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A TECHNIQUE FOR INVESTIGATING ROOT DISTRIBUTION

Joseph H. Robertson

Range Ecologist, Department of Environmental and Resource Sciences, University of Nevada, Reno, Nevada 89557 U.S.A.

ABSTRACT

A method of direct observation of root tips in the field is described. Covered holes served as moist chambers and root tips of nearby plants extended from the walls where they could be recorded and correlated with soil characteristics or phenology.

Most methods of root study are time consuming, destructive to the root system, or require artificial conditions. The method described here also has these advantages, but in only a limited degree. It is a technique for ascertaining root distribution relative to the soil surface or to soil horizons. It can be used, for example, to discover the time of resumption of root growth in the spring as a guide to time the application of systemic growth regulators and defoliators.

KEY WORDS: root growth, root distribution, root phenology

METHODS

In the first trial, cylindrical holes were dug, before spring growth, to a depth of 3 feet, and a diameter of 12-14 inches. Extraneous species were carefully removed at the crown, leaving only the plant of immediate concern near the hole. A 5-gallon bucket of water was placed in each hole with cloth wicks over the side to increase evaporation. Finally, the holes were covered with boards and mounded with earth.

At weekly intervals the holes were partially uncovered and the first appearance of root tips observed with the aid of a flashlight. If desired, rates of appearance by depths could be determined by marking each tip with a different colored toothpick at each inspection.

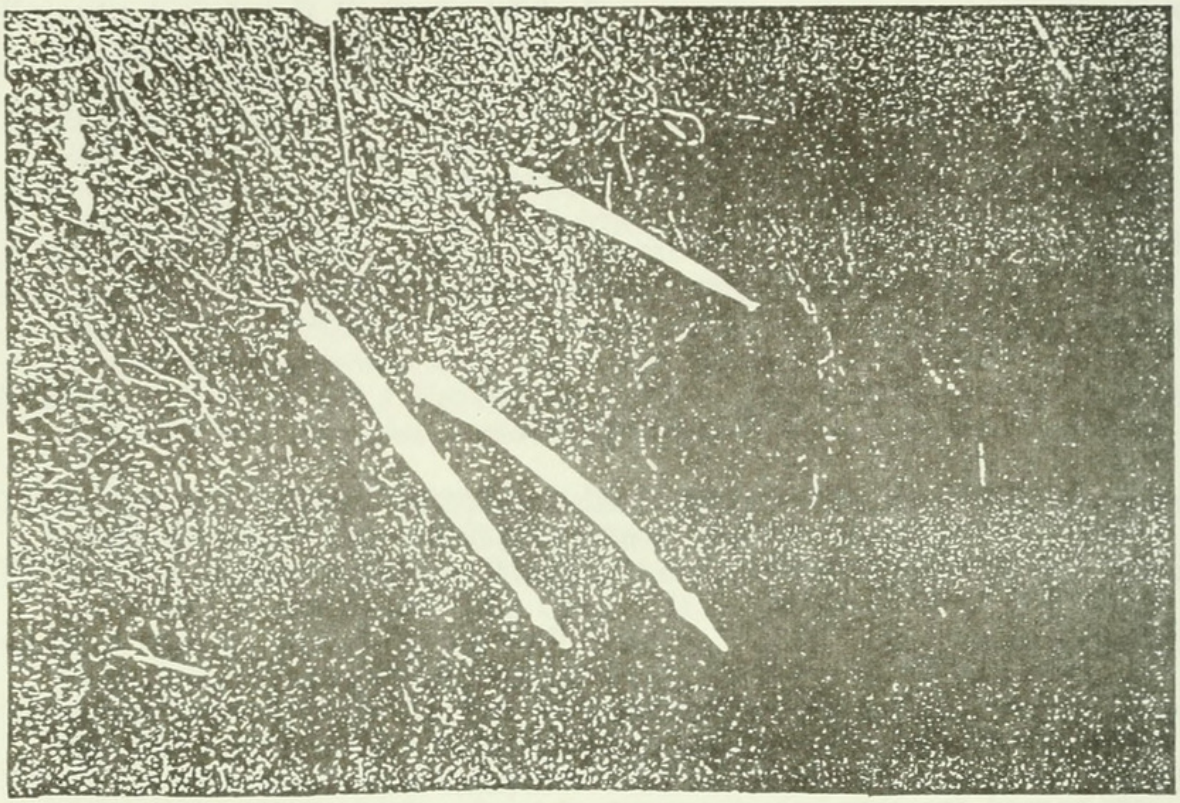

Figure 1. Nodal roots of Russian wildrye (*Elymus junceus* Fisch.) emerging from the trench wall 9-10 inches below the soil surface.

In a second trial, trenches were excavated into the water table in pure stands of exotic grasses to locate roots in the capillary zone. Some trenches were lined with sheets of polyethylene, and others with burlap. Planks and earth were used to exclude light, moderate the temperature, and maintain humidity in the trenches.

By partially uncovering a trench and sliding a ladder into the water, trench walls could be examined and the root tips charted or counted.

RESULTS AND DISCUSSION

The time of initiation of root growth was readily noted in the cylindrical holes, as was the density of root tips above the bucket.

Results with the trench technique were less satisfactory, primarily for two reasons. Difficulty of uncovering the trench discouraged frequent observation. More important was the propensity of small rodents to burrow under the cover. Where this occurred, the trenches were ventilated so that the moist chamber effect was lost. Root tips either failed to appear, or if emerged, died in the drier air.

The trench linings were detrimental in that they encouraged fungi and arthropods rather than root tips.

Tightly sealed holes and trenches afforded a good environment for root growth (Figure 1).

This offers a direct method of correlating root activity with site factors such as soil structure, temperature, or photoperiod.

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