Special Technology Development Program
New Project Proposal

PROJECT NUMBER: R08-2001-02

PROJECT TITLE: Nantucket Pine Tip Moth Phenology and Timing of Insecticide Applications in Arkansas, Louisiana, and Texas.

PROJECT STATUS: New

EXPECTED PROJECT DURATION: 2 yrs

EXPECTED COMPLETION DATE OF THE PROJECT: 2002

SUBJECT: Biological Control___ Invasive Species___ Methyl Bromide Alternatives___ Models _1_ Monitoring_2_ Organism Biology _2_ Pesticides: Microbial _2_ Pesticides: Synthetic _1_ PTIPS___ Population___ Risk and Hazard___ Remote Sensing___ Semiochemicals___ Silvicultural Technology _1_ Social Values___ Spray Technology___ Other_____

STATUS OF SUBJECT SPECIES: Native

PROJECT OBJECTIVES: To provide a more effective, economically viable and ecologically compatible means for controlling tip moth infestations than currently exists in the Western Gulf region. Specifically, to model tip moth phenology and predict optimal spray periods throughout the region and provide prediction dates to forest managers in a concise, easily used format.

BRIEF DESCRIPTION OF PROJECT:

1st year: 1) Acquire necessary data from NOAA database.

2) Calculate predicted spray dates using NOAA database and degree-day model.

3) Initiate model validation at selected field sites.

2nd year: 1) Completion of model validation.

2) Complete manuscript preparation.

3) Initiate technology transfer.

FHP LEAD CONTACT:

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PRINCIPAL INVESTIGATORS:

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COOPERATORS:

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax
Donald M. Grosman	Texas Forest Service	(409) 639-8170 (p) (409) 639-8175 (f) d.grosman@inu.net

COOPERATOR INVOLVEMENT:

Name	Role	Time Commitment
Donald M. Grosman	-Provide validation field sites -Help in model validation -Help transfer technology to forest managers through WGFPMC	4 weeks per year

JUSTIFICATION: Insecticides provide effective control of tip moth, but timing is critical to achieve maximum efficacy (Nowak et al. 2000). Degree-day models have been developed to facilitate spray timing (Gargiullo et al. 1983, Fettig et al. 1998), but require a detailed knowledge of moth biology, pheromone trap deployment, degree-day calculations, and the ability to acquire temperatures at or near each field site. These models are often costly and labor intensive to use, and therefore have received little use by resource professionals. The current project would allow resource managers to accurately time insecticide applications by simply referencing a publication. This method would provide adequate control with a reduction in costs, application frequency, and environmental impact.

URGENCY: Not urgent

NATIONAL FHP TECHNOLOGY DEVELOPMENT PRIORITY:

Priority 1: ___ Priority 2: ✓ Priority 3: __ Priority 4: __

TECHNICAL COMMITTEE DEVELOPMENT PRIORITY:

Priority 1: __ Priority 2: __ Priority 3: __ Priority 4: __

Priority 5: __ Priority 6: __ Priority 7: __ Priority 8: __

SCOPE OF APPLICATION: The results would be applicable to Arkansas, Louisiana, and Texas. After consulting with members of the Western Gulf Forest Pest Management Cooperative and its representatives, we anticipate wide-spread use of the model after validation in the region.

RESEARCH BASIS: A similar system was recently developed for the southeastern USA (Fettig et al. 2000), and is currently being used operationally. In this study, nearly 80 % of the field validation dates were within 5 days of the predicted spray period. In a separate study, Nowak et al. (2000) found that all field determined optimal dates were within 9 days of the predicted dates.

METHODS: Mean daily maximum and minimum temperatures will be obtained from weather stations that will be chosen to provide a complete description of the macroclimate for each state. The annual number of degree-days accumulated will be used to determine the number of Nantucket pine tip moth generations per year for each location and the corresponding optimum spray periods. To test the validity of spray period predictions, the predictions will be compared to actual spray dates determined at several field sites in the three states by monitoring moth flight with pheromone-baited sticky traps and accumulating degree-day totals with biophenometers.

MEASURES OF SUCCESS:

Standard of Success: Actual spray dates for each location match predicted dates closely enough that optimum tip moth control will be achieved.

Expected Outcomes: If the model-predicted spray dates are closely adhered to, optimum or near optimum control for each tip moth generation and each location should be achieved. Nowak et al. (2000) demonstrated that the time window for optimal control is about 12 days for the first generation and 7 days for subsequent generations.

Implementation of Products/methods: Distribution of publication reprints.

PRODUCTS AND DUE DATES:N/A

PUBLICATIONS: USDA Forest Service Research Paper, same format as Fettig et al. (2000).

TECHNOLOGY TRANSFER: The methodology will be transferred to resource professionals by traditional and web-based formats. Traditional methods will include publication in a peer reviewed journal and through the Western Gulf Forest Pest Management Cooperative and the University of Georgia Pine Tip Moth Research Consortium.

LONG-TERM BUDGET REQUEST:

	Item	**Requested FHP STDP Funding**	**Other-Source Funding**	**Source**
FIRST YEAR				
Administration	Salary	$6500	$1500	UGA
	Staff Benefits	$1950	$390	UGA
	Overhead			
	Travel	$3000		
Procurements	Contracting			
	Equipment			
	Student Labor	$2500		
	Supplies	$3000		
Year Totals		$16950	$1890	
SECOND YEAR				

Administration	Salary	$6500	$1500	UGA
	Staff Benefits	$1950	$390	UGA
	Overhead			
	Travel	$5000		
Procurements	Contracting			
	Student Labor	$2500		
	Equipment			
	Supplies	$2000		
Year Totals		$17950	$1890	
PROJECT TOTALS		$34900	$3780	

STDP PRODUCTION FUNCTION

PROJECT NUMBER: FHP-STDP-R8-2001-02

PROJECT OBJECTIVE:

The objective of this work is to extend previously-developed technology on timing of pine tip moth control into the Western Gulf States. A spray timing model has been developed and made available for the southern states east of Mississippi which utilizes a degree-day model and long-term temperature averages from a large number of weather stations. Anyone who wishes to precisely time tip moth control can simply "look up" the station nearest to their area and find recommended spray dates for each tip moth generation. Currently any chemical control timing in the western gulf area is mostly guesswork or localized application times have been developed by trial and error. Therefore, the degree of tip moth control is highly variable. For example, control with permethrin (Pounce formulation) is optimum only during about a 10 day period and efficacy decreases dramatically if the application falls outside the "window". Efficacy frequently decreases by 20-80%.

The use of appropriate timing should provide generally good control and increase pine growth where chemical control is used.

ASSUMPTIONS:

Chemical control of pine tip moth will be improved by use of the spray timing models developed from historical temperature data.
Treatment costs will be the same with or without the model.
Benefits from treatments will accrue for 18 years (rotation age)
Two percent of the available acreage will be treated using optimum spray timing

BACKGROUND DATA:

Stem volume of trees treated twice with timed sprays will increase 5% over those with untimed applications, producing an additional 0.5 tons of fiber/acre/year
The annual increase in volume will be maintained through rotation (18 years)
Treatment costs will be $15.00/acre for both timed and untimed sprays

There are ca. 900,000 acres of 1 and 2 year old loblolly pine plantations in the South each year under intensive management (250, 000 in the western gulf area)

EXPENDITURE AND VALUES (EOV) WITHOUT PROJECT:
EOV without project = $0 from increased fiber production

EXPENDITURE AND OUTPUT VALUES WITH PROJECT:
EOV with project = 0.5 additional tons/ac/yr. x $15.00/ton x 5,000 ac = $750,000 discounted to $721,153 - 0 (spray timing does not increase application costs)

BENEFIT ATTRIBUTABLE TO PROJECT:
$721,153 - 0 = $721,153

BENEFIT/COST RATIO:
$721,153/38,680 = 18.64

BENEFIT ATTRIBUTABLE TO STDP:
$34,900 X 18.64 = $650,536

PNV OF PROJECT:
$721,153 - 38,680 = 682,473

PNV OF STDP:
$721,153 - $34,900 = 686,253

LITERATURE CITED

Fettig, C. J.; Berisford, C. W.; Dalusky, M. J. 1988. Revision of a timing model for chemical control of the Nantucket pine tip moth (Lepidoptera: Tortricidae) in the southeastern coastal plain. Journal of Entomological Science 33: 336-342.

Fettig, C. J.; Dalusky, M. J.; Berisford, C. W. 2000. Nantucket pine tip moth phenology and timing of insecticide spray applications in seven Southeastern States. Res. Pap. SRS-18. Asheville, NC: U. S. Dept. of Agric. For. Serv. South. Res. Sta. 21 p.

Gargiullo, P. M.; Berisford, C. W.; Canalos, C. G.; Richmond, J. A. 1983. How to time dimethoate sprays against the Nantucket pine tip moth. Georgia Forestry Commission Forest Research Paper No. 44. Macon, GA: Georgia Forestry Commision. 11 p.

Nowak, J. T.; Fettig, C. J.; McCravy, K. W.; Berisford, C. W. 2000. Efficacy tests and determination of optimal spray timing values to control Nantucket pine tip moth (Lepidoptera: Tortricidae) infestations. Journal of Economic Entomology *In press*.