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THE COST EFFECTIVENESS OF BIOLOGICAL CONTROL: THE CASE OF  
INVASIVE MOLE CRICKETS AND FLORIDA'S COMMERCIAL PASTURELAND.

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# The Cost Effectiveness of Biological Control: The Case of Invasive Mole Crickets in Florida’s Commercial Pastureland: A Preliminary Result

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## ABSTRACT

Over the past 25 years, the population of invasive mole crickets in Florida was significantly reduced by several biological control agents. This study evaluates the economic efficiency of the mole cricket biological control project (MCBCP) to Florida’s commercial cattlemen. The analysis is based on a survey of Florida’s cattle and dairy producers as represented by the Florida Cattlemen’s Association membership.

Preliminary results indicate that while mole crickets are still among the top four insect pests in Florida pastureland, their control costs has declined by \$24 per acre annually. This represents a savings to cattle producers of nearly eight million dollars annually, or a cumulative benefit of \$260 million. Further analysis will be conducted to compare MCBCP total cost to these and other benefits to estimate a benefit/cost ratio as well as the overall economic impact to Florida’s economy using IMPLAN.

## INTRODUCTION

Pest mole crickets were introduced in the United States in the early 1990s. By the 1960’s three species of mole cricket from South America were well established in Florida and causing significant damage to a wide array of agricultural interests including pastureland. These species include; the tawny mole cricket (*Scapteriscus vicinus*), short winged mole cricket (*Scapteriscus abbreviates*) and southern mole cricket (*Scapteriscus borellii*).<sup>1</sup>

Controlling mole crickets by chemical means (mostly chlordane) was the first methods which proved both economical and effective. However, by the 1970’s many of the inexpensive and effective chemical control agents were ban due to potential health and environmental concerns. By the 1980’s efforts began at the University of Florida to identify potential biological control agents for these invasive mole crickets as a replacement for the banned chemicals.

The idea behind biological control is to reunite the invasive pest species with one or more of its natural enemies. If successful, the biological control agent(s) will become established and significantly reduce the pest species’ population and damage. Successful biological control agents for these species of mole crickets included the Brazilian fly (*Ormia diptera*), wasp (*Larva bicolor*) and nematodes (*Steinernema scapterisci*).<sup>1</sup> Their combined effort has reduced the invasive mole cricket population by over 95%



IMAGE OF A MOLE CRICKET



MOLE CRICKET DAMAGE ON PASTURELAND

## OBJECTIVE

The overall purpose of this study is to document the economic benefits and costs related to the mole cricket biological control project and more specifically:

1. document the cost of developing and implementing the MCBCP,
- 2.document the benefits of the MCBCP to cattle producers in Florida,
- 3.estimate the overall economic impact of reduced mole cricket control to Florida’s economy, and
- 4.conduct benefit -cost analysis of the MCBCP.

## METHODOLOGY

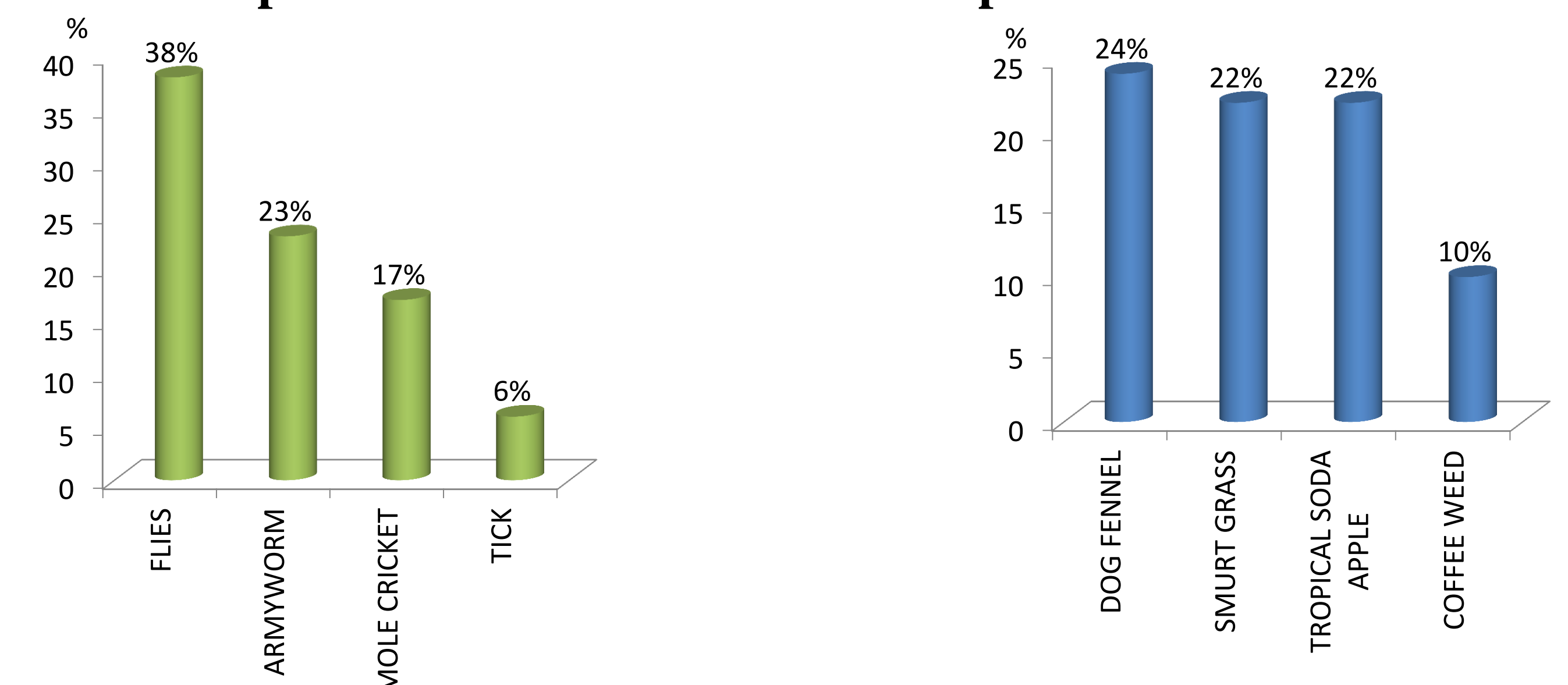
The survey instrument, consisting of four parts, was developed for mailing to members of the Florida Cattlemen Association. Part 1 collected information about the type and scope of the cattle operation. Part 2 collected information on the respondent’s experience with agriculture pests and methods of control/management. Part 3 of the questionnaire focused on the respondent’s knowledge and experience with biological control. The last part of the survey collected demographic information and the importance of the cattle production enterprise to the rancher’s household income. A total of 3,800 surveys were mailed to Florida Cattlemen Association members.

## PRELIMINARY RESULTS

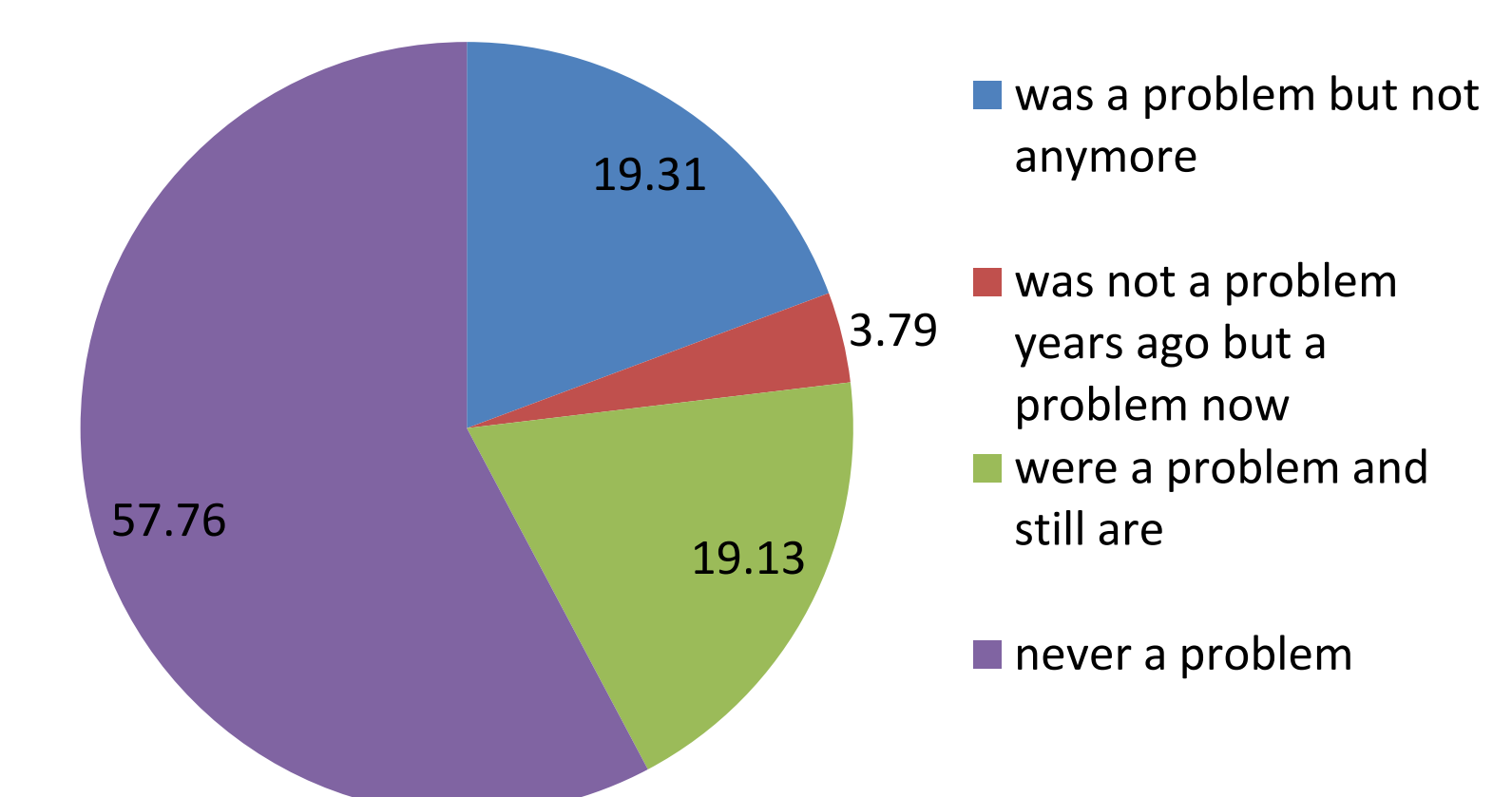
- Of the 3,800 surveys sent out in one mailing, 580 were returned for a response rate of 15%.
- The average cattle producer operates 1,340 acres of commercial pastureland.
- For the average rancher, mole crickets have been a problem for approximately 16years.
- 42% of the respondents are presently and/or historically effected by mole crickets
- For those affected by mole crickets, the average cattle producer has historically reduced stocking by 22% and increased supplementary feeding by 66%
- Historically, mole cricket control costs \$43 per acre per year.
- Presently, mole cricket control costs \$19 per acre per year. A \$24 per acre savings.
- On average, it takes approximately 2 years for the control project to work in many ranches
- The success of the project is ranked at 60%
- Preliminary estimates of MCBCP cost is \$4 million.

SAVINGS PER YEAR				
Total Florida Pasturelands is 571490 acres (NAS Data 2007)				
		Thousands of acres	Control cost \$ saving per acre	Total savings(millions \$)
Mole cricket status	Percentage			
Problem in the past	20	110	43	4.7
A current problem	22	126	24	3.0

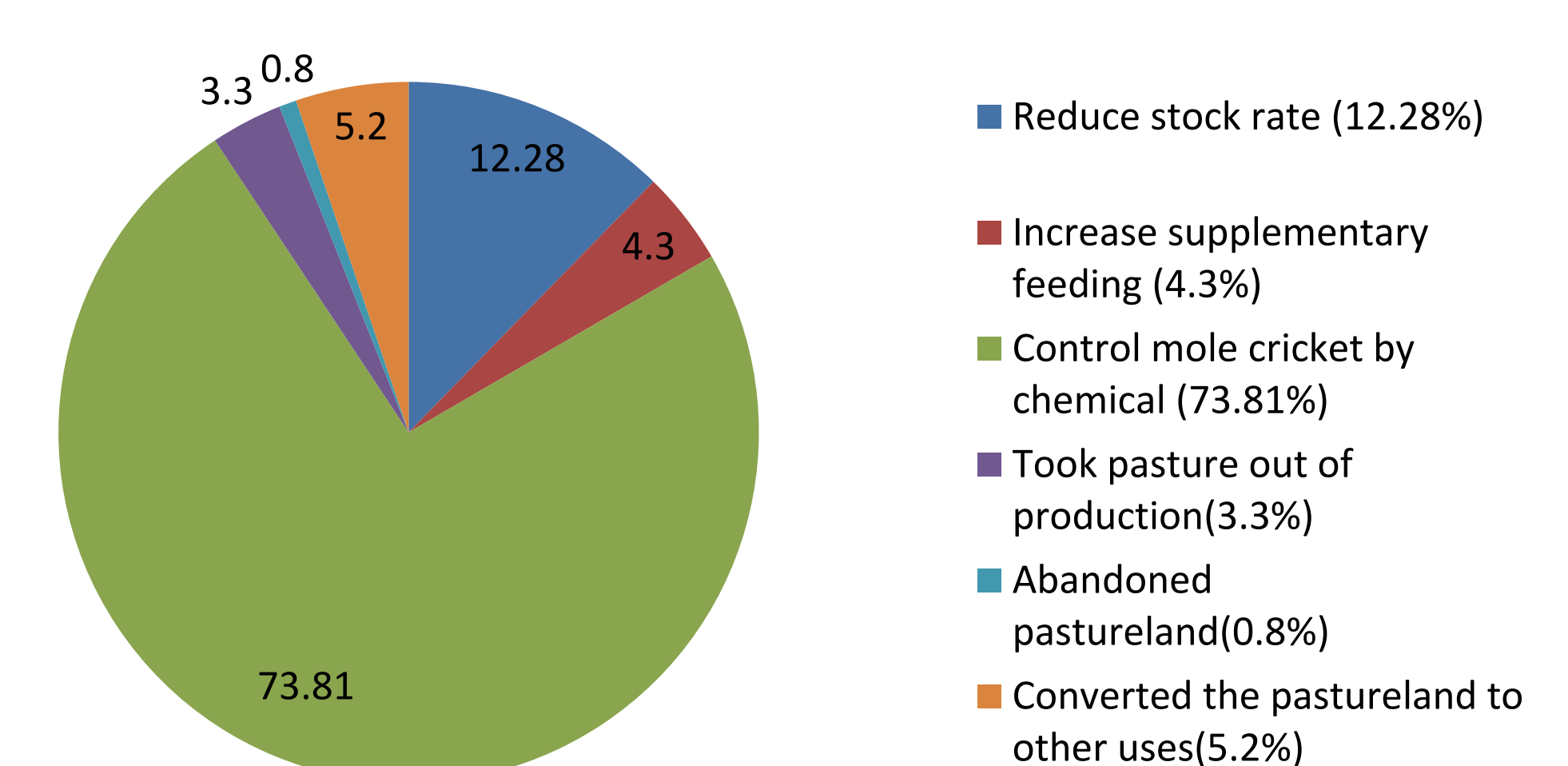
## Top Four Insect Pests and Weed Species in Florida



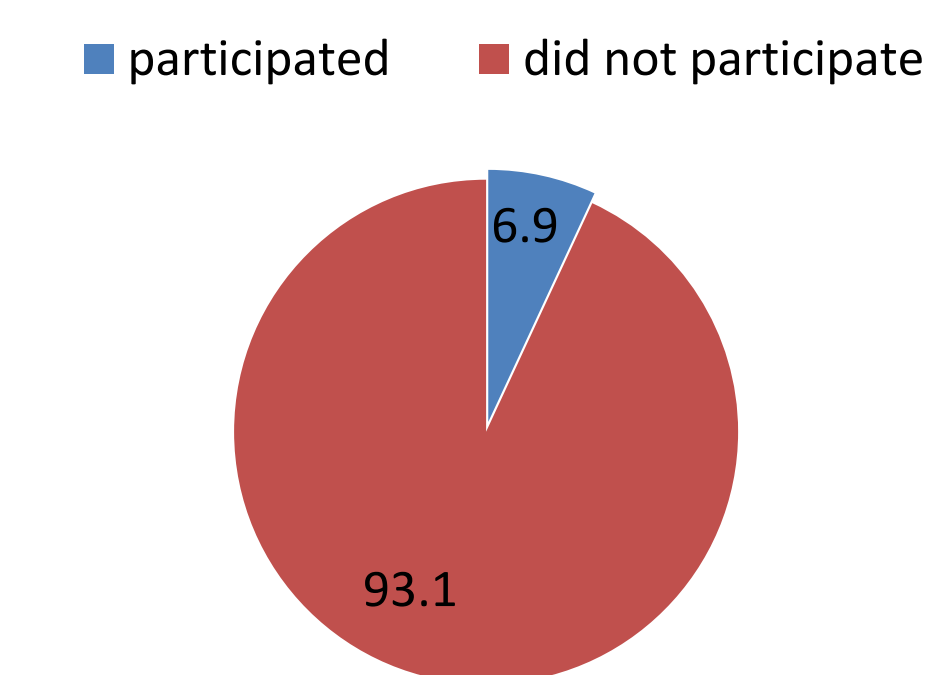
## Mole Cricket Status in Florida Pastureland %



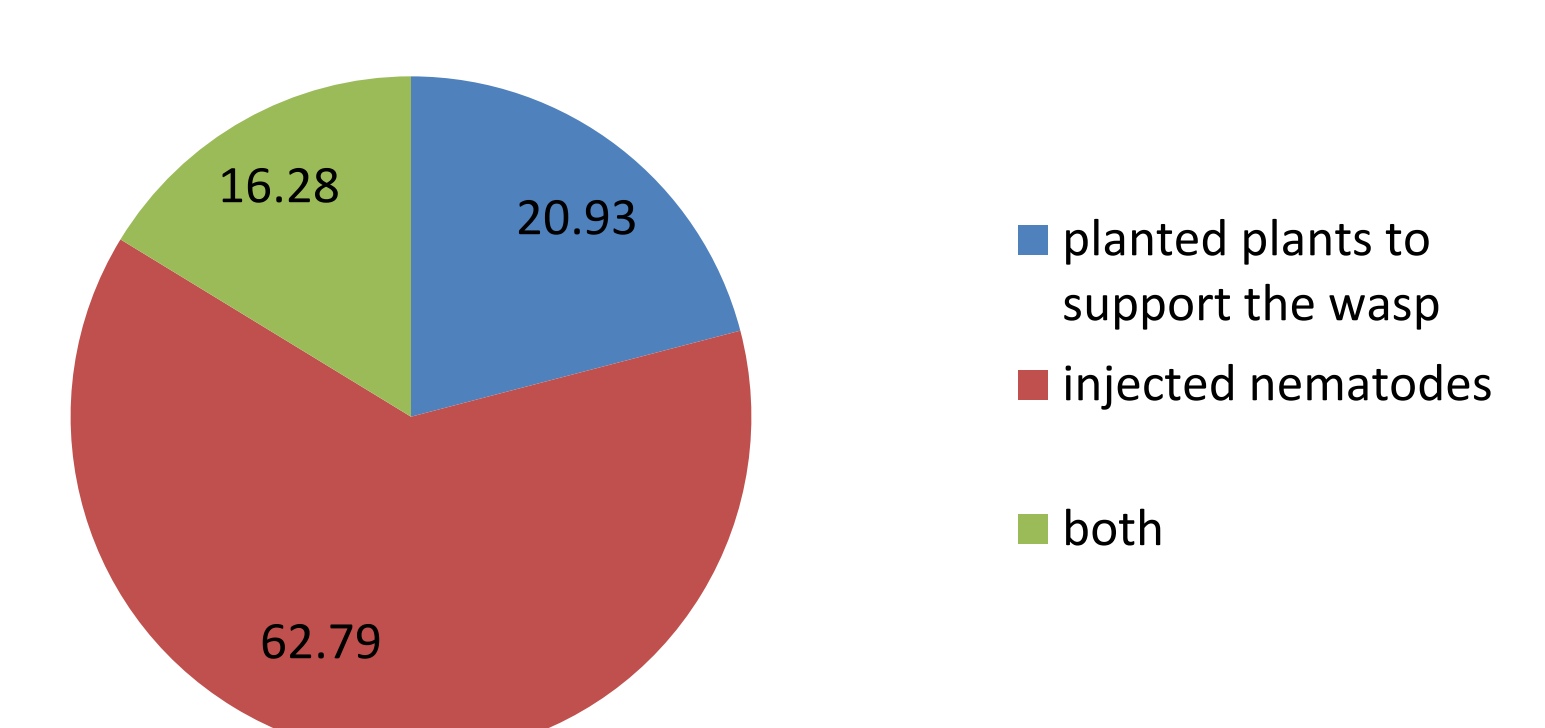
## Response to Mole Cricket Damage (%)



## Participation in the MCBCP (%)



## MCBCP Control Measure Proportion (%)



## CONCLUSION

- When only considering the control cost, the MCBCP resulted in an annual savings to cattle producers of \$7.7million. Assuming a 3% social discount rate that equates to a total savings of nearly \$206 million.
- Additional analysis will likely reveal savings from reduced stocking and supplementary feed costs and document the overall impact on Florida’s economy.
- Preliminary estimated benefit/cost ratio is 65 to 1

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