



Ginger

Postharvest Quality-Maintenance Guidelines

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The rhizome of the ginger plant is referred to as a root. The knobby, fibrous mature root has light yellowish-brown skin when fresh. It is dried, ground, and used as a spice, or grated or minced for use in cooking. The rhizome is used as a spice because of its aroma and pungency (Paull et al. 1988b) and reported medicinal properties (Kubra and Rao 2012). The rhizome is also harvested at a very early stage before fiber development, for use in pickles and confectionery.

Quality Characteristics and Criteria

Desired quality characteristics include skin color; plumpness of tuber pieces; sheen on skin; and absence of vegetative sprouts, blemishes, soil, and insect injury. Young or "baby" ginger is bright yellow to brown and has a high sheen with greenish-yellow vegetative buds but no sprouts. There is little or no fiber in young ginger, and it is often used as a vegetable snack.

Horticultural Maturity Indices

Mature ginger rhizomes are harvested when plant tops begin to wilt and die. Rhizomes should be plump, with



Mature (top) and young (above) ginger (*Zingiber officinale*) rhizomes.

a dry, bright yellow-brown skin color. The sheen is soon lost and the skin darkens.

Grades, Sizes, and Packaging

Rhizomes are sold in full telescoping 13.6 kg (30 lb) or 6.8 kg (20 lb) fiberboard cartons or 1.7 kg (5 lb) cartons with film bags. Perforated low-density polyethylene bags are becoming more common. Fresh young ginger is also sold in trays with a plastic over-wrap.

Pre-Cooling Conditions

Forced-air or room-cooling to 12 to 14°C (54 to 57°F) should be used.

Optimum Storage Conditions

Mature ginger rhizomes can be stored at 12 to 14°C (54 to 57°F) with 85 to 90% relative humidity (RH) for 60 to 90 days. Storage at 13°C (55°F) with 65% RH leads to extensive dehydration and a wilted appearance (Akamine 1962, Paull et al. 1988). Superficial mold growth can occur if condensation collects on rhizomes, especially on the broken ends.

Young ginger rapidly loses water and will wilt in a few days at 25°C (77°F). To store at a high RH and

avoid condensation, holding the rhizome in sand with water-absorbent polymers has been recommended (Liu et al. 2014).

Controlled Atmospheres (CA) Consideration

There are no published recommendations.

Retail Outlet Display Considerations

Display fresh young ginger with misting, and display mature ginger at ambient temperature with no misting.

Chilling Sensitivity

Mature and young ginger are chilling sensitive if held below 12°C (54°F). Symptoms include loss of skin color and pitting of the skin. Internal breakdown occurs in severe cases of chilling damage.

Ethylene Production and Sensitivity

Very low.

Respiration Rate

About 5.5 to 6.8 mg CO₂ kg⁻¹ h⁻¹ (3.1 to 3.8 μL kg⁻¹ h⁻¹) at 22°C (72°F). To get mL kg⁻¹ h⁻¹, divide the mgkg⁻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 metric ton per day.

Physiological Disorders

Dehydration is the most common problem, especially with young or “baby” ginger. The rhizomes lose their sheen and darken rapidly during handling (Akamine 1962). Shriveling of the pieces becomes pronounced after the loss of about 10% of harvest weight (Paull et al. 1988a). Waxing is of limited effectiveness in reducing water loss. Initial sprout development is associated with cell expansion and not cell division (Paull et al. 1988a), and chemical sprout inhibitors are less effective. Irradiation at 25 to 50 Gy is effective at inhibition of sprouting during long-term storage.

Postharvest Pathology

Fusarium rot (*Fusarium* spp.) can cause serious problems. Symptoms include pale brown discoloration of the vascular strands (Trujillo 1963) that invades the rest of the rhizome, causing it to become brown and dry

(Teakle 1965). Pythium rot (*Pythium* spp.) has also been reported. When infested by this, the rhizome becomes soft and watery (Haware and Joshi 1974). Fungicides are not permitted for use on ginger, but reasonable control is obtained if the rhizome are adequately cured and held at 12 to 14°C (54 to 57°F). Saprophytes, such as *Penicillium* spp., may grow on cut ends and injured areas, and although not parasitic, they give the cut ends and surface an unsightly appearance, and may lead to mycotoxin production (Overy and Frisvad 2005).

Quarantine Issues

Rhizome pieces free of soil and insect injury require no treatment.

Suitability as Fresh-Cut Product

Not applicable.

Special Considerations

None.

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