Pea

Stephen Morris and Jenny Jobling
Morris and Jobling are with the Sydney Postharvest Laboratory, Food Science Australia, North Ryde, New South Wales, Australia.

Specific Name and Introduction

There are three types of edible peas (*Pisum sativum* L.) from the family Fabaceae (also called Leguminosae). The most common is the garden or green pea *P. sativum* var. *sativum* L. This pea has a tough pod that is discarded prior to eating (Basterrechea and Hicks 1991, Snowdon 1991). Most often these peas are frozen or processed. The success of the frozen pea industry in the United States has resulted in a decline in the sale of peas sold in the pods (Basterrechea and Hicks 1991). The other two types of peas have soft, edible pods and belong to the subspecies *P. sativum* var. *macrocarpon* Ser. The snow or sugar pea has a flat pod with minimal development of the seeds, while the sugar snap pea or snap pea has well developed seeds and is fully rounded (Hocking 1997, Suslow and Cantwell 1998). The sugar snap pea is the result of a cross between the snow pea and an unusual tightly podded pea with thick walls. All of these peas grow best under cool, moist conditions.

Quality Characteristics and Criteria

Good-quality peas are uniformly bright green, fully turgid, and free from defects and mechanical damage. Stems and calyxes should be green.

Grades, Sizes, and Packaging

Grades include U.S. No. 1 and U.S. Fancy, based primarily on external appearance. They should exhibit similar varietal characteristics and be not overmature or excessively small, not badly misshapen or water-soaked, fairly well filled, fresh, and free from decay and from damage caused by black calyxes, freezing, splitting, hail, dirt, leaves or other foreign matter, mildew or other diseases, insects, or mechanical or other means. There are no USDA grades for snow or snap peas, but best-quality snow peas are 7.6 to 9 cm (3 to 3.5 in) long and 1.9 cm (0.75 in) wide, while snap peas should be 6.4 to 7.6 cm (2.5 to 3 in) long. Green peas are shipped in 13.6-kg (30-lb) bushel baskets, or crates. Snow and sugar snap peas are shipped in 4.5-kg (10-lb) cartons.

Harvest Maturity Indices

For best quality, both edible podded peas and green peas should be harvested before physiological maturity; that is, before peas deform the hull (Basterrechea and Hicks 1991). Snow peas should be harvested when the pods are maximum size but before any visible seed development; frequent harvesting is necessary. Sugar snap peas should be harvested after they have developed seeds, as with garden peas (Hocking 1997).

Precooling Conditions

Sugar content and flavor decrease rapidly after harvest unless green peas are promptly cooled to 0 °C (32 °F). Therefore, they must be promptly precooled after harvest by forced-air cooling, hydrocooling, or vacuum-cooling. If vacuum-cooling is used, it is important that the peas are prewet to ensure rapid cooling (Ryall and Lipton 1979). Forced-air cooling is the preferred method of cooling for edible podded peas (NWREC 1998).

Optimum Storage Conditions

All three types of peas can be stored for 1 to 2 weeks at 0 °C (32 °F) with 95 to 98% RH (Wager 1964, Suslow and Cantwell 1998). Garden peas store better unshelled than shelled, possibly because shelling damages the peas (Basterrechea and Hicks 1991). If there is surface moisture on peas, it is essential that they be stored below 2 °C (36 °F).

Controlled Atmosphere (CA) Considerations

Little work has been done on CA storage of peas. Green pea quality was maintained better for 20 days in 5 to 7% CO_2 at 0 °C (32 °F) than in air (Tomkins 1957). Snow and snap peas respond moderately to CA of 2 to 3% O_2 and 2 to 3% CO_2, though not all research has found CA to be beneficial (Suslow and Cantwell 1998).

Retail Outlet Display Considerations

Storage with crushed ice can be beneficial, and water sprays are acceptable for garden and snow peas, but these methods should be avoided for snap peas (Suslow and Cantwell 1998).

Chilling Sensitivity

Peas are not sensitive to low temperature and should be stored as close to 0 °C (32 °F) as possible without freezing.

Ethylene Production and Sensitivity

Peas produce very low levels of ethylene: <0.1 μL kg^{-1} h^{-1} at 20 °C (68 °F). However, they are moderately sensitive to ethylene after harvest, which results in yellowing and increased decay. The calyx is more sensitive to ethylene than the pod (Suslow and Cantwell 1998).

Respiration Rates

Temperature	Garden Peas	Edible-pod peas (estimated)
	----------mg CO_2 kg^{-1} h^{-1}----------	
0 °C	30 to 46	30 to 48
5 °C	55 to 72	53 to 74
10 °C	63 to 108	65 to 112
15 °C	165 to 185	165 to 187
20 °C	220 to 322	221 to 324
25 °C	298 to 327	—

Data from ASHRAE (1985) and Suslow and Cantwell (1998).

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 ton^{-1} day^{-1} or by 61 to get kcal $tonne^{-1}$ day^{-1}.

Physiological Disorders

Freezing may start at -0.6 °C (31 °F). Freezing causes water-soaked areas followed by rapid decay from soft rot bacteria (Suslow and Cantwell 1998). Edible podded peas are susceptible to premature senescence resulting in yellowing, color changes in the calyx, and loss of tenderness and flavor (Suslow and Cantwell 1998). Storage at >5 °C (41 °F) and exposure to ethylene can accelerate this problem.

Postharvest Pathology

Because of high respiration rate, the heat generated by unrefrigerated peas will promote decay. Blemishes that reduce quality can be caused by alternaria blight *(Alternaria alternata),* anthracnose *(Colletotrichum),* ascochyta pod spot (*Ascochyta pisi* Lib), and powdery mildew (*Erysiphe* spp.) (Snowdon 1991). Common diseases for edible podded peas are gray mold *(Botrytis cinerea),* watery soft rot *(Sclerotinia sclerotiotorum),* rhizopus rot, and bacterial soft rot. Botrytis gray mold can be a problem at the blossom-end of fresh-cut pods.

Quarantine Issues

There are no known quarantine issues.

Suitability as Fresh-Cut Product

Edible podded peas are suitable for use in fresh-cut mixtures.

Special Considerations

Keeping peas cold is critical for retaining quality. Surface moisture should be avoided unless the marketing chain is short and temperatures are kept <2 °C (<36 °F).

References

ASHRAE [American Society of Heating, Refrigerating, and Air-Conditioning Engineers]. 1985. ASHRAE Handbook—1985 Fundamentals. ASHRAE, Atlanta, GA.

Basterrechea, M., and J.R. Hicks. 1991. Effect of maturity on carbohydrate changes in snap pea pods during storage. Sci. Hort. 48:1-8.

Hocking, D.F. 1997. Snow peas and sugar snap peas. Agfact H8.1.35, New South Wales Agriculture, Sydney, Australia.

NWREC [North Willamette Research and Extension Center]. 1998. Edible pod peas. *At* http://horticulture.oregonstate.edu/content/vegetable-production-guides.

Ryall, A.L., and W.J. Lipton. 1979. Handling, Transport and Storage of Fruits and Vegetables, 2nd ed., vol. 1, Vegetables and Melons. AVI Pub., Westport, CT.

Snowdon, A.L. 1991. A Colour Atlas of Postharvest Diseases and Disorders of Fruit and Vegetables, vol. 2, Vegetables, pp. 97-138. Wolfe Scientific, London, U.K.

Suslow, T.V., and M. Cantwell. 1998. Peas—Snow and Snap Pod Peas. Perishables Handling Quarterly 93:15-16

Tomkins, R.G. 1957. Peas kept for 20 days in gas store. Grower (U.K.) 48:226-227.

Wager, H.G. 1964. Physiological studies of the storage of green peas. J. Sci. Food Agr. 15:245-252.

The editors of this Handbook will appreciate your input for future editions of this publication. Please send your suggestions and comments to HB66.Comments@ars.usda.gov.