

COLD RESISTANCE OF THE AVOCADO

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Several rather cold periods of weather having occurred during the winter of 1916-17, it was thought desirable to collect information regarding the effect of the cold on the different varieties of avocados. It is highly important in this early stage of the industry to have as reliable information on this matter as it is possible to obtain. Early in the winter, the writer sent a letter to each member of the Avocado Association, requesting him to make observations as to comparative injury on his different trees and report these observations. Carefully prepared statements were received from some fifty different members, and the writer desires to extend his thanks to these members for their kind co-operation.

The conditions were so variable in different places, and the temperature records reported so unreliable in many instances, that it has not appeared to the writer to be profitable to report the different observations in detail. Certain points were reported, however, in sufficient harmony to indicate their reliability, and these observations may thus be taken as fairly conclusive evidence. A summary of the conclusions from a study of the various reports follows:

FACTORS INFLUENCING INJURY

AGE OF TREE.—Of the same variety, young trees are much more easily injured than old trees. In several instances nursery trees of a variety were killed to the ground, while five to eight-year-old budded trees sustained no appreciable injury, only the young, growing tips being injured. In analyzing the reasons for this result, it must be remembered that the cold is usually most severe near the surface of the ground. The tender shoots and branches on an old tree are much further from the ground than on the young tree, and in a warmer zone. Wood of the same age on an old tree may be just as tender as that on a young tree.

CONDITION OF GROWTH.—The observation was very generally made that trees in a condition of rapid growth were much more injured than similar trees of the same variety that had completed their growth and were more or less dormant. In the same orchard, trees side by side frequently showed marked differences. One tree, in rapid growth, exhibited injured young leaves all over its surface, while a tree of the same variety, next to it, having no young growth, showed no indication of injury. This is apparently not merely a difference of age of wood or branch injured, as the older leaves on a rapidly growing tree showed more injury than similar leaves on the dormant tree.

CONSTITUTIONAL CONDITION.—Vigorous, healthy trees showed much less injury than trees weakened by disease, transplanting, or other causes. Trees, newly planted, that had not fully recovered from the shock, were severely injured. Weak, sickly looking trees, which occur to some extent in almost every planting, suffered much more than good, vigorous trees of the same variety and age. Trees with weak tops from poor bud unions showed severe injury. Apparently any condition that results in weakening the trees,—such as, poor cultivation, poor irrigation, disease, or mechanical injury,—renders the tree more susceptible to cold injury.

TIME WHEN IRRIGATED.—The evidence on the effect of irrigation is very meager, but there are some observations to indicate that trees that were suffering for water and needed irrigation when the freeze came, suffered rather severely, as did also trees that had been irrigated three to five days before the freeze and were thus gorged with water. The least injury seemed to be on trees that had been thoroughly irrigated two or three weeks before the *freeze*, and had water supposedly in what might be termed optimum amount. This degree of injury, with reference to water condition in the soil following irrigation, was very clearly brought out with citrus trees in the great freeze of 1913 and evidently applies also with the avocado.

COMPARATIVE HARDINESS OF VARIETIES

The data regarding the comparative hardiness of the different varieties is so conflicting that only a few statements can be safely made.

All observers agree in placing the Mexican varieties as the most hardy, with the Guatemalan varieties coming second and the West Indian and Hawaiian sorts, third. Several cases were reported where a tree of a Mexican variety was more injured than similar-aged trees of Guatemalan varieties nearby, but in all such cases the greater injury of the Mexican tree was apparently due to the sappy, growing condition in which the tree was caught.

Of the Mexican varieties, the Knowles and San Sebastian appear to be slightly the most hardy, but the degree of difference between the true Mexican sorts is very slight. Queretaro, which may be a hybrid and not a true Mexican type, proved rather tender. Puebla, which is thought to be a Mexican-Guatemalan hybrid, in general proved to be about as hardy as the true Mexican.

Observations on the various Guatemalan varieties were very conflicting, and no very positive statements can be made. Apparently, the following classification of the degree of hardiness of a few varieties is about correct:

Most hardy—Fuerte and Lyon;

Medium hardy—Taft, Spinks, Sharpless, Dickinson, and Challenge;

Most tender—Meserve and Miller.

The following statements of temperature endurance is based on a very large number of observations made in different places and is as nearly correct as can be determined from the data collected:

30° F.—Nothing injured so far as could be observed.

29° F.—No injury of account; only traces on most tender growth of West Indian and Guatemalan varieties.

28° F.—New foliage scorched on Guatemalan types; West Indian varieties showing considerable foliage damage.

27° F.—Mexican varieties, with new tips slightly scorched; Guatemalan, with almost all new foliage injured; West Indian-badly damaged.

25° to 26° F.—Mexican varieties, with new foliage injured but some dormant trees uninjured; all Guatemalan sorts, with new foliage badly injured and some old foliage scorched.

24° F.—Some dormant Mexicans uninjured; Guatemalan varieties badly injured, small limbs frozen back.

21° F.—All Guatemalan types killed to bud; a few of hardiest Mexicans, such as Knowles and San Sebastian, with young leaves only, injured.

It must be remembered that the above statements at best can only be approximately correct; and much variation will always be found, due to tree condition and environment.