COMPETITIVE FACTORS INFLUENCING THE ENCROACHMENT OF *POA ANNUA* IN TURFS

James E. Bogart
James B. Beard
Department of Crop and Soil Sciences
Michigan State University

Annual bluegrass (*Poa annua* L.) is among the most widespread of turfgrass pests. Although a native of Europe, *Poa annua* is now readily identified in all areas of this country as well as in many varied parts of the world. Over the years much has been said and written concerning this pest; however, many questions remain unanswered. Many professional turfmen have abandoned control programs and have chosen to "live" with annual bluegrass. Some have been quite successful in this endeavor while others have failed due to a lack of knowledge concerning *Poa annua*.

This is a preliminary report of research being conducted to define some of the factors responsible for infestations of annual bluegrass. The three main areas of investigation are: (1) temperature-growth responses; (2) mowing height-fertility study in established turf; and (3) rooting studies of seedling turf. In all cases the grasses being studied include *Poa annua*, Merion Kentucky bluegrass (*Poa pratensis* L.), and penncross creeping bentgrass (*Agrostic palustris* Huds.).

Studies involving temperature-growth responses include both field observations and controlled climate growth chamber studies. *Poa annua* plants were observed growing under five distinctly different sets of soil and cultural conditions. Soil temperature readings and leaf length measurements were made at each location throughout the 1971 growing season. These observations showed that shoot growth of annual bluegrass started at soil temperatures of 55 F. These observations are being compared with the results of controlled climate growth chamber studies.

Individual plants of the three species are being grown in sand cultures under controlled temperature conditions. Following a two week stabilization period six replicates of each species are removed at days 0, 15, and 30 for measurement of root and shoot dry weights. The results of this experiment are to encompass the temperature range from 40 - 110 F., with 40 and 50 F. completed at this time. Shoot growth of the individual plants will be compared with clipping yields from 4" plugs of the same species. These clipping yields are determined at five day intervals throughout the 30-day study. In addition, germination studies are being made at each temperature. The results of this experiment will be used to develop relative temperature-growth curves for each of the three species. These temperature-growth curves would then enable the professional turf manager to determine the best time for fertilization of the desired species.

To determine the effects of cutting height and fertility level on annual blue-grass, individual seedlings were transplanted into a merion Kentucky bluegrass sod grown in a greenhouse flat. The treatments were arranged in a split-block design with each receiving either 0.5 or 2.0 # N/1000 sq.ft. per month. The five cutting height treatments were 0.5, 1.0, 1.5, 2.0 and 2.5 inches. The sods were clipped three times weekly. The Poa annua plants were removed after two months. The data taken included tiller number, shoot dry weights, and root organic matter. It was found that the cutting height significantly influenced tillering and shoot dry weights of annual bluegrass. Tillering was affected the most, while the effect on rooting was not significant. The optimal cutting height for shoot growth and tillering of Poa annua was 1.0" under these conditions (tables 1 & 2).

TABLE 1. The effects of cutting height on the mean shoot dry weights of annual bluegrass seedlings grown in a merion Kentucky bluegrass sod.

CUTTING HEIGHT (inches)	SHOOT DRY WEIGHTS (mg.) (1)
	(2)
1.0	26.7 a
1.5	24.0 a b
2.0	23.4 a b
2.5	18.7 a b
0.5	16.4 b

(1) Values given are the means of 12 replications over two fertility levels.

(2) Means in the column followed by common letters are not significant at the 5% level of Duncan's Multiple Range test.

TABLE 2. The effects of cutting height on the tillering of annual bluegrass seedlings grown in a merion Kentucky bluegrass sod.

CUTTING HEIGHT (inches)	TILLER NUMBER (1)
	(2)
1.0	3.0 a
1.5	2.4 a b
0.5	2.3 a b
2.0	1.8 b c
2.5	1.3 c

(1) Values given are the means of 12 replications over two fertility levels.
(2) Means in the column followed by common letters are not significant at the 5% level of Duncan's Multiple Range test.

The fertility treatments were not significant in the development of Poa annua in this short-term study. Although there appeared to be a reduction in root growth at the higher fertility level it was not significant at the 5% level. It would appear that significance would be obtained under long-term conditions.

The third phase of this investigation involves the study of root growth of Poa annua in comparison with merion and penncross. Specially constructed boxes 10 inches square with slanting glass fronts are used to observe root elongation and development. Daily root growth is marked on the glass plates and measured to determine the mean daily root growth of each species. In a preliminary study using this procedure it was observed that Poa annua roots developed at a faster rate than did the roots of merion or penncross. This phenomenon lasted for the first three weeks after which the penncross creeping bentgrass roots became equal in overall length. Roots of merion Kentucky bluegrass developed more slowly throughout the experimental period. These observations are now being examined in greater detail under both cut and uncut conditions. After two weeks with this new study the annual bluegrass roots had reached a depth of 4-6" on the glass. In comparison merion roots were just beginning to appear in two of the boxes and penncross roots were not observed in any box.

The results of this three-part study should make a significant contribution to the available information concerning the environmental and cultural requirements of annual bluegrass. With this information at hand the professional turf manager can better understand and adapt to the problems associated with Poa annua.