

**Minutes of the Third Meeting of the Great Plains Tree Pest Workshop
Manhattan, Kansas
March 14 and 15, 1995**

Tuesday, March 14, 1995

The meeting was called to order by Chairperson Rick Dorset at 9:00 AM.

In attendance: Robert Bauernfeind (KSU); Rich Dorset (SDSF); Jeri Lyn Harris (USFS, Rapid City Service Center); Judy Pasek (USFS, Rapid City Service Center); Bill Schaupp (USFS, Rapid City Service Center); Mike Schomaker (GSFS); Ned Tisserat (KSU); Les Pinkerton (KSFS); Dave Johnson (USFS, Lakewood Service Center).

After welcome and introductions by our hosts, Les and Ned, the mailing list was circulated for additions and corrections. A motion was made to drop from this list any persons who haven't attended or responded for the last 3 years. The motion was passed and the Secretary will update the mailing list accordingly. The minutes of the last meeting were read and accepted.

Old business: Mike Schomaker reported on a 2-day riparian ecology workshop that was held in Ft. Collins. One data base that is sorely needed is an inventory of insects and diseases that are commonly encountered. Since riparian ecosystems contain a wide array of tree species it might be difficult to develop such a list, unless a few host species are focused on. No decision was reached.

Judy Pasek reported on a meeting with RMS researchers at the Rapid City office. Willow in riparian areas within the Black Hills is a concern and surveys have been conducted by the Nemo RD. A gradual reduction of willow habitat has occurred since the turn of the century. The Black Hills NF are currently growing willow planting stock at the Bessey Nursery, Halsey, NE for future planting efforts. Bill Schaupp mentioned that the RMS (Rapid City) is doing much work on woody draw problems, but no insect and disease research.

A general discussion on other efforts regarding cottonwood and willow culture followed.

Bill Schaupp reported that Bob Obedzinski (RMS, Ft. Collins) is writing a white paper on riparian ecosystems and the current status of our knowledge, including research needs. Bill agreed to contact Bob to determine the status of his report and whether it can be released in a more formal format for the user.

Organizational reports: Individual agency reports followed. Copies of printed reports from USFS Service Centers in Lakewood and Rapid City; Kansas State Forest Service; Kansas State University; Colorado State University; Bureau of Plant Industry, State of Nebraska; North Dakota State University; South Dakota Division of Forestry; and Iowa Department of Natural Resources are attached.

Wednesday, March 15, 1995

The meeting resumed at 8:15 AM. A slide presentation was made by Les of the walnut trunk webber (Gretchena concitatricana) that had been recorded as defoliating black walnut in 1992. A previous report was made in 1965. This insect was thought to be a new problem in Kansas. Only a few larvae were observed in 1994.

Mike Schomaker gave a slide presentation on herbicide injury slides. Each person in attendance was given the opportunity to order all or specific slides from Mike. If you are interested in purchasing a slide set, contact Mike. He is also seeking additional slides for the series.

Rich gave a special report on a request from Jim Walla, North Dakota State University, on ash yellows. Jim is interested in conducting a survey for this disease throughout the Northern Great Plains and is seeking support for collection and testing of samples. If you are interested in assisting Jim, contact him at 701-237-7069.

The meeting concluded with the election of new officers. Mark Harrell, University of Nebraska, was elected as Chairperson; Mike Schomaker, Colorado State Forest Service, as Secretary. The site of the next meeting will be determined by Rich Dorset and the newly elected officers.

The meeting was adjourned at 9:50 AM.

Respectfully submitted, David W. Johnson, Secretary

were reported in communities across the state.

Dutch elm disease in several species of elms was also a major cause of tree mortality in Iowa communities, claiming over 5,100 trees in 1994. Again the occurrence of the new aggressive strain of DED, lack of sanitation and removal of infested trees is allowing significant tree loss, claiming state big tree champion American elm, red elm and Siberian elms.

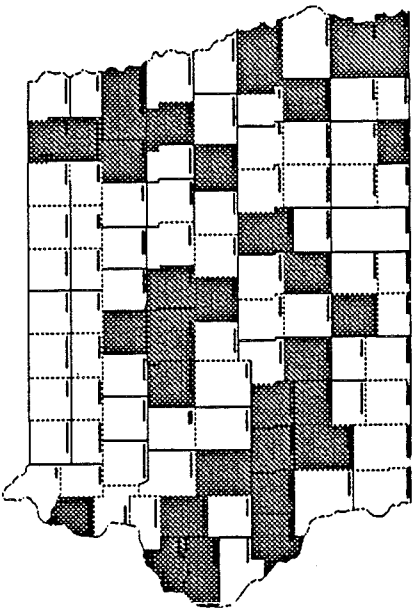
Severe weather in the form of a tornado and large hail caused extensive stem breakage in the Cities of Decorah and LeMars and the City of Dubuque respectfully in early September of 1994. A widespread ice storm occurred on December 6 and 7, 1994 causing major stem-breakage of approximately 6,500 trees in the southern Iowa communities of Humwa, Centerville, Fairfield, Muscatine and Washington. The potential of invasion by secondary organisms due to stem breakage will probably increase over the next several years.

Gypsy Moth in Iowa

The Gypsy Moth (*Lymantria dispar*) is a potentially serious insect defoliator of Iowa's native deciduous trees and forests. In 1994, the State Entomologist Office successfully treated the 90 acre infestation site in Polk County with aerial and ground treatments of Bacillus thuringiensis (Bt). Adult male moth trapping across the state yielded 143 moths and increase of over 50% from 1993. This increase in trapping results and alerts from other sites confirmed that several shipments of infested Michigan nursery stock of blue spruce (*Picea pungens*) and White Pine (*Pinus strobus*) entered the state and were distributed unknowingly by large discount retail merchants. This major violation of federally mandated quarantine of Gypsy moth infested

nursery shipment may cause the occurrence of between 50 to 100 infestation sites in Iowa over the next few years. Major trapping efforts will be conducted by the State Entomologist Office and other cooperators during 1995 to delimit infestation sites for potential eradication efforts in 1996 and beyond.

1994 Gypsy Moth Captures



For More Information, Contact:
Forest Health Program
Forestry Division-Iowa DNR
Wallace State Office Building
Des Moines, Iowa 50319-0034
(515)242-5966 or Fax (515)281-6794

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Forest & Tree Health in Iowa 1994

Why worry about the health of our forests?

Although only 6% of Iowa is covered by forests, approximately 2 million acres, these natural resources have significant impact on our state. Wood industries employ over 7,000 Iowans producing lumber and high quality wood products. Our forests are a critical component for wildlife habitat, soil conservation, water quality, outdoor recreation and aesthetic pleasure. Trees in our communities increase property values and conserve energy. For many Iowans, "living in Iowa without our forest and trees, would make our *Field of Dreams* a dust bowl."

Because our forest resources are valuable to the citizens of Iowa, the Forestry Division of the Iowa Department of Natural Resources (DNR) began monitoring forest and tree health conditions in the late 1970's. It continues today to determine overall forest and tree health conditions, status of natural and exotic insect and disease problems, and to provide up to date information for private and public managers to aid in the sustained management of Iowa's forest resources.



Cooperative efforts with Iowa State University, the Iowa Department of Agriculture and Land Stewardship, the USDA Forest Service, municipal foresters and private forest land owners allows efficient monitoring efforts. In addition, cooperation fosters improved communications to the professional and general public on Iowa's forest resource management issues.

Monitoring Efforts for 1994

Estimates of serious forest and tree health problems, such as insects, diseases, and flooding impacts were determined by aerial surveys of over 222,000 acres of representative forest areas across the state conducted over the Summer of 1994. In addition, visual surveys from DNR Foresters, municipal foresters, Christmas tree growers, trained volunteers and results from the Plant Disease Clinic at Iowa State University assist in determining forest and tree health conditions and distribution. The potentially greatest threat to our forests from the famous "Gypsy Moth" required placement of 5,797 traps by the State Entomologists Office to determine infestation areas and sites in need of quick eradication efforts.

Recent efforts to develop vegetation management plans for selected state park areas utilizing Geographic Information System (GIS) mapping was begun in 1994 utilizing DNR Forestry aerial survey work. State park areas where this information is being utilized include: Backbone State Park, Stone State Park, Green Valley State Park, Springbrook Recreation Area, Wildcat Den State Park and Lake Darling State Park.

To determine the areas impacted by the Floods of 1993 on Iowa's forests, aerial flights of the wooded areas along major Iowa rivers were conducted. This included wooded areas along the Mississippi, Missouri, Des Moines, Cedar, Iowa and Nishnabota Rivers. Ground surveys were conducted by DNR foresters to confirm specific tree species response in public areas in Charles City, Cherokee, Council Bluffs, Davenport, Des Moines, Fort Madison, Iowa City, Muscatine, Spencer, Waterloo and Webster City.

Intensive sampling was conducted in cooperation with Iowa State University Department of Plant Pathology in six Iowa communities to determine the impact of a



potentially serious Green/White Ash decline in community settings, "Ash Yellows". Municipal foresters participating included: Burlington, Davenport, Des Moines, Fort Dodge, Iowa City and Waterloo. Results and follow up work are expected in 1995.

Plans for 1995, include aerial surveys of flood impacted sites and large tracts of forests.

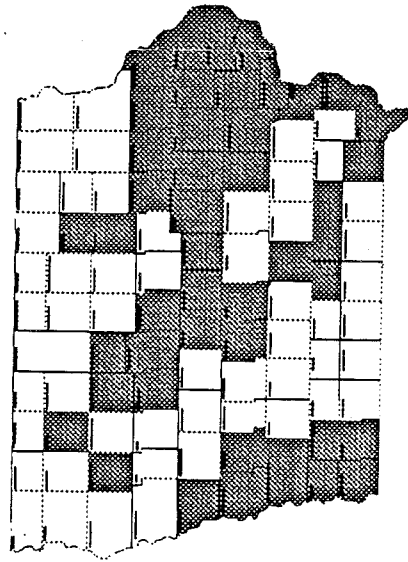
Forest Results

Extensive flooding problems in 1993 were recorded in all 99 Iowa counties and had significant impact on over 97,500 acres of forest. In 1994, approximately 11,000 acres of forest throughout the state suffered complete tree mortality due to the 1993 long-term (greater than 2 consecutive weeks) flooding. Sites where tree mortality was greatest included areas behind major flood control reservoirs, such as Saylorville, Red Rock and Coralville dams. In addition, areas where major waterways met and flood waters backed up or stagnated showed high tree mortality. This included many state park and wildlife areas, for example, flood waters were over 30 feet deep for up to 3 months in Ledges State Park along the Des Moines River. Tree species most impacted by the floods of 1993 include:

hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*) and many non native landscape ornamental and coniferous species.

Oak Wilt, caused by the fungus *Ceratocystis fagacearum* invades the water conducting tissues (xylem) of oak trees and causes the foliage to wilt and die. This continues to be the most serious tree disease in Iowa, although acreage infected decreased from 10,440 acres in 1993 to 8,800 acres during 1994. Although all species of oaks are susceptible, the red oak group,

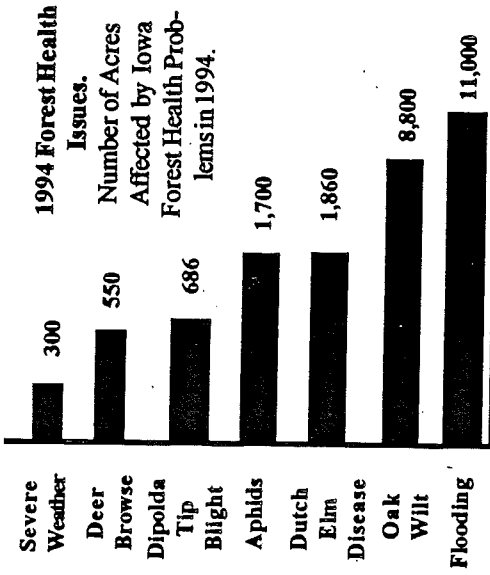
Flooding Tree Mortality 1994



especially black oak (*Quercus velutina*) and red oak (*Quercus rubra*) often die within weeks of infection. Oak wilt is spread via root grafts and sap-feeding bark beetles. Although there is no cure for Oak Wilt, control strategies such as preventing tree wounds during high infection periods (April 1 to July 1), disease containment, and removing infected trees promptly appear to be the most effective management options.

Dutch elm disease (DED) caused by the fungus *Ophiostoma ulmi/novo-ulmi*, has re-established itself with a new aggressive strain across Iowa during 1994, infecting an additional 1,860 acres of American elm (*Ulmus americana*), red elm (*Ulmus pumila*), and even Siberian elm (*Ulmus pumila*). Much of the re-emergence of DED is due to the high humidity conditions of the past few years, and an increase in the number of 20-30 year old American elms that have naturally regenerated in bottomland areas across the state. Lack of sanitation and removal of infected trees has contributed to the increase by providing breeding sites for fungus carrying bark beetles infecting neighboring elms. The new strain of DED appears to cause faster tree mortality and is more aggressive infecting red elm and Siberian elm. DED will continue to be a problem in Iowa until sanitation efforts of infected trees improves.

White-tailed deer (*Odocoileus virginianus*) continued to cause extensive damage to forest and Christmas tree plantations and natural regeneration across the state. In 1994, approximately, 550 acres of forest



received severe browse damage, and increasing amounts of damage to horticultural crops is occurring in the urban/rural interface zones. Severe weather in the form of tornadoes, hard frosts, hail and ice storms caused extensive stem breakage in Northeast and Southern Iowa during 1994. Soft wooded species such as silver maple, Siberian elm and high valued black walnut suffered damage of approximately 300 acres. Finally, agricultural herbicide drift appeared to be more severe in Eastern sections of the state in 1994, impacting over 100 acres.

Community Tree Results

The typical Iowa community is dominated by three major tree species: green ash (*Fraxinus pennsylvanica*), silver maple and Norway maple (*Acer platanoides*). These trees are subject to tremendous environmental stresses caused by severely compacted soils, herbicide injury and mow damage. These stresses often cause opportunistic secondary insect and disease the chance to become established and cause gradual tree dieback and mortality. The impact of the floods of 1993 were not only felt by trees near waterways, but also by trees growing in poorly drained clay soils common in Iowa, due to saturated conditions. These saturated conditions caused additional tree losses in 74 Iowa communities involving non native little leaf lindens (*Tilia cordata*), Norway maple and several conifers species. Increasing secondary insects and disease problems such as Verticillium wilt (*Verticillium albo-atrum*) on Norway maple and linden, Dipoldia tip blight on Austrian pine, Cytospora canker (*Cytospora spp.*) on spruce, Anthracnose (*Gloeosporium griseum*) on ash and sycamore, Aphids on ash and maples, and Ash Plant bug (*Tropidosteptes amoenus*) on green ash

Aphids (*Periphyllus spp.*) caused noticeable foliage discoloration of native stands of sugar maple (*Acer saccharum*) and basswood (*Tilia americana*) in Northeastern Iowa, impacting approximately 1,700 acres. Much of this appears to be due to plant stress caused by the saturated soils of 1993. Dipoldia tip blight (*Sphaeropsis sapinea*) combined with Dothistroma needle blight (*Mycosphaerella pini*) damage to non native conifer plantations, windbreaks and ornamental plantings of Austrian pine (*Pinus nigra*), Red Pine (*Pinus resinosa*), Ponderosa pine (*Pinus ponderosa*) and Scotch Pine (*Pinus sylvestris*) increased significantly to 686 acres in 1994. Sources of the fungus increased due to the humid conditions of the 1992-93 and is forcing stand conversions from conifer plantations to native hardwoods on several state forest areas.

Browsing damage by White-tailed deer (*Odocoileus virginianus*) continued to cause extensive damage to forest and Christmas tree plantations and natural regeneration across the state. In 1994, approximately, 550 acres of forest

LAKWOOD SERVICE CENTER, FOREST HEALTH MANAGEMENT
USDA FOREST SERVICE, ROCKY MOUNTAIN REGION (R-2)

REPORT TO THE GREAT PLAINS TREE PEST WORKSHOP
MANHATTAN, KS
MARCH 14 & 15, 1995

Organization

Permanent Staff: David W. Johnson, Center Leader and Supervisory Plant
Pathologist
Susan Johnson, Biologist (Entomologist trainee)
Vacant, Entomologist
Vacant, Biological Technician

Geographic Area: Colorado east of the Continental Divide and northwestern
Colorado
All of Kansas
Southern Wyoming east of the Continental Divide (generally
south of Casper).

Functions: Provide technical assistance on forest pest problems and
forest health issues to federal land management agencies
(USFS, NPS, BLM, BIA, DOD) and cooperate with state and
other federal agencies to provide assistance on state and
privately-owned lands.

Office: Located on the Federal Center, Building 20 in Lakewood,
Colorado. Mailing address Lakewood Service Center, P.O. Box
25127, Lakewood, Colorado 80225-5127.
Phone: 303-236-9541.
Fax: 303-275-5075.

SUMMARY OF INSECT AND DISEASE CONDITIONS ROCKY MOUNTAIN REGION
Lakewood Service Center

INSECTS

Gypsy moth Lymantria dispar

Each year, detection traps are placed in campgrounds and other sites that have a high likelihood of being introduction sites for the gypsy moth. Several National Forest recreation sites and the Air Force Academy at Colorado Springs were sampled for gypsy moth during the summer of 1994. Two traps were placed at each of 14 sites, for a total of 28 traps; 10 traps were placed at the Air Force Academy. All traps were retrieved. No gypsy moths were caught in 1994, meaning no followup action will be required on the basis of the survey.

The sites were selected on the basis of elevation, presence of hardwood species, and potential for high numbers of out-of-state visitors. The gypsy moth survey is an attempt to discover gypsy moth "hitch-hikers" which escape from vehicles used by out-of-state visitors. We are going to re-examine the criteria and selection of sites in coordination with personnel responsible for gypsy moth detection in Colorado including the Colorado State Forest Service, and USDA APHIS, in Colorado and PPQ Office, Wyoming; therefore, sites selected for 1995 may differ from 1994.

Douglas-fir tussock moth Orgyia pseudotsugata

On August 24, 1993, an infestation of the Douglas-fir tussock moth, Orgyia pseudotsugata, was discovered in West Creek, South Platte Ranger District, Pike National Forest. It was located in T10S, R70W, Sec 13 and 14, and covered about 300 acres. Defoliation was heavy on Douglas-fir and Engelmann spruce. The population of feeding larvae was very high. On September 8, the area was visited again and defoliation of trees was nearly 100 percent. Abundant numbers of pupae were found, some adults and egg deposition were observed.

The infestation and subsequent defoliation could be found only on National Forest system lands at that time. Private lands with homes (summer and permanent residences) were only a short distance to the south. The probability was high that the infestation would spread to include some of those properties in 1994.

Continued monitoring and aerial surveys of the infestation in 1994 revealed spread to over a gross area of 20,000 acres, including Pine Creek, Sugar Creek, Hatch Gulch, Jenney Gulch, Camp Creek, and West Creek drainages. The population was so high that the larvae fed on all tree species in several drainages, including aspen, ponderosa pine, and common juniper. Egg deposition was also high in many areas indicating the population would continue to expand in 1995.

In addition to the direct effects of defoliation on the trees, it was noted in scattered areas of the original infestation area that Douglas-fir bark beetle, Dendroctonus pseudotsugae, activity was increasing. Some mortality of trees

can probably be attributed to the combined effects of defoliation and bark beetles.

Douglas-fir tussock moth infestations collapse suddenly, usually due to a naturally-occurring, host-specific virus that develops in the population. A few virus-infected larvae were observed in 1994, but not enough to expect the infestation to collapse before more severe defoliation occurs in 1995. A number of insect parasites were also observed in the population during the summer of 1994; however, their impact on the population is unknown.

Historically, the Douglas-fir tussock moth has not been a significant pest in the forests of the Rocky Mountain Region; however, it is a major defoliator of dry-land interior forests in other western regions of North America. Virtually all reports of damage by this insect in the Rocky Mountain Region have come from suburban landowners in the Denver, Colorado Springs and Cheyenne areas. Only three previous outbreaks of the insect have been reported in forested areas in Region 2.

Previous outbreaks of the Douglas-fir tussock moth have occurred on the Pike National Forest and adjacent lands. The first report was an outbreak on Cheyenne Mountain near Colorado Springs in 1937. It was reported that all Douglas-fir and white fir were killed on 150-200 acres. The next reported outbreak was in 1947 at Evergreen, Colorado. The severity is unknown, but the area was treated experimentally with DDT.

Detection surveys using pheromone-baited sticky traps were conducted in 1975 and 1976 in the forested areas of the Colorado Front Range and in 1977 the trapping was expanded into Wyoming. Although moths were captured at many trapping sites, no areas of defoliation were discovered. In 1982, several individual ornamental blue spruce in Evergreen, Conifer and Shaffer's Crossing, Colorado were defoliated. These isolated occurrences were adjacent to thousands of acres of susceptible natural stands of Douglas-fir, yet they were not affected by the insect.

During 1983-1985, several small stands of Douglas-fir were severely defoliated along the Platte River drainage on the Pike National Forest. The area around Saloon Gulch, east of Kelsey Campground, was particularly heavily defoliated. The population collapsed without tree mortality.

Following the 1983-1985 infestation, an intensive monitoring of populations was continued for several years using pheromone traps and cryptic shelters. It was hoped that a stand hazard rating system could be developed, using predictions about the population of insects as a function of site-specific characteristics such as slope, aspect, latitude, elevation, plant association, and stand density. No conclusions were reached from this effort since the numbers of moths and other life stages trapped were very low and no defoliation was noted until the recent infestation in 1993.

The current infestation is the largest that has been recorded. The reasons for this are somewhat speculative; however, since the exclusion of fire from our Front Range pine ecosystem, Douglas-fir has invaded sites historically occupied by ponderosa pine, which is resistant to Douglas-fir tussock moth. The recent outbreaks of the Douglas-fir tussock moth and the western spruce budworm, another insect dependent upon Douglas-fir as a host, have been of greater

intensity and covered larger areas than in the past. It is predicted that these insects will continue to plague us until these ecosystems are brought back to a more natural state.

DISEASES

Armillaria root disease Armillaria spp.

A survey of the biological species of Armillaria present in Region 2 was initiated. This information will be used to develop better root disease management strategies for our various customers. Starting in 1993, diseased wood samples containing Armillaria collected from throughout Region 2, were sent to the diagnostic lab at the Lakewood Service Center. The fungus was isolated from the host material, and current work involves identification to biological species by mating unknown isolates with known tester strains in culture. To date all collections have been identified as A. ostoyae.

The fungal isolates will then be catalogued and kept in cold storage (along with the various tester strains) as part of the Region's new fungal reference collection.

Diplodia blight Sphaeropsis sapinea (=Diplodia pinea)

During the 1994 field season, mortality of 2-0 lodgepole pine (Pinus contorta var. latifolia) seedlings was observed at the USDA Forest Service Bessey Nursery in Halsey, Nebraska. Lodgepole pine seed sources from the Shoshone National Forest appeared to be affected more than seed sources from the Routt and White River National Forests. Also, adjacent Scots pine (P. resinosa) and jack pine (P. banksiana) seedlings appeared healthy in comparison to the Shoshone seed sources. An infected ponderosa pine (P. ponderosa) windbreak tree was noted adjacent to the nursery beds and needles were collected.

Field examination of affected seedlings and needles from the windbreak tree revealed pycnidia of a fungus fruiting on older dead needles. Microscopic examination of pycnidia at needle bases revealed light brown, ellipsoid, one-celled conidia averaging 27.8 x 11.8 microns in size for the lodgepole pine seedling needle samples and 28.4 x 13.1 microns for the ponderosa pine windbreak tree needle samples. Since the spore measurements were very similar, they are believed to be the same fungus. Published reports of spore descriptions for Sphaeropsis sapinea also fall within these ranges of spore size.

A review of the weather records for the nursery indicated that low night temperatures in April followed by hot, windy weather in May might have stressed the lodgepole pine seedlings and made them susceptible to infection. Rainfall in July was favorable for spore production and disease intensification. This fungus has not been previously reported on lodgepole pine seedlings in this Region. However, it was reported by James (1) on 2-0 Austrian pine (P. nigra) at this nursery in September 1978. Since this is a new disease of lodgepole pine seedlings in this nursery, it will be important to carefully inspect future crops for the disease and take appropriate measures to reduce its spread.

References:(1) R. L. James. USDA For. Serv., Rocky Mountain Region 3430 Biol. Eval. R2-79-1, 5p., 1979.

Melampsora leaf rusts Melampsora spp.

The native leaf rusts belonging to the genus Melampsora are commonly seen in the summer and early fall throughout Colorado; however, to our knowledge, there are no descriptive accounts of the host tree species affected and specific rust species in Colorado. Only one other survey has been conducted in Colorado for Melampsora rusts. Dr. Brian Geils, USDA Forest Service, made collections of P. tremuloides (quaking aspen) from more than 20 sites along the Colorado Front Range from Woodland Park to Frazer in August 1992 and found only M. medusae on infected leaves (personal communication). His collections did not include other species of Populus or Salix.

In other parts of North America, Europe and Asia, several species of Melampsora are considered as important pathogens of Populus species and their hybrids.

Within the last few years, concern over native Melampsora species and the introduced Eurasian poplar leaf rust, Melampsora larici-populina, has developed as hybrid poplar plantations along the Columbia River have become infected. Melampsora larici-populina has subsequently been detected in Oregon, Washington and California and quarantines were placed on these sites prohibiting the movement of poplars and potential conifer hosts. As a result of the detection of M. larici-populina in other western states, we were contacted to be aware of any developing poplar leaf rust problems.

As part of this investigation, we began a general survey of leaf rusts of native Populus and Salix species along the Colorado Front Range during the summer of 1994. In addition, native Populus species and hybrids were sent to investigators at Washington State University, Puyallup by Dr. William Jacobi, Colorado State University, Ft. Collins, to determine their relative susceptibility to M. larici-populina and M. medusae formae speciales deltoidae, a native rust.

During the summer of 1994, a general reconnaissance and collection of leaves from native Populus and Salix species was made along the Colorado Front Range from Golden to Ft. Collins. Leaves exhibiting heavy urediniospore infection were selected from all Populus and Salix species encountered. The location of each collection was noted as well.

Identification of Salix species was based on leaf morphology and location of collection since leaves were collected in the summer and reproductive parts were not present.

Urediniospores collected from P. tremuloides, P. sargentii, P. deltoides var. wislizenii and P. angustifolia were determined to be from a single species, M. medusae. A single species of rust, M. epitea, was found on all Salix species examined. At this time, the entire complex of Melampsora rusts on Salix species in North America has been grouped under M. epitea.

The results of the screening test conducted at Washington State University indicated a very high level of resistance of Colorado sources of P. tremuloides

to both M. larici-populina and M. medusae, with narrowleaf cottonwood (P. angustifolia), Siouxland (P. sargentii var. Siouxland) and Lombardy poplars (P. nigra var. italica) moderate to low in resistance. It is interesting that the Rocky Mountain sources of P. tremuloides showed resistance to M. medusae. It has been reported that great diversity occurs in the species of M. medusae which might suggest many biological species. Thus, the Rocky Mountain sources of P. tremuloides might be more resistant to the Pacific Northwest forms of M. medusae.

As a result of this survey, we do not believe that the introduced rust M. larici-populina is present in the Colorado Populus species populations examined. Continued surveillance and wider collections should be planned for the future since some native Populus species appear to have low to moderate resistance to this rust.

RECENT PUBLICATIONS (as of March 1995)

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- Johnson, D.W. 1994. Catalog of specimens located in the herbarium, Lakewood Service Center, Rocky Mountain Region USDA Forest Service. USDA For. Serv., Renewable Resources, Rocky Mountain Region Tech. Rep. R2-56. 14 p.
- Johnson, D.W. 1995. Quercus gambelii Nutt. IN: Enzyklopedie der Holzgewachse (Encyclopedia of Woody Plants). (In press).
- Johnson, D.W. 1995. Picea pungens Engelm. IN: Enzyklopedie der Holzgewachse (Encyclopedia of Woody Plants). (In press).
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- Johnson, D.W. and Y. Wu. 1995. A survey for *Melampsora* rusts along the Colorado Front Range. USDA For. Serv., Renewable Resources, Rocky Mountain Region Tech. Rep. R2-57. 7 p.
- Sharon, E.M. 1994. Spotting potential failures. *Arbor Age* 14(10):10-12.
- Wu, Y., D.W. Johnson, and P. Angwin. 1995. Identification of *Armillaria* species in the Rocky Mountain Region. USDA For. Serv., Renewable Resources, Rocky Mountain Region Tech. Rep. R2- . (In preparation)

RAPID CITY SERVICE CENTER, FOREST HEALTH MANAGEMENT
USDA FOREST SERVICE, ROCKY MOUNTAIN REGION (R-2)

REPORT TO THE GREAT PLAINS TREE PEST WORKSHOP
MANHATTAN, KS
MARCH 14 - 15, 1995

Organization

Permanent Staff: Judith Pasek, Center Leader and Supervisory Entomologist
Willis (Bill) Schaupp, Pest Mgmt Specialist and Entomologist
Jeri Lyn Harris, Plant Pathologist

Geographic Area: Most of South Dakota except extreme northwest corner;
All of Nebraska;
Northern Wyoming east of the Continental Divide (generally
north of Casper and South Pass City).

Functions: Provide technical assistance on forest pest problems and
forest health issues to federal land management agencies
(USFS, NPS, BLM, BIA, DOD) and cooperate with state and
other federal agencies to provide assistance on state and
privately-owned lands.

Office: Co-located with the Rocky Mountain Forest and Range
Experiment Station, 501 E. St. Joe, South Dakota School of
Mines & Technology, Rapid City, South Dakota 57701-3995.
Phone: 605-394-1960. FAX: 605-394-6627.

RECENT AND PLANNED ACTIVITIES

1. Gypsy moth surveys--Each year, detection traps are placed in campgrounds and other sites that have a high likelihood of being introduction sites for the gypsy moth. In 1994, the Rapid City Service Center coordinated the deployment of 78 detection traps on federal lands in South Dakota and 38 detection traps in northern Wyoming. No gypsy moths were found in these traps.

Two delimitation surveys were conducted in 1994 by Forest Service staff. One survey block of federal and private lands between Rapid City and Rockerville in South Dakota encompassing about 11 square miles was trapped at a grid density of 25-36 traps per square mile for a total of 283 traps. This block overlaid sites where gypsy moths had been found in traps in 1991-1993. No moths were detected in this 1994 survey block and no further delimitation trapping is planned for 1995 although detection traps will be placed at campground sites by cooperating agencies. The second delimitation block was located on the Wapiti Ranger District of the Shoshone National Forest in Wyoming. Twenty-two traps were concentrated in and around the Newton Creek Campground, where a gypsy moth was detected in 1993. No gypsy moths were caught in this area in 1994, and no further delimitation trapping is planned for 1995.

Cooperating agencies reported a number of catches of gypsy moth in traps, primarily located on private lands, during 1994. South Dakota had eleven moths, with one each at the Rapid City KOA, the Happy Holiday Campground south of Rapid City, Kemp's Kamp in Keystone, Mt. Rushmore KOA, Horsethief Resort south of Hill City, and the Tilford truck scale, two moths at the Hart Ranch Resort south of Rapid City, and three moths at the Dakota Dunes Development in the southeastern corner of the state along the Iowa border. Moths caught in the Black Hills area were located along the tourist corridor and likely are hitchhikers; however, this is the third year in a row that gypsy moths have been caught at the Hart Ranch Resort. Rapid City Service Center staff plan to assist the S.D. Dept. Agriculture, Division of Regulatory Services in trapping and surveying for gypsy moths at the Hart Ranch site during 1995. The moths found at the Dakota Dunes Development likely resulted from infested nursery stock introduced to an Iowa park in 1993. For Wyoming, a total of four gypsy moths were reported found in detection traps in the cities of Laramie, Jackson, and Cody, and at the Mammoth Campground in Yellowstone Park. Nebraska received four separate shipments during 1994 of infested nursery stock originating from infested areas of Michigan. A total of 74 gypsy moths were subsequently caught in urban areas in seven counties including the cities of Bellevue, Blair, Columbus, Crete, Kearney, Lincoln, North Platte, and Omaha. Moths, eggs, larvae, and pupae were found in Bellevue, resulting from a 1992 military move-in from Michigan.

2. Pine tussock moth outbreaks--An infestation of pine tussock moth, Dasychira

griseifacta (Lymantriidae), collapsed near Edgerton, Wyoming, after having severely defoliated over 5,000 acres in 1993. A fall 1993 survey indicated that a large population was present in the egg stage; however, by summer, caterpillars were virtually absent in the same area. No defoliation was observed in 1994. Similar collapses of pine tussock moth outbreaks have occurred at sites in Montana, Nebraska, and South Dakota within the past two years. A survey was conducted to assess impact in terms of tree mortality at the Wyoming site.

3. Diplodia study--A survey and collection of Diplodia pinea specimens for a population genetics study was done in 1994 by Dr. G. R. Stanosz of the University of Wisconsin, Madison. The Rapid City Service Center helped with the survey and collections in Nebraska and South Dakota. Although the disease was declining in 1994, several infected trees remaining from past outbreaks were located for the survey.

4. Diversity unit analyses--Many National Forest Districts are beginning to analyze resource management conditions and options on a broader, landscape-level scale rather than just within proposed project boundaries. The Rapid City Service Center has been involved with two diversity unit analyses on the Black Hills National Forest, helping to provide site-specific survey information about Armillaria, risk-rating for mountain pine beetle, and forest health management input to the interdisciplinary project planning teams.

5. Aerial detection surveys--Aerial surveys were conducted to detect tree mortality and defoliation caused by insect and disease agents in the Black Hills, Bighorn Mountains, and the Clarks Fork District of the Shoshone National Forest during 1994. Tree mortality caused by mountain pine beetle and Ips bark beetles declined for a second year in a row on the Black Hills, affecting about

3,000 trees. Observed tree mortality declined 48% from that observed in 1993 and acreage affected declined 61% to about 1,500 acres. This represents the lowest level of bark beetle activity reported in several years. In the Bighorns, moderately heavy defoliation of Douglas-fir caused by western spruce budworm was visible on about 1,135 acres in the northern end of the forest. Subalpine fir mortality affecting over 2,000 trees was widespread across the forest, especially on the northern end; much of this likely was caused by western balsam bark beetle. Mountain pine beetle, Ips, and Douglas-fir beetle activity was very low, causing tree mortality in a few localized spots. The outbreak of Douglas-fir beetle on the Shoshone National Forest increased 19% from 1993 affecting nearly 5,000 trees.

6. Pest considerations in forest planning--Efforts have been made to incorporate current knowledge of pest management practices and forest health issues into the revision of the Black Hills Forest Plan. Judy Pasek serves as a member of the interdisciplinary planning team. The Draft Revised Forest Plan and EIS was completed and released for public comment in June 1994. Thousands of comments were received by the end of the comment period in December 1995. The interdisciplinary planning team is beginning to review the comments. A final version of the Revised Forest Plan and EIS is expected to be completed in another year. Once approved, the final plan will guide management activities on the Black Hills National Forest for the next ten year interval.

7. FPM Workshop held in South Dakota--Fifteen people attended a 3-day training session in June 1994 held in Custer, South Dakota, covering insects and diseases common to the Rocky Mountain Region. The course, taught by Rapid City Service Center staff and Rich Dorset of the S.D. Division of Forestry, got rave reviews from attendees. Attendees came from three National Forests, the South Dakota Department of Agriculture, Divisions of Forestry and Regulatory Services, Wyoming State Forestry Division, and USDI Bureau of Land Management.

8. School presentations on insects--The Rapid City School System offered two "Bugology" classes during their summer enrichment program in 1994. Judy Pasek helped kindergarten through sixth grade students round up insects with a sweep net from vegetation along Rapid Creek. Students discovered a variety of insects that they might otherwise have overlooked. They also learned about the gypsy moth and how it inadvertently travels to South Dakota, and how mountain pine beetles and pine engraver beetles infest pine trees in the Black Hills.

9. Survey of fire effects on Armillaria root disease--A three-year survey will be started this summer to examine the effects of wildfire and prescribed burning on Armillaria spp. Sites in the Black Hills forest ecosystem that are to receive a prescribed burn will be surveyed prior to the burn to collect data on Armillaria centers of the sites. Six months after the prescribed burn and once a year for the next three years, the sites will be resurveyed to observe any changes that may have occurred to the Armillaria centers. Other sites that had wildfires will be surveyed for Armillaria. Data on Armillaria centers will be collected from sites that had high-intensity burning, and low-intensity burning for comparing differences of the Armillaria centers.

TECHNOLOGY DEVELOPMENT PROJECTS

1. *Armillaria* permanent plots--The final *Armillaria* root disease permanent plots were established in 1994. A total of six plots in ponderosa pine and three plots in Black Hills (white) spruce are now installed and will be remeasured every two years. These plots will be used to validate and calibrate models of root disease spread and impact on tree growth and mortality.
2. *Armillaria* hazard-rating project--Development of a hazard-rating project for *Armillaria* was initiated in 1994. The project is a cooperative effort of USFS Rocky Mountain Region Forest Health Management, Colorado State University (CSU), and USFS Rocky Mountain Forest and Range Experiment Station. Over 1000 acres were surveyed by Rapid City Service Center's plant pathologist and field technicians, and a CSU plant pathology graduate student to collect *Armillaria* specimens and site characteristics data. Laboratory clonal studies to examine distribution patterns are being done. Site data will be combined with soil types, habitat types, meteorological data, and stand inventories in a GIS database to look for possible associations. These distributions and associations will comprise a hazard-rating system for *Armillaria* root disease in the Black Hills National Forest. Funding was obtained through the Technology Development Program to continue this project in 1995-1997.
3. Comandra blister rust permanent plots--In 1995, field crews will be attempting to relocate, remark, and remeasure approximately 38 permanent plots established in Wyoming in 1982 and 1986 to study comandra blister rust. Data from these plots will be used to develop and validate models to help forest managers predict the incidence and severity of this destructive disease in lodgepole pine stands.
4. Risk-rating for Douglas-fir beetle--A study is being conducted to develop a risk-rating system that will be useful for estimating potential effects of Douglas-fir beetle infestations, prioritizing preventative treatments of Douglas-fir stands, and making decisions regarding suppression activities. Data on mortality from Douglas-fir beetle on 12 National Forests in four states will be used to produce a susceptibility classification for use by the end of 1996. The project area covers the Rocky Mountains from southern Colorado to the Canadian border in order to survey a wide variety of conditions. Rapid City Service Center staff are focusing their efforts on the Douglas-fir beetle outbreak area on the Shoshone National Forest in Wyoming, while cooperators cover sites in other states.

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GREAT PLAINS TREE PEST WORKSHOP
KANSAS INSECT AND DISEASE REPORT
1995

GYPSY MOTH (*Lymantria dispar*)

A total of 1050 gypsy moth traps were placed at various locations across the state by federal and state agencies. One male moth was caught at an RV park near Salina.

Egg masses found on a Christmas tree from Michigan at a Kansas City retail outlet were determined to be sterile. It was speculated that the eggs froze during the cold 1993-94 Michigan winter and did not hatch in the spring of 1994.

PINE PITCH MOTH (*Dioryctria tumicolella*)

A heavy infestation of a pine pitch moth (probably *Dioryctria tumicolella*) was detected by the Department of Agriculture in a windbreak in Sherman County. The pitch moth had not previously been found in Sherman County.

PINE TIP MOTH (*Rhyacionia* spp.)

Pine tip moth control continues to be a difficult problem for Christmas tree growers in Kansas. Overlapping life cycles of two or maybe three species of tip moths makes the proper timing for insecticide application very difficult. Control is difficult even when using pheromone traps.

PINE SHOOT BEETLE (*Tomicus piniperda*)

No pine shoot beetles were found on Christmas trees coming from out-of-state sources (Department of Agriculture).

WALNUT TRUNK WEBBER (*Gretchena concitaticana*)

Only a few larvae were observed on walnut trees. The numbers were not great enough to observe any webbing on the trunk of the trees.

Damage to the leaf was observed to occur at the base of the leaflet first. Adults are believed to emerge from pupa in the soil and lay eggs on the leaves in early may. Eggs were laid singly rather than in egg masses on the leaves.

Trees will be observed in 1995 to determine insect population, observe damage, and document life history information. The purpose of the webbing still has not been determined.

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Report from J.A. Walla, Plant Pathology Dept., NDSU, Fargo 58105
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1. *Lirula* needle blight of spruce. (with Stack)

Lirula needle blight is a minor disease of spruce in ND, but can cause serious damage when present. Research to improve fungicide application timing recommendations is being done. Previous fungicide application trials indicated that chlorothalonil would control *Lirula* needle blight with two applications, one each in early June and early July. One trial also indicated that a single late July application would control the disease. Results in 1994 of a fungicide application trial that began in 1993 indicated that 2 applications, one each in early June and early July, were highly effective in controlling the disease. A single application in early July was equally effective. A single application in early June or in late August did not adequately control the disease.

In addition to sites throughout ND, *Lirula macrospora* has been confirmed on spruce over a period of several years in northwest Minnesota and in northcentral Wyoming and on samples sent from southwest South Dakota (Rich Dorsett) and from Wisconsin (Jane Cumings Carlson).

2. Ash yellows of green ash. (with several others)

Ash yellows (AshY) was first found in the Great Plains in ND in 1993 (with Ash, Draper). It was confirmed in 3 counties in eastern and western counties in urban landscape trees and rural windbreak and native trees. In 1994, AshY was confirmed on a symptomatic green ash in central ND in a rural ornamental planting. Also in 1994, AshY symptoms were found on 22 ornamental, windbreak, and research trees and seedlings in Fargo (with Cheng, Guo, Chaput) and on trees at several sites in 2 more counties in southeastern ND. AshYML0 was confirmed in South Dakota and Nebraska in green ash that had ash yellows symptoms. The disease has not been reported in those states. All confirmations of AshY were with an AshY-specific monoclonal antibody.

The discovery of AshY in ND prompted research on the disease. Early work will involve determining incidence and damage in green ash in North Dakota and possibly cooperatively in the Great Plains region. Research under discussion involves developing management techniques.

3. X-disease of chokecherry. (with Guo and Cheng, NDSU Plant Science)

A polyclonal antibody to XML0 from chokecherry in ND was developed. It was tested on chokecherry plants with or without X-disease symptoms from ND and other states and on XML0 and other MLOs in other hosts. The antibody was active against XML0 in materials from a wide collection area and was generally specific to XML0. It was not active against two MLOs in the XML0 cluster from other hosts and it was active against a different MLO from another host. A monoclonal antibody against chokecherry XML0 from ND has been developed and is being tested.

Chokecherry plants in ND with symptoms typical of X-disease were confirmed by electron microscopy and with the polyclonal antibody to contain XML0. X-disease was confirmed from sites throughout ND. The only known cultivated variety of chokecherry ('Canada Red Cherry'), which had been thought to be resistant to X-disease, was found to be infected by XML0. X-disease was confirmed on symptomatic chokecherry from southwestern and east-central SD (from Rich Dorsett) and on symptomatic black chokecherry from southwestern Saskatchewan (from Don Reynard and Bruce Neill). These are the first confirmations that X-disease occurs in the Great Plains. Some chokecherry with symptoms of X-disease were negative against the polyclonal antibody, indicating possible variability in the pathogen, low pathogen titer, or unknown problems with the antibody.

In 1993 and 1994, potentially X-disease-resistant chokecherry plants were identified based on absence or reduction of X-disease symptoms on individuals or seed sources in a USDA Plant Materials Center (PMC) chokecherry germplasm collection. Putative X-disease symptoms were recorded on chokecherry plants in the PMC chokecherry germplasm collection and compared with results of polyclonal antibody testing for presence of XML0 to determine the value of each symptom for disease diagnosis; no symptoms were found that conclusively indicated the presence of XML0. Some plants without X-disease-like symptoms were found to contain XML0, possibly indicating recent infection or tolerance to infection.

4. Western gall rust of ponderosa pine. (with others)

Two pathogenicity types of *Peridermium harknessii* were identified through host inoculations with multiple spore isolates; no reports of such differences have been published. The types corresponded to isozyme biotypes, (w/Wang & others, NDSU Plant Science and w/Schumann, USFS). Final readings of inoculation of multiple families of control-pollinated ponderosa pine seedlings with two WGR spore isolates were made in 1994. Clear differences among pine families and between pathogen isolates were identified (w/Schumann). Sporulation of *P. harknessii* western gall rust on ponderosa pine was obtained one season after inoculation as compared to the normal 2 years until sporulation (w/Schumann). This short sporulation period had only been found with other pines in relatively mild climates. Differentiated aeciospores were produced in axenic cultures. Incubation and inoculation of those spores indicate that they are not viable.

5. Disease control by alternative windbreak planting design.

Most ND windbreaks are planted with single species or cultivars. A project to test the hypothesis that planting genetically diverse tree rows would buffer disease severity was started in 1989 using poplar cultivars and spruce species. To examine the hypothesis, windbreaks were planted in single cultivar/species and multi-cultivar/species replicated plots.

In 1994, defoliation in August of Northwest poplar leaves by foliage diseases, primarily Septoria leaf spot, was up to 200% higher in single cultivar plots as compared to mixed cultivar plots (75% vs. 25% defoliation). This supports findings of much reduced infection and defoliation in mixed cultivar plots by *Melampsora* leaf rust and Septoria leaf spot each year since 1991. The findings in these demonstration windbreaks for 4 continuous years show that there are advantages in using greater diversity in windbreaks.

6. Other

Walla found a severe level of infection by *Taphrina confusa* on chokecherry in the first finding of this disease in ND in recent time (ID by R.W. Stack).

Walla found (during surveys for white pine blister rust) that the pine bark adelgid is common and is the most damaging pest of white pines in ND.

PUBLICATIONS SINCE LAST REPORT:

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- Guo, Y.-H., Walla, J.A., and Cheng, Z.-M. _____. Polyclonal antibody confirmation of X-MLO in chokecherry in North Dakota. *Phytopathology* (submitted).
- Lundquist, J.E., Walla, J.A., and Tuskan, G.A. 1994. Characteristics of *Peridermium harknessii* in axenic culture. *Can. J. Bot.* 24:1345-1353.
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1994 NEBRASKA REPORT
 TO THE GREAT PLAINS TREE PEST WORKSHOP
 BY
 STEPHEN V. JOHNSON, STATE ENTOMOLOGIST
 VICKI B. WOHLERS, NURSERY PROGRAMS

Summary

Nursery Stock Inspections & Certifications:

Acres nursery stock inspected.....	1,726
Nursery stock grower licenses issued.....	259
Dealer locations inspected.....	190
Nursery dealer licenses issued.....	515

Surveys (Gypsy moth (GM), Japanese beetle (JB), Rangeland Grasshopper (GH), Cereal Leaf Beetle (CLB), Pine Shoot Beetle (PSB), Exotic Pests (EXP), and Soybean Cyst Nematode (SCN)):

GM - Traps used.....	1,997
Male moths captured.....	73
Total number of positive traps.....	55
Number of multiple trap catches of the total.....	10
Counties involved.....	8
JB - Traps used.....	94
Beetles captured.....	138
GH - Number of sites surveyed.....	75
Number of counties surveyed.....	33
Total number of specimens identified.....	6,468
Number of species.....	49
Total acres >8/square yard.....	14,884,000
CLB - Number of sites surveyed.....	47
Number of counties surveyed.....	13
Number of positive tests.....	0
PSB - Number of growers of nursery stock surveyed.....	150
Number of retail Christmas tree lots surveyed.....	111
Number of positive sites.....	0
EXP - Light brown apple moth sites surveyed.....	10
Number of counties involved.....	8
Apple ermine moth sites surveyed.....	10
Number of counties involved.....	8
Cherry bark tortrix sites surveyed.....	10
Number of counties involved.....	8
European cherry fruit fly sites surveyed.....	10
Number of counties involved.....	8
False codling moth sites surveyed.....	10
Number of counties involved.....	10
Maize borer sites surveyed.....	10
Number of counties involved.....	10
Summer fruit tortrix moth sites surveyed.....	10
Number of counties involved.....	8

All above traps were negative.

SCN - Number of potato fields surveyed.....	20
Number of counties involved.....	8
Number of nursery fields surveyed.....	30
Number of counties involved.....	19
Counties known infested to date.....	11

.....Narrative.....

NURSERY INSPECTION & CERTIFICATION

NURSERY GROWER INSPECTIONS

The Nebraska Department of Agriculture licensed 259 nursery growers for a total of 1,726 acres of nursery stock. This is a slight decrease of nurseries from 1993 (259 nurseries inspected in 1993, totalling 1,729 acres). Many of the nurseries are getting into more container production, concentrating about 100 times more stock to the acre. Also, some nurseries were totally restricted due to Zimmerman pine moth problems. Estimates indicate that the nursery industry in Nebraska generated nearly \$24 million in sales in 1993.

Changes to the Plant Protection and Plant Pest Act became effective in September 1993 and will allow the department to levy administrative fines, require certificates of origin on nursery stock, require licenses for brokers of nursery stock, address genetically engineered organisms, address door-to-door tree sales, require nurserymen to mark areas within their nurseries that would be inspected, allow the department to post signs in certain blocks or areas of a nursery that are withdrawn from distribution and issue permits to persons distributing biological control agents. Rules and regulations are being changed with the input of the Nebraska Nursery Review Board to address these law changes. Public hearings are planned for this spring.

NURSERY DEALER INSPECTIONS

The Nebraska Department of Agriculture licensed 515 nursery dealers in 1994. This is a slight decrease of dealers compared to 1993. During May and June, 190 dealer inspections were conducted. These inspections resulted in 123 Withdrawal-From-Distribution orders consisting of:

1. *Disease Problems
2. **Insect Problems
3. Nursery stock not on pallets
4. Weeds present
5. Environmental damage/mechanical damage (Trunk damage, top damage, etc.)
6. Wrong or missing labels including Barberry-Black Stem Rust Quarantine label violations
7. Plastic twine still on plants
8. Cover B & B with mulch
9. Exposed roots
10. Dry container/packaged stock
11. No license

* Disease problems included rose mosaic virus (930 plants), crown gall (70 plants), canker, powdery mildew, cedar-apple rust, apple scab, rose black spot, miscellaneous leaf spots, Dothistroma needle blight, ash rust, chrysanthemum rust, hawthorn rust, pine gall rust, peach, leaf curl and anthracnose.

** Insect problems included borers, Zimmerman pine moth, spider mites, ash plant bug, aphids and pine needle

scale.

Plants withdrawn from distribution because they were nonviable were broken down as follows:

Container	673
B & B	98
Packaged	629
Potted	22
Bareroot	3
<hr/>	
TOTAL	1,425

During the 1994 nursery dealer inspections, Nebraska Department of Agriculture inspectors kept track of the barberry varieties that each dealer location was carrying. No rust-susceptible barberry varieties were found but some label violations were found on barberry in the Sutherland Lumber chain of stores. These originated from Mid-Western Nurseries in OK.

In April we began receiving calls from surrounding states alerting us to pest problems coming in on nursery stock. Some of these included:

- Japanese beetle larvae found in B & B stock from Pleasant Cove Nursery (TN) (3 nurseries utilized this source), Valley Hill Nursery (KY) (5 nurseries utilized this source) and Lake County Nursery (OH) (7 nurseries utilized this source).
- Black vine root weevils found in container stock from Zelenka Nursery (MI) (165 nurseries utilized this source).
- *Disculis dogwood* anthracnose from H.J. Judkins (TN) shipped through the K-Mart chain however no K-Marts in Nebraska utilized this source.

Upon special inspection, no problems were found.

GENETICALLY ENGINEERED ORGANISM RELEASE

AgrEvo/Hoechst/Nor-Am, Asgrow Seed Company, Ciba-Geigy, Dekalb Plant Genetics, Monsanto Agricultural Company, Mycogen Corp., Northrup-King Corp., and Pioneer International received permits for field testing genetically engineered organisms. There were 43 notification permits for field testing at 104 sites in Nebraska. The field tests involved genetically engineered corn, potatoes and soybeans.

SURVEY AND DETECTION

GYPSY MOTH

This year 1,997 gypsy moth pheromone traps were distributed state-wide. Emphasis was on parks, forests, cities and towns above 5,000 and distributors of nursery stock. In 1994, a total of 73 moths were trapped in 8 counties. The numbers are as follows:

Buffalo county	1 trap	1 moth
Douglas county	8 single trap catches	8 moths
	1 multiple trap catch	2 moths
Lancaster county	3 single trap catches	3 moths
Lincoln county	1 trap	1 moth
Platte county	1 trap	1 moth
Saline county	1 trap	1 moth
Sarpy county	29 single trap catches	29 moths

NebGuide is planned for 1995.

RANGELAND GRASSHOPPER

A total of 75 sites in 33 counties of western Nebraska were surveyed 4 times during 1994. Twenty sweep net samples were taken at each survey site during each survey period. The samples were later examined to determine species and instar. The total number of specimens examined during the 4 surveys was 6,468 comprising 49 species. This data was sent to Bozeman, Montana in the APHIS western regional format. The fall adult survey indicated 14,894,000 acres with economic levels of 8 or more hoppers per square yard. No control programs occurred in 1994.

RHIZOMANIA IN SUGAR BEETS

In 1994, Nebraska reported new finds of rhizomania in Morrill county. This disease is a combination of a fungus Polymyxa betae and the beet necrotic yellow vein virus. At this time 3 counties (Morrill, Scotts Bluff and Sioux) have reported rhizomania.

SOYBEAN CYST NEMATODE

Surveys were conducted in 1994. Currently 11 counties are reported as infested. They are the eastern counties of Burt, Cass, Douglas, Gage, Johnson, Nemaha, Otoe, Pawnee, Richardson, Sarpy and Wayne. Soil samples from the 1994 survey are currently being analyzed by the University of Nebraska Department of Plant Pathology for all cyst-forming nematodes, including golden nematode. Thus far, all samples from potato fields have been negative. Results from the soil samples from nursery fields have not yet been completed.

LEAFY SPURGE, SPOTTED & DIFFUSE KNAPWEED BIOCONTROL

Monitoring activity was conducted at 37 leafy spurge biocontrol release locations in Nebraska (USDA monitored 17 of these sites and our department monitored 20 sites). New release sites were established with Aphthona nigricutis in Cherry, Dawes, Dixon, Gosper and Knox counties. New release sites were established with Aphthona lacertosa and A. crwallinae in Antelope, Garfield, and Keya Paha counties. A new release site was established with Obera erythrocephala in Brown county. A new release site was established with Spurgella esula in Cass county.

Urophora affinis releases were made at one new location in Pierce county on diffuse knapweed. Two releases of Bangasternus fausti were made on spotted knapweed in Holt county. Agapeta zozana releases were made on spotted knapweed at one new location in Holt county. A new release site was established with Larinus minutus in Pierce county on spotted knapweed.

PROGRAM CHANGES

This year we employed three temporary employees. Jason Kuehl and Jim Huer were gypsy moth surveyors and monitored traps in the Omaha area, inspected nursery stock and conducted special surveys. Brooke McVicker (Lincoln) inspected nursery dealers and growers and conducted special surveys.

The Nebraska Apiary Act was amended during the 1994 legislative session to concentrate on inspections for the issuance of health certificates for migratory beekeepers and for selling bees and equipment interstate. The State Apiarist position was eliminated and the State Entomologist now assumes those duties and administers the apiary program. Nursery inspectors were trained during the summer to do honeybee inspections but the majority of the work will be done by an Ag Specialist I position that is shared with the Seed Laboratory.

	9 multiple trap catches	26 moths
Washington county	1 trap	1 moth

TOTAL		73 moths

In 1994, five separate introductions of gypsy moth infested nursery stock from Michigan were detected.

In May, our department inspected an Omaha nursery which received 55 - 8 ft. B&B Colorado Blue Spruce. The majority of the trees had been distributed; two trees were found with viable egg masses at the nursery site. The nursery provided 43 planting sites where the infested nursery stock might have been planted. All sites were inspected and 9 more infested trees were found. All infested trees were destroyed or treated.

The second introduction was discovered in late July. It involved 1,724 items of nursery stock distributed from 43 retail outlets in 23 cities. The nursery stock was potted Colorado Blue spruce 15/18", 18/24", Black Hills spruce 15/18", 18/24" and white pine 15/18", 18/24". Most of this nursery stock was distributed by discount stores and the vast majority had been sold by the time our inspectors arrived. Infested nursery stock was found in Columbus, Omaha, North Platte and Seward. An 800 number was established to help find infested stock that had already been distributed. One infested tree was detected at Rising City as the result of the 800 number.

The third introduction occurred in late August and involved 330 - 12/15" and 15/18" Black Hills Spruce and Colorado Blue spruce. These were distributed through one discount chain in 3 cities. Most of this nursery stock was still in the store. Two infested trees were found at Hastings and destroyed.

The fourth introduction, discovered in late September, was in a new development in Omaha. Five moths had been trapped in this area in 1994. An egg mass survey was conducted in October and November. Inspectors found 34 - 10 to 12 ft. Colorado Blue Spruce trees with 48 gypsy moth egg masses.

The fifth introduction, found in December, involved Christmas trees at two sales lots in Omaha. Two egg masses were found on two separate douglas fir trees.

A Gypsy Moth Advisory Board Meeting was held on December 6, 1994 in Omaha to plan for survey and control measures for 1995. The area of immediate concern is the Bellevue area as surveys in November found 14 viable egg masses which we believed to be responsible for the 54 moths trapped in that area. We believe this infestation resulted from a Michigan house hold move.

JAPANESE BEETLE SURVEY

Many alerts were sounded by Missouri and Kansas this year. Those states intercepted shipments of nursery stock from Tennessee with Japanese beetle infestations. Our department did not detect larval infestations in root balls, but did find adult beetles. Our department placed 94 traps in 26 counties concentrating on airports, golf courses, rail yards, rest stops and nursery stock distributors. A total of 138 Japanese beetles were trapped state-wide. At a rest stop north of Lincoln where an eradication effort is underway 51 beetles were trapped. Ten nursery stock distributors in Lincoln and Omaha were found with beetle numbers ranging from 1 to 24. One beetle was trapped at a rest stop in Hall and Seward counties. Our department has been working with the Tennessee Department of Agriculture and is requiring treatment before B & B nursery stock can be shipped to Nebraska.

ZIMMERMAN PINE MOTH SURVEY

We continue to see an increase and spread of these insects in Nebraska. Zimmerman pine moths are actually 3 separate species found in Nebraska. This year we changed our recommendations necessary for the certification of pine nursery stock in infested areas of Nebraska. We are now requiring two treatments per year and rouging out of infested trees. Tightly sheared trees in infested areas can't be adequately inspected, so they will not be inspected and certified as nursery stock. This policy has resulted in a better quality nursery stock and improved management of these pests. This insect was detected in Lancaster county for the first time in 1994. An updated

Forest and Shade Tree Pathology Research Activities during 1994-95 and Planned for 1995

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I. Shade Tree Research

A. Current Research: Soil Flooding/ Low Oxygen as Predisposing Stresses

We have completed three experiments of short term (6-8 wk) flooding of potted Honeylocusts and found no significant effect on the size of *Thyronectria* cankers.

We have completed a long term (two seasons) pot study simulating the over watered yard vs the adequate watered yard. Early and late summer inoculations caused cankers but there were no differences between the two treatments. There was a relationship between root wt and canker size so I think over watering is an important stress but we had too much variation in canker sizes to show differences. We are currently writing a draft of a manuscript for *J. Arboriculture*.

B. Future shade tree research.

1. We are in the process of establishing a new research nursery to study the interactions of irrigation practices, turf, and insect and biotic and abiotic diseases of selected shade trees. We were able to finally find funding to complete the establishment of this facility. Part of the water system is in and we plan to plant wind break trees and turf in the spring 1995. This is a major undertaking and experiment in truly cooperative work with soil hydrologists, turf specialists, entomologists, and pathologists. We'll see how we do. We will be trying to actually get water usage values for one of our more common tree species.
2. We may actually get Gene Smalley's hybrids planted this year.
3. Whitney Cranshaw and I have a small grant to develop IPM procedures for nurseries and landscapes. This project is supposed to get off the ground this spring.
4. Gerry Adams (Michigan State) and I am trying to establish a study to look at the genetic variation in *Cytospora chrysosperma* across different hosts.
5. I have a new student starting this fall who may work on the epidemiology of *Marssonina* leaf spot. Is there anyone working on this now that would like to cooperate???

II. Forest Tree Research

A. Armillaria Root Disease Melanie Kallas M.S. Graduate Student

In cooperation with the U.S. Forest Service Region 2 FPM, and the Rocky Mountain Forest and Range Experiment Station, we are utilizing GIS to study the occurrence of *Armillaria* root disease in the Black Hills National Forest. We will be looking at relationships between root disease and soils, past disturbance, and meteorological data. The study is aimed at determining general relationships over the entire hills.

III. Publications

None of any importance: I am working hard on four manuscripts.

Plant Pathology Report 1995
Ned Tisserat
Department of Plant Pathology
Kansas State University

Diagnostic Lab. Extensive damage to eastern redcedar, Austrian pine and Scots pine was observed in northeastern Kansas in spring 1994. Symptoms included excessive needle defoliation, branch dieback and tree mortality. Damage is thought to have been the result of water-saturated soils during the summer of 1993. Other trees and ornamental species were also damaged.

Pine wilt is epidemic in the eastern section of Kansas and may limit further plantings of Scots pine. Austrian pine continues to be damaged by *Sphaeropsis* tip blight. Because of the significant disease problems on these species, arborists are searching for other conifers that may be adapted to the Great Plains.

Juniper diseases. Demonstration plantings of *Juniperus* spp. (Manhattan and Wichita) were rated in May 1994 for severity of Kabatina tip blight (*Kabatina juniperi*), cedar-apple rust (*Gymnosporangium juniperi-virginiana*), *Cercospora* needle blight (*Cercospora sequoiae* var. *juniperi*) and *Botryosphaeria* canker (*Botryosphaeria stevensii*). Although cultivars of the different species were replicated at both locations, they were not randomized. Therefore, ratings were based on overall ratings and were not subjected to statistical analysis. In general, cultivars of *J. chinensis* were relatively resistant to all of the major diseases, while *J. scopulorum* cultivars were extensively damaged. Most cultivars of *J. virginiana* were susceptible to rust.

Attempts to control *Sphaeropsis* tip blight of pines with fungicide injections.

Sphaeropsis tip blight, caused by the fungus *Sphaeropsis sapinea*, is the most destructive disease of Austrian pines in Kansas. Historically the disease has been controlled by foliar fungicide applications in the spring to protect newly developing shoots. An alternative to foliar applications is injection of systemic fungicides into the tree.

Mature, moderately to severely diseased Austrian pines were injected with fungicides by two methods. The first method consisted of a syringe-type device developed by Arbor-Systems in Omaha, Nebraska. The syringe needle was placed into the cambium of the pine, and 1 ml of the undiluted fungicide was injected into the small cavity created between the phloem and sapwood. The needle was then removed and reinserted at approximately 3-4 inch intervals around the circumference of each tree. Each tree received 2 ml of the undiluted fungicide propiconazole or tebuconazole per inch diameter (e.g., a 10 inch DBH tree had 20 injection sites containing 1 ml of fungicide). Injections were made 9 November 1993 and 1 April 1994.

Other Austrian pines were injected with the fungicide propiconazole by means of a microcapsule system marketed by ArborX systems, New York. Each capsule or vial contained 12 ml of undiluted fungicide. Injections were attempted in November and April. Injections in November were unsuccessful because rapid pitch production by the tree plugged the injection holes. In contrast, injections in April were successful; most vials were emptied within 72 hours after insertion into the tree.

Table 1. Relative resistance of various *Juniperus* selections to cedar-apple rust, cedar-hawthorn rust, Phomopsis tip blight, Kabatina tip blight, Cercospora needle blight, and Botryosphaeria canker. Ratings of 0 = no disease, L = light, M = moderate, S = severe disease, and ... = not determined were gathered during seasons favorable for disease development. Those selections with moderate to severe levels of rust, Phomopsis tip blight, or Kabatina tip blight may be aesthetically unacceptable during a portion of the year and could require additional cultural and chemical controls. Juniper selections with moderate to severe levels of Cercospora blight or those susceptible to Botryosphaeria canker should be avoided.

	Apple rust	Hawthorn rust	Phomopsis tip blight	Kabatina tip blight	Cercospora blight	Bot canker
<i>Juniperus chinensis</i>						
Ames	0	0	L-M	0	0	0
Aureo-globosa	0	0	L	...	...	...
Blue Point	0	...	...	M	0	0
Columnaris	0	0	S	...	...	...
Femina	0	0	L	...	...	...
Fortunei	0	0	...	...	...	...
Globosa	M	L	L	...	...	...
Hetzii Columnaris	0	0	M	0	0	0
Hetzii	...	...	L	...	...	...
Japonica	0	0	S	...	...	...
Keteleeri	0	0	L	0	0	0
Leeana	0	0	...	...	...	...
Maney	0	...	M	0	0	0
Mas	0	...	L	...	...	...
Mountbatten	0	...	L	0	0	0
Oblonga	0	0	...	...	...	...
Parsonsii	0	0	...	...	...	...
Pendula	0	0	S	...	...	...
Perfecta	0	...	...	0	0	...
Pfitzeriana	L	0	M	L	...	0*

	Apple rust	Hawthorn rust	Phomopsis tip blight	Kabatina tip blight	Cercospora blight	Bot canker
<i>Juniperus horizontalis</i> cont.						
Eximius	0	0	S	...	...	...
Filicina	0	0	M	...	...	...
Glenmore	0	...	L-M	...	...	...
Glomerata	0	...	...	...	...	...
Grey Carpet	0	...	M	...	...	...
Livida	0	0	S	...	...	...
Petraea	0	0	S	...	...	...
Plumosa	L?	0	S	...	...	...
Prince of Wales	...	...	M	...	...	...
Procumbens	0	0	L	...	...	...
Variegata	0	0	S	...	...	...
Wiltonii (Blue Rug)	0	0	M	L-M?	...	...
<i>Juniperus sabina</i>						
Arcadia	0	0	L	...	...	...
Broadmoor	0	0	L	...	...	S*
Fastigiata	0	0	L	...	...	...
var. <i>tamariscifolia</i>	0	0	S	L	...	...
Variegata	0	...	...	...	...	...
<i>Juniperus scopulorum</i>						
Blue Haven	M	...	L-S	S	M	S
Cologreen	M	...	...	L	M	S
Dewdrop	L	...	...	M	M	?
Gray Gleam	M	...	...	M	0?	0
Horizontalis	M	S	S	...	...	...
McFarland	M	...	...	L	S	M
Medora	0	...	...	M	L	0

	Apple rust	Hawthorn rust	Phomopsis tip blight	Kabatina tip blight	Cercospora blight	Bot canker
<i>Juniperus virginiana</i> cont.						
Elegantissima	S	S	M	...	...	...
Emerald Sentinel	M	...	...	L	0	0
Glauca	S	S	M	...	...	...
Globosa	L?	0	L	...	...	...
Henryii	S	...	...	L	0	0
Hillii Dundee	S	...	M-S	L	0	0
Hillspire (Cupressifolia)	0	0	M-S	L	0	0
Kosteri	0	0	...	...	...	...
Manhattan Blue	S	...	...	L	0	0
Nova	S	S	...	...	...	...
Oxford	M	...	...	M	0	0
Pendula	S	M	M	...	...	...
Pseudocupressus	0	0	...	...	...	...
Pyramidalis	L?	0	...	...	...	...
Pyramidiformis	S	S	M	...	...	...
Reptans	S	0	L	...	...	...
Schottii	S	0	...	...	...	...
Tripartita	0	0	0	...	...	...
Variegata	M	L	...	...	...	...
Venusta	0	...	...	...	...	...

Sources of information for table: 1) Himelick and Neely. 1960. Plant Dis. Rep 44:109-112 (rusts)

2) Schoeneweiss, D.F. 1969. 94:609-611. (Phomopsis tip blight).

3) Tisserat and Pair. 1993. Report of Progress 693. Ag. Exp. Station, KSU. (rust, Kabatina tip blight, Cercospora)

* Ratings based on general field observations and not from replicated plots.

SOUTH DAKOTA FOREST INSECT AND DISEASE
1994 STATUS REPORT

for Great Plains Tree Pest Workshop
Manhattan, Kansas
March 14 & 15, 1995

The South Dakota Division of Forestry is currently in the middle of a massive reorganization, merger, and personnel reduction which started in mid-1994. At the top of the list is the loss of 5 positions and the complete closure of 2 field offices. Next to occur was a complete structural reorganization. The division is now divided into 2 sections, Fire Management and Service Forestry. District boundaries have more or less been done away with. Even though each conservation district still has one specific forestry office in their area to contact for assistance, division personnel will be sent where ever the work needs to be done. Service forestry assistance will be carried out by 4 foresters in eastern SD and 5 in the Black Hills. Finally, the state Division of Conservation and the Division of Forestry will be merged on April 17 into one Division of Resource Conservation and Forestry. (The Division of Conservation was down to only 5 people and 3 of them are on somewhat shaky funding sources).

Pest Management activities during 1994 were concentrated on 2 detection surveys at the state's Big Sioux Nursery, on compiling a database of all the field detection reports sent to the division since the mid 1970's, on preparing a display of the top 15 tree problems reported since the mid-70's (derived from the previous database), on preparing for the upcoming Forest Inventory Analysis training session and Inventory to be conducted in SD in 1995, participating in the 1994 Gypsy Moth detection survey, participating in a statewide Pine Shoot Beetle Detection Survey, assisting 15 communities with Dutch Elm Disease surveys as well as responding to over 200 specific landowner requests for pest management assistance.

Inspections at the Big Sioux Nursery generally showed most of the stock to be healthy. Several blight problems still go undiagnosed as to actual cause, especially on crabapple, Harbin pear and Russian olive but most of these seem to be under control from various fungicides. Phomopsis blight on one Eastern red cedar seed source was very heavy while virtually nonexistent on adjacent beds of a different seed source. Willow sawflies had a third generation and completely defoliated some of the willows before they were noticed.

The detection database is almost complete. If time allows old survey information may be added in some format. As it is, the data consists of date, county, host, stand type, type of problem, specific cause, latin name where appropriate, number of acres and number of trees affected when reported. Information from this database has already been used for several talks by both the pest specialist and the field foresters. Based on information from this database a traveling poster display has also been put together on the top 15 tree problems encountered in SD.

Gypsy Moth surveys in SD did not show any areas to contain an established infestation. However, several moths were collected in several traps in the southeastern corner of the state; it's possible they may have blown in from Iowa. A few other moths were found in detection traps around the state, mostly in the Black Hills areas. Most of these are suspected to be hitch hikers. However, one campground location has now collected one or two moths each year for a number of years. An inspection for other life stages is being planned for this area this summer.

No Pine Shoot Beetles were found anywhere in South Dakota.

New Dutch Elm Disease infections held fairly steady from 1993 to 1994. It is doubtful that infection rates will ever get much higher than they are now due to the simple fact that there just aren't that many susceptible elms left anymore.

GENERAL PEST ACTIVITIES

Hail Damage - was the most reported problem, coming from many areas of the state.
Rodent Girdling - on almost all species was the second most commonly reported problem.

Herbicide Damage - fell to the third most common problem reported in 1994. Some of this may have been due to very wet conditions in some parts of the state.

Flooding damage - from both previous years and from 1994 spring flooding is really starting to show up in east central SD, especially on pines in shelterbelts.

Ash Plant Bug - populations exploded all across the state causing early defoliation on most green ash.

Spider Mites - especially on cedars and junipers were fairly common

Diplodia Tip Blight - seems to be on the increase in many areas, particularly western SD

Fire Blight - seemed to explode on Cotoneaster all over the eastern 1/2 of the state. It was also commonly reported from apples.

Willow Sawflies (several species) - were very noticeable, although not in huge populations in any one location.

The other most commonly reported problems included Ips engravers from the Black Hills area, Transplant Damage, Winter Burn and Winter Kill, Ash Borers (an annual problem), minor local outbreaks of Pear Slug Sawflies, and Ponderosa Pine Sawflies around the Black Hills, and Fall Webworms which seem to be undergoing a slow but steady statewide population increase.