

Pre-harvest fruit bagging: as eco-friendly approach for protection, colour, quality and reducing storage disorders in apple

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Abstract

Apple is considered as 'king of temperate fruits' in the world. In India, it is grown in hilly states like Himachal Pradesh, Jammu and Kashmir, Uttarakhand, NE states and to some extent in hilly regions of south India. From hills, apples are transported to plains for storage or marketing. During culture, apple is infested by several insect-pest and diseases, for which several insecticides and fungicides are sprayed. In general, Red coloured apples are preferred by the consumers in the market. For inducing red colour on apples, farmers use chemicals like ethrel, which may be injurious to human health. Similarly, during marketing, transportation and storage, apples suffer from several diseases and disorders. For the control of different diseases and disorders, farmers and traders use several chemicals and postharvest fungicides like carnendazim, thiabendazole, imazalil and captan are used, which are again injurious to human health. Hence, efforts worldwide have been started to find out some non-chemical approaches to reduce the incidence of diseases and disorders in fruits including apple. Several studies have indicated that pre-harvest fruit bagging has been proved to be very useful in reducing anthocyanin and reducing the incidence of insect-pests, sun scorching in several other fruits. Experiments on fruit bagging have given different results in different fruit crops. Hence, experiments were conducted to study the effect of single-layered spun-bounded fabric bags in apple cv. Royal Delicious. Studies were conducted in the Division of Post Harvest Technology, IARI, New Delhi-12 during 2010-12. Apples were bagged with single layered spun-bound fabric bags about one month before harvesting, in a private orchard at Kullu (H.P.) and the bagged fruits were re-exposed to sunlight for 3 days before harvesting. After harvesting, observations on colour, insect-pests, disease incidence and fruit Ca contents were taken. After initial observations, apples were stored at 2°C with 90-95%RH for 6 months, during which observations were recorded on fruit firmness, fruit Ca content, LOX activity, occurrence of diseases and disorders and quality parameters at monthly interval.

Standard procedures were adopted for taking these observations. Results indicated that bagging has resulted apples in the development of attractive red colour in apples over non-bagged apples. The incidence of sooty blotch and fly speck was significantly reduced (0.0%) over non-bagged apples (22.6%). Similarly, the incidence of San Jose scale was only 2.2% in bagged apples than non-bagged ones (12.6%). Fruit bagging has also affected the fruit firmness and quality of apples. At harvest, bagged fruits had higher firmness (38.6 N), Ca content (5.38 mg/100g) and LOX activity (1.38 $\mu\text{moles min}^{-1} \text{g}^{-1}$ FW) than non-bagged apples.

Fruit TSS (13.6 °B) and ascorbic acid content (28.6 mg /100 pulp) were also better in bagged fruits and their quality in respect to TSS, ascorbic acid etc, were also better over non-bagged apples. During storage, there was drastic reduction in disorders such as bitter pit, cork pit and brown core in the bagged fruits than non-bagged ones. At the end of 6th month of storage, the incidence of bitter pit (14.5%), cork pit (4.8%) and brown core (7.8%) was significantly higher in non-bagged apples than non-bagged ones.

Based on our results, it can be concluded that fruit bagging is a simple, eco-friendly technology, which has multifarious effects on apple fruits.

Biography

After post graduation from IARI, New Delhi, R. R. Sharma joined as Scientist there in 1997. He is Senior Scientist and associated with release of mango hybrids like Pusa Arunima, Pusa Surya, Pusa Lalima, Pusa Shresth, Pusa Pitamber etc., He has published 40 research articles in International journals, 60 in National journals, and authored 8 books. He is recipient of Dr. R.N. Singh award (twice), Dr Rajinder Prasad award (twice), and *Himachal Shri Award*. He has also served as International Mango Registrar for about 5 years (1999-2004). He is member, editorial board of *Scientia Horticulturae*, *International Journal of Fruit Science* (U.K.), *American Journal of Plant Sciences* (US), *Journal of Food Processing and Technology* (US), and *Stewart Postharvest Reviews* (UK), and Chief Editor of *International Journal of Processing and Postharvest Technology*, India.