Russeting of Bartlett Pears

investigation in two areas showed copper dusts applied for blight control not cause of russeting in orchards studied

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Bartlett pears—in a Placer County foothill orchard and in a Sacramento Valley orchard—were equally russeted in 1954, whether they developed on trees dusted with copper, sprayed with streptomycin, or given no blight control treatment during the blossoming period.

The 1954 findings corroborated those of 1953 when it was found that copper dusts applied during bloom to Bartlett pear trees—in the Sacramento Valley orchard—were not the primary cause of russeting.

The study was extended during 1954 to include a Bartlett pear orchard in the Placer County foothills.

Branch units of 30 to 60 blossom clusters were again used, and each treatment was repeated on five different trees. The bagging technique used during the blossoming period was similar to that used the previous season. Branches were protected—by large silk or muslin bags—from single applications or various combinations of the copper-lime dusts. However, instead of changing the bags only once between dustings, as was done in 1953, the branches to be protected were bagged just before each dust application and uncovered the following morning. Thus, the blossoms or fruit were exposed between dustings, and any direct effect of bagging was kept to a minimum.

In each orchard, five limbs were exposed to all the dusts but bagged between dustings. Some branches were bagged continuously during the first half of the blooming period; others, during the last half; and still others were bagged throughout the entire blooming period of trees dusted with copper-lime.

In 1953, the fruit from trees dusted with streptomycin had less russet than that from trees given no blight control. To determine if streptomycin might have some protective action against russeting, five branches in each orchard in the 1954 studies were sprayed with 100 ppm—parts per million—streptomycin either before or after each copper dusting.

Twig specimens were collected periodically during the blight-control period in each orchard and returned to the laboratory. Twigs, buds, blossoms, developing fruit, and leaves were examined for the presence of any insect that might cause russeting. No insects were found to account for the russeting that developed.

A few days before the first commercial picking, a sample—of ten fruits—was collected from each experimental branch and taken to the laboratory to be rated according to the per cent of lenticels russeted. The photograph on this page shows the extremes of lenticel russeting.

During the bloom period, trees in the block receiving the standard blight-control program developed for the Sacramento Valley orchard were given five dustings with 20–80 copper-lime at the rate of 30 pounds per acre—2.1 pounds of metallic copper per application. Branches on trees in three nearby blocks which received no blight control applications, or were treated with seven sprays of 100 ppm streptomycin or with seven dusts of 240 ppm streptomycin were bagged continuously for the entire bloom period. The bar graph in column 3 shows the percentages of russeted fruit from branches bagged to protect them from various exposures to the different blight-control treatments in the four test plots at the Sacramento Valley orchard.

Pears exposed to all five of the dustings under the standard program had an average russet rating of 47%. Protecting blossoms and fruit from the five dusts—by bagging the branch before each dusting and removing it the next day—did not significantly reduce the russeting of the lenticels.

Fruit dusted with all the copper applications but covered between dustings showed significantly less russet than exposed fruit. This fruit was protected from two spray applications of two pounds of DDT and 0.8 pound of parathion on April 19 and May 10. Pears that were bagged for each dusting but exposed between dustings received these sprays. This suggests that the significantly cleaner fruit obtained from the branches bagged between dustings may have been due to the absence of these two sprays. This possibility may be largely ruled out, however, since the fruit from branches bagged continuously from March 29 to April 13 was exposed to both of these sprays, yet was

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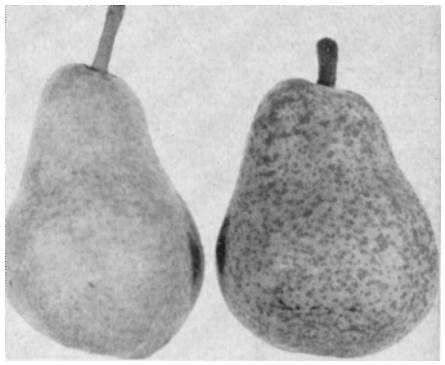
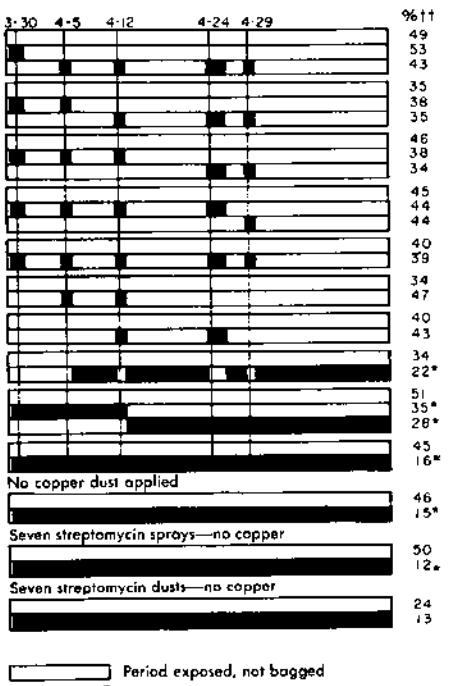


Left: Bartlett pear with little lenticel russet; rating 10%. *Right:* Severely russeted Bartlet pear; rating 90%.

The effect of bagging branches of trees receiving different blight-control treatments on russeting of Bartlett pears. Sacramento Valley, 1954.



† 20–80 copper-lime dust at 30 pounds per acre—2.1 pounds metallic copper.

Streptomycin spray applied at 100 ppm, 500 gallons per acre.

Streptomycin dust applied at 240 ppm, 60 pounds per acre.

†† Each value is the average of five ten-fruit samples. The per cent of russeting values of fruit protected for various periods of time should be compared with the value of exposed fruit in the same group.

* Lenticel russet of protected fruit significantly less than exposed fruit—5% level.

RUSSETING

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significantly less russeted than fruit exposed between dustings.

Pears bagged continuously during the first half, second half, or all of the dusting period had significantly less russet than exposed fruit.

Fruit on trees which were not dusted or sprayed with any blight-control material was just as russeted as fruit dusted with copper-lime.

Pears on trees sprayed with seven applications of 100 ppm streptomycin had just as much russet as fruit dusted with copper-lime according to the standard schedule.

Spraying 100 ppm of streptomycin either before or after the standard copper-lime dustings had no effect on the amount of lenticel russeting. Streptomycin as applied did not protect the fruit from the russet-causing factors.

Pears from trees dusted with streptomycin had less russet than fruit dusted with copper-lime, sprayed with streptomycin, or given no blight-control treatment. This corroborated the 1953 findings and gives further evidence that streptomycin dust may have a protective action against russet. Since spraying streptomycin either before or after the copper-lime dustings had no effect on the amount of russet, the bentonite carrier used in the streptomycin dust may have been responsible.

The Placer County orchard received five dusts of a 20% basic cupric zinc sulfate complex at the rate of 20 pounds per acre—0.7 pound metallic copper per application—according to the blight-control program developed for it. In addition to the dusts, this orchard was sprayed on April 22 with two pounds of DDT, one pound of a basic cupric zinc sulfate complex, and six pounds of wettable sulfur at the rate of 400 gallons to the acre—0.8 pound metallic copper. The amount of russeting on fruit from branches bagged to protect them from either all of the copper applications or various combinations is shown in the bar graph on this page.

Significantly less lenticel russet—44%—occurred on the fruit that developed on the branches bagged during the time of the one-spray application on April 22 than on fruit from branches exposed to this spray—58%. This reduction in russet was of commercial importance since most of the pears exposed to the spray could be marketed only for canning, whereas a high percentage of those protected could have been sold in the fresh market.

In addition to the lenticel russet, approximately 20% of the fruit exposed to this spray had large, conspicuous spots of russet. Pears protected from the spray were almost completely free from these spots.

Pears harvested from branches bagged during each copper dust application but exposed to the one spray had as much lenticel russeting and spotting as fruit exposed to all the dusts as well as the spray.

Pears exposed to all of the copper dusts and the one spray containing copper but bagged between applications showed significantly less lenticel russeting than exposed fruit. The russet spotting was not reduced, however. Bagging apparently had some protective action against lenticel russeting.

Fruit from branches bagged continuously either throughout the blight-control period or for the last three-quarters of it had significantly less russet and spotting than pears exposed to the five dusts and the spray. The fruit was protected from the spray in both cases.

It is apparent, therefore, that the spray mixture applied April 22 was responsible for the russet spotting as well as for the significant increase in amount of lenticel russet. Just which material or combination of materials was responsible for the russeting is not apparent. Only 0.8 pound of metallic copper per acre was applied. According to the orchard manager, similar spotting occurred the year before when the same spray plus parathion was used.

As was true in the Sacramento Valley orchard, spraying 100 ppm of streptomycin either before or after the regular copper dust applications had no effect on the amount of lenticel russet or spotting.

The results of this two-year study show that copper dusts applied for blight control did not cause the fruit russeting present in the orchards under study. The specific factor or factors responsible for the russeting were not determined, but adverse weather conditions are indicated. Regardless of treatment, the longer the fruit was protected by bagging during blossoming and blight control, the less russet developed. The effectiveness of bagging in preventing russet, therefore, seems to be largely due to protection from unfavorable climatic conditions. Weather conditions such as cold, frost, cold winds, heavy rains, and continuous, cloudy weather during the blossoming period have been associated with fruit russeting.

In the experiments here reported and observations in other orchard trials, pears from trees sprayed with streptomycin to control pear blight had the same degree of russeting as fruit from trees treated with copper dusts or not treated at all.

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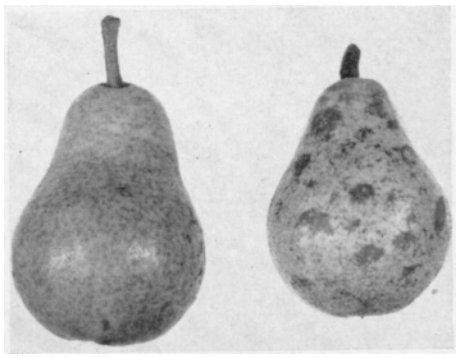
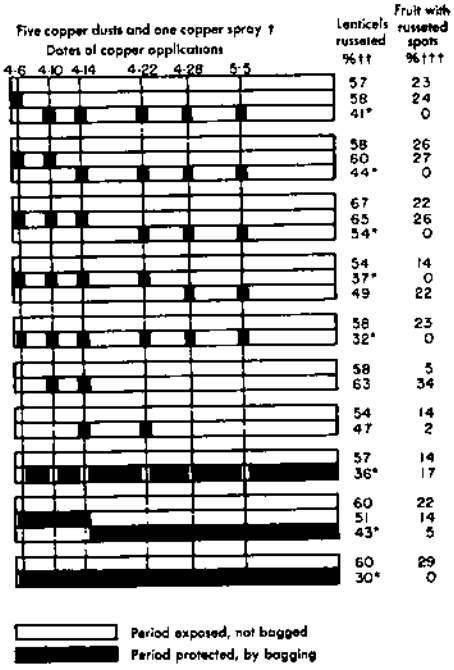


Left: Bartlett pear protected from spray containing 2 pounds DDT, 1 pound basic cupric zinc sulfate complex, and 6 pounds wettable sulfur per 100 gallons of water at 400 gallons to the acre, on April 22. Right: Bartlett pear exposed to the above spray.

The effect of bagging branches of trees receiving copper blight-control treatments on russeting of Bartlett pears. Placer County, 1954.



† Basic cupric zinc sulfate complex dust at 20 pounds per acre—0.7 pound metallic copper.

Spray applied April 22 at 400 gallons per acre:
2 pounds DDT
1 pound basic cupric zinc sulfate complex—0.8 pound metallic copper
6 pounds wettable sulfur per 100 gallons

†† Each value is the average of five ten-fruit samples. The per cent of russeting values of fruit protected for various periods of time should be compared with the value of exposed fruit in the same group.

††† See photograph above.

* Lentical russet of protected fruit significantly less than exposed fruit—5% level.

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F. M. Summers, Associate Professor of Entomology, University of California, Davis, made the examination for insects which might account for russeting.