ments are responsible for the reduction in broadleaf weed cover, but we do know that application of both of these products together does result in a reduction of weeds. This could be due to the suppression of germination of broadleaf weeds seeds from the corn gluten meal or some suppression of established broadleaf weeds from the beet juice extract or from the nitrogen contained in these products. It is also suggested from this data that it may take more than one year of application of these products to realize a reduction in broadleaf weeds. After three years of application of the combined alternative products, the result was an overall broadleaf weed cover of less than 10%. It should be noted however, that the addition of fertilizer alone also reduced weed cover to a similar level.

At the beginning of the study at GTI, there was an average of 15-20% weed cover in all plots. Examining the no pesticide/no fertility plots, there was a rapid rise in the weed population to just under 60% by November 2003. There was a plateau at this level throughout the 2004 season until September 2004 when weed cover dropped below 50% and rose again in late fall. Over the 2005 season, weed levels dropped off throughout the season ending off at 30%. It is possible that the dry weather in the spring and summer of 2005 inhibited the germination of new weed seeds or that the drought had an adverse effect on the perennial broadleaf weeds.

In 2005, the plots at GTI, Brantford and London were irrigated. The effect of the irrigation during the season on average weed cover was the opposite of what was expected. The irrigated plots had a higher percent broadleaf weed cover than the non-irrigated plots. It is possible that the irrigation provided the necessary moisture for weed seed germination during a droughty year.

Pesticide Reduction

At the GTI, conventional plots received a total of six broadcast pesticide applications, while the IPM plots received only two treatments and many of these plots were spot treatments only. The alternative plots received a total of five broadcast treatments of organic herbicides. At Brantford there was an additional post emergence crabgrass treatment on the IPM plots due to the presence of crabgrass on some plots. This represents a reduction of 66.6% in the number of pesticide applications at GTI for each year of the study and a reduction of 50% in the number of pesticide applications at Brantford for each year of the study.

The total area that was treated with pesticides each year on the IPM plots vs. the conventional plots was also calculated for GTI and Brantford in Table1. By year three of the study there was a 99.35% reduction in the amount of area treated with pesticides for GTI and a 98.33% reduction in the area treated at Brantford. A part of this reduction was due to the fact that the conventional plots received two insecticide treatments and a pre-emergence crabgrass treatment and the IPM plots demonstrated that those three treatments were not necessary. Secondly, by year three there was

Contributions Welcome

Contact Lee Huether at the STA office if you are interested in contributing to the *Sports Turf Manager*. We appreciate feature-length articles, column ideas and newsworthy items. Updates on innovative research or equipment are also welcomed. This is a great way to both support your professional association and enhance your resume!

Table 1. Total reduction of pesticide treated area of IPM vs. conventional plots in Brantford and GTI in all years.

Location	Treatment	2003	2004	2005
GTI	Conventional	2376	2376	2376
GTI	IPM	350.955	165.924	15.444
GTI % Reduction (Conventional–IPM/Conventional x 100)		**85.23%**	**93.01%**	**99.35%**
Brantford	Conventional	1680	1680	1680
Brantford	IPM	221.2	31.08	28
GTI % Reduction (Conventional–IPM/Conventional x 100)		**86.80%**	**98.15%**	**98.33%**

only a need to spot treat for broadleaf weeds and this also greatly reduced the amount of area treated with pesticide in the IPM plots.

Conclusions

Turf quality was highest in conventional followed by IPM, alternative and no-pesticide programs in all three years. Despite the 50-66.67% reduction in the number of pesticide use or the 98-99% reduction in the area of turf treated with pesticides in the IPM plots compared to conventional plots, the quality of the turf in IPM plots was only reduced slightly. In addition, quality of the turf at the two different mowing heights was very similar. The 4 cm height of cut was slightly denser than the 8 cm height of cut. The application of fertilizer improved turf colour and density resulting in higher quality ratings and it also reduced broadleaf weed cover in the no-pesticide plots.

Turfgrass insects were not an issue in all three municipalities in all three years. They were all present in numbers below the OMAFRA threshold for each pest. Crabgrass infestation was also not a problem. It was only found at Brantford and London in numbers below the IPM threshold level (10-15%) with the exception of one plot in 2003. In subsequent years, it was below the threshold and only required spot treatment in a few plots. Again, this study demonstrated very significant pesticide reductions without loss of turf quality by implementing IPM.

As for broadleaf weed cover, a couple of trends were observed. The no pesticide/no fertilizer plots at GTI had a rapid increase in broadleaf weeds in 2003, up to 60%. This remained steady through 2004 until the late fall. Weed cover rose again in the summer of 2005, but it did not go as high 2003. Finally, at the end of the summer in 2005, the weed population declined to 30%. Both the no pesticide/fertilized plots and the alternative plots had an increase in weeds in the summer of 2003. The following seasons there was a steady decline in weeds to a final weed count of 10% at the end of the study period. This trend was very similar in the no pesticide plots at Brantford and London. There was a noticeable interaction between the different growing seasons and the broadleaf weeds, with all weed populations decreasing in 2005. This was consistent at all three sites and demonstrates the effect of temperature and rainfall on weed ecology. This trial clearly demonstrated that broadleaf weed cover can be greatly reduced with regular applications of fertilizer at a rate of 2.0 kg of nitrogen/100m^2 per season. With this rate of fertilizer application, weeds were below the OMAFRA threshold of 10-15% and only spot treatment would be needed, eliminating the need for broadcast applications of broadleaf herbicides. ♦

— Gema Cheong, Ontario Pesticide Advisory Committee (OPAC) Resource Technician (RT); Stacey Fearman, OPAC RT; Erica Gunn, Guelph Turfgrass Institute RT; and Pam Charbonneau, OMAFRA