THIRD REPORT

National Steering Committee for Application of Pesticides - Western Defoliators

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USDA Forest Service
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CONTENTS

I. INTRODUCTION

The third meeting of the National Steering Committee for Application of Pesticides - Western Defoliators met in Salt Lake City, Utah, November 6, 1990. The meeting was held in conjunction with the National Steering Committee for Application of Pesticides - Gypsy Moth and Eastern Defoliators.

A. Committee Members

J. Robert Bridges	WO/FIDR (Washington, DC)
Jesus Cota	WO/FP (Washington, DC)
John Cunningham	Forest Pest Management Institute (Sault Ste. Marie, Ontario)
Gary Daterman	PNW/FIDR (Corvallis, OR)
Kees van Frankenhuyzen 1.	Forest Pest Management Institute (Sault Ste. Marie, Ontario)
Ladd Livingston	Idaho Department of Lands (Coeur D'Alene, ID)
John Neisess	R-5(RO)FPM (San Francisco, CA)
Max Ollieu	R-6/FPM (Portland, OR)
Iral Ragenovich	R-6(RO)FPM (Portland, OR)
Pat Shea	PSW/FIDR (Davis, CA)
Larry Stipe	R-1(RO)TM (Missoula, MT)
Julie Weatherby	R-4(BFO)FPM (Boise, ID)
Jack Barry (Chairperson)	WO/FPM (Davis, CA)

1. Absent

B. Other Participants

Dave Bridgewater	R-6/FPM (Portland, OR)
Leo Cadogen	Forest Pest Management Institute (Sault Ste. Marie, Ontario)
Harold Flake	R-8/FPM (Atlanta, GA)
Michelle Frank	NA/FPM (Durham, NH)
Tom Hofacker	WO/FPM (Washington, DC)
Dave Holland	R-4/FPM (Ogden, UT)
Win McLane	USDA/APHIS (Otis AFB, MA)
Mike McManus	NES/FIDR (Hamden, CT)
Dick Reardon	NA/AIPM (Morgantown, WV)
Jessie Rios	California Department of Forestry (Sacramento, CA)
Harry O. Yates III	SEFES/FIDR (Athens, GA)

These participants were encouraged to share with the committee their concerns and needs related to managing gypsy moth.

C. Purpose of Steering Committee

The purpose of the steering committee is to analyze, identify, and recommend field and pilot testing needs for application of pesticides to manage western defoliators. Needs include those associated with pesticides, application systems, techniques, and strategies that influence the USDA Forest Service's (FS) and and State cooperator's ability to use pesticides safely, effectively, and in an economically, and environmentally acceptable manner.

D. Operating Guidelines

The committee expanded its scope as reflected in paragraph C above, to include use of ground application of pesticides to manage insects

that defoliate western forests. The committee will also serve, at the request of the Director, Forest Pest Management, as a panel to review national technology project proposals that relate to western defoliators. Additional operating guidelines adopted at the previous committee meeting are as follows:

1. **Emphasize cooperation between FIDR and FPM especially in planning and conducting field projects.**

2. **Emphasize the need to field test new strains of Bacillus thuringiensis (B.t.) and not the HD-1 strain. The HD-1 strain has been adequately tested by FIDR; however, unique or unusual changes to HD-1 or its carrier may qualify it for testing.**

3. **Maintain the traditional approach to field testing and pilot projects.**

4. **Encourage thorough and timely reporting of field tests and pilot project results.**

5. **Facilitate cooperation with industry and encourage their development and testing of microbials.**

6. **Seek ways to reduce costs of field tests and pilot projects, and to encourage industry to share costs.**

7. **Maintain this steering committee.**

E. Reports to the Committee

Reports delivered to the Committee by members and other participants are contained in the Appendix.

II. CURRENT RECOMMENDATIONS

Current recommendations are primarily recommendations carried forward from the previous meeting. Recommendations are listed in order of priority with No. 1 being the highest priority followed by the organization that the committee recommends as the lead to initiate action.

A. Laboratory and/or Investigations

1. Pursue laboratory testing of new Bacillus thuringiensis (B.t.) strains.

New strains of B.t. that may have significantly higher efficacy against western defoliators should be tested in the laboratory in cooperation with industry, e.g. Novo and Abbott.

PNW

2. Develop a plan to obtain data on impact of B.t. on non-target organisms.

There is only limited information in this area and the committee recommends that a plan be developed by PNW to obtain these data. The plan would include field inventory, laboratory evaluations, field testing, and methods to fund and accomplish this work.

PNW

3. Explore techniques for rapid bio-assay of B.t.

ELISA (enzyme link immunosorbant assay) techniques are needed for rapid bio-assay of B.t. in the field. Capabilities exist at University of California, Davis (UCD) and Entotech, Inc., (Novo),

Davis, CA. The committee recommends that a proposal be prepared and funds be made available with Pat Shea taking the lead.

PSW

4. **Develop, identify, and evaluate improved carriers for TM Biocontrol-1.**

The current tank mix of field grade molasses, Orzan LS, and water handled well during January 1991 airport trails at Davis, CA. Atomization from Micronair atomizers and flat fan nozzles appeared to be excellent; however data are still being evaluated. Product Coordinators (Jim Hadfield for TM Biocontrol-1 and Dick Reardon for Gypchek) are cooperatively developing a 5-year plan that will lead to operational use of these insecticides. Investigating improved carriers and cooperation with Canada on carrier development should be part of the plan. The committee also recommends that the product managers seek cooperation from the private sector in developing improved carriers, especially Gypchek carriers as the potential use of Gypchek far exceeds that of TM Biocontrol-1.

R-6
NA
PNW

5. **Determine evaporation rates and physical properties of microbial tank mixes.**

MTDC is soliciting for a contractor to determine evaporation rates and physical properties of pesticide tank mixes used by the FS. Rates will be determined as funds are available; however MTDC should request funding pursuant to this recommendation.

MTDC

B. Field Tests

1. Field test TM Biocontrol-1 including lower doses, and with improved carriers as they become available. Priority is given to testing methods of controlling Douglas-fir Tussock Moth (DFTM) as the insect is in current outbreak.

PNW

2. Conduct mating disruption tests using pheromones against western spruce budworm.

PNW

3. Conduct cooperative field tests of several dosages (0.5, 1, and 2 ounces per acre) of Dimilin against DFTM and study non-target effects compared to non-target effects of B.t.

PSW

C. Pilot Projects and Cooperative Field Tests/Pilot Projects

1. Conduct cooperative pilot test of TM Biocontrol-1, double (spring and summer treatments) against new, low level, and sub-outbreaks of DFTM.

PNW

2. Conduct mating disruption tests using pheromones against DFTM.

PNW
R-4
R-6

Who is involved??!

3. Conduct cooperative field tests/pilot tests of new strains of B.t. against western spruce budworm as they are recommended by PNW (Project 4502).

PNW
R-6

4. Conduct pilot test of B.t. against new and low level outbreaks of DFTM.

R-6

5. Conduct pilot test of Dipel 8L and Dipel 8AF applied at 32 ounces per acre to control western spruce budworm.

Abbott Laboratories

D. Equipment, Models, and Technology Development.

1. Evaluate the utility of the computer model Computer Assisted Spray Productivity Routine (CASPR) on a pilot or operational project.

R-4
WO/FPM
MTDC

2. Evaluate existing aircraft guidance systems and provide recommendations for operational deployment.

MTDC

3. Evaluate and recommend methods of sampling ultra low volume (ULV) sprays on pilot and operational projects.

MTDC

4. **Update and add spray nozzle specification data to the Program WIND aerial application equipment handbook.**

MTDC

5. **Determine physical properties and drag coefficients of substances.**

MTDC

6. **Coordinate complex terrain modeling with Global Positioning System (GPS), Geographic Information Systems (GIS), and expert system activities being developed by the FS.**

MTDC

E. Information and Administrative Management

1. **Plan and conduct multi-year monitoring, analyses, and data management of spray treatments.**

R-3
R-4
R-5
R-6

The data and information are needed for cost/benefit analyses by resource managers. We need to know duration of carryover benefits of treatments and tree growth information. Even short term benefits of treatment cannot be determined during the first year of treatment. For cost/benefit information and other economic analysis, the benefits or lack of benefits over 3 to 5 year periods should be established and recorded. This includes the R-6 Meacham Pilot Project conducted in 1988. Monitoring during 1989 shows that the benefits of treatment were carried over from 1988 to 1989. Monitoring the R-3 Jemez Mountain

control project showed that the western spruce budworm was kept suppressed for 5 years. This is valuable information in developing control strategies and in calculating cost/benefits for future control operations.

2. **Develop guidelines for conduct of wind tunnel and airport spray characterization trials.**

WO/FPM

3. **Pursue microbial research.**

WO/FIDR
WO/FPM
PNW

The committee recommends maintaining and increasing support of microbial and pheromone research for improved pest monitoring and suppression.

4. **Evaluate and revise current standards for determining successful control.**

FIDR/WO
FPM/WO

5. **Registered B.t. formulations.**

Currently registered B.t. products for DFTM and western spruce budworm, and their respective undiluted application rates for 16 BIU's per acre are listed below.

Product	Application Rate	Registration DFTM[1.]	WSBW[2.]
Thuricide 32LV	64 oz	X	X
Thuricide 48LV	43 oz	X	X
SAN 415	64 oz	X[3.]	X[3.]
Dipel 6L	43 oz	X	X
Dipel 8L	32 oz	X	X
Dipel 6AF	43 oz	X[3.]	X[3.]
Dipel 8AF	32 oz	X[3.]	X[3.]
Foray 48B	43 oz	X[3.]	X[3.]

1. DFTM = Douglas-fir tussock moth.
2. WSBW = Western spruce budworm
3. Not registered for forestry use in California.

6. **The committee strongly endorses assignment of Product Coordinators for TM Biocontrol-1 and Gypchek.**

7. **The committee expresses concern over apparent failure of the DFTM pheromone early warning system to detect DFTM build-up in Idaho.**

III. STATUS OF PREVIOUS RECOMMENDATIONS

Status of previous committee recommendations is summarized below.

A. Laboratory and/or Field Investigations

1. Pursue laboratory evaluation of new B.t. strains.

PNW

No new strains were evaluated.

2. Develop a plan to obtain data on impact of B.t. on non-target lepidoptera.

PSW
PNW

The committee recommended that PSW and PNW join to obtain data on impact of B.t. on non-target leptidoptera. This was not accomplished.

3. Develop, identify, and evaluate improved carriers for TM Biocontrol-1.

PNW
R-6

Jim Hadfield, R-6, has been designated TM Biocontrol-1 product coordinator and is cooperating with Roy Beckwith. Jim's charge includes field evaluation of tank mixes. Tests will be conducted in early 1991 at the University of California, Davis wind tunnel to investigate atomization and influence of physical properties. Also, airport trials were conducted at Davis, CA to evaluate mixing, handling, and atomization of TM Biocontrol-1 and Gypchek. Results of these tests are being evaluated.

4. Explore techniques for rapid bio-assay of microbials.

PSW

Pat Shea has discussed with Bruce Hammock, University of California, Davis (UCD), the feasibility of using an enzyme link immunosorbant assay (ELISA) method of determining B.t. potency. The next step is to pursue funding and establish a cooperative project at UCD.

5. Determine evaporation rates and physical properties of microbial tank mixes.

WO/FPM

Bob Ekblad, MTDC, has prepared an RFP to contract a facility to measure evaporation rates and proposal responses will be reviewed in March. Physical properties of tank mixes are being measured at UCD for selected biological tank mixes.

6. Obtain spreadfactors for all micorbial tank mixes.

WO/FPM

The U.S. Army, Aberdeen Proving Ground, was contracted to evaluate B.t. spreadfactors on deposit papers. FPM (Davis) Report 90-8, Spectroscopically Derived Spreadfactors for Different Bacillus thuringiensis Insecticidal Formulations on Paper Impaction Cards. The report discusses utility of kromekote as an impaction surface and provides spreadfactors for Foray 48B and Thuricide 32 LV. Additionally Alam Sundaram and Errol Caldwell (FPMI) have been contacted about doing spreadfactors work for the FS. The latter is still under discussion. The pesticide laboratory at Pennsylvania State University determines spreadfactors for microbials and should be contacted for

spreadfactor information. Recommend that industry be encouraged to provide spreadfactors for their products using standardized methology.

B. Field Tests

1. Conduct field tests of new strains of B.t. against western spruce budworm as recommended.

PNW

No field tests were conducted in 1990 and none scheduled until 1992.

2. Conduct field tests of improved tank mixes of TM Biocontrol-1.

PNW

No tests due to lack of a qualifying population.

3. Conduct mating disruption tests using pheromones against western spruce budworm and (DFTM) outbreaks.

PNW
R-4

Julie Weatherby and Lonnie Sower are cooperating on mating disruption test of DFTM moth on 200-500 acre blocks. PNW is planning DFTM test scheduled in 1991.

4. Conduct field experiments of Sandoz Crop Protection Corporation (Sandoz) product SAN 415 SC 32LV (NRD-12 strain, 32 BIU per gallon) against DFTM to obtain efficacy data.

PNW

No field experiment was conducted and Sandoz has not demonstrated an interest in supporting forest spraying with SAN 415.

5. Conduct field experiments of lower doses of TM Biocontrol-1.

PNW

No field experiments were conducted as there were no test populations in the Northwest. A dosage rate test is scheduled in 1991.

6. Conduct cooperative field tests of several dosages (0.5, 1, and 2 ounces per acre) of Dimilin against DFTM in California.

PSW

No field tests were conducted as there were no test populations in California.

C. Pilot Projects and Cooperative Field Tests/Pilot Projects

1. Conduct cooperative pilot test of the Sandoz B.t. product SAN 415 against western spruce budworm.

PNW

No test of SAN 415 was conducted.

2. Conduct cooperative pilot test of TM Biocontrol-1, double (spring and summer treatments) against new, low level, and sub-outbreaks of DFTM.

PNW

No cooperative test of TM Biocontrol-1 was conducted.

3. Conduct pilot test of B.t. against new and low level outbreaks DFTM.

PNW

No test of B.t. was conducted against low levels of DFTM.

4. Conduct pilot test of Dipel 8L and Dipel 8AF applied at 32 ounces per acre to control western spruce budworm.

Abbott Laboratories

No test of low rates of Dipel 8L or Dipel 8AF were conducted.

D. Equipment, Models, and Technology Development

1. Conduct airport spray trails to characterize Dipel 6AF.

WO/FPM

Aircraft characterization trails of Dipel 6AF were conducted by WO/FPM (Davis), R-6/FPM and Abbott Laboratories at Marysville, CA in 1990 and results reported.

2. Evaluate and recommend methods of sampling ultra low volume (ULV) sprays on pilot and operational projects.

MTDC

No work was initiated.

3. Evaluate existing aircraft guidance systems and provide recommendations for operational deployment.

MTDC

MTDC has been asked to develop a proposal to address this recommendation.

4. Evaluate the utility of the computer model Computer Assisted Spray Productivity Routine (CASPR) on a pilot or operational project.

MTDC

Steve Munson (R-4) used CASPR to plan the 1990 R-4/Utah gypsy moth project. Evaluation of CASPR will be continued in 1991 on the R-4/Utah project.

5. Update reference reports on atomization of current pesticide tank mixes.

WO/FPM

WO/FPM (Davis) has published and distributed an update reference on atomization of pesticide tank mixes.

6. Update and add spray nozzle specification data to the Program WIND aerial application equipment handbook.

MTDC

MTDC has not initiated action on this recommendation.

7. Coordinate complex terrain modeling with Global Positioning System (GPS), GIS, and expert system activities being developed by the FS.

MTDC

WO/FPM (Davis), MTDC, and MAG met to discuss these needs and a feasibility report was prepared by FPM. Also, two meetings have

been held with EPA at Las Vegas to plan cooperative activities that include geographical and visualization techniques with EPA. An EPA/FS workshop is scheduled for June 1991. MTDC has a contract with Battelle to adopt a complex terrain model to FPM needs. Bob Ekblad prepared two status reports to the FPM technology task groups in August 1990. The project is progressing well.

8. Determine physical properties and drag coefficients of substances.

MTDC

MTDC has not initiated action on this proposal.

E. Information Management

1. Plan and conduct multi-year monitoring, analyses, and data management of spray treatments.

R-3
R-4
R-5
R-6

No action has been initiated.

2. Publish a reference and maintain a Data General computer data base on western defoliator aerial spray projects.

WO/FPM

WO/FPM (Davis) in cooperation with R-4/FPM has compiled and distributed a report entitled Aerial Insecticide Projects for Suppression of Western Defoliators: 1970-1989 - An annotated Bibliography.

F. Administrative

1. Guidelines for Field tests and Pilot Projects

a. Guidelines have been finalized and incorporated in the FS Handbook.

b. No other guidelines have been prepared.

2. West-wide EIS for DFTM.

This was not done and committee does not believe it is necessary as EA's seem to accommodate this need.

3. Testing of NOVO's Foray 48B.

The committee had suggested that NOVO pilot test Foray 48B. In that the material was pilot tested in 1990 a pilot test becomes somewhat academic.

IV. SUMMARY

The National Steering Committee for Application of Pesticides - Western Defoliators met in Salt Lake City, Utah, November 6, 1990. The April 1990 committee meeting recommendations were reviewed and discussed. Some progress on the recommendations has been made; however, the committee noted that progress is slow on most of the high priority recommendations. At the meeting previous recommendations were updated, expanded, and priorities changed as appropriate. The next meeting is proposed for early July 1991.

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appendix

REPORT TO WESTERN DEFOLIATOR STEERING COMMITTEE MEETING, November 6-8, 1990.
G. Daterman, PNW-Station.

1990 ACTIVITIES:

1. R. Beckwith and D. Grimble have been evaluating a modified spray formulation for the DFTM virus (TM BioControl-1). Laboratory results are very good, but there is a need for testing the material in aircraft spray apparatus.

2. Field testing of trap design and modified lures for monitoring DFTM populations with pheromone-baited traps indicate that the standard (0.001%) pvc lure could be used in a commercially-available "USDA" trap for operational monitoring. This would simplify the process in comparison to the current use of the "milk-carton" trap. The Phero Tech lure was again compared in the field and found to be much improved in calibration of its release rate of pheromone (for avoiding premature trap saturation).

3. Western spruce budworm monitoring for prediction of defoliation levels was again conducted in Regions 1,2, and 6. Results were not available at the time this report was prepared. The PNW lead scientist for this work, C. Sartwell, retired September 28, 1990, but has assured Daterman that he will prepare a report and manuscript on the effectiveness of this technique.

4. Laboratory research on phytochemicals as feeding deterrents has turned up some promising leads for certain extracts and isolated compounds as effective feeding deterrents of the western spruce budworm and the gypsy moth. From a practical viewpoint, these materials would likely be useful for protection of ornamentals, rare (threatened and endangered spp) plants, nurseries, etc. Work is continuing on development of specific compounds.

1991 PLANS:

1. PNW/R6 has a joint proposal for Special Project Funding to evaluate a Mycogen Co. (San Diego, Calif.) set of BT strains and formulation against western spruce budworm. The proposal specifies screening tests in 1991 and field testing in 1992. R.Beckwith and D.Grimble are the PNW participants.

2. The upsurge of DFTM in NE Oregon and southern Idaho has prompted discussion and planning for field testing of lower dosages and new spray formulations for the nuclear polyhedrosis virus (TM BioControl-1). The dosage test would compare 1/4 and 1/2 dosages to the recommended label dose. Formulations would include comparisons of the Espro Co. modified molasses preparation to the label standard. Other promising candidate formulations should also be evaluated. This effort could be a combination field and pilot test project, with test variables evaluated appropriately between the respective efforts. R.Beckwith and D.Grimble are projected PNW participants.

3. The pending R4/R6 DFTM outbreak also prompted a study plan for pilot testing the pheromone mating disruption method of control for this pest. This