# Brown Spot of Bartlett Pears

## disorder of canning pears a direct result of impact bruising of firm fruit during the handling operations after harvest

G. E. Mattus, L. E. Scott, and L. L. Claypool

**Barlett pear canners** have been concerned with brown flesh areas called brown spot that are not externally evident but are found upon peeling of pears.

Tests were conducted during the Bartlett harvest and storage season of 1957 to determine the incidence and cause of brown spot. Some 93 lots of grower-picked Bartlett pears were peeled and checked for presence of brown spot. Fruit was also checked from 96 lots of Bartletts at eight packing houses and more than 10,000 pear sections were inspected on the peeling lines in seven canneries.

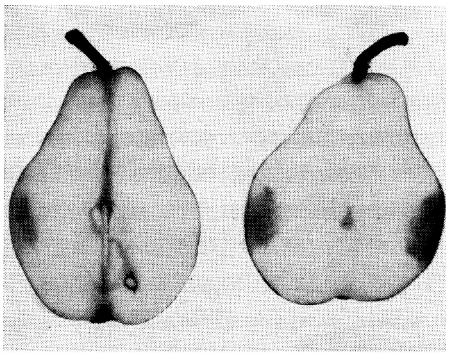
The findings of this study definitely established that the brown spot disorder was a direct result of impact bruising of firm fruit. Brown spot brusing was found to occur at all stages in the handling of pears from the time of harvest until the pears were ripened.

Brown spot developed immediately after bruising of pear fruits by impact and the affected tissues became water soaked in appearance. Later these areas darkened to various shades of brown, dependent presumably upon the enzyme-substrate system of the individual fruit. This browning occurred within three hours. With prolonged holding, bruised areas became dry and corky. These areas persisted during the storage, ripening and canning operations.

It was found that brown spot occurred on all canner lots of Bartlett pears from all commercial produicng areas in California that were checked. Brown spot incidence in canneries in Oregon and Washington was found to be similar to that in California.

The symptoms referred to as brown spot were not caused by surface abrasions such as limb rub, box rub, or belt bruise. Nor were they caused by slow pressure or slow compression forces but resulted instead from impact bruising such as occurred with drops in picking, filling of field boxes, dumping, sizing, or drops in refilling operations.

In the 1957 season, brown spot symptoms were not found on fruit on the tree and comparatively few brown spot bruises were found following careful harvesting operations. However, the incidence of brown spot could be highly due to lack of careful harvesting operations. Some lots showed 30%–40% brown spot and one lot ran 80%.



Bartlett pears cut to show brown spots that developed after bruising.

Hauling to canneries of filled pear boxes caused little or no bruising.

By far the great majority of brown spot bruising in 1957 resulted from the grading or sizing of firm fruit at packing houses and canneries. In general, the filling of cannery boxes resulted in brown spot in those fruits that struck the bottom of the lug box after falling from the carrying belt. Another important bruise site was the dumping operation. Other sources of bruising were excessive drops at various points in the grading or sizing lines, or fruit striking hard surfaces.

### Handling Care Necessary

Some packing house and cannery operators were shown how and where brown spot bruising occurred in their operations. After modifying grading and sizing lines such as reducing height of drops and padding of hard surfaces at points of impact, there was a great reduction in brown spot incidence in these establishments in 1957. Increased precautions are necessary to reduce Bartlett pear brown spot in handling at all packing houses and canneries.

To help determine factors that are related to bruise severity, drop tests were conducted on 3,000 pears at Davis. Variability was found in bruise incidence, bruise size and bruise coloring on pears from different orchards and even between pears in samples from the same tree. However, if drops were severe enough, all fruits would bruise. All Barlett pears are therefore subject to potential bruising and brown spot development.

Bruising severity was found to be greater when cold pears were bruised—31°F–41°F—than when warm fruit was bruised—70°F–80°F.

Although the degree of browning of brown spot may lessen during prolonged storage, bruised areas remained corky. These areas do not disappear in canning. When bruising occurs shortly before ripening there is little or no decrease in size or color of the brown spot during the ripening process. Ripe fruit bruising is visible externally and is not termed brown spot.

Although brown spot resulted from experimental bruising of firm pears of all varieties checked, Bartlett, Anjou, Bosc, Comice, and Winter Nelis, it has received little attention in fresh market pears. When the fruit is consumed fresh, the presence of brown spot apparently has not been considered a major quality factor. Also, because it shows no external blemish and does not result in fruit decay, it has not as yet been recognized by the fresh pear trade. However, when Bartletts are peeled for canning, brown spot is very objectionable.

Brown spot is of economic concern to Bartlett pear canners because it requires the use of extra labor in trimming, results in a loss of fruit trimmed, and lowers the grade of trimmed sections. Brown spot bruising therefore should be especially avoided in Bartlett pears intended for canning.

Since brown spot is a direct result of impact bruising, the following precautions will lessen the opportunities for such bruising at any point between harvest and ripening and will decrease the losses suffered from brown spot:

*1.* Harvesting should be done in a manner that will avoid dropping the fruit, especially when filling field boxes.

*2.* All dumping, sizing, and box filling operations should be carried out in such a manner that fruit will not drop onto a hard surface for distances in excess of 4″, or upon other fruit for distances exceeding 8″.

*3.* Existing grading lines should be carefully examined with respect to the above and all possible areas of impact be suitably padded or protected. Such examination should be made frequently during the packing season.

*4.* Particular attention should be paid to the dumping and box refilling opera-

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# Filbertworm Control

## experimental insecticides show promise in tests on northern California walnuts

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**In the second year** of tests, Guthion and Sevin—not yet released for use on walnuts—again showed encouraging control of the filbertworm on Payne and Franquette walnuts.

Prior to 1957 lead arsenate was the only insecticide that had shown much effectiveness against the filbertworm and the control obtained was less than desired, amounting to around 50%.

Experiments with Guthion and Sevin were undertaken in 1957. When applied on August 20 to Payne and Franquette walnuts in an orchard near Gridley both insecticides showed promise in controlling filbertworm. Because of the results the insecticides were investigated further in 1958.

All treatments and untreated checks were run in duplicate. Guthion, 25% wettable powder, at 6.5 pounds per acre and Sevin, 50% wettable powder at 8.0 pounds per acre were applied in approximately 200 gallons of water by an air carrier sprayer. Applications of both insecticides were made on August 20 when the husks of sound Payne nuts were just beginning to show signs of cracking.

At harvest, 100 nuts were picked from 10 trees for each variety plot. After curing, a crack test was made to determine the degree of infestation. Most of the wormy nuts had been attacked by the filbertworm. In the check plot, 22% of the Payne nuts and 9.6% of the Franquettes were infested. In the Guthion plots, 7.6% of the Payne and 2.4% of Franquettes were infested. The infestations in the Sevin treated plots were 10.2% for the Payne and 4.5% for the Franquettes. It is possible that both insecticides might have produced better results had they been used at a higher concentration per acre.

The filbertworm attacks walnuts nearly everywhere the crop is produced in northern California. Fortunately, it has proved to be a serious pest only in certain localities. However, in years of localized outbreaks there is a general rise in the infestation throughout most walnut producing sections.

The 1958 season concluded the fifth year of trapping filbertworm moths in bait pans in an orchard near Gridley. There was a large flight in 1958 and a destructive infestation occurred in the walnuts at harvest. The seriousness of the attack approched or may have surpassed the outbreak in 1954.

The 1958 season was the fifth consecutive year that the filbertworm has been a moderate to a severe pest in the potential areas of heavy attack. Prior to 1954 investigations indicated that the pest population reached peaks of outbreak proportions and then, in subsequent years, declined to almost noneconomic levels. The recent behavior may be caused by a developing strain of the filbertworm that has a greater preference for walnuts. The possibility of the development of such a strain certainly warrants investigation.

The filbertworm is unable to penetrate the sound green husks of walnut and therefore it can not enter the nuts until the husks begin to crack as maturity is reached. An outbreak of the filbertworm may not be very troublesome in itself, but can be annoying when added to the infestation caused by the codling moth or the navel orangeworm. Treatments directed against the codling moth exert no control against the filbertworm.

Because the information on chemical control is so limited, growers must rely upon cultural measures to check damage by the pest. Every effort should be made to harvest the crop at the earliest possible date because the filbertworm can not enter sound nuts until the husks begin to crack. Further, because the filbertworm is unable to complete its development on dried walnut meats, the crop should be thoroughly dried as soon as harvested.

Although neither Guthion nor Sevin has been released for use on walnuts, it is anticipated that permission for use on walnuts will be granted by the proper authorities.

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### NITRIFICATION

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and ammonium concentration becomes evident from a comparison of the maximum rates of nitrification at 45°F and at 75°F. The inhibiting effect of high ammonium concentration in the soil on nitrification rate was more pronounced at the lower temperature. In general, the time lag before the maximum rate of nitrification was attained, was longer at the lower temperature, and was extended with increasing concentration of ammonium nitrogen. Maximum rates of nitrification where aqua ammonia was applied varied from 4–41 pounds per acre per day depending on the temperature and concentration. Generally, the maximum rate at 45°F was between 20% and 40% of the rate at 75°F.

In California, the mean January temperature in the major agricultural areas does not go much below 45°F. Results of these experiments demonstrate that nitrification is still appreciable at temperatures below 45°F, which indicates that winter temperatures in California are not sufficiently low to prevent oxidation of substantial quantities of ammonium nitrogen to the nitrate form. The concentration effect of band applications of ammonium fertilizers—combined with low temperature—will play a role in retarding nitrification and thus preserve a greater proportion of the fall applied nitrogen for use by the following spring crop.

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### PEARS

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tions. In refilling, provisions should be made to break the fall of the fruit from the carrying belt into the bottom of the box.

5. When possible, fruit from cold storage should be permitted to attain room temperature before sizing operations take place.

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