Another area of study in 1994 was the use of plant growth regulators for fairway growth suppression. Plant growth regulators have found increasing use upon golf course turf for reduction in mowing requirements and improved turf density. Additionally, claims have been made that PGR's improve recovery from injury and wear tolerance. These factors were investigated on a Penncross creeping bentgrass turf maintained at 5/8" height of cut. Three plant growth regulators (Primo, Cutless, and Scott's Turf Enhancer) at three different rates were applied to the bentgrass on June 1, July 1 and August 1 of 1994. Each PGR application was made on turf fertilized at a high rate of N fertility, 5 lbs N/1000 ft^2/yr, or at a low rate of N fertility, 2.5 lbs N/1000 ft^2/yr. Data on clipping yields were collected on a weekly basis throughout the summer (data not shown). Data in Figure 3 indicates the time in days to 75 % divot fill-in. Nitrogen fertilization had the largest influence on recovery from divot damage (Figure 3). For example, the untreated turf required almost 25 days to reach 75 % divot closure at low N while requiring only 12 days at high N. PGR's did not have as big an influence on recovery rate although some interesting trends were observed. The lowest rate used of each of the three PGR's tested seemed to have a slight stimulatory effect on recovery from divot damage. Faster recovery was also more dramatic at the lower fertility rates. The two highest rate of each PGR caused some slight reduction in time to divot fill-in with the exception of Cutless, which was slightly slower at all three rates. Remember however, in most cases the difference in recovery rates between PGR treatments and untreated turf was small. Nitrogen fertilization will control the rate of recovery from divots. PGR's seem to have a small effect on recovery rate which is interesting since PGR's significantly reduce clipping production, but apparently have a much smaller effect on tillering and lateral growth.

A study on the effect of the number of Prograss applications on the amount of annual bluegrass (AB) control was conducted at Walnut Hills Country Club in East Lansing, MI. Plots were treated with either 2 or 3 applications of Prograss at 0.75 lbs AI/A in the fall or 3 applications in the fall plus one the following spring for a total of 4 applications. Application dates 10/15 and 11/15 for the treatment receiving two applications, 10/15, 11/1, and 11/15 for the three fall applications, and the 4 application treatment had an additional application the following spring on 4/15.

Data were collected on turf quality (Figure 4) and on percent creeping bentgrass (CB) in the plots (Figure 5). These plots provided very striking data on the effects of Prograss. The injury data (Figure 4) shows that all three Prograss treatments caused a significant reduction in turfgrass quality which was caused by a lack of greenup of the CB and AB compared to untreated turf. However by 4/26, the turf receiving fall only applications had recovered nicely and was nearly equal to the control in quality. The plots receiving 4 applications, the last of which was applied on 4/15, showed a serious drop in quality from the 4/11 rating date to the 4/26 rating. This drop in quality occurred because the spring application was enough to push the AB turf over the edge and most of it died leaving large areas of bare ground in those plots. By the 5/25 rating, the plots receiving fall only applications of Prograss had recovered nicely and were then equal or superior in quality to the untreated control. The higher quality ratings resulted from an inhibition of seedhead production by the fall Prograss treatments. This response has been observed in the past but has not been well documented. The effect was quite striking in 1994 due to the intense seedhead production by AB. The plots receiving the April Prograss application still had significant amounts of bare ground resulting in poor quality ratings.

Data on percent CB cover (Figure 5) dramatically shows the results of Prograss use on golf course turf and the dynamics of AB/CB competition. Ratings taken in the early fall of 1994 show the percent CB in the plots prior to treatment averaged 33%. At the first rating in early April the plots had only 17% CB. This difference is due to the fact that AB produces abundant tillers and new seedlings in the fall, increasing its presence in the turfgrass community. During the summer, the tables are turned and CB tends to outperform AB. By using Prograss, the AB in the plots is injured or killed allowing the CB to spread and increase its presence at a time when it normally would be outcompeted by AB. The plots treated three times in the fall showed an increase in percent CB compared to the control treatment. Notice, however, that the Prograss treated plots only returned to their early fall levels. Again, this demonstrates that CB outperforms AB during the summer and the control plots would increase from the percentage CB found in the spring during the course of the summer. The plots receiving four Prograss applications show the difficulty in using Prograss on high quality, high use turf. The spring treatment caused nearly 100% kill of the AB in the plots. This allowed the bentgrass in the plots to expand but also left large areas of bare ground in the plots. In a sense the four applications worked too well resulting in large scale kill of annual bluegrass and a poor quality playing surface. Therefore, as has been stated in the past, use of Prograss on golf course turf with AB populations higher than 25% can result in poor turf quality if the AB control approaches 100%. In the turf receiving 3 fall treatments, the annual bluegrass was injured and some kill resulted but not enough to leave bare areas that the bentgrass could not fill in. Thus, superintendents should exercise great care when using Prograss on golf course turf.

Figure 4. Effects of Prograss Applications on Turf Quality

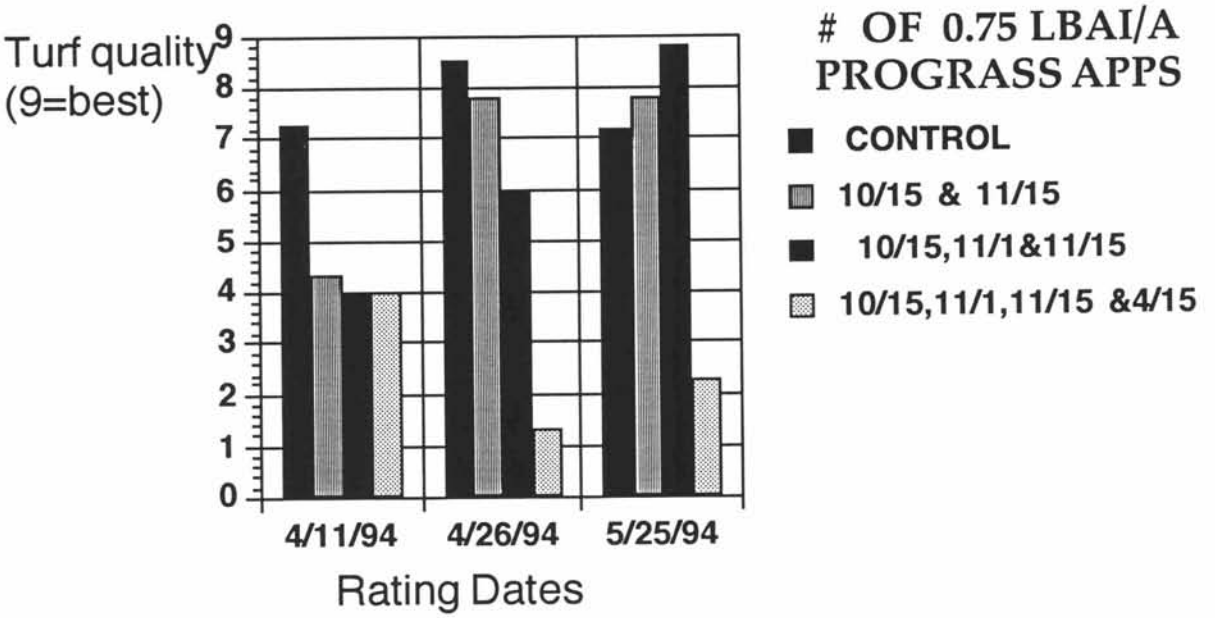

Figure 5. Prograss Application Frequency - Effects On % Bentgrass