

## **Feeding Preferences of Chinch Bugs for Fine Fescue and Kentucky Bluegrass**

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### **Research Update**

For the past three years we have been investigating the relationship of the chinch bug to its turfgrass environment. We began the study with a survey that investigated parameters such as number of predators in a lawn, chlorophyll content, dry weight, soil moisture, relative temperature, grass height, thatch thickness and turf species present. Of these, thatch thickness and species composition of the turf appeared to have the most promising predictive value (Kortier and Smitley, 1987). In previous MTF Proceedings (Kortier Davis and Smitley, 1988) we have reported a positive correlation between thatch thickness and chinch bug abundance. We can now report a significant difference in thatch thickness between chinch bug infested and non-infested lawns. Data were collected from 1986 to 1988 on 107 lawns in the Lansing area, 44 with chinch bugs and 63 without. Chinch bug abundance was recorded as the sum of five 5 ft-long, one inch-wide transects. Uncompressed thatch was measured to the nearest mm at five randomly selected sites in the lawn.

For infested lawns the average thatch thickness was 9 mm, versus 5 mm in non-infested lawns ( $t=3.52$ ,  $.001 < P < .002$ ). Turf managers may remark on these relatively small thatch values. This was caused by the way the thatch was measured. If a site that was randomly selected for thatch thickness was a bare area, then the thatch measurement was zero. Thus the thatch measurement also included a turf density component.

Species composition of the turf is also significantly different between chinch bug infested and non-infested lawns. Species composition was determined by removing a total of 50 plants along five randomly placed transects. The plants were placed in a plant press and later determined as to species in the laboratory. Percent composition of each species in a lawn was determined by dividing the number of plants of a particular species by the total number of plants sampled (50). In lawns with chinch bugs, there is more fine fescue and less Kentucky bluegrass than in lawns without. Figure 1 represents the average species composition for 44 infested and 63 non-infested lawns. There is an average of 42% Kentucky bluegrass in infested lawns, compared to 64% in non-infested lawns ( $t=4.12$ ,  $P < .001$ ). Fine fescue composes an average of 35% of the lawn in infested lawns compared to 12% in non-infested ones ( $t=5.31$ ,  $P < .001$ ). The category "other" was not significantly different between the two lawn types.

These thatch thickness and species composition data can be made useful to turf managers. We calculated a mathematical equation called a discriminant function using

the three variables thatch thickness, amount of Kentucky bluegrass and amount of fine fescue. The function is essentially a line equation with slope values for each of the three parameters in each lawn type (infested or non-infested). This equation could correctly predict 75% of the time whether or not a lawn had chinch bugs. However, the function is too unwieldy for use in the field, so we present an alternative method of risk assessment.

The determination of risk of chinch bug infestation hinges on knowing the thatch thickness (measured as described earlier) and species composition of a lawn. Then it must be determined how many of the criteria in Table 1a are met. Is the thatch greater than 8mm? Does Kentucky bluegrass compose between 10 and 50% of the lawn? Does fine fescue make up more than 30% of the lawn? A risk of chinch bug presence can be assigned based on the number of these criteria that are true for a lawn (Table 1b). For zero criteria met, 19% of lawns sampled had chinch bugs. This translates into a 19% risk of infestation. For 1 criterion, there is a 50% risk, and for two criteria met, a 63% risk. If all three criteria are met, there is an 88% risk that the lawn will have chinch bugs. These values are based on the percentages of 143 lawns surveyed. The criteria were determined based on the means and standard errors of the three variables for the two lawn types. It should be noted that this risk assessment procedure does not predict damage, only presence of the bugs. The procedure will be most useful in the spring, before the chinch bugs become readily apparent. High risk lawns can be identified and monitored more closely for the insect.

### Feeding Preference Study

We have reported in this paper that there is more fine fescue in infested lawns than in non-infested ones. This led us to the hypothesis that this was because the chinch bugs were feeding preferentially on the fine fescue in the lawns. We tested this hypothesis using feeding preference chambers constructed from 90 mm plastic petri dishes. Five holes were drilled along the edge of the bottom of the dish, four of which were covered with mesh to serve for ventilation and the fifth fitted with a cork. In damp white silica sand in the other end of the dish bottom was planted one mature Kentucky bluegrass and one fine fescue plant. The top was put on the dish, sealed with parafilm, and the whole chamber was stood on end and gently tapped to level the sand. Three different cultivars of Kentucky bluegrass (Fylking, Adelphi, and Kenblue) and fine fescue (Wintergreen, Biljart, and Jamestown) were used in all combinations, making for 9 different chamber types. Twelve hours after set-up of the chamber, a single 5th instar chinch bug was introduced via the corked hole. Every 15 minutes for seven hours, the bug was observed and its feeding behavior noted. Each of the chamber types was replicated 5 times, for a total of 45 chambers per run. The experiment was run twice, for a total of 90 bugs observed.

For all 90 bugs observed in this experiment, 60% fed solely on Kentucky bluegrass, compared to 8% which fed on fine fescue. Twenty-four percent fed on both Kentucky bluegrass and fine fescue, while 8% did not feed. Of those that fed on both grass species, much more time was spent on the Kentucky bluegrass than on the fine fescue, an average of 9.1 vs. 1.6 feeding observations, respectively. Thus it appears chinch bugs prefer to feed on Kentucky bluegrass over fine fescue. It may be that the bugs are attracted to the thatchiness of fine fescue, but prefer to feed on Kentucky bluegrass, thus explaining the need for values of both grass types to predict chinch bug presence.

Literature Cited

Kortier Davis, M. G. and D. R. Smitley. 1988. Relationship of thatch thickness and grass species to abundance of chinch bugs in home lawns. 58th Annual Michigan Turfgrass Conference Proceedings 17:57-58.

Kortier, M. G. and D. R. Smitley. 1987. Factors influencing chinch bug densities on home lawns. 57th Annual Michigan Turfgrass Conference Proceedings 16:146-147.

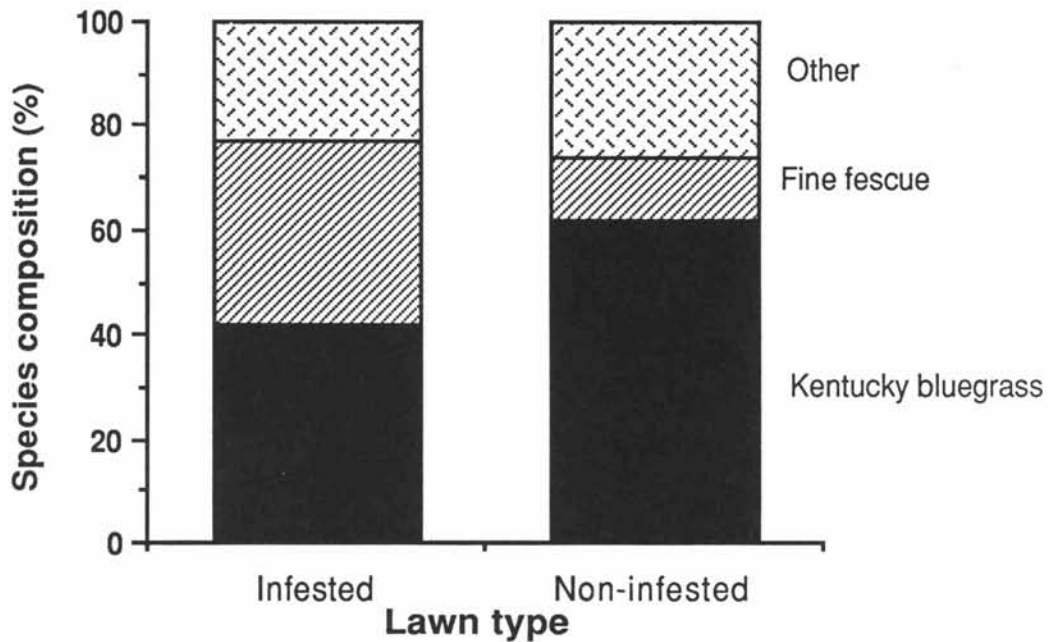


Figure 1. Average species composition of chinch bug infested and non-infested lawns. Sample sizes are 44 and 63, respectively.

Table 1. Risk assessment for chinch bug infestation in a lawn.

a. Criteria for determining risk. The number of the following statement that are true for a lawn will determine the risk of chinch bug infestation for that lawn.

- Thatch thickness is greater than 8 mm.
- Kentucky bluegrass composes between 10 and 50% of the lawn.
- Fine fescue composes greater than 30% of the lawn.

b. Risk assesment based on the number of the above three criteria that are met for a lawn.

	<u>Number of Criteria met</u>			
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>
Percent chinch bug infested ( % risk)	19	50	63	88
Number of lawns that fell into each category (n=143)	48	41	38	16