THE NUMBER OF TEMPORARY ROOTS IN THE CEREALS.

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The statement that seeds of the cereals, particularly of corn, upon germination produce either three or four temporary roots has been generally accepted without investigation insofar as the writer has been able to find. Livingston, speaking of corn, says:

When a kernel is placed in the ground, with conditions favorable for growth, a root shoot called the hypocotyl rapidly pushes downward into the soil. Soon two or three branches grow out from the base of the hypocotyl.

Montgomery makes this statement:

When a kernel of maize germinates there is produced, first, a root from the tip end of the seed. A few hours later the stem will appear at the upper end of the germ chit. At nearly the same time two roots will be sprouting from about the median joint between root and stem. These are the "temporary" roots and maintain the plant for a short time.

General observations made in class-room tests indicated that there was considerable variation in the number of temporary roots produced by corn and that probably the above statements had been made from an insufficient number of observations. The purpose of this paper is to give some data recently gathered on this subject.

Seeds upon germination first send out what is known as the radicle and a very short time later the plumule appears. The plumule develops into the stem while the radicle is the first and most important temporary root. Next appear whatever other temporary roots that develop, the number varying from none to twelve. Later the permanent roots appear, forming a whorl at the first node, which is usually about an inch below the surface of the soil. The temporary roots during their short period of existence function in the same way as the permanent roots; that is, they absorb water and food material. As the permanent roots develop the temporary roots slowly disappear, as they no longer function in the development of the

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2 Livingston, George, Field Crop Production, p. 31. New York, 1914.