Effects of vertical mowing of bermuda turf in the fall in Southern California on Poa annua *establishment. Photographed in January. Area ne xt to street with dense stand of* Poa annua *was partially dethatched with a vertical mower in No vember. Area next to fence containing a few scattered clumps was not dethatched.*

Vertical Mowing — Aerification — and Poa Annua Invasion

by DR. V. B. YOUNGNER, University of California, Riverside

Turf weed problems can be related frequently to specific management practices. Slight errors in timing of a maintenance operation or improper use of equipment may result in a weed population explosion. This is certainly true for annual bluegrass, **Poa annua,** a weedy grass that thrives under many conditions that may weaken or destroy the desirable turf grasses. Elimination of annual bluegrass from golf greens seldom may be possible, but attention to a few practices can reduce the problem greatly.

Often faulty methods are used because of an inadequate knowledge of the life history and ecology of the weed plants. **Poa annua** populations in golf greens increase and control methods fail when certain characteristics of the plant are not considered. In much of the United States, heaviest germination of annual bluegrass seeds takes place in the fall. While germination may continue through the winter in regions of mild winter climate such as California, it will be at a much lower rate.

However, in cold-winter regions heavy germination may occur also in the spring. Very little seed germinates during the warm weather from late spring to early fall. Time of germination and length of the germination period can be determined for any area by a little observation.

Poa annua seeds require moisture, moderate temperature (optimum about 70°F.), light and

air for germination. Seedlings are poor competitors in a dense turf of perennial grasses.

Flowering begins a few weeks after seed germination, when plants may consist of only four or five tillers, and continues thereafter within a wide range of temperatures and photoperiods. A single plant, therefore, can produce seed continuously for many months. This seed does not germinate immediately, but lies dormant in the soil and thatch for several months, usually until fall. Thus, large quantities of seed, which may be produced by only a few plants, will be ready to germinate as soon as favorable conditions are provided.

VERTICAL MOWING AND AERIFICATION

Vertical mowing and aerification are necessary management practices for high quality golf greens. Moreover, they are effective means to keep **Poa annua** in check by maintaining a vigorous bentgrass turf. However, performing these operations during the wrong time of the year can have the opposite effect. Disturbing the turf by any means, so as to expose the seed that is almost certain to be in the thatch or soil to light and air, at a time when temperature and moisture conditions are favorable for germination will increase the **Poa annua** population.

There are perhaps few times in the year when these operations will not have some effect on germination, but it is obvious that they should be avoided if possible during the normal time of highest germination rate.

A few years ago a simple experiment on the UCLA campus demonstrated clearly the effects of fall vertical mowing on the subsequent **Poa annua** population. A long narrow plot of U-3 bermudagrass turf which had contained some **Poa annua** in past seasons was divided in half longitudinally. The thatch was partially removed from one half in the fall, using a vertical mower, while the other half was left untouched. Following vertical mowing the entire area was watered as necessary to keep the soil constantly moist. No seed was planted.

Within 10 days after vertical mowing, numerous annual bluegrass seedlings were observed in the dethatched area. A month later this entire area was covered with a solid stand of **Poa annua,** but there were only a few scattered plants in the untreated part.

The following autumn the experiment was repeated, reversing the two treatments. As in the previous year, the area on which the vertical mower was used contained a dense stand of **Poa annua** in contrast to the untreated area, which had a thin, scattered population. Thus, the dense population always developed on the disturbed area regardless of the condition the previous year.

TIMING IS IMPORTANT

The lesson should be obvious. While this study was conducted on bermuda turf, the principle illustrated would apply to any turf including bentgrass greens. The same result, although perhaps to a lesser degree, could be expected from fall aerification which would promote **Poa annua** germination in the aerifier holes. This has been observed in one instance where the annual bluegrass plants were evenly spaced in the turf, corresponding to the former location of aerifier holes.

What should you do if the turf condition necessitates vertical mowing, aerification or spiking at an unfavorable time in respect to annual bluegrass? A logical suggestion seems to be to follow immediately with an application of a preemergence herbicide for **Poa annua** such as Bensulide (brand names are Betasan and Presan) or standard lead arsenate. By so doing, many seedlings will be killed shortly after germination.

Germinating seeds are highly vulnerable to drying. Therefore, permitting the soil to dry as much as possible at the surface between irrigations will assist also in reducing the stand. In fact, this is a good practice to follow throughout the year to reduce weed infestation.

Chemical control of **Poa annua** in bentgrass greens is seldom as successful as desired. Often this is the result of poor timing of herbicide applications. If heavy seed germination occurs in the fall, it is illogical to expect control from a late fall or spring treatment. The weed killer must be in the soil at a toxic level prior to seed germination. Where germination may extend over a long period, supplimentary herbicide applications may be required to maintain this toxic level throughout the germination period.

There are, as yet, no effective post-emergence annual bluegrass herbicides that are safe for bentgrass greens. As many **Poa annua** variants are perennial rather than annual, spreading vegetatively year after year, the necessity for preventative management becomes more apparent. Once perennial types have become established in a green, the choice must be between living with them or complete renovation.