2014 Southeast Hay Convention

Introduction to the Bermudagrass Stem Maggot

Sampling techniques and population estimation for *Atherigona reversura* Villenueve (Diptera:Muscidae) in bermudagrass hay fields

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Muscidae: *Atherigona* Rondani

- Over 200 described species. Small, grey or yellowish grey with long face and large antennal flagellomere (Pont and Magpayo, 1995).
- Two subgenera, seperated by feeding habits: *Acritochaeta*(decaying plant sometimes animal), *Atherigona* s.(living and decaying, shootflies)
- *A. orientalis* Schiner (pepper fruit fly) and *A. reversura* (bermudagrass stem maggot) only reported N.A. species
- *A. soccata* pest of sorghum in Asia

A.Reversura male

A. reversura *(bermudagrass stem maggot BSM)*

- Widespread oriental species
- Reports in Hawaii in 1974 (Hardy 1981)
- the continental U.S. in 2010 in Georgia (Hudson 2010)
- Since been reported through much of southeastern and south central North America
- Little known biology

Threat to bermudagrass hayfields

- Eggs are believed to be laid on apical shoot, the larva then bores down the shoot to the node where it develops
- Larva have enlarged oral bars for cutting plant tissue
- Feeding causes death of shoot and consequent regrowth of new shoot at node (delays hay cutting, thickens stem)
- 3rd instar larvae exit shoot and pupate in soil
- Larval emergence after hay cutting
- life cycle 3-4 wks

Factors to consider for control of BSM

- Sampling technique and population estimation
- Mowing practices
- Percentage of shoot damage/larval infestation
- Pupation period
- Emergence success rate and synchronization
- temperature and growth rates
- Rapid population fluctuations in field

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Methods: poplation estimation

Absolute(cage and vacuum)

- All flies vaccuumed from cage with .5 m^2 footprint

- 2-3 absolute (abs)/relative (rel)
- 1 grass sample/abs (18 in diameter)

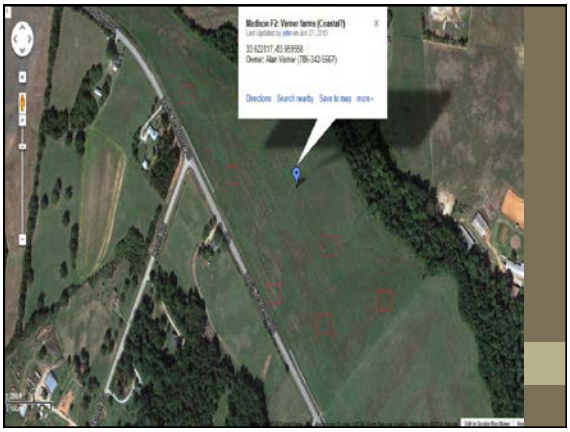
Relative(sweepnet)

- 10 sweeps of net walking in straight line

- All samples placed in bags with information then chilled and taken to lab

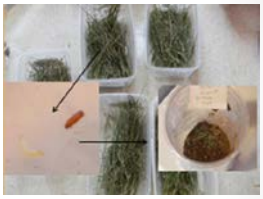
Methods

- Both abs and rel samples taken in ~10m^2 plots in random locations throughout field (3,6,10), various fields throughout the state (8 different locations, 15 dates July-Oct)
- Grass and fly samples taken to lab where flies counted, males/ females identified, damaged shoots counted, grass height
- The mean of the absolute samples was compared to relative samples in order to determine the relationship between the two. Regression analysis produced an equation to estimate the overall fly population.



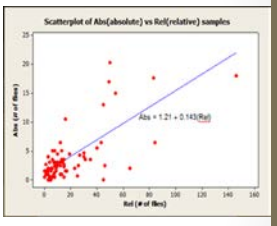
Methods: pupation period

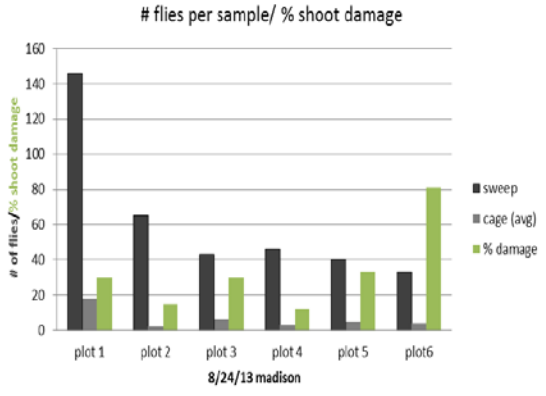
- Once grass samples sorted, larvae emerge from clippings
- Larvae allowed to pupate then counted and placed in containers for adult emergence, pupation period recorded



Results

- Regression analysis of fly sample data yielded a highly significant regression with R^2= 0.535
- If we multiply the regression equation by 2 (the absolute sample was .5 m^2) we can estimate the population of flies in a given field: Abs = 2[1.21 + 0.143(Rel)], where Abs= # of flies/ m^2 and Rel= # of flies/ 10-sweep sample





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Date	Location	techniq	female	male	total	f/m ratio	% damage10C	# of undmg	# damgd	total # shc	# sdhd/oti	other
9/10/2013	eatonton	cage	0	2	2							
9/10/2013	eatonton	cage	0	0	0	1						
9/10/2013	eatonton	sweep1	6	1	7		0.92	6	79	85		2-3 ft
9/10/2013	eatonton	cage	0	0	0							
9/10/2013	eatonton	cage	1	0	1	0.5						
9/10/2013	eatonton	sweep2	5	0	5		0.9	7	68	75		1-2ft
9/10/2013	eatonton	cage	3	0	3							
9/10/2013	eatonton	cage	0	0	0	1.5						
9/10/2013	eatonton	sweep3	13	3	16		0.92	7	73	80		0-1
9/10/2013	eatonton	cage	1	1	2							
9/10/2013	eatonton	cage	0	0	0	1						
9/10/2013	eatonton	sweep4	11	2	13		0.76	23	74	97		2 3 ft
9/10/2013	eatonton	cage	2	1	3							
9/10/2013	eatonton	cage	0	0	0	1.5						
9/10/2013	eatonton	sweep5	8	1	9		0.79	14	53	67		1-2ft
9/10/2013	eatonton	cage	0	0	0							
9/10/2013	eatonton	cage	0	0	0	0						
9/10/2013	eatonton	sweep6	3	0	3		0.69	24	54	78		1-2ft

Date	Location	techniq	female	male	total	f/m ratio	% damage10C	# of undmg	# damgd	total # shc	# sdhd/oti	other
9/6/2013	madison2	cage	5	1	6							
9/6/2013	madison	cage	6	1	7	6.5						
9/6/2013	madison	sweep1	53	31	84		0.39	63	41	104		0-1 ft
9/6/2013	madison	cage	2	1	3							
9/6/2013	madison	cage	5	0	5	4						
9/6/2013	madison	sweep2	21	9	30		0.33	81	39	120		0-1
9/6/2013	madison	cage	2	1	3							
9/6/2013	madison	cage	0	1	1	2						
9/6/2013	madison	sweep3	17	6	23		0.42	83	61	144		0-1
9/6/2013	madison	cage	0	0	0							
9/6/2013	madison	cage	0	0	0	0						
9/6/2013	madison	sweep4	32	13	45		0.29	46	19	65		0 1
9/6/2013	madison	cage	2	0	2	3.5						
9/6/2013	madison	cage	5	0	5							
9/6/2013	madison	sweep5	25	6	31		0.38	93	58	151		1-2 ft
9/6/2013	madison	cage	2	1	3							
9/6/2013	madison	cage	2	0	2	2.5						
9/6/2013	madison	sweep6	19	7	26		0.2	84	21	105		0-1

Results: pupation period

- Preliminary results suggests that pupae from grass samples synchronously emerge as adults in 10 days at temperatures of 24-27°C with a high success rate. More data is needed under controlled conditions.

Future studies

- Additional trials to obtain a more accurate estimate of the pupation period, success rate, and synchronization of emergence will be carried out in incubators at varying temperatures (75-95˚F).
- Further sampling to establish correlation between fly populations and grass damage
- Implementation of prescribed treatments on individual fields based on population estimates, percentage of damaged grass, number of days since the last hay cutting, and pupation period.
- It may be that populations are better controlled initially at low levels when the flies are first detected after the spring emergence or after adult emergence following hay cuttings. However, it is probable that fly populations disperse from local fields to nearby locations

Acknowledgements/References

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