RELATION OF LEAF AREA TO GRAIN YIELD IN SORGHUM

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Leaves differ in size, shape, surface area, and number per plant among different varieties of sorghum. Early-maturing varieties generally have smaller and fewer leaves than late varieties. The number of leaves, as shown by Sieglinger (3), varies with date of planting, locality, season, and other environmental factors, as well as with variety, and the length of the maturity period is increased from 2.8 to 3.5 days for each additional leaf a plant produces. The number of leaves is not constant for a variety, but for each variety there is a range of number of leaves produced that is fairly constant for a given environment.

Dwarf, short-stalked varieties may have as many leaves and as great a leaf area as tall varieties when both have the same or a similar range of maturity.

The purpose of this paper is to show the relationship of the leaf area of sorghum plants to grain yield and the response of leaf development to rainfall. The determinations were made at Hays, Kans., from 1929 to 1933.

MATERIALS AND METHODS

Leaf area determinations were made on plants of Dwarf Freed, Modoc, Custer, Kalo, and Dwarf Yellow milo. These five grain sorghum varieties were selected because they covered a rather wide range in time of maturity, height, leaf area, number of nodes, and length of internodes. The plants were grown in field plots by the usual methods with the spacing 6 inches apart in the row which was considered to be about the optimum for grain production under the conditions at Hays, except that milo generally responds better to a thinner stand.

About two weeks after full heading, but before any of the functioning leaves had dried or become torn by the elements, the sorghum stalks were cut several inches above the crown and taken to the laboratory. The leaves, without the sheaths, were stripped from the stalks and charted on paper with a pantograph. Later the leaf area was determined by a planimeter and calculated in terms of square feet per acre from the known number of stalks growing on 0.0424 acre plots. Leaf measurements were taken on three to six stalks of each variety each year. Both main and tiller stalks were used, since both types function in grain production. Only one surface of the leaves was considered as the measured area.

The leaves measured were only those still functioning and varied from 5 to 13 per stalk depending upon the variety. The small dried up leaves at the base of the stalks were discarded. Sieglinger (3) has shown that sorghum varieties similar to those studied at Hays may produce a total of 15 to 26 leaves. Usually, the lower 10 or 12 small leaves of the plants are covered by cultivation, are more or less disintegrated, or are so badly frayed by the elements before the active fruit-