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## Winter Injury to Fruit Trees

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THE following is an outline of the conclusions reached so far with regard to the factors which affect winter injury of fruit trees.

A. Factors which affect the general air temperature of fruit plantations.

1. Slope of land—North slope gives more even temperature as the heating effect of sunshine is considerably lessened. Sun-scald may be somewhat lessened on slopes because of the more even temperature, but as a rule sun scald is particularly a local problem, and is concerned only with the exposure of any given portion of the tree to the sun's rays.

2. Presence of large bodies of water. This also regulates temperature, and tends to keep it more uniform. In addition it also furnishes moisture by evaporation and thereby checks evaporation of moisture from the twigs and the surface area of trees. This is especially important during the winter time, as actual injury seems to be due in many cases to the dryout rather than to the actual degree of cold experienced.

3. Windbreaks.—Windbreaks check the force of wind and thereby reduce evaporation, important in summer, but more important during winter conditions. Under normal or dry temperature conditions, windbreaks tend to widen the daily range of temperature, but when trees are wet, as after rain, windbreaks tend to check evaporation, but equalize the temperature of the twigs themselves. Evaporation of moisture from the surface of the twig under the influence of wind may reduce the temperature of the twig to a point several degrees below that of the actual air temperature.

B. Factors which influence maturity of the tree. It is well known that late growth in autumn greatly increases the danger of winter killing.

1. Character of Soil.—Lighter soils appear to give better results in northern districts. This may be because they are warmer, and it is of course true that light soil warms up quicker in spring and cools off earlier in the fall. It is stated by some that vines and trees generally mature earlier on clay land than on sand. It is probable, however, that trees thrive better on lighter soil in the north because of the check of root activity, which occurs when the soil cools in early autumn.

2. Underdrainage.—A surplus of water in the soil delays cooling in autumn, and by prolonging root activity also prolongs growth.

3. Soil Treatment.—In cultivated orchards cover crops are sown at mid-summer, or somewhat earlier, to extract moisture, and thereby cause earlier ripening of the wood. Trees in sod, if well nourished and not