then determine if there is a correlation between adult densities and future larval densities.

Fairways on three golf courses in central and northern New Jersey were sampled weekly by vacuum and core sampling from late March through the end of the third generation in mid-October to estimate adult abundance and to compare techniques. A leaf blower/vacuum was fit with a mesh (324 openings per square inch) basket to capture adults as they entered the nozzle. A section of fairway (36 square feet) was vacuumed by placing the nozzle directly on the turf and vacuuming in a zig-zag pattern while maintaining a tight fit of nozzle and turf. The entire section was covered during 10 seconds of vacuuming. Afterward, the basket was emptied on a tray and the numbers of adults counted. The estimate of adults in vacuum samples was compared to destructive soil sampling with a turf plugger followed by saline extraction in the laboratory.

The relationship between the number of adults vacuumed and future larval densities was studied on the edges of six fairways. On each fairway 32 plots (each 36 square feet) were sampled to estimate adult density. Each plot was vacuumed weekly between the start of adult emergence from overwintering sites through the end of the egg laying period of the overwintered adults (mid May in northern New Jersey). Once the egg laying period was complete, the plots were sampled for larvae, and larval densities were compared to the numbers of adults captured in weekly sampling periods as well as during the entire adult sampling period.

Results

ABW vacuum sampling proved as reliable and consistent as soil coring + saline extraction for estimating adult densities and peaks in abundance. But vacuum sampling was non-damaging to the turf, took less time to process a sample, and gave instantaneous information on presence and density.

Additionally, vacuum sampling detected adults in low densities on fairways prior to when plant indicators *(Forsythia* full bloom) would have indicated in both years of the study. In each year of the study, vacuuming sampling allowed us to detect two separate peaks in adult densities, indicating staggered emergence from overwintering sites. The timing of the two peaks was similar between courses and years (1st = April 21-23; 2nd = May 5-7).

Strong relationships were found between number of adults collected in vacuum samples and future larval densities in both years. The number of adults collected either during the second peak of adult abundance or across the entire 6-week sampling period was significantly correlated with larval densities. These correlations suggest that egg laying occurs over an extended period, yet the majority of eggs are deposited during the second peak in abundance. Future work is needed to optimize the size of the area sampled and the number of samples needed to adequately correlate adult and larval densities to best integrate curative controls.

Conclusions

Turfgrass managers have several methodologies to assess ABW populations. Unfortunately, most turf managers opt to manage ABW without assessing presence or population density. Our studies indicate that vacuum sampling can be an effective tool and provide a rapid estimate of ABW adult density. In addition, we found that adult counts on fairways are correlated to future larval densities. Future work is needed to determine adult ABW density thresholds and if this information can aid in targeting curative controls against larval stages.

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ABW vacuum sampling proved as reliable and consistent as soil coring.

PHOTO COURTESY: BENJAMIN A. MCGRAW

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