New Package for Marketing Ripe Bartlett Pears

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Dec 1, 2005

Abstract

A newly developed suspended tray package (Hammock pack) is capable of protecting ripe Bartlett pears from transport vibration damage. The system can be designed for a consumer clamshell package or larger corrugated master container for food service applications.

Background

Ripe pears outsell green fruit by more than three-to-one in retail markets. But ripe fruit soften quite quickly at room temperature and are very susceptible to surface bruising. The bruising can be caused by transport vibration, rough handling of boxes at wholesale or retail distribution and by consumers inspecting fruit on display. The bruises on ripe fruit quickly turn dark brown reducing the visual appeal of the fruit. The pear industry and the consumer would greatly benefit from a package that would protect ripe fruit from bruises sustained in transportation, handling and retail display.

During the past fifteen years we have developed a good understanding of the physical causes of transport vibration bruising. It is greatest in the top boxes of pallets loaded in the rear of a trailer. Air ride suspension greatly reduces damage and packing fruit in polyethylene bags also minimizes damage to mature but not ripe pears. However ripe fruit that has begun to soften below 12 to 15 pounds firmness is very subject to damage even with best possible handling.

Goal

Develop a packaging system that protects pears from bruise damage and test its effectiveness of the suspended tray in protecting pears from transport vibration damage.

Procedure

We have developed a package called a suspended-tray pack (sometimes called a ‘hammock pack’) that better protects soft fruit from vibration damage, Fig 1. Commercial prototypes of the tray were manufactured by the FDS Manufacturing Co. Inc, Pomona, CA, (909-591-1733) and were used in the test. The system can be designed for a consumer clamshell package or larger corrugated master container for food service applications. The following packages were placed on a computer-controlled vibration

table and subjected to 30 min. of vibration, designed to simulate the worst (i.e. the roughest roads, most potholes, etc.) 30 minutes of travel in an across country trip (ASTM D 4728-91):

1) UCD suspended tray clamshell with 6 pieces of fruit per clamshell, 8 clamshells (2 layers) per 5-down master container, Fig. 2,
2) conventional clamshell – 8 pieces of fruit per clamshell, 6 clamshells (2 layers) per 5-down master container, Fig. 3,
3) Standard 2-layer tray pack.

Before placing the fruit on the vibration table, the fruit was allowed to ripen at room temperature to differing firmnesses. Immediately before the vibration test, the firmness of each piece of fruit was measured with a Sinclair nondestructive firmness tester. After the vibration test, the fruit were held for a minimum of 24 hours at room temperature to allow any firm fruit to soften below 10 pounds penetrometer firmness so bruises would become evident. Eighty pieces of fruit from the three package treatments and a non-vibrated, non-ripened control were scored for bruise damage. Damage was expressed using the 0 to 5 point Mitchell transit bruising scale. A score of 0 means no bruising damage, a score of 3 is enough damage for a consumer to consider not buying the fruit, and a score of 5 is a fruit with damage over its entire surface.

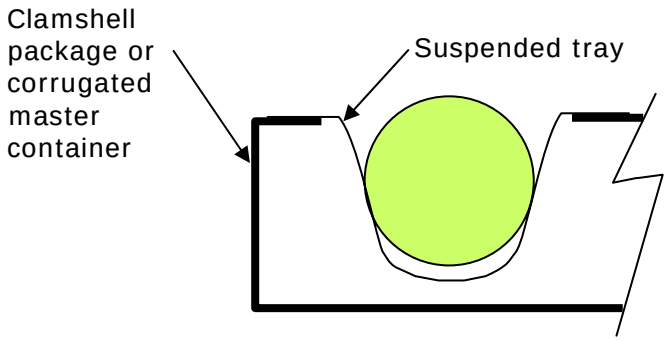

Figure 1. Cross-section view of the UCD suspended (or "hammock") package design for transportation and handling of ripe fruit.

Results

The UCD clamshell protected soft fruit from damage much better than either the standard 2-layer tray or the conventional clamshell, Fig. 4. At estimated penetrometer firmness levels less than 6 pounds the bruise score was just above 1 for the new clamshell. This means that the fruit sustained only slight damage that would not be noticeable to most consumers. Soft pears in the standard tray had bruise scores near 3, meaning that bruises were visible on over half the fruit surface and a consumer would seriously consider not buying the fruit unless it were discounted in price. Soft fruit in the conventional clamshell had a bruise score near 4. Damage was visible on over three-quarters of the fruit surface and it was unsaleable. Many fruits in the conventional clamshell were cut

where the fruit touched the plastic near the junction of the top and bottom sections of the clamshell.

Figure 2. Photo of suspended tray clamshell package (Hammock pack) used in test

Figure 3. Photo of standard clamshell package

We did not evaluate damage that may occur at retail display, but the two clamshell packages prevent consumers from sorting through fruit on display and squeezing it. Fruit shipped in conventional trays is usually displayed in bulk and subject to damage on display.

Conclusions

The suspended tray clamshell pack (Hammock pack) is capable of protecting soft, ripe Bartlett pears from transport vibration damage. Pears shipped in either the conventional clamshell package or the standard tray pack should not be softer than a penetrometer firmness of 12 pounds to prevent transport vibration damage.

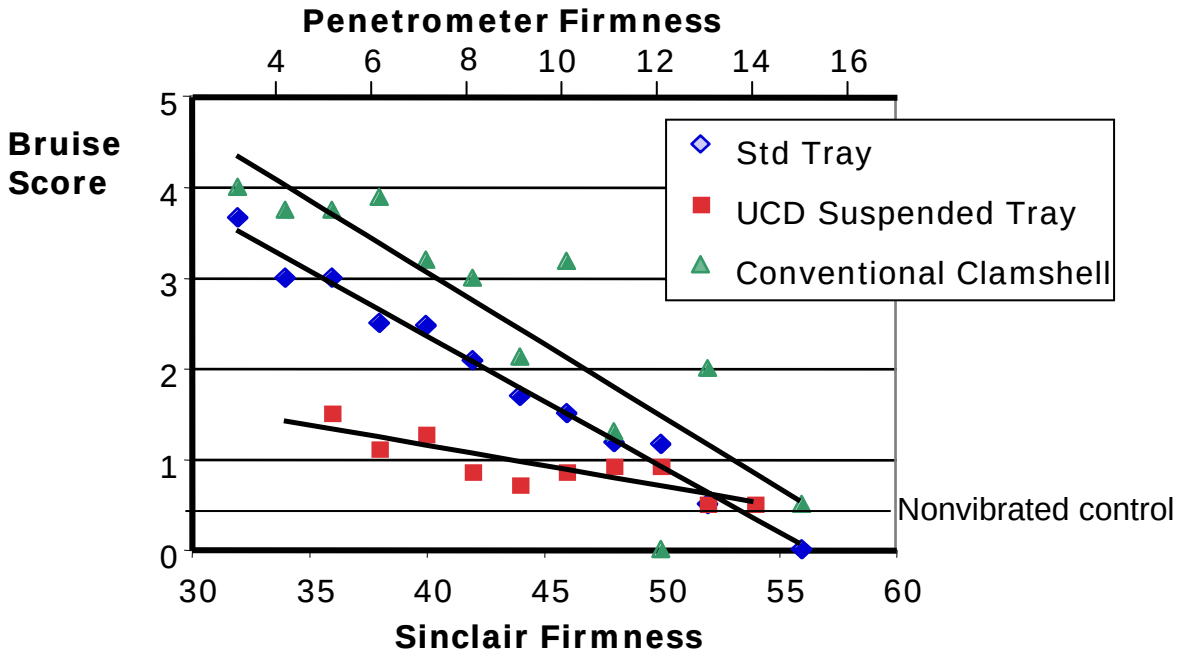

Figure 4. Effectiveness of three packages in protecting Bartlett pears from transport vibration damage. Each data point is the average damage score for all fruit in a 2 unit range of firmness.

Acknowledgements

We appreciate Bob McClain's assistance in obtaining fruit for the testing and his encouragement in the development of the new package.