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RESEARCH ARTICLE

EXTENSION OF THE STORAGE-LIFE OF GREEN PEAS (*PISUM SATIVUM* L.) USING A COLD STORAGE UNIT

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ABSTRACT

The storage life of uniform and healthy green Pea pods (*Pisum sativum* L.) inside a cold storage unit called Ecofrost and at ordinary room conditions was studied from 23 November to 8 December 2016. The pea pods, harvested in the evening session at the horticulture maturity conditions, were then transported within 2 hours and 30 min in an air-conditioned vehicle to the Agricultural Research Laboratory of Ecofrost Technologies Pvt. Ltd., Pune. The selected pea pods were kept in the cold storage unit *i.e.* Ecofrost. The study was aimed to determine the effectiveness of cold storage conditions (0°C and 93% RH) on the post-harvest weight loss of green peas. The results recorded the lowest average weight loss for the peas (within zip-lock bag with 2% ventilation) inside Ecofrost, around 6.28kg / day / tons for six days of storage. Maximum average weight loss of 113 kg / day / tonne was observed at ordinary room conditions for nearly the same period. Peas stored in the Ecofrost demonstrated a maximum storage life of 12.5 days and became inedible after 15 days (without zip lock bag), to 14 days (within zip-lock bag with 2% ventilation) with very slight (less than 30%) shrivelling and became inedible after 16.5 days.

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INTRODUCTION

Pisum sativum L. is an annual plant. It is a cool-season crop grown in many parts of the world; planting can take place from winter to early summer depending on locations. The average pea weighs between 0.1 and 0.36g. Immature peas are used as a vegetable - fresh, frozen or canned. Varieties of the species typically called field peas are grown to produce dry peas like the split-pea shelled from the matured pod. These form the basis of pea porridge and pea soup, staples of medieval cuisine; in Europe, consuming fresh immature green peas was an innovation of early modern cuisine. Peas are not only good in taste, but also have high nutritional value. "Fresh green peas contain per 100 g: 44 calories, 75.6% water, 6.2g protein, 0.4g fat, 16.9g carbohydrate, 2.4g crude fiber, 0.9g ash, 32mg Ca, 102mg P, 1.2mg Fe, 6mg Na, 350mg K, 405ug b-carotene equivalent, 0.28mg thiamine, 0.11mg riboflavin, 2.8mg niacin, and 27mg ascorbic acid, while dried peas contain: 10.9% water, 22.9% protein, 1.4% fat, 60.7% carbohydrate, 1.4% crude fiber, and 2.7% ash" (Duke 1981; Hulse 1994). Edible pea pods include both Oriental and Asian flat pods (also called Snow), harvested when the seeds are very small and immature, and the Snap or Sugar Snap Pea which resemble a typical fresh garden pea but with smaller seeds. Fresh peas can last up to 7 days under 4°C without humidity control, but there are many variables that need further consideration. Peas are highly perishable in nature and will not maintain good quality for more than 14 days even at 0°C with humidity control. Wilting, yellowing of pods, increased alfa amylase hydrolysing enzyme activity, S-Adenosyl Methionine (SAM) activity, enhanced senescence, skin cracking, loss of chlorophyll content, loss of tenderness, development of starchiness and decay are likely to increase beyond 14 days. These defects occur faster at ordinary distribution conditions of 5 to 10°C (41 to 50°F) (http://postharvest.ucdavis.edu/Commodity_Resources/Fact_Sheets/Datastores/Vegetables_English/?uid=26&ds=799).

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MATERIALS AND METHODS

The study was carried out in the Agricultural Research Laboratory of Ecofrost Technologies Pvt. Ltd. Tathawade, Pune (MH), India, from 23rd of November to 8th of December 2016. The selected pea pods were harvested about 10 days after flowering. The pods were uniformly bright green (light to deep green but not yellow-green), fully turgid, clean, and free from any damage or defect such as thrip injury, broken pods, etc. The stem and calyxes were green and there were very few

blossoms attached to the pods. Harvesting and handling were done with care to prevent damage to the pods and attached calyx. Pods were cut in the evening hours of 23rd of November 2016. Storage-life (days) was recorded by the number of days that the peas displayed good conditions after the time of harvest. Collected pea pods were subjected to three treatments *i.e.* control T_1 (kept at ordinary room conditions (RT)), T_2 (kept inside cold room conditions (0°C and 93% RH) without packaging) and T_3 (kept inside cold room conditions (0°C and 93% RH) with zip-lock bag packaging). For treatment T_3, a zip-lock bag for packaging purposes was used, partially opened at 2% to allow for proper air circulation. Visual observations on shrinkage, freshness and color changes were recorded. The three treatments were replicated seven times with completely randomized block design (CRD). Treatment-wise replication data was collected, and average mean values were taken for further investigation (http://www.ccari.res.in/waspnew.html).

RESULTS AND DISCUSSION

Parameters such as storage life (Figure 1), weight-loss (Figure 2), chilling injury symptom (Table 1) and shriveling in seeds (Figure 3) were observed daily inside Ecofrost and at ordinary RT. Pea pods stored in the Ecofrost with zip-lock bag packaging retained maximum storage life of up to 14 days (Photo 1) with less than 30% shrinks. The rate of weight loss increased with increase in time of the storage period in all conditions. The maximum average weight loss (113kg) per day per tonne during storage was recorded in Peas kept at ordinary room conditions at RT, while minimum average weight loss (6.28kg) per day per tonne during storage was recorded in green Peas kept inside the Ecofrost, inside zip-lock bag packaging with 2% air ventilation. Also, average weight loss (11.42kg) per day per tonne during storage was recorded in green Peas kept in the Ecofrost without zip-lock bag packaging.

Table 1. Chilling injury development at room and inside cold room conditions in Peas (*Pisum sativum* L.)

Treatment Details	Chilling injury
T□- Pea pods kept at ordinary room conditions	--
T□- Pea pods kept at cold room conditions (0°C and 93% RH) + without packaging of zipper lock bag	Not seen
T□- Pea pods kept at cold room conditions (0°C and 93% RH) + zipper lock bag packaging with 2% ventilation	Not seen

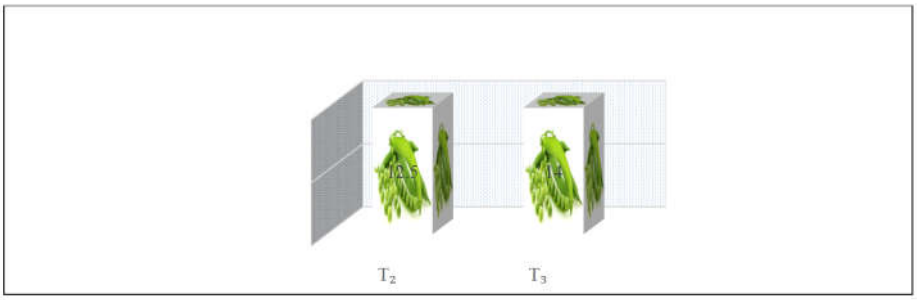

Figure 1. Storage life (Days) of Green Peas inside Ecofrost (0°C and 93% RH)

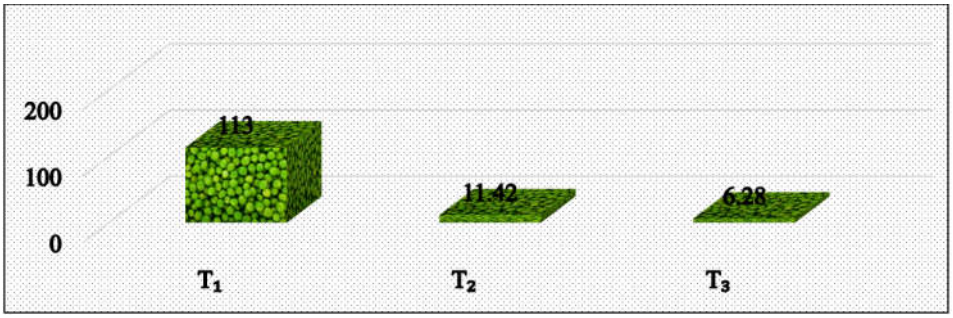

Figure 2. Average weight loss during storage in kg per day per tonne of Peas (For first six days)

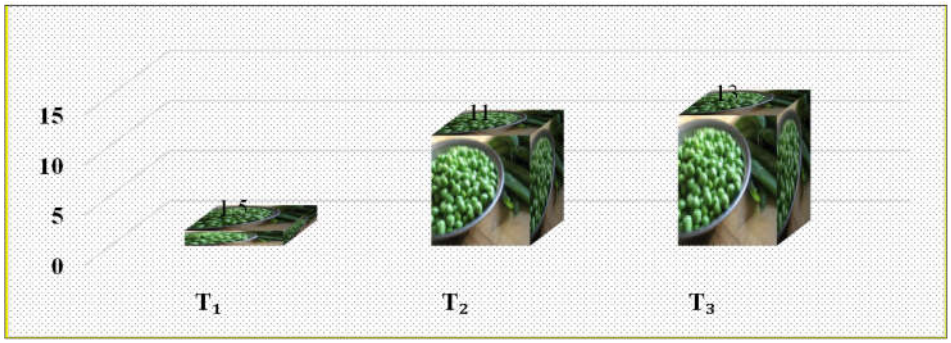

Figure 3. Peas Seed shrivelling observed (days)

Photo 1. Peas (*Pisum sativum* L.) storedat room temperature and inside Ecofrost (0°C and 93% RH)

Initial view on the end of the 1st day after storage

View after 6-day storage inside cold room

View after 6-day storage at ordinary room conditions

View after 8-day storage inside cold room conditions

View after 8-day storage at ordinary room conditions

View after 9-day storage inside cold room conditions

View after 9-day storage at ordinary room conditions

View after 15th day storage inside cold room (Without ziplock bag)

View after 15th day storage inside cold room (With ziplock bag)

The maximum storage life was recorded in Pea pods kept in the Ecofrost, with zip-lock bags. Chilling injury symptoms were not seen during the experimentation period. Green Pea seeds edibility recorded up to on 16.5 and 15 days for treatments T_3 and T_2, respectively. Green Pea seeds started shrivelling (less than 10%) in the pods on 13^{th}, 11^{th} and 1.5^{th} days for treatments T_3, T_2, and T_1 respectively. Likewise, shrivelling on stem-end of pods (less than 10%) was recorded on 11^{th}, 8.5^{th} and 1^{st} day, respectively. Better colour (green) retention due to lowered chlorophyllase enzyme activity is observed in low temperature conditions. Special care is necessary during the storage of Peas as surface moisture promotes decay by enhancing microbial activities, especially bacteria that are responsible for rotting. A grey mould (*Botrytis cinerea*) was observed to develop after 14 days in cold storage. Yellowing of Pea pods, browning of calyx, and loss of tenderness of seeds or pods, enhancing senescence of pods were observed to develop rapidly at RT due to the high rate of respiration, enhancing maximum weight loss at ordinary room conditions in the form of water vapour loss. Storage of fruits and vegetables at low temperature, immediately after harvesting reduces the rate of respiration resulting in reduction of respiration heat, thermal decomposition, microbial spoilage and it helps in retention of quality and freshness of the stored material for a longer period (Chopra *et al*., 2003).

Conclusion

Subjecting peas to T_3 helped in extending the storage-life to the maximum *i.e.* up to 14 days under cold storage (Ecofrost). Also, Pea pods subjected to T_2 retained a storage life of 12.5 days.

The shelf-life was recorded to be 1.5 days at ordinary room conditions (T_1).

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REFERENCES

Chopra, S, Baboo, B., Alesksha, Kudo S.K. and Oberoi, H.S. 2003. An effective on farm storage structure for tomatoes. *Proceedings of the International Seminar on Downsizing Technology for Rural Development held at* RRL, Bhubaneswar, Orissa, India, October 7–9, pp 591–598

Duke, J.A. 1981. *Hand book of legumes of world economic importance*. Plenum Press, New York. p. 199-265

http://postharvest.ucdavis.edu/Commodity_Resources/Fact_Sheets/Datastores/Vegetables_English/?uid=26&ds=799

http://www.ccari.res.in/waspnew.html

Hulse, J.H. 1994. Nature, composition and utilization of food legumes. p. 77-97. In: F.J. Muehlbauer and W.J. Kaiser (eds*.), Expanding the Production and Use of Cool Season Food Legumes*. Kluwer Academic Publishers. Dordrecht, The Netherlands.

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