

NOTE ON ESTIMATION OF LEAF AREA AND LEAF DISTRIBUTION IN FRUIT TREES¹

Knowledge of leaf distribution and leaf area measurements are essential factors in estimation of the photosynthetic potential of fruit trees. In this note, methods for mapping leaf distribution in fruit trees and for providing a rapid estimate of individual leaf area are described.

One north-south and one east-west vertical wire grid plane, through the center of the tree, are placed in each tree studied. Each grid plane is divided into four equal horizontal layers from the highest to the lowest foliage. The vertical planes are further divided into 16 vertical sections, 4 in each direction of the vertical planes from the center of the tree to the outermost foliage (Figure 1).

The numbering system indicates both the location of the grid section and the intersections of the grid wires. For example, in Figure 1, section N23 is located in the north side of the tree, the second quarter down from the top and the third quarter in from the outside. This section is determined by the four points of intersection N23, N24, N33 and N34.

Counts of spur and shoot leaves are made between movable guides 6 inches on either side of the grid plane in each of the grid sections. The total leaf areas in these 64 grid sections are calculated by use of leaf counts

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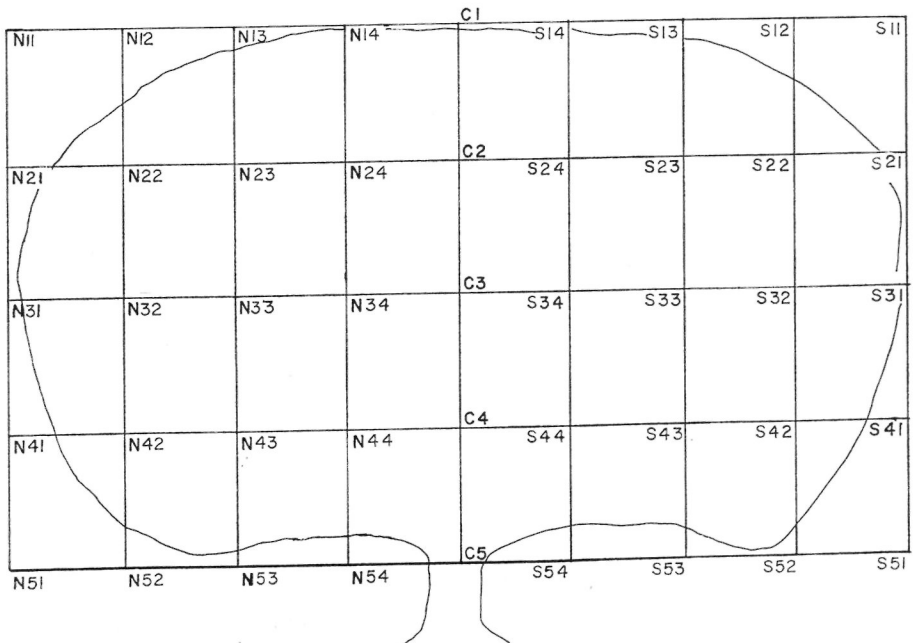


FIGURE 1. North-south vertical-grid plane and numbering system superimposed on tree outline. Each tree also has an east-west plane through the center of the tree.

and an average area per leaf. The leaf area of the two 1-foot panels through the tree is considered as the total, and the leaf area of each grid section as a percentage of that total. The leaf-area-index (LAI) is the ratio of leaf area to the horizontal ground surface above which it occurs. This was calculated for each of the 16 vertical sections. "Partial" LAI's were calculated by determining the leaf area down only to the level of each horizontal wire in each of the vertical sections. These leaf areas above the various levels are then related to the horizontal surface area covered by one vertical section, 1-foot wide. This produces three "partial" LAI's in addition to the regular LAI for each vertical section. This measurement makes it possible to study the influence of leaf density on light penetration. The total leaf area of the tree or a portion of the tree is calculated either by comparing the tree volume to the volume of the two 1-foot panels (Equation 1), or by using the LAI and the horizontal areas occupied by the tree (Equation 2).
Equation 1:

$$\text{Tree leaf area} = \text{tree volume} \times \frac{(\text{panel leaf area})}{(\text{panel volume})}.$$

Equation 2:

$$\text{Tree leaf area} = \text{LAI} \times (\text{horizontal area occupied}).$$

In order to account for leaf size differences due to their type and location, areas are calculated for inner and outer spur and shoot leaves by measuring all leaves on fifteen shoots or spurs in each category. Outer tree samples were those from the upper or outside quarter of the tree. The inner tree samples were taken from the inner three-quarters of the tree.

Individual leaf area is determined by the use of a transparent grid on which white dots have been placed in the center of squares each of which has an area of 0.5 square centimeter (Figure 2). The leaf, either attached or detached, is placed on a white background and the grid is then placed over the leaf. The white dots visible on the green leaf are then counted. Each dot counted represents one-half cm² of leaf area. If small leaves are used closer spacing of the dots is required. This method has been used in studies to determine foliar distribution in relation to light penetration in fruit trees. The grid system was also used to provide points of reference for the light readings.

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NOTE ON CONTROL OF THE IMPORTED CABBAGEWORM *PIERIS RAPAE* (L.) ON CAULIFLOWER¹

The recent establishment of a frozen vegetable industry in the Annapolis Valley of Nova Scotia has created a demand for cauliflower, broccoli, and Brussels sprouts that are virtually free of insect injury. The experience of local growers in controlling foliage pests of cole crops has been limited to a

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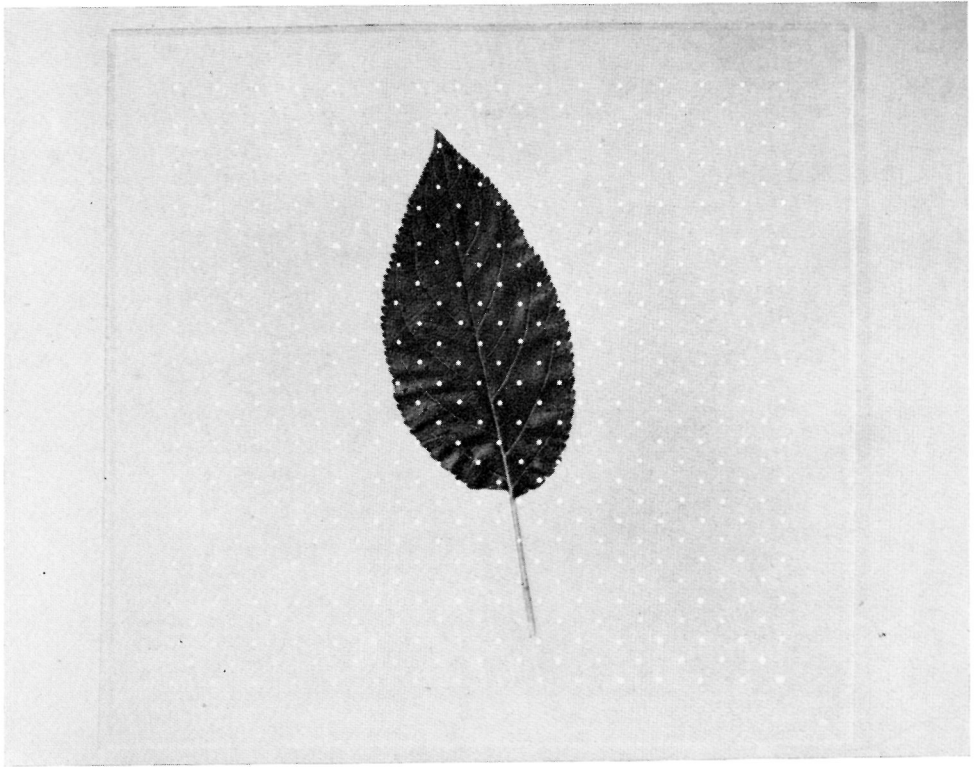


FIGURE 2. Transparent leaf-area grid in position over leaf. (Count indicates 30 square centimeters for this leaf.)