Environment Canada
Canadian Forestry Service

Environnement Canada
Service canadien des forêts

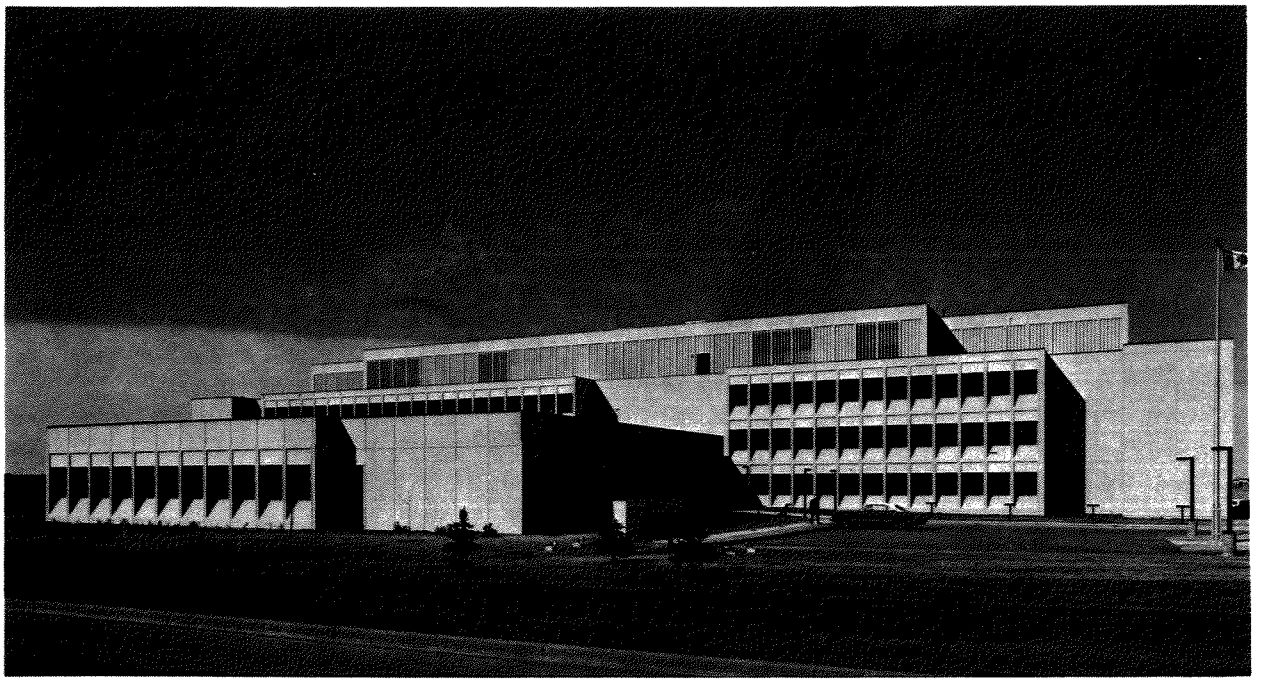
Canada

STUDY STATEMENTS 1982-83

Northern Forest Research Centre

Canadian Forestry Service

Edmonton, Alberta



STUDY STATEMENTS

1982-83

NORTHERN FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

APRIL 1982

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 14, 1982

1. Project: Detection and appraisal of forest insects and diseases

2. Title: Forest insect and disease survey

3. New: Cont.: X 4. No.: NOR-1-033

5. Study Leader: Y. Hiratsuka, H. Cerezke and B. Moody

6. Key Words: Detection, appraisal, distribution, parasites, hosts, damage, predators, biological control, hazard, susceptibility, stability, management, parks, recreation, symptoms, damage, effluents, easement atmosphere.

7. Location of Work: Throughout region.

8. Study Objectives:

   1. To gain an improved knowledge of forest insects and diseases in the region for the purpose of minimizing damage to trees and shrubs attributable to these organisms and to provide an advisory service to management agencies and the public, and to contribute to FIDS national overview of important pest conditions.

   2. Provide management agencies with diagnostic impact and appraisal services relating to effects of insects, diseases, climatic influences and pollutants on trees and shrubs and other types of vegetation.

9. Goals for 1981-82:

   1. Aerial and ground surveys to monitor major forest pests will be conducted in the three prairie provinces and the Northwest Territories (Petty, Still, Grandmaison, Tidsbury, Gates).

   2. Provide pest extension service to various client agencies (Emond).

   3. Special surveys for particular pests or of designated areas will be conducted. Some examples of special surveys which will be carried out in 1981 are:

a. Mountain pine beetle surveys in southern Alberta and southern Saskatchewan including Cypress Hills and Rocky Mountain National Parks (Petty, Still, Grandmaison).

b. Repeat true color aerial photography in Cypress Hills Provincial Park (likely joint cost-shared with Alberta Parks) and cover additional areas not covered in 1980-81 (Hall, Petty).

c. Schleroderris canker detection surveys will be conducted in Banff and Jasper National Parks and in red pine plantations in eastern Manitoba (Hiratsuka).

d. Data on insect and disease incidence and tree mortality in mechanically thinned plots near Edson will be summarized into a report (Cerezke).

e. Elm bark beetle surveys will be conducted in Alberta with personnel from Alberta Agriculture (Emond).

4. Compile and publish an information report on the forest pest situations in the region for 1980 and make predictions for 1981. Draft copy of the report will be sent to the FIDS co-ordinator (Ottawa) by the end of January, 1981.

5. Organize annual Federal-Provincial forest pest review and planning meeting in March of 1981 with representatives from provincial forest services and Parks Canada.

6. Prepare and present lectures and talks on forest insects and diseases to various client agencies as requested.

7. Contribute several articles to "Forest Management Notes" as required.

8. Review and evaluate survey methods used elsewhere for major forest insects and diseases, and work towards the production of a standard survey methodology manual suitable for the region (Moody).

9. A report on mountain pine beetle incorporating data up to 1980 will be prepared and published possibly as an information report (Cerezke, Petty).

10. Pest depletion estimates by major forest pests for 1976-81 will be made and will be incorporated in the National Forest Resource Data Program (Moody).

10. Accomplishments for 1981-82:

1. Aerial and ground surveys were conducted, and areas of severe to moderate infestations were mapped of major forest pests (spruce budworm, mountain pine beetle, forest tent caterpiller, and jack pine budworm) in the three prairie provinces and the Northwest Territories.

2. Pest extension program was conducted and more than 2,000 inquiries were processed. Information booths on tree pests were displayed, on several occasions, to the general public, and many pest leaflets and other publications were distributed.

3. Many special surveys for particular pests or of designated areas were conducted. Examples are as follows:

   a. Special surveys were conducted of mountain pine beetle in southern Alberta and several national parks.

   b. Scleroderris canker detection survey was conducted in Banff and Jasper National parks with Dr. C. Dorworth (GLFRC) but the disease was not found in new locations.

   c. Report of results from survey on insect and disease incidence and tree mortality in mechanically thinned plots near Edson has been prepared.

   d. Elm bark beetle surveys were conducted with Alberta Agriculture but beetles were not detected in southern Alberta.

4. Compiled and published information report on the forest pest situations in the region for 1980 and made predictions for 1981. Draft copy of the report was sent to Ottawa for FIDS national report.

5. Annual interagency FIDS review and planning meeting was conducted at NoFRC with representations from three prairie provinces, the Northwest Territories and Parks Canada.

6. Lectures and talks on forest pests were presented on various occasions, e.g. Parks Canada staff, tree pruning courses sponsored by Alberta Agriculture, staff of tree nurseries, AFS staff on mountain pine beetle, etc.

7. One article entitled "1981 forecast for the forest tent caterpillar in the prairie provinces" was published in the Forest Management Note (No. 7).

8. Significant progress has been made towards the production of a standard survey methodology manual suitable for the region.

9. The first draft report completed in 1980 has not been revised. Since much of the data contained in this report has already been published in 1980 and 1981 FIDS reports, further need for the above as a publication needs to be discussed.

10. Pest depletion estimates by major forest pests for 1976-81 were made and sent to Ottawa coordinator for national compilation and incorporation in the National Forest Resource Data Program.

11. Goals for 1982-83:

1. Survey, map and report on major forest pests of the region, i.e. mountain pine beetle, forest tent caterpillar, spruce budworm, and jack pine budworm.

2. Conduct special surveys for particular pests or of designated areas.

3. Compile and publish an information report on the forest pest situations in the region for 1981 and make predictions for 1982. Draft copy of the report will be sent to FIDS coordinator in Ottawa for national compilations.

4. Provide pest extension service to various client agencies and general public.

5. Represent NoFRC and CFS on various provincial, regional and national forest insect and disease committees and advisory groups.

6. Organize and conduct annual interagency FIDS review and planning meeting with representatives (contact persons) from three prairie provinces, the Northwest Territories and Parks Canada (Prairie and Western regions).

7. Continue working towards the production of a standard survey methodology manual suitable for the region.

8. Make a map of major aspen and balsam poplar distribution in Alberta and explore the possibility of using satellite imagery to delineate area of severe defoliation by forest tent caterpillar and other aspen-poplar defoliators.

12. Publications:

Up to 1981 (from 1970)

Journal articles: 10

Information reports, notes, etc.: 32

File reports: Numerous (about 15/year)

1981-82:

Journal articles:

Nil

Information reports, notes, etc.:

Hiratsuka, Y., H. F. Cerezke, J. Petty and G. N. Still. 1981. Forest insect and disease conditions in Alberta, Saskatchewan, 1980 and predictions for 1981. Northern Forest Research Centre, Information Report NOR-1-231, 13 p.

Still, G. N. 1981. Forecast for the forest tent caterpiller in the prairie provinces. Forest Management Note No. 7, 2 p.

File reports:

Grandmaison, M. 1981. Forest tent caterpillar (*Malacosma distria* Hbn.) defoliation forecasts for 1982 in Saskatchewan. File Report.

Still, G. N. 1981. Spruce budworm in Alberta. 1981. (*Choristoneura fumiferana* Clem.). File Report.

Still, G. N. and M. Grandmaison. 1981. Forest insect and disease condictions in the Northwest Territories and Wood Buffalo National Park, 1981. File Report.

Still, G. N. 1981. Forest insect and disease conditions in Prince Albert National Park, 1981. File Report.

Still, G. N. 1981. Jack pine budworm in Saskatchewan, 1981 and forecast for 1982. File Report.

Petty, J. 1981. Some insects and diseases of Kananaskis Provincial Park. File Report.

Still, G. N. 1981. Trembling aspen defoliation in Alberta, 1981. File Report.

Petty, J. 1981. Mountain pine beetle - Cypress Hills Provincial Park. File Report.

Still, G. N. 1981. Trembling aspen defoliation in Saskatchewan, 1981. File Report.

Still, G. N. and J. Petty. 1981. Forest tent caterpillar defoliation forecast for 1981 - Central Alberta. File Report.

Cerezke, H. and H. Gates. 1982. Damage and mortality factors in mechanically thinned young lodgepole pine, Edson Forest, Alberta. File Report.

Tidsbury, C. 1982. Spruce budworm infestations in Manitoba 1981 and forecasts in 1982. File Report.

Tidsbury, C. 1982. Forest tent caterpillar infestations in Manitoba, 1981 and defoliation forecasts for 1982. File Report.

Emond, F. J. 1981. Tree pest extension report, 1981. File Report.

Tidsbury, C. 1982. Insect and disease conditions in Riding Mountain National Park, 1981. File Report.

Tidsbury, C. 1982. Insect and infectious disease conditions in the Pineland Forest Nursery, Hadashville, Manitoba, 1981. File Report.

13. Signatures:

Investigator

Program Manager

Investigator

Director A. D. Kiil

Investigator

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 14, 1982

1. Project: Detection and appraisal of forest insects and diseases
2. Title: Sawfly systematics
3. New: Cont.: 4. No.: NOR-1-058
5. Study Leader: H.R. Wong
6. Key Words: Tenthredinoidea, Nearctic Region, distribution, hosts, keys, life history, morphology, new genera, new species, biogeography, revision, Symphyta, evolution, phylogeny.
7. Location of Work: Edmonton, Alberta
8. Study Objectives:

   1. To make biosystematic studies of the sawflies of Canada and maintain taxonomic expertise in this group of insects at the national and international level.

   2. To separate the various sawfly species in their mature and immature forms by means of keys, descriptions and illustrations.

   3. To study the evolution and biogeography of the more important sawfly genera leading to their revision in North America, North of Mexico.

   4. To study the external and internal morphology of the more economic sawfly species.

9. Goals for 1981-82:

   1. Identify sawflies for research personnel, institutions and laboratories.

   2. Prepare descriptions of the 27 new species of *Pristiphora* for a monograph on the Evolution, Classification and Biogeography of the genus *Pristiphora* Latreille with a catalogue of the world species (Nymenoptera: Tenthredinidea).

   3. Find morphological characters in larvae of the coniferous feeding sawfly of the family Diprionidae to separate the different genera in North America.

10. Accomplishments in 1981-82:

1. (a) Identified nearly 350 larval and adult sawflies for the Forest Insect and Disease Survey of the Northern Forest Research Centre, Canadian National Collection, regional clients and in-service personnel.

(b) Reviewer. Two sawfly papers submitted to the Canadian Entomologist.

(c) Presented a paper on sawfly taxonomy at the invitation of the Chinese Academy of Forestry, Beijing, China on November 10, 1981.

2. Descriptions have been made for the 27 new species of *Pristiphora* from the Northwest Territories, Yukon and Alaska. These species will be incorporated in the study on the evolution and taxonomy of this genus.

3. Morphological characters have been found on the head and body to separate the different genera of Diprionidae in North America.

11. Goals for 1982-83:

1. Identify sawflies for research personnel, institutions and laboratories.

2. Illustrate the morphological characters to separate the different genera of Diprionidae in North America.

3. Collaborate with J.A. Drouin on an information report dealing with seasonal development and chemical control of the birch leaf miners in Alberta.

4. When time permits work on the *Pristiphora* monograph.

12. Publications:

Up to 1981-82

Journal articles	27
Information Reports etc.	8
File Reports	0

1980-81

Nil

13. Signatures:

Investigator

Program Manager

Director A. D. Kiil

NOR-1-143

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 15, 1982

1. Project: Detection and appraisal of forest insects and diseases

2. Title: Control and damage impact of insects injurious to trees and shrubs.

3. New: Cont.: X 4. No.: NOR-1-143

5. Study Leader: H. F. Cerezke

6. Key Words: Forest habitats, shelterbelts, woodlots, parks and recreational areas, plantations, seed orchards, tree nurseries, pesticides, cultural control, integrated control, growth losses, pupulation sampling.

7. Location of Work: Region wide.

8. Study Objectives:

   1. To maintain up-to-date information and provide technical and advisory services on insect problems of trees and shrubs common to the region, laws related to pesticides and their usage, insect control methods and effects of pesticides on the environment.

   2. To provide information on insect control, abundance, hazard, damage impact and depletion losses in areas of concern to various clients.

9. Goals for 1981-82:

   1. Provide lead role at NoFRC in coordination of mountain pine beetle activity within the region with client agencies (AFS, Parks Canada, Alta. Parks, Private Industry, Sask. Parks, Sask. D.T.R.R.) and with PFRC, BCMF and H.Q. as required.

      Some specific goals include:

      (i) provide advisory and information role on biological and control aspects in the mountain pine beetle infestations of the region as requested.

(ii) provide documentation, with cooperation of Alta. Parks and FIDS, of the outbreak history and distribution of mountain pine beetle in the Cypress Hills, for the purpose of evaluating control strategy now in place and its success.

(iii) gather information on the mountain pine beetle in the Cypress Hills for biological assessment of tree attack pattern, brood survival and productivity, and mortality factors.

(iv) Incorporate the biological information into a stand hazard rating classification which can be used in the overall forest - park management plan of Cypress Hills Prov. Parks.

2. Finalize the following reports or publications:

(a) Impact studies of the jack-pine budworm (*Choristoneura pinus pinus*) in Nisbet Provincial Forest, Sask.

(b) Surveys of spruce budworm populations and damage impact in Riding Mt. National Park, 1979-80.

(c) Control studies of seed and cone insects in mature white spruce trees with carbofuran near Grande Prairie, Alberta.

3. Provide CFS - NoFRC representation on various provincial, regional and national committees as required.

10. Accomplishments in 1981-82:

1. Little progress made toward preparation of first draft because of heavy commitments on mountain pine beetle (MPB). A few photographs were assembled and several references were added to files. Further input will be devoted between now and end of fiscal year.

2. Involvement in mountain pine beetle was varied and time consuming as indicated in the following:

(a) A typed brochure on the biology, damage and tree protection aspects of mountain pine beetle was prepared and distributed on a request-need basis. Clearance for insecticidal approval was obtained from CDA, Ottawa, Alberta, Environment and Saskatchewan Environment.

(b) A special survey was initiated with FIDS to establish the dispersion of the MPB in the southern prairie zone (results reported under NOR-1-033). Data are being gathered to relate to wind and beetle emergence and flight.

(c) Attended three meetings with AFS staff to review MPB status in the designated control and salvage zones of SW Alta. Participated by aerial and ground surveys to assess the outbreak and controls. Prepared a report for AFS use.

(d) Conducted an evaluation of overwinter survival and population trend in the Cypress Hills (Alta. side), including 4 locations, and summarized main results for Provincial Park use. Data contribute toward 2 (ii, iii and iv).

(e) Participated as speaker at joint AFS-CFS-CIF sponsored MPB Symposium, Coleman, Alta., Feb. 1981. Presented a report "An Overview of the Problem".

(f) Prepared short note for Prairie Landscape Magazine titled "Mountain Pine Beetle in Southern Alberta and Saskatchewan".

(g) Participated in a 2-day training program on MPB for national park Wardens in Kootenay and Yoho N.P.

(h) Presented talk as one of three panel speakers to Environment Protection Study Group of Public Advisory Committee, Environment Council of Alberta.
Title: "Mountain Pine Beetle Control and Salvage Operations, with Special Reference to the South Castle Area".

(i) Served as CFS-NoFRC representative on Technical Subcommittee on MPB to help resolve problems relating to the MPB in the Rocky Mt. zone along the B.C.- Alta. border. Attended four meetings with PFRC - BCMF - AFS and PC participation to review and formulate a control strategy plan. Also attended two meetints of the Interagency Committee on MPB.

(j) Attended International meeting at Fairmont Hot Springs to review all concerns of MPB in western U.S. and Canada.

(k) Provided input into several T.V., newspaper media reports on MPB.

(l) Assisted in an aerial-ground inspection of suspected MPB-killed trees in Rocky-Clearwater Forest; identified that causal agent was likely lightning. Report prepared for AFS: "Report on Group Tree Mortality, Rocky-Clearwater Forest".

(m) Numerous consultory services and technical advice have been provided to different clientel and agencies including identification of bark beetle specimens.

3. (a) Little progress made toward finalizing this report due to MPB.

   (b) Foliage collected in 1980 has been examined and analyzed for pattern of recovery following budworm collapse. Data have yet to be incorporated into the 1979-80 report.

   (c) Final report on seed and cone insect study prepared and circulated for local editorial review. Permission for use of data was obtained from Proctor and Gamble. Final revisions still incomplete.

4. Served as CFS-NoFRC representative on the following committees:

   (a) Alberta Pest Control Advisory Committee: attended and reported.

   (b) Annual Meeting of the Insect Committee of Saskatchewan Advisory Council of Crop Pests: Submitted a report.

   (c) Western Forum and Western Committee of Crop Pests: attended and provided reports.

   (d) Forest Pest Control Forum Review Meeting - Ottawa: attended and prepared reports.

   (e) Environmental Subcommittee of Alberta Horticultural Advisory Committee: attended and provided a report. Also, gave slide presentation on MPB.

   (f) Attended extra spruce budworm meetings in Ottawa dealing with depletion loss and Survey Implementation Plans.

   (g) Attended Pheromone Workshop at FPMI for national review of forest insects within CFS, April, 1981.

5. Provided a variety of consultory services in the form of editorial reviews, insect identifications, control information, tree growth problems and other technical information dispersal.

11. Goals for 1982-83:

1. Provide lead role at NoFRC in coordination of MPB survey, monitoring, infestation spread and population trend evaluation within the region with client agencies, and including the following areas:

   (a) Help coordinate aerial and ground detection within FIDS and outside agencies in forested, urban, park and agricultural areas for annual mapping of infestations;

(b) Provide on-site assessment of MPB hazard and potential for spread in key sensitive areas defined by Inter-agency and/or Technical Subcommittee;

(c) Maintain active role as NoFRC representative on MPB Technical Subcommittee to review and recommend need for control action;

(d) Maintain advisory role on MPB technical information to satisfy client requests;

(e) Initiate field evaluation studies with client agencies for assessment of the effectiveness of control strategies;

(f) Examine stand hazard rating systems published elsewhere to extract those elements which can be applicable in western Canada.

(g) Prepare reports on MPB activity as requested and for annual or seasonal update.

2. Finalize the following reports or publications:

(a) Impact studies of the jack pine budworm (*Choristoneura pinus pinus*) in Nisbet Provincial Forest, Sask.

(b) Surveys of spruce bueworm populations and damage impact in Riding Mt. National Park, 1979-80.

(c) Control studies of seed and cone insects in mature white spruce trees with carbofuran near Grande Prairie, Alberta.

3. Provide CFS-NoFRC representation on various provincial, regional and national committees as required.

12. Publications:

1981-82

Cerezke, H. F. 1981. Mountain pine beetle in southern Alberta and Saskatchewan - Prairie Landscape Magazine, 1 p.

Cerezke, H. F. 1982. Mountain pine beetle: an overview of the problem. Proc. being assembled and printed by Alberta Forest Service.

Cerezke, H. F., J. A. Drouin and B. Neill. 1981. Revision of recommended insecticides for control of insects on shelterbelts, ornamental trees and shrubs. (Chapter in WCCP report, 1981); 17 pp.

Cerezke, H. F. 1981. Control recommendations for insects of "Seasoned Wood and Timber Structures"; 3 pp. (New chapter for 1981 WCCP report).

Unpublished reports 1981 82

Cerezke, H. F. 1981. Report on group-tree mortality, Rocky-Clearwater Forest, 3 pp.

Cerezke, H. F. 1981. Interim report on mountain pine beetle in the Cypress Hills, Alberta, 4 pp.

Cerezke, H. F. 1981. Mountain pine beetle - its biology, damage and control, 4 pp. Prepared as handout brochure.

Cerezke, H. F. 1981. Assessment of mountain pine beetle control area, Porcupine Hills - East Livingstone Range, Sept. 1981, 4 pp.

Cerezke, H. F. 1981. Mountain pine beetle control and salvage operations, with special reference to the South Castle area; 7 pp. illust. with slides. Panel presentation to Environ. Protection Study Group, Public Advisory Comm., Environment Council of Alta.

Cerezke, H. F. 1981. Western Forest Insect Work Conference: Workshop summary: How can we speed up the return of survey information to the land manager, 2 pp.

Knowles, K., Y. Beaubein, H. Gates, D. Hunt and D. Taylor. 1981. White spotted sawyer beetle survey, Kipahigan Lake fires, Manitoba, April 1981. 10 pp. For. Br., Dept. Nat'l Resources, Manitoba.

Additional Reports prepared by H. Cerezke for the following Committees: Alta. Pest Control Advisory Committee; Insect Committee of Sask. Adv. Council of Crop Pests; Forest Pest Control Forum, Environmental Subcom., Alta. Hort. Adv. Comm.

13. Signatures:

Investigator

Program Manager

Director A. D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 14, 1982

1. Project: Detection and appraisal of forest insects and diseases

2. Title: Forest Insects: Diagnostic and taxonomic services

3. New: Cont.: X 4. No.: NOR-1-154

5. Study Leader: H. R. Wong

6. Key Words: Insects, larvae, damage, hosts, parasites, biological control, galls, seasonal occurrence, distribution, nomenclature, taxonomy, identification, reference collection, insectary, life history.

7. Location of Work: Edmonton, Alberta.

8. Study Objectives:

   1. Provide diagnostic and biosystematic services to clients, in-service personnel, outside agencies and scientists engaged in biological and taxonomic research on insects.

   2. Maintain and improve the regional collection of insects and mites.

   3. When the opportunity arises, initiate biological and ethological studies to improve the diagnostic and biosystematic services.

9. Goals for 1981-82:

   1. Provide diagnostic and biosystematic services for the more difficult determinations on mature and immature insects damaging forest and shade trees.

   2. Maintain and improve regional reference collection of insects and mites.

   3. Provide information and specimens to scientists engaged in taxonomic and biological studies.

Goals Added in 1981:

4. Make surveys in eastern Manitoba and western Alberta for the European pine shoot moth, larch casebearer and the European spruce sawfly.

5. Identify the species of pill beetle in outbreak numbers in the nursery beds of spruce and pine in Big River, Sask.

6. Review application for Research Grant.

7. Determine the species of *Proteoteras* attacking shoots of boxelder in the Prairies.

10. Accomplishments in 1981-82:

1. Determined several thousand insect specimens in the mature and/or immature stages submitted to the Northern Forest Research Centre and handled over a thousand enquiries for in-service personnel, clients, outside agencies and scientists.

2. (a) One hundred and thirty specimens determined by specialists in Ottawa and by myself have been incorporated into the Insect Reference collection.

   (b) Over four hundred immature insects were reared and about seventy-five overwintered to obtain biological information and specimens for the reference collection.

   (c) Over three hundred specimens were pinned, spread, labelled or preserved for the reference or store collections.

3. Biological information and/or specimens were provided to the following:

   Dr. Xia gang-row, Chinese Academy of Forestry, Baijing, China.
   K. D. Bolte, Biosystematic Research Institute, Ottawa, Ontario.
   Dr. D. N. Duffy, McGill University, Anne de Bellevue, Quebec.
   D. R. Ward, Carleton University, Ottawa, Ontario.
   Dr. D. E. Bright, Biosystematic Research Institute, Ottawa, Ontario.
   Dr. W. C. McGutha, Biosystematic Research Institute, Ottawa, Ontario.
   Dr. P. Dang, Biosystematic Research Institute, Ottawa, Ontario.
   I. Cummings, University of Alberta, Edmonton, Alberta.

4. Field collections in eastern Manitoba and western Alberta disclosed populations of the larch casebearer declined in Manitoba, and still not present in Alberta. The European spruce sawfly appeared to be more abundant in Manitoba and has spread west to Vivian and north to Lac du Bonnet. The European shoot moth has not been detected in the Prairies, although present in Ontario and British Columbia.

5. The species of pill beetle in outbreak numbers in the spruce and pine nursery beds in Big River, Sask. has been identified as *Tylicus subcanus* Lec. This species has been recorded from British Columbia, Washington and Oregon. It appears to be the first observed infestation in Saskatchewan.

6. Reviewed the merits of an application to the Natural Sciences and Engineering Research Council for a research grant in my field of knowledge.

7. Field collections and laboratory studies indicate three species and not one attack the shoots of boxelder in the Prairies. These have been identified as *Proteoteras aesculana* Riley, *P. willingana* (Kearfott) and *P. crescentana* Kearfott.

8. Chairman of the local arrangements committee of the thirty-second meeting of the western forest insect work conference at Banff, Alberta, 1981.

11. Goals for 1982-83:

1. Provide diagnostic and biosystematic services for the more difficult determinations on mature and immature insects damaging forest and shade trees.

2. Maintain and improve regional reference collection of insects and mites.

3. Provide information and specimens to scientists engaged in taxonomic and biological studies.

4. Instruct Yvonne Beaubien of the Manitoba Dept. of Natural Resources on the identification and curating of insects.

5. Instruct Bert Bailey of the National Research Council, Saskatoon, Sask. on how to identify species of the genus *Proteoteras*.

6. Prepare insects for display in the New Natural History Museum of the Manitoba Forestry Association near Hadashville, Manitoba.

7. Identify approximately 2,850 insects for the Forest Technology School, Hinton, Alberta.

8. Collaborate with Dr. P. Dang, Biosystematic Research Institute on a paper dealing with the identification of *Proteoteras* in the Canadian Prairies.

9. Collaborate with J. A. Drouin on an information report dealing with Insect pests of saskatoon and chokecherry in Alberta and their control.

10. Make a survey of the tree nurseries in the Canadian Prairies to determine the major insects attacking seedlings, and prepare a forest management note on them.

12. Publications:

Up to 1980-81

Journal articles	37
Information Reports etc.	30
File Reports	1

13. Signatures:

Investigator

Program Manager

Director A. D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 15, 1982

1. Project: Detection and appraisal of forest insects and diseases

2. Title: Damage appraisal of major forest pests.

3. New: Cont.: X 4. No.: NOR-1-184

5. Study Leader: B.H. Moody

6. Key Words: Damage, appraisal, impact, hosts, forest pests, management, mortality, growth loss.

7. Location of Work: Prairie Provinces, Northwest Territories.

8. Study Objectives:

   1. To determine the significance of specific forest pests in terms of measured damage to the tree and forest stands.

   2. To develop or modify appraisal methods for assessment of losses caused by forest pests; and to provide information on forest depletion that can be used in the national forest statistics data program.

9. Goals for 1981-82:

   1. Conduct preliminary surveys of established impact study plots and areas of known pest infestations to determine the current and past pest damage, and the feasibility of quantifying its effect on tree mortality and growth loss. Major pests involved would be:

      a. Mountain pine beetle in southern Alberta and Saskatchewan.

      b. Spruce budworm in Manitoba.

   2. Review and evaluate the literature and data on the effects of major forest pests on tree growth and tree mortality in the forests of the region. If possible, apply this information to quantify pest depletion estimates for the National Forest Resource Data Program.

Goals for 1981-82 (cont'd.)

3. Investigate the possibility of establishing permanent plots in forests with known pests infestations (spruce budworm, jack pine budworm and dwarf mistletoes) to measure impact annually.

4. Investigate the possibility of using remote sensing techniques to assess pest damage.

5. Explore avenues of improved liaison with other forestry agencies to maximize data collection.

10. Accomplishments for 1981-82:

(1) Preliminary surveys were conducted and impact plots (37) established in mountain pine beetle infested pine stands in Waterton Lakes, Yoho and Kootenay National Parks. The spruce budworm impact plots established in 1978 in Riding Mountain National Park were reassessed.

(2) The literature and available data on the effects of major forest pests on tree mortality and growth in the region were reviewed and evaluated and used for depletion estimates for the National Forestry Statistics Program.

(3) Permanent plots (17) were established in spruce-fir forests with known pest infestations by the spruce budworm in Manitoba.

(4) Remote sensing techniques to assess pest damage were investigated, and a seminar and discussion held at NoFRC. An Information Report on the proceedings is in final preparation.

(5) Contacts with provincial forestry personnel have been established and cooperation has been good.

11. Goals for 1982-83:

(1) Remeasure 37 impact plots and assess damage by the mountain pine beetle in the National Parks. Establish additional plots if required.

(2) Prepare first draft of a literature review on the effects of major forest pests on tree mortality and growth in the forests of the region.

(3) Remeasure 17 spruce budworm impact plots established in 1981 in Manitoba and establish additional plots if required. Establish impact plots in stands of known jack pine budworm infestations and dwarf mistletoe infection.

Goals for 1982-83 (cont'd.)

(4) Continue to investigate the use of remote sensing techniques as a tool to assess pest damage in cooperation with project NOR-22.

(5) Continue to develop effective working relationships with officials of provincial and industrial forest resource management agencies.

12. Publications:

1981-82:

Journal articles: Nil
Information reports, notes, etc.

The following Papers In Hudak and A. G. Raske (editors). 1981. Review of the Spruce Budworm Outbreak in Newfoundland -- its Control and Management Implications. Env. Can., Can. For. Serv., Nfld. For. Res. Centre. Inf. Rpt. N-X-205.

(a) Moody, B. H. 1981. Damage caused by the spruce budworm in immature stands. pp. 47-49.

(b) Raske, A. G. and B. H. Moody. 1981. V. 3. Damage by the present outbreak to the forests of Newfoundland to 1979, a) Commercial fibre production. b) Mature stands. pp. 37-47.

(c) Van Nostrand, R. S., B. H. Moody and D. B. Bradshaw. 1981. II. The forests of Newfoundland, their major pests and fire history. pp. 3-10.

(d) Blais, J. R., E. G. Kettela and B. H. Moody. 1981. III. History of spruce budworm outbreaks in eastern North America with special reference to Newfoundland. pp. 12-17.

Moody, B. H. 1981. The role, informational requirements and pest problems of the forest insect and disease survey. Paper presented at seminar on "The Use of Remote Sensing in Forest Pest Damage Appraisal". Envir. Can., Can. For. Serv., NoFRC, Inf. Rpt. NOR-X- (In Press).

File Reports:

Moody, B. H. 1981. Impact of the mountain pine beetle on various lodgepole pine stands. I. Plot establishment and methods. File Rpt. Study NOR-1-184.

Moody, B. H. 1981. Impact of the spruce budworm on some major forest types of Manitoba. I. Plot establishment and methods. File Rpt. Study NOR-1-184

13. Signatures:

B. H. Moody
Investigator

Program Manager

Director A. D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: February 2, 1982

1. Project: Reduction of damage from pollutants in the atmosphere.

2. Title: Assessment of air pollution impact on forest systems.

3. New: Cont.: X 4. No.: NOR-7-114

5. Study Leader: P.A. Addison and D.G. Maynard

6. Key Words: Sulphur gases, element sulphur, vegetation, lodgepole pine, white spruce, biomonitoring.

7. Location of Work: Region-wide (with emphasis on west-central Alberta)

8. Goals for 1981-82:

    1. Revise and submit a journal article on the quantification of branch dwelling lichen communities for the detection of air pollution impact.

    2. Study the influence of type and density of plant canopies on the ground level concentration of SO_2.

    3. Examine the effect of SO_2, light and humidity on the stomatal resistance of jack pine.

    4. Initiate a paper on the gradient sites in the vicinity of Athabasca Oil Sands development.

    5. Represent Canadian Forestry Service as a member of the Regional Hydrocarbon Committee.

    Additional Goals:

    6. Initiate a study to assess plant ecological effects of sour gas processing in west-central Alberta.

    7. Establish and describe a biomonitoring network in the vicinity of Ram River and Strachen sour gas plants.

    8. Assess the forest damage resulting from a sulphur block fire at Ram River Gas Plant.

9. Determine the effect of Ram River gas plant tailings pond water on seed germination and initial root growth of lodgepole pine and white and black spruce.

9. Accomplishments in 1981-82:

1. The article on the quantification of branch dwelling lichen communities for the detection of air pollution impact has been partially revised with the incorporation of data from a fourth year of study. Completion is expected before the end of the fiscal year.

2. Three towers, 2.8 km south of Suncor Inc. were established in each of three forest types (jack pine, aspen and black spruce). Pairs of sulphation plates were placed 3 m above the canopy, at the top of the canopy and at 4 other heights down through the canopy. Samples were changed at 1-2 month intervals and analysed.

3. Owing to a combination of difficulty in obtaining equipment, in maintaining the pollution chamber, a change in staff and the addition of several major goals, this goal was not met. It is anticipated that the experiments will be carried out in 1982-83 and that stomatal response will be incorporated into the study on the combined effects of time of fumigation and concentration of SO_2 on jack pine.

4. A paper entitled "Biomonitoring in the Athabasca Oil Sands area of Alberta: progress and pitfalls" has been written and will be presented to the Alberta Department of the Environment, Canadian Petroleum Association, Oil Sands Environmental Study Group Symposium on Acid Forming Emissions in Alberta and their Ecological Effects. The information on the gradient sites is included in detail.

5. The Regional Hydrocarbon Committee was involved in a variety of ways with the following projects:
    a. North Davis Strait Drilling Program
    b. Oil Transport through Parry Channel
    c. Lancaster Sound Hearings
    d. Beaufort Sea Oil and Gas Development

Additional Accomplishments:

6. Upon request from industry (Aquitaine Company of Canada and Gulf Canada Ltd.) a proposal was written and submitted to:
    a. Establish a biomonitoring network in west-central Alberta in the vicinity of Ram River and Strachen sour gas plants.
    b. Determine the impact of elemental sulphur on the forest system in the area.

7. A set of 26 biomonitoring sites were established and described in lodgepole pine sites surrounding the two sour gas plants. Site locations were based upon air quality information, topography, air-flow pattern, logistics and accessibility. Descriptions included vascular and lichen plant communities, soils and several measurements of the growth and vitality of lodgepole pine. Samples of soils and 5 different plant species (10 reps) were collected for element analysis and sulphation plates were installed (5) at all sites.

8. An Assessment of the damage resulting from a sulphur block fire in mid-July was carried out upon request from the Air Quality Division of Alberta Environment. Copies of the report have been submitted to Alberta Environment, Alberta Forest Service and Aquitaine Company of Canada.

9. Seed germination and initial root growth of the dominant tree species in the Ram River area were determined in both tailings water and distilled water. No significant differences were observed in either root growth or germination with the noteable exception of lodgepole pine which had greater root growth in pond water.

10. Goals for 1982-83:

1. Work Plan Goals 3 and 12. Under field conditions in the vicinity of sulphur dust sources, measure the movement of sulphur and other elements in forest soil. (Addison-Maynard)

2. Work Plan Goal 4. In the vicinity of sulphur dust sources determine the variability and distribution of sulphur and other essential macronutrients in the primary soil horizons. (Maynard)

3. Work Plan Goal 9. Complete description of vegetation and soils plots to provide information of forest condition in west-central Alberta. (Addison-Maynard)

4. Work Plan Goal 10. Measure the amount and form of sulphur deposition in the vicinity of sulphur dust sources. (Addison-Maynard)

5. Work Plan Goal 11. Sample and analyse lichen and moss material in the vicinity of Ram River and Strachan Gas Plants. Measure living and dead moss cover in the vicinity of sulphur dust sources. (Addison)

6. Work Plan Goal 17. Revise and submit an article on the quantification of branch dwelling lichen communities for the detection of air pollution impact. (carried over from 1981-82) (Addison)

11. Publications:

12. Signatures:

Investigator

Program Manager

Investigator

Director A.D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: February 2, 1982

1. Project: Reduction of damage from pollutants in the atmosphere.

2. Title: Impact of air pollutant mixtures on forest vegetation and soils.

3. New: Cont.: X 4. No.: NOR-7-182

5. Study Leader: D.G. Maynard and P.A. Addison

6. Key Words: Sulphur dioxide (SO_2), nitrogen oxides (NO_x), vanadium nickel, synergistic, additive, antagonistic.

7. Location of Work: Oil sands areas of Alberta, Northern Forest Research Centre.

8. Goals for 1981-82:

    1. Write annual progress report on pollutant mixture effects. (Addison)

    2. Continue studies on the influence of pollutant mixtures on jack pine by soil contamination by measuring plant responses such as photosynthesis, peroxidase activity, growth, visual symptom development and element content. (Addison)

    3. Determine the magnitude and pattern of migration of pollutant elements and changes in soil nutrition caused by the addition of pollutant mixtures. (Baker)

    4. Continue the study on the impact of air pollution mixtures on epiphytic lichens. (Addison)

9. Accomplishments in 1981-82:

    1. Two reports were written and accepted by Research Management Division, Alberta Environment.
        a. Addison, P.A., A.A. Khan, J. Baker, S.S. Malhotra, F. Theriault, F. Radford and J.I. Ridgway. 1981. Effects of mixed pollutants on soil-plant microcosms. 20 pp.
        b. Khan, A.A., S.S. Malhotra, F. Radford and P.A. Addison. 1981. Effects of SO_2 on lichen physiology. 8 pp.

2. The effect of litter on the response of jack pine seedlings to pollutants added to the soil was examined. Plants grown in sand with a mantle of litter had greater carboxylase activity than those grown in sand alone. No effect of the pollutant treatments has been demonstrated to date.

3. Owing to technical difficulties, the experiment on soil-plant microcosms had to be terminated. No work was done on the movement of pollutants within the cores.

4. A study on the effects of time of exposure and SO_2 concentration on *Evernia mesomorpha* has been carried out in part. Analyses of physiological responses and tissue S concentrations have been completed. Several statistical tests are currently being performed and follow-up experiments to confirm some results are still required.

10. Goals for 1982-83:

1. Work Plan Goal 1. Continue measuring the effect of pollutants in the soil on vascular plants by developing a closed experimental system and measuring above- and below-ground biomass. (Addison)

2. Work Plan Goals 2 and 13. Initiate leaching and deposition experiments on soil columns to determine the influence of soil LFH on the mobility of pollutants and other elements in the soil. (Maynard)

3. Work Plan Goal 6. Continue experiments on previsible and transitory responses of plants to pollutants to develop methods to assess pollutant injury to plant metabolism. (Addison)

4. Work Plan Goal 7. Measure the response of RUDP carboxylase and stomatal resistance of jack pine to various SO_2 concentrations and times of exposure. (Addison)

5. Work Plan Goal 8 and from NOR-7-114. Measure changes in photosynthetic rate, stomatal resistance and RUDP carboxylase in jack pine during fumigation with SO_2 to attempt to separate biochemical and biophysical components of plant resistance to SO_2. (Addison)

6. Work Plan Goal 14. Submit an article on the sensitivity of boreal forest woody plants to SO_2 and the effect of a contaminated substrate. (Addison)

7. Work Plan Goal 15. Submit an article on the effect of time of exposure and concentration of SO_2 on lichens. (Addison)

8. Work Plan Goal 16. Write a report on the influence of stand type on the patter of S deposition in forests. (Addison)

11. Publications:

12. Signatures:

P.N. Addison
Investigator

Program Manager

Doug Maynard
Investigator

Director A.D. Kiil

NOR-9-132

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: Jan. 15, 1981

1. Project: Forest insect and vegetation management systems

2. Title: Chemical Controls of pests and vegetation in managed forests.

3. New: Cont.: X 4. No.: NOR-9-132

5. Study Leader: J. Drouin

6. Key Words: Efficacy, spraying toxicology, pesticides, registrations, residuals, formulations, herbicides, pheromones.

7. Location of Work: Prairie Region

8. Study Objectives:

   1. To develop control methods and assess needs on the use of herbicides and pesticides as a tool in forest management.

   2. Conduct efficacy trials for various dosages, formulations and timing and to determine percent mortality of host species.

   3. Provide data to aid registration recommendations for selected chemical products.

9. Goals for 1981-82:

   1. Continue evaluations with herbicides, selections of herbicides, selection of program and proposals for ground and aerial applications of herbicides in Alberta and Manitoba, monitor and assess existing trials, establish new test sites, and expand to spring and summer applications of herbicides as follows:

      a) Conifer release from weeds/grass competition:

         - with new 5% grid balls @ 6' spacing
         - foliar application with glyhosate (Roundup)
         - with Velpar L (hexazinone) @ 2, 3, 4, lbs/acre applied in early spring.

Goals for 1981-82: (cont'd)

b) Conifer release from Brush competion:

- with Kre ite (no common name) for site preparation and release
- with glyphosate (Roundup)

c) Chemical Thinning in Pine:

- with Hyvar X-L (bromacyl) @ 4 mL/2" stem diameter

2. Assist in the development of attractant (pheremone) studies with N.R.C. Saskatoon; assistance from H. Wong and Survey personnel:

- continue field tests of pheremone traps for *P. willingana* & *P. crescentana* to distinguish damage larval differences, populations & distribution.

- set out 6 traps in Manitoba, Alberta, Saskatchewan for *Rhyacionia buoliana* for distribution, populations.

- set out 6 traps at Devon Nursery to collect the northern pitch twig moth *P. albicapitana* and collect 100 pupae in mid-June for analysis.

3. Participate in the study of Seed and Cone insects in the prairie region by investigating means of control through chemicals.

4. Review, edit, illustrate Pest Leaflets, Information Reports and journal articles.

5. Obtain input from Tree Physiologist.

10. Accomplishments in 1981-82:

1. Continued assessments, monitoring of the established herbicide trials and have expanded these evaluations to spring and fall tests in Manitoba and Alberta to a total of 69 plots in 1981 as follows:

a) Conifer Release from weed/grass competition; Alberta

Grande Prairie:	Velpar L @ 2,3,4, lbs/acre...6 + 1 control plot,	..spring
	Hyvar X-L @ 4 ml/2.5 cm stem 2 plots	..fall
	Velpar Granular 20% @ 12.5 lbs/acre.. 1 plot	..fall
	Krenite, 2% solution .. 1 plot	..fall

Accomplishments in 1981-82: (cont'd)

Results: Fair control with Velpar 'L' @ 2, 3, lbs/acre, good @ 4lbs/acre - some chlorosis on host. Hyvar X-L gave 100% defoliation on alder, poplar, willow. Velpar Granular and Krenite will be assessed 1982.

MANITOBA: Agassiz

Velpar Gridballs, ½ cc 20% @ 7.5,15,25 lbs/acre + control 7 plots..spring
Velpar Granular 20% @ 12.5,25 lbs/acre....4 plots..spring
Velpar Gridballs, ½ cc 20% @ 7.5,15, 25 lbs/acre 3 plots..spring

Results: Good to excellent controls with Velpar gridballs - from 70 - 75% defoliation on all species - gridballs more effective in sandy soils, Animal "digs" at pellet drops - damage to white spruce increases with dosage. Granular shows excellent control on all ground cover from 70-100% - Granular adequate at 12.5 lbs/acre in sandy soils.

Piney: Red Pine Release

Velpar Gridballs, 2 cc 10%
½ cc 10%..@ 7.5,15,25 lbs/acre, 3 plots ea + 1 control
Velpar Granular 20% @ 12.5 & 25 lbs/acre 2 plots ea + 1 control

Pine Falls

Velpar Gridballs, ½ cc 20% @ 3.75,7.5,12.5/acre + control
Velpar GB, ½ cc 10% @ 3.75,7.5,15.0,25.0 lbs/acre 8 plots..spring
Velpar Granular 20%, 12.5,25.0 lbs/acre...4 plots..spring

Results: Velpar gridballs increasing fair to good in 15 lbs/acre very heavy black ash growth (also elm, maple, cranberry). Velpar G. gave good to excellent results in all 4 plots.

b) Conifer Release from Brush Competition in Alberta, Manitoba;

Slave Lake:

Velpar GB, ½ cc 20%, 7.5, 15, 25 lbs/acre 3 plots..spring
½ cc 10%, 7.5, 15, 25 lbs/acre 3 plots..spring
1 cc 20%, 10, 20 lbs/acre 2 plots..fall
Velpar Granular 20%, 12.5, 25.0 lbs/acre 4 plots..spring

Accomplishments in 1981-82 (cont'd)

Results: July 1980 Velpar gridball tests varied fair to good with some "streaking" in higher dosage,-some mortality to host at 30 lbs/acre also. Spring 1981 gridball tests gave fair to excellent defoliation-occasional host chlorosis or mortality. Velpar granular plots were excellent, visible with little host mortality.

MANITOBA: Agassiz
Velpar GB, ½ cc 20%, 7.5,15,25 lbs/acre 10 plots,..spring
Velpar Granular 20%, 12.5,25 lbs/acre + control
4 plots,..spring

Results: Plots and results are one and the same. Controls were for both Conifer Release from weed/grass and brush competition

Pine Falls:
Velpar GB, ½ cc 20%, 3.75,7.5,12.5 lbs/acre..3 plots..spring
½ cc 10%, 3.75,7.5,15,25 lbs/acre + control..
5 plots..spring
Velpar Granular 20%, 12.5,25 lbs/acre 4 plots..spring

Results: Again, same plots/results for Conifer Release from grass/weed and shrub competition.

c) Chemical Thinning in Pine and White Spruce, Alberta

Edson: Hyvar X-L bromacil 4 ml/2.5 cm stem diam..
2 plots..spring
@ 6' grid

Results: Hyvar X-L (bromacil) for chemical thinning was very good but causing mortality to a group of trees. Dosage is too high and was reduced in subsequent trials to 4 ml/2.5 stem diam. @ 6 foot grid.

Grande Prairie: Hyvar X-L, @ 4 ml/2.5 cm stem diam, alder, willow ..2 plots
4 ml/2.5 cm stem diam, alder, willow and poplar, summer applications

Results: Hyvar X-L (bromacil) to remove alder, willow, poplar clumps. Excellent results, no mortality to hosts (w. spruce and lodgepole pine).

Accomplishments in 1981-82 (cont'd)

2. Assisted in the development of attractants (pheromone) studies with National Research council, Saskatoon personnel with Dr. Wong, D. Szlabey and survey personnel:

   - mass collection of northern pitch twig moth pupae (200) in early spring for rearing and attractant identification. These were reared and used in extration of attractants. The first series were not successful but the second resulted in excellent catches, identification and distribution.

   - continued field testing of attractants traps (41) for P. willingana, P. crescentana and P. aesculana, rearings, biologies, populations and distribution attractant successfully trapped these three species where we thought only P. willingana existed - identifications were made as well as some biologies of each species.

   - Set out 6 traps respectively in Manitoba, Saskatchewan and Alberta for Rhyacionia buoliana for distribution, populations. No pine shoot moths were found in the traps when retrieved in the fall.

   - Set out traps at Devon (30), Edson (14) and Hinton w/W.G.H. Ives program (9) to test a variety of attractants for the Northern Pitch Twig Moths, Petrova albicapitana, and metallica for distribution, populations and effectiveness of chemicals. Second batch of attractant proved to be efficient and attracted good catches of both species. The 1982 chemical will be even further refined and should be superior.

3. Participate in Seed and Cone collections for J. Muldrew.

4. Review, edit Pest Leaflet, Illustrate 3 covers for Information Reports.

5. Obtained input from tree Physiologist.

6. CFS representation, reporting, handling requests, surveys, consultations talks and papers were provided to the following:
   - Western Committee on Crop Pests (ECPUA)
   - Expert Committee on Weeds (ECW)
   - National Research Centre
   - Plant Industry Lab Alta, Agric., Brooks Horticultural Res. Ctr., general public industry.

   Drouin, J. A. and H. R. Wong. 1981. Insects attacking the fruits of Saskatoon and Chokecherry and their Chemical Controls, 1982. Environ. Canada, Can. For. Ser., North. For. Res. Cent. Edmonton, Alberta File Report.

Drouin, J. A. and H. R. Wong, 1981. Birch Leaf Miners and their Chemical Controls in Alberta. 1982. Environ. Canada, Can. For. Ser., Nor. For. Res. Cent., Edmonton, Alberta. Inf. Rep. NOR-X

Wong, H. R., J. A. Drouin, D. Szlabey and W. Dang. 1981. Identification of species of Proteoteras in the Canadian Prairies. 1982. Can. Ento.

11. Goals for 1982-83:

1. Continue assessment, monitoring of established plots, continue to expand field testing of Velpar Granular for spring application, Velpar L at lower dosage and of Krenite at Grande Prairie (Saddle Hills) and at Faust, Slave Lake.

   a) Conifer Release and Site Preparation, from weed/grass competition;

      Velpar G 20% @ 8, 12.5 lbs/acre..Faust, Saddle Hills, Piney, Agassiz, Manitoba

      Velpar L @ 2, 3 lbs/acre.....Economy Tower, Grande Prairie

      Krenite 48%, 1, 2% spray solution....Saddle Hills, Grande Prairie

2. Continue and complete evaluation of pheromones with NRC Saskatoon;

   - for the Boxelder Twig Borer complex, clarify biologies and (taxonomy) of the species (3) with Wong, Szlabey, Dang.

   - continue evaluation of attractants for the northern pitch twig moth w/large scale field testing in the Edson-Hinton areas with W. G. H. Ives' study

   - continue to cooperate in monitoring for the detection of the pine shoot moth, R. buoliana.

   - cooperate with NRC Saskatoon, in the evaluation of new attractants for assessing the abundance of white pine weevil, root collar weevil, by mass collections of adults, population and distribution in forest regeneration in Hinton-Edson areas with W. G. H. Ives' study.

3. Participate in the Seed and Cone study and chemical controls with J. A. Muldrew using the systemic insecticide as soil drenches that have proven to be most successful to date, i.e. orthene, dimethoate and carbofuran.

12. Publications:

1981-82

Drouin, J. A. 1981. Expert Committee on Weeds, Research Report Vol. 3. Western Canada Section Meeting, Banff, Alberta, pp. 126-131.

Drouin, J. A. 1981. Annual revision of insect pests and controls on berry crops. In WCCP Report (1981). 5 pp.

Cerezke, H. F., J. A. Drouin and B. Neill. 1981. Annual revision of insect pests and controls on shelterbelts, ornamentals and shrubs. In WCCP Report (1981). 18 pp.

Soehngen, U. and J. A. Drouin. 1981. Annual revision of insect pests and controls on houseplants and on greenhouse woody ornamentals. In WCCP Report (1981). 14 pp.

13. Signatures:

Investigator

Program Manager

Director A. D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982-83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 15, 1982

1. Project: Forest insect and vegetation management systems

2. Title: Evaluation of mortality in stands of young trees in plantations and scarified areas.

3. New: Cont: X 4. No.: NOR-9-181

5. Study Leader. W.G.H. Ives, K. Froning

6. Key Words: Jack pine, *Pinus banksiana* Lamb., lodgepole pine, *Pinus contorta* Dougl., red pine, *Pinus resinosa* Ait., white spruce, *Picea glauca* (Moench) Voss, insect damage, tree diseases, stocking standards, site classes, reforestation, browsing, rodent damage.

7. Location of Work: Prairie Provinces and Edmonton.

8. Study Objectives:

To determine whether or not pine tree survival from establishment to age 35 years is related to site conditions, and if so, to prepare a set of survival curves for each site class.

9. Goals for 1981-82:

1. Select a number of sampling areas to represent several age groups and sites in lodgepole pine regeneration on scarified and planted sites in the Hinton area of Alberta.

2. Establish 40 10 m^2 plots in each of the above areas, recording the numbers of trees on each plot. A total of about 3000 plots are planned (Three sites, two planting methods, six age groups, two replicates, 40 plots).

3. Locate the 18 jack pine plots established by DeBoo in Manitoba in 1967 and measure height to base of current growth. Record numbers of living and dead trees and re-stake and re-tag trees as necessary.

Goals for 1981-82 (cont'd)

4. If time permits, establish additional plots to give representation in additional age groupings to those represented by DeBoo's plots.

10. Accomplishments in 1981-82:

1. A total of 59 sampling areas in several age classes were selected in the Hinton, Alberta area. These areas were distributed among the various working circles as follows: McLeod II--8; McLeod VI--17; McLeod IX--6; Embarras III--2; Athabasca XIX--15; Berland III--7; and Marlboro VII--4. The poor representation in Embarrass III and Marboro VII was due to the difficulty encountered in working these areas from a base at the Hinton trailer camp. There was simply too much travel involved.

2. A total of over 2,000 plots were established in these areas, of which 1,829 contained one or more lodgepole pine. The planned replication could not be followed for a number of reasons;
   1) site classes, as such, could not be recognized reliably with our limited expertise;
   2) scarification was almost universally utilized by St. Regis, planting was used only to fill in gaps;
   3) only limited cut-over areas were available in some age categories, particularly in the early years of operation;
   4) because of the previously mentioned problems, strict equality in representation was impossible; and
   5) not all areas had 40 plots, for various reasons.

   What we attempted to achieve instead was to have plots in a representative cross-section of the pine areas. We avoided problem areas, where adequate stocking had not been achieved, simply because the small-plot concept was not satisfactory for such areas. As it was, a number of the plots contained only 1 or 2 pine, the rest of the sample trees were around the plot area. All information relating to the plots near Hinton, has been transferred to data sheets preparatory to key punching. This includes data on tree height and condition, stand density in each of the plots, a crude description of the vegetative cover in most of the plots and information on each of the cut-over areas sampled, such as a number of positive and negative plots and aspect.

3. Information on the 18 jack pine plots established by DeBoo in 1967 was not obtained until the fall, so it was not possible to do any work with the plots. Ten of the plots were located, however, and the areas containing the remaining eight plots are known. On the

Accomplishments in 1981-82 (cont'd)

basis of limited checking in plots that were examined, it should be possible to resurrect most or all of them. The plots will have to be re-staked, and the trees re-tagged, but this should not be too difficult, as the trees were planted in furrows. Ingress may present some problems, but the amount of natural regeneration seems to be low.

4. A number of plantations were selected, five from each 5-year age class, over a planting span of 25 years. Plots were established in 7 of these areas, at the rate of 40 per area, to give a total of 280 plots in all. Other commitments limited the amount of time available for plot establishment.

11. Goals for 1982-83:

1. Establish additional plots in lodgepole pine regeneration near Hinton, Alberta, to fill in gaps. These plots will probably be in the Marlboro and Embarrass working circles, as these areas were poorly represented, due to the difficulty in working them from Hinton.

2. Assess first-year mortality of lodgepole pine in the plots near Hinton.

3. Prepare an establishment report outlining the procedures used in establishing the lodgepole pine plots near Hinton, and summarizing information on tree condition and first-year mortality.

4. Locate the 18 jack pine plots established by DeBoo in Manitoba in 1968 and measure height to base of current growth. Record numbers of living and dead trees and re-stake and re-tag trees as necessary.

5. Complete the establishment of plots in plantations of jack pine in Manitoba to provide a cross sectional representation of plantings varying from 1 to 25 years in age.

12. Publications:

Nil

13. Signatures:

Investigator

Program Manager

Investigator

Director A. D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 1983

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 15, 1982

1. Project: Forest insect and vegetation management systems

2. Title: Insects and diseases affecting seed production in the Prairie Region.

3. New: X Cont.: 4. No.: NOR-9-185

5. Study Leader: J. A. Muldrew

6. Key Words: Seed production, seed and cone insects, seed orchards, white spruce, *Picea glauca*, Jack pine, *Pinus banksiana*, Lodgepole pine, *Pinus contorta*, *Dioryctria abietivorella* (fir coneworm), *D. reniculelloides* (spruce coneworm), *Laspeyresia youngana* (spruce seed moth), *Hylemia anthracina* (spruce cone maggot), *Megastigmus atedius*.

7. Location at work: Prairie Provinces

8. Study Objectives:

   1. Determine the species and abundance of cone and seed insects and their importance in the production of coniferous seed, primarily white spruce.

   2. To study the natural enemy complexes of each pest species and the extent of mortality exerted by these natural enemies.

9. Goals for 1981-82:

   1. To contact the seed producing agencies in each of the Prairie Provinces to arrange to obtain samples of cones from a reprentative series of the areas in which the cones are collected. Each sample should be between 100 and 200 cones and ideally should be removed from the collection before any seeds have come loose from the cones.

   2. Cones will be collected at weekly intervals at two selected locations near Edmonton from the time of early cone formation to the time of seed fall. Some cones will be dissected and some reared to determine the insects attacking the cones and seeds and the extent of the damage caused by them.

3. Insect pests of cones will be dissected to study the natural enemies attacking them and they will be reared to obtain adult specimens of these natural enemies for identification.

10. Accomplishments in 1981-82:

1. Contact was made with workers at the Pine Ridge Nursery, Alberta; the St. Regis Ltd. Nursery, Alberta; the Prince Albert Nursery, Saskatchewan and the Pineland Nursery in Manitoba (the latter via K. Froning). In all cases either no cones or very few had been collected by these nurseries. Some collectors in Alberta had reported that in the few locations where cones were fairly abundant, the damage to the seeds by insects was so high as to make collecting impractical.

2. Cones on selected trees at the Devon Nursery and in Elk Island Park, Alberta, were marked in early June shortly after they appeared and were checked at bi-weekly intervals. At Devon, 1,860 cones were marked on five trees and at Elk Island, 1,172 were marked on ten trees. Loss of cones during the summer was low; less than 5% on each tree. Missing cones appeared to be due to removal by squirrels. All cones examined showed at least some insect damage and those checked late in the season, when feeding by insects was complete, showed over 90% damage to the seeds, varying up to 98%. Cones removed by squirrels found on the ground had a few scales removed but were mostly rejected by the squirrels for food, probably due to the high rate of insect damage.

3. Attempts to rear both the insect pests and their natural enemies were unsuccessful. Methods attempted were (a) placing branches bearing white spruce cones in jars of water over a layer of peat moss in cages and (b) rearing the larvae recovered during examination in the rearing medium developed for the spruce budworm.
In the latter case the dipterous pest commonly found (almost certainly Hylemya anthracina) died before forming puparia. The common lepidopteours pest (almost certainly Laspeyresia youngana) fed to pupation in several cases but the pupae did not survive.

11. Goals for 1982-83:

1. Cooperate with the F.I.D.S. in the assessment of damage due to seed and cone insects in the Region.

2. Study the phenology of cone insects on white spruce and elaborate losses due to insects during the season.

3. Assess the importance of insect pest problems related to nursery production of conifers in cooperation with the F.I.D.S.

4. Assess mortality of seed and cone pests due to natural enemies and relate to biological control.

5. Initiate preliminary studies on the use of systemic insecticides to control seed and cone insect pests on white spruce.

6. Complete publication "Dispersal of Olesicampe benefactor Hinz, an introduced parasite of the larch sawfly.

12. Publications:

N/A

13. Signatures:

Investigator

Program Manager

Director A. D. Kiil

227

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: February 2, 1982

1. Project: Long range transport of air pollutants.

2. Title: Impact of air pollutants from major regional sources on forest vegetation and soils.

3. New: Cont.: X 4. No.: NOR-32-178

5. Study Leaders: G. Hogan, D. Maynard

6. Key Words: Pollutant, sulphur, metals, vegetation, soils, diagnosis, impact, restoration.

7. Location of Work: Region wide.

8. Goals for 1981-82:

   1. Complete a report on the baseline study in Thompson. (Hogan)

   2. Prepare a journal article on the soil and vegetation work which forms a part of the Thompson study. (Hogan)

   3. Write a journal article on the lichen work which was part of the Thompson study. (Hogan)

   4. Prepare a journal article on the use of the moss bag technique and resultant data. (Hogan)

   5. Publish a journal article entitled "Pollutant distribution and containment within a forest system as a function of distance from a smelter source. (Hogan)

   6. Continue to investigate metal toxicity symptoms and metal tolerance in native vegetation, (hydroponic studies) and examine the physiological effects of metals. (Hogan)

   Added goals

   7. Supervise the delivery installation and quality assurance of the ICAP-AES.

   8. Design and construct an acid misting chamber and initiate experiments on the effects of acid mists on photosynthesis and nutrient composition of white spruce.

9. Investigate air pollutant damage to forest in the Yellowknife area at the request of EPS regional headquarters.

10. Continue to monitor bulk (wet & dry) deposition in expanded gradients around the Thompson and Flin Flon smelters. Continue to monitor particulate input to these sites using moss bags.

11. Initiate studies of sulphur and metal particulates introduced by deposition of forest soil processes and chemistry.

12. Initiate studies on the cycling of metals and sulphur within affected and control stands.

9. Accomplishments in 1981-82:

1. A report on the studies carried out in Thompson, to date, has been written. This report has been submitted to the Manitoba Clean Environment Commission to be considered as evidence during a public hearing to be held in March 1982.

2. This goal has not been met because of the expended in completing #7, defer to 1982-83.

3. This goal has not been met because of inconsistencies in the data which were collected over a two year period. Further sampling and analysis will be required before this goal can be met.

4. This goal has not been met because of the time expended in completing goal #7, defer to 1982-83.

5. A rough draft of this article has been completed and is ready for the initiation of the review process.

6. A study of the role of malic acid in metal tolerance in native grasses was carried out. These preliminary results indicate that the classical interpretation of this phenomenon does not apply to the species tested. Further work will be done in this area when time permits.

7. The installation of the ICAP-AES was initiated in May and was not completed until September. This lengthy process required the constant attention of professional staff during a three month period. The outcome of this objective is that the instrument is operational and adds significantly to the analytical capacity of this lab.

8. An acid misting facility has been designed and built and experiments on the effects of acid mists on three year old white spurce seedlings have begun. The first results of this study will not be available until late April of 1982.

9. An investigation of air pollution damage in the Yellowknife area was carried out. The results of this survey showed that an SO_2 fumigation event had occurred north and west of the smelter. Significant damage to white birch was evident up to 5 km from the source.

10. Monitoring of bulk deposition was carried out in Flin Flon and Thompson. The samples have been analysed and the data is being compiled. Monitoring of particulate deposition has been carried out at 22 stations using moss bags around two sources. The samples have been analysed and the results are being compiled.

11. Initiation of studies on metal and sulphur deposition and their effects on soil biological processes were carried out. Samples were taken on a monthly basis throughout the summer. Analysis of the samples has not taken place. This work was delayed because the soil chemist position was not filled until November.

12. This work could not be initiated because of delays in hiring a soil chemist.

10. Goals for 1982-83:

1. Initiate investigations into the effects of acid rain and dry deposition individually and in combination on the physiology and biochemistry of lichens and vascular plants. (Hogan)

2. Investigate and report on current and historical data on acid rain within the region (Forestry report) (Hogan)

3. Continue to investigate the effects of heavy metals and sulphur dioxide on soil chemical and biological processes, with particular reference to studies on soil respiration. (Maynard & Hogan)

4. Reexamine the sampling plots in Thompson and Flin Flon to determine effects of additional inputs of pollutants since the 1977/78 sampling. (Hogan & Maynard)

5. Prepare a report on the soil and vegetation work which forms part of the Thompson study. (Hogan)

6. Prepare an article on the use of the moss bag technique and resultant data. (Hogan)

7. Prepare a paper on the Flin Flon study entitled "Pollutant distribution and containment within a forest system as a function of distance from a smelter source". (Hogan)

8. Prepare a report (Forest Management Note) on the hazards of remote precip monitoring and the interpretation of data. (Hogan)

9. Reexamine lichen data from Thompson, if it warrants publication submit it as a quarterly report. (Hogan)

11. Publications:

12. Signatures:

Investigator

Program Manager

Investigator

Director A.D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: February 3, 1982

1. Project: Long range transport of air pollutants.

2. Title: Transport of airborne radionuclides released during uranium mining and milling operations and their effects on forest vegetation and soils.

3. New: Cont.: X 4. No.: NOR-32-186

5. Study Leaders: M.J. Apps and G.D. Hogan

6. Key Words: ^{222}Rn, airborne radioactivity, uranium mining and milling, forest vegetation and soils.

7. Location of Work: Uranium City - Wollaston Lake, Sask. and Northern Forest Research Centre, Edmonton, Alberta

8. Goals for 1981-82:

   1. Set up laboratories and develop methods for the determination of ^{226}Ra, ^{210}Pb, and ^{210}Po in plants and soils.

   2. Collect various plant and soil samples from the study area and analyze these for ^{226}Ra, ^{210}Pb and ^{210}Po.

   3. Determine the soil-plant radionuclide transfer coefficients and the fluxes of ^{210}Pb soils.

   4. Complete a review article on airborne radioactivity and plants.

9. Accomplishments in 1981-82:

   1. This goal could not be met because of the lack of funds for capital equipment. Funding for capital equipment must be forthcoming in 1982-83 if the objectives of this programme are to be met.

   2. Some samples from the Uranium City area were collected and an analysis for Uranium was carried out. Determinations of ^{226}Ra, ^{210}Pb and ^{210}Po cannot be carried out on existing equipment.

   3. This goal was not met because of the lack of instrumentation.

4. This review article has been completed and has been submitted to the journal "Science of the Total Environment" for publication.

10. Goals for 1982-83:

1. Select study sites to investigate pathways for the transport of radionuclides to vegetation in the Uranium City area. (Hogan & Apps)

2. Select species as monitors for radionuclide accumulation and migration. (Apps & Hogan)

3. Establish analytical facility to measure U.^{210}Pb, and ^{226}Ra and other toxic elements commonly associated with the Uranium mining and milling industry. (Apps)

4. Initiate a study to differentiate between wind blown dust and the emission component derived from tailings areas. (Apps)

5. Establish a benchmark and baseline monitoring system around a proposed representative mine site to study deposition of radionuclides during the mining and milling process. (Apps & Hogan)

11. Publications:

12. Signatures:

Investigator

Program Manager

Investigator

Director A.D. Kill

NOR-35-026

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982-83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 14, 1982

1. Project: Tree Disease Research

2. Title: Forest tree rusts of western North America.

3. New: Cont.: X 4. No.: NOR-35-026

5. Study Leader: Y. Hiratsuka

6. Key Words: *Cronartium*, *Pucciniastrum*, *Peridermium*, *Melampsora*, *Chrysomyxa*, cytology, morphology, taxonomy, Uredinales, inoculation experiment, pathogenicity.

7. Location of Work: Edmonton (laboratory, greenhouse and mycological herbarium), Western North America with particular emphasis on Northern Region (field).

8. Study Objectives:

General:

To acquire a comprehensive knowledge and to improve diagnostic capability on the forest tree rusts of western North America with particular emphasis on the Northern Region in terms of identity, host range, life history, distribution and pathogenicity.

Specific:

To study aspects of cytology, taxonomy, life history and host-parasite relationship of conifer needle rusts, pine stem rusts, and poplar-conifer rusts of the region, and related species in the world.

9. Goals for 1981-82:

1. Publish a paper on a new species of fungi isolated from a pine stem rust with Dr. A. Tsuneda.

2. Help revise a book entitled "Illustrated Genera of Rust Fungi" with Dr. C. B. Cummins (University of Arizona).

3. Complete analysis of data and the first draft of a paper on pine stem rusts plot study with Dr. A. Van Sickle (PFRC) and Dr. J. M. Powell (NoFRC).

4. Publish a paper on rodent damage of pine stem rusts (Powell).

10. Accomplishments in 1981-82:

1. A journal paper has been published on a new species of fungi isolated from a pine stem rust (see 15. Publications below).

2. Continued to help revision of a book entitled "Illustrated Genera of Rust Fungi" with G. B. Cummins (University of Arizona).

3. Analysis of data and publication of a paper on pine stem rusts plot study with Drs. Van Sickle and Powell was not completed.

4. A paper on rodent damage of pine stem rusts is submitted to a journal (Powell).

Added Accomplishments:

5. Conducted herbicide control trials of the alternate hosts of comandra blister rust at Pine Ridge Tree Nursery and prepared two reports for AFS. Funds for this work was made available by AFS.

6. Cooperated with Dr. M. Pickard (Dept. of Microbiology, University of Alberta) on isolation and characterization of antifungal metabolites produced by mycoparasites of pine stem rusts and prepared a report for AFS who supported this work.

7. Gave an invited talk at the XVII IUFRO World Congress in Kyoto, Japan entitled "Host relationship, life cycle, and species concept of *Cronartium* and *Endocronartium*", and the paper was published in the proceedings.

11. Goals for 1982-83:

1. Initiate and propose research plan for western gall rust of young lodgepole pine and screening methods for the disease. This plan will involve several cooperators including Dr. W. A. Ayer (Dept. of Chemistry, U. of A.), Dr. M. Pickard (Dept. of Microbiology, U. of A.), Dr. N. Dhir (AFS) and a graduate student in forest pathology (U. of A.).

2. Continue to help Dr. G. B. Cummins (University of Arizona) to revise a book entitled "Illustrated Genera of Rust Fungi" as a co-author.

3. Complete analysis and prepare a publication of a paper on pine stem rusts plot study with Drs. Van Sickle and Powell.

4. Results of herbicide control trials of the alternate hosts of comandra blister rust (second year results) will be reported.

12. Publications:

Up to 1981:

Journal articles: 35
Information reports, notes, etc.: 7
File reports: 2

1981-82:

Journal articles:

Hiratsuka, Y. 1981. Host relationship, life cycle, and species concept of *Cronartium* and *Endocronartium*. Proceedings XVII IUFRO World Congress Division 2: 247-255.

Tsuneda, A. and Y. Hiratsuka. 1981. *Scopinella gallicola*, a new species from rust galls of *Endocronartium harknessii* on *Pinus contorta*. Can. J. Bot. 59:1192-1195.

Tsuneda, A. and Y. Hiratsuka. Biological control of pine stem rusts by mycoparasites. Proceedings of Japan Academy 9:337-341.

Information reports, notes, etc.:

Hiratsuka, Y. 1981. Some developments in tree disease studies: Dutch elm disease and pine stem rusts. Proceedings of Western Society of Horticulturalists Convention, Regina, Saskatchewan.

Hiratsuka, Y. 1981. Western gall rust infections of nursery origin on jack pine in Manitoba. Northern Forest Research Centre, Canadian Forestry Service. Forest Management Note No. 5, 2 p.

Hiratsuka, Y. and S. Sato. Morphology and taxonomy of rust fungi. In: K. J. Scott (Ed.) "The Rust Fungi". Academic Press (In press).

File reports:

Hiratsuka, Y. and E. Allen. 1981. Eradication trials of comandra blister rust alternate hosts at Pine Ridge Tree Nursery, Smoky Lake, Alberta. Unpublished report submitted to AFS.

Pickard, M. A., N. Fairbairn and Y. Hiratsuka. 1981. Isolation and characterization of antifungal substance(s) produced by *Scytalidium uredinocola*, a hyperparasite of *Endocronartium harknessii*, the western gall rust. Unpublished report submitted to AFS.

Hiratsuka, Y. and E. Allen. 1981. Second-year results of the eradication trials of comandra blister rust alternate hosts at Pine Ridge Tree Nursery, Smoky Lake, Alberta. Unpublished report submitted to AFS.

Hiratsuka, Y. and E. Allen. 1981. Fungicide control of western gall rust - Establishment of control plots, 1981. Unpublished report submitted to AFS.

13. Signatures:

Investigator

Program Manager

Director A. D. Kiil

CANADIAN FORESTRY SERVICE

STUDY STATEMENT

1982 - 83

Responsibility Centre: NORTHERN FOREST RESEARCH CENTRE

Date: January 14, 1982

1. Project: Tree Disease Research

2. Title: Forest diseases: Research and technical transfer services

3. New: Cont.: 4. No.: NOR-35-153

5. Study Leader: Y. Hiratsuka

6. Key words: Mycology, herbarium, culture collection, nomenclature, identification.

7. Location of work:

8. Study Objectives:

   1. To provide diagnostic and taxonomic service of tree diseases and other forest fungi.

   2. To maintain and improve diagnostic and taxonomic service capabilities of tree disease pathogens and other forest fungi in the region.
   3. To prepare check lists of forest fungi of important areas (e.g. national parks, provincial parks, etc.), diagnostic keys for identification, and other related publications.

9. Goals for 1981-82:

   1. Complete the first draft of an information publication on major tree diseases of the Prairie Provinces by the end of 1981 to be able to be published in 1982-83 fiscal year.

   2. A journal paper on a new poplar leaf spot fungus will be published.

   3. Two pest leaflets (western gall rust and silver leaf) will be published.

   4. Provide diagnostic and identification service of tree and shrub disease.

Goals for 1981-82: (cont'd)

5. Maintain and upgrade the Mycological Herbarium and a fungus culture collection.

10. Accomplishments for 1981-82:

1. Significant progress (80%) was made to complete the first draft of an information publication on major tree disease of the prairie provinces.

2. A journal article on a new poplar leaf spot fungus has been prepared and under review.

3. Two pest leaflets (silver leaf and western gall rust) were prepared and under review.

4. Provided diagnostic and identification service of tree and shrub diseases, and other fungi.

5. Maintained and upgraded the Mycological Herbarium and a fungus culture collection.

Added goals:

6. Cooperated with Dr. W.A. Ayer (Dept. of Chemistry, Univ. of Alberta) on biologically active metabolites of selected forest disease pathogens.

7. Cooperated with Dr. S. Takai (GLFRC) on DED research and two journal publications are under review. Gave an invited talk at DED Symposium and Workshop.

11. Goals for 1982-83:

1. Complete the first draft of an information publication on major tree diseases of the Prairie Provinces by the end of 1982.

2. Provide diagnostic and identification service of tree and shrub diseases.

3. Maintain and upgrade the Mycological Herbarium (forest disease reference collection) and a fungus culture collection.

Goals for 1982-83: (cont'd)

4. Cooperate with Dr. W.A. Ayer (Dept. of Chemistry, U. of A.) on biologically active metabolites of selected forest disease pathogens.

5. Cooperate with Dr. S. Takai (GLFRC) on DED research and prepare two mss for publication.

6. Supervise the thesis research of a Ph.D. candidate in forest pathology on Armillaria root rot of young coniferous forests.

12. Publications:

Up to 1980:

Journal articles: 3
Information reports, notes, etc.: 6
File reports: Nil

1981-82:

Journal articles:

Hughes, S. J. and Y. Hiratsuka. 1981. *Capnobotrys sessilispora* Fungi Canadensis No. 201: 1-2.

Information reports, notes, etc.:

Hiratsuka, Y. and S. Takai. 1981. Scanning electron micrographs of cerato-ulmin and *Ceratocystis ulmi* induced vascular symptoms in elm. Symposium and Workshop on Dutch elm disease, Winnipeg, Manitoba. p. 24.

Takai, S. J. Kryweincyyk, Y. Hiratsuka, W. C. Richards and B. A. Mathieson. 1981. Cerato-ulmin, the Dutch elm disease toxin. Poster Session, IUFRO World Congress, Kyoto, Japan.

Hiratsuka, Y. 1981. Conifer seed pathology. In: R. Huber (ed.) High quality collection and production of conifer seeds. Northern Forest Research Centre, Information Report NOR-X-235 p. 62-63.

13: Signatures:

Investigator

Program Manager

Director A. D. Kiil