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ASSESSMENT OF FIRE ANT INFESTATION AT RANDOLPH AFB
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MEDICINE BROOKS AFB TX T H LILLIE ET AL JAN 88

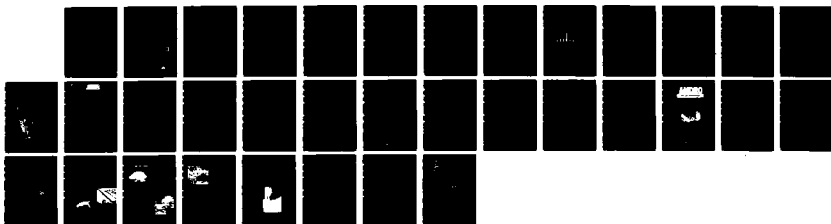
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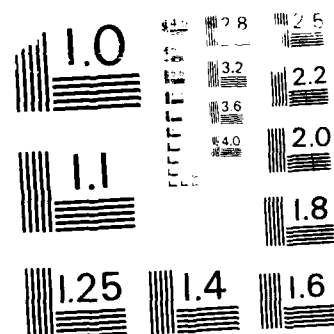
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NATIONAL BUREAU OF STANDARDS - 1963

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**ASSESSMENT OF FIRE ANT INFESTATION AT
RANDOLPH AFB, TEXAS, AND A PROPOSED
SELF-HELP CONTROL PROGRAM**

AD-A190 591

**Thomas H. Lillie, Major, USAF, BSC
Mary Hatfield, Master Sergeant, USAF**

January 1988

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Final Report for Period July 1986 - April 1987

Approved for public release; distribution is unlimited.

**USAF SCHOOL OF AEROSPACE MEDICINE
Human Systems Division (AFSC)
Brooks Air Force Base, TX 78235-5301**



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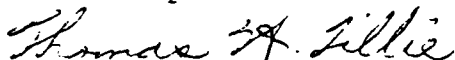
NOTICES

This final report was submitted by personnel of the Epidemiology Services Branch, Epidemiology Division, USAF School of Aerospace Medicine, Human Systems Division, AFSC, Brooks Air Force Base, Texas, under job order SUPTXXEK.

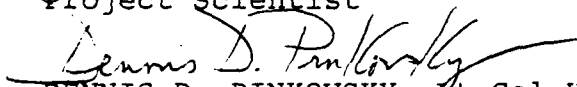
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The Office of Public Affairs has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.



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The imported fire ant infestation at Randolph AFB, TX was monitored from July 1986 to April 1987 to determine the density of fire ant mounds and the feasibility of a self-help control program. Lawns in enlisted and officer housing areas contained an average of 16 and 10 fire ant mounds per acre, respectively. Land near the Randolph AFB high school had 41 fire ant mounds per acre, and a sod farm for St. Augustine grass near the base stables had 126 fire ant mounds per acre. A self-help control program using Amdro insecticide is recommended for implementation in housing areas on Randolph AFB. Common areas such as boulevards, school grounds, and recreation areas should be treated each spring by personnel from the base pest control facility. St. Augustine grass grown near the stables should be treated with insecticide prior to transplanting in other parts of the base.				
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All other editions are obsolete

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**ASSESSMENT OF FIRE ANT INFESTATION
AT RANDOLPH AFB, TEXAS,
AND A PROPOSED SELF-HELP CONTROL PROGRAM¹**

INTRODUCTION

Many people have difficulty identifying imported fire ants or recognizing their mounds, but few will ever forget the pain and swelling that follow stings received during an attack. The unsuspecting victim usually disturbs a mound by accident, and thousands of ants come boiling out to defend the colony. Small children are particularly vulnerable because they are unable to escape quickly and remove the ants.

As the name implies, imported fire ants are not native to the United States. They were accidentally introduced into this country from South America in the late 1920s at Mobile, Alabama (3). The ants reproduced rapidly, and their spread in all directions was inadvertently aided by shipments of infested nursery plants. By the early 1950s imported fire ants were established in 10 states: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas (2). Since then, the infestation in Tennessee has been eradicated (4). Further spread of the pest was limited by oceans to the south and east, cold temperature to the north, and arid conditions to the west. Quarantines on movement of nursery stock imposed by government officials reduced the likelihood of accidentally introducing the imported fire ant into the Pacific states. The current distribution of the imported fire ant in the United States is presented in Figure 1.

People use the term "fire ant" to refer to most any ant that stings; however, only two types were imported into the United States: a black form (Solenopsis richteri) and a red form (Solenopsis invicta). The red form is the more widespread of the two. Both types live in underground colonies and build mounds on the surface when the soil is moist. At times the ants have so proliferated some areas that their mounds are an offensive sight as well as a medical hazard in lawns, parks, roadsides, and pastures. Colony densities as high as 600 mounds per acre may occur (4). The ants can also have an adverse economic impact when they infest agricultural areas and feed on corn, okra, soybean, and other crops (6).

¹ Mention of a proprietary product in this paper does not constitute an endorsement by the USAF or the Department of Defense. Amdro® and Combat® are registered trademarks of the American Cyanamid Company, Wayne, New Jersey 07470. Labels and technical information sheets have been reproduced with their permission.



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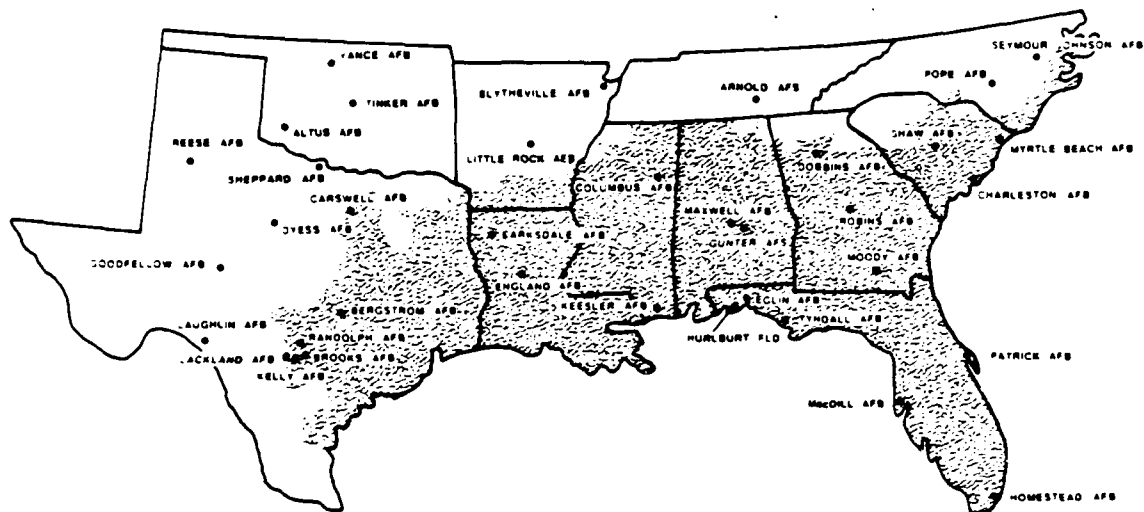


Figure 1. Location of USAF installations within the distribution of the imported fire ant (shaded area) in southeastern United States (4).

Fire ants are a common pest of medical importance on several USAF installations in the southeastern United States (Fig. 1). Occupants of base housing, grounds maintenance personnel, and individuals participating in outdoor recreation run the risk of being stung. For most people the reaction following a sting is mild, but secondary infection and additional complications can result if the victim receives multiple stings. Also, severe allergic reactions can cause anaphylaxis in approximately 0.61% of people who are stung (5). The fear of possible severe sting reaction is what leads many people to demand some form of imported fire ant control (1).

The USAF has managed the fire ant problem for many years by having base pest control personnel treat individual mounds with Amdro®. This is a costly procedure because of the labor involved; therefore, a self-help program was established for occupants of base housing to pick up Amdro® free of charge and perform their own treatment. The program failed because of the following drawbacks:

1. Careless occupants were stung while treating mounds.
2. There was a tendency for waste or overapplication because the smallest package on the market contained sufficient pesticide to treat 16 mounds.
3. Transferring the pesticide to smaller packages for distribution was labor intensive and a possible violation of the Federal Insecticide, Fungicide, and Rodenticide Act.

A new program was proposed when the makers of Amdro® began packaging the material (sold under the trade name Combat®) in 0.9-oz packets (Appendix A) for treating individual mounds to make treatment quicker and easier.

At the request of the USAF Engineering and Services Center (AFESC) we initiated a project to evaluate the imported fire ant infestation at Randolph AFB, TX, and to provide guidelines for base housing occupants to control the pest. Randolph AFB was selected because it has a history of fire ant infestation in residential and recreation areas.

PROCEDURES

In July 1986 we met with personnel from civil engineering and the base housing office at Randolph AFB to formulate procedures for assessing the extent of the fire ant problem. Implementation of a self-help control program was also discussed.

Pest control personnel currently treat individual mounds with Amdro® in response to reports from employees and housing occupants on the installation. The majority of requests to control fire ants are received from residents of officer housing. Housing occupants are also allowed to perform fire ant control at their own expense and at their own risk by using over-the-counter pesticides.

To assess the extent of the fire ant infestation, we randomly selected 40 lawns in the officer housing area and 10 lawns in the enlisted housing area. Two remote sites served as control plots (Appendix B). The front and back yards of single family dwellings and the front yards of multiple family dwellings were measured to calculate the density of mounds/acre in each lawn. For the remote sites, permanent landmarks were used as reference points for measuring a 100 X 150 ft area at each site. The number of mounds at each lawn and remote site was counted once a month from July 1986 to April 1987, except for February.

Occupants of base housing were allowed to use any pesticide registered by the US Environmental Protection Agency for use against fire ants on their lawn. Amdro® (0.9-oz packets) was made available without charge at the civil engineering self-help activity. Each occupant was allowed to pick up two packets of Amdro® per day when the program began. Self-help information was printed in the base newspaper and the base bulletin; anyone requesting fire ant control from pest control personnel was instructed to use the self-help program. Pesticide was not used on the remote sites throughout the project.

The objectives of the project were to determine the density of imported fire ant mounds on designated areas of the installation and to establish the amount of pesticide required to

manage a self-help control program. We were not interested in evaluating the effectiveness of one pesticide versus another.

RESULTS AND DISCUSSION

The fire ant infestation was assessed on 4.68 acres of Randolph AFB (Table 1). The majority of land (3.15 acres) was in the officer housing area while 0.85 and 0.68 acres were in enlisted housing and remote sites respectively. All homes in officer housing were single family dwellings; the combined area of the front and back yard lawns ranged from 1,938 to 6,499 ft². The landscape in the enlisted housing area had fewer trees than in officer housing, and the buildings were multiple family apartment dwellings with 2 to 4 apartments per building. The front lawns in the enlisted area ranged from 2,408 to 5,000 ft². The remote sites were located at opposite extremes of the base in areas without trees. One was about 200 yards from the base high school and the other was near the horse stables. The area near the horse stables was watered frequently because it served as a sod farm for St. Augustine grass which was used for landscaping other parts of the base.

TABLE 1. RED IMPORTED FIRE ANT INFESTATION AT 4 AREAS ON RANDOLPH AFB, TX

Location	Area (ft ²) surveyed	Acres surveyed	Mounds/acre (mean $\pm$ SD)	Mounds/acre (maximum)
Officer	137,073	3.15	10 $\pm$ 4.7	19
Enlisted	37,093	0.85	16 $\pm$ 15.3	53
School	15,000	0.34	41 $\pm$ 18.4	61
Stables	15,000	0.34	126 $\pm$ 37.4	174
OVERALL	204,166	4.68	48 $\pm$ 51.4	174

The red imported fire ant was the only type of imported fire ant observed in this study; the black form is not found in Texas (7). The heaviest infestation, 126 $\pm$ 37 mounds per acre (mean $\pm$ standard deviation), was recorded near the horse stables and a high of 174 mounds per acre was observed in that area in October (Fig. 2). The remote site near the school had 41 $\pm$ 18.4 mounds per acre and a high of 61 mounds per acre in November. These levels are lower than those found in soybean and corn fields

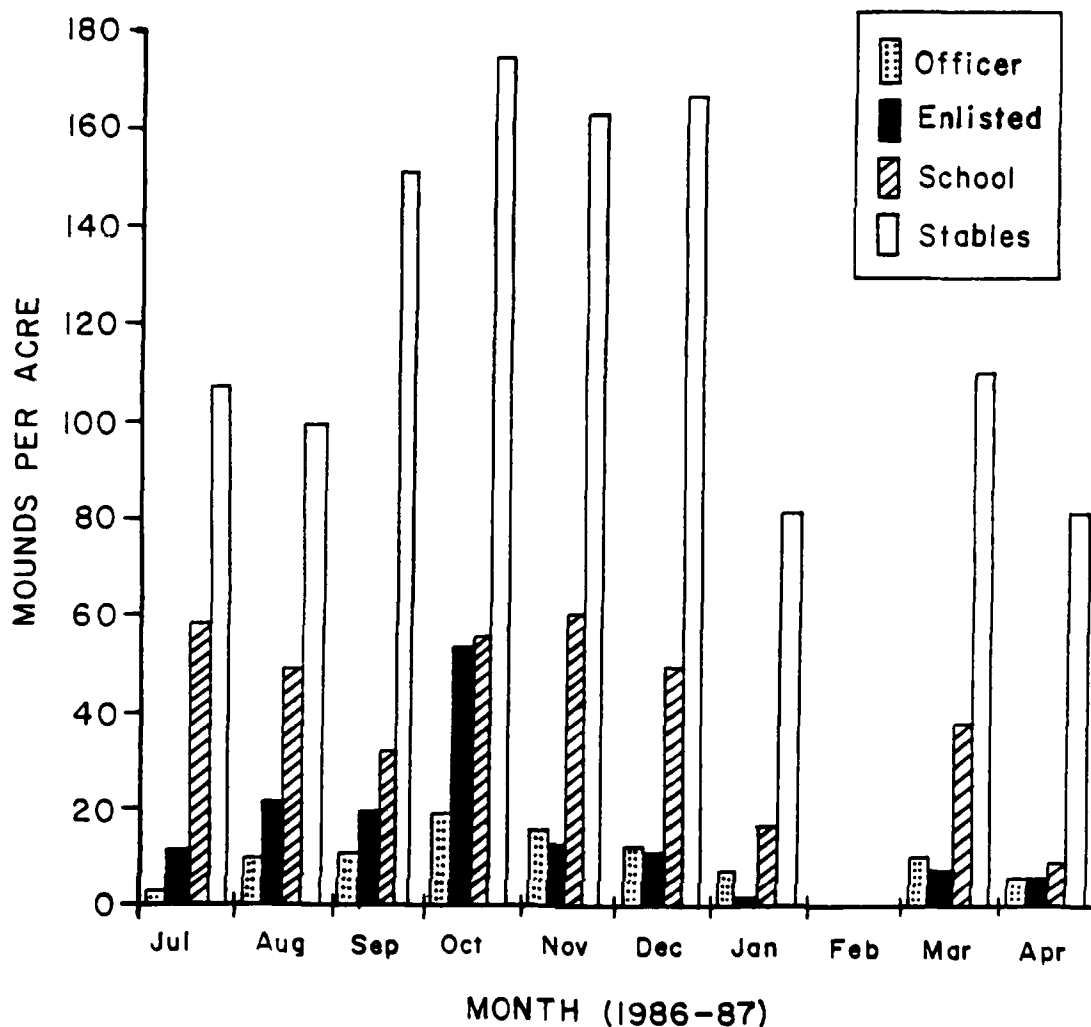


Figure 2. Number of imported fire ant mounds observed per month from July 1986 to April 1987 on 4 areas of Randolph AFB, TX (no survey in February 1987).

(250-300 mounds per acre) in Florida (1); however, they are significant because ants produced near the school and stables can infest other parts of Randolph AFB. Also, grounds maintenance workers can inadvertently transport fire ants with sod from the stables to lawns throughout the base.

Lawns in officer housing had fewer imported fire ant mounds than lawns in enlisted housing, contrary to what we expected based on preliminary information from personnel at base pest control. An average of 10 ± 4.7 mounds per acre was recorded in the officer housing area while 16 ± 15.3 mounds per acre occurred in the enlisted housing area (Table 1). Perhaps the work requests for fire ant control submitted by occupants of officer housing prior to our survey resulted in a reduction of the number of mounds. Another possible explanation is that occupants of single family dwellings are more likely to take better care of

their lawns as opposed to persons in multiple family dwellings who share responsibilities for lawn maintenance with other occupants of the same building.

A large increase was observed in the density of fire ant mounds in housing areas in October (Fig. 2); the increase prompted base pest control personnel to initiate a large-scale application program with bulk quantities of Amdro®. Such a measure was necessary because of the risk of fire ant stings. Application equipment was pulled through open areas with a tractor. Few lawns were treated in officer housing because the abundance of trees prevented effective use of the equipment. Most lawns in enlisted housing were treated. A decrease in the density of mounds in that area in November (Fig. 2) was probably caused by the application of pesticide by base pest control personnel. No pesticide was used on the remote sites during that time and little change occurred in the density of fire ant mounds. A sharp decrease in the density of mounds in all areas in January (Fig. 2) was probably not caused by pesticide, but by something else, possibly weather conditions.

Many housing occupants used the self-help activity as a source of Amdro®, but some complained about the 2 packet limit per day. This is an understandable complaint since some lawns had 10 to 16 mounds (Appendix B). The problem was resolved by increasing the limit to 4 packets per day, which was sufficient to accommodate most housing occupants; over 90% of the lawns had fewer than 4 mounds (Appendix B).

The self-help program to control fire ants should be continued; however, base officials should not rely on it as the sole control method. Base pest control personnel should use chemical control each spring on recreation areas, boulevards, and other open areas on Randolph AFB to prevent fire ants from developing there and spreading into lawns of the base housing area. Also, sod grown near the base stables should be treated to kill fire ants before the grass is transplanted. Control of fire ants in base housing areas should be the responsibility of each occupant. Individual packets of Amdro® (0.9-oz) are convenient for that purpose, but the manufacturer plans to discontinue the item because of poor demand. Base officials should consider switching to a 6-oz plastic bottle (Appendix C) and limiting occupants to three bottles per month. Each bottle will treat six fire ant mounds, which is sufficient for over 90% of the lawns surveyed during this study. An information sheet such as that used by the state of Florida (Appendix D) should be dispensed with the Amdro®.

RECOMMENDATIONS

1. HQ AFESC/DEMM

a. Expand the self-help program to control imported fire ants at all USAF bases within the range of the imported fire ant (Fig. 1).

b. Authorize use of 6-oz plastic bottles of Amdro® (Appendix C) for the self-help program to control imported fire ants.

c. Advise pest control personnel at USAF installations within the range of the imported fire ant to treat common areas (i.e., boulevards, school grounds, pastures, etc.) each spring.

d. Prepare an information sheet for release to housing occupants as part of the fire ant self-help control program.

2. Randolph AFB

a. Treat common areas (i.e., boulevards, school grounds, pastures, etc.) each spring to reduce the overall population of imported fire ants on the installation.

b. To prevent spreading imported fire ants, St. Augustine grass sod near stables should be treated with insecticide before it is transplanted.

c. Request approval from HQ AFESC/DEMM to continue using Amdro® as a self-help item to control imported fire ants.

ACKNOWLEDGMENTS

Lt Col Pinkovsky, Capt Goddard, Dr McHugh, SrA DuVall, and Amn VandeBerg assisted with monthly surveillance. We are grateful to Lt Col Palmer, Ms Erwin, Mr Doling, Ms Bailey, and the residents of base housing at Randolph AFB for their cooperation during this project. Capt Rogers, Defense Pest Management Information Analysis Center, provided reference material and a thorough critique of the technical report.

REFERENCES

1. Adams, C. T. Agricultural and medical impact of the imported fire ants, ch. 5, pp. 48-57. In C. S. Lofgren and R. K. Vander Meer (eds.). Fire ants and leaf-cutting ants. Boulder: Westview Press, Inc., 1986.
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APPENDIX A

TECHNICAL INFORMATION AND INSTRUCTIONS FOR
USING FIRE ANT INSECTICIDES

COMBAT[®] Fire Ant Killer

DIRECTIONS:

1. Using a pair of scissors, cut the packet along the dotted line and apply the entire contents of this packet uniformly around the base of the ant mound. Do not apply directly to the top of the mound and do not disturb the mound.
2. Avoid application during the heat of the day or if rain threatens.
3. For particularly large ant mounds containing *extreme numbers* of ants, it may be necessary to apply a second packet to the mound. Refer to the illustration on the back of the box to see if you have enough product coverage.

PRECAUTIONARY STATEMENTS:

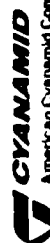
CAUTION: HAZARDS TO HUMANS: May be harmful if swallowed. Avoid contact with skin or eyes. Wash hands and scissors thoroughly after handling.

FIRST AID: If swallowed, drink one or two glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person. Get Medical Attention.

HAZARDS TO ANIMALS: This product may be an attractant to pets. Store in a secure place. Keep pets away from treated areas for at least 24 hours after application. COMBAT fire ant killer is not highly toxic and should not cause serious harm to pets if ingested.

ENVIRONMENTAL HAZARDS: This product is toxic to fish. Do not apply directly to lakes, ponds, or streams.

DISPOSAL: Do not reuse empty packets. Wrap packets and put in trash collection.



American Cyanamid Company ©
Household Products
Wayne, NJ 07470
10 10506

NET WT. 0.90Z.
EPA Reg. No. 1730-65
EPA Est. No. 37604-NY-01
75100000 46900

COMBAT[®] Fire Ant Killer



KILLS THE QUEEN AND
DESTROYS THE COLONY

Contents of this packet will treat 1 average size
(approximately 28 inches in diameter) fire ant mound.

NET WT. 0.90Z.

ACTIVE INGREDIENT: Hydramethylnon (tetrahydro 5,5-dimethyl 2,1,1-trifluoro-1,2,4-triazole-3-carbonylhydrazide) 99.12%
INERT INGREDIENTS: 0.88%



AMERICAN CYANAMID
WAYNE, NEW JERSEY 07470

AMDRO
fire ant insecticide

PAGE 1 OF 5

MATERIAL SAFETY DATA SHEET

MSDS NO. 2075-03
CAS NO. 067485-29-4
DATE: 09/30/86

EMERGENCY TELEPHONE: (201) 835-3100

**PRODUCT
IDENTIFICATION**

TRADE NAME: **AMDRO® Fire Ant Insecticide**

SYNONYMS: Hydramethylnon
Tetrahydro-5,5-dimethyl-2(1H)-
pyrimidinone [3-[4(trifluoromethyl)
phenyl]-1-[2-[4-(trifluoromethyl)
phenyl]ethenyl]-2-propenylidene]
hydrazone

CHEMICAL FAMILY: Amidinohydrazone

MOLECULAR FORMULA: $C_{25}H_{24}N_4F_6$

MOLECULAR WGT.: 494.5

**WARNING
STATEMENTS**

CAUTION.
KEEP OUT OF REACH OF CHILDREN.
MAY BE HARMFUL IF SWALLOWED.
AVOID ANY PROLONGED CONTACT TO SKIN OR EYES.

**HAZARDOUS
INGREDIENTS**

COMPONENT	CAS. NO.	%	TWA/CEILING
hydramethylnon	067485-29-4	1.02	1.4 mg/m ³ (TWA)

REFERENCE: Cyanamid PEL

**PHYSICAL
PROPERTIES**

APPEARANCE AND ODOR: Yellow-tan, free-flowing granules having an odor characteristic of vegetable oil.

BOILING POINT: Not applicable

MELTING POINT: Not applicable

VAPOR PRESSURE: Not applicable

BULK DENSITY: 15-24 lbs/ft³

VAPOR DENSITY: Not applicable

% VOLATILE (BY VOL.): Not applicable

OCTANOL/H₂O PARTITION COEF.: Not applicable

PH: Not applicable

SATURATION IN AIR (BY VOL.): Not applicable

EVAPORATION RATE: Not applicable

SOLUBILITY IN WATER: Insoluble

**FIRE AND
EXPLOSION
HAZARD
INFORMATION**

FLASH POINT:	Setaflash (c.cup) > 220°F
FLAMMABLE LIMITS	Not available
AUTOIGNITION TEMP.:	404±5°C
DECOMPOSITION TEMP:	Not available

FIRE EXTINGUISHING MEDIA:

Use water, foam, carbon dioxide, or dry chemical.

FIRE CONTROL TACTICS:

Avoid heavy hose streams; airborne dust may create an explosion hazard. Wear self-contained, positive pressure breathing apparatus. Keep unnecessary people away. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Control runoff water - if water enters drainage system, advise the authorities downstream.

**NFPA HAZARD
RATING**

Hazard rating not assigned by NFPA

REACTIVITY DATA**STABILITY:** STABLE**CONDITIONS TO AVOID:**

This product may develop rancidity on prolonged exposure to air.

POLYMERIZATION: N WILL NOT OCCUR**INCOMPATIBLE****MATERIALS:** Not available**HAZARDOUS
DECOMPOSITION
PRODUCTS:**

Thermal decomposition may produce hydrogen fluoride and oxides of carbon and nitrogen.

HEALTH HAZARD
INFORMATIONTOXICITY DATA AND
EFFECTS OF
OVEREXPOSURE:INGESTION TOXICITY:

The acute oral LD₅₀ in both male and female rats is > 5000 mg/kg indicating that this product is practically nontoxic by ingestion in single doses.

DERMAL TOXICITY:

The acute dermal LD₅₀ in both male and female rabbits is > 2000 mg/kg indicating this product is no more than slightly toxic by single skin applications. This product is mildly irritating to the rabbit skin but is not irritating to the rabbit eye.

EMERGENCY &
FIRST AID
PROCEDURES:IF ON SKIN:

Wash skin with plenty of soap and water. Get medical attention if irritation persists.

IF IN EYES:

Wash with plenty of water.

EXPOSURE**CONTROL METHODS** Avoid breathing dust. Wash thoroughly after handling.**SPILL OR LEAK
PROCEDURES**

Sweep up any spill and place in a closed container for disposal.

WASTE DISPOSAL:

Dispose in accord with local, state, and federal regulations.

**SPECIAL
PRECAUTIONS****HANDLING AND
STORAGE/OTHER:**

Maintain good housekeeping to control accumulation of dust.

Do not contaminate water, food, or feed by storage or disposal.

This product is toxic to fish. Do not apply directly to lakes, ponds, or streams. This product may be an attractant to pets and rodents. Store in a secure place. Keep pets away from treated areas for at least 24 hours after application.

STORAGE: STORE IN A COOL, DRY, SECURE PLACE AND KEEP CONTAINER TIGHTLY CLOSED. Amdro is formulated in an oil bait that functions as an attractant to ants. Prolonged exposure to air may turn oil rancid and reduce the attractiveness of the bait. USE WITHIN 3 MONTHS AFTER OPENING CONTAINER.

APPENDIX

AMDRO[®] FIRE ANT INSECTICIDE IS A REGISTERED TRADEMARK OF THE AMERICAN CYANAMID

SOURCE AND	SHEET NO.: 2075-03
DATE INFORMATION	DATE: 09/30/86

The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE.

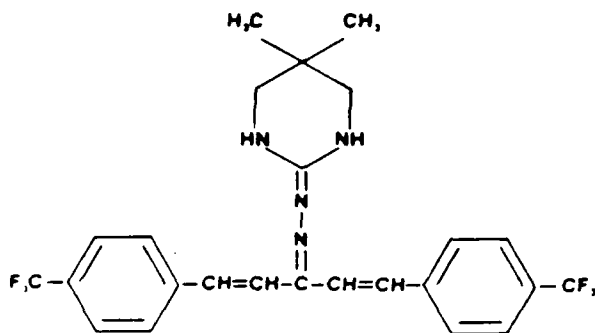
TECHNICAL INFORMATION

AMDRO[®] fire ant insecticide

INTRODUCTION: AMDRO® fire ant insecticide is an amidinohydrazone compound that is a slow-acting stomach insecticide. It is very active against imported fire ants, harvester ants, and Argentine and big-headed ants when fed in a bait at a rate of approximately 0.25 grams active ingredient per mound. Its rapid degradation in the environment and extremely low mammalian toxicity make it an ideal product for use in highly populated areas or in wide-area control programs.

GENERAL PROPERTIES

CHEMICAL NAME AND STRUCTURE: AMDRO fire ant insecticide is tetrahydro-5, 5-dimethyl-2-[1H-pyrimidin-2-yl]-1-[2,4-bis(trifluoromethyl)phenyl]ethenyl]-2-propenylidene hydrazine, represented by the structural formula:



EMPIRICAL FORMULA: $\text{N}_2\text{F}_2\text{O}_2\text{H}_2$

MOLECULAR WEIGHT: 494.5

COMMON NAME: Hydramethylnon

CHEMICAL AND PHYSICAL PROPERTIES: AMDRO technical fire ant insecticide is an odorless, yellow, crystalline solid with a melting point of 178-185 °C. The compound is insoluble in water and soluble in acetone, methanol, ethanol, isopropanol, and hot ethyl acetate.

FORMULATION: AMDECO is formulated as a 58% bait-attraiting soybean oil at 20%–30% w/w as the attractant for ants on a pre-gel, defatted corn grit carrier.

BEHAVIOR IN ENVIRONMENT: AMDRO degrades rapidly in sunlight with a half life of less than 24 hours. AMDRO does not leach in the soil and is degraded by soil microorganisms. It does not bioaccumulate in the environment as demonstrated by model ecosystem studies.

RESIDUES: AMDRO is not systemically taken up by grass and no residues are expected, except for the occasional granule that falls into the leaf axils. A temporary tolerance of 0.05 ppm for residues of AMDRO in or on forage grass has been granted by the EPA.

TOXICITY: AMDRO technical has an acute oral LD₅₀ of 1131 mg/kg to male rats and 1300 mg/kg to female rats. This is equivalent to an oral LD₅₀ of roughly 2 ounces of formulated AMDRO per pound body weight. It is poorly absorbed by mammals and greater than 95% is excreted unchanged in the feces. The dermal LD₅₀ to male and female rabbits is greater than 5000 mg/kg. AMDRO technical is irritating to the eyes of the male rabbits and is not irritating to the skin of the male rabbits. An AMDRO soybean oil concentrate is not irritating to the eyes or skin of the male rabbits. The Ames mutagenicity test indicates that AMDRO is non-mutagenic.

WILDLIFE: AMDRO technical is considered non-toxic to mallard duck and bobwhite quail. LD₅₀ in mallard duck, 2510 mg/kg; LD₅₀ in bobwhite quail, 1828 mg/kg. This compound is toxic to fish as determined under artificial laboratory conditions: 96-hour LC₅₀ to channel catfish, 0.10 mg/l; 96-hour LC₅₀ to bluegill sunfish, 0.227 mg/l; 96-hour LC₅₀ to rainbow trout, 0.16 mg/l. AMDRO is not expected to be toxic to fish in the natural environment because of its low solubility in water and rapid degradation in sunlight.

HANDLING: May be harmful if swallowed. If swallowed, drink one or two glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything to an unconscious person. Get medical attention. Wash thoroughly after handling. Do not contaminate food or feed products.

STORING. Store in a cool, dry place and keep the container tightly closed. Do not store near heat or flammable products.



Agricultural Division

10/10/1941

APPENDIX B

RESULTS OF IMPORTED FIRE ANT SURVEY
AT RANDOLPH AFB, TEXAS

OFFICER HOUSING			FIRE ANT MOUNDS COUNTED ON EACH DATE 1986-87									
Hs. No.	Type	Sq. ft.	3 Jul	8 Aug	17 Sep	24 Oct	21 Nov	19 Dec	26 Jan	11 Mar	17 Apr	
314	Off	3267	0	1	0	0	0	1	0	0	0	
345	Off	3381	1	0	2	0	0	0	0	0	0	
326	Off	6499	1	0	1	3	2	3	2	1	1	
331	Off	3608	0	2	2	3	3	1	2	2	1	
341	Off	3242	0	1	1	0	1	0	0	0	1	
344	Off	4974	1	2	3	13	16	10	10	13	5	
327	Off	3214	0	0	0	1	1	0	1	1	0	
363	Off	2814	0	0	0	2	1	1	0	0	0	
370	Off	3936	0	0	0	2	0	1	0	0	0	
383	Off	1938	0	0	0	0	0	0	0	0	0	
400	Off	5415	0	1	1	1	0	0	0	0	0	
401	Off	3422	0	0	0	0	2	0	0	0	0	
410	Off	3564	0	0	0	1	1	0	0	0	0	
411	Off	4823	1	0	0	0	2	0	0	0	1	
416	Off	2501	0	2	1	2	5	2	1	0	0	
428	Off	4284	0	1	2	2	0	1	1	1	0	
448	Off	3108	0	2	3	2	1	1	1	1	0	
463	Off	4160	1	0	2	2	2	1	1	2	2	
474	Off	3132	0	10	5	6	3	4	0	2	0	
512	Off	4472	2	2	1	3	4	5	1	5	1	
518	Off	3675	0	0	0	1	0	0	0	0	0	
522	Off	2378	1	0	1	0	0	0	0	0	0	
545	Off	3518	1	0	4	3	1	2	2	0	1	
554	Off	3021	0	1	0	0	0	1	1	1	0	
560	Off	3016	0	0	2	0	0	1	1	0	0	
602	Off	3795	0	0	0	0	0	0	0	0	0	
610	Off	2958	0	0	0	1	0	0	0	0	0	
612	Off	2691	0	0	0	1	0	0	0	0	1	
626	Off	4161	0	0	0	1	1	0	0	0	2	
635	Off	2550	0	0	1	0	1	1	0	1	0	
639	Off	4275	0	0	0	2	1	0	0	0	0	
660	Off	2829	0	2	0	2	0	0	0	0	0	
692	Off	1952	0	2	1	0	0	0	0	0	1	
702	Off	3000	0	0	0	0	0	0	0	0	0	
707	Off	2900	0	1	0	0	1	0	0	0	0	
806	Off	2900	0	0	0	0	1	0	0	0	0	
913	Off	3000	1	0	2	5	0	1	0	1	2	
928	Off	3000	1	1	1	0	0	1	0	0	0	
911	Off	2850	1	0	0	0	0	0	0	0	0	
910	Off	2850	0	0	0	0	0	0	0	1	0	
TOTAL	Off	107713	10	11	16	59	60	38	14	12	6	
Acres	Off	24.7										
Mounds/Acre	Off		1.18	1.05	1.14	1.675	1.666	1.222	1.05	1.11	0.6	

ENLISTED HOUSING			FIRE ANT MOUNDS COUNTED ON EACH DATE 1986-87								
Hs. No.	Type	Sq. ft.	3 Jul	8 Aug	17 Sep	24 Oct	21 Nov	19 Dec	26 Jan	11 Mar	17 Apr
2008	Enl	4914	1	3	3	3	1	2	0	2	0
2035	Enl	3900	4	2	1	4	1	1	0	1	0
2082	Enl	2816	2	4	0	3	1	1	0	0	0
2114	Enl	3850	1	6	8	7	1	1	0	1	2
2122	Enl	2408	0	1	0	1	0	0	0	0	0
2138	Enl	3939	0	0	1	13	3	1	0	1	1
2144	Enl	3535	1	2	4	3	1	2	0	0	2
2156	Enl	5000	0	0	0	7	2	0	0	0	0
2187	Enl	3131	0	0	0	1	0	1	0	1	0
2199	Enl	3600	1	1	0	3	1	0	1	0	0
TOTAL	Enl	37093	10	19	17	45	11	9	1	6	5
Acres	Enl	0.85									
Mounds/Acre	Enl		11.74	22.31	19.96	52.85	12.92	10.57	1.17	7.05	5.87

REMOTE SITES			FIRE ANT MOUNDS COUNTED ON EACH DATE 1986-87								
Location	Type	Sq. ft.	3 Jul	8 Aug	17 Sep	24 Oct	21 Nov	19 Dec	26 Jan	11 Mar	17 Apr
School	Rem	15000	20	17	11	19	21	17	6	13	3
Stables	Rem	15000	37	34	52	60	56	57	28	38	28
TOTAL	Rem	30000	57	51	63	79	77	74	34	51	31
Acres	Rem	0.69									
Mounds/Acre	Rem		82.76	74.05	91.48	114.71	111.80	107.45	49.37	74.05	45.01

APPENDIX C

INSTRUCTIONS FOR USING PLASTIC BOTTLE
OF FIRE ANT INSECTICIDE

AMDRO

fire ant insecticide

Active Ingredient:

Tetrahydro-5,5-dimethyl-2(1H)-pyrimidinone	
(3-[4-(trifluoromethyl)phenyl]-1-(2-[4-(trifluoromethyl)phenyl]-	By wt.
ethenyl)-2-propenylidene)hydrazine	0.88%
Inert Ingredients	99.12%
Total	100.00%

SPECIMEN



Keep Out of Reach of Children

CAUTION

See Back Panel for Other Cautions

EPA Reg. No. 241-260

EPA Est. No. 5905-AR-1

AMDRO is a registered trademark of American Cyanamid Company.

In case of an emergency endangering life or property involving this product, call collect, day or night, Area Code 201-835-3100.

Net Wt.: 6 OZ.

Product Code 24564-09 D-42

CYANAMID
American Cyanamid Company
200 Madison Avenue
New York, N.Y. 10017

READ ENTIRE LABEL. DO NOT USE THIS PRODUCT FOR ANY USES OTHER THAN THOSE SPECIFIED ON THIS LABEL. OBSERVE ALL PRECAUTIONARY STATEMENTS AND DIRECTIONS ON LABEL BEFORE USE. It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

DIRECTIONS

AMDRO is for use in lawns, turf, pasture, range grass and nonagricultural lands.

Treatment	Rate	Comments
Individual mound treatment: fire ants harvester ants	5 level tablespoons	Distribute bait uniformly around the base of the mound. Do not disturb ant mounds. Do not apply directly to the top of the mound. Do not apply more than 1.5 lbs of bait per acre. Do not contaminate kitchen utensils by use or storage.
Broadcast treatment: fire ants harvester ants	$\frac{1}{4}$ - $\frac{1}{3}$ lb/10,000 square feet 1-1 $\frac{1}{2}$ lb/acre	Broadcast bait uniformly with ground equipment (spinning disk types)

NOTE: Do not use on vegetable or other food crops.

Apply when ants are active (typically when soil temperature is greater than 60°F).

AMDRO is a bait which is highly attractive to fire ants and harvester ants. It works by becoming part of the ant food chain. Worker ants will find the **AMDRO** bait, carry it back to the mound and pass it along to the queen and the other ants in the mound.

An effective ant insecticide must be slow acting so that it can be passed by the workers throughout the ant mound and eventually to the queen. **AMDRO** is a slow acting insecticide and is especially effective against the queen. Typically, in 1-4 weeks the queen and a number of ants are killed. Within 2-8 weeks, a visible reduction in mound activity is observed. Very large mounds may continue to be active for a period of time even though the queen is dead and no young are being produced. Retreatment may be desirable under these circumstances.

Further information regarding ants may be obtained from your Cooperative Agricultural Extension Service.

Precautionary Statements

Hazards to Humans: May be harmful if swallowed. Avoid any prolonged contact to skin or eyes. Wash thoroughly after handling.

FIRST AID: If swallowed, drink one or two glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person. Get medical attention.

Hazards to Animals: This product may be an attractant to pets and rodents. Store in a secure place. Keep pets away from treated areas for at least 24 hours after application.

Environmental Hazards: This product is toxic to fish. Do not apply directly to lakes, ponds or streams.

Storage and Disposal

Storage: STORE IN A COOL DRY SECURE PLACE AND KEEP CONTAINER TIGHTLY CLOSED. **AMDRO** is formulated in and on bait that functions as an attractant to ants. Prolonged exposure to air may turn brittle and reduce the attractiveness of the bait. USE WITHIN 3 MONTHS AFTER OPENING.

Disposal: Do not reuse empty container. Wrap container and put in trash collection.

DISCLAIMER: American Cyanamid Company warrants only that the material contained herein conforms to the chemical description on the label and is reasonably fit for the use therein described when used in accordance with the directions for use. American Cyanamid Company makes no other express or implied warranty, including any other express or implied warranty of FITNESS or of MERCHANTABILITY.

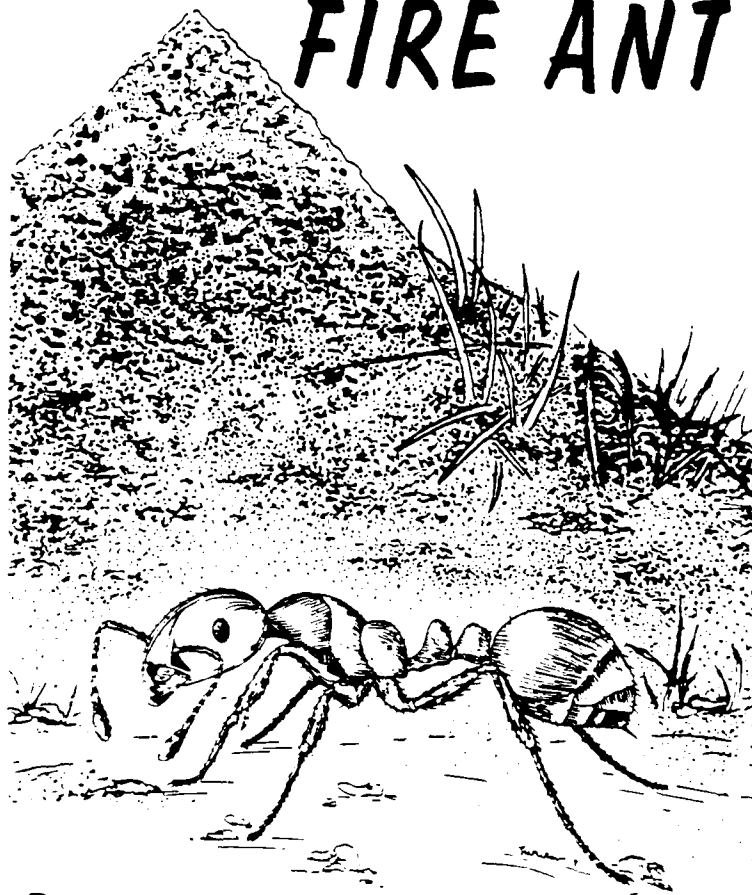
APPENDIX D

INFORMATION SHEETS ABOUT IMPORTED FIRE ANTS
AND USE OF INSECTICIDE

**Florida Department of Agriculture
and Consumer Services**

Doyle Conner, Commissioner

IMPORTED FIRE ANT



Leaflet No. 1 (Revised) May 1983
Division of Plant Industry
Post Office Box 1269
Gainesville, Florida 32602

THE IMPORTED FIRE ANT

J. C. Everett Nickerson

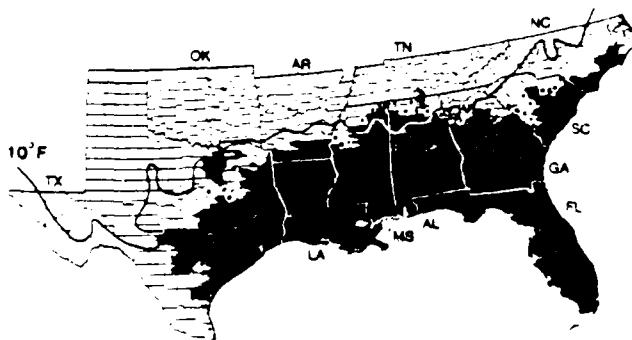
The imported fire ant, *Solenopsis invicta* Buren, is considered a general nuisance pest in Florida. This ant causes personal discomfort and economic loss to property of urban, suburban, and rural inhabitants. Maintenance of property infested with fire ants is difficult in both agricultural and residential areas.

Origin and Spread

A native of Brazil, the fire ant was introduced into the United States at Mobile, Alabama in the early 1930s. The initial spread was slow, but as local populations increased, the rate of spread accelerated.

In 1950, only small portions of Mississippi, Alabama, and Florida were affected; however, by 1960, approximately 50% of the land area in Louisiana and Mississippi, small areas in Texas and Georgia, and approximately 5,000,000 acres in north and central Florida were infested.

Today, the imported fire ant is well established in 9 states: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Texas. Northward expansion of the imported fire ant apparently is limited by low temperature as the ant has not become successfully established very far above a line delimiting average minimum temperatures of 10°F.



FA infestations in the U.S.

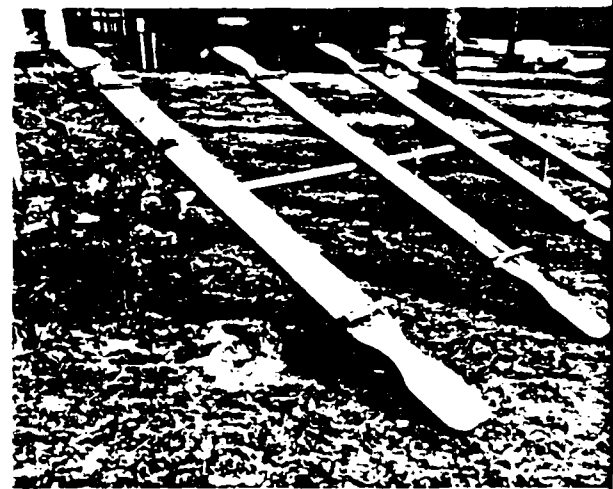
All or portions of Florida's 67 counties are now infested. Some areas within the more recently infested counties may presently have very low or zero populations. Experience in similar situations indicates that, as

developing colonies mature and new queens become successfully established, suitable habitats within these areas will be inundated by the imported fire ants.

Rural Problems

The economic importance of the imported fire ant is difficult to assess. Whereas most insects that are harmful to agriculture physically attack crops or a specific crop, the impact of this ant is due primarily to its stinging man or animals and the presence of mounds.

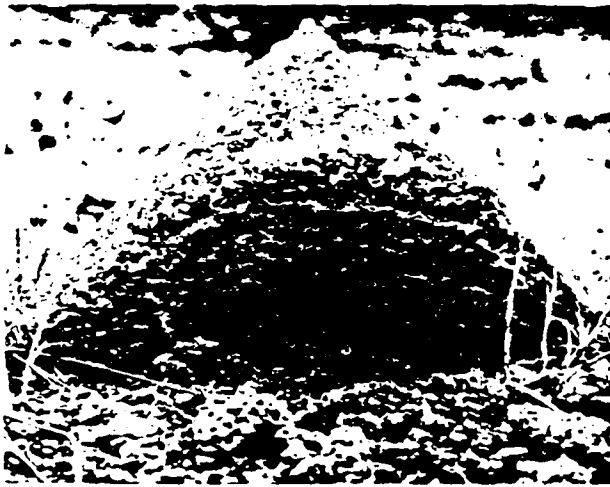
The imported fire ant is troublesome to all horticultural and agronomic crops. Both cultivation and harvesting are made difficult due to the discomfort of ant stings to field workers as well as damage to equipment that strikes mounds. The ant is particularly troublesome to workers harvesting hay, rebuilding or repairing fences and working around farm buildings. Reports of harm to farm animals are common. The ants also feed on some plants, particularly young plants and germinating seeds.



Playground

Urban Problems

In urban areas, the imported fire ant is a stinging pest to users of school grounds, recreational areas, and other public or private properties. In addition, the mounds of imported fire ant are a nuisance to urban and suburban dwellers. These mounds detract from the appearance of property and make the landscape difficult to maintain.



Mound Cross Section showing Tunneling

Medical Problems

The sting of the imported fire ant results in a characteristic pustule that forms within 24 hours. These pustules can swell and are prone to infection by bacteria, resulting in diseases such as impetigo. Persons with hardening of the arteries, varicose veins, and diabetes should be very cautious about secondary infections resulting from fire ant stings. Normally, infection can be avoided by washing the stung area with soap and water and not breaking the skin by scratching. Allergic individuals may exhibit symptoms ranging from a simple rash to swelling, paralysis, or anaphylactic shock with death resulting in a few rare instances. Tests have been developed to determine hypersensitivity to the fire ant venom. It is recommended that anyone experiencing allergic symptoms after being stung by the imported fire ant consult a physician.

Life Cycle and Biology

After mating, it takes approximately 30 days for the fertile queen to produce the first workers. At about 120 days, a developing colony can produce sexual adults for mating flights. In Florida, mating flights may occur every month of the year. Fire ant queens may, under normal conditions, fly for 12 or more miles during a mating flight.

Fire ants mate in flight. After mating the queen sheds her wings, digs a cell in the ground, caps the cell with soil, and then deposits the eggs for the

first brood. During this period, she does not leave the cell to hunt food but survives by assimilation of food deposits stored in her body. After the first brood develops to new adult workers, the first workers open the cell and begin foraging for food. The queen is then fed by the workers. This feeding process continues for the rest of her life. The adults do not "eat" solid food, rather they are able to consume only liquid food.

Imported fire ant workers range in size from 1/8 to almost 1/4 inch. The workers are classified for convenience as majors (largest), minors (mid-size), and minims (smallest). The queen is approximately 5/16 inch long. The workers and queen are reddish-brown to dark-brown and the males are jet black.

The most visible features of the fire ants are their mounds. The general shape and height of a mound will vary according to soil type. In heavy soils, the ants construct 8 inch to 3 foot tall hardpacked mounds with a diameter of up to 4 feet. In loose, sandy soil, the mounds are not as tall and may be larger in diameter. During the rainy season and in areas with high water tables, the ants build higher mounds to escape saturated soil. During winter months, the mounds are built higher and are more exposed to the sun.

Not all ant mounds are constructed by imported fire ants. For example, the mounds most commonly found in pastures, yards, and other open areas throughout



Mound in Highway Median



Ants building a mound in water meter box.

Florida are about 4 inches in diameter and are cone-shaped. These mounds are constructed by the harmless pyramid ant which does not have a sting. The native fire ant, *Solenopsis geminata* Fabricius, is prevalent in peninsular Florida and builds a relatively smaller and flatter mound than the mound built by the imported fire ant.

Workers from a mature or nearly mature colony forage for food over a wide area. Single foraging routes have been traced for distances of over 100 feet from a mound. Characteristically, imported fire ants often construct underground tunnels that lead to one or more sources of food. Most often, these tunnels can be traced easily from the parent mound to the food source by telltale signs of disturbed soil on the ground surface.

Typically, when a fire ant mound is disturbed, the entire colony may relocate and construct a new mound. This phenomenon has led to the erroneous conclusion that ants in the old ant mound had been killed by some treatment.

Investigations

Now an extensive program is in progress to evaluate the imported fire ant and its control measures. Candidate materials are being tested and evaluated. Candidate materials are further evaluated, not only for their insecticidal value, but also for their impact on other organisms and the environment.

State and federal agencies are conducting biological studies on the life cycle and biology of the imported fire ant. Searches for the natural enemies, predators, parasites, and pathogens of the fire ant are being conducted in the Brazilian homeland of the ant. At the same time, research projects on the interactions of the fire ant with native organisms and environmental factors are being conducted within the interstate area of the United States.

Quarantine

In trying to regulate the movement of the imported fire ant, quarantine zones are established by mutual agreement between federal and state agricultural officials. There are no restrictions on movement of regulated articles within this state, however, interstate movement from Florida of nursery stock, soil, hay, and used equipment may be restricted because of the fire ant. Regulations in this regard may be obtained from any local office of the Florida Department of Agriculture and Consumer Services, Division of Plant Industry, or from the United States Department of Agriculture (USDA).

Control

At present, chemical control of the imported fire ant is primarily based on contact poisons and baits. Drenches, used as contact poisons, may be formulated from one of several insecticides, however, all of these are used in much the same manner. These materials are intended to be diluted with water and applied directly to a mound. Effectiveness may be increased if applications are timed properly. Applications are best made when the workers, brood, and the queen are concentrated in the upper portion of the mound. This concentration of the colony usually occurs in the morning soon after the sun strikes the mound and in the wintertime.

Other types of contact poisons are being tested as formulations that may be either applied to the mound or broadcast over an area.

Baits are a highly effective means of controlling the fire ant. Materials are being tested and evaluated in the process of a pending approval for use. They are basically the same action. Most of the active ingredients in baits are carried in a sweetener, oil, attractant, or an intoxicant material as carrier. These materials are

level of toxicity and are fed by workers to the queen. No visible effects of mortality should be expected for 2 or more weeks following application. In fact, some colonies may linger for extreme periods, sometimes up to 6 months after application, as it may take this long for all individuals in the colony to die of old age.

The timing of application is very important with baits. The greatest foraging activity of fire ants occurs at surface soil temperatures between 60 and 90°F; thus, these materials should not be applied under conditions of lower or higher temperatures as much of the material will not be picked up before it is broken down into ineffective compounds. Also, application should not be made prior to a rain or during a heavy dew.

Reinfestation

Reinfestation of treated areas from adjoining non-treated areas and by fly-in from distant untreated areas can occur quickly, because no residual control remains after treatment with any of the federal or state approved pesticides.



FIGURE 1. Fire ant control.

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DOYLE CONNER COMMISSIONER

FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES

• DIVISION OF PLANT INDUSTRY DOYLE CONNER BUILDING 191 S.W. 34TH STREET

• POST OFFICE BOX 1269 GAINESVILLE 32602 TELEPHONE 904-372-3505

AMDRO FOR FIRE ANT CONTROL

The Imported Fire Ant (IFA) is a nuisance to man. The ant damages some crops; it can interfere with cultivation and harvesting of many crops; it is a threat to man's health, and may injure, maim or kill domesticated animals and wildlife.

The IFA was first discovered in Florida near Pensacola in 1948. During the intervening 33 years, the ant has spread throughout Florida to infest portions of all 67 Florida counties. Resistance to the IFA invasion by natural predators and the IFA's preference for certain type habitats are important factors in the time necessary for the establishment of IFA populations on a given piece of land. Populations in old infested areas may range from no colonies to over 100 per acre, averaging less than 20 colonies per acre.

The Florida Department of Agriculture and Consumer Services, Division of Plant Industry, and the USDA, APHIS, have entered into a 50/50 cooperative program designed to give temporary control of the IFA. This program makes Amdro Fire Ant Bait available at a relatively low cost. The state charges the user the actual cost to the state related to the purchase of Amdro and the cost of distribution of the material.

This money is deposited in a trust fund for continued refunding of the program, pending the Legislature's permission to use the funds.

Amdro Fire Ant Bait: This bait was developed for use in controlling the IFA, Solenopsis invicta; however, it also controls the native fire ant, Solenopsis geminata. Amdro has the following characteristics:

1. Slow acting: An important characteristic of bait insecticides for the IFA is that they be slow acting. A fast acting insecticide will kill the individual ants that it contacts, but the colony escapes. Treated colonies may be expected to show effects in a few days; however, complete kill may take 2 months.
2. No residual: To prevent possible environmental damage, Amdro is designed to breakdown upon exposure to sunlight for approximately 12 hours. For this reason, no residual effect may be expected.

3. Rancidity: Amdro contains soybean oil, which is used as a feeding attractant. Soybean oil may become rancid under moist conditions, and IFA will not feed on rancid bait. For this reason, the bait should be stored in a dry place in an airtight container. Under proper conditions, the bait can be stored for 1 year or more.
4. Reinfestation: The IFA queen is capable of flying 12 miles or more. For this reason, reinfestation will occur regardless of treatment of neighboring properties. As previously stated, Amdro has no residual effect. As with all the present registered IFA control insecticides, when used as directed, reinfestation of a treated property may occur within a few weeks. Thus one must expect to retreat as needed to maintain the desired level of control.

Application of Amdro:

1. Weather conditions for application:
 - a. The IFA feeds when soil temperatures are above 60°F and below 80°F. During cool weather, they feed during the warm part of the day, and in summer, generally at night and in the early morning.
 - b. The carrier used in Amdro is defatted corn. When wet, it assumes the consistency of cooked grits. Try to apply when no rain is expected.
2. When to apply:
 - a. During warm or hot periods of the year, apply in the late afternoon.
 - b. During fall and winter, apply in the morning. Avoid application on frosty days or cold, cloudy days.
3. Application methods and amounts:
 - a. Broadcast: Amdro may be broadcast by aircraft or by ground equipment at the rate of 1-1½ pounds per acre.
 - b. Mound treatment: Scatter 2-5 tablespoons of Amdro in the area of the mound, but not necessarily on the mound itself. Do not dig into the mound.

Amounts Needed:

<u>Size of Property</u>	<u>Amount</u>	
City Lot (Approx. ¼ acre)	1 pound	1½ years or more
1 acre	1 pound	1 year (plus)

REB/ml1

Prepared by:

Ralph E. Brown
February 10, 1982

END

DATE

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