The development of adventitious buds and shoots on the roots of alfalfa is an unusual occurrence. The only observations found recorded in the literature were made in South Dakota (1, 2, 3, 4). Oakley and Garver (3), in 1918, noted what they referred to as root proliferation in a strain of yellow-flowered alfalfa, *Medicago falcata*, originating from Orenburg, Russia. They state that lateral roots were found extending parallel to the soil surface and, at intervals, the roots enlarged to about double the normal diameter. From these enlargements or swellings, shoots diverged and emerged above-ground developing into aerial stems. Oakley and Garver (4) and Garver (1) later state that this development of roots was also found in strains of *Medicago falcata* from Semipalatinsk, Siberia, as well as strains from Orenburg, Russia. Garver (2), after plowing under old stands of alfalfa in August 1930, and 432 varietal plots of common and variegated alfalfa in July 1931, noted the production of vigorous shoots arising from the severed roots of the Ladak variety. These shoots originated at just below the point of severance by the plow. This condition apparently did not prevail with any of the other varieties of alfalfa.

When root cuttings of seedling plants of Ladak and Cossack alfalfa were made in the greenhouse at Madison, Wis., during the winter of 1947–48, buds were observed to form on many of the Ladak root segments and these buds developed into vigorous aerial shoots. This did not occur with Cossack alfalfa grown under the same conditions. Since adventitious shoots on the roots of alfalfa have been rarely observed, the subject was given further study under greenhouse conditions.

Materials and Methods

The alfalfa plants used in these studies were dug from field sown plots or rows. As needed, alfalfa plants were brought to the greenhouse, washed of soil, and the tap roots cut into segments with a sharp razor blade at a given distance below the cotyledonary node. One-year old plants were used for the most part and the cotyledonary scars were easily found. In all cases, the main tap root was used for segmenting after the branch roots were cut away. The root segments were then planted upright in 8-inch porous clay pots containing a mixture of one-half pit sand and one-half composted soil. A covering of from 1/4 to 1/2 inch of the soil mixture was placed over the tops of the cuttings. The pots were kept lightly watered and in this manner deterioration of the roots was reduced. Although some decay did occur, counts made at the completion of each experiment indicated that the amount of deterioration was about the same for all experiments.

Since several cuttings were placed in each pot, root segments were removed from the pots at the time of counting in order to ascertain the exact root segment which produced the shoot.

The data presented in the tables are for the root segments which produced adventitious shoots in 21 days following planting in the greenhouse.

### Root Segments Cut at Different Levels Below the Cotyledonary Node

Seedling plants of Ladak, Cossack, and Montana Common alfalfa were removed from the pots the first week of January 1949. These plants had been dug in the fall, tied into bundles, placed in metal cans filled with sand, and buried in the field. In this manner, plants were available during the winter even though the ground was frozen.

About 300 healthy and uniform plants of each variety were selected. When measured just below the cotyledonary node, the hypocotyledonary region averaged 3.6 mm in diameter. Each variety was then divided into four separate groups of 75 plants each: 1, 2, 3, and 4 inches long were cut from each root. The segments were cut at a distance of 1 inch below the cotyledonary node and in the remaining three groups, 2, 3, and 4 inches below the cotyledonary node. These segments were then planted in soil as described.

The total number and per cent of the root segments which produced adventitious shoots after 21 days are shown in Table 1. Of the three alfalfa varieties, Ladak was the only one to produce adventitious shoots. The data also indicate that the number of root segments producing adventitious shoots was the same for each of the four levels of seven varieties of alfalfa, ranging from 31.7% to 33.1% of these Ladak segments produced adventitious shoots. Adventitious shoot formation by Ladak segments is shown in Fig. 1 for roots segments 3 inches long at different levels below the cotyledonary node.

A month earlier, in December 1948, seedling plants each of Ladak, Cossack, and Montana Common alfalfa were selected from plants stored in cold frames. The diameters in the hypocotyledonary region averaged 4.0 mm. All roots of each variety were cut into segments 1 inch below the cotyledonary node and a segment 4 inches in length was cut from each root. After 11 weeks, 33.1% of the...