I. General Morphology

THE CULTIVATED oat is an annual grass. Its stem or culm is composed of a series of nodes and internodes. The nodes are solid. The elongated internodes of the mature stem are hollow in the center but during the early vegetative stage of development the internodes are solid or show only a slight indication of the breakdown of pith.

The position of the leaf on the oat plant and the kinds of plant parts produced are similar to those in other grasses (Arber, 1934). The leaves are solitary, alternate, two-ranked (distichous), and sessile. A completely developed oat leaf consists of a terminal portion, the blade, a basal portion, the sheath, and a membranous appendage, the ligule. The blade is elongate, flat, narrow, and linear. The margin of the blade is entire and its tip is acute. The leaf sheath is an open cylinder. In the young plant the sheaths of the older leaves enclose the stem and the younger leaves. At maturity, the leaf sheath encloses all or a portion of the elongated internode above it. The ligule is a thin membranous appendage which is continuous with the inner margin at the junction of the blade and sheath. The ligule extends upward and clasps the stem (Stanton, 1955).

The lateral branches (tillers) of the oat plant arise in the axils of the foliage leaves. The first leaf on a tiller, the prophyllum, differs from a foliage leaf in having two keels and a large vascular bundle in each keel but it is without a blade. The plane of the leaves of a tiller (lateral branch and associated adventitious roots) is at right angle to that of the parent axis.

The oat inflorescence is a loose open panicle (Fig. 1). The main axis of the panicle is a continuation of the stem and it ends in a single spikelet. Solitary, alternate, two-ranked, lateral branches arise from the main axis. Each first-order branch gives rise to second-order branches, and so on, forming a system of branches of different orders. The most basal branch is the most profuse in its branching, and the number of branches at each node decreases from below upward so that there will be found only one or a very few second-order branches on the first-order branch just beneath the apical spikelet (Figs. 2 to 6). Each branch terminates in a pedicellate spikelet (Bonnett, 1937).

Oat spikelets consist of two empty glumes (bracts) on a rachilla, which bears several flowers, but usually only the two basal flowers are fertile. The flower consists of a lemma and a palea, two lodicules, three stamens, and one pistil (Figs. 27 to 36). Superficially the pistil consists of an ovary and two styles upon which there are stigmatic branches (Figs. 33 to 35).