Proceedings of the Iowa Academy of Science

Volume 40 | Annual Issue Article 27

1933

Contraction of the Roots and Crowns Medicago and Melilotus

Austin O. Simonds
Iowa State College

J. N. Martin
Iowa State College

a large part of the xylem and are present in the phloem of the roots and crowns of the alfalfas and sweet clovers. They deserve mentioning in these legumes because the modifications they undergo at different periods in the plant's growth cycle indicate that they function as storage structures, and have an importance relative to the nutrition of the plant.

The libriform fibers, as they occur in the roots and crowns of the alfalfas and sweet clovers, are long and slender, ranging from one half to two millimeters in length and from five to ten microns in width. They have three walls, primary, secondary, and tertiary. The primary and secondary walls are relatively thin, whereas the tertiary wall, which is the one involved in storage, attains a remarkable thickness when fully developed. The walls are crossed by simple pits.

In the alfalfas the tertiary layers are removed from the fibers in the locality of the cambium during the early spring growth and are restored as soon as an excess of food is provided. In the biennial sweet clovers the tertiary layer is removed from most of the fibers during the second season, chiefly during the formation of flowers and seeds, and there follows the thickening and lignification of the remaining portion of the libriform fibers which consequently become responsible for the woody texture of the main root at the end of the second season.

IOWA STATE COLLEGE,
AMES, IOWA.

CONTRACTION OF THE ROOTS AND CROWNS MEDICAGO AND MELILOTUS

AUSTIN O. SIMONDS AND J. N. MARTIN

The longitudinal contraction, a natural phenomenon of many plants, which results in lowering the basal portion of the plant deeper in the soil, is apparently accomplished in various ways.

In both alfalfa and sweet clover the crowns are pulled vertically downward two to four inches during the first season. This is accomplished chiefly by the contraction vertically and the expansion radially and tangentially of parenchymatous cells that are continuously being formed in isolated groups scattered among the vascular elements. The development and expansion of these intercalated masses of parenchyma separate the vascular elements into tortuous strands, the tortuosity of which results in the shortening

of the entire vascular cylinder. The strands of libriform fibers in the cortex are shortened in the same manner.

There is evidence, however, that some of the parenchyma tissues, as those of the cortex, are forced to reduce their vertical dimension on account of the compression induced by the lengthwise shortening of the mechanical tissues. The crumpling sometimes noticeable on the surface of the roots and crowns of the biennial sweet clovers affords evidence of this fact.

IOWA STATE COLLEGE,
AMES, IOWA.

GERMINATION OF CORN IN THE FIELD AS AFFECTED BY SOIL AND AIR TEMPERATURE

J. M. AIKMAN

The corn was planted at weekly intervals from April 15 to May 27. A continuous record of soil and air temperature was obtained from a soil-air thermograph set up in the plot. Tabulations were made of maxima, minima and average weekly soil and air temperatures for the germination period of each planting. The length of the period necessary for 85 per cent emergence for the seven plantings was 21, 22, 18, 18, 16, 15 and 11 days respectively. Length of germination period shows a higher correlation with average soil temperature than with air temperature. Correlation with the total heat units above a plant zero of 50° F. is highest.

IOWA STATE COLLEGE,
AMES, IOWA.

THE EFFECT OF LIME AND PHOSPHATE ON NITRIFICATION IN AN ACID SOIL

HAROLD L. DEAN AND F. B. SMITH

The nitrate content in all soils is maintained through the action of microorganisms upon ammonia. This process of nitrate production is called nitrification. It is interesting to note the effect that lime and rock phosphate has upon the nitrate producing power in an acid soil.

Tama silt loam, having a pH of 5.3 and lime requirement of 3 tons per acre, was used for this experiment. Calcium and dolomitic

