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represented a decreasing percentage of the relative maximum yield from the lowest to the highest rate of planting. The low summer rainfall was a big factor in limiting the yield of corn at the higher rates of planting in this experiment.

The data also show that the decrease in grain per plant with increasing rate of planting was due to a reduction in both leaf area per plant and grain/dm$^2$ of leaf area. [Grams of grain reduction per plant for each of these causes can be calculated from the data in Table 3.] On the other hand, the increase in bushels per acre with increase in rate of planting, was associated with an increase in leaf area per acre and a decrease in grain/dm$^2$ of leaf area. The failure of the different rates of planting to reach 100% of their relative maximum yield was due to the reduction in grain/dm$^2$ of leaf area only, which in all probability was caused by mutual shade and lack of water.

Producing sufficient leaf area per acre for a very high yield of corn grain is a rather easy thing to do, as shown by the relative maximum bushels per acre for the higher rates of planting in Table 3. Therefore, the problem in further increasing the acre yield of corn is to produce more grain per unit of leaf area at current rates of planting or have the actual yield represent a higher percentage of the relative maximum yield. Consequently, analysis of corn yield data from the standpoint of grain/dm$^2$ of leaf area, relative maximum yield, and the percent the actual yield is of the relative maximum yield, seems to be a logical interpretation of the data for the development of higher yielding corn hybrids.

A RAPID METHOD FOR DETERMINING LEAF AREA OF POTATO PLANTS

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A RAPID nondestructive method of determining growth rate of potato plants is needed in studies of factors affecting early top growth, tuber initiation, and tuber development. With potatoes several indirect methods have been used (2, 6). Broadbent et al. (3) estimated total leaf area of potato plants from determinations of leaf area of a small number of leaves per plant. Bald (1) developed a series of standards of known leaf area for estimating the area of individual potato leaves. Williams (7) used tomato plants and Williams et al. (8) used clover and lucerne to further refine this technique. Procedures involving use of a photoelectric cell were reviewed in a book edited by Milthrope (4). A further modification of this technique was described by Voisey and Kloek (5).

The objective of the present study was to investigate leaf area as an indication of plant size and to develop a rapid, nondestructive method for estimating leaf area.

Leaf area was determined by outlining the leaf and measuring the area with a planimeter. Data on length, width, and area were obtained for individual leaflets and compound leaves of entire plants. The compound leaf of the potato plant was measured from the base of the petiole to the leaf tip. Data were obtained on plants of the Katahdin variety grown in the field and under a range of soil temperatures in the greenhouse. Measurements on greenhouse-grown plants were made during June and March and June. Selected measurements on field-grown plants of five varieties: 'Katahdin', 'Bliss', 'Russet', and 'Cobbler'.

Leaf area of Katahdin potato plants was correlated ($r^2 = 0.94$) with dry weight of plant tops. The relationship was similar whether the plants were grown in the greenhouse or in the field. Leaflet area showed a linear relationship between leaf area as a function of leaf length for plants grown in the field and at different seasons in the greenhouse.

Figure 1. Leaf area as a function of leaf length.

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Figure 1. Leaf area as a function of leaf length.
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Figure 2. Regression lines for leaf area as a function of leaf length for plants grown in the field and at different seasons in the greenhouse.
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