2000 ACCOMPLISHMENT REPORT

GULFPORT PLANT PROTECTION STATION

CENTER FOR PLANT HEALTH SCIENCE AND TECHNOLOGY

PLANT PROTECTION AND QUARANTINE

U.S. DEPARTMENT OF AGRICULTURE

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These reports were prepared for the information of the U.S. Department of Agriculture, Animal and Plant Health Inspection Service personnel, and others interested in imported fire ant control or sweet potato weevil programs. Statements and observations may be based on preliminary or uncompleted experiments; therefore, the data are not ready for publication or public distribution.

Results of insecticide trials are reported herein. Mention of trade names or proprietary products does not constitute an endorsement or recommendation for use by the U.S. Department of Agriculture.

Compiled and Edited by:

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2000 IMPORTED FIRE ANT OBJECTIVES

GULFPORT PLANT PROTECTION STATION
GULFPORT, MS

OBJECTIVE 1: Development and refinement of quarantine treatments for certification of regulated articles.

- Empha
  nursery stock.
- Evaluate candidate toxicants, formulation, and dose rates for various use patterns.
- Test and ev
  grown nursery stock.
- Assist in registration of all treatments shown to be effective.

OBJECTIVE 2: Advancement of technology for population suppression and control.

- New product/formulation testing and evaluation.
- Conduct label expansion studies.
- Evaluation of non-chemical biocides including microbial, nematodes, and predaceous arthropods.

OBJECTIVE 3: Preparation/distribution of technical information on control, quarantine procedures, new technology, biological hazards, etc., to state agencies, the media, and the public.

- Provide training to state regulatory agencies and nursery associations.
- Publish and distribute informational aids for state agencies, nursery associations, PPQ personnel, and other interested stakeholders.

OBJECTIVE 4: Determine impact of IFA on biodiversity of various ecosystems.

- Provide technical support and assistance to other research organizations such as ARS, Universities, Mississippi Heritage Foundation, etc. to expedite ecological studies on the impact of IFA on T&E species.

- Conduct bait transects and compare current myrmecofaunal records IFA on other ant species.

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PROJECT NO: FA01G037

PROJECT TITLE: Residual Activity of Fipronil 0.1G in Nursery Potting Media

TYPE REPORT: Final

LEADER/PARTICIPANTS: Lee McAnally

INTRODUCTION:

Fipronil is produced by Aventis Corp. (Montvale, NJ) (formerly Rhone-Poulenc Ag. Co.; Research Triangle Park, NC) and is currently marketed in numerous countries for control of many insect pests in a variety of crops. U.S. registrations for the product include mole cricket control in sod, termite control in structures and fleas on dogs. Our laboratory has achieved excellent results with a granular formulation of the product when used as a preplant incorporated treatment (FA01G123, FA01G025). In 1996, we expanded our evaluation of the 0.1% granular formulation of fipronil, and also began preliminary testing of a water dispersable formulation as a drench treatment (FA01G076). In 1997, we again expanded our evaluation to include the incorporation of the granular formulation into several different media and aged at the Gulfport site.

MATERIALS AND METHODS:

Fipronil was blended into nursery potting soil from Windmill Nursery, Folsom, LA (bulk density of media was 360 pounds per cubic yard) on May 14, 1997. A portable cement mixer (2 cu ft capacity) was used to blend the toxicant into the potting media, and was operated for 15 minutes per batch to insure thorough blending. Treated media was then poured into one-gallon capacity plastic pots and weathered outdoors under simulated nursery conditions. A pulsating overhead irrigation system supplied ca. 1-
treatment were composited and subjected to standard alate queen bioassay.

Theoretical treatment rates used were 10, 15, 20, 25, 40 and 50 ppm. Due to an error in calculating bulk density, the actual initial treatment rates were 7, 10.5, 14, 17.5, 28, and 35 ppm. Rates of 40 and 50 ppm were mixed and added to the trial in September 1997. An additional trial was set up on August 7, 1997 using Flowerwood media (Flowerwood Nursery, Mobile, AL, 550 pounds per cubic yard), and on August 11, 1997 with our standard potting mix (MAFES mix, 650 pounds per cubic yard).

RESULTS:

Windmill media:

pm) these trials were evaluated on the 7-day exposure period. Seven days is the traditional exposure period called for in the standard protocol used by this lab. Due to the slower acting nature of some of the newer compounds, it was decided to change the exposure period to 14 days. It was also decided to start

checking the bioassays daily to determine the length of exposure required by each rate to reach 100% mortality. Bioassays were checked daily for a 14-day exposure period beginning at 10 and 6 months post-treatment.

Treatment rates below 35 ppm were either poor or erratic at the 7 days exposure period (Table 1). The 7 and 10.5 ppm rates were dropped from the trial and discarded after 4 months. The higher rates maintained 95-
efficacy through 11 months for the 40 ppm rate and 27 months for the 50 ppm rate in 7 days or less . All rates retained in the trial, 14-50 ppm, have provided 100% mortality within 14 days exposure through 38 months (Table 2).

MAFES media:
The 10 ppm rate maintained 95-100% through 14 months when the ants were exposed for 7 days (Table 3). The 25 ppm rate maintained 100% efficacy through 17 months, the 40 ppm rate through 26 months, and the 50 and 75 ppm rates through 29 months. Through 7 months these trials were evaluated on the 7-day exposure period. Bioassays conducted at the 14-day exposure period began at 8 months post-
months. All rates have maintained 100% efficacy through 39 months at the 14 day exposure except the 10 and 25 ppm rates which dropped to 85% effective in month 28 then returned to 100% efficacy through the remainder of the trial. (Table 4).

Flowerwood media:
Treatment rates of 10-40 ppm maintained 100% efficacy through 26 months at exposures of 7 days or less and the 50 and 75 ppm rates through 39 months (Table 5). Through 7 months these trials were evaluated on the 7-day exposure period. Bioassays conducted at the 14-day exposure period began at 8 months post-
months. All rates have maintained 100% efficacy through 39 months at the 14 day exposure (Table 6).

CONCLUSIONS:

Fipronil is slower acting than traditional chemicals used for IFA control in nursery media. However, control is achieved at very low rates of application and provides excellent residual activity against IFA in potting media.

Table 1. Residual Activity of Fipronil

Rate of application (ppm)	% mortality of alate females at indicated months post-treatment (7 days exposure)																		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
7	30	60	10	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10.5	30	30	5	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	65	55	15	25	10	0	20	--	--	--	60	30	50	25	20	*	10	10	40
17.5	95	75	75	20	10	55	55	60	100	35	95	75	60	40	60	*	35	35	70
28	100	100	90	100	50	100	100	90	100	95	100	100	100	100	100	*	40	80	100
35	100	100	100	100	95	100	100	100	100	100	100	100	100	100	100	*	75	80	85
Check	0	25	15	15	0	5	5	15	10	5	10	10	40	15	15	*	5	5	10
40	100	100	100	100	100	100	100	100	100	100	100	*	80	95	100	100	100	**	100
50	100	100	100	100	100	100	100	100	100	100	100	*	100	100	100	100	100	**	100
Check	0	5	5	15	10	5	10	10	40	15	15	*	5	5	10	0	5	**	15

* not evaluted at 7 days due to Hurricane Georges
** not evaluated due to lack of alate queens

Table 1. (Cont.) Residual Activity of Fipronil

Rate of application (ppm)	% mortality of alate females at indicated months post-treatment (7 days exposure)																		
	20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	65	55	**	45	85	**	85	75	30	65	50	85	40	10	10	25	45	60	45
17.5	35	85	**	95	90	**	60	85	10	50	95	60	75	5	35	25	65	80	85
28	90	100	**	100	100	**	100	80	85	100	100	100	100	65	85	100	95	100	90
35	100	100	**	100	100	**	100	100	95	100	100	100	100	100	100	100	100	100	100
Check	0	10	**	15	10	**	10	5	5	10	0	5	0	5	5	0	10	0	5
40	100	**	80	100	100	100	100	100	100	100	100	100	90	100	100	100	60	100	70
50	100	**	100	100	100	100	100	100	100	95	100	100	100	85	100	100	55	100	50
Check	10	**	10	5	5	10	0	5	0	5	5	0	10	0	5	5	0	10	10

** not evaluated due lack of alate queens

Table 2. Residual Activity of Fipronil 0.1G in Windmill Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure)																		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--	--	10d*	12d	9d	13d	11d	**	12d	10d	13d
17.5	--	--	--	--	--	--	--	--	--	9d*	10d	12d	9d	10d	8d	**	12d	10d	11d
28	--	--	--	--	--	--	--	--	--	8d*	5d	12d	7d	7d	7d	**	12d	10d	7d
35	--	--	--	--	--	--	--	--	--	7d*	5d	6d	4d	7d	7d	**	8d	10d	11d
Check	--	--	--	--	--	--	--	--	--	5%*	10%	10%	40%	15%	15%	45%	10%	15%	10%
40	--	--	--	--	--	7d*	4d	5d	4d	6d	5d	**	8d	10d	7d	6d	6d	***	4d
50	--	--	--	--	--	7d	4d	5d	4d	6d	5d	**	7d	7d	7d	6d	6d	***	4d
Check	--	--	--	--	--	5%	10%	10%	40%	15%	15%	45%	10%	15%	10%	0%	10%	***	15%

• daily readings of bioassays not performed prior to this evaluation period
** was not read 4-9 days exposure due to Hurricane Georges all were 100% at 10 days
*** not evaluated due to lack of alate queens

Table 2. (Cont.) Residual Activity of Fipronil

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure)																		
	20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	12d	10d	***	12d	10d	***	10d	10d	10d	11d	9d	8d	12d	11d	11d	10d	9d	10d	11d
17.5	12d	8d	***	8d	10d	***	10d	10d	10d	8d	8d	8d	8d	11d	10d	10d	9d	10d	11d
28	8d	7d	***	5d	6d	***	7d	10d	10d	5d	7d	7d	7d	8d	10d	7d	8d	6d	8d
35	7d	7d	***	4	5d	***	5d	7d	10d	6d	7d	6d	6d	6d	7d	6d	6d	6d	6d
Check	5%	10%	***	15%	10%	***	20%	10%	10%	15%	10%	5%	20%	15%	10%	10%	10%	0%	10%
40	5d	***	10d	7d	5d	5d	7d	6d	5d	7d	7d	6d	8d	6d	6d	6d	11d	6d	8d
50	5d	***	7d	6d	6d	6d	7d	5d	5d	11d	7d	6d	6d	10d	7d	7d	10d	7d	8d
Check	10%	***	20%	10%	10%	15%	10%	5%	20%	15%	10%	10%	10%	0%	10%	0%	0%	10%	10%

*** not evaluated due to lack of alate queens

Table 3. Residual Activity of Fipronil

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (7 days exposure)																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13***	**14**	**15**	**16**	**17**	**18**
10	100	100	100	100	100	100	100	100	100	100	100	100	95	100	60	85	80	35
15	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	95	65
20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90	85
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	85
40	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	0	10	10	5	5	15	0	10	15	15	15	15	15	10	15	10	0	5

Table 3. (cont.) Residual Activity of Fipronil

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (7 days exposure)*																	
	20	**21**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**37**	**38**	**39**
10	95	100	80	50	90	100	0	5	100	100	55	100	100	85	100	20	50	15
15	90	100	85	70	100	100	10	25	85	100	90	100	100	50	100	5	95	40
20	100	100	100	100	100	100	30	50	100	100	100	100	100	100	100	50	100	25
25	95	100	100	100	100	100	30	40	100	100	100	100	100	100	100	35	100	10
40	100	100	100	100	100	100	75	100	100	100	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	5	10	25	15	15	10	0	0	5	10	0	5	15	15	0	5	5	0

* months 19, 22 & 36 were not evaluated due to lack of alate queens

Table 4. Residual Activity of Fipronil 0.1G in MAFES Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure)																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
10	--	--	--	--	--	--	--	5d*	6d	7d	7d	7d	13d**	7d	9d	11d	9d	9d
15	--	--	--	--	--	--	--	4d*	6d	7d	7d	6d	6d	7d	7d	7d	8d	9d
20	--	--	--	--	--	--	--	5d*	6d	4d	5d	5d	5d	6d	7d	7d	12d	9d
25	--	--	--	--	--	--	--	4d*	6d	4d	6d	5d	5d	6d	7d	7d	7d	8d
40	--	--	--	--	--	--	--	4d*	6d	3d	4d	5d	4d	6d	7d	7d	6d	7d
50	--	--	--	--	--	--	--	3d*	3d	3d	5d	5d	4d	6d	4d	4d	6d	6d
75	--	--	--	--	--	--	--	3d*	3d	3d	4d	4d	3d	3d	4d	4d	6d	6d
Check	--	--	--	--	--	--	--	15%*	15%	15%	15%	15%	55%	10%	15%	15%	10%	15%

* daily readings of bioassays not performed prior to this evaluation period
** was not read 7-12 days exposure due to Hurricane Georges

Table 4. (cont.) Residual Activity of Fipronil 0.1G in MAFES Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure) *																	
	20	**21**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**37**	**38**	**39**
10	8d	7d	10d	9d	8d	7d	11d	85%	7d	6d	9d	7d	6d	14d	7d	13d	13d	13d
15	8d	7d	10d	8d	6d	6d	11d	10d	10d	5d	8d	7d	6d	14d	6d	12d	10d	12d
20	7d	6d	7d	7d	6d	6d	11d	10d	7d	6d	7d	5d	6d	7d	7d	11d	7d	12d
25	8d	5d	7d	7d	6d	4d	11d	85%	7d	6d	7d	6d	6d	7d	5d	10d	7d	12d
40	7d	6d	6d	6d	6d	4d	9d	6d	6d	4d	5d	5d	5d	6d	5d	7d	6d	7d
50	6d	5d	5d	6d	6d	4d	7d	7d	5d	5d	5d	5d	6d	4d	5d	6d	5d	7d
75	5d	5d	5d	5d	3d	4d	7d	5d	4d	3d	5d	4d	5d	4d	4d	5d	5d	7d
Check	5%	10%	25%	15%	15%	10%	25%	10%	5%	10%	10%	5%	15%	15%	0%	10%	10%	5%

* months 19, 22 & 36 were not evaluated due to lack of alate queens

Table 5. Residual Activity of Fipronil 0.1G in Flowerwood Media

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (7 days exposure)																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
40	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	0	5	0	30	20	0	10	0	25	25	20	5	5	5	0	15	0	25

Table 5. (cont.) Residual Activity of Fipronil 0.1G in Flowerwood Media

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (7 days exposure) *																	
	20	**21**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**37**	**38**	**39**
10	100	100	100	90	100	100	5	5	100	100	65	100	95	70	100	40	100	30
15	100	100	100	100	100	100	75	100	100	100	100	100	100	85	100	45	100	35
20	100	100	100	100	100	100	85	100	100	100	100	100	100	100	100	55	75	95
25	100	100	100	100	100	100	20	100	100	100	100	100	100	100	100	60	100	100
40	100	100	100	100	100	100	15	100	100	100	100	100	100	100	100	90	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	0	5	50	5	5	0	10	5	15	5	0	5	10	10	0	5	10	0

*months 19, 22 & 36 not evaluated due to lack of alate queens

Table 6. Residual Activity of Fipronil 0.1G in Flowerwood Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# days to reach 100% mortality or % mortality at 14 days exposure)																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
10	--	--	--	--	--	--	--	5d*	7d	7d	7d	7d	6d	7d	7d	7d	6d	7d
15	--	--	--	--	--	--	--	4d*	6d	7d	5d	5d	6d	6d	7d	4d	6d	3d
20	--	--	--	--	--	--	--	4d*	6d	4d	5d	7d	6d	6d	7d	4d	6d	3d
25	--	--	--	--	--	--	--	3d*	6d	4d	5d	5d	5d	6d	7d	4d	6d	3d
40	--	--	--	--	--	--	--	3d*	3d	3d	4d	4d	5d	6d	4d	4d	6d	3d
50	--	--	--	--	--	--	--	4d*	3d	3d	4d	4d	5d	6d	4d	4d	6d	3d
75	--	--	--	--	--	--	--	3d*	3d	2d	3d	4d	5d	3d	3d	4d	6d	2d
Check	--	--	--	--	--	--	--	0%*	25%	25%	20%	5%	5%	5%	0%	15%	0%	25%

* daily readings of bioassays not performed prior to this evaluation period

Table 6. (cont.) Residual Activity of Fipronil

Rate of Application (ppm)	% mortality of alate females at indicated months post- exposure)*																	
	20	**21**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**37**	**38**	**39**
10	7d	7d	6d	10d	7d	6d	14d	10d	7d	6d	9d	7d	8d	10d	6d	10d	7d	13d
15	6d	6d	6d	6d	7d	5d	9d	7d	5d	5d	6d	5d	5d	10d	7d	11d	7d	13d
20	4d	5d	5d	5d	6d	5d	8d	6d	5d	4d	6d	5d	7d	6d	5d	10d	8d	8d
25	7d	5d	5d	5d	6d	4d	8d	6d	5d	4d	6d	6d	5d	7d	5d	10d	7d	7d
40	4d	5d	5d	4d	6d	4d	8d	6d	5d	3d	5d	5d	5d	4d	5d	10d	7d	7d
50	4d	5d	4d	4d	6d	4d	5d	5d	4d	3d	5d	4d	5d	5d	5d	6d	7d	7d
75	4d	4d	4d	4d	3d	4d	4d	4d	4d	3d	5d	4d	5d	4d	3d	5d	3d	6d
Check	0%	5%	50%	5%	5%	0%	10%	5%	15%	5%	0%	5%	15%	10%	0%	10%	10%	10%

*months 19, 22 & 36 not evaluated due to lack of alate queens

PROJECT NO: FA01G067

PROJECT TITLE: Residual Activity of Fipronil 0.05G Incorporated into Potting Media and Applied "Over-the-Top"

TYPE REPORT: Interim

LEADER/PARTICIPANTS: Lee McAnally

INTRODUCTION:

Fipronil is produced by Aventis Corp. (Montvale, NJ)(formerly Rhone-Poulenc Ag. Co. Research Triangle Park, NC) and is currently marketed in numerous countries for control of many insect pests in a variety of crops. Currently, U.S. registrations for the product include mole cricket control on golf courses, termites in structures and fleas on dogs. Our laboratory has achieved excellent results with a 0.1% granular formulation of the product when used as a preplant incorporated treatment for containerized nursery stock (FA01G123, FA01G025). In 1996, we expanded our evaluation of the 0.1% granular formulation of fipronil, and also began preliminary testing of a water dispersible formulation as a drench treatment (FA01G076). In 1997, we again expanded our evaluation of the 0.05% granular formulation to include incorporation and an over-the top application.

MATERIALS AND METHODS:

Incorporated Treatment:
Granular 0.05% fipronil was blended into nursery potting soil (MAFES mix, 650 pounds per cubic yard) on 2 October 1997. A portable cement mixer (2 cu ft capacity) was used to blend the toxicant into the potting media, and was operated for 15 minutes per batch to insure thorough blending. Treatments rates used were 5, 10, 15, 25, and 50 ppm. Treated media was then poured into one-gallon capacity plastic nursery pots and weathered outdoors under simulated nursery conditions for one month prior to the first bioassay. Subsequent bioassays were conducted at monthly intervals. A pulsating overhead irrigation system supplied ca. 1-1½" water per week. Bioassays were conducted in the laboratory by confining alate queens to treated soil placed in 2" x 2" plastic flower pots equipped with a Labstone® bottom. The labstone absorbs moisture from an underlying bed of damp peat moss. There were four replicates per treatment in each bioassay.
alate queens. Initially queen
mortality was assessed after seven days of continuous confinement to the treated soil. At 6 months post-treatment, bioassays were checked daily for 14 days or until 100% mortality was attained. On 23 June 1998 Windmill potting media (Windmill Nursery, Folsom, LA, 200 pounds per cubic yard) at rates of 5, 10, 15, 20, 25, 40, and 50 ppm was added to the trial. On 1 July 1998 Flowerwood potting media (Flowerwood Nursery, Mobile, AL, 390 pounds per cubic yard) was also added at the same rates as the Windmill media. Both of these later trials were bioassayed in the same manner described above and were evaluated daily for 14 days or until 100% mortality.

Over-the-top Treatment:
One gal. nursery pots were filled with media and placed on a masonry brick in a 12" x 18" x 5" plastic pan. The sides of the pan were talced and ca. 1" of water was added to prevent escape. Five replicates per treatment rate were set up. Field collected colonies were separated from their nest tumulus by the floatation method (Banks et al. 1981) and 50 cc of workers and brood were added to each media-filled pot. The fragmented colonies were allowed to acclimate 3-5 days before treatment. Fipronil 0.05G was applied by sprinkling over the surface of the soil. Each container was then watered in with approximately 400 ml of water. Rates of 0.012, 0.12, and 1.2 grams per pot were used in the first trial (approximately 0.01 ppm, 0.1 ppm, and 1 ppm). A second trial was initiated using rates of 12, 18, and 25 grams per pot (10 ppm, 15 ppm, and 25 ppm). Containers were watered as needed for the duration of the 7 day trial. Ants were inspected daily for mortality and colonies were considered dead when less than 20 workers were present.

RESULTS:

Incorporated Treatment:
Results for the various media tested are summarized below and in the tables referenced below. The results for the MAFES media are final. The Flowerwood and Windmill media are still being tested.

MAFES Media:
When using the 7 day exposure period, the 50 ppm rate provided 95-100% efficacy for 38 months, except for an anomaly at 26 months. The 25 ppm rate maintained 85-100% efficacy through 24 months. The 15 ppm rate showed some unexplained drops in efficacy at 1 and 4 months post- 21 months and became erratic thereafter. The 10 ppm rate maintained 95-100% efficacy through 21 months except for a drop to 80% at 13 months. The 5 ppm rate has been erratic through the entire test (Table 1). However, the 15, 25 & 50 ppm rates were still attaining 95-100% mortality through 29 months using the 14 days exposure period with the exception of the 15 ppm rate attaining only 75% efficacy at 14 days exposure at the 23 month time period. The 5 and 10 ppm rates maintained 100% efficacy through 31 and 35 months respectively (Table 2).

Windmill Media:
At six months post-treatment, the 5, 10, 15 and 20 ppm rates evaluated at the 7 day exposure period showed poor results and became erratic after that (Table 3). The 25 ppm rate showed a decline at 6, 11, and 13 months, the 40 ppm rate showed a decline at 6 and 11 months but otherwise maintained 100% through 21 months. The 50 ppm rate has provided 95-100%. At 14 days exposure the 5 ppm rate attained 100% mortality through 27 months except for a drop in month 22. The 10 ppm rate has attained 90-100% through 28 months. All other rates remain at 100% through 28 months (Table 4).

Flowerwood Media:
At 7 days exposure the 5 ppm ra
months and became erratic after that. The 10 ppm rate maintained 80-100 % efficacy through 14 months. The 15 ppm rate maintained 90-100% through 25 months. The 20 & 25 ppm rates

maintained 100% through 26 months with the exception of a dip to 75% at 17 months for the 20 ppm rate. The 40 & 50 ppm rates have maintained 100% through 29 months (Table 5). All rates except the 5 & 10 ppm rates were at 100% at 14 days exposure or less. The 5 ppm rate was at 100% through 26 months while the 10 ppm was at 100% through 27 months. (Table 6).

Over-the-top Treatment:
In the first trial, no treatment rate provided more than 30% efficacy. In the second trial, no treatment rate provided more than 75% efficacy. This is probably due to the low mobility of fipronil in soil, and supports the necessity of incorporation into potting media.

CONCLUSIONS:

Fipronil is slower acting than traditional chemicals used for IFA control in nursery media. However, control is achieved at very low rates of application, with excellent residual activity (see below).

	Months residual activity		
PPM	MAFES-final	Windmill-interim	Flowerwood-interim
5	31	21	26
10	35	>28	28
15	38	>28	>29
20	-----	>28	>29
25	>38	>28	>29
40	-----	>28	>29
50	>38	>28	>29

Data marked with > indicate that those rates were at 100% at termination of test (MAFES) or are at 100% and still being evaluated.

References Cited:

Banks, W.A., C.S. Lofgren, D.P. Jouvenaz, C.E. Stringer, P.M. Bishop, D. F. Williams, D.P. Wojcik and B.M. Glancey.
imported fire ants. USDA, ARS, Science & Education Administration, Advances in Agricultural Technology, Southern Series, No. 21.

Table 1. Residual Activity of Fipronil 0.05G in MAFES Media (7 days exposure)

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment *																
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**18**
5	100	30	100	100	75	95	60	60	25	20	60	100	100	50	90	100	15
10	100	100	100	95	100	100	100	100	100	100	100	100	80	100	95	100	100
15	55	100	100	50	100	100	100	100	100	100	100	100	100	100	100	100	100
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	5	0	0	10	0	20	10	15	15	0	15	35	15	10	15	10	0

* not evaluated at 17 months due to lack of alate queens

Table 1. (cont.) Residual Activity of Fipronil 0.05G in MAFES Media (7 days exposure)

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment *																	
	19	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
5	100	95	20	85	5	55	55	45	90	0	80	60	15	100	45	5	15	5	0
10	100	100	5	100	20	95	95	100	100	50	55	85	25	100	100	15	6.7**	25	10
15	100	100	50	15	80	100	35	80	100	25	85	75	100	100	100	20	5	15	5
25	100	100	85	95	100	60	100	100	85	90	100	100	100	100	100	100	65	100	50
50	100	100	100	100	100	100	35	100	100	100	100	100	100	100	100	100	100	100	100
Check	10	0	10	10	0	0	5	5	5	5	0	5	15	0	0	0	5	5	0

* not evaluated at 20 months due to lack of alate queens
** Queens escaped from one replicate

Table 2. Residual Activity of Fipronil 0.05G in MAFES Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-mortality at 14 days exposure) **																
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**18**
5	--	--	--	--	--	8d*	10d	10d	10d	11d	8d	5d	7d	10d	11d	6d	13d
10	--	--	--	--	--	7d*	5d	7d	7d	6d	5d	5d	9d	6d	11d	7d	6d
15	--	--	--	--	--	5d*	5d	5d	7d	7d	5d	4d	6d	6d	6d	7d	6d
25	--	--	--	--	--	5d*	4d	3d	5d	5d	5d	3d	6d	6d	5d	4d	3d
50	--	--	--	--	--	5d*	4d	3d	4d	4d	5d	5d	6d	6d	4d	3d	3d
Check	--	--	--	--	--	20%*	10%	20%	20%	5%	15%	35%	25%	25%	15%	10%	5%

** 17 months not evaluated due to lack of alate queens

Table 2. (cont.) Residual Activity of Fipronil 0.05G in MAFES Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-mortality at 14 days exposure) *																		
	19	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
5	6d	8d	10d	8d	10d	12d	11d	11d	8d	12d	11d	12d	65%	6d	11d	13d	90%	13d	13d
10	6d	7d	10d	7d	10d	9d	10d	7d	7d	10d	11d	8d	13d	7d	6d	11d	53.3%	11d	13d
15	6d	6d	10d	75%	10d	7d	10d	11d	7d	10d	11d	12d	7d	6d	7d	11d	14d	14d	95
25	5d	6d	10d	8d	7d	12d	10d	5d	8d	10d	7d	6d	7d	4d	6d	6d	11d	7d	65
50	4d	4d	5d	6d	4d	5d	10d	4d	7d	5d	4d	4d	6d	4d	5d	5d	7d	4d	5d
Check	10%	10%	15%	15%	10%	20%	10%	5%	5%	5%	10%	15%	15%	0%	15%	10%	15%	10%	10%

* 20 months not evaluated due to lack of alate queens

Table 3. Residual Activity of Fipronil 0.05G in Windmill Media (7 days exposure)

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment *																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
5	70	20	40	35	0	5	60	35	25	5	45	10	55	0	60	25	5	5
10	95	80	65	55	20	10	100	70	75	15	100	70	90	10	100	80	85	40
15	100	100	95	90	75	45	100	100	100	20	100	55	65	30	100	95	35	85
20	100	100	100	100	85	95	100	100	100	45	100	75	100	80	100	100	95	100
25	100	100	100	100	100	75	100	100	100	45	80	100	100	100	100	100	100	100
40	100	100	100	100	100	75	100	100	100	75	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	60	20	50	35	20	25	5	5	10	5	20	5	5	0	5	0	0	0

* 8 & 12 months not evaluated due lack of alate queens

Table 3. (cont.) Residual Activity of Fipronil 0.05G in Windmill Media (7 days exposure)

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment *																	
	21	**22**	**23**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
5	20	10	40	5	30	10	0											
10	15	30	75	10	40	25	0											
15	45	45	75	35	65	70	10											
20	85	53.3	90	100	75	35	20											
25	100	66.7	100	65	90	60	35											
40	100	60	100	100	90	85	35											
50	100	95	100	100	100	100	70											
Check	15	5	5	0	0	0	0											

* 24 months not evaluated due lack of alate queens

Table 4. Residual Activity of Fipronil 0.05G in Windmill Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure) *																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
5	10d	11d	13d	10d	14d	14d	10d	9d	11d	11d	12d	10d	11d	11d	12d	12d	11d	13d
10	8d	8d	9d	10d	11d	14d	7d	9d	10d	10d	7d	10	10d	10d	8d	8d	8d	12d
15	7d	6d	8d	10d	9d	9d	6d	7d	6d	9d	7d	10d	10d	9d	8d	8d	11d	9d
20	6d	6d	7d	5d	8d	9d	6d	6d	6d	8d	7d	10d	7d	8d	7d	5d	8d	7d
25	6d	5d	7d	5d	7d	9d	6d	6d	5d	8d	8d	7d	7d	7d	7d	5d	7d	7d
40	6d	5d	7d	4d	7d	9d	5d	5d	5d	8d	5d	4d	5d	7d	6d	5d	7d	6d
50	6d	5d	7d	4d	4d	7d	5d	5d	5d	4d	4d	5d	5d	7d	6d	5d	7d	5d
Check	60%	20%	50%	40%	30%	25%	10%	15%	20%	15%	25%	10%	5%	5%	10%	0%	5%	15%

* 8 & 12 months not evaluated due lack of alate queens

Table 4. (cont.) Residual Activity of Fipronil 0.05G in Windmill Media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure) *																	
	21	**22**	**23**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
5	14d	55%	14d	12d	13d	14d	80%											
10	10d	90%	11d	12d	12d	11d	11d											
15	10d	10d	10d	8d	11d	9d	12d											
20	10d	10d	10d	6d	11d	10d	12d											
25	7d	10d	7d	8d	8d	9d	12d											
40	6d	10d	7d	6d	8d	8d	12d											
50	7d	10d	7d	4d	7d	7d	8d											
Check	15%	10%	10%	5%	10%	5%	0%											

*24 months not evaluated due lack of alate queens

Table 5. Residual Activity of Fipronil 0.05G in Flowerwood media (7 days exposure)

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment *																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
5	75	100	100	100	50	55	100	80	90	70	30	75	30	5	15	10	15	0
10	100	100	100	100	90	95	100	80	100	100	95	100	45	65	50	100	100	70
15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90
20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	75	100	85	95
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
40	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Check	0	0	5	5	20	20	0	15	20	15	0	15	10	5	0	5	0	16.7**

* 8 &11 months not evaluated due to lack of alate queens
** Queens escaped from one replicate

Table 5. (cont.) Residual Activity of Fipronil 0.05G in Flowerwood media (7 days exposure)

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment *											
	21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
5	25	65	20	85	50	35	10	60	0			
10	30	75	55	100	100	55	45	20	0			
15	100	100	100	100	100	30	40	55	20			
20	100	100	95	100	100	100	25	95	30			
25	100	100	100	100	100	100	65	100	50			
40	100	100	100	100	100	100	100	100	100			
50	100	100	100	100	100	100	100	100	100			
Check	0	5	20	5	10	0	0	5	0			

Table 6. Residual Activity of Fipronil 0.05G in Flowerwood media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure) *																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
5	8d	7d	5d	6d	10d	11d	7d	9d	8d	8d	11d	8d	10d	14d	13d	11d	11d	10d
10	6d	5d	5d	6d	8d	11d	5d	8d	7d	7d	10d	7d	10d	12d	10d	7d	7d	10d
15	6d	5d	5d	6d	6d	6d	4d	6d	6d	6d	6d	6d	7d	7d	7d	7d	6d	10d
20	4d	5d	3d	6d	6d	7d	4d	6d	6d	5d	6d	5d	7d	7d	10d	6d	8d	10d
25	4d	5d	5d	6d	6d	5d	3d	6d	6d	5d	6d	5d	7d	6d	5d	6d	6d	6d
40	4d	5d	3d	6d	6d	6d	3d	3d	5d	5d	4d	5d	5d	6d	5d	5d	5d	6d
50	4d	5d	3d	3d	6d	4d	3d	3d	4d	5d	4d	5d	4d	5d	4d	4d	6d	5d
Check	0%	0%	5%	5%	25%	20%	0%	15%	20%	20%	5%	15%	20%	10%	10%	5%	0%	16.7%**

* 8 &11 months not evaluated due to lack of alate queens
** Queens escaped from one replicate

Table 6. (cont.) Residual Activity of Fipronil 0.05G in Flowerwood media During 14 Day Exposure Periods.

Rate of Application (ppm)	% mortality of alate females at indicated months post-treatment (# of days to reach 100% mortality or % mortality at 14 days exposure)											
	21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
5	14d	12d	13d	11d	10d	12d	85%	14d	60%			
10	11d	12d	10d	6d	6d	11d	11d	95%	85%			
15	7d	7d	7d	6d	6d	11d	11d	11d	12d			
20	7d	7d	8d	6d	6d	7d	11d	11d	9d			
25	7d	5d	6d	4d	6d	4d	11d	7d	8d			
40	7d	5d	6d	4d	5d	6d	7d	7d	7d			
50	7d	4d	6d	4d	5d	5d	6d	6d	7d			
Check	10%	15%	20%	5%	15%	5%	5%	5%	10%			

PROJECT NO: FA01G019

PROJECT TITLE: Further Testing of Chlorfenapyr as an Imported Fire Ant Quarantine Treatment

REPORT TYPE: Interim

PROJECT LEADER/PARTICIPANT(s): Lee McAnally

INTRODUCTION:

The Federal Imported Fire Ant Quarantine Program (7CFR §301.81) states that all regulated products (nursery stock) leaving the quarantined area must be treated in a prescribed manner. Currently, treatments for containerized nursery include the use of granular insecticides incorporated into potting media or liquid drenches applied prior to shipping. Nursery stock treated with incorporated insecticides (bifenthrin or tefluthrin) may be certified for 6 months to 2 years, depending on the rate incorporated into the media (10-25 ppm based on bulk density of media). This allows the grower to use less insecticide on nursery stock that will be held on site for a short period of time, and more on those that need a longer growing period prior to selling. Drench treatments (chlorpyrifos, diazinon or bifenthrin) are generally used just prior to shipping, and those currently approved for use in the quarantine have certification periods of 10 days to 6 months. Since drench treatments are used just prior to shipping, long residual activity is not a requirement.

Chlorfenapyr is an experimental insecticide-miticide under development by American Cyanamid (Princeton, NJ). The product is active against many pests, and works as a broad spectrum contact and stomach poison. Previously w
product showed significant activity against IFA in containerized nursery stock. In August 1997, we began testing a 0.5G granular formulation as an incorporated treatment (FA01G097).

In August 1999, we initiated an expanded test of chlorfenapyr using a 2SC liquid formulation as
ch on two different carriers (clay and corn cob grit) as incorporated treatments. All of these treatments were applied to three different potting media.

MATERIALS AND METHODS:

Drench Treatments

A 2SC liquid formulation of chlorfena
nursery stock. Trade gallon nursery pots were filled with three different media, our standard (MAFES) potting media (3:1:1 pine bark: sphagnum peat moss sand - bulk density = 720 lb/cu yd), Flowerwood media (Flowerwood Nursery, Mobile, AL, bulk density = 470 lb/cu yd), and Windmill media (Windmill Nursery, Folsom, LA, bulk density = 235 lb/cu yd). The filled pots were left for 3-5 days under simulated nursery conditions (ca. 1-1½" irrigation per week) to allow the media to become fully s

on 28 June 1999 at rates of 25, 50, 75, 100, and 200 ppm. Each pot was drenched with a volume of solution equal to 1/5 the volume of the pot (i.e. 400 ml solution). Standard alate queen bioassays were then performed at 24 hrs., 1 week, 2 weeks, and monthly through 6 months after treatment.

Incorporated Treatments

Granular treatments included 1, 1.5 and 2% products formulated either on clay or corn cob grit carriers. Each of the granular formulations was blended into each of the three media described above at rates of 10, 25, 50, 75 and 100 ppm
to blend the toxicant into the pott
thorough blending. Treated media was then poured into one-gallon capacity plastic nursery pots and weathered outdoors under simulated nursery conditions. A pulsating overhead irrigation system supplied ca. 1-1½ inches water per week. At monthly intervals, subsamples were taken from 3 pots of each treatment and composited and subjected to standard alate queen bioassay. The 1.0G formulations were mixed from 30 June to 2 July 1999, the 1.5G formulations were mixed from 17 through 20 August 1999, and the 2.0G formulations were mixed from 15 through 17 September 1999.

RESULTS:

Drench Treatments

Results to date indicate that media type has an impact on chlorfenapyr efficacy. Rates of 100 ppm and greater have provided 100% mortality in both Flowerwood and MAFES media in 7 days or less up to 1 month after treatment. At exposures of 14 days or less rates of 75 ppm or greater in the Flowerwood media and the 100 & 200 ppm rates in the MAFES media were 100% effective through 6 months (Table 1). In the Windmill media only the 200 ppm was 100% effective up to 1 month against IFA.

Incorporated Treatments

Results of the granular treatments also indicate that media type effects the efficacy of chlorfenapyr. Carrier formulation also appears to effect the efficacy. At 5-7 months post-treatment American Cyanami
formulations due poorer results achieved by those formulations. Those formulations were therefore dropped from further testing. Windmill media showed erratic results regardless of percent a.i. or carrier type (Tables 2, 3 & 4). Rates of 50 ppm and higher of the grit formulation of chlorfenapyr have provided excellent control of IFA in Flowerwood and MAFES media 15-17 months post-treatment.

Table 1. Residual activity of chlorfenapyr 2SC.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated period post-treatment after 14 days exposure (days required to reach 100% mortality)								
		24 Hours	1 week	2 weeks	1 month	2 months	3 months	4 months	5 months	6 months
Flowerwood	25	90	70	100 (8)	100 (8)	55	90	70	35	60
	50	100 (7)	100 (9)	100 (8)	100 (8)	100 (7)	90	95	100 (13)	100 (13)
	75	100 (7)	100 (8)	100 (6)	100 (6)	100 (7)	100 (8)	100 (10)	100 (9)	100 (12)
	100	100 (7)	100 (6)	100 (5)	100 (5)	100 (5)	100 (6)	100 (6)	100 (7)	100 (6)
	200	100 (3)	100 (6)	100 (5)	100 (5)	100 (5)	100 (6)	100 (6)	100 (5)	100 (4)
	Check	10	40	70	15	25	15	5	5	10
MAFES	25	85	65	55	100 (13)	60	60	70	25	60
	50	100 (7)	100 (14)	100 (12)	100 (11)	85	100 (9)	75	75	95
	75	100 (11)	100 (7)	100 (9)	100 (6)	100 (9)	100 (8)	100 (8)	90	100 (12)
	100	100 (7)	100 (7)	100 (7)	100 (5)	100 (12)	100 (6)	100 (8)	100 (9)	100 (13)
	200	100 (7)	100 (6)	100 (7)	100 (4)	100 (6)	100 (6)	100 (6)	100 (7)	100 (8)
	Check	15	15	70	5	10	15	20	5	5
Windmill	25	15	5	75	60	85	30	0	0	0
	50	30	5	65	45	55	30	10	10	0
	75	70	60	65	55	30	35	5	10	0
	100	90	35	85	95	45	40	25	10	0
	200	100 (9)	100 (14)	100 (13)	100 (13)	95	65	50	30	80
	Check	10	25	95	20	30	20	0	5	5

Table 2. Residual activity of chlorfenapyr 1.0 G.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment after 14 days exposure (days required to reach 100% mortality)								
		1	3	4	6	7	8	9	10	11
Flowerwood	Clay									
	10	100 (11)	65	0	25	35	*	*	*	*
	25	100 (7)	100(10)	70	15	30	*	*	*	*
	50	100 (4)	100 (8)	100 (8)	100 (8)	100 (10)	*	*	*	*
	75	100 (3)	100 (7)	100 (6)	100 (7)	100 (6)	*	*	*	*
	100	100 (3)	100 (7)	100 (5)	100 (5)	100 (6)	*	*	*	*
	Grit									
	10	100 (11)	80	25	5	10	10	20	50	40
	25	100 (8)	100 (7)	100 (12)	80	90	95	70	85	70
	50	100 (4)	100 (7)	100 (7)	100 (8)	95	100 (12)	100 (13)	100 (12)	100(12)
	75	100 (2)	100 (7)	100 (6)	100 (7)	100 (10)	100 (8)	100 (11)	100 (9)	100 (8)
	100	100 (2)	100 (7)	100 (5)	100 (5)	100 (4)	100 (6)	100 (6)	100 (6)	100 (6)
	Check	5	20	20	5	10	10	5	10	10
MAFES	Clay									
	10	55	75	20	20	20	*	*	*	*
	25	80	90	10	100 (14)	70	*	*	*	*
	50	100 (10)	100 (10)	95	100 (11)	100 (10)	*	*	*	*
	75	100 (7)	100 (7)	95	100 (6)	100 (6)	*	*	*	*
	100	100 (7)	100 (7)	100 (8)	100 (6)	100 (6)	*	*	*	*
	Grit									
	10	35	60	0	10	15	0	40	45	25
	25	50	100 (14)	10	45	25	20	60	50	45
	50	100 (13)	100 (9)	100 (13)	100 (11)	100 (12)	100 (12)	100 (13)	100 (12)	100 (13)
	75	100 (7)	100 (7)	100 (10)	100 (7)	100 (7)	100 (11)	100 (10)	100 (9)	100 (9)
	100	100 (7)	100 (7)	100 (8)	100 (6)	100 (6)	100 (11)	100 (6)	100 (7)	100 (7)
	Check	10	10	0	5	5	5	10	5	5
Windmill	Clay									
	10	85	75	40	15	0	*	*	*	*
	25	50	70	35	20	15	*	*	*	*
	50	80	90	0	65	33.3	*	*	*	*
	75	100 (12)	95	45	10	80	*	*	*	*
	100	100 (12)	100 (13)	95	75	100 (13)	*	*	*	*
	Grit									
	10	40	60	0	25	15	*	*	*	*
	25	40	35	10	5	5	*	*	*	*
	50	70	95	40	10	10	*	*	*	*
	75	85	90	40	70	60	50	30	65	45
	100	100 (12)	100 (13)	75	95	95	45	90	100(14)	80
	Check	20	10	5	15	10	0	5	10	10

* Removed from evaluation

** Queens from one replicate escaped

Table 2. (Cont.) Residual activity of chlorfenapyr 1.0 G.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment after 14 days exposure (days required to reach 100% mortality)								
		12	13	14	15	16	17			
Flowerwood	Clay									
	10	*	*	*	*	*	*			
	25	*	*	*	*	*	*			
	50	*	*	*	*	*	*			
	75	*	*	*	*	*	*			
	100	*	*	*	*	*	*			
	Grit									
	10	50	65	45	50	55	60			
	25	85	80	60	95	55	45			
	50	100 (7)	100 (7)	100 (14)	100(13)	100(13)	95			
	75	100 (5)	100 (5)	100 (12)	100 (7)	100 (8)	100(13)			
	100	100 (5)	100 (6)	100 (6)	100 (6)	100 (8)	100(9)			
	Check	10	5	5	5	5	10			
MAFES	Clay									
	10	*	*	*	*	*	*			
	25	*	*	*	*	*	*			
	50	*	*	*	*	*	*			
	75	*	*	*	*	*	*			
	100	*	*	*	*	*	*			
	Grit									
	10	20	55	100 (8)	60	10	0			
	25	75	95	100 (8)	90	85	25			
	50	100 (10)	100 (10)	100 (8)	100 (10)	100 (13)	100(13)			
	75	100 (5)	100 (7)	100 (6)	100 (6)	100 (8)	100(9)			
	100	100 (5)	100 (5)	100 (6)	100 (6)	100 (7)	100(9)			
	Check	10	5	5	10	10	10			
Windmill	Clay									
	10	*	*	*	*	*	*			
	25	*	*	*	*	*	*			
	50	*	*	*	*	*	*			
	75	*	*	*	*	*	*			
	100	*	*	*	*	*	*			
	Grit									
	10	*	*	*	*	*	*			
	25	*	*	*	*	*	*			
	50	*	*	*	*	*	*			
	75	100 (12)	65	95	70	75	40			
	100	100 (11)	100 (10)	90	85	100 (13)	46.7**			
	Check	5	15	6.7**	15	15	0			

* Removed from evaluation

** Queens escaped from one replicate

Table 3. Residual activity of chlorfenapyr 1.5G.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment after 14 days exposure (days required to reach 100% mortality)								
		1	2	3	5	6	7	8	9	10
Flowerwood	Clay									
	10	100 (5)	85	100 (12)	85	100 (7)	*	*	*	*
	25	100 (6)	100 (7)	100 (9)	100 (11)	100 (6)	*	*	*	*
	50	100 (5)	100 (7)	100 (5)	100 (8)	100 (9)	*	*	*	*
	75	100 (4)	100 (7)	100 (5)	100 (4)	100 (3)	*	*	*	*
	100	100 (4)	100 (7)	100 (5)	100 (4)	100 (3)	*	*	*	*
	Grit									
	10	100 (6)	85	100 (12)	90	100 (6)	100 (14)	55	50	75
	25	100 (5)	100 (5)	100 (7)	100 (7)	100 (6)	100 (12)	100 (9)	75	100(13)
	50	100 (4)	100 (7)	100 (5)	100 (5)	100 (3)	100 (8)	100 (7)	100 (10)	100 (5)
	75	100 (4)	100 (5)	100 (5)	100 (4)	100 (3)	100 (5)	100 (6)	100 (7)	100 (5)
	100	100 (4)	100 (5)	100 (5)	100 (6)	100 (6)	100 (5)	100 (5)	100 (7)	100 (5)
	Check	5	15	10	5	5	5	15	15	10
MAFES	Clay									
	10	5	10	5	0	10	*	*	*	*
	25	20	15	20	15	53.3**	*	*	*	*
	50	85	50	85	90	100 (9)	*	*	*	*
	75	100 (11)	100 (12)	100 (11)	100 (11)	100 (7)	*	*	*	*
	100	100 (8)	100 (12)	100 (8)	100 (11)	100 (6)	*	*	*	*
	Grit									
	10	20	15	20	10	15	50	25	60	45
	25	100 (14)	60	100 (14)	30	25	85	60	50	95
	50	100 (8)	100 (12)	100 (8)	100 (11)	95	100 (7)	100 (12)	100 (10)	100 (6)
	75	100 (7)	100 (8)	100 (6)	100 (8)	100 (9)	100 (6)	100 (9)	100 (10)	100 (5)
	100	100 (6)	100 (7)	100 (5)	100 (8)	100 (7)	100 (5)	100 (6)	100 (10)	100 (5)
	Check	15	5	15	5	10	5	10	25	10
Windmill	Clay									
	10	0	5	5	0	*	*	*	*	*
	25	5	5	15	5	*	*	*	*	*
	50	10	0	50	10	*	*	*	*	*
	75	30	20	5	20	20	*	*	*	*
	100	65	65	50	65	65	*	*	*	*
	Grit									
	10	30	5	5	0	*	*	*	*	*
	25	5	10	0	20	*	*	*	*	*
	50	25	55	25	5	*	*	*	*	*
	75	80	50	40	30	40	100 (13)	55	75	100 (13)
	100	100 (11)	75	90	90	93.3**	100 (13)	100 (13)	100 (14)	100 (13)
	Check	10	0	0	0	5	10	10	5	15

* Removed from evaluation

** Queens from one replicate escaped

Table 3. (Cont.) Residual activity of chlorfenapyr 1.5G.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment after 14 days exposure (days required to reach 100% mortality)								
		11	13	14	15					
Flowerwood	Clay									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	*	*	*	*					
	100	*	*	*	*					
	Grit									
	10	80	75	20	45					
	25	75	85	50	40					
	50	100(11)	100(14)	95	100(13)					
	75	100(6)	100(10)	100(11)	100(9)					
	100	100(6)	100(9)	100(10)	100(8)					
	Check	5	15	0	10					
MAFES	Clay									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	*	*	*	*					
	100	*	*	*	*					
	Grit									
	10	25	30	15	10					
	25	45	35	45	35					
	50	100(11)	100(9)	100(12)	100(13)					
	75	100(6)	100(8)	100(7)	100(9)					
	100	100(6)	100(8)	100(6)	100(7)					
	Check	5	10	0	10					
Windmill	Clay									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	*	*	*	*					
	100	*	*	*	*					
	Grit									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	80	100(14)	20	55					
	100	90	100(14)	65	70					
	Check	10	10	10	0					

* Removed from evaluation

Table 4. Residual activity of chlorfenapyr 2.0G.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment after 14 days exposure (days required to reach 100% mortality)								
		1	2	3	4	5	6	7	8	9
Flowerwood	Clay									
	10	100 (8)	100 (10)	100 (11)	100 (7)	55	*	*	*	*
	25	100 (8)	100 (6)	100 (11)	100 (5)	100 (10)	*	*	*	*
	50	100 (11)	100 (7)	100 (6)	100 (4)	100 (4)	*	*	*	*
	75	100 (7)	100 (6)	100 (4)	100 (4)	100 (4)	*	*	*	*
	100	100 (6)	100 (6)	100 (4)	100 (4)	100 (4)	*	*	*	*
	Grit									
	10	100 (8)	100 (8)	100 (4)	100 (6)	90	100 (6)	90	45	45
	25	100 (8)	100 (6)	100 (7)	100 (4)	100 (6)	100 (6)	100 (12)	85	85
	50	100 (5)	100 (6)	100 (4)	100 (4)	100 (4)	100 (4)	100 (8)	100 (9)	10
	75	100 (6)	100 (3)	100 (4)	100 (4)	100 (4)	100 (4)	100 (8)	100 (6)	10
	100	100 (5)	100 (3)	100 (4)	100 (4)	100 (4)	100 (4)	100 (5)	100 (5)	10
	Check	10	25	33*	5	5	10	15	5	10
MAFES	Clay									
	10	45	5	0	0	0	*	*	*	*
	25	25	15	0	5	0	*	*	*	*
	50	70	25	30	50	25	*	*	*	*
	75	90	65	70	95	100 (14)	*	*	*	*
	100	100 (12)	85	100 (11)	100 (11)	100 (10)	*	*	*	*
	Grit									
	10	5	10	0	30	15	10	65	40	10
	25	65	30	0	100 (11)	20	75	55	60	90
	50	100 (9)	100 (10)	100 (13)	100 (7)	100 (13)	100 (11)	100 (14)	100 (9)	10
	75	100 (8)	100 (8)	100 (11)	100 (6)	100 (10)	100 (8)	100 (12)	100 (8)	10
	100	100 (7)	100 (8)	100 (11)	100 (6)	100 (10)	100 (7)	100 (8)	100 (8)	10
	Check	10	20	10	10	10	10	10	10	10
Windmill	Clay									
	10	15	0	15	0	5	*	*	*	*
	25	30	5	30	5	5	*	*	*	*
	50	10	0	10	10	20	*	*	*	*
	75	55	5	55	5	30	*	*	*	*
	100	40	20	40	60	50	*	*	*	*
	Grit									
	10	20	0	20	0	10	*	*	*	*
	25	20	20	20	10	10	*	*	*	*
	50	80	25	80	65	5	*	*	*	*
	75	85	80	85	90	60	85	65	80	90
	100	100 (11)	100 (14)	100 (13)	95	95	80**	40	100 (13)	10
	Check	5	15	5	0	10	0	10	15	5

* Removed from evaluation

** Queens escaped from 1 replicate

Table 4. (Cont.) Residual activity of chlorfenapyr 2.0G.

Media Treated	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment after 14 days exposure (days required to reach 100% mortality)								
		10	12	13	14					
Flowerwood	Clay									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	*	*	*	*					
	100	*	*	*	*					
	Grit									
	10	55	70	35	45					
	25	85	45	45	20					
	50	100(11)	100(13)	100(9)	100(13)					
	75	100(6)	100(9)	100(7)	100(8)					
	100	100(5)	100(8)	100(7)	100(10)					
	Check	15	15	5	10					
MAFES	Clay									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	*	*	*	*					
	100	*	*	*	*					
	Grit									
	10	5	35	15	10					
	25	65	70	75	15					
	50	100(13)	100(9)	100(10)	100(13)					
	75	100(11)	100(8)	100(8)	100(10)					
	100	100(7)	100(8)	100(7)	100(8)					
	Check	15	0	15	10					
Windmill	Clay									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	*	*	*	*					
	100	*	*	*	*					
	Grit									
	10	*	*	*	*					
	25	*	*	*	*					
	50	*	*	*	*					
	75	75	100(13)	40	15					
	100	90	100(14)	30	75					
	Check	0	5	0	5					

* Removed from evaluation

PROJECT NO: GPPS00-01

PROJECT TITLE: Further Testing of Chlorfenapyr as an Imported Fire Ant Quarantine Treatment (2000)

REPORT TYPE: Interim

PROJECT LEADER/PARTICIPANT(s): Lee McAnally

INTRODUCTION:

The Federal Imported Fire Ant Quarantine Program (7CFR §301.81) states that all regulated products (nursery stock) leaving the quarantined area must be treated in a prescribed manner. Currently, treatments for containerized nursery include the use of granular insecticides incorporated into potting media or liquid drenches applied prior to shipping. Nursery stock treated with incorporated insecticides (bifenthrin or tefluthrin) may be certified for 6 months to 2 years, depending on the rate incorporated into the media (10-25 ppm based on bulk density of media). This allows the grower to use less insecticide on nursery stock that will be held on site for a short period of time, and more on those that need a longer growing period prior to selling. Drench treatments (chlorpyrifos, diazinon or bifenthrin) are generally used just prior to shipping, and those currently approved for use in the quarantine have certification periods of 10 days to 6 months. Since drench treatments are used just prior to shipping, long residual activity is not a requirement.

Chlorfenapyr is an experimental insecticide-miticide under development by American Cyanamid (Princeton, NJ). The product is active against many pests, and works as a broad spectrum contact and stomach poison. Previously w
product showed significant activity against IFA in containerized nursery stock. In August 1997, we began testing a 0.5G granular formulation as an incorporated treatment (FA01G097).

In August 1999, we initiated an expanded test of chlorfenapyr using a 2SC liquid formulation as
ch on two different carriers (clay and corn cob grit) as incorporated treatments. All of these treatments were applied to three different potting media (FA01G019).

In August 2000, another trial was initiated using the 1G and 1.5G formulations on the grit carrier. Another drench trial will also be initiated in January 2001.

MATERIALS AND METHODS:

Incorporated Treatments

Granular treatments included 1% and 1.5% products formulated on a corn cob grit carrier. Each of the granular formulations was blended into the MAFES media (3:1:1 pine bark: sphagnum peat moss: sand - bulk density = 785 lb/cu yd) at rates of 50, 75, 100 and 200 ppm. A portable

cement mixer (2 cu ft capacity) was use to blend the toxicant into the potting media, and was operated for 15 minutes per batch to insure thorough blending. Treated media was then poured into one-gallon capacity plastic nursery pots and weathered outdoors under simulated nursery conditions. A pulsating overhead irrigation system supplied ca. 1-1½ inches water per week. At monthly intervals, subsamples were taken from 3 pots of each treatment and composited and subjected to standard alate queen bioassay. The 1.0G formulation was mixed on August 28 and the 1.5G formulation was mixed on August 29, 2000.

RESULTS:

All rates are producing 100% mortality in 11 days exposure or less through three months post-treatment (table 1).

Table 1. Residual activity of chlorfenapyr 1.0G and 1.5G.

Formulation Tested	Rate of Application (ppm)	Mean % mortality to alate females at indicated months post-treatment (days required to reach 100% mortality)		
		1	2	3
1.0G	50	100(6)	100(8)	100(11)
	75	100(5)	100(7)	100(7)
	100	100(4)	100(7)	100(8)
	200	100(3)	100(7)	100(5)
1.5G	50	100(6)	100(8)	100(11)
	75	100(6)	100(8)	100(8)
	100	100(6)	100(4)	100(7)
	200	100(4)	100(4)	100(5)
	Check*	15	10	5

*Check mortality is shown at longest exposure time

PROJECT NO: GPPS00-02

PROJECT TITLE: Evaluation of Knox Out™ 2FM as a Drench Treatment for Control of Imported Fire Ants

TYPE REPORT: Interim

LEADERS/PARTICIPANTS: Anne-Marie Callcott

INTRODUCTION:

Elf Atochem North America, Inc. has a microencapsulated flowable formulation of diazinon currently labeled for general use on ants. Due to its microencapsulated nature this product may have potential as a control treatment for imported fire ants. Several tests were initiated to evaluate Knox Out as an IFA treatment.

MATERIALS AND METHODS:

Knox Out was obtained from Elf Atochem and the labeled rates of 0.5% and 1.0% spray were followed for all tests. Several tests were initiated to evaluate the efficacy of the product.

Drench of Containerized Nursery Stock: Trade 1 gallon nursery containers were filled with standard GPPS nursery media (MAFES mix - 3:1:1 mix of pine bark, peat moss, and sand). Containers with media were allowed to sit for 5-7 days in a simulated nursery area with overhead irrigation applied at a rate of approximately 1.5 inches water per week (irrigation system runs nightly). On July 28, 2000, the containerized media was treated with Knox Out. The rates of application were 0.5% and 1.0%, and 400 ml of finished solution was applied to each container. Standard alate female bioassays (Appendix I - yearly accomplishment report) were performed at 1 wk, 2 wks, 1 mth, and monthly thereafter.

Elimination of Established Colony in Containerized Nursery Stock: Trade 1 gallon nursery containers were filled with standard GPPS nursery media (MAFES mix - 3:1:1 mix of pine bark, peat moss, and sand). Containers were placed on a brick in 12" x 18" x 6" (height) plastic pans. The sides of the pans were coated with Fluon™ to prevent escape. Field collected colonies were separated from their nest tumulus by the desiccation method described by Markin (1968) and 50 cc. of workers and associated brood were added to each container. Fragmented colonies were allowed to acclimate for 5-7 days before treatment. On July 24, 2000, the containerized media was treated with Knox Out. The rates of application were 0.5% and 1.0%, and 400 ml of finished solution was applied to each container. Control containers were drenched with 400 ml water. Five replicates per treatment were set up. The containers were inspected daily for mortality.

RESULTS:

Drench of Containerized Nursery Stock: In bioassays set up one week after the drench treatment, Knox Out at both rates of application, provided 100% mortality to IFA alate females 3 days after bioassay initiation. A 2-week bioassay was not performed due to a lack of available alate females (weather related). At one month after drenching, both rates of application provided 100% mortality within 7 days. The 1.0% rate of application continued to provide 100% mortality within 7 days through 3 months, while the 0.5% rate provided 100% mortality within 6-8 days through 3 months. At 4 months, the low rate required 11 days for 100% mortality, and the high rate required 10 days. Bioassays will continue on a monthly basis.

Elimination of Established Colony in Containerized Nursery Stock: Twenty-four hours after treatment, all ants in the Knox Out treated containers appeared to be dead. Three days after treatment, the containers were destructively inspected. At that time, 100% mortality had been achieved with both treatment rates of Knox Out.

DISCUSSION:

Knox Out provided excellent control of IFA
in containerized nursery stock and in killing alate females confined to drench treated media at one week after treatment. We will re-evaluate the product at lower rates of application in the spring of 2001.

References Cited:

Markin, G.P. 1968. Handling techniques for large quantities of ants. J. Econ. Entomol. 61: 1744-1745.

PROJECT NO: GPPS00-03

PROJECT TITLE: Evaluation of Conserve™ SC as a Drench Treatment for Control of Imported Fire Ants

TYPE REPORT: Final

LEADERS/PARTICIPANTS: Anne-Marie Callcott

INTRODUCTION:

Dow AgroSciences has developed a product line using the active ingredient spinosad which is in the new chemical class of spinosyn chemicals. Conserve SC is one formulation of this product which includes IFA on its label. The label indicates that this product may be used for mound control in turfgrass

MATERIALS AND METHODS:

Conserve SC was obtained and the labeled rate of 3 ml/gal of water was followed for all tests. Several tests were initiated to evaluate the efficacy of the product.

Drench of Containerized Nursery Stock: Trade 1 gallon nursery containers were filled with standard GPPS nursery media (MAFES mix - 3:1:1 mix of pine bark, peat moss, and sand). Containers with media were allowed to sit for 5-7 days in a simulated nursery area with overhead irrigation applied at a rate of approximately 1.5 inches water per week (irrigation system runs nightly). On July 28, 2000, the containerized media was treated with Conserve SC. The rate of application was 3 ml SC/gal water, and 400 ml of finished solution was applied to each container. Standard alate female bioassays (Appendix I - yearly accomplishment report) were performed at 1 wk, 2 wks, 1 mth, and monthly thereafter.

Elimination of Established Colony in Containerized Nursery Stock: Trade 1 gallon nursery containers were filled with standard GPPS nursery media (MAFES mix - 3:1:1 mix of pine bark, peat moss, and sand). Containers were placed on a brick in 12" x 18" x 6" (height) plastic pans. The sides of the pans were coated with Fluon™ to prevent escape. Field collected colonies were separated from their nest tumulus by the desiccation method described by Markin (1968) and 50 cc. of workers and associated brood were added to each container. Fragmented colonies were allowed to acclimate for 5-7 days before treatment. On July 24, 2000, the containerized media was treated with Conserve SC. The rate of application was 3 ml SC/1 gal water, and 400 ml of finished solution was applied to each container. Control containers were drenched with 400 ml water. Five replicates per treatment were set up. The containers were inspected daily for mortality.

Laboratory Drench Test of Field Collected Mounds: Field colonies were collected in 3 gal pails (talced to prevent escaped) and transported back to the laboratory. Mounds were allowed to acclimate to the pail (rebuild) for 3-5 days. On July 19, 2000 five mounds were treated with

1100 ml of a finished solution mixed at 3 ml SC/gal of water. Mounds were inspected daily for mortality.

RESULTS:

Drench of Containerized Nursery Stock: In a bioassay initiated one week after treatment, Conserve provided 30% mortality of IFA alate females (no different from the control - 30% mortality). A 2-week bioassay was not performed due to a lack of available alate females (weather related). Bioassays were conducted at 1, 2, and 3 months after treatment. At no time did Conserve provide better than 35% mortality against IFA alate female within 14 days of exposure.

Elimination of Established Colony in Containerized Nursery Stock: Twenty-four hours after treatment, all ants in the Conserve treated containers appeared healthy and active. By 3 days after treatment, it appeared that ca. 10-20% of the workers in the treated containers were dead, although surviving ants appeared healthy and active. Two weeks after treatment, there was little visual difference between the Conserve treated colonies and the control colonies, and the test was terminated.

Laboratory Drench Test of Field Collected Mounds: Twenty-four hours after treatment, numerous ants appeared to be dead in the treated mounds, and the surviving ants were moving very slowly. The mounds were not as worked up as the control mounds. At 2-3 days after treatment, surviving ants were still moving slowly, but by 1 week after treatment, surviving ants were moving normally. Most mounds had some ants present at 1 week after treatment, but it appeared that >90% of the mound succumbed to the treatment. By 2 weeks after treatment, 2 mounds were dead, 2 mounds had ca. 100 workers alive (99% mortality) and one mound had 200-300 workers alive (95-98% mortality). At this time the test was terminated.

DISCUSSION:

Preliminary testing with the labeled rate of Conserve SC applied as a drench was not effective in eliminating existing colonies in containerized nursery stock nor in killing alate females confined to treated media one week after treatment. Field collected colonies contained in pails and treated in the laboratory were more sus

nch is not able to pass through the mound (since it was contained in a pail
container with drain holes. This also suggests that higher rates of application may be more effective against IFA.

References Cited:

Markin, G.P. 1968. Handling techniques for large quantities of ants. J. Econ. Entomol. 61: 1744-1745.

PROJECT NO: FA01G018

PROJECT TITLE: 1998 Expanded Trials with Spin Out® Technology Used in Combination with Bifenthrin Insecticide to Prevent Imported Fire Ant Infestations in Containerized Nursery Stock

TYPE REPORT: Final

PROJECT LEADER/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Lee McAnally, Avel Ladner and Shannon Wade

COOPERATORS: Lerio Corporation, Mobile, AL (Mark Christian and Andy Zimlich)
Griffin Corporation, Valdosta, GA (Mark Crawford)
Windmill Nursery, Folsom, LA (Dennis McCloskey)
Flowerwood Nursery, Loxley, AL (Jim Berry)
Rocky Creek Nursery, Lucedale, MS (Lee Howell)

INTRODUCTION:

Spin Out root growth regulator technology was developed by Griffin Corporation to enhance the development of dense, compact root growth. The active ingredient in the current formulation is 7% copper hydroxide contained in a latex matrix which is sprayed onto the interior of plastic nursery pots. In 1995 Griffin supplied this laboratory with Spin Out treated pots that also contained various concentrations of bifenthrin (0.25, 0.5, and 1.0% AI). Pots were filled with potting media and then placed in a simulated can yard. Laboratory bioassays were then conducted on a monthly basis by allowing red imported fire ant (RIFA) colonies free choice to move into either a Spin Out treated pot or an untreated control pot. The Spin Out treated pots containing bifenthrin had prevented fire ant colonies from invading the test pots for 24 months (report FA01G155). These results warranted an expanded study to include actual rather than simulated nursery conditions, various size containers, different potting medias, and varying climatic conditions. A trial initiated in 1997 (report FA01G017) at 5 nurseries in the Southeast used Spin Out 300 combined with various concentrations of bifenthrin (0.25, 0.5 and 1.0% AI). The Spin Out 300 was applied to 1 and 3 gallon nursery pots, however the rate of application of bulk material was 3X less than in the original 1995 trial (this was the result of Griffin perfecting the Spin Out product to deal with economic concerns). Therefore 3X less bifenthrin was available in each pot as an insecticide. Results from this trial were less effective, with 7-33% of the 0.25 and 0.5% treated pots becoming infested with fire ants at 1-6 months after treatment. The 1-gallon pots treated at 1.0% provided protection from infestation for 3 months, while the 3-gallon pots treated at 1.0% failed 7-13% of the time at 1, 3, and 6 months after treatment.

Due to the less than acceptable results from the 1997 trial, Lerio, Griffin, and GPPS jointly decided to initiate another trial in 1998 using higher rates of bifenthrin (1.5 and 2.0% AI) combined with the Spin Out 300 to accommodate the lower amount of material applied to the pots. We also evaluated pots with the Spin Out/bifenthrin applied in a band to the inside or outside of the pot.

MATERIALS AND METHODS:

Griffin Corporation supplied Spin Out 300 containing bifenthrin (1.5% and 2.0% AI by weight) for treatment of a sufficient number of pots to conduct a three year study. Lerio Corporation provided the containers (one and three gallon sizes) used in the expanded study and applied the Spin Out 300/bifenthrin to the pots using automated equipment. Treatments included:

- 1.5% AI combined with Spin Out 300 sprayed on entire inside of pot; both 1-gallon and 3-gallon sizes
- 2.0% AI combined with Spin Out 300 sprayed on entire inside of pot; both 1-gallon and 3-gallon sizes
- 2.0% AI combined with Spin Out 300 sprayed in a 1-2" band on the inside bottom side of pot; band will overlap side drainage holes; there will be no bottom drainage hole; both 1-gallon and 3-gallon sizes
- 2.0% AI combined with Spin Out 300 sprayed in a 1-2" band on the outside bottom side of pot; band will overlap side drainage holes; there will be no bottom drainage hole; both 1-gallon and 3-gallon sizes

Lerio color coded the pots for identification of treatment type. After treatment, Lerio delivered treated pots to the nurseries and assisted with potting up, and at each sampling period, they transported test pots from each nursery to this laboratory. Griffin and Lerio purchased all plants for the test. Cooperating nurseries provided space, irrigation, fertilization, and weed control for the test pots. Gulfport personnel purchased potting media from each nursery, filled the pots and placed the test pots in a designated test area (or bed). All pots were planted with slow growing, relatively pest free woody ornamentals such as Japanese boxwood. Each individual nursery determined the best species of plants to use at that particular location.

Nursery	Location	Soil Type	Plants (1-gal and 3-gal)
Flowerwood	Loxley, AL	65% new bark 35% aged bark	*Berberis thunbergi atropurpurea* Redleaf Japanese Barberry
Windmill	Folsom, LA	100% bark	*Ilex vomitoria nana* Dwarf Yaupon Holly
Rocky Creek	Lucedale, MS	unknown	*Cleyera japonica* Japanese Cleyera

The Gulfport Plant Protection Station was responsible for determining the efficacy of the Spin Out technology by conducting bioassays in the laboratory.

Bioassay - prevention of whole colony infestation: All treatments were tested against field collected RIFA colonies. Three containers (replicates) from each treatment were bioassayed at 1 and 3 months after the pots are filled with media, and then quarterly thereafter until activity ceased. Plant tops were removed prior to bioassaying as needed. Each replicate was bioassayed by placing the treated container at one end of a 2' x 8' test arena. Sides of the test arena were

coated with talcum powder or Fluon® to prevent the ants from climbing out and escaping. An untreated check container filled with media was placed at the distal end of the test arena (see FA01G017 for diagram of test arena). A field collected RIFA colony complete with associated soil and nest tumulus was then placed in the center of the arena. Overhead incandescent light bulbs slowly desiccated the nest tumulus so the ants were encouraged to migrate to the more moist and hospitable containers. Therefore, the RIFA colony was provided a free choice to invade either a Spin Out treated pot or an untreated check pot. Pots were observed at 24 hour intervals for 7 days after introduction, and the estimated number of workers successfully invading each pot recorded. A pot was considered infested if +25 workers were inside the pot.

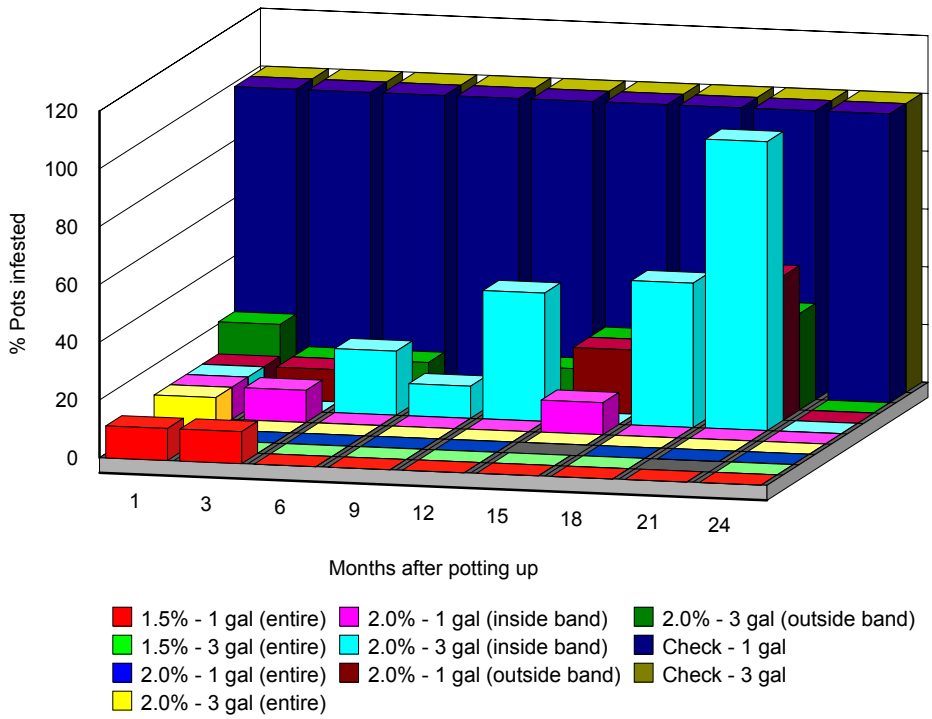
RESULTS:

The higher rates of insecticide in latex coating the entire inside of the pot appeared to provide better protection against IFA infestation than earlier trials using lower rates of insecticide (Figure 1). The 1.5% 1-gallon rate, and the 2.0% 1-gallon and 3-gallon rates had one pot each infested within the first 3 months of testing, although these infestations involved less than 100 workers and no brood. There was 100% exclusion of IFA from all the pots evaluated with the entire inside coating from 6 to 24 months after treatment. The band treatments did not work as well as the entire inside coating, and many of these pots were infested with 1000+ ants with brood. Unfortunately, the Flowe
evaluation, therefore the 18 month evaluation contains 6 replicates instead of the original 9
stent with data due to logistically
problems. The 21 month evaluation included only Windmill pots (3 replicates) and this was the last of the Windmill pots, also due to the nursery inadvertently discarding the pots. The Rocky Creek pots were not collected at 21 months, but were collected at 24 months and evaluated.

CONCLUSIONS:

The 1.5% and 2.0% rates of bifenthrin
nursery pots have successfully prevented infestation of nursery pots for 24 months after a 1 to 3 month exposure period. This trial, thus far, supports our original data (FA01G115) as discussed above. This treatment, if granted approval for use in the Federal Imported Fire Ant Quarantine would give nurserymen the advantage of the Spin Out technology for better root growth and control, as well as protection against transporting IFA in their containerized nursery stock. We
tiated in the spring of 2001 to
provide confidence in this treatment for quarantine purposes.

Figure 1. Percent of Spin Out 300 + Bifenthrin Treated Pots Infested with IFA. Multi-State Trial - Initiated March 1998.



PROJECT NO: FA01G038

PROJECT TITLE: Effectiveness of Permethrin Impregnated Nursery Pots in Preventing Imported Fire Ant Invasion of Containerized Nursery Stock: A Preliminary Appraisal

TYPE REPORT: Final

PROJECT LEADERS: Homer Collins, Anne-Marie Callcott and Shannon Wade

INTRODUCTION:

Nursery stock and other regulated articles cannot be shipped outside the imported fire ant (IFA) quarantined area unless treated with an approved insecticide (7CFR §301.81) to prevent inadvertent spread of IFA. Several treatment options are approved and registered for this use pattern. Both liquid drenches (chlorpyrifos, diazinon, and bifenthrin), and granular insecticides (tefluthrin and bifenthrin)
incorporation of either granular tefluthrin or bifenthrin into the potting media prior to "potting up". The residual activity of the insecticide prevents IFA invasion of containerized nursery stock for up to 24 months, depending upon dose rate employed.

A totally new and novel approach currently under investigation by us involves the addition of the insecticide bifenthrin to the SpinOut® technology. SpinOut (Griffin Corp., Valdosta, GA) is a coating of copper hydroxide applied to the interior surface of pots, grow bags, etc. to control root development by chemical root pruning. We have hypothesized that IFA colonies invade containerized nursery stock through the drain holes in the bottom of the pots, rather than climbing up the sides of the pot and entering from the top. Preliminary studies with SpinOut have demonstrated potential for use of this technology to prevent IFA invasion of nursery containers (FA01G017, FA01G018).

MATERIALS AND METHODS:

Following several telephone conversations with Dr. Earl Tryon, representing Brandywine Compounding, Chadds Ford, PA, we received 12 one pint (4.75" x 4.75") nursery containers on October 7, 1997. No information other than the pots contained permethrin was provided. The pots were filled with potting media (MAFES mix: 3:1:1 mix of pine bark, sphagnum peat and sand), and placed on raised benches in a simulated can yard. Irrigation water (ca. 1½" per week) was provided through overhead pulsating sprinklers in addition to natural rainfall. The pots did not contain plants because the extremely low number of pots provided required that we conduct periodic resampling of the same 12 pots rather than destructive sampling normally done in similar trials. Bioassays were conducted in the laboratory in 2' x 4' test arenas (Figure 1). Sides of the test arena were talced to prevent ants from climbing out and escaping. An impregnated pot was placed at one end of the arena, and an untreated check container filled with potting media was placed at the distal end of the arena. A field collected IFA colony complete with associated soil and nest tumulus was then placed in the center of the arena. Overhead

incandescent light bulbs (60 watts, placed 14" above the test arena) slowly desiccated the nest so that the ants were encouraged to migrate to the more moist containers. The IFA colony had an equal opportunity to move into either a permethrin pot or the untreated check pot. Pots were observed at 24 hour intervals for 7 days after introduction, and the estimated number of worker ants successfully invading each pot was recorded. A pot was considered infested if there were +25 workers in

At 4, 6 and 9 months after potting up, we subjected four permethrin pots to a test in which the ants had no choice of pots. Only a permethrin treated pot was placed in the test arena with a field collected colony. Pots were observed for 7 days after introduction.

RESULTS:

Permethrin treated pots prevented IFA
choice of pots. One pot was infested with 25-100 workers, but no brood, at several evaluation periods since the 12 month evaluation. Otherwise, IFA have been excluded from these small containers impregnated with permethrin for 28 months. At 29 months, all treated pots were infested with about 1000 workers and brood, similar to the untreated pots. When ants had no choice, they did try to move into the permethrin treated pots. At 4 mths, all ants exposed to the permethrin pots died. At 6 mths, some ants successfully infested the pots, but the majority of the workers preferred to live in the arena. By 9 mths, ants successfully infested all the replicates when there was no other choice. Based on these promising results, we recommended that al larger trial with various dose rates and different container sizes be initiated (FA01G069).

Figure 1. Diagram of test arena.

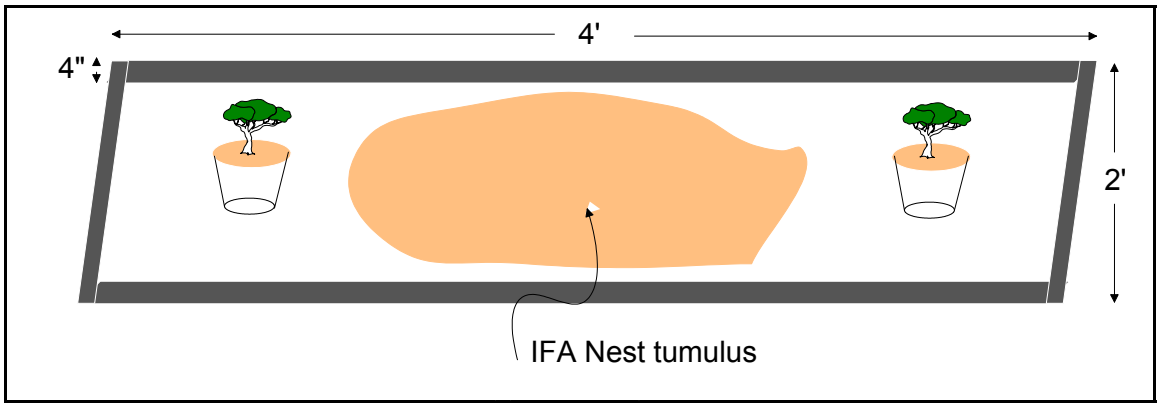
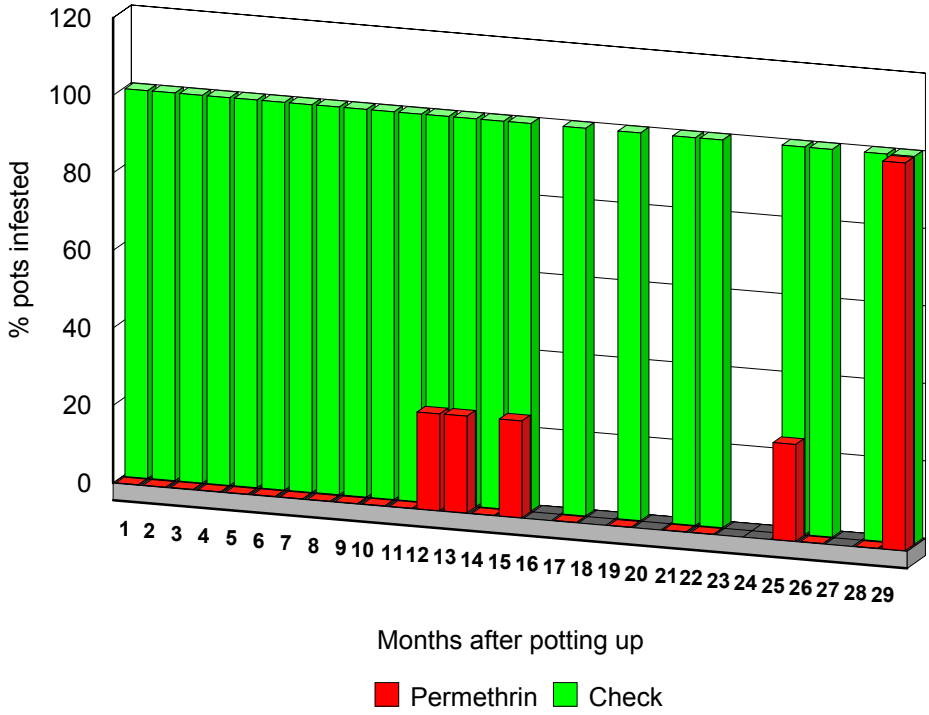


Figure 2. Percent of Original Permethrin Pots Infested with IFA - Preliminary Trail at Gulfport, MS - initiated 1997.



PROJECT NO: FA01G069

PROJECT TITLE: Effectiveness of Permethrin Impregnated Nursery Pots in Preventing Imported Fire Ant Invasion of Containerized Nursery Stock, 1999

TYPE REPORT: Interim

PROJECT LEADERS: Homer Collins, Anne-Marie Callcott and Shannon Wade

COOPERATORS: Premium Compounded Products, LLC (Corinne Brothers)
Nursery Supplies, Inc. (Henry Guarriello, Jr.)
AgrEvo Environmental Health - now Aventis Environ. Sci. (John Lucas)
Windmill Nursery (Tom Cooper)

INTRODUCTION:

Nursery stock and other regulated articles cannot be shipped outside the imported fire ant (IFA) quarantined area unless treated with an approved insecticide (7CFR §301.81) to prevent inadvertent spread of IFA. Several treatment options are approved and registered for this use pattern. Both liquid drenches (chlorpyrifos, diazinon, and bifenthrin), and granular insecticides (tefluthrin and bifenthrin)
incorporation of either granular tefluthrin or bifenthrin into the potting media prior to "potting up". The residual activity of the insecticide prevents IFA invasion of containerized nursery stock for up to 24 months, depending upon dose rate employed.

New technologies utilizing insecticides applied to the nursery pot or insecticides impregnated into the plastic of the nursery pot to prevent IFA invasion have been investigated by our laboratory over the past several years. Preliminary work with permethrin impregnated nursery pots has shown the potential for preventing IFA infestation of small nursery containers (report FA01G038). This trial was initiated to expand on our preliminary observations and test the impregnated containers in actual nursery conditions with plants added.

MATERIALS AND METHODS:

Three sizes of nursery containers (1, 3, and 10 gallon) impregnated with permethrin or deltamethrin were produced the week of December 14, 1998 by Premium Compounded Products. Concentrations of permethrin
deltamethrin were 0.025, 0.050, 0.075 and 0.10%. Containers were potted up at Windmill Nursery on May 1, 1999. Due to logistics and resources, only three treatments were subjected to bioassay at our laboratory: 0.5 and 1.0% permethrin, and 0.10% deltamethrin. Pots were transported to the Gulfport laboratory quarterly for bioassay testing. The 0.05% deltamethrin concentration was tested at another laboratory at 6 month intervals. The other rates will be held for testing as needed. Other trials, not reported here, were initiated in other nurseries and bioassays performed by other laboratories.

Bioassays were conducted in the laboratory in 2' x 8' test arenas (Figure 1). Sides of the test arena were talced to prevent ants from climbing out and escaping. An impregnated pot was placed at one end of the arena, and an untreated check container filled with potting media was placed at the distal end of the arena. A field collected IFA colony complete with associated soil and nest tumulus was then placed in the center of the arena. Overhead incandescent light bulbs (60 watts, placed 14" above the test arena) slowly desiccated the nest so that the ants were encouraged to migrate to the more moist containers. Therefore, the IFA colony had an equal opportunity to move into either a permethrin pot or the untreated check pot. Pots were observed at 24 hour intervals for 7 days after introduction, and the estimated number of worker ants successfully invading each pot was recorded. A pot was considered infested if there were +25 workers inside the pot. There were 3 replicates per sampling interval.

RESULTS:

Through 16 months after potting up, the 1.0% permethrin impregnated nursery containers have excluded IFA in all container sizes (Figs. 2, 3 and 4). However, at 18 months, one 1.0% permethrin 1-gallon container had about 100 workers in the container. Results with both 0.5% permethrin and 0.1% deltamethrin have been erratic. The 3-gallon containers have been the most erratic with these treatments, with 50 to 5000 (whole colony) infesting the treated pots. In conversations with AgrEvo (now Aventis)
initiated under this protocol, indicating possible formulation/production problems with this container size.

Figure 1. Diagram of test arena.

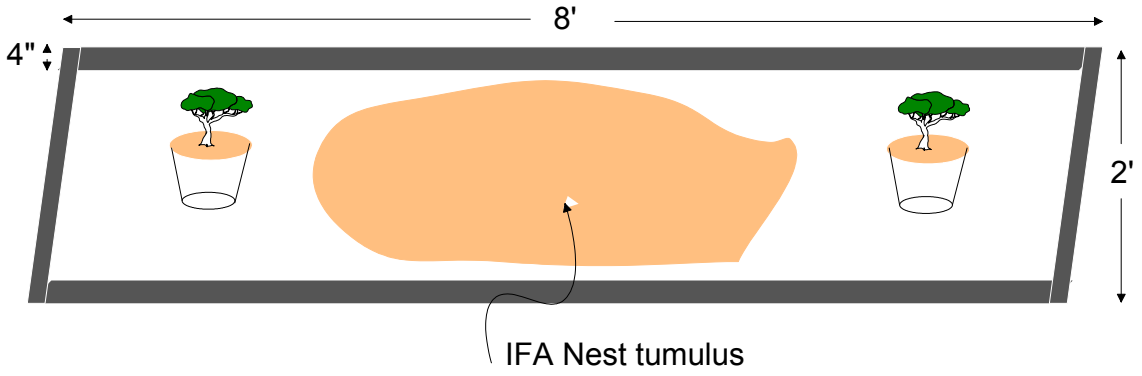


Figure 2. Percent of insecticide impregnated 1 gallon pots infested with IFA - Trial at Windmill Nursery - initiated 1999.

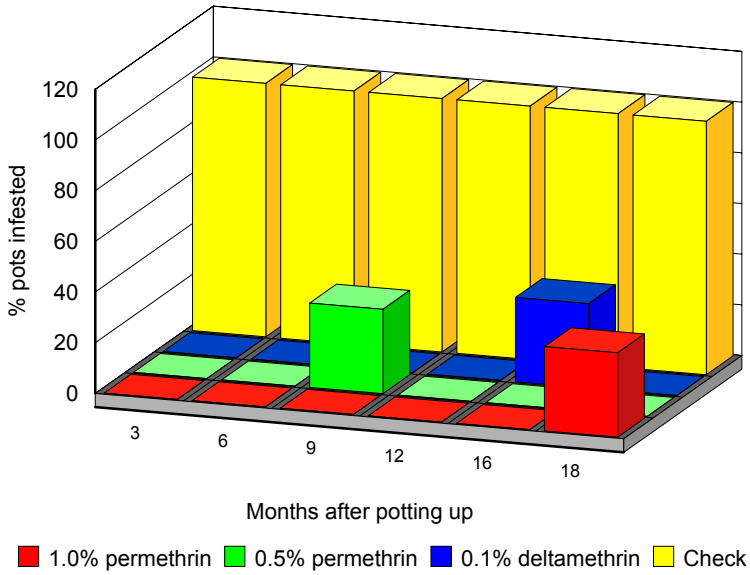


Figure 3. Percent of insecticide impregnated 3 gallon pots infested with IFA - Trial at Windmill Nursery - initiated 1999.

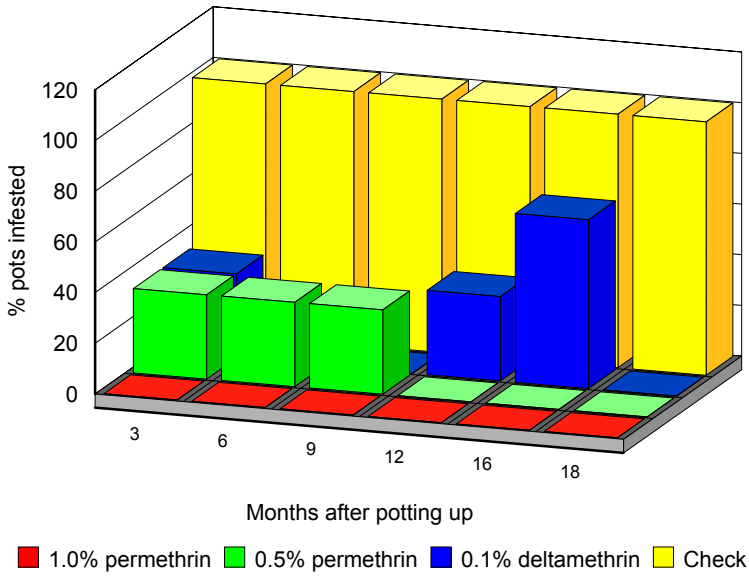
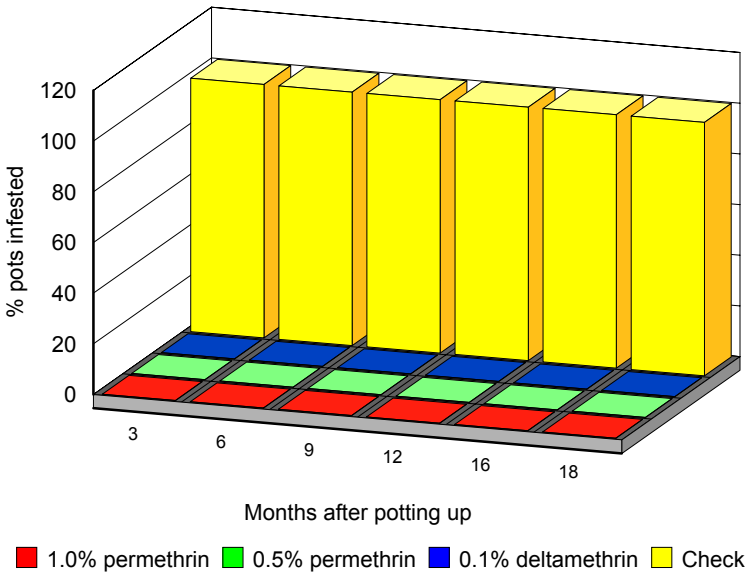


Figure 4. Percent of insecticide impregnated 10 gallon pots infested with IFA - Trial at Windmill
Nursery - initiated 1999.



PROJECT NO: GPPS00-04

TITLE: Evaluation of Toxic Polyethylene Film for Control of Imported Fire Ants in Containerized Nursery Stock

TYPE REPORT: Final

LEADER/PARTICIPANTS: Homer Collins and Tim Lockley

INTRODUCTION:

At the current time containerized nursery stock can be certified for movement outside the imported fire ant (IFA) quarantine area by the use of a variety of insecticides including liquid drenches that are applied just prior to shipment or as granular formulations that are blended into the potting media prior to planting. Recent technological advances by Premium Compounded Products (Chadds Ford, PA) have made it possible to impregnate the insecticide permethrin into polyethylene film and other plastic compounds. Some nurseries that ship containerized nursery stock outside the quarantine area place black polyethylene film beneath their containers as a means of weed control. Theoretically a black polyethylene film containing permethrin would serve two purposes in the nursery industry; weed control as well as control of imported fire ants and other insects. IFA infestation of containerized nursery stock can occur when entire colonies relocate their nest by migrating into containers or by newly mated queens that descend from mating flights and create incipient colonies within the container. Either mechanism would result in exposure of ants to the permethrin embedded in the black polyethylene film. Preliminary unpublished laboratory studies indicate that polyethylene film containing 1% permethrin film is highly toxic to IFA, resulting in 100% mortality within 15 minutes of exposure. However, effects of UV degradation, irrigation, weather, etc. on permethrin film under outdoor conditions over time are not known. This study was designed to determine how long black polyethylene film containing permethrin will remain toxic to IFA.

MATERIALS AND METHODS:

Rolls of black polyethylene film containing 1 and 2% permethrin (designated as PA-01, and PA-02, respectively) as well a control containing no permethrin (designated PA-00) were provided by Premium Compounded Products. Each roll was 30' x 100'. Rolls were naturally exposed to weathering at the Mississippi Agricultural Experiment Station (MAFES) in Poplarville, MS. The film was placed on the ground on March 1, 2000 and all edges secured by driving spikes through 2" x 2" x 8' wooden strips. An overhead pulsating irrigation system was installed to simulate actual nursery conditions. Containerized plants without insecticide were placed on the film at 3' centers, and observed quarterly for the presence of IFA.

In addition to the container surveys two different laboratory bioassays were conducted on a quarterly basis for the duration of the study.

Newly mated queen bioassay: In order to simulate conditions following nuptial flights unmated alate queens which are readily available year around were substituted for newly mated queens which are not readily available. Film samples (3 per treatment) were randomly removed from each roll of film and returned to the laboratory for bioassay. Bioassays were conducted by placing the film samples (cut to fit) in the bottom of plastic shoe boxes (Sterilite Corporation, Townsend, MA 01469) which were 13½" x 8" x 4" (test arena). A 3" x 3" nursery pot filled with moist potting media was placed in the center of the arena. Five alate IFA females and 50-75 workers were then placed in the arena. The ants were induced to move into the pots to avoid desiccation. The ants were exposed to the permethrin film as they moved about the test arena prior to entering the pots. After a 24 hour exposure period the pots were emptied and all live alates counted.

Whole colony bioassay: As mentioned above, whole colonies can infest containers when they relocate the entire colony from the original nest site. Under natural conditions this means the colonies will have to walk variable distances across the toxic film. In order to simulate this situation in the laboratory a whole colony bioassay was performed at each sampling interval. Plastic storage containers 16 3/4" x 34 7/8" (w x l) (Sterilite Corp., Townsend, MA 01469) were used as test arenas. Strips of film 12" wide were secured with 1/2" wide double side tape (3M Company, St. Paul, MN 55133) across the entire bottom center of the arena. A one gallon nursery container containing moist potting media was placed in the distal end of the arena. 500cc of nest tumulus and associated ants (all life stages) from a field collected IFA colony were placed in the proximal end. As the nest tumulus slowly desiccated the colony was induced to cross the 12" strip of film to move into the container. After a 7 day exposure period success of colony relocation into the pots was determined by emptying the pots and estimating the number of ants present in each pot. There were three replicates per treatment at each sampling interval.

RESULTS:

Visual survey of containers: Results of the visual survey of nursery containers are shown in Table 1. No active nests were observed in any treatment 3 months after the film was installed. However, low numbers of nests were observed in all treatments at each of the two subsequent sampling intervals.

Table 1. Nursery container survey.

Treatment	No. active nests at indicated post treatment interval		
	3 mths	6 mths	9 mths
PA-00	0	6	3
PA-01	0	2	3
PA-02	0	2	2

Alate queen bioassay: Results of the alate
PA-01 and Pa-02 were highly toxic to the ants, but by 3 months PA-01 was beginning to degrade and both treatments were ineffective at 6 and 9 months after installation.

Table 2. Results of alate queen bioassay.

Treatment	Mean % queen mortality at indicated post treatment interval			
	0 mths	3 mths	6 mths	9 mths
PA-00	0	0	0	0
PA-01	100	93.3	0	0
PA-02	100	100	0	0

Whole colony bioassay: Results of the whole colony bioassay are shown in Table 3, and are similar to the results seen in the visual survey and alate queen bioassay. Initially PA-01 prevented infestation of the pots, but small numbers of workers did infest PA-02 at the first bioassay. Neither PA-01 or PA-02 prevented infestation in subsequent bioassays.

Table 3. Results of whole colony bioassay.

Treatment	Estimated no. ants in pot at indicated interval (avg) of 3 replicates			
	0 mths	3 mths	6 mths	9 mths
PA-00	1,000	1,000	1,000	1,000
PA-01	0	1,000	1,000	1,000
PA-02	367	1,000	1,000	1,000

The trial was terminated after the nine month bioassay.

PROJECT NO: FA02G029

PROJECT TITLE:

TYPE REPORT: Final

LEADERS/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Shannon Wade, Lee McAnally, Avel Ladner and Tim Lockley

INTRODUCTION:

Practical and cost-effective quarantine treatments for certification of field grown/balled and burlapped (B&B) nursery stock are not currently available. Growers wanting to ship their nursery stock outside the IFA quarantined area have several treatment option available, but none are user-friendly or practical. Currently we have a study underway in Tennessee (see report number FA01G077) to determine when mating flights cease. Once that has been determined, it may be possible to use a fast-acting metabolic inhibitor bait such as Amdro to certify movement of B&B nursery stock in Tennessee. The bait would be applied after mating flights have stopped. Rapid rate of kill would increase the window of opportunity for certification purposes. We hypothesized that dual applications of Amdro, spaced about one week apart might increase the rate of kill obtained from a single Amdro application.

MATERIALS AND METHODS:

The test site was located in a pasture in Jackson County, MS. Amdro was applied to test plots using a shop- . 23, 1999. The equipment provided a 21' swath and was operated at 4 mph. Soil temperature at the time of the first application was 70°F and air temperature was 76°F. The second application was made on Nov. 29, 1999, at which time the soil and air temperature were 60°F and 65°F, respectively. Treatments were a single Amdro application, two Amdro applications spaced 1 week apart, and an untreated control. There were 4 replicates per treatment, and all test plots were 1.0 acre in size. A ¼-acre circular efficacy plot was established in the center of each 1.0 test plot. Prior to bait application and at 3 week intervals thereafter, IFA populations in each efficacy plot were evaluated using the population index system developed by Harlen et al. (1981), and revised by Lofgren and Williams (1982). Using this data, both colony mortality and decrease in pretreatment population index were calculated. Experimental data were statistically analyzed using analysis of variance, and means were separated using the LSD test (P=0.05) for each posttreatment rating interval.

RESULTS:

In the first 13 weeks after treatment, the dual Amdro application was numerically superior to the single treatment, but this superiority was not significant (Tables 1 and 2). At the 10 week evaluation (Feb. 4, 2000), the check plots experienced large decreases in colonies and populations, probably due to a week of cold weather just prior to the evaluation and tall grass in the check plots. By 13 weeks, we were able to detect many colonies on the check plots that we

apparently could not detect 3 weeks earlier. Also at 13 and 17 weeks after treatment there were several small reproductively viable colonies on both the single and double treated Amdro plots, indicating reinfestation.

Results of this trial indicate that dual applications of Amdro, one week apart, do not significantly increase the rate of kill of the product when applied in the fall. Therefore, this type of application will not be adequate for B&B certification purposes as described in the Introduction.

Table 1. Efficacy of single versus double applications of Amdro for control of imported fire ants in the fall - decrease in colony numbers.

	% decrease in no. pretreat colonies present at indicated weeks after treatment				
Treatment	3	6	10	13	17
Amdro - 1X	73.0a	83.1a	85.5a	76.7a	88.6a
Amdro - 2X	77.9a	91.9a	90.6a	87.2a	84.0a
Check	18.2b	22.9b	55.8a	18.2b	15.6b

Table 2. Efficacy of single versus double applications of Amdro for control of imported fire ants in the fall - change in population indices.

	% change in pretreat population index at indicated weeks after treatment				
Treatment	3	6	10	13	17
Amdro - 1X	-77.5a	-91.0a	-88.1ab	-77.5a	-88.8a
Amdro - 2X	-83.8a	-97.2a	-93.0a	-88.9a	-81.4a
Check	-15.8b	-17.3b	-57.1b	-8.2b	-8.0b

Means within a column followed by the same letter are not significantly different (LSD test, P=0.05)

References Cited:

Harlan, D.P., W.A. Banks, H.L. Collins & C.E. Stringer. 1981. Large are test of AC217,300 bait for control of imported fire ant in Alabama, Louisiana, and Texas. Southwest. Entomol. 8: 42-45.

Lofgren, C.S. & D.F. Williams. 1982. Avermectin B_1a, a highly potent inhibitor of reproduction by queens of the red imported fire ant. J. Econ. Entomol. 75: 798-803.

PROJECT NO: GPPS00-05

PROJECT TITLE: In-Band Treatment of Field Grown Nursery Stock with Fipronil

TYPE REPORT: Final

LEADER/PARTICIPANTS: Homer Collins, Avel Ladner, Anne-Marie Callcott, Tim Lockley, Lee McAnally, Shannon Wade

INTRODUCTION:

Nursery Stock and other regulated articles cannot be shipped outside the quarantined area unless treated with an approved insecticide to prevent inadvertent spread of imported fire ants (7CFR§301.81). At the current time only three treatments are approved by APHIS for use on balled-and-burlapped nursery stock. Immersion in a chlorpyrifos solution, a twice daily spray-on with chlorpyrifos for three consecutive days, on an in-field treatment with chlorpyrifos used in combination hydramethylnon, pyriproxyfen, or fenoxycarb baits are the three options available to growers. The immersion process is labor intensive and disruptive to the root ball, and the spray-on treatment is also labor intensive and somewhat impractical. A simple, cost effective, and practical treatment is needed to enable growers to ship balled-and-burlapped nursery stock outside the quarantined area which now includes all or part of 13 southern states, Puerto Rico, one county in New Mexico, and all or part of 3 counties in California.

Fipronil, a broad spectrum pyrazole insecticide under development by Rhone Poulenc Ag Company (Research Triangle Park, NC: now Aventis, Montvale, NJ), has demonstrated long residual activity against imported fire ants (IFA), when applied as a granular formulation to nursery potting media or commercial grass sod. Fipronil has also provided long residual activity against termites. Based on these results, fipronil may offer a means of preventing IFA infestation of field grown nursery stock.

MATERIALS AND METHODS:

The test site for this study was on federally owned property in Harrison County, Mississippi. Test plots consisting of rows 6' wide x 75' long were thoroughly disked (tilled) to prepare a seed bed. A furrow ca. 12" wide x 12" deep was opened with a moldboard plow, and "liners" of various species of woody ornamentals were planted at 36" intervals along each plot. Granular fipronil (0.05% ai) was manually applied to four plots (replicates) at a rate of 0.05 lbs ai/acre on June 22, 1999. The insecticide was applied in a 12" wide band down the entire length of the test plots and then 1 to 2" of soil was raked over the band to cover the insecticide. Four plots (replicates) served as untreated controls. After planting, vegetation control in each plot was maintained by periodic mowing. Supplemental irrigation water was applied as needed by an underground drip irrigation system which was installed prior to planting. The combination of mowing between plots and the irrigation system will induce IFA colonies to nest adjacent the trunks of the woody ornamentals. Efficacy of the fipronil band treatment will be determined by closely inspecting each plot at three-

IFA colonies. All active IFA colonies in each test plot will be enumerated and categorized on the population index scale described by Lofgren and Williams (1982). Treatment means will be statistically analyzed with a *t*-test.

Due to limited IFA colonies moving into our test plot, we artificially introduced newly mated females collected in south Mississippi. On May 22, approximately 100 females were distributed evenly among the 8 rows of plants. On May 23, another 400 females were distributed.

RESULTS:

At 3 and 6 months after treating, no IFA
(Table 1). Results from 9-18 months were erratic and minimal, however, these preliminary data indicate that this in-band treatment may not be sufficiently effective in preventing IFA colonies from locating next to the base of field grown nursery stock.

Table 1. Efficacy of in-band treatment of fipronil against IFA in field grown nursery stock.

Months post treatment	No. plants infested with IFA	
	Treated	Untreated
3	0	0
6	0	0
9	1	0
12	0	2
15	2	1
18	3	1

PROJECT NO: FA01G028

PROJECT TITLE: Evaluation of Various Granular Insecticides for Control of Imported Fire Ants in Turfgrass, 1998

TYPE REPORT: Final

LEADER/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Avel Ladner, and Lee McAnally

INTRODUCTION:

Several companies are developing new chemistries with potential as granular products for control of imported fire ants. These products have the potential to be used in both the homeowner market and the Federal IFA
companies supplied us with new granular products for evaluation.

MATERIALS AND METHODS:

The test site was located at the Slidell Municipal Airport in Slidell, Louisiana. Mowed areas between taxiways and runways simulated conditions that occur in commercial turfgrass. Granular products were applied broadcast to test plots using a Herd® GT-77 spreader (Herd Seeder Co., Logansport, IN) on a farm tractor on June 3-4, 1998. There were 3 replicates per treatment. Products, producers, and rates of application are listed below:

Product	% active ingredient	Producer	Rate of application (lbs/acre)
Fipronil	0.05%	Rhone-Poulenc Ag. Co., Raleigh, NC	25.0, 37.5, 50.0
Force	1.5% tefluthrin	Zeneca Ag Products, Wilmington, DE	46.7
Lambda-cyhalothrin	0.1%	Zeneca Ag Products, Wilmington, DE	120
Talstar	0.2% bifenthrin	FMC Corp., Philadelphia, PA	100

A ¼ acre circular efficacy plot was established in the center of each 1.0 acre test plot. Prior to and at 2, 4, and 6 weeks after treatment, and at 6 week intervals thereafter, IFA populations in each efficacy plot were evaluated using the population index system developed by Harlen et al. (1981) and revised by Lofgren and Williams (1982). Using this data, both colony mortality and decrease in pre-treatment population indices were calculated. Data were statistically analyzed

using analysis of variance and means separated using Tukey's test (P=0.05) for each post-treatment interval.

RESULTS:

Treatments were applied on June 3-4, 1998 with air temperatures between 87-94°F and soil temperatures between 80-82°F. At 2 weeks after treatment, Talstar and the two high rates of fipronil provided the greatest control of IFA (Tables 1 & 2). By 4 weeks, all treatments, except lambda-cyhalothrin reduc
lambda-cyhalothrin and the lowest fipronil rate, reduced colony numbers by >70%. The 50.0 lb/acre rate of fipronil provided 100% control at 4 weeks. At 6 weeks after treatment, all fipronil rates and the Force treatment were still significantly better than the check; the low fipronil rate and Force providing >80% reduction in population indices, and the two higher fipronil rates providing >95% reduction in population indices.

By 12 weeks after treatment, all fipronil rates provided 100% control of IFA. All other products provided 60-75% control of IFA. At 18 weeks after treatment, the two lower fipronil rates were still providing 100% control of IFA; one plot in the high fipronil rate had one large reproductive colony, which probably moved into the area from the untreated surrounding area. All other treatments had reproductively viable colonies. The Talstar and lambda-cyhalothrin plots were not evaluated after this time.

At 24 weeks after treatment, the two higher fipronil rates were at 100% mortality; the one mound found on a high rate plot at 18 weeks had either moved out of the area or succumbed to the treatment. Two of the plots of the lowest fipronil rate (25 lb/acre) had reproductively viable colonies on them, showing possible reinfestation. The Force plots were all reinfested with
his time.

Fipronil rates of 37.5 and 50 lb/acre continue to provide excellent control of IFA through 71 weeks after treatment. Plots treated with the low rate continue to have a few reproductively viable colonies present. This trial was terminated after the 99 week evaluation. At that time all fipronil

DISCUSSION:

Talstar 0.2G, at 100 lb IFA (>88% mortality at 2 weeks after treatment), but did not provide adequate residual control, as evidenced by the rapid reinfestation by either movement into the treated area, or possibly rejuvenation of treated colonies. Lambda-cyhalothrin
provided more than 75% control of IFA,
viable colonies present. Force at 46.7 lbs/acre (0.7 lb AI/acre) performed a little better numerically, providing 70-80% control of IFA through 18 weeks.

In general, the higher the rate of application with fipronil, the faster the control of IFA in grass sod. The two higher rates provided >84% control of IFA by 4 weeks after treatment, >91% after 6 weeks, and by 12 weeks after treatment, all rates provided 100% control. The lower rate

achieved the same control (100%
inferior to the higher rates of application. Within 6-12 weeks after treatment, the lowest fipronil rate showed excellent control of IFA
weeks (80-100%), while the two higher rates have provided excellent control through 71 weeks (90-100%).

References Cited:

Harlan, D.P., W.A. Banks, H.L. Collins & C.E. Stringer. 1981. Large are test of AC217,300 bait for control of imported fire ant in Alabama, Louisiana, and Texas. Southwest. Entomol. 8: 42-45.

Lofgren, C.S. & D.F. Williams. 1982. Avermectin B_1a, a highly potent inhibitor of reproduction by queens of the red imported fire ant. J. Econ. Entomol. 75: 798-803.

Table 1. Efficacy of various granular insecticides applied broadcast to grass sod: change in pretreatment population indices. Slidell Airport, LA; June 3-4, 1998.

Treatment	Rate of Applic. (lb/acre)	Mean pretreat population index/acre*	PT**							
			2 wks	4 wks	6 wks	12 wks	18 wks***	24 wks	32 wks	41 wks
Fipronil	25.0	526.8	-43.0abc	-85.1a	-85.9a	-100.0a	-100.0a	-85.1ab	-86.3a	-87.5a
Fipronil	37.5	313.2	-91.1a	-89.7a	-99.3a	-100.0a	-100.0a	-100.0a	-100.0a	-100.0a
Fipronil	50.0	404.0	-76.9a	-100.0a	-95.2a	-100.0a	-90.5a	-100.0a	-100.0a	-96.4a
Force	46.7	440.0	-70.5ab	-89.6a	-80.2a	-59.2ab	-75.7a	-23.9c	--	--
Lambda-cyhalothrin	120.0	366.8	-16.2c	-64.9ab	-74.3ab	-61.6ab	-66.9a	--	--	--
Talstar	100.0	312.0	-94.7a	-88.7a	-63.9ab	-75.6a	-20.3a	--	--	--
Check	--	620.0	-19.4bc	-34.0b	-30.1b	-28.8b	-48.1a	-36.8bc	-37.3b	-18.3b

* Mean of 3 replicates.

** Means within a column followed by the same letter are not significantly different (Tukey's test, P=0.05).

*** 18 wk count made on 10/9/98 after Hurricane Earl (9/1-9/3), T.S. Frances (9/10-9/13), T.S. Hermine (9/17-9/22), and Hurricane Georges (9/2 this count was approximately 32 inches.

Table 1. Cont.

Treatment	Rate of Applic. (lb/acre)	Mean pretreat population index/acre*	PT**							
			47 wks	53 wks	59 wks	65 wks	71 wks	79 wks	89 wks	99 wks
Fipronil	25.0	526.8	-87.5a	-93.8a	-91.3a	-100.0a	-97.0a	-97.0a	-89.4a	-79.4a
Fipronil	37.5	313.2	-100.0a	-100.0a	-91.7a	-100.0a	-100.0a	-88.3a	-85.0a	-71.6a
Fipronil	50.0	404.0	-96.0a	-100.0a	-100.0a	-100.0a	-92.9a	-93.0a	-84.8a	-73.3a
Force	46.7	440.0	--	--	--	--	--	--	--	--
Lambda-cyhalothrin	120.0	366.8	--	--	--	--	--	--	--	--
Talstar	100.0	312.0	--	--	--	--	--	--	--	--
Check	--	620.0	-3.0b	-49.0b	-20.6b	-47.3b	-38.6b	6.6b	8.2b	5.3b

* Mean of 3 replicates.
** Means within a column followed by the same letter are not significantly different (Tukey's test, P=0.05).

Table 2. Efficacy of various granular insecticides applied broadcast to grass sod: decrease in pretreatment colony numbers. Slidell Airport, LA; June 3-4, 1998.

Treatment	Rate of Applic (lb/acre)	Mean no. pretreat colonies/ acre*	PT**							
			2 wks	4 wks	6 wks	12 wks	18 wks***	24 wks	32 wks	41 wks
Fipronil	25.0	30.8	41.1bc	56.1ab	72.3ab	100.0a	100.0a	83.9ab	81.1a	86.7a
Fipronil	37.5	24.0	88.6a	83.8ab	95.2a	100.0a	100.0a	100.0a	100.0a	100.0a
Fipronil	50.0	25.2	68.3ab	100.0a	91.7a	100.0a	93.3ab	100.0a	100.0a	95.8a
Force	46.7	29.2	63.9ab	79.3ab	74.5ab	63.4ab	76.3ab	34.8c	--	--
Lambda-cyhalothrin	120.0	24.0	22.9c	35.7b	73.0ab	56.8ab	67.1ab	--	--	--
Talstar	100.0	21.2	88.6a	70.0ab	53.8ab	75.2ab	28.6b	--	--	--
Check	--	40.0	19.7c	35.6b	31.4b	27.8b	40.3ab	41.7bc	30.6b	25.3b

* Mean of 3 replicates.

** Means within a column followed by the same letter are not significantly different (Tukey's test, P=0.05).

*** 18 wk count made on 10/9/98 after Hurricane Earl (9/1-9/3), T.S. Frances (9/10-9/13), T.S. Hermine (9/17-9/22), and Hurricane Georges (9/2 this count was approximately 32 inches.

Table 2. Cont.

Treatment	Rate of Applic (lb/acre)	Mean no. pretreat colonies/ acre*	PT**							
			47 wks	53 wks	59 wks	65 wks	71 wks	79 wks	89 wks	99 wks
Fipronil	25.0	30.8	86.7a	93.3a	90.6a	100.0a	94.4a	94.4a	83.3a	75.0a
Fipronil	37.5	24.0	100.0a	100.0a	93.3a	100.0a	100.0a	90.5a	85.7a	62.1a
Fipronil	50.0	25.2	90.3a	100.0a	100.0a	100.0a	93.3a	94.4a	82.2ab	68.3a
Force	46.7	29.2	--	--	--	--	--	--	--	--
Lambda-cyhalothrin	120.0	24.0	--	--	--	--	--	--	--	--
Talstar	100.0	21.2	--	--	--	--	--	--	--	--
Check	--	40.0	10.0b	44.4b	21.1b	55.3b	41.1b	13.3b	16.7b	20.0a

* Mean of 3 replicates.
** Means within a column followed by the same letter are not significantly different (Tukey's test, P=0.05).

PROJECT NO: FA01G059

PROJECT TITLE: Evaluation of Fipronil Insecticide For Control of Imported Fire Ants in Turf Grass, 1999

TYPE REPORT: Final

LEADERS/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Avel Ladner, Lee McAnally, and Shannon Wade

COOPERATORS: Rhone-Poulenc Ag Company (Aventis)

INTRODUCTION:

Fipronil is a relatively new broad spectrum pyrazole insecticide currently under development by Aventis Corp. (Montvale,NJ) (formerly Rhone-Poulenc Ag Company, Research Triangle Park, NC). Fipronil has demonstrated potent insecticide and acaricide properties on a large number of pests including fleas, ticks, boll weevils, thrips, flies, fire ants, and others (Colliot et al. 1992, Collins and Callcott 1998). In trials initiated in June 1998, 100% control was obtained through more than 65 weeks at rates of 37.5 and 50.0 lbs formulated product per acre. Additional studies were needed to confirm the results obtained in prior studies. Therefore a trial was conducted at an abandoned grass sod farm near Gulfport, Mississippi in June 1999.

MATERIALS AND METHODS:

Test plots were one acre in size, with a ¼ acre efficacy subplot located in the center of the test plots. Granular fipronil (0.05 G) was applied with a Herd® granular applicator mounted on a farm tractor on July 7, 1999. Rates of application were 25, 37.5, and 50 lbs. formulated product per acre. Prior to treatment and at 6 week intervals thereafter, evaluations of IFA populations were made in each ¼ acre efficacy subplot using the procedures described by Lofgren and Williams (1982) and Collins and Callcott (1995). Differences in treatment means will be separated by a LSD test (P=0.05).

RESULTS:

At 6 weeks after treatment, fipronil showed 100% control of IFA in the plots treated at the two high rates and greater than 95% control in plots treated at the lowest rate of application (Tables 1 & 2). Results in this trial were different from numerous previous trials with this product. One or more colonies appeared on the treated plots 12 and 18 weeks after treatment, signs of normal reinfestation. However, in all other trials with this product if a mound appeared on a plot within 6 months of the treatment, it generally was not present at the next evaluation period. It should also be noted that the mean population index of the check plots had increased 100% from the pretreatment index at the 18 week count, and the mean number of colonies present on the check plots increase 73% during the same period. There may have been uncommon pressure to inhabit

the treated areas at this site during the late fall/early winter due to the unseasonably warm weather. By 27 weeks after treatment, the 50 lb/acre plots had only one small colony class 7 mound present, indicating that the other mounds that had inhabited those plots in the previous count had either succumbed to the treatment or moved outside the evaluation area. The trial was terminated at 41 weeks after treatment, due to site disturbance. At that time, the high rate of application, maintained >92% control of IFA while the lower rates were showing increased evidence of reinfestation.

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Colliot, F., K. A. Kukorowski, S. W. Hawkins and D. W. Roberts. 1992. Fipronil: a new soil and foliar broad spectrum insecticide. Brighton Crop Protection Conference. pp. 29-34.

Lofgren, C. S. and D. F. Williams. 1982. Avermectin B_1a, a highly potent inhibitor of reproduction by queens of the red imported fire ant. Jour. Econ. Entomol. 75: 798-803.

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associated dermatological signs in dogs and cats. Veter. Dermatol. 6: 153-158.

Searle, A., C. J. Jensen and R. B. Atwell. 1995. Results of a trial of fipronil as an adulticide on ticks (*Ixodes holocyclus*) naturally attached to animals in the Brisbane area. Australian Veter. Practit. 25: 157-158.

Table 1. Efficacy of granular fipronil population indices. Harrison Co., MS; July 7, 1999.

Treatment	Rate of Applic. (lb/acre)	Mean pretreat population index/acre*	% change in pretreatment population indices at indicated wks PT**					
			6 wks	12 wks	18 wks	27 wks	33 wks	41 wks
Fipronil	25.0	720.0	-99.0a	-90.0a	-71.2a	-83.8a	-82.0a	-77.9a
Fipronil	37.5	640.0	-100.0a	-94.2a	-83.2a	-86.3a	-77.7a	-75.1a
Fipronil	50.0	733.3	-100.0a	-100.0a	-88.4a	-97.5a	-93.0a	-92.7b
Check	--	593.3	7.1b	2.1b	100.4b	59.1b	107.5b	98.5c

* Mean of 3 replicates
** Means within a column followed by the same letter are not significantly different (LSD test, $P<0.05$).

Table 2. Efficacy of granular fipronil colony numbers. Harrison Co., MS; July 7, 1999.

Treatment	Rate of Applic. (lb/acre)	Mean pretreat population index/acre*	% change in pretreatment population indices at indicated wks PT**					
			6 wks	12 wks	18 wks	27 wks	33 wks	41 wks
Fipronil	25.0	50.7	94.2a	85.1a	66.5a	83.1a	78.1ab	75.6a
Fipronil	37.5	48.0	100.0b	91.2a	83.8a	84.5a	71.8b	70.5a
Fipronil	50.0	53.2	100.0b	100.0a	86.2a	96.7a	94.3a	92.2b
Check	--	40.0	0.0c	15.2b	0.0b	0.0b	0.0c	0.0c

* Mean of 3 replicates
**Means within a column followed by the same letter are not significantly different (LSD test, $P<0.05$).

PROJECT NO: GPPS00-06

PROJECT TITLE: Evaluation of Talstar™ and Fipronil Insecticides For Control of Imported Fire Ants in Turf Grass, 2000

TYPE REPORT: Interim

LEADERS/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Lee McAnally, Tim Lockley, and Shannon Wade

INTRODUCTION:

Talstar (bifenthrin), in both granular and liquid formulations, have been evaluated by this laboratory for control of IFA in grass sod. Results with the granular formulation has been somewhat variable (FA01G063, FA01G066, FA01G028), but excellent control was obtained in two trials with the flowable formulation (FA01G065, FA01G066). Fipronil granular insecticide has been shown to be very effective against IFA in grass sod, and was used as a standard in this trial.

MATERIALS AND METHODS:

The test site was located at the Slidell Muni
in size, with a ¼ acre efficacy subplot located in the center of the test plots. Originally, several rates of application were to be tested using the bifenthrin granular and liquid formulations. However, due to the amount of material received, the following rates were used. Granular formulations of 0.1G fipronil (0.025 lb ai/acre) and 0.2G bifenthrin (0.4 lb ai/acre) were applied on June 28, 2000 with a Herd® granular applicator mounted on an ATV. Two rates of liquid bifenthrin (0.2 lb ai/acre and 0.4 lb ai/acre) were applied with a roller pump boom sprayer equipped with five TKSS tips with provided a 10 ft. swath. The system was operated at 50 psi providing 25 gallons of finished spray per acre. Prior to treatment and at 6 week intervals thereafter, evaluations of IFA populations were made in each ¼ acre efficacy subplot using the procedures described by Lofgren and Williams (1982) and Collins and Callcott (1995). Differences in treatment means were separated by a LSD test (P=0.05).

RESULTS:

Six weeks after treatment, all rates provided >96% control of imported fire ants (Tables 1 & 2) and were statistically similar. Granular fipronil and bifenthrin both provided 100% control. Although all treatments were statisti nular fipronil maintained 100% control. The granular bifenthrin treatment provided ca. 80% control, with the liquid treatments providing >92% control (Tables 1 & 2). Counts were delayed due to unseasonable cool weather. At 22 weeks after treatment, all treatments were providing significantly better control than the untreated control, and were not significantly different from each. However, only the fipronil and the high rate of the flowable bifenthrin provided better

ed as evidenced by numerous small, incipient colonies. Counts will continue on the fipronil and high rate bifenthrin.

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Collins, H. L. and A.-M. A. Callcott. d imported fire ant (Hymenoptera: Formicidae) control. J. Entomol. Sci. 30: 489-496.

Lofgren, C. S. and D. F. Williams. 1982. Avermectin B_1a, a highly potent inhibitor of reproduction by queens of the red imported fire ant. Jour. Econ. Entomol. 75: 798-803.

Table 1. Efficacy of Talstar grass sod treatments - Decrease in colony numbers.

Treatment	Mean no. colonies/acre - pretreat	% decrease in no. pretreat colonies at indicated wks. after treatment			
		-6-	-12-	-22-	-28-
Talstar G - 0.4 lb ai/acre	32.0	100.0a	80.0a	63.9a	
Talstar F - 0.2 lb ai/acre	36.0	96.3a	92.2a	49.9ab	
Talstar F - 0.4 lb ai/acre	34.7	97.4a	95.2a	87.9a	
Fipronil	41.3	100.0a	100.0a	91.7a	
Check	38.7	23.7b	23.7b	6.7b	

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

Table 2. Efficacy of Talstar grass sod treatments - Change in population indices.

Treatment	Mean pop. index/acre - pretreat	% decrease in pretreat population indices at indicated wks. after treatment			
		-6-	-12-	-22-	-28-
Talstar G - 0.4 lb ai/acre	450.7	-100.0a	-82.8a	-59.6a	
Talstar F - 0.2 lb ai/acre	473.3	-97.1a	-97.0a	-48.8a	
Talstar F - 0.4 lb ai/acre	533.3	-99.7a	-95.5a	-90.7a	
Fipronil	586.7	-100.0a	-100.0a	-98.6a	
Check	580.0	-20.1b	-7.5b	24.6b	

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

PROJECT NO: GPPS00-07

PROJECT TITLE: Evaluation of Polymer Coated Acephate Formulations

TYPE REPORT: Final

PROJECT LEADERS/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Lee McAnally, and Tim Lockley

INTRODUCTION:

Acephate is a commonly used insecticide for control of imported fire ants. Purcell Technologies Inc. (Sylacauga, AL) produces a variety of slow-release fertilizers through a polymerization process. Two experimental formulations of acephate designated PTI-10TC and PTI-18TC were provided to for field testing. Both formulations contained 4% acephate.

MATERIALS AND METHODS:

The test site was a grassy area between the runway and taxiway at the Laurel, MS airport. The area is kept mowed and simulates conditions found on non-irrigated commercial grass sod farms. Treatments were PTI-10TC applied at 100 and 200 lbs formulated product per acre, PTI-18TC applied at 100 and 200 lbs formulated per acre, and an untreated control. Treatments were applied on August 10-11, 2000, and there were three replicates per treatment. Treatments were applied with a Herd® spreader (Model 3PT.M-96) mounted on a farm tractor. The application equipment was operated at 4 mph, and a 21' working swath was assigned. All test plots were one acre in size. A ¼-acre circular efficacy plot was established in the center of each 1.0 acre test plot. Prior to application and at 6 week intervals thereafter, IFA populations in each efficacy plot were evaluated using the population index system developed by Harlen et al. (1981) and revised by Lofgren and Williams (1982). Using this data, both colony mortality and decrease in pretreatment population indices were calculated. Experimental data were statistically analyzed using analysis of variance and means were separated using the LSD test (P=0.05) for each posttrreatment rating interval.

RESULTS:

At 6 weeks after treatment, no treatment was significantly better than the untreated control at reducing numbers of colonies present, although they were numerically better than the control providing 57-77% reduction in the number of pretreatment colonies. The two high rates of application were significantly better than the control at reducing pretreatment population indices, providing 84-88% reduction in population indices (Tables 1 & 2). Counts were delayed due to unseasonable cool weather. At 17 weeks after treatment, no treatment was significantly different from the untreated control and control of IFA colonies and population indices had decreased to less than 60%. The trial was terminated at this point.

This trial was initiated very late in the summer (August) at the beginning of our hot, dry season. This year we were under severe drought conditions. It is recommended that this trial be repeated again in the spring of 2001 to better evaluate the effects of this fertilizer/acephate product.

REFERENCES CITED:

Harlan, D. P., W. A. Banks, H. L. Collins, and C. E. Stringer. 1981. Large area tests of AC-217,300 bait for control of imported fire ant in Alabama, Louisiana, and Texas. Southwest. Entomol. 8: 42-45.

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Table 1. Efficacy of Polymer Coated Acephate - Decrease in colony numbers.

Treatment	Mean no. colonies/acre - pretreat	% decrease in no. pretreat colonies at indicated wks. after treatment	
		-6-	-17-
PTI-10TC - 100 lb/acre	25.3	57.1a	46.0a
PTI-10TC - 200 lb/acre	33.3	76.9a	59.0a
PTI-18TC - 100 lb/acre	30.7	60.3a	43.4a
PTI-18TC - 200 lb/acre	38.7	77.9a	53.6a
Check	32.0	42.6a	38.9a

Table 2. Efficacy of Polymer Coated Acephate - Change in population indices.

Treatment	Mean pop. index/acre - pretreat	% change in pretreat population indices at indicated wks. after treatment	
		-6-	-17-
PTI-10TC - 100 lb/acre	340.0	-59.3ac	-46.3a
PTI-10TC - 200 lb/acre	473.3	-88.6b	-58.3a
PTI-18TC - 100 lb/acre	420.0	-63.2abc	-34.6a
PTI-18TC - 200 lb/acre	553.3	-84.7ab	-48.9a
Check	440.0	-47.8c	-16.9a

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

PROJECT NO: GPPS00-08

PROJECT TITLE: Efficacy of Combination Bait Treatments (Metabolic Inhibitors and Insect Growth Regulators)

TYPE REPORT: Final

LEADER/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Lee McAnally, Tim Lockley,
Shannon Wade

COOPERATORS: David St. Louis, MAFES
Doug VanGundy, Wellmark International

INTRODUCTION:

Fire ant baits can be divided into two categories: metabolic inhibitors such as hydramethylnon, fipronil, and sulfluramid, and insect growth regulators (IGR's) such as fenoxycarb, methoprene, and pyriproxyfen. The metabolic inhibitors generally affect all life stages whereas IGR's generally affect only some life stages. It has been assumed that combination treatments utilizing both metabolic inhibitors and IGR's would be more effective than multiple applications of the same bait toxicant. Recent eradication efforts in California have raised the question of which type of toxicant should be applied first in order to achieve maximum control. The study described herein was designed to determine if the order in which combination treatments are

MATERIALS AND METHODS:

The study site for this trial was at the Mississippi Agricultural and Forestry Experiment Station (MAFES) at Poplarville, Mississippi. Treatments were as follows: (1) Amdro® (hydramethylnon) alone, (2) Extinguish® (methoprene) alone, (3) Amdro followed in one week with Extinguish, (4) Extinguish followed in one week with Amdro, (5) untreated control. Each treatment was applied on June 6, 2000 to one acre test plots at a rate of 1.5 lb bait per acre with a shop-built bait spreader mounted on a farm tractor. This equipment was operated at 4 mph utilizing a 21 foot swath. There w , at 2, 5, and 8 weeks after treatment, and at 4 week intervals thereafter, evaluations of fire ant populations in each test plot were made in ¼-acre circular subplots in the center of each one-acre test plot using procedures described by Lofgren and Williams (1982). Differences in treatment means were separated by ANOVA and a LSD test (P=0.05). Evaluations continued until re-infestation was apparent based on the appearance of numerous incipient colonies in the test plots.

RESULTS:

Extinguish (IGR) alone was slower acting than either of the bait combinations or Amdro (metabolic inhibitor) alone in reducing numbers of colonies present and in reducing population indices from pretreatment rates (Tables 1 & 2). At no time were the dual applications (Amdro followed by Extinguish or the reverse) significantly different from each other in reducing IFA colonies or populations, nor were they different from the Amdro standard at any evaluation period. Maximum control for the dual treatments was achieved at 8-16 weeks after treatment, similar to the Amdro standard. Counts were delayed due to adverse weather conditions. At 27 weeks after treatment, most plots were being reinfested by small, incipient colonies as indicated by the raw data and the decrease in control noted in the tables. Therefore the trial was terminated.

This trial indicates that combination treatments of the metabolic inhibitor Amdro and the IGR Extinguish are not significantly better than a single application of Amdro, and that the order in which the two bait types are applied does not affect rate or level of control. The combination treatments used in this trial did provide faster speed of control than the IGR Extinguish applied alone.

REFERENCES CITED:

Lofgren, C. S. & D. F. Williams. 1982. Avermectin B_1a, a highly potent inhibitor of reproduction by queens of the red imported fire ant. J. Econ. Entomol. 75: 798-803.

Table 1. Combination Bait treatments - Decrease in colony numbers.

Treatment	Mean no. colonies/acre - pretreat	% decrease in no. pretreat colonies at indicated wks. after treatment					
		-2-	-5-	-8-	-11-	-16-	-27-
Amdro+Extinguish	145.3	40.0ab	62.9a	88.1a	82.6a	83.0a	70.2a
Extinguish+Amdro	116.0	34.8ab	77.7a	89.7a	90.8a	83.8a	66.6a
Extinguish	173.3	11.2a	17.8b	46.7b	56.4b	86.4a	89.3a
Amdro	92.0	47.6b	74.7a	87.5a	87.0a	76.2a	58.8a
Check	74.7	19.9ab	11.5b	32.5b	33.0b	23.7b	1.5b

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

Table 2. Combination Bait treatments - Change in population indices.

Treatment	Mean pop. index/acre - pretreat	% change in pretreat population indices at indicated wks. after treatment					
		-2-	-5-	-8-	-11-	-16-	-27-
Amdro+Extinguish	2266.7	-50.1a	-94.6ab	-98.4a	-97.4a	-93.3a	-82.6a
Extinguish+Amdro	2126.7	-60.9a	-96.9a	-98.7a	-98.8a	-91.4a	-89.5a
Extinguish	3160.0	-51.8a	-88.3b	-93.2a	-93.9a	-98.3a	-97.3a
Amdro	1740.0	-60.1a	-93.5ab	-98.4a	-98.4a	-87.1a	-72.5a
Check	1473.3	-10.2b	-20.0c	-39.6b	-36.8b	-35.3b	-7.6b

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

PROJECT NO: GPPS00-09

PROJECT TITLE: Control of Fire Ants with Baits Formulated on Two Different Inert Carriers

TYPE REPORT: Final

LEADER/PARTICIPANTS: Homer Collins, Anne-Marie Callcott, Lee McAnally, Tim Lockley,
(MAFES), and Shannon Wade

INTRODUCTION:

At the current time most commercial fire ant baits are formulated on the same inert carrier. This carrier is a corn based product known as pregelled corn and is produced by a sole source (Illinois Cereals Mills, Paris, IL). If for any reason that source is eliminated, alternate bait carriers are not available. The first successful bait toxicant for use against fire ants was mirex, which was formulated with corn cob grit as the inert carrier (Lofgren et al. 1963). Banks et al. (1981) reported that efficacy of hydramethylnon
superior to baits formulated with corncob grit carrier. Superior performance of hydramethylnon formulated on the more friable and absorbent extruded corn pellets led to registration of Amdro® in 1980. Almost all other baits that have been commercialized are formulated on the pregelled corn carrier.

Tast-E-Bait™ (Advanced Organics, Upper Sandusky, OH) is under development as a potential alternative carrier for use with various active ingredients. Tast-E-Bait is derived from bakery waste and contains ca. 11.3% protein, 10.4% fat, and 62.7% sugars and starches (Source: Advanced Organics).

Collins and Callcott (2000) conducted a series of laboratory tests with Tast-E-Bait and concluded that it could potentially be used as an inert carrier for fire ant bait toxicants and insect growth regulators.

A field trial to compare efficacy of several IFA toxicants formulated on both the Tast-E-Bait and pregelled corn carrier was initiated on June 13, 2000.

MATERIALS AND METHODS:

Abamectin formulated on Tast-E-Bait (0.011% ai) was provided by Novartis. Unfortunately, the product formulated on pregelled corn as a 0.011% ai bait (Varsity®) was not received until after the trial had been initiated. Aventis provided us with fipronil formulated at 1.5ppm on pregelled corn and at 50ppm on Tast-E-Bait. Invicta Ltd. submitted two bait formulations designated as Fire Ant Bait #491 (Tast-E-Bait carrier) and Fire Ant Bait #492 (pregelled corn). The ai for 491 and 492 was not specified.

The test site was located at the Mississippi Agricultural and Forestry Experiment Station (MAFES) at Poplarville, Mississippi. All bait formulations were applied with a shop-built granular applicator mounted on a farm tractor. The equipment provided a 21' swath and was operated at 4 mph. Each time a different formulation was applied the equipment was re-calibrated to deliver 1.5 lbs of bait per acre. Air and soil temperatures were approximately 90° and 80°F, respectively. There were three replicates per treatment, and all test plots were 1.0 acre in size. A ¼-acre circular efficacy plot was established in the center of each 1.0 acre test plot. Prior to bait application and at 6 week intervals, IFA populations in each efficacy plot were
an et al. (1981), and later revised
by Lofgren and Williams (1982). Using this data, both colony mortality and decrease in pretreatment population indices were calculated. Experimental data were statistically analyzed using analysis of variance, and treatment means were separated using the LSD test (P=0.05) for each posttreatment rating interval.

RESULTS:

South Mississippi experienced drought conditions during 2000. The Poplarville site did receive some rainfall during the trial, but was still under very hot and dry conditions.

At 6 weeks after treatment, all treatments provided significantly greater reductions in IFA population indices compared with the check plots, however, no treatment was significantly different than the check in reducing numbers of colonies (Tables 1 & 2). Unfortunately, the check plots had large reductions in colonies numbers and population indices, probably due to the drought conditions. This high check mortality continued through out the study, making interpretation of the data difficult.

At no time were colony numbers reduced more than 85%, most treatments reducing numbers by 50-60%. At 6, 12 and 18 weeks after treatment, the fipronil baits as well as the Invicta Bait #491 provided greater than 88% reduction in IFA population indices, while abamectin was greater than 88% only at the 6 week evaluation. These numbers were significantly better than the corresponding check plots through the 18 week evaluation (Table 2).

A t-test was used to compare the two Invicta Baits (#491 and #492), and the two fipronil baits. There was no significant difference ($t>0.05$) in the activity of fipronil on either the standard carrier or the Tast-E-Bait (Table 3). There were not significant differences between carrier type in the Invicta baits until the 24 week evaluation when the Tast-E-Bait formulation was significantly better than the standard carrier ($t = 0.002, 0.013$). Differences noted by the low t values (0.118, 0.059, and 0.108) in the 12 and 18 week evaluations, indicating that for this bait, the carrier type may be important.

In this trial, the Tast-E-Bait formulation of the Invicta bait (#491) was numerically and statistically superior to the standard bait carrier, fipronil apparently was not affected by carrier type, and abamectin (with no standard bait formulation to compare with) performed well. However, due to the extreme drought conditions, we recommend that this trial be repeated in 2001.

Treatment	Mean no. colonies/acre - pretreat	% decrease in no. pretreat colonies at indicated wks. after treatment			
		-6-	-12-	-18-	-24-
Fipronil 1.5ppm corn	42.7	39.9a	52.7ab	58.0abc	32.6bc
Fipronil 50ppm Tast-E	66.7	59.8a	67.9a	69.0abc	41.9b
492 corn	57.3	31.1a	52.9ab	40.0bc	0.0c
491 Tast-E	82.7	31.3a	65.3a	85.8a	85.2a
Abamectin Tast-E	156.0	35.6a	62.5a	72.9ab	32.8bc
Check	56.0	31.9a	28.6b	37.0c	28.6bc

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

Table 2. Taste-Bait treatments - Change in population indices.

Treatment	Mean pop. index/acre - pretreat	% change in pretreat population indices at indicated wks. after treatment			
		-6-	-12-	-18-	-24-
Fipronil 1.5ppm corn	806.7	-90.5ab	-88.8ab	-88.1a	-78.3a
Fipronil 50ppm Tast-E	1246.7	-94.2a	-91.6a	-88.6a	-85.0a
492 corn	1166.7	-80.1b	-71.8b	-63.2bc	6.0b
491 Tast-E	1580.0	-88.6ab	-95.6a	-98.0a	-98.3a
Abamectin Tast-E	2800.0	-90.3ab	-79.7ab	-82.9ab	-46.6c
Check	1220.0	-50.4c	-52.9c	-54.1c	-35.9c

LSD test (P=0.05) means within a column followed by the same letter are not significantly different

Table 3. Comparison of the Standard Carrier vs. Tast-E-Bait (t value).

	6 wk.		12 wk.		18 wk		24 wk	
	no. col.	pop. ind.	no. col.	pop. ind.	no. col.	pop. ind.	no.col.	pop. ind.
491 vs. 492	0.987	0.367	0.575	0.118	0.059	0.108	0.002	0.013
fipronil	0.347	0.221	0.317	0.662	0.519	0.928	0.730	0.638

Acknowledgments: We thank David I. B. Vander Hooven (Advanced Organics) for his many helpful suggestions and comments.

References Cited:

Banks, W. A., H.L. Collins, D. F. Williams, C. E. Stringer, C. S. Lofgren, D.P. Harlan, and C. L. Mangum. 1981. Field trials with AC-217,300 A new amidinohydrazone bait toxicant for control of the red imported fire ant. Southwest. Entomol. 6: 158-164.

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Harlan, D. P., W. A. Banks, H. L. Collins, and C. E. Stringer. 1981. Large area tests of AC217,300 bait for control of imported fire ants in Alabama, Louisiana, and Texas. Southwest. Entomol. 8: 42-45.

Lofgren, C. S., F. J. Bartlett, and C. E. Stringer. 1963. Imported fire ant toxic bait studies: evaluation of carriers for oil baits. J. Econ. Entomol. 56: 62-66.

Lofgren, C. S. and D. F. Williams. 1982. Avermectin B_1a, a highly potent inhibitor of reproduction by queens of the red imported fire ant. J. Econ. Entomol. 75: 798-803.

Williams, D. F., C. S. Lofgren, and A. Lemire. 1980. A simple diet for rearing laboratory colonies of the red imported fire ant. J. Econ. Entomol. 73: 176-1717.

PROJECT NO: GPPS00-10

PROJECT TITLE: A Preliminary Assessment of GX484 Bait

PROJECT TYPE: Final

LEADER/PARTICIPANTS: Homer Collins, Shannon Wade

INTRODUCTION:

On July 12, 2000, a two pound sample of SPG00-013 (also referred to as GX484 bait) was received from FMC Corporation
with this product.

MATERIALS AND METHODS/RESULTS:

1. Physical characteristics: The bait was observed to be very dry, uniform, and flowable. Based on past experience, this bait will be easily applied with mechanical bait applicators currently in use.

2. Palatability to imported fire ants

IFA colonies. After allowing the colonies to acclimate for 3-4 days 5 colonies (replicates) are allowed to feed ad lib on 4 grams of the candidate as well as 4 grams of a standard bait (pregelled corn loaded with 20% soybean oil) for a 24-hour feeding period. At that time any remaining bait is removed and re-weighed. A bait acceptance ratio is then computed by dividing the number of grams of the candidate consumed by the number of grams of the standard consumed. Acceptance rations with a value of <1.0 indicates that a given candidate is less attractive than the standard. Values equal to or greater than 1.0 indicates that the candidate is equally or more attractive than the standard. A bait acceptance test with GX484 was initiated on July 18, 2000. Although this trial was scheduled to run for 24 hours, all baits in all colonies were totally consumed in about 4 hours. Therefore, an acceptance ratio of 1.0 was obtained. This means the 0.2% formulation is very palatable to foraging imported fire ant workers.

3. Toxicity to field collected colonies
usually discarded after the trial, the 5 colonies mentioned above were retained and observed for mortality for 20 weeks following the bait acceptance trial. Colonies were maintained on a diet of crickets and water was added to each nest as needed. Each replicate slowly declined, and all replicates contained large "bone piles" of dead ants. At 12 weeks after treatment two of the five treated colonies were dead (i.e. <20 live workers). The other three colonies remained greatly decimated through 20 weeks but contained several hundred live workers each when the trial was discontinued on December 5, 2000.

4. Toxicity to laboratory reared colonies
on July 18, 2000. Lab colonies are reared from newly mated queens and maintained on a diet of

crickets and sugar water. Lab colonies are less vigorous than field collected colonies presumably due to the stress of living in artificial nests and possible nutritional deficiencies. Colonies (n=5) comprised of a functional queen, approximately 2000 workers, and various stages of immatures were fed 2 gms of GX484 and observed for mortality over a 4.5 month period. Mortality was slow and gradual with 3 queens out of 5 dead on July 27, 2000. The remaining 2 queens were dead on October 25, 2000. After death of the queen workers succumbed in ca. 3 months.

5. Dose rate trial: Since 4 grams of the 0.2G formulation were not effective in eliminating all colonies from the original palatability trial, a trial was initiated on October 2, 2000 to determine if higher rates of application would increase performance. Field collected IFA colonies were offered 4, 8, and 12 grams of GX484 for a 24 hour feeding period at which time any remaining bait was weighed. The amount of bait consumed by each colony is shown below.

Rate (g/colony)	g removed after 24 hrs			
	Col. 1	Col. 2	Col. 3	Avg
4	4.0	4.0	0.8	2.9
8	4.0	5.8	3.9	5.9
12	10.9	12.0	12.0	11.6

Colonies were observed for mortality for a 9 week period until December 5, 2000 at which time the test was discontinued. Whereas large numbers of ants were killed at each rate of application, the higher rates were not more effective than the lowest rate of 4 grams/colony. None of the colonies treated at 12 g bait/colony were dead after 9 weeks. One colony each at 8 and 4 g bait/colony was dead after 9 weeks. All surviving colonies contained several hundred live workers.

RECOMMENDATIONS:

Based on very limited evidence, it appears that GX484 is a slow-acting toxicant to imported fire ants to some extent, but does not provide an acceptable level of control when used as a 0.2G formulation on Tast-E-Bait™ carrier. Additional laboratory trials should be conducted to determine if higher concentrations will provide higher mortality without becoming repellent. Concentrations to be tested might be 0.2, 0.3, etc. Time line: Feb.-April, 2001. If higher dose rates improve performance in the laboratory, field trials by the USDA and other cooperators are indicated. Time line: May-June, 2001. Depending upon the outcome of the first field trials, additional multi-state, multi-

GX484 exhibits two very desirable characteristics in a fire ant bait: first, it is very dry and flowable, thereby enhancing mechanical application; second it is a very slow acting toxicant similar to mirex, Amdro®, and other efficacious baits.

PROJECT NO: FA02G049

PROJECT TITLE: Evaluation of Field Releases of *Thelohania solenopsae*, 1999

TYPE REPORT: Interim

LEADER/PARTICIPANTS: Anne-Marie Callcott, Homer Collins, Shannon Wade, Lee McAnally, Avel Ladner and Tim Lockley

COOPERATORS: Drs. David Williams and David Oi, USDA, ARS, CMAVE, Gainesville, FL

INTRODUCTION:

The microsporidium *Thelohania solenopsae* (Microsporidia: Thelohaniidae) was discovered in Brazil in the red imported fire ant (Knell et al. 1977). Since that time, USDA, ARS, CMAVE personnel in Argentina have also discovered the pathogen in the black imported fire ant in that country and have determined that the pathogen does decrease colonies and colony vigor and therefore may be a good candidate for use as a biological control agent in the United States (Briano et al. 1995a, 1995b, 1996). In 1998, we initiated a trial releasing the microsporidium in Harrison and Hancock counties, MS (FA02G048). We lost our polygyne site prematurely, and had poor results with the monogyne

MATERIALS AND METHODS:

In October, 1999 we assisted ARS with the initiation of a trial to evaluate field releases of the pathogen *Thelohania solenopsae*. Two sites, one polygyne in Hancock Co. and one monogyne in Harrison Co., were selected for the inoculation and four plots set up at each site. At the polygyne site, circular test plot evaluation areas were 1/16 acre in size due to the large number of mounds in the area. Two plots were used as inoculation plots and two were maintained as non-inoculated control plots. On October 19, 1999 nine mounds in each of the inoculation plots were inoculated with 3.5g of brood infected with *T. solenopsae* (field collected by ARS prior to study). At the monogyne site, circular tes
Inoculations were also made on October 19 to nine mounds in each of two test plots. Every two months we monitor the inoculated plots and corresponding non-inoculated control plots by evaluating mounds with the mound index system, geo-referencing each mound within the plots, and collecting worker samples from each mound within the plots. We also assist by microscopically examining collected workers for pathogen spores.

RESULTS:

Colony mortality
Due to the holidays, our first evaluation was done at 12 weeks after inoculation. At the 12 week evaluation, small decreases in number of colonies present in both the monogyne and polygyne site were seen (Table 1). Since decreases also occurred in the control plots, these decreases probably cannot, at this time, be attri

were more significant, particularly in the monogyne site. However, these decreases were mainly due to many colonies not hav
production slows down in the winter months). In the monogyne site, the control plots have, on average maintained colony numbers and populations through 49 months, while the inoculated plots have shown decreases in both (Tables 1 & 2). The polygyne site has shown fluctuations in both colony numbers and population indices over the 49 months of the trial. However, by 49 months, both inoculated and control plots showed significant decreases in colony numbers and population indices. Whether this can be attributed to the pathogen is not yet known (see below).

Presence of pathogen

Pretreatment samples were examined and no spores were detected at either site. At 12 weeks after inoculation (January 2000), 2 mounds in one of the polygyne inoculated plots were positive for spores. At 20 months, 3 mounds in one polygyne inoculated plot had spores present, and a few spores were detected 2 mounds in a control plot on the polygyne site. Samples after 20 months have not been examined. No spores were detected in the monogyne site through 20 months. The monogyne site was lost to pasture improvements after the 49 month evaluation. The polygyne site will continue to be monitored.

References Cited:

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Knell, J.D., G.E. Allen and E.I. Hazard. 1977. Light and electron microscope study of *Thelohania solenopsae* n. Sp. (Microsporidae: Protozoa) in the red imported fire ant, *Solenopsis invicta*. J. Invertebr. Pathol. 29: 192-200.

Table 1. Change in colony numbers of *Thelohania solenopsae* inoculated sites.

Type of Site	Treatment	Mean no. colonies/ acre - pretreat	Mean % change in number of colonies at indicated weeks after inoculation				
			-12- (Jan)	-20- (Mar)	-28- (May)	-36- (Jun/Jul)	-49- (Sept)
Monogyne	Inoculated	66	-5.5	-2.8	-2.6	-17.7	-27.4
	Control	34	40.0	42.9	57.2	5.0	55.0
Polygyne	Inoculated	304	-12.8	-2.5	8.1	-12.5	-66.1
	Control	336	-17.9	-8.0	-12.9	-40.6	-43.4

Table 2. Change in population indices of *Thelohania solenopsae* inoculated sites.

Type of Site	Treatment	Mean pop. index/acre - pretreat	Mean % change in population indices at indicated weeks (month of year) after inoculation				
			-12- (Jan)	-20- (Mar)	-28- (May)	-36- (Jun/Jul)	-49- (Sept)
Monogyne	Inoculated	1,160	-53.7	-7.6	0.4	-36.5	-32.5
	Control	590	-13.5	50.0	65.8	-0.1	30.9
Polygyne	Inoculated	4,440	-28.9	-5.9	2.3	-32.9	-76.1
	Control	4,800	-17.3	-10.4	-0.7	-50.7	-54.9

PROJECT NO: GPPS00-11

PROJECT TITLE: Phorid Fly Project

TYPE REPORT: Interim

LEADER/PARTICIPANTS: Tim Lockley and Homer Collins

COOPERATORS: Sanford Porter, USDA, ARS, CMAVE, Gainesville, FL

INTRODUCTION:

Pseudacteon species are endoparasites of *Solenopsis* species and are widely distributed throughout the fire ant range in their native habitats. These phorid flies have a potential to suppress fire ant populations if they can become established in North America. To determine their ability to acclimatize, these phorids were released at predetermined sites and monitored over time.

MATERIALS AND METHODS:

A release site and a paired control site was selected. The paired sites were ca. 10-15 miles apart. Each site had similar fire ant densities and habitats. Areas were selected to maximize fly success. The ideal site had 1] abundant fire ants, 2] monogyne colonies, 3] a soil moisture gradient associated with a permanent body of water and 4] vegetational diversity. After selection, one area from one of the paired sites was selected to receive the phorids the other area was designated as control. Two nearby sites (100-500 m away) were also selected for monitoring in each area. These sites were as different a site from the release/control sites as possible. The purpose of these sites was to determine the relative success of the flies in different habitats.

The presence of the flies in the field was determined by forming small depressions (ca. 10 cm diameter) in 8 to 10 mounds and inspecting them every few minutes for hovering flies. Monitoring took place between 10:30AM and 1:30PM, depending on season and temperature. On hot days, "sun shades" were placed over the exposed mounds to reduce desiccation and allow ants to remain active on the surface for longer periods of time.

Ca. six months after initial release, monitoring of fly activity began at increasing distances from the original site. These searches were conducted in the spring and fall.

Fire ant populations were evaluated using three methods. The first method was mound counts using mound area (pi x length x width/4) to adjust for differences in colony size (Macon & Porter 1996). Mound counts were made for areas of ca. 0.1 ha, and only active mounds were measured. The second sampling method was a grid line of 25 baits set at intervals of 8 paces. Baits were left exposed for ca. 30 minutes at soil temperatures between 20 and 35°C (Porter & Tchinkel 1987). Baits consisted of small glass tubes (12 x 75 mm) with a piece of hot dog

pushed into the end of the tube. The third method consisted of 15 test tube pitfall traps (27 x 55 mm) (Majer 1978) set at intervals of 8 paces. Traps remained in place for 3 days.

Approximately 2,500 laboratory raised phorids were released at the selected test site over a 2 to 3 week period in the spring of 2000. Thirty to sixty adult phorids were released near each of 5 to 10 disturbed mounds. Mounds were agitated every few minutes for 2 hours to be certain that the flies have a sufficient number of ants to attack.

Beginning on 11 April, 2000 and continuing daily until 20 April that year, 2612 phorids were released on 45 separate imported fire ant colonies. The release site was an improved pasture adjacent to a permanent pond ca. 0.5 ha in surface area. The site was located on Old Hwy 49 ca. 3 km north of Saucier, Harrison
Gill family. Secondary sites were located ca. 500 m NW of the release site and 500 m W of the release site. The control sites were located at the Harrison County Work Farm.

RESULTS:

Results are shown in the Tables 1, 2 and 3.

References Cited:

Macon, T.E. & S.D. Porter. 1996. Comparison of polygyne and monogyne red imported fire ant (Hymenoptera: Formicidae)
535-543.

Majer, J.D. 1978. An improved pitfall trap for sampling ants and other epigaeic invertebrates. J. Aust. Entomol. Soc. 17: 261-262.

Porter, S.D. and W.R. Tschinkel. 1987. Foraging in *Solenopsis invicta* (Hymenoptera: Formicidae): effects of weather and season. Environ. Entomol. 16: 802-808.

Table 1. Comparative myrmecofaunal populations collected by pitfall trapping at selected control
and phorid release sites.

	TREATMENT SITES						CONTROL SITES					
	1*		2		3		1		2+		3	
TAXON	IV	X	IV	X	IV	X	IV	X	IV	X	IV	X
S. invicta	36	14	11	218	370	229	7	17	193	159	161	89
S. molesta							1				3	1
Pheidole spp.		2		2				4		6		1
P. dentata	1	2	4	2							3	
P. vinlandica	7	15	1	2	6	3	19	4	1			
B. depilis	1	4	5	4	1	3	4	2	42	5	52	12
C. rimosus	2	31	4	35	11	12	8	10				
L. pergandei							1					
H. opaciceps							1					
D. bureni											21	40
P. pergandei		1										
P. croceum				1								

* Release Site, + Paired Control Site

Table 2. Comparative myrmecofaunal populations collected by bait trapping at selected control and phorid release sites.

	TREATMENT SITES						CONTROL SITES					
	1*		2		3		1		2+		3	
TAXON	IV	X	IV	X	IV	X	IV	X	IV	X	IV	X
S. invicta	1059	2365	1438	2160	1744	2121	618	580	453	1163	536	618
Pheidole spp.							1	1				
P. vinlandica	97						81	44			69	
D. bureni												0
L. pergandei							73					
B. depilis												

* Release Site, + Paired Control Site

Table 3. Average Comparative Pretreatment Mound Size.

RELEASE		CONTROL	
SITE	MOUND SIZE (cu. in.)	SITE	MOUND SIZE (cu. in.)
1*	440.7	1	667.6
2	701.4	2+	1355.3
3	775.4	3	1145.0

* Release Site, + Paired Control Site

PROJECT NO: FA05G019

PROJECT TITLE: The Terrestrial Arthropods of Horn Island, MS: A Comparison With a Survey Conducted Between 1943 and 1961.

TYPE REPORT: Interim

LEADER/PARTICIPANTS: Tim Lockley

INTRODUCTION:

In 1963, and in a supplement published 4 years later, E. A. Richmond described the flora and fauna of Horn Island, Mississippi. The data presented in these publications was a composite of almost 20 years of research. Within these publications, Richmond listed sixteen orders, 160 families, 478 genera and 599 species of insects as well as three orders, 15 families, 24 genera and 27 species of arachnids. Among the insects was the first imported fire ant (IFA) collected in the state of Mississippi (1943). An initial survey of the island revealed a light population of IFA. To our knowledge, Horn Island has never been treated for fire ant control. Questions this study will ask will include: why are populations of IFA low when compared with adjoining islands and on the mainland and what are the dominant competitive species of ants on the island?

It has been over fifty years since the first arthropod collections were carried out on Horn Island and over 35 years since these data were published. Collections from the Horn Island arthropod population were undertaken in 1999 to compare populations of selected groups to see if any major shifts in species abundance/richness has occurred over those years.

MATERIALS AND METHODS:

Collections were begun in April 1999. Samples were taken using an ultraviolet light trap, pitfall traps, bait traps and hand sampling. UV lights and pitfall traps were set for ca. 24 hours; at which point they were removed from the island. Twelve pitfall traps were set from the dunes adjacent to the pier area on the north side of the island and running the width of the island along a path to the southern end of the island. Pitfall traps consisted of 10 oz. capacity cups placed in the ground with 70% ethanol used as the killing/ preserving agent. Bait traps (for collection of ant species) were set within two meters of the pitfall traps and allowed to remain in place for ca. 1.0 hour. Bait traps were collected and returned to the lab the first day of each sampling period.

RESULTS:

From collections made from April through October 1999, three previously undescribed species of Scarabaeidae were found as well as a new species of ant in the genus *Brachymyrmex* (Table 1).

Among the scarabs, three new island and one new state record were recorded from the 1999 collections. Among the carabids, 11 names were added to the list of the island's fauna. Along with the cicindellid, this brought the 1999 total of new records for beetles to 19.

Among the ants, seven species were found not previously recorded from Horn Island. One of these, *Pogonomyrmex badius*
been heavily impacted directly by IFA
remnant populations occur in the central Florida area and in isolated pockets in the panhandle (Wojcik, pers. comm.).

Along with the insects, a number of spiders were also added to the record for Horn Island in 1999. Although the study was not specifically designed for the capture of spiders (except ground dwelling species), 18 new names were added to the island list with one as a new record for the state.

In 2000, only three collecting trips were accomplished: March, August and October. From those limited collections, one carabid (*Pasymachus sublaevis*) and four ant species were taken as new records for the island (Table 1). Other specimens have yet to be determined.

During the 2000 surveys, it was noted that IFA numbers were even lower than they had been in the previous year. A search of the island ca. 50 meters to either side of the transect was unable to locate a single active colony of IFA in either the August or October collections. A comparative survey of Ship Island in October 2000 showed a substantially higher population of IFA. Imported fire ants were collected at eight of the eleven bait stations and in all eleven of the pitfall traps. During that same month, IFA
taken by baiting. Conversely, populations of the harvester ant, *Pogonomyrmex badius*, were substantially higher. In 1999, 5 active colonies were identified along the transect. In 2000, fifteen active colonies were found.

Collections will begin again in the spring of 2001 and proceed through out the summer and early fall. It is anticipated that collecting on the island will continue over the next two years.

References Cited:

Richmond, E.A. 1963. The Fauna and Flora of Horn Island, Mississippi. Gulf Research Reports 1(1): 59-106.

Richmond, E.A. 1967. A Supplement to the Fauna and Flora of Horn Island, Mississippi. Gulf Research Reports 7(1): 213-254.

Table 1. Horn Island Arthropods

INSECTA

Coleoptera

Scarabaeidae

*Anomala undulata Melsch.

Aphodius n. sp. A

Ataenius n. sp. A

Ataenius n. sp. B

A. alternatus (Melsch.)

A. wenzeli Horn

*Cyclocephala lurida Bland

Diplotaxis bidentata Lec.

Dyscinetus morator (F.)

****Gronocarus autumnalis Schaeffer**

*Lygyrus gibbosus (DeGeer)

Phyllophaga latifrons (Lec.)

P. prununculina (Burm.)

Carabidae

*Agonum punctiforme (Say)

*Bembidion viridicolle (LeFerte-Senectere)

*Dyschiriodes abbreviatus (Putzeys)

*Notiobia purpurescens (Bates)

*N. terminata (Say)

*Oodes amaroides DeJean

*Pasymachus sublaevis

*Platynus cincticollis (Say)

*Pterostichus ophryoderus (Chaudoir)

*Scarites subterraneous Fab.

Selenophorus sp.

*Stenolophus ochropezus (Say)

*Semiardistomis puncticollis (DeJean)

Cicindellidae

*Cicindela trifasciata ascendens LeConte

Staphylinidae

Table 1. cont'd.

Hymenoptera

Formicidae

*Aphaenogaster treatae Forel

****Brachymyrmex n. sp.**

*B. depilis Emery

Camponotus abdominalis floridanus (Buckley)

Crematogaster clara Emery

*Cyphomyrmex rimosus

Dorymyrmex bureni Trager
*D. medeis Trager
Forelius sp.
*F. maccooki Forel
F. pruinosus (Roger)
*Leptothorax pergandei
*Paratrechina phantasma Trager
Pheidole sp.
*P. dentata
*P. moerens Emery
Pogonomyrmex badius Latr.
Solenopsis invicta Buren
*S. molesta Say
*Tetramorium guineense

ARACHNIDA

ARANEAE

Araneidae

*Argiope aurantia Lucas
*Nephila clavipes (L.)

Oxyopidae

*Oxyopes aglossus Hentz
*O. salticus Hentz

Gnaphosidae

*Drassylus dixinus Chamb.
*Zelotes pullus Bryant

Agelenidae

*Agelenopsis barrowsi (Gertsch)

Lycosidae

**Arctosa sanctaerosae Gertsch
*A. littoralis (Hentz)
*Gladicosa gulosa (Walck.)
*G. pulchra (Keys.)
*G. huberti (Chamb.)
*Lycosa lenta Hentz
*L. rabida Walck.
*L. timuqua Wallace
*Pardosa delicatula Gertsch & Wallace
*Schizocosa crassipes (Walck.)
*Sossipus mimus Chamb.

* New record Horn Island; ** New record Mississippi

APPENDIX I - LABORATORY BIOASSAY PROCEDURE

PROTOCOL FOR BIOASSAY OF INSECTICIDE TREATED POTTING MEDIA WITH ALATE IFA QUEENS

Introduction: The development of quarantine treatments to prevent artificial spread of imported fire ants (IFA) in nursery stock requires the evaluation of candidate pesticides, dose rates, formulations, etc. The use of a laboratory bioassay procedure for these evaluations provides a rapid and inexpensive means of evaluating the numerous candidates tested each year. Various bioassay procedures have been devised over the years, but the procedure currently used by the USDA, APHIS Imported Fire Ant Laboratory in Gulfport, Mississippi, is described herein. This procedure is a slight modification of the test described by Banks et al., 1964 (J. Econ. Entomol. 57: 298-299).

Collection of test insects: Field collected alate imported fire ant queens are used as the test insect. IFA colonies are opened with a spade and given a cursory examination for the presence of this life stage. Alate queens are seldom, if ever, present in all IFA colonies in a given area. Some colonies will contain only males, others may have few or no reproductive forms present, others may contain both males and queens, while some will contain only alate queens. Seasonal differences in the abundance of queens is quite evident; in the warmer months of the year 50% or more of the colonies in a given area may contain queens. However, in the cooler months, it is not uncommon to find that less that 10% of the colonies checked will contain an abundance of alate queens. Therefore, it is necessary to examine numerous colonies, selecting only those which contain large numbers of alate
cluster near the surface of the mound facing the sun. Collection during midday on bright, sunny days is highly recommended for winter; whereas the cooler time of day is recommended for hot, dry days of summer. Once a colony (or colonies) has been selected for collection, the entire nest tumulus is shovelled into a 3-5 gallon pail. Pails should be given a liberal dusting with talcum powder on the interior sides to prevent the ants from climbing up the sides of the pail and escaping. Approximately 3-6" head room should be left to prevent escape. An effort should be made to collect as many ants as possible while minimizing the collection of adjacent soil which will contain few ants. Collected colonies are then transported to the laboratory for a 3-5 day acclimation period. The addition of food or water during this short acclimation period is not necessary. Alate queens are collected with forceps after placing a 1-2 liter aliquot of the nest tumulus in a shallow laboratory pan. Again, the use of talc on the sides of containers prevents escape while talced rubber gloves minimizes the number of stings experienced by the collector. The forceps should be used to grasp the queens by the wings in order to prevent mechanical injury. An experienced collector can collect 2-300 queens per hour. It is generally advisable to place collected queens in a 500 cc beaker or other suitable vessel containing moist paper towels prior to being introduced into the test chamber.

Test chambers: Test chambers are 2.5" x 2.5" plastic flower pots which have been equipped with a labstone bottom. Labstone is generally available through dental supply firms such as Patterson Dental Co., 2323 Edenborn Ave., Metairie, Louisiana. The labstone bottom prevents the queens from escaping through the drain holes in the bottom of the pot and also serves as a

wick to absorb moisture from an underlying bed of wet peat moss (see Figure 1). Ants are susceptible to desiccation so humidity/moisture levels must be optimized. Pots should be soaked in water to moisten the labstone prior to placing potting media in the pots. Plastic petri dishes are inverted over the tops of the pots to prevent escape from the top of the test chambers. Prior to placing queens in the test chamber, 50 cc of treated potting media is placed in the bottom of each pot. Due to possible pesticide contamination, test chambers are discarded after use.

Replicates: Each treatment to be evaluated is subdivided into 4 replicates; with one test chamber per replicate. Five alate queens are then introduced into each replicate.

Test interval: All evaluations are based on a 7 day continuous exposure period. i.e., introduced queens remain in the test chambers for 7 days. At this time the contents of each chamber are expelled into a shallow laboratory pan and closely searched for the presence of live IFA alate queens.

Recording of data: Results of each bioassay are entered on the attached data form. Conclusions regarding efficacy and residual activity of the candidate treatments are drawn from this raw data.

Time estimates: The time required to conduct a bioassay will vary greatly, dependent upon a number of factors:

1) Availability of queens; supply is primarily influenced by season. More time will be

2) Number of treatments to be evaluated; e.g., if only a single treatment and an untreated check are to be evaluated only 40 queens/month are needed. Conversely, a test involving 4 insecticides at 3 rates of application (12 treatments + untreated check)

Duration of the trial: A successful preplant incorporated treatment for nursery potting soil must provide a minimum of 12-18 months residual activity in order to conform with normal agronomic practices of the nursery industry. Since some plants may be held for longer periods of time prior to sale, a 24-36 month certification period (residual activity) would be ideal. Therefore, most initial or preliminary trials with a given candidate treatment are scheduled for 18 months.