



Generally, the fine fescues predominate on dry mounds, high dry areas and in unwatered roughs.

Irrigation Affects Species Predominance

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A TURFGRASS STAND is most often a community of different grass species and cultivars which react dynamically to cultural and environmental changes. In other words, as conditions change, so does the relative population of each species or cultivar in the community. A number of factors influence the ultimate composition of the turfgrass stand at any time, including the climatic and soil environment, the cultural system under which it is maintained, the influence of turfgrass pests, the type and intensity of use it receives, and the genetic makeup of each individual cultivar.

Although it is just one of many cultural factors which can influence competition between grasses in a turfgrass stand, irrigation is perhaps one of the most important. It is also one which can vary greatly from superintendent to superintendent, and a knowledgeable outsider may have little difficulty determining the irrigation philosophy of the superintendent simply by observing the percentages of the various grasses on the golf course.

It would be a mistake, however, to rely solely on this type of observation and analysis. Climate, soils, and local topography will affect how natural

rainfall and bodies of water influence nearby turf. The competitive ability of any particular grass species or cultivar will be weakened or enhanced by annual rainfall and distribution, water-holding capacity of the soil, and location near rivers and streams with regard to flooding or high water tables. Specifically, and with respect to the influence of water on turfgrass stands in northern regions, the fine fescues compete best in droughty soils, Kentucky bluegrass in moist but well-drained soils, and bentgrass in moist, poorly drained soils or where flooding occurs occasionally. Annual bluegrass (*Poa annua*) is similar to bentgrass in its ability to compete well in moist or overly moist conditions. There is a difference, however, between *Poa annua* and bentgrass which can be used by the turfgrass manager to encourage one over the other. This will be discussed later in more detail.

THE FESCUES

The group of fine fescues, generally regarded as low-maintenance grasses, is perhaps the best example of a turfgrass which is very dependent upon specific cultural and environmental condi-

tions to thrive. On golf courses the fescues are most frequently found in droughty, infertile areas of the rough, on high mounds and around sand bunkers and elevated tees. The mechanism by which these grasses conserve water during dry periods makes them very drought tolerant and highly competitive with other cool-season grasses. They are well suited to the areas they inhabit, offering color and textural contrasts to the other grasses and providing a substantial penalty to the golfer who strays into their domain.

In past years it was not uncommon to find golf courses with fairways composed largely of fescues, and a few such courses exist today. However, the advent of the modern irrigation system all but eliminated the fine fescues from frequently irrigated fairway turf. Fescues are not found in moist soils, and by maintaining high soil moisture through regular irrigation, these grasses have been relegated to the droughty and unirrigated areas of the golf course. As moisture increases, the bentgrasses, Kentucky bluegrasses and *Poa annua* all gain a significant competitive advantage over the fescues.

POA VS. BENT: AN IRRIGATION STRATEGY

The cultural demands of low-cut *Poa annua* and bentgrass are very similar in nature, and this makes the development of a program to promote bent over annual bluegrass a most difficult task. Under relatively high moisture and fertilization regimes, both types of grasses compete very well against other grasses. The Kentucky bluegrass-annual bluegrass relationship can also be a hard one to control, but usually other factors, primarily cutting height, are more important than irrigation in determining the relative population of each grass in a Kentucky bluegrass-*Poa annua* stand. It is true, though, that judicious irrigation can promote Kentucky bluegrass over *Poa annua* on low-cut bluegrass tees or fairways.

While it is difficult to give bentgrass the upper hand in the bent-*Poa* relationship, it is very easy to develop predominantly *Poa annua* greens, tees or fairways. Soil cultivation during the prime annual bluegrass germination periods (early spring and mid-fall) and frequent irrigation throughout the season will dictate a largely *Poa annua* turf. The key to the spread of annual bluegrass is irrigation, which artificially provides moisture to promote seed germination and seedling development during these critical early spring and fall-winter germination periods.

Although it would be unrealistic to expect to eliminate annual bluegrass from the golf course, one of the keys to successfully suppressing *Poa annua* is certainly careful irrigation. If there is one basic rule to follow in irrigating turf to promote bentgrass over annual bluegrass, it would have to be: "Irrigate only as necessary to keep the desirable grasses alive."

If we were to follow this irrigation strategy throughout the season, it might go as follows:

Withhold for as long as possible any urge to irrigate in the spring and then irrigate only after

long intervals, allowing the soil to dry between each session. Doing this will discourage *Poa annua* seeds from germinating and developing and will encourage the permanent grasses to develop deep, strong root systems in their search for water down through the soil profile. The root systems will not tend to grow deeply if, through frequent irrigation, moisture is readily available at the surface. One added benefit is the suppression of some of the summer annual weeds, such as crabgrass and knotweed. Though this irrigation philosophy may be easy enough to rationalize, the golf course superintendent may have a difficult time implementing it over the demands of the club membership. After a long winter's layoff, many golfers are anxious to see lush, green grass and soft greens so that every shot will hold, whether it be a high pitch shot or distance requiring a 2-iron. They may have just spent tens of thousands of dollars on a new irrigation system and want to see it used to suit their needs and desires. The only way to overcome this problem is through education, and it may take some time to convince the membership that withholding water in the spring will pay dividends later in the season.

As the season progresses through spring and early summer, irrigate only when necessary. Some turf managers prefer to wait until signs of wilt are evident before they apply water. The state of the turfgrass roots as summer approaches will help determine the mid-season irrigation strategy. If roots are deep and dense, irrigation every few days may prove adequate, whereas if roots are near the surface, daily watering and syringing may be necessary to keep the turf alive.

As high temperatures begin to dominate the summer weather, turfgrass roots naturally tend to cease growth and become shorter. It is therefore important to investigate root survival frequently and adjust the irrigation schedule accordingly. Mid-summer is not the time to withhold water in an effort to suppress *Poa annua*. Just do whatever needs to be done to promote turf survival, regardless of the species present. At the same time, don't overcompensate by overwatering; this can be just as devastating as providing too little moisture.

Autumn is again a time for judicious irrigation in the effort to prevent *Poa annua* germination and development. Temperatures decline and turfgrass roots respond with increased growth, especially when the soil is allowed to dry between each session. Irrigation should continue in the fall only to the point of ensuring that soil moisture is adequate to provide good winter survival. During most years, natural rainfall will satisfy this requirement, and late fall irrigation will not be necessary.

By providing the proper cultural conditions and by adhering to this annual irrigation strategy, *Poa annua* can be suppressed and an increase in the relative population of permanent grasses can be achieved in a bent-*Poa* turfgrass stand. Where bentgrass already predominates, *Poa annua* invasion can be minimized or avoided altogether.