

Evaluation of liquid *Pasteuria*-based Products for Sting and Lance Nematode Control The Country Club at Lake City – Lake City, FL

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Key Conclusions

- When present as a mixed population, sting and lance nematodes may cause significant damage and be difficult to control even when below the accepted threshold values.
- Application of liquid *Pasteuria*-based products effectively reduced sting and lance nematode count at each rating date compared to the non-treated.

Introduction

Nematode problems in the coastal regions of the United States are seemingly ubiquitous. For golf course superintendents, especially in the state of Florida and coastal areas, managing nematode populations occupies a great deal of time and money. Nematodes directly impact turf health by feeding on the root system, halting root growth, and can result in killing the turfgrass. Additionally, this feeding activity exposes the root systems to many other soil-borne pathogens. In recent years, control options for nematodes in established turf systems have become extremely limited.

Sting (*Belonolaimus longicaudatus*) and lance (*Hoplolaiumus galeatus*) nematodes are the two predominant nematodes affecting turfgrasses in the southeast and coastal regions of the United States. These two nematodes are especially problematic because they can cause damage at relatively low thresholds (Sting – 10 per 100 cc of soil; Lance – 40 per 100 cc of soil). Due to its ability to enter the root system (semi-endoparasitic), the lance nematode has traditionally been difficult to control with commercial nematicides. When present together, sting and lance nematodes may cause significant damage and be difficult to control even when populations are below

the accepted damage threshold values. In early 2010, Pasteuria Bioscience, Inc., released Econem[®], a granular product that specifically targets sting nematodes. Pasteuria Bioscience, Inc., is currently evaluating a liquid formulation of the active ingredient in Econem[®] and a lance-specific product to potentially control both sting and lance nematodes in turfgrass systems. Extensive on-site research has been conducted at golf courses throughout the southeast to determine the efficacy of liquid *Pasteuria*-based products for nematode control.

Methods

Research was conducted at The Country Club at Lake City located in Lake City, FL, during summer of 2010. Greens at The Country Club at Lake City are composed of native soil/sand mix with TifEagle bermudagrass. The experimental design was a randomized complete block with five replications. Treatments included liquid Econem[®] plus lance product applied at a rate of 6 gal/1000 ft² and a non-treated control. Three applications were applied at 14 day intervals using a battery powered backpack sprayer. Applications were made on June 17, July 5, and July 20, 2010.

Soil samples were taken prior to initiation of the research and prior to application of treatments for enumeration of sting and lance populations (Tables 1 and 2). Eight to ten core samples (3 – 4" deep and 1-1.5" in diameter) were randomly taken within each plot and subsequently processed using the sugar-flotation with centrifugation method. Nematode enumeration is based upon a 100 cc composite subsample take from each sample. Due to its ability to quickly and effectively extract parasitic nematodes, the sugar flotation with centrifugation method is the accepted extraction method by scientists and the industry for golf course greens.

Results

Application of liquid Econem[®] with lance-specific *Pasteuria* significantly reduced sting and lance nematode populations at each rating date (Tables 1 and 2). Following two applications of liquid Econem[®] with lance-specific *Pasteuria*, sting nematodes were reduced to zero whereas the non-treated was still near the industry accepted damage threshold (9 per 100 cc of soil). Similarly, thirty days after the final application, sting nematode populations remained low, just 1 per 100 cc of soil. Lance nematodes were consistently decreased after each application throughout the study (Table 2). Two applications of liquid Econem[®] with lance-specific *Pasteuria* effectively reduced lance nematodes by 93%, from 60 to 4 per 100 cc of soil. At the final rating, lance nematode populations were reduced to 2 per 100 cc of soil in the *Pasteuria*-treated plot compared

to 37 per 100 cc in the non-treated control.

Table 1. Mean sting nematode count after three applications of liquid Econem® with lance-specific *Pasteuria* versus the non-treated control.

	———— # of Sting Nematodes ———— ^a		
Treatment ^b	June 17 ^c	July 20	August 23
Liquid Econem® + Lance	20 a	0 b	1 b
Non-treated	21 a	9 a	9 a

^a Nematode counts expressed per 100 cc of soil.

^b Liquid Econem® with lance-specific *Pasteuria* applied at 14 day intervals at 6 gal/1000 ft² rate.

^c Means within column followed by different letter are significantly different at P ≤ 0.05.

Table 2. Mean lance nematode count after three applications of liquid Econem® with lance-specific *Pasteuria* versus the non-treated control.

	———— # of Lance Nematodes ———— ^a		
Treatment ^b	June 17 ^c	July 20	August 23
Liquid Econem® + Lance	60 a	4 b	2 b
Non-treated	62 a	44 a	37 a

^a Nematode counts expressed per 100 cc of soil.

^b Liquid Econem® with lance-specific *Pasteuria* applied at 14 day intervals at 6 gal/1000 ft² rate.

^c Means within column followed by different letter are significantly different at P ≤ 0.05.

Summary

As previously mentioned, a mixed population of sting and lance nematodes is typically very difficult to control and may cause extensive damage to turfgrasses, even when below the accepted threshold values. Results of this study indicate that the application of liquid *Pasteuria*-based products may be effective in controlling sting and lance nematodes on golf course greens. According to John Waters and The Country Club at Lake City superintendent, Doyle Worthington, applications of liquid Econem® with lance-specific *Pasteuria* product resulted in a more resilient turfgrass, exhibiting less stress and better traffic tolerance during the hot summer months. A liquid formulation, as evaluated in this research, is desirable to turfgrass managers treating a large area such as a fairway or tee complex. Furthermore, a liquid formulation adds the ability to tank-mix with foliar applications of nutrients and/or other liquid pesticides that are applied regularly.