Seasonal Root Behavior of Poa Annua and 'Penncross' Creeping Bentgrass Maintained Under Putting Green Conditions

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The study of the seasonal root responses of turfgrasses has been long neglected. The lack of research in the area of turfgrass roots is not due to a lack of interest by investigators, but due to the fact that plant root systems in general are extremely difficult to study. At Ohio State University we are fortunate to have a facility which allows the root systems of plants to be monitored nondestructively under field conditions.

The rhizotron or underground root observation lab currently has two rooting studies underway. The first study was initiated in 1979. The primary objective was to characterize the seasonal root and shoot behavior of Poa annua and 'Penncross' creeping bentgrass while maintained under putting green conditions. The preliminary results of that study have been previously reported. The second study concerns the seasonal root responses of tall fescue, Kentucky bluegrass, perennial ryegrass, creeping bentgrass and Poa annua. This investigation was initiated in the spring of 1980. A summary of our latest findings for both studies is presented below:

Poa Annua and Creeping Bentgrass Under Putting Green Conditions

In the fall of 1978 sprigs of Penncross and Poa annua were removed from a golf green in northern Ohio and transplanted into flats in a greenhouse. The turfs were allowed to increase until it formed a complete sod cover. On July 13, 1979, the sod pieces were removed from the greenhouse and placed on the rhizotron observation cells. Each observation cell contained a washed quartz sand having a pH of 6.6. Mowing height throughout the study was maintained at 3/16 inch. The turf received five pounds of actual nitrogen per 1000 square feet throughout the growing season. A preventative fungicide program was used. The turf was irrigated to prevent wilt.

Almost immediately following the placement of sod on the rhizotron cells, dramatic rooting differences were noted between the two species. Through the first summer, Penncross showed more active rooting than Poa annua (Fig. 1). Active rooting (new initiations and growth) for both species was reduced significantly during the last two weeks of August. Throughout the remainder of the first growing season, Penncross showed as much as five times more active rooting than Poa annua. It is significant to note the almost total cessation of Poa annua rooting, occurring between October 15 and November 23, preceded that observed for Penncross by almost three weeks. The same trends, although not as dramatic, were again observed in 1980. Similar to the fall decline of Poa annua rooting, but even more striking, is the dramatic reduction of Poa annua active rooting in the spring (Fig. 2 and 3).

From approximately April 1 to May 15, Poa annua showed on the average more than a 70% reduction in active rooting. Penncross during the same period exhibited only a 12% reduction. This reduction in Poa annua rooting coincided with the appearance of seedhead formation. Apparently the plant uses the majority of available carbohydrates (food reserves) for seed formation rather than for initiation and growth of new roots. Although significant root behavior differences occurred during the first two years of this study, there were no significant differences in turf quality of the aerial portions of the two species. The fact that Poa annua exhibited a less extensive root system than Penncross but

did not show decreased quality or a loss of turf can be explained by the preventative fungicide program and relatively mild summers.

Currently research is being planned to investigate the effects of Poa annua seedhead removal on root growth. If seedhead removal or inhibition allows more of the available carbohydrates to be used for root growth, the end result will be a more stress resistant turf.

When studying the seasonal active rooting graphs of the two species, many implications are obvious. By knowing the behavior and relative activity of the root system of a turfgrass species at any given point in the growing season, the turfgrass manager would be better able to select the cultural practice (fertilization, cultivation, irrigation, pesticide, etc.) that will encourage the maximum health and vigor of the turfgrass.

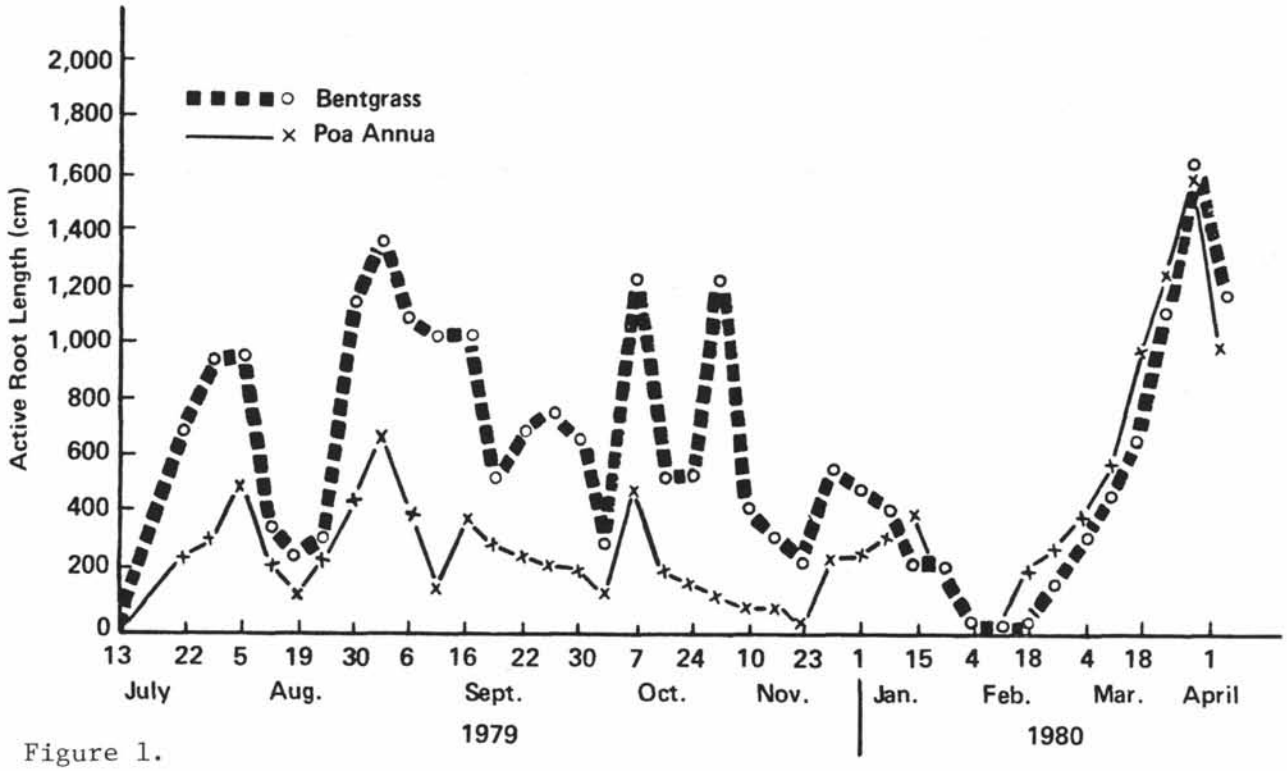
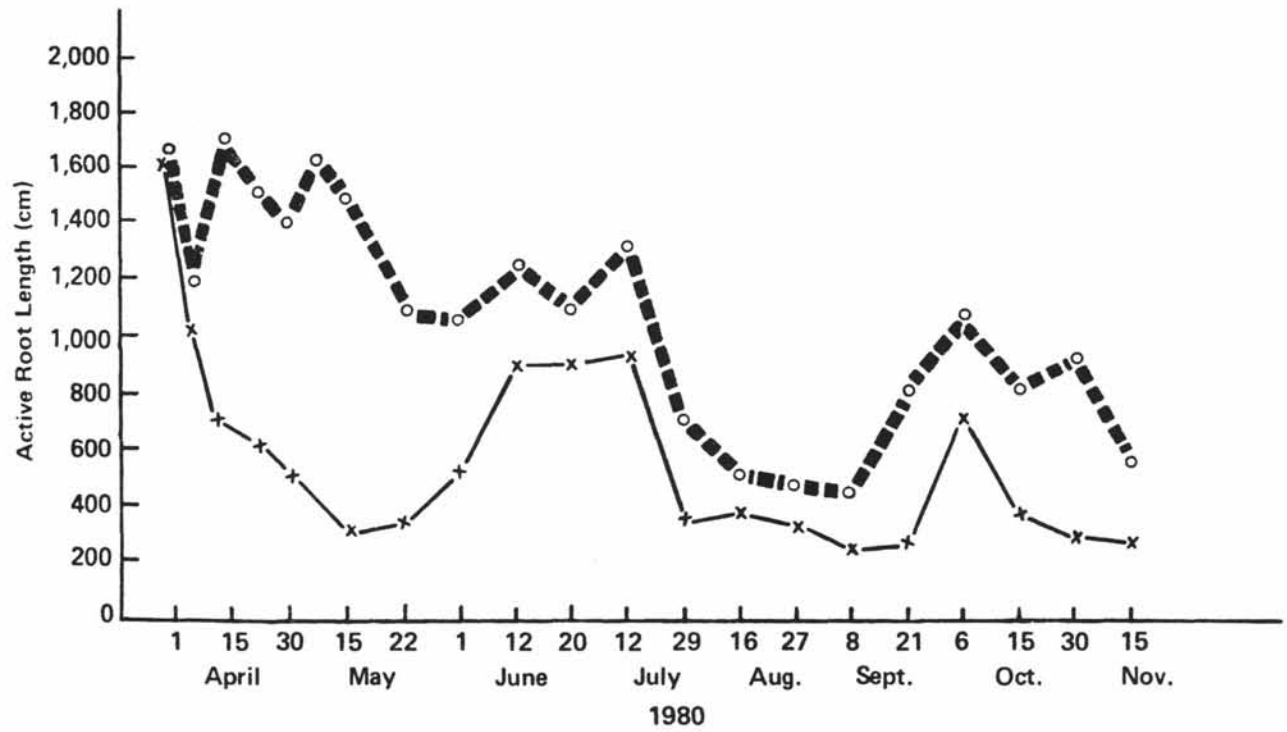


Figure 1.



Figures 1 and 2. Seasonal Active Rooting Growth of Poa annua and "Penncross" creeping bentgrass from July, 1979 through November, 1980

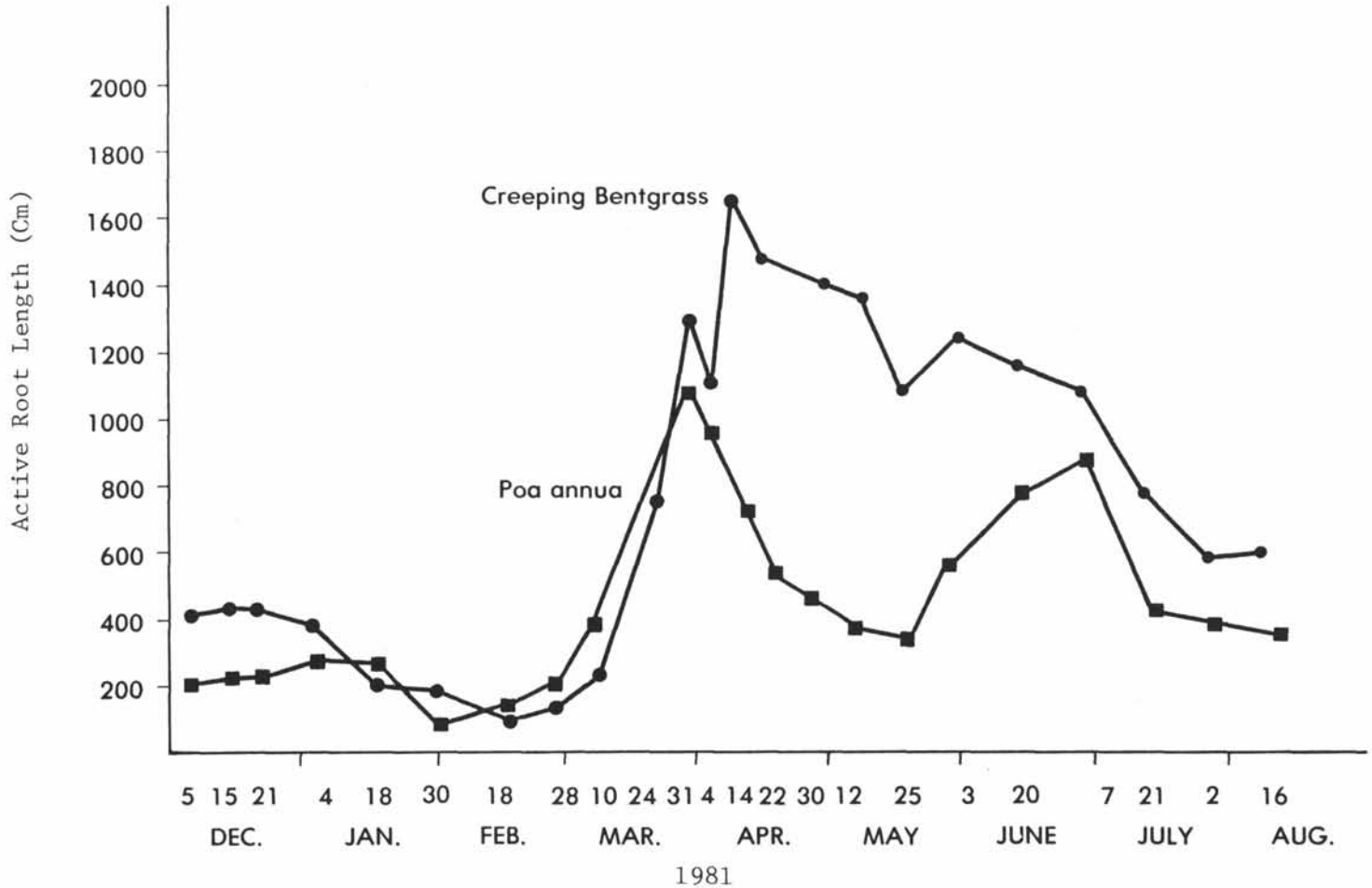


Figure 3. Seasonal active rooting growth of Poa annua AND "Penncross" creeping bentgrass from December, 1980 through August, 1981