200

To get mL CO₂ 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

Similar to those of leaf lettuces.

Postharvest Pathology

Similar to those of leaf lettuces.

Quarantine Issues

There are no quarantine issues.

Suitability as Fresh-Cut Product

Very high, especially in salad mixes with other leafy greens and lettuces.

Special Considerations

Endive and escarole must be handled with care to avoid mechanical damage and to minimize discoloration and pathological problems. Temperatures must be kept low and RH high to prevent loss of turgor and wilting.

References

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