

Squash

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Scientific Name and Introduction

Summer squash are the young fruit of *Cucurbita pepo*. They are members of the Cucurbitaceae family. There are six horticultural groups of summer squash: cocozelle, crookneck, scallop, straightneck, vegetable marrow, and zucchini (Paris 1986). Summer squash are cultivated throughout the world and is available year-round. Zucchini is the most widely grown and economically important summer squash.

Quality Characteristics and Criteria

Tenderness and firmness are the major quality characteristics. The surface of summer squash should be shiny; dullness is a sign of senescence. Fruit should be firm and free of physical injury. Dark green types should be entirely green; yellowish areas are a sign of senescence. Water loss results in a dull surface and loss of firmness.

Horticultural Maturity Indices

Summer squash are harvested up to 1 week after anthesis, when they are still shiny. Small fruit are more desirable than large fruit because small fruit's flesh and seeds are more tender and slightly sweet.

Grades, Sizes, and Packaging

Summer squash are graded U.S. No. 1 and U.S. No. 2 (AMS 1984). Summer squash can be harvested over a wide range of sizes, from <50 g to >400 g (<2 oz to >0.9 lb). Acceptable size is a function of the type of squash and market demand. Squash may be field-packed directly into shipping containers or transported to the packinghouse in field boxes or bulk bins for washing and sizing before packing. Squash are packed in a variety of containers including bushel baskets, wire-bound wooden crates, and fiberboard boxes (McGregor 1987). A plastic liner should be used in all wooden containers to prevent abrasion and retard water loss.

Precooling Conditions

Room-cooling, forced-air cooling, and hydrocooling are acceptable methods for removing field heat from summer squash (Lill and Read 1982). Prompt precooling after harvest reduces the rate of water loss and is essential for maximum postharvest life.

Optimum Storage Conditions

Summer squash are highly perishable and not suited for storage longer than 2 weeks (Hardenburg et al. 1986). For maximum shelf-life, Summer squash should be held at 5 to 10 °C

(41 to 50 °F) with 95% RH.

Controlled Atmosphere (CA) Considerations

Storage in low-O₂ atmospheres appears to be of little or no value for zucchini squash (Mencarelli et al. 1983, Leshuk and Saltveit 1990).

Retail Outlet Display Considerations

Summer squash should not be stacked more than four layers deep and should be arranged carefully so they do not fall off the rack. The display should be refrigerated, but direct contact with ice should be avoided as it can cause physical damage as well as lead to chilling injury.

Chilling Sensitivity

Summer squash are chilling sensitive and should not be exposed to temperatures below 5 °C (41 °F) (Ryall and Lipton 1979). However, variation in chilling tolerance among summer squash types is great (Sherman et al. 1987, Suslow and Cantwell 1998). Chilled summer squash show surface pitting and decay rapidly at nonchilling temperatures, though damage may be absent during refrigeration. Chilled fruit have increased rates of water loss upon transfer to nonchilling temperatures (McCollum 1989).

Ethylene Production and Sensitivity

Summer squash produce low to moderate amounts of ethylene: 0.1 to 1.0 $\mu\text{L kg}^{-1} \text{h}^{-1}$ at 20 °C (68 °F). The rate of ethylene evolution is greatly increased in fruit that have been held at chilling temperatures (McCollum 1989). Increased yellowing may result if green-skinned summer squash are exposed to ethylene (Ryall and Lipton 1979).

Respiration Rates

Temperature	mg CO ₂ kg ⁻¹ h ⁻¹
0 °C	24 to 26
5 °C	27 to 37
10 °C	65 to 68
15 °C	139 to 167
20 °C	153 to 175

Data from Hardenburg et al. (1986).

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 tonne⁻¹ day⁻¹.

Physiological Disorders

Summer squash are very susceptible to water loss. Shriveling may become evident with as little

as 3% weight loss. Precooling and storage at high RH minimize weight loss. Squash can be waxed, but only a thin coating should be applied. Waxing provides some surface lubrication that reduces chafing in transit. Summer squash skin is very tender; skin breaks and bruises can be a serious source of water loss and microbial infection.

Postharvest Pathology

Decay caused by fungal and bacterial pathogens can cause significant postharvest losses in summer squash. The incidence of decay increases in fruit that have physical injury or chilling stress. Common postharvest diseases include alternaria rot, bacterial soft rot, cottony leak, fusarium rot, phytophthora rot, and rhizopus rot. Alternaria rot can be especially pronounced following chilling injury.

Quarantine Issues

There are no known quarantine issues.

Suitability as Fresh-Cut Product

Summer squash is frequently sliced and marketed in foam trays overwrapped with polyethylene.

Special Considerations

All types of summer squash are extremely tender and are injured by the slightest scratch, bruise, or scuff. Yellow and scalloped squash show scuffing clearly because the ensuing darkening is obvious on a light background. Summer squash should be handled gently throughout marketing; sorters and packers should wear cotton gloves to prevent fingernail cuts.

References

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