

**Special Technology Development Program
Progress Report**

PROJECT NUMBER: NA-2001-04

PROJECT TITLE: Improving and Validating a Model of the Gypsy Moth Pathogen
Entomophaga maimaiga

PROJECT STATUS: Continuing

EXPECTED PROJECT DURATION: 2 years

ORIGINAL EXPECTED COMPLETION DATE OF THE PROJECT: 2002

EXPECTED COMPLETION DATE OF THE PROJECT: 2002

SUBJECT: Biological Control 2, Fungus Pathogen 1, Invasive Species 2,
Models 2, Monitoring 2, Population 2.

STATUS OF SUBJECT SPECIES: non-native noxious

PROJECT OBJECTIVES: Refine and validate a previously developed computer model of the gypsy moth pathogenic fungus, *Entomophaga maimaiga*, and develop the validated model as a tool to determine the susceptibility of newly infested or uninfested areas to damage by the gypsy moth, and predict future interactions between the pathogen and host in the generally-infested areas.

BRIEF DESCRIPTION OF THE PROJECT: R. Weseloh has developed a computer model that integrates rainfall patterns, temperature, gypsy moth density, and the numbers of resting spores of the gypsy moth fungus in soil so that infection rates of caterpillars can be predicted. However, the model has not been validated, and some of its parameters must be adjusted to fit experimental data. The purpose of this proposal is to validate the model and develop it for use by others. In the 2001 spring season, 10 forested sites in Connecticut were established. The original goal was to that these sites be completely separate from each other. However, owing to the limited areas easily available where gypsy moths were abundant, two sites were chosen in one area of Rhode Island, 6 sites at Mansfield Hollow State Park, and 2 sites in an area in Harwinton, CT. Thus, sites were not completely independent, but fortunately different abundances of pathogen and host occurred even in nearby plots, so a variety of conditions could be explored. At each site, resting spores in the soil were sampled and automated rain gauges and temperature and humidity data loggers monitored weather conditions. Gypsy moth population density was sampled and gypsy moth larvae were collected to determine fungus disease incidence. Laboratory-reared gypsy moths were exposed on trees in these same sites to obtain information about infection rates. Appropriate data were obtained from all procedures except the exposure of laboratory-reared larvae. Owing to logistical problems, larvae could only be exposed in 4 plots, only a few of these larvae became infected, and the pattern of infection could not be meaningfully related to other measures of fungus activity. Parameters of the model have

been fit to these data and data obtained from 1999 and 2000. Parameter values obtained by fitting to 2001 data were similar to those obtained from 1999 and 2000 data, which is an encouraging sign of model stability. The program carried out the first year will be essentially duplicated in 2002, but not necessarily in the same plots. Second year data will be used to validate the model. The finished model will be most valuable as an aid in determining the susceptibility of newly infested or uninfested areas to damage by the gypsy moth. The model will be developed into a form with documentation that can be easily used by gypsy moth managers and will be made available to them and other interested parties. Results of the work will be published in appropriate journals.

CHANGES TO ORIGINAL PROJECT SCOPE OR OBJECTIVES: The laboratory exposure of caterpillars in the forest may be discontinued due to the inconsistent results obtained in the first year.

ADDITIONS TO ORIGINAL PROJECT SCOPE OR OBJECTIVES: None contemplated.

FHP LEAD CONTACT:

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Dennis Souto	Durham, New Hampshire	603-868-7717, dsouto@fs.fed.us , Fax 603-868-7604 or 1066

PRINCIPAL INVESTIGATOR:

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Ronald M. Weseloh	Department of Entomology	203-974-8484 Ronald.Weseloh@po.state.ct.us Fax 203-974-8502

COOPERATORS:

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
John A. Tanner	USDA-APHIS, Otis, MS	508-564-9303 Fax 508 564 4398

COOPERATOR INVOLVEMENT:

<u>Name</u>	<u>Role</u>	<u>Time Commitment</u>
John A. Tanner	Provide gypsy moth eggs	Two hours per month

PRODUCTS AND DUE DATES: January, 2002—The computer model of fungus activity will be refined to incorporate data from the 2001 field season.

October 2003—The computer model will be validated using data from the 2002 field season.

STATUS OF PRODUCTS/PRESENTATIONS: The computer model has been refined and modified with the incorporation of 2001 data. Currently, sensitivity analysis is being carried out and the model will be ready for validation in 2002.

ACCOMPLISHMENTS TO DATE:

Products: Refined computer model.

Publications: None.

Technology Transfer: None.

FIRST FISCAL YEAR FUNDED:

FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH CURRENT FISCAL YEAR:

	Item	Requested Funding	Received Funding	Expanded Funding
PREVIOUS YEAR FY 2001				
Administration	Salary	2100.00	1780.90	
	Overhead	620.00	523.92	
	Travel	1200.00	684.82	
Procurements	Contracting	0.00	0.00	
	Equipment	5500.00	5100.00	
	Supplies	600.00	0.00	
YEAR TOTALS		10020.00	8089.64	
CURRENT YEAR FY 2002				
Administration	Salary	2200.00	0.00	
	Overhead	660.00	0.00	
	Travel	1200.00	0.00	
Procurements	Contracting	0.00	0.00	
	Equipment	0.00	0.00	
	Supplies	600.00	0.00	
YEAR TOTALS		4660.00	0.00	

FUNDS NOT USED FROM PREVIOUS FISCAL YEAR:

Fiscal Year	STDP Funding Allocated	Funds Obligated	Funds Unused
2001	10020.00	8089.64	1930.36

EXPECTED BUDGET FOR NEXT FISCAL YEAR:

	Item	Requested FHP STDP Funding	Other- Source Funding	Source
Administration	Salary	\$2200.00	\$14500.00	Conn. Agr. Exp. Station
	Overhead	\$660.00	\$6200.00	Conn. Agr. Exp. Station
	Travel	\$1200.00	0.00	
Procurements	Contracting	0.00	0.00	
	Equipment	0.00	0.00	
	Supplies	\$600.00	0.00	
Totals		\$4660.00	\$20700.00	

DIFFERENCE BETWEEN ORIGINAL AND AMENDED REQUESTS AND JUSTIFICATION: None.

STDP FUNDING NEEDED (BEYOND CURRENT FISCAL YEAR): None.