Minutes of The 1997 Great Plains Tree Pest Workshop

Hathaway Building
Basement Auditorium
Cheyenne, WY

March 18 and March 19, 1997

Tuesday, March 18, 1997

Meeting called to order by Chairperson Bill Jacobi at 8:10 am.

Attendees: Lia Spiegel, Dave Leatherman, John Hart, Bruce Neill, Don Reynard, Jeff Wischer, Mark Harrell, Mike Schomaker, Dave Johnson, Bill Schaupp, Judy Pasek, Kurt Allen, Jim Walla, Laurie Stepanek, Jeri Lyn Harris, and Bill Jacobi.

1996 minutes were approved as amended with correction covering John Ball as replacement for Rich Dorset.

Announcements:

John Ball is currently the replacement for Rich Dorset in South Dakota.
Mailing list was distributed for corrections and updates.

State and Organizational reports (20-30 minutes each):

Copies of printed reports were distributed and are attached for those not attending this meeting. Additional discussion of note is reported below. A common thread in all these reports was the 1995 increase in diseases from the excessively moist spring months of May and June.

Region-2 USFS (Lakewood Service Center) -

Erik Johnson will complete the "wall to wall" aerial survey of all forested lands in Colorado in 1997. This will cover approximately 14 percent of the remaining forest cover in Colorado. No gypsy moths were caught in Colorado in 1996. Pine sawfly defoliated ponderosa pines near Colorado Springs.

Nebraska (Mark Harrell and Laurie Stepanek) -

"Pointer" is the trade name of imidacloprid used in the trunk injection study.

Pointer doesn't work well on lepidoptera but works on beetles. Chlorosis treatments seemed only to work on trees where the roots could find the fertilizer tubes. About 50% of birch trees in the western part of the state are dead or dying due to a large increase in bronze birch borer where it hadn't been a problem prior to 1994. There is a strong correlation between sunflowers and *Isophrictus* sp. infestations of red cedar seedlings. It appears from size of entry wounds that the more mature larvae come from nearby infested sunflowers.

Colorado State University (Bill Jacobi) -

Ash yellows survey found in all sites but trees were either healthy or dying and didn't really express the expected symptoms. Mid-season leaf infections by Septoria on cottonwoods were not expected but were common in the nursery IPM studies. Mark Harrell suggested that the disease identification guide be pocket size to facilitate usage. A turf and tree water use study has begun at the new CSU study site.

North Dakota (Jim Walla) -

North Dakota has lots of snow and more is coming - Jim showed slides of this years record snow. X-disease of choke cherry is up for some reason and causing severe problems in many plantings. All 44 infected select plants, that show few or no symptoms, are being tested to determine their resistance levels. Nurseries are not moving spruce so Lirula needle blight is not currently a big problem. Chlorothalonil provides excellent control where this disease is a problem. Insects were not found to be associated with the unknown juniper disease that was reported in 1995. Attempts to control the disease with various fungicides have been ineffective. Affected junipers have come from at least four different nurseries from Canada to Iowa.

Colorado (Dave Leatherman and Mike Schomaker) -

Dave will try to determine which of over 100 species of grasshoppers are affecting woody seedlings in eastern Colorado. *Ips pini* was previously thought to be the dominant Ips in ponderosa pine but *Ips plastographus* was identified as a major species in ponderosa this year. Many *Ips pini* determinations in the past may have been *Ips plastographus*. Bostrichids (apple twig borer) were found attacking tamarisk in a 1996 burn area. Tamarisk is not a recorded host for this insect. Dutch elm disease was found on 100 of 188 samples submitted to the CSU plant diagnostic clinic. The baseline report for Colorado's Forest Health Monitoring program will be published in 1997.

Kansas (Jeff Wischer) -

Jeff, small tree nursery manager, presented the report for the recently retired Les

Pinkerton. Part of Jeff's time may be in pest diagnosis in the future and we may see more of him. However, if the trend in seedling sales goes back up, he may not have time to devote to anything else.

Region-2 USFS (Rapid City Service Center) -

Pine sawfly was on the eastern edge of the Black Hills by Custer State Park and Wind Cave. Pine butterfly outbreaks were more centrally located in the Black Hills, not on the edges, although in some areas the two pests overlapped. Walnut caterpillar outbreaks were found in plantations in northeastern Nebraska. Jeri Lyn and Kurt will do general I&D surveys in the Nebraska grasslands, especially wooded draws, this summer to help determine and evaluate potential pest problems that aren't typically covered by R-2. They will be testing fallowing to control pathogens in nursery beds at Bessey Tree Nursery to replace Basamid.

Wyoming (Lia Spiegel) -

Lia distributed the Nebraska Department of Agriculture report and then gave her report. Due to the 12 gypsy moths caught in 3 traps in Cheyenne in 1996, in 1997 gypsy moth delimiting traps will be dispersed throughout Cheyenne at 1000 foot intervals covering an area of 9-12 square miles. Lia is now being directed to work more closely with cities by the new State Forester and so will become more involved with plains/prairie forestry.

Canada PFRA Shelterbelt Centre (Don Reynard and Bruce Neill)

The Prairie Farm Rehabilitation Administration Shelterbelt Centre is trying to change the name of choke cherry to wild black cherry because some people don't like the term choke used with an edible fruit. They have done studies on home heating costs, carbon sequestration by trees, impacts of shelterbelts on a variety of resources and farm economics, etc. Green ash is the number one tree species their nursery ships out and ash yellows is of great importance to them. Woolly elm aphids occasionally use earthworm tunnels to get to the soil surface from saskatoon roots 6-8 inches deep. Cytospora damage may be related to wooly elm aphid damage. This is an area that needs study. Vaseline or stickum applied to saskatoon plants to trap aphids doesn't work and the plants tend to weaken and collapse at the application area. Cygon toasts saskatoons - it kills the aphids and the plants.

Special Reports:

Comandra Blister Rust - Jeri Lyn Harris

Discussed the life cycle and history of CBR in Wyoming. Jeri Lyn analyzed data from

many plots established since the 1980's and presented her findings. CBR is static or decreasing in Wyoming. This indicates a possible "outbreak" in the first half of this century. Trees dying to CBR in many cases are opening stands and releasing other species to fill in the canopies. Bigger trees had cankers higher in the crown while smaller trees tended to have cankers lower in the tree. Mortality was higher when cankers were found lower in the tree. The declining trees were the largest and oldest trees on the sites. While the dead trees tended to be the smallest trees on the sites. Intensive management should be focused on sites with low site indices to mitigate as much CBR damage as possible. Managers should remove substantial top-killed and dead trees. Little growth will occur after top-kill. This will be written up and published in a technical report.

Larval guide to trees and shrubs - Dave Leatherman

Dave suggested that this group may start collecting and compiling photos of larval lepidoptera affecting woody plants as a reference tool for diagnosticians. These could eventually be placed on a CD ROM for distribution, although the problem of proprietary rights was recognized. Dave volunteered to curate this collection, if it's needed or desired. Participants could send him slides for duplication and he would return the originals. Most agreed that this is a good idea. **Send your photos to Dave. AGENDA ITEM FOR 1998**: Dave will report on the progress of this effort in 1998.

Regional publications - Bill Jacobi

Bill presented the list of publications sent to him by some states. Is there a need to do some regional publications for pests that cross state boundaries? Are people willing to do this type of work or at least notify the group when they are rewriting a handout so that it may be used/purchased by others that desire it? It was suggested that each state/province and the USFS have one contact volunteer to participate in this effort. **The following people will be responsible for notifying the relevant people within their state/province or organization when a revision or new publication on tree pests/diseases in the plains is in the works: Bruce Neill-Canada, John Ball-South Dakota, Mark Harrell-Nebraska, Jim Walla-North Dakota, Ned Tisserat-Kansas, Bill Jacobi-Colorado, Lia Spiegel-Wyoming, Dave Johnson-USFS.** Possibly an e-mail listserv could be generated to facilitate transfer of information. Bill will continue to try to collect, update and distribute this list. **If you haven't sent a publication list to Bill, please do so**. Bill Jacobi will receive: (1) A list of existing Forest Insect & Disease Leaflets from **Dave Johnson**, (2) A list of existing PFRA fact sheets from **Bruce Neill**, and (3) A list of Kansas publications from **Ned Tisserat**. Talks centered on how to revise or update the two Great Plains insect and disease publications that are now out of print. The problem is getting the energy and participants to do the revision. Bill and Jim Walla will work together to look into updating the disease publication and the possibility of adding insects to it.

Old Business :

The Plains and Prairie Forestry Association (PPFA) still desires our membership or interaction. Last years motions, decisions and actions were presented and discussion continued. There is still a desire by the Association to have us participate as a committee associated with them. Do we desire a level of interaction with the Association? If so, at what level? Bill Jacobi moved and Don Reynard seconded to: send two volunteer representatives to the annual PPFA meeting, these representatives will give a formal presentation to PPFA and then report back to GPTPW on PPFA concerns, issues, and happenings raised at the annual meeting. In addition, GPTPW will hold meetings in conjunction with PPFA when they are meeting in our geographic area, approximately every 4 years, to ensure that their needs as a our customers are being met. Motion carried. **The two representatives for 1997 are Jim Walla and either Kurt or Judy.**

Bill Schaupp discussed the status of the white paper on riparian ecosystems. He apologized for not sending the bibliography to those who requested it. An updated list of recipients was made and **Bill will** make sure they all get a copy before 1998.

New Business -

Election of new officers -

Lia Spiegel was unanimously elected as Chairperson.
John Ball was unanimously elected as secretary.

Next meeting location -

A motion was made and carried to meet in Rapid City, SD or a location in South Dakota to be determined by the newly elected officers and the past Chairperson.

Include a mailing list of the current members in the mailing of the minutes for each meeting.

Judy will provide past minutes and organization bylaws to current secretary. In the future each secretary will pass these items on to the incoming secretary so there is a travelling log for the organization.

The past chairman will write a note that can be sent to each retiring member of this workgroup to thank them for their participation in and support of this group and plains forestry.

A unanimous thanks to Lia for her efforts in getting this year's meeting together and announced in a timely fashion.

Wednesday, March 19, 1997

Meeting called to order by Bill Jacobi at 8:05.

Special Reports (continued):

Ash Yellows Survey Presentation - Jim Walla

Jim has a bibliography available on ash yellows for those who are interested. Jim presented a brief history of ash yellows in North America. We've doubled the area of ash yellows with the survey results from last years study. Five states (Colorado, Kansas, Nebraska, North Dakota and South Dakota) and two Canada provinces (Manitoba and Saskatchewan) were involved in this survey. The survey sampled at least 10 trees (5 healthy and 5 symptomatic) from urban plantings, rural plantings and natural stands from five different areas (except Colorado did 15 sites in four areas) in the state or province (10x3x5=150 total samples each). Root samples (1-3 mm in diameter and 3 inches long) were taken and shipped via overnight mail to Jim and placed in the refrigerator to be diagnosed. All trees were measured and data recorded on: location, owner, crown class - three classes based on dieback; dbh; increment cores at dbh (if possible) - trying for at least 20 rings/minimum of 5 needed and; symptoms (Witches brooms - basal and stem, deliquescent branching, epicormic sprouting, basal sprouts, cracks in the stem, loss of apical dominance). Suckers are not brooms! Brooms typically have some single leaflet leaves.

Root samples were free-hand thin sectioned, dyed and checked for monoclonal antibodies using fluorescence microscopy (looking for immuno-fluorescence as opposed to background auto-fluorescence). Phytoplasms only occur in phloem tissue. Positive diagnosis required at least three root sections to have at least three definite immuno-fluorescent areas in them. If this standard was not met, a tree was not considered to be positive. Vectors for ash yellows still have not been determined. Phytoplasms are not transmitted by seed.

Jim distributed a handout of his findings and discussed the results. Sampling (sample size and handling) and diagnosis techniques may have been responsible for the variation in percent positives found. The percent positives range for the total number of infected trees in a state or province (first ten trees at each of 15 sites) was from 28% in North Dakota to 71% in south Dakota. Fifty-seven percent (570/1020) of the samples taken in 1996 were positive. Ash yellows was found at all sampled sites. Crown class information showed that 63% of the trees in crown class 1 (high percentage dieback) were positive. Fifty-six percent of crown class 2 were positive. Fifty-three percent of crown class 3 (healthy) were positive. Witches broom analysis was not done. Other measurement analysis provided no definitive information relating symptoms found to presence of ash yellows. Based on this study there is no indication that ash yellows is causing an impact on our ash trees. There is also not enough evidence to say that ash yellows is not affecting our ash trees.

A lengthy discussion followed the presentation including the possibility of trying: to identify the vector(s) of ash yellows; and determining tolerance to the disease. If you would like samples checked for ash yellows, NDSU is the only lab known to do it. The charge per sample is $15 to $18.

Herbicide Slide Presentation - Mike Schomaker

Mike started with a brief update of his state report. White pine blister rust was found on an imported Western white pine from Idaho in Denver. An lumpy, bumpy aspen was passed around that had no evidence of causal agent present (possibly genetic or abiotic problem?).

Mike also distributed a list of the herbicide damage slides he has received and showed the slides. Members present could check on their list the slides they would like copied. Mike will send duplicates and an invoice for reimbursement to those who submit their desired list to him. A list of the herbicide slides is included with the minutes for anyone interested in receiving copies, sight unseen, from Mike. Just send him your list with name and address.

Slide presentation - Bruce Neill

30 slides of insect pests of Saskatchewan.

Meeting was formally adjourned at 11:00 am.

Submitted by Lia Spiegel, Secretary

Nebraska Report to the Great Plains Tree Pest Workshop
March 18 & 19, 1997
Cheyenne, WY

Mark Harrell and Laurie Stepanek
Nebraska Forest Service, University of Nebraska
Lincoln, NE 68583-0814

1996 Research and Survey Activities

1. Ash yellows

Nebraska participated in the region-wide survey of ash yellows in green ash. The survey found the phytoplasma at all 15 of the sampled locations across the state and in 66% of the sampled trees.

2. Trunk injections

A study was conducted with ArborSystems to identify a method that would improve the retention of pesticides injected into trees with their Wedge injector. A method was developed that allows four to five milliliters to be injected into the trunk at each injection site without any of the liquid leaking out.

Trunk injections of imidacloprid applied through the Wedge injector were compared to Mauget bidrin injections for the amount of damage done to trees around the injection sites. Overall, the amount of damage was about the same for both products. The Wedge imidacloprid injections caused shallower but wider damage (ca. 3 cm wide for 1 ml injected), while the damage from the Mauget bidrin was deeper but narrower. In 1997 a study will be conducted to identify pesticide carriers with low phytotoxicity.

material Same as MERIT → use Siberian elm contra elm leaf beetle as model
· treatment very effective
· also gets sucking insects
· does NOT seem to work on lepidoptera very well

3. Fabric mulch

The second year of a three-year study of the effects of landscape fabric mulch on the survival and growth of newly planted trees was completed. Trees were planted, treatments were applied, and data were collected on one-year-old and new tree plantings. Preliminary results suggest, as expected, that some form of weed control, either fabric mulch, wood chip mulch, or herbicide treatment increases survival of tree seedlings. The fabric mulches produced summer soil temperatures generally equal to bare soil and soil with weeds, and higher than soil covered with wood chips. Soil moisture was lowest in soil with weeds, intermediate in soil covered with fabric, and highest in soil with wood chips.

4. Soil treatment for chlorosis

The second-year evaluation of a three-year study of a new iron chlorosis soil treatment (Micromax fertilizer, sulfur, and NPK fertilizer in 2-inch perforated tubes) was completed. Results on silver maple suggest the soil treatment is beginning to work, but not all trees have started improving.

Some of the fertilizer tubes were dug up, and the trees that had begun to improve had new roots in large numbers growing around the tubes. Trees that had not started to respond did not have many roots growing around the tubes.

Noteworthy Pests

Bronze birch borer -- This insect has always been a common and damaging pest of birch in eastern Nebraska. Until 1994 the borer was almost undetectable in the western part of the state. Now in much of western Nebraska probably 60 to 80% of the birch are dead or dying because of the borer. The outbreak appears to have begun as a result of an early fall freeze in 1991.

Gypsy moth -- No known infestations are present in the state. A previous infestation in Bellevue along the eastern edge of the state was sprayed with Bt in May 1995 and is believed to have been eradicated. Four moths were caught in separate traps across the state in 1996.

Dioryctria pine moths -- Continue to be the most damaging insect pests of pines in the state.

Hackberry lace bug -- Caused lots of yellowing on hackberry for about the fifth year in a row.

Isophrictis sp. borer of redcedar seedlings -- An *Isophrictis* sp. borer (Lepidoptera: Gelechiidae) killed many first-year transplanted redcedar seedlings several years ago in western Nebraska and has again killed many seedlings in new windbreak plantings. The insect may be an unknown species. The outbreak several years ago occurred mostly in new plantings that had abundant sunflowers surrounding them. Evidence suggests that the insects might spend much of their early development in sunflower and move to redcedar seedlings just before pupation. A study of these insects will continue in 1997.

Sphaeropsis blight -- Continues to be the most damaging disease of pines in the state. Was also seen in Colorado blue spruce.

Dutch elm disease -- Incidence of the disease was less in 1996 than in 1995.

Cercospora blight -- Continues to be a problem throughout the eastern half of the state, especially on Rocky Mountain juniper.

Recent publications

Dix, M. E., M. O. Harrell, N. B. Klopfenstein, K. Barkhouse, R. King, and R. Lawson. 1996. Insect infestations and incidence of western gall rust among ponderosa pine seed sources grown in the central Great Plains. Environmental Entomology 25:611-617.

Harrell, M. O., F. P. Baxendale, and J. A. Jones. 1996. Pine moths. Univ. Nebr. Coop. Ext., NebGuide G96-1277-A, 4 p.

Dix, M. E., L. Hodges, J. R. Brandle, R. J. Wright, and M. O. Harrell. Effects of shelterbelts on the aerial distribution of insect pests in muskmelon. J. Sustainable Agriculture. (accepted)

Saskatchewan Agriculture and Food

PFRA

Woolly Elm Aphid

Woolly elm aphid is the most serious insect pest of saskatoon seedlings.

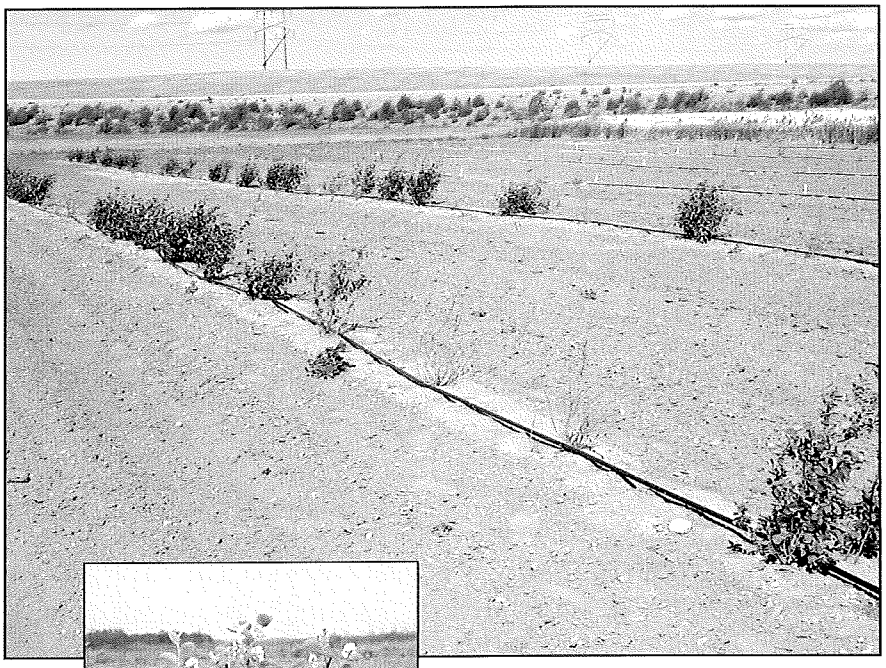

Figure 1. Saskatoon orchard with sparse or reduced establishment.

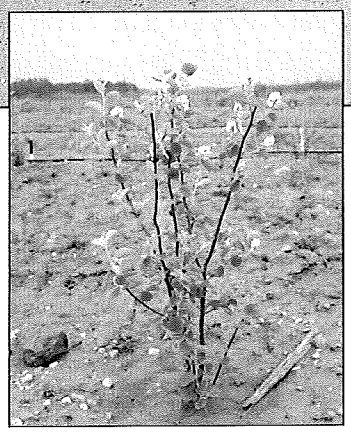

Figure 2. Healthy saskatoon plant.

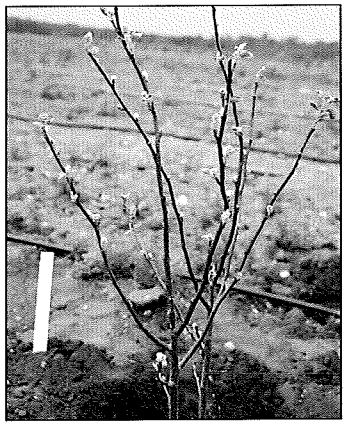

Figure 3. Saskatoon plant damaged by woolly elm aphid.

Funded by

Saskatchewan Agriculture Development Fund

Introduction

The woolly elm aphid (Eriosoma americanum) feeds on American elm (Ulmus americana) and saskatoon (Amelanchier alnifolia) during its life cycle. In spring and early summer, the woolly elm aphid colonizes the elm leaf causing the leaf to curl to form a pseudo-gall. Within the protection provided by the gall, hundreds of aphids are produced. In late summer and fall, this aphid produces colonies on the roots of saskatoon. Damage by colonies infesting the roots can cause significant losses for saskatoon growers during orchard establishment (Figure 1). The woolly elm aphid is therefore considered the most serious insect pest of saskatoon seedlings on the Canadian prairies. Saskatoon plants damaged by the root aphid may not show symptoms until the following spring. In the spring, damaged plants break bud, produce a few small leaves and may die (Figure 2 & 3). Saskatoon seedlings in their second or third growing season appear to be most susceptible. Plants growing in unsheltered locations or in non-irrigated orchards appear to be the most susceptible to aphid damage. A cooperative research study funded by the Saskatchewan Agriculture Development Fund, sponsored by the Saskatchewan Fruit Growers Association and conducted by the Prairie Farm Rehabilitation Administration (PFRA) Shelterbelt Centre and Saskatchewan Agriculture and Food has examined the life history of the aphid in Saskatchewan and has developed control strategies that will significantly reduce aphid populations on the roots of saskatoon.

Frequently Asked Questions About Woolly Elm Aphid

Q1. What percentage of my two to three-year-old saskatoon plants can the woolly elm aphid damage or kill?

Injury to plants will vary from year to year and with the age of the plants. Some growers have indicated losses of more than 50 percent of their seedlings in a year due to woolly elm aphid with many of the surviving plants being unthrifty.

Q2. Does the woolly elm aphid attack fruit bearing saskatoons?

Woolly elm aphids will infest older saskatoon plants. The aphid can reduce the vigour and fruit production of these older plants but they are less likely to kill the plants. Note that insecticides are not registered to control woolly elm aphid on fruit bearing saskatoons. Contact the PFRA Shelterbelt Centre for any changes in recommendations.

Q3. Are saskatoon clones resistant to woolly elm aphid?

The saskatoon cultivars, Martin, Nelson, Northline, Pembina, Smoky and Thiessen have been evaluated for susceptibility to woolly elm aphid. All cultivars were susceptible.

Q4. Does the woolly elm aphid survive on other elm species such as Siberian or Japanese elm?

Studies indicated that woolly elm aphids overwinter in the egg stage on other elm varieties, but the nymphs were only able to become established on the leaves of American elm.

Q5. Can I prevent woolly elm aphids from infesting my saskatoons by removing all the nearby American elms?

Control of woolly elm aphid will not be achieved by removing nearby American elms. Aphids are easily dispersed by wind. The removal of American elms in the immediate area may decrease the numbers of migrating aphids but it will not protect your orchard. Infested saskatoons have been found in orchards that have no American elms within several kilometres. It is not advisable to plant American elm near your saskatoon orchard.

Q6. Where will I find most of the root aphid colonies?

Most of the root colonies will be found within a 10 cm radius of the stem to a depth of 10 cm. Some colonies can be found up to 15 cm below the soil surface and 25 cm away from the main stem. Many colonies develop on the tender white shoots of newly developing suckers.

Q7. Will natural enemies control woolly elm aphids?

There are at least three predators and one parasite that attacks woolly elm aphids within elm leaf curls. No predators or parasites have been noted within the root colony. Lady beetles have been observed feeding on winged aphids as they leave the root colony and when they fly to American elm. These beneficial insects may reduce woolly elm aphid populations yet many growers still experience significant losses due to the aphid. Researchers are testing other natural controls such as nematodes but there are no recommendations at this time.

For further information contact:

PFRA Shelterbelt Centre
Indian Head, Sask.
S0G 2K0
Telephone (306) 695-2284
Fax (306) 695-2568

OR

Saskatchewan Fruit Growers Association
Box 218, White City, Sask.
S0G 5B0
Telephone (306) 771-2921

Saskatchewan Fruit Growers Association
Saskatchewan Agriculture and Food
PFRA

1997 Report - North Dakota
Great Plains Tree Pest Workshop, Cheyenne, WY, March 18-19, 1997

Report from J.A. Walla, Plant Pathology Dept., NDSU, Fargo 58105
phone 701-231-7069, email Walla@Badlands.nodak.edu

1. Ash yellows of green ash

A regional project to find the incidence and impact of ash yellows on green ash in the Great Plains was started in 1996. Samples were collected from six geographical areas (ND, SD, NE, KS, & CO as individual areas, and Manitoba & Saskatchewan combined into an additional area). The project coordinators in each state were Neill & Reynard (Man/Sask), Walla (ND), Ball (SD), Harrell (NE), Tisserat (KS), & Jacobi (CO). The USFS, S&PF, Lakewood, CO, provided partial funding for sample collections and assays in the 5 states. Ash yellows was confirmed at each of the 90 sites sampled across the northern and central Great Plains, and the average incidence was 57% (range 28% in ND to 71% in SD) of the sampled trees. The disease had not previously been found in Kansas, Colorado, Saskatchewan, or Manitoba. Little or no association of ash yellows with growth rate or crown condition was identified. There was an association with site type, with the least incidence in natural stands and the most in rural planted stands. There are several possible explanations for the lack of association with damage.

Immunofluorescence using an ash yellows-specific monoclonal antibody was used for the assays. This technique provided the best balance of sensitivity, accuracy, and speed as compared to ELISA, immuno-PCR, or traditional PCR for the assay of green ash roots for the ash yellows phytoplasma. The DAPI test is used by others assaying large numbers of samples; it was not used in these assays because of lack of experience in interpreting the results using DAPI.

2. X-disease of chokecherry (with Cheng and Guo)

Chokecherry plants in the USDA Plant Materials Center (PMC) chokecherry germplasm collection that were previously identified as potentially resistant to X-disease were examined again to monitor disease development. In 1996, 44 plants remain in the "select" category. The X-disease phytoplasma was found to be present in each of these 44 putatively resistant plants that have few or no disease symptoms, indicating that the plants can maintain vigor despite infection.

A monoclonal antibody raised against X-disease phytoplasma antigen from diseased chokecherry was developed and tested. It is generally specific to phytoplasmas in the X-disease phytoplasma cluster and is more sensitive than our previously developed polyclonal antibody, but less sensitive than nested-PCR. The antibody is being used to screen chokecherry for infection.

Chokecherry cross-pollination methods were refined. Poor seed-set occurred again, but the cause may have been environmental (drought). Pollen was stored for future use so processing would not be required on-site.

3. Western gall rust

An Actinomycete was isolated that appears to invigorate some isolates in axenic culture that were in poor vigor. The active substance appears to be diffused in the media, and appears to have a beneficial effect at a low concentration, but a detrimental effect at a higher concentration. It is being investigated for use in manipulating colonies to produce aeciospores.

4. Lirula needle blight of spruce

Final ratings on a 1994 fungicide trial were taken. Results were consistent with earlier data that fungicide applications in early June and early July, or only in July, provided excellent control of Lirula needle blight. Current studies involve the life cycle and morphology of the fungus. Chlorothalamil treats this very well. Is may be a species complex.

5. Unknown juniper disease

Junipers in urban landscapes in Bismarck developed serious dieback problems in 1995. The condition appears to be initially expressed by death of individual twigs. Twig dieback appears to be followed by dieback down the branch that had the dead twig and by twig dieback of all or nearly all the twigs around the previously dead twig, resulting in an area of dead foliage. The area of dead foliage appears to expand, gradually merging with other areas of dead foliage. The expansion may continue over the entire crown, and many junipers have either died or lost their ornamental value. In 1995, this type of dieback was observed in landscape plants in Bismarck and in nursery stock in both Bismarck and the Fargo area. Plots were set up in 1995 to visually record the development of the dieback and to try to stop the dieback with fungicides. The fungicides used were Fore (mancozeb), Cleary's 3336 (thiophanate methyl), and Chipco 26019 (Iprodione). The observations and fungicide applications continued into 1996.

In 1996, the dieback continued on affected landscape plants in Bismarck, and a few landscape junipers with similar symptoms were seen in Fargo and in North Platte, NE. Twig dieback developed on junipers in each fungicide treatment, including the control, and in some cases, the dieback expanded outward from the dead twigs. However, the expansion was limited to relatively small areas of the trees. The fungicide trials and assessment of long-term plots were completed without determining the cause of juniper dieback. I am trying to find a different approach to determine the cause of this problem. The city forester suspects that dicamba herbicide is involved, and I wonder if a nutrient deficiency, e.g., iron, might be involved. However, neither of these seem to explain the type of dieback observed.

6. "Aspen stunt"

In October, 1995, severely stunted aspen root sprouts were observed in a recently cut native aspen site in northeast ND. Most of the stunted plants were 8-14 inches tall, while unaffected plants were 3-4 feet tall. The pattern of symptoms appeared to fit a phytoplasma disease, but no phytoplasma was found. Virus-like inclusion bodies were

observed in both symptomatic and nonsymptomatic plants.

Five rooted sprouts were collected and potted in the greenhouse in late summer, 1995. The plants were taken through a natural dormant cycle, and were brought back into the greenhouse in the spring of 1996. The plants all survived, and each exhibited the same "stunt" symptoms observed in the field.

Completed Citations and Publications Since Last Report:

Guo, Y.H., Cheng, Z.-M., and Walla, J.A. 1996. Genetic separation of chokecherry X-disease phytoplasmas in North Dakota From CX and WX phytoplasmas. (Abstr.) Phytopathology 86 (Supplement):S96.

Guo, Y.H., Walla, J.A., Cheng, Z.-M., and Lee, I.-M. 1996. X-disease confirmation and distribution in chokecherry in North Dakota. Plant Disease 80:95-102.

Walla, J.A. 1996. Aeciospore formation in *Peridermium harknessii* axenic cultures (Abstr.) Inoculum 47 (3):32.

Walla, J.A., Cheng, Z.-M., Guo, Y.H., and Knudson, M.J. 1996. Field resistance of chokecherry to X-disease. (Abstr.) Phytopathology 86 (Supplement):S87.

Walla, J.A., and Guo, Y.H. 1996. Ash yellows in the northern Great Plains region. Plant Disease 80:343-344.

Walla, J.A., Tuskan, G.A., Lundquist, J.L., and Wang, C. 1997. Expression of inoculum and family specific responses in the ponderosa pine-western gall rust pathosystem. Plant Disease 81:57-62.

Report to the Great Plains Tree Pest Workshop

Cheyenne, Wyoming, March 18 and 19, 1997

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1996 PEST REPORT

In 1996 we received approximately 375 inquiries relating to insect and diseases of trees and shrubs. Most enquiries were received from rural areas of Saskatchewan, with the most common enquiries regarding woolly elm aphid, ash plant bug, spruce spider mite, yellow-headed spruce sawfly, spruce budworm and bronze birch borer.

1996 RESEARCH STUDIES

Woolly Elm Aphid - A three year project was completed in 1996 by Bruce Neill and Don Reynard (PFRA Shelterbelt Centre), Lianne Carpenter (Saskatchewan Fruit Growers Association), and Lloyd Harris (Saskatchewan Agriculture and Food) regarding life history and control of the woolly elm aphid, *Eriosoma americanum* (Riley), in Saskatchewan. The woolly elm aphid (WEA) is a pest of both American elm, *Ulmus americana* L., and saskatoon, *Amelanchier alnifolia* Nutt. This aphid produces disfiguring leaf-curl galls on American elm early in the season then moves to the roots of saskatoon causing significant mortality during orchard establishment. Saskatoon is being planted on the Canadian prairies as a fruit crop as an economic diversification opportunity. This project was funded by the Saskatchewan Agriculture Development Fund.

Life History of the Woolly Elm Aphid.

The life cycle of the WEA, on American elm was determined by bi-weekly sampling of leaf curls at Indian Head. In 1996, stem mothers (fundatrix) were first recorded on May 14 with 3 to 7 stem mothers establishing each leaf colony. New generation nymphs (immature fundatrigenae) were first recorded on June 8 with peak populations of 181 WEA/leaf occurring on June 18. Winged WEA (alate fundatrigenae) were first found in elm leaf curls on June 21 and peaked on June 28. Winged WEA migrating from elm to saskatoon were collected in yellow pan traps at Indian Head, Theodore and Marquis, Saskatchewan between June 20 and July 15. At Indian Head, 25, 50, 75 and 90% cumulative catch of winged WEA occurred in a saskatoon orchard on June 26, 28, July 3 and 4, respectively. This migration data can be used to time insecticide treatments on saskatoons.

Once a WEA landed on a saskatoon leaf, it deposited an average of 14 nymphs within one hour. The nymphs walked down the stem to the roots where they established colonies. The development of the WEA underground was not determined. Yellow pan traps were used from August 15 until October 22 to monitor the return flight of the WEA to American elm. Winged WEA were captured from August 20 until October 17 with 25, 50, 75 and 90% cumulative catch occurring on September 8,9,10 and 13, respectively. Winged WEA returning to American elm deposit microsexual males and females that mate and deposit a single overwintering egg on the bark.

Woolly Elm Aphid Control Studies

Various rates of Orthene® (acephate) and Admire® (imidacloprid) were tested for the control of WEA on saskatoon roots in orchards at Grand Coulee, Grandora and Marquis, Saskatchewan in 1996. Treatments were applied by soil injection, soil drench or drip irrigation. Orthene® was tested at 0.65, 1.1 and 1.7 g product/plant and Admire® at 0.063 and 0.125 mL product/plant. All treated plants were two years old. Treatments were applied between July 24 and 31 and assessed for WEA damage between August 20 and 27. Orthene® and Admire® did not cause phytotoxic damage at rates tested. When all application methods were combined, WEA populations were reduced by 84, 91 and 95% for the low, mid and high rates of Orthene®, respectively and by 74 and 74% for the low and high rates of Admire®, respectively. Soil injection, soil drench and drip irrigation were all effective methods of applying Orthene® or Admire® for control of WEA on saskatoon roots.

Orthene® at 0.65g product/plant and Admire® at 0.125mL product/plant was applied by soil injection or drip irrigation to control WEA on saskatoon roots either early (July 2 or 3), mid (July 15 or 16) or late (July 29 or 30) in the season at Condie and Sintaluta, Saskatchewan. All plants treated were two years old. No phytotoxic damage was noted. WEA root populations were assessed between August 23 and 30. When both application methods were combined, Orthene® reduced the WEA populations by 97, 90 and 86% for the early, mid and late application dates, respectively and Admire® reduced WEA populations by 95, 91 and 63% for the early, mid and late application dates, respectively.

A Canadian minor use registration has been received for contol of WEA on non-fruit bearing saskatoons that are 3-years old and younger using Orthene® at 1.7 g product/plant applied with a soil injector between mid July and early August. Based on the above

efficacy trials, a request can be made to move the application window forward to early July and that soil drench and drip irrigation applications are alternatives to soil injection. Admire® at the rates tested is not as efficacious as Orthene®, but could be considered as an alternative. None of these recommendations apply to fruit bearing saskatoons since residue testing has not been done.

Native Elm Bark Beetle - A field project was initiated to study the native elm bark beetle, *Hylurgopinus rufipes* (Eichh.), in Saskatchewan. The project was conducted by Braden Walters (SOS Elms Inc.) and supervised by Bruce Neill and Don Reynard (PFRA Shelterbelt Centre, Indian Head, Saskatchewan) with funding from Saskatchewan Environment and Resource Management. The objectives were to obtain regional life history data on this vector of Dutch elm disease and to provide trapping recommendations for monitoring the beetle.

Life History of the Native Elm Bark Beetle

Life stages of the native elm bark beetle (NEBB) were monitored at Trossachs and Round Lake, Saskatchewan in 1996. Adult NEBB were active by mid-May when sampling began. Eggs and first instar larvae were first found the second week of June. Egg hatch was completed by the first week of July. By the third week of July, most larvae had entered the pupal stage. Newly emerged adults were present in early August but very few were captured on sticky traps. There was evidence of a partial second generation at the Trossachs site. Larvae were noted in brood wood late in the season and there was the potential for these larvae to overwinter. NEBB usually overwinters as an adult at the base of healthy elms.

NEBB Trap Evaluation Study

Pheromone baits are available for the smaller European elm bark beetle (SEEBB), *Scolytus multistriatus* (Marsh.), but not for the NEBB which is the main vector of Dutch elm disease on the prairies. Trials were set up at Trossachs and Round Lake, Saskatchewan in 1996 to evaluate traps for monitoring NEBB adult activity. Traps were constructed of waxed cardboard measuring 0.7 m x 0.5 m and coated with Stickum Special®. Traps were baited with either SEEBB pheromone (Great Lakes IPM, Vestaburg, Michigan), an elm wood disc or no bait (check). Each type of trap was placed 1.5 m from ground level on a healthy American elm trunk within a wild stand of elm or on metal posts outside the elm stand. The traps were monitored from May 22 until June 17 and then again from August 19 until September 24.

When all trap types were combined, traps placed on elm trunks caught 17 times more NEBB than traps on free standing poles at the Trossachs site while at Round Lake three times as many NEBB were caught on elm trunks than poles. The type of bait used on the trap had no significant affect on the number of NEBB captured when traps were place on elm trunks or on poles. Therefore the use of elm disks or SEEBB pheromone did not increase the efficiency of traps for capturing NEBB. Failure of the SEEBB bait to attract NEBB was expected since pheromone baits are normally species specific. No SEEBB were captured in this trial. Placement of unbaited sticky traps on elm trunks is the recommended method to monitor NEBB adults until such time as a species specific pheromone is developed.

Ash Yellows Survey of Green Ash in Saskatchewan and Manitoba - Green ash, *Fraxinus pennsylvanica* Marsh. var *subintegerrima* (Vahl.) Fern, was sampled for ash yellows (AshY) disease as part of a cooperative survey with Dr. Jim Walla, plant pathologist, North Dakota State University at Fargo. Ten to 15 green ash trees, each over 20 years old, were sampled at each of nine sites in Saskatchewan and six sites in Manitoba between August 6 and 13, 1997. The sites were either wild stands, boulevard plantings or shelterbelt plantings. Trees were rated for percentage dieback and evidence of other potential AshY symptoms. An increment borer was used to obtain core samples for ring analysis. Two root samples were taken from each tree and submitted to Dr. Walla for AshY analysis.

Dr. Walla confirmed AshY at each of the 15 sites surveyed. About half of all green ash sampled were positive for AshY. Dr. Walla is currently analysing the data as part of a larger survey conducted in five of the Great Plains States. These are the first confirmed cases of AshY on the Canadian Prairies. The impact of AshY on green ash on the Canadian prairies is not known.

Western X-Disease Survey of Choke Cherry in Saskatchewan and Manitoba - A single case of Western X-Disease (WXD) was confirmed from choke cherry, *Prunus virginiana melanocarpa* var. (A. Nels) Sarg., at Red Jacket, Saskatchewan in 1994. This was the first confirmed case of WXD on the Canadian Prairies. A total of 21 choke cherry plants exhibiting red colouration typical of WXD were sampled from 12 locations in Saskatchewan and three locations in Manitoba between August 29 and September 17, 1997. These samples were sent to Dr. Jim Walla at North Dakota State University for WXD analysis.

Eight of 12 sites in Saskatchewan were confirmed positive for WXD (Dundurn, Douglas Park, Katepwa Lake, Indian Head, Langenburg, Moosomin, Montmartre and Lumsden) and all three sites in Manitoba were positive (Austin, Melita and LaRiviere). These are all new WXD locations and are the only additional confirmations since the 1994 sample. This preliminary survey indicates that WXD is well established and wide spread in Manitoba and Saskatchewan. The impact of WXD on choke cherry on the Canadian prairies is not known.

3/07/97

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

REPORT TO THE GREAT PLAINS TREE PEST WORKSHOP
CHEYENNE, WY
MARCH 18-19, 1997

Organization

Permanent Staff: David W. Johnson, Center Leader and Supervisory Plant Pathologist
Willis C. Schaupp, Entomologist
Erik Johnson, Aerial Survey Specialist
Bernard Benton, Computer Specialist

Service 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: 303-236-9542.

SUMMARY OF SELECT INSECT AND DISEASE CONDITIONS
ROCKY MOUNTAIN REGION, 1996
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 Fort Carson and the Air Force Academy at Colorado Springs were sampled for gypsy moth during the summer of 1996. A delimitation effort in response to the 1995 capture of one gypsy moth was conducted on the Air Force Academy. No gypsy moths were captured in 1996 by Lakewood Service Center trapping.

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 continue to 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 1996 may differ from 1995.

In response to the capture of gypsy moths on the Warren Air Force Base in Cheyenne, Wyoming, in 1996, there will be a large-scale delimitation trapping effort in 1997 with assistance from the LAkwodd Service Center.

Douglas-fir tussock moth, Orgyia pseudotsugata

The infestation of the Douglas-fir tussock moth, Orgyia pseudotsugata, that was reported on the South Platte Ranger District, Pike National Forest, collapsed completely in 1996. No defoliation was detected in wildland forests. Low-dose pheromone traps baited with Douglas-fir tussock moth made no captures, as well, in 1996.

Douglas-fir beetle, Dendroctonus pseudotsugae

In scattered parts of the Douglas-fir tussock moth infestation mentioned above, it is clear that Douglas-fir beetle, Dendroctonus pseudotsugae, activity is increasing. Some mortality of trees can probably be attributed to the combined effects of defoliation and bark beetles. However, Douglas-fir beetle emergence was confirmed in 1996 from mass attacks which were noted in 1995 upon trees that had been completely defoliated in 1994. Several stands adjacent to areas impacted by Douglas-fir tussock moth were found to contain many green, beetle-infested trees in the fall of 1996. It is expected that there will be an epidemic of Douglas-fir beetle in this area that will likely subside in a few years after the defoliated trees fully recover.

In the area burned by the Buffalo Creek fire of May, 1996, many trees are currently infested by Douglas-fir beetle. Infested trees were mostly or entirely burned; very few scorched or green trees contain beetles. It is expected that scorched and green Douglas-fir in the area will be attacked in 1997 when the beetles emerge from thier burned hosts. This area is across the South Platte river drainage from the area impacted by the Douglas-fir tussock moth.

Both areas of concern with respect to Douglas-fir beetle were repeatedly defoliated by the western spruce budworm, Choristoneura occidentalis, in the 1980s. Douglas-fir beetle activity increased during and after the budworm defoliation throughout the area. It is quite likely that the current high population of Douglas-fir beetle was enabled by these prior events, which elevated populations that were able to take advantage of more recent disturbances in a "two-step" fashion.

A pine-feeding sawlfy, Neodiprion autumnalis

Defoliation was detected in 1996 on a plantation of off-site pines near Colorado Springs. Defoliation was heavy on several hundred acres of ponderosa pine growing on the prairie in sand along I-25 on the Air Force Academy. Many pines were completely defoliated. In addition, a large population of pine needle-sheath miner, Zelleria haimbachi, was noted in the same area. Insecticidal treatment was applied by the Air Force Academy staff. It is

expected that the sawfly population will be large again in 1997 and the situation will be closely monitored.

AERIAL SURVEY MISSIONS

Aerial surveys for insect and disease detection are performed annually on lands requested by resource managers on the national forest districts and states as well as special project areas for Forest Health Management. Approximately 22 million acres were surveyed in 1996 on 15 National Forests in Colorado, Wyoming and South Dakota. Of that total, 1.1 million of the acres surveyed were on state lands, 5.7 million acres on private and 4.8 million acres on other (non-USFS) federal lands. Some of the more common pests detected include bark beetles, defoliators, root disease centers and areas heavily infested with dwarf mistletoe.

OTHER PROJECTS

Several landscape scale analyses are currently in various stages of development. The intent of these analyses is to portray the risks and impacts of major forest insects and diseases to resource managers. Forests involved include the Arapaho/Roosevelt and the Medicine Bow/Routt National Forests.

RECENT PUBLICATIONS (as of March 1997)

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Johnson, D.W. 1996. Picea pungens Engelm. IN: Schutt, Schuck, Aas, Lang [eds.]. Enzyklopadie der Holzgewachse (Encyclopedia of Woody Plants). Ecomed Verlag, Landsberg, Germany. 8 p.

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SOUL

Entomologist

NEBRASKA DEPARTMENT OF AGRICULTURE (NDA) REPORT TO THE GREAT PLAINS TREE PEST WORKSHOP MARCH, 1997

By
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Due to budget cuts, we were not able to hire temporary employees for the 1996 season. In the past, we hired one temporary employee for the Lincoln area and two temporary employees for the Omaha area. We utilized noxious weed and pesticide inspectors in the entomology program to assist with hanging gypsy moth traps and other Cooperative Agricultural Pest Survey (CAPS) surveys.

The Plant Protection and Plant Pest Act Regulations were amended during a hearing held August 14, 1996. These changes officially took effect on December 22, 1996. The license fee for a nursery dealer was raised from $30 to $100 per year. The license fee for a nursery growers license was raised from $15 for the first acre plus $3 for each additional acre to $25 for the first acre plus $5 for each additional acre.

NURSERY GROWER INSPECTIONS

The final grower inspection for the 1996 season was completed on January 6, 1997. We prefer to be done with our grower inspections by October, but due to lack of adequate staff, we had no other choice but to complete inspections late. The Nebraska Department of Agriculture (NDA) licensed 274 nursery growers in 1996 for a total of 1,875 acres of nursery stock. This is an increase of 1 grower from 1995 (273 growers inspected in 1995) and an increase of 131 acres (1,744 acres inspected in 1995).

Needle cast diseases in evergreens were more prevalent during 1996, probably due to the wet spring weather that occurred. Quince rust on hawthorns is one of the most commonly reported problems in nurseries. Quince rust control recommendations were formulated and mailed out in early spring of 1996 to those growers with known problems. The best control still seems to be a combination of pruning out the galls on the twigs and using a fungicide spray program. Black vine weevil infestations have been reported in residential plantings in Omaha. More work needs to be done to determine establishment of this pest.

NURSERY DEALER INSPECTIONS

The NDA licensed 536 nursery dealers in 1996 . This is an increase of 13 dealers from 1995. During May and June, 144 dealer inspections were conducted. These inspections resulted in 96 Withdrawal-From-Distribution orders. A total of 2,168 plants were withdrawn from distribution due to disease problems, insect problems, or being nonviable.

Disease problems included apple scab, anthracnose, ash rust, canker, cedar-apple rust, crown gall, leaf spots, powdery mildew, peach leaf curl, and rose mosaic virus (980 plants).

Insect problems included aphids, birch leaf skeletonizer, borers, eastern tent caterpillar, fletcher scale (171 plants) (American Nursery Products/Mid-Western Nurseries, Tahlequah, Oklahoma, Northland Evergreens, West Olive, Michigan, Studebaker Nursery, New Carlisle, Ohio, Monrovia Nursery, Dayton, Oregon, and Sunset Nursery, Portland, Oregon), leafhoppers, spider mites, and spruce needleminer.

Because Nebraska is a protected state concerning Quarantine 38 (Black Stem Rust/Barberry Quarantine), NDA inspectors kept track of the barberry varieties that each dealer location was carrying. No rust-susceptible barberry varieties were found.

FIELD INSPECTIONS

Growing season field inspections are conducted on various seed fields. The plant diseases detected at the time of the inspection are documented. The inspections are required by foreign countries. These inspections facilitate the export of Nebraska seed. The Nebraska Crop Improvement Association (NCIA), under the direction of the NDA, conducts field inspections of production fields for export. NDA inspectors are responsible for inspecting nursery fields for export. NDA inspectors also inspect nursery fields for plant diseases that maybe imported with foreign seed.

The following are statistics concerning 1996 field inspections for firms exporting seeds:

NUMBER OF FIELDS	CROP	TOTAL ACRES
400	Corn	30973
3	Gamagrass	38
1	Pearl Millet	4
1	Popcorn	120
1	Sorghum	2
2	Soybeans	9

NUMBER OF FIELDS	CROP	TOTAL ACRES
3	Wheat	18
Total: 411 fields		Total: 31164

EXPORT CERTIFICATION

Phytosanitary certificates are issued to firms exporting plants or plant products. A total of 2,014 phytosanitary certificates (1,951 federal, 50 state, 11 processed product, and 2 re-export) were issued from the NDA. This is an increase of 54 certificates from 1995 (a total of 1,960 phytosanitary certificates were issued in 1995).

The USDA has recently entered into an agreement with Agriculture Canada to establish a greenhouse certification program. Under the program, approved facilities will be able to ship greenhouse-grown plants to Canada with a special label that has a registration number assigned by the Nebraska Department of Agriculture. These labels will be used in lieu of a phytosanitary certificate.

GYPSY MOTH SURVEY

Nationwide, gypsy moth populations declined in the infested areas of the eastern United States. This was because of *Entomophaga maimaiga*, a gypsy moth fungus which was responsible for population decline; however, populations in Wisconsin continue to build.

A total of 1,463 gypsy moth traps were set statewide in Nebraska in 1996 (1,292 set by NDA and 171 set by USDA/APHIS/PPQ). Every county in Nebraska was trapped. Intense pheromone delimiting trapping programs were conducted in the cities of Omaha (Douglas/Sarpy Counties), Lincoln (Lancaster County), Blair (Washington County), Columbus (Platte County), Crete (Saline County), Decatur (Burt County), Kearney (Buffalo County).and North Platte (Lincoln County) this year.

Nine of the 13 special trapping blocks established in the Omaha area in 1994 were also delimited in 1996. These blocks were established because of gypsy moth infested spruce trees received from Vern Johnson and Sons, LeRoy, Michigan and Zelenka Nursery, Grand Haven, Michigan and planted in 1994 and 1995. The rest of the Omaha metro area was trapped at the rate of 1 trap per square mile.

Referring to the 1994 gypsy moth introduction discussed above, a fine was levied on Vern Johnson and Sons Nursery in a federal court case because of a breach in the federal gypsy moth quarantine.

We have trapped a total of four gypsy moths in four gypsy moth traps. The counties involved are Dakota, Douglas, Hall, and Harlan. The treatment block in Bellevue was negative

for gypsy moth. If we have one more year of negative trapping results in that area, we can declare the gypsy moth eradicated.

JAPANESE BEETLE SURVEY

In 1996, large populations of Japanese beetle were reported in Ohio and other eastern states. Nebraska continues to receive infested nursery stock. The mode of travel for the Japanese beetle is usually in grub form in the soil of balled and burlapped nursery stock. Container nursery stock is considered a lower risk for movement, but not if grassy weeds are present.

In Nebraska, a total of 60 Japanese beetle traps were placed in 14 counties statewide in Nebraska during 1996 with emphasis on rest stops and nurseries. Eighteen of these traps were placed at an infested rest stop on Interstate 80 and Highway 77 North (near Lincoln) and past trapping history (including 1996) is as follows:

1996: 13 Japanese beetles
1995: 133 " "
1994: 51 " "
1993: 32 " "
1992: 28 " "

1991: 42 Japanese beetles
1990: 131 " "
1989: 551 " "
1988: 366 " "
1987: 318 " "
1986: 112 " "

A portion of the rest stop which is in turfgrass and under irrigation was treated with Merit (Miles, Inc.) in early July 1996.

Other positive Japanese beetle finds are listed on a table on the next page.

COUNTY	LOCATION	NUMBER OF BEETLES
Dodge	1 dealer	1
Douglas	4 growers 1 dealer	137 2
Lancaster	3 dealers 1 grower 1 rest area	14 6 13
GRAND TOTAL		173

A decrease was shown of Japanese beetles trapped in 1996: 173 total beetles trapped in 1996 as compared to 353 total beetles trapped in 1995.

ZIMMERMAN PINE MOTH

Zimmerman pine moth species known to occur in Nebraska are Dioryctria tumicolella, D. zimmermani and D. ponderosae. A total of 40 nurseries are under a strict control program for Zimmerman pine moth. We are requiring an April and August insecticide treatment combined with roguing out trees with active infestations. This management program is working quite well for many of the growers and we are seeing reduced numbers of infested trees at each nursery. A new NebGuide entitled "Pine Moths" (G96-1277-A) by Mark Harrell, Fred Baxendale, and Ackland Jones was distributed this year.

A total of 223 trees were withdrawn from distribution due to Zimmerman pine moth in 1996.

OTHER SURVEYS/CAPS SURVEYS

Surveys conducted by the Nebraska Department of Agriculture this year included:

1. Karnal bunt survey - 625 wheat samples were collected during 1996; 370 samples came from grain elevators, 150 samples were seed, 100 samples were research seed grown out of state, and 5 samples were from laboratories. A total of 71 counties were sampled. A karnal bunt laboratory was set up at our Nebraska State Seed Lab in Lincoln where samples were processed and identified. Results were all negative. Negative surveys have facilitated the export of wheat from Nebraska.

2. Soybean cyst nematode, golden nematode, and other cyst-forming nematodes survey - soil samples were collected from 30 potato fields in Box Butte County. Soil samples are currently being analyzed at the University of Nebraska, Plant Pathology Department.

3. Cereal leaf beetle (CLB) survey - 60 oat and wheat fields were swept in June in 20 counties. All results were negative. This insect is found in Kansas, Iowa, and Missouri. If CLB is found, a biological control program would be initiated. Negative survey results allow the free movement of nursery stock to certain western states.

4. Stewart's wilt survey - 446 fields in 31 counties were surveyed. All results were negative.

5. Pine shoot beetle - surveys were conducted during the regular growing season inspections at approximately 153 pine growing fields in 46 counties in Nebraska. All surveys were negative. Inspections were conducted in November and December on 100 imported Christmas tree lots in 9 counties. In 1997, certain growers will be selected and insect traps will be run for this insect in February

and March. Negative surveys in Nebraska allow for the unrestricted movement of pine nursery stock and Christmas trees.

NEW PLANT PESTS IN THE UNITED STATES (NOT YET FOUND IN NEBRASKA)

The Asian longhorned beetle (*Anoplophora glabripennis*) is a destructive beetle that attacks healthy trees including maples such as Norway, sugar, silver, red, and others, horsechestnut, poplar, willow, elm, mulberry, and black locust. This beetle is widely distributed in China, Japan, and Korea. The only known infestation of this insect in the U.S. is in the Greenpoint section of Brooklyn, New York and in a small area in Amityville, New York. The large, bullet-shaped beetle is shining coal black with white spots and is about an inch long. It has very long, horn-shaped antennae which are black with white rings and are longer than the insect itself. The white, worm-like immature beetles bore into tree trunks and branches, causing heavy sap flow from wounds and large sawdust accumulation at tree bases. Adult beetles leave round holes that are three-eights inch or larger in the bark. Yellowing leaves and leaf drop are other indicators that the pest may be present. USDA/APHIS is working on preventing the spread of this destructive insect. The New Pest Advisory Group (NPAG) is recommending that a quarantine be established to prevent movement to uninfested areas. They are asking that cut wood, stumps, and hardwood nursery stock not be moved from the infested areas previously listed.

The viburnum leaf beetle (*Pyrrhalta viburni*) is a Eurasian pest of viburnum that was introduced into Canada in 1947 near Ontario. It has since been moving southward towards the United States. It has been found in Maine and four counties in New York. The adults and larvae of this insect destroy the leaves except for the midrib and major veins. *Viburnum opulus* is the preferred host, but it will also feed on *V. lantana, V. dentatum, V. rafinesquianum, V. acerifolium*, and *V. lentago*. The adult of viburnum leaf beetle looks similar to elm leaf beetle but is slightly smaller. Eggs overwinter in twigs of the current season's growth and hatch in May. Larvae are present early May through June. Adults are present mid-July through October.

SOURCES OF NURSERY STOCK UTILIZED BY NEBRASKA GROWERS AND DEALERS

STATE	NUMBER OF SOURCE NURSERIES
Nebraska	278
Oregon	87
Michigan	59
Illinois	54
California	52

STATE	NUMBER OF SOURCE NURSERIES
Minnesota	51
Iowa	50
Tennessee	46
Colorado	38
Pennsylvania	36
Missouri	36
Ohio	35
Wisconsin	30
Texas	26
Florida	21
Kansas	19
Oklahoma	19
Washington	18
New York	15
South Dakota	15
North Carolina	15
New Jersey	14
Idaho	13
Indiana	13
Connecticut	10
Maine	8
Georgia	7
Montana	7
Maryland	6
South Carolina	6
Virginia	6

STATE	NUMBER OF SOURCE NURSERIES
Wyoming	6
Louisiana	4
North Dakota	4
Utah	4
Kentucky	3
Mississippi	3
New Mexico	3
Canada	3
Alabama	2
Delaware	2
Maine	2
New Hampshire	2
Alaska	1
Arkansas	1
Arizona	1
Rhode Island	1
Germany	1
The Netherlands	1
GRAND TOTAL: 46 STATES 3 FOREIGN COUNTRIES	**1134 SOURCES**

TOP TEN INSECTS AND DISEASES FOR 1996

A grand total of 3,919 plants have been withdrawn from distribution.

INSECTS

1. Borers (includes carpenter worm, cottonwood borer, ash/lilac borer, honey locust borer, and unknown borers)

2. Zimmerman pine moth
3. Aphids (includes birch, woolly hawthorn, woolly apple, leaf curl, willow, and unknown aphids)
4. Spruce needleminer
5. Scales (includes black willow, cottony maple, euonymus, fletcher, oyster shell, and pine needle)
6. Galls (includes jewel oak gall, bullet gall, woolly oak gall, hackberry nipple gall, maple bladdergall mite, and unknown galls)
7. Fall webworm
8. Leafhoppers (includes potato leafhopper, redbanded leafhopper, and unknown leafhoppers)
9. Oak sawfly
10. Ash plant bug

DISEASES

1. Quince rust
2. Cankers
3. Leaf spots (includes dogwood, birch, cherry, iris, linden, ash, bacterial, daylily, frogeye, mountain ash, Marsonnia, maple tar spot, rose black spot, oak, peony, and phyllosticta leaf spots)
4. Dothistroma needle blight
5. Brown spot
6. Ash rust
7. Powdery mildew
8. Apple scab
9. Anthracnose (includes ash, maple, oak, sycamore, and walnut anthracnose)
10. Verticillium wilt

OTHER

1. Trunk damage (miscellaneous causes)
2. Sunscald
3. Environmental damage (miscellaneous causes)
4. Nonviable stock
5. Canada thistle (noxious weed)
6. Deer damage
7. Musk thistle (noxious weed)
8. Bindweed (noxious weed in some counties)
9. Herbicide damage
10. Rabbit damage

VW:jw

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

REPORT TO THE GREAT PLAINS TREE PEST WORKSHOP

Cheyenne, WY
March 18 & 19, 1997

Organization

Staff: Judith Pasek, Center Leader and Supervisory Entomologist
Kurt Allen, Entomologist
Jeri Lyn Harris, Plant Pathologist
Tom Juntti, Forestry Technician

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).

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HIGHLIGHTS OF 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 1996, the Rapid City Service Center coordinated the deployment of 41 detection traps on federal lands in South Dakota and 48 detection traps on federal lands in northern Wyoming. In addition, 26 traps were deployed as a delimitation survey at Falls Campground on the Shoshone National Forest where there was a single moth caught in 1995. No moths were caught in any of these traps. (Judy, Kurt)

Cooperating agencies reported a number of catches of gypsy moth in traps, primarily located on private lands, during 1996. South Dakota had four moths found in private campgrounds in the Black Hills. In Wyoming, fifteen gypsy moths were reported found, with one each in Cody, Jackson, and Sheridan and 12 in Cheyenne. In Nebraska, 4 moths were caught: two in Omaha and one each in South Sioux City and Harlan County.

2. **Aerial detection surveys**--Aerial surveys were conducted by Erik Johnson (Lakewood Service Center) to detect tree mortality and defoliation caused by insect and disease agents in the Black Hills National Forest and the Shoshone National Forest during 1996. Tree mortality caused by mountain pine beetle and Ips bark beetles was down significantly in the Black Hills, with generally scattered single trees killed across most of the forest except for two areas of concentrated activity. It was the lowest level of beetle caused mortality in the Black Hills in over 20 years. Although not detected during the aerial

survey, there was widespread light to heavy defoliation of pines around the perimeter of the Black Hills in 1996 caused by sawflies and the pine butterfly. In many places populations of these insects are expected to continue to cause some level of defoliation again next year. The outbreak of Douglas-fir beetle on the Shoshone National Forest also decreased significantly. The beetle killed 989 trees on 1203 acres. It appears that the infestation is starting to die out. The most widespread damage detected on the Shoshone NF was dwarf mistletoe and a combination of dwarf mistletoe and comandra blister rust. Subalpine fir decline was the second most common damage detected. (Kurt)

3. Risk/hazard rating comparisons for mountain pine beetle in ponderosa pine--Methods of rating ponderosa pine stands for mountain pine beetle risk/hazard were compared for four project analysis locations in the Black Hills National Forest. The following risk/hazard rating systems and variations were calculated and displayed in GIS format using ARCVIEW: that of Stevens et al. (1980) with basal area modification of Schmid and Mata (1992); model used in FORPLAN for the Draft Revised Forest Plan (same as previous except for assumption that all stands were single-storied); the PONBUG computer program, which is generally based on Stevens et al. but uses data for trees 1 inch DBH and larger; an extrapolation of a method developed by Schmid et al. (1994); and a modification of the extrapolation of Schmid et al. to use data for trees 5 inches DBH and larger.

Considerable differences were found in results of the 5 variations examined. The FORPLAN model most closely resembles the Stevens model although some stand MPB risk/hazard ratings shifted from low to medium and from medium to high. In general, both stands and acres tend to increase substantially in the low MPB risk/hazard class (frequently doubling) using the PONBUG model compared to the Stevens model, while stands and acres in medium and high MPB risk/hazard rating classes tend to decline. The Schmid model shifted even more stands and acres to the low MPB risk/hazard class than did the PONBUG model. In general, stands and acres in the medium and high MPB risk/hazard classes declined for the Schmid model, with a few exceptions, relative to the Stevens model and its variations. The Schmid 5 model shifted some stands and acres into the high risk/hazard class compared to the Schmid model, but those stands appear to have no relation to the particular stands that rated high in the Stevens model. It is not known which model more closely represents nature. A technical report on this study is currently being revised for publication. (Judy, Tom)

4. Pest considerations in forest planning--The Final Revised Forest Plan Revision and EIS for the Black Hills NF has been completed and the Record of Decision (ROD) is due out this month. For the Final EIS, a relative ranking of proposed management alternatives was devised based upon the mountain pine beetle risk/hazard rating system of Schmid et al. (1994). Additionally, a model of tree mortality caused mountain pine beetle infestation was devised to compare alternatives and attempt to project salvage harvest needs. This final plan will guide management activities on the Black Hills National Forest for the next ten-fifteen year interval. (Judy)

The Nebraska National Forest is now revising their forest plan and incorporating the National Grasslands of the Custer and Medicine Bow/Routt National Forests into a Northern Great Plains land management plan. Jeri Lyn is assigned to an extended planning team to provide input and technical

assistance regarding insect and disease concerns in woody draws and riparian areas and regeneration problems in both forests and grasslands. In 1997, Jeri Lyn and Kurt plan to survey regeneration of the plantation areas on the McKelvie and Bessey Districts of the Nebraska NF. The purpose of this survey is to re-examine root disease areas identified in past surveys and to evaluate the condition of regeneration. Kurt and Jeri Lyn will also do a general insect/disease detection survey of tree stands on the National Grasslands covered by this plan. (Jeri Lyn, Kurt)

5. **Monitoring Douglas-fir beetle outbreak**--Monitoring of the Douglas-fir beetle outbreak that followed the Yellowstone fires is continuing on the Clarks Fork RD of the Shoshone National Forest. It appears as though the infestation is letting up. Fall brood sampling indicated there are still pockets where there are quite a few beetles. In most areas there is becoming a scarcity of suitable host material. (Judy, Kurt, Tom)

6. **White Pine Blister Rust Survey**--A survey was conducted of 10 sites with limber pine and 2 sites of whitebark pine in the Black Hills, Medicine Bow, Bighorn, and Shoshone National Forests. Several specimens of white pine blister rust were collected and sent to Dr. Paul Zambino of Rhinelander, Wisconsin for genetic tests. Dr. Zambino was especially interested in rust samples from our zone because both eastern and western races of the rust might occur here. Survey results indicate that rust occurs at varying levels of intensity and causes some mortality in all of the limber pine stands. The rust was not seen in the 2 sites of whitebark pine on the Shoshone National Forest. However, since the rust does occur in nearby limber pine stands and has been reported in whitebark pine stands on the west side of the Continental Divide, it is likely that the rust is also in the whitebark pine stands of the Shoshone NF. A more intensive survey to study incidence and damage levels of white pine blister rust will be conducted this summer; 12-14 permanent plots will be established on the four National Forests in Wyoming and South Dakota. (Jeri Lyn, Tom)

7. **Western Balsam Bark Beetle**--This past summer we used pheromone traps baited for the western balsam bark beetle in susceptible stands on the Bighorn National Forest. This was done as an initial step in determining whether this beetle was present in stands of subalpine fir that were showing decline. The beetle was detected in the traps. The next step is to determine how much this beetle and other damage agents are affecting subalpine fir. Further investigations into subalpine fir decline will be undertaken this year. (Kurt)

8. **National Forest Health Policy**--Issuance of a Forest Service interim directive on forest health was held up at the Department of Agriculture level, apparently for political considerations. Renewed efforts to get the policy approved are underway since the appointment of a new FS Chief. (Judy)

9. **Red belt in the Black Hills**--There have been a number of calls this year concerning an area of fairly intense winter drying damage around Spearfish, SD. The damage is most highly concentrated at an elevation of about 4000 feet and probably occurred in late December 1996 or January 1997. In most cases, it appears that the trees should recover this spring. (Jeri Lyn, Kurt)

10. **Miscellaneous technical assistance**--We expect to be involved in a number of smaller projects this year including assistance in the ash yellows survey in

Wyoming, monitoring surrounding trees and the wildlife snags that were created by fungal inoculations, involvement in releases of insect biocontrol agents for canada thistle, testing nursery beds for pathogens after fallowing is used to replace Basamid at Bessey Tree Nursery, and revisits to blowdown areas in the Bighorns.

11. **Economic Analysis of Forest Health Program**--Each region in the Forest Service is preparing economic analyses of costs and benefits of our programs based upon fiscal year 1996 expenditures. Additionally, a diminishing returns analysis will be done for each production function to determine what level of funding provides the most optimal use of resources. This exercise is meant to assist the headquarters staff in developing budget requests for Congress and determining how to allocate funds between regions and regional activities. (Judy)

12. **Training**--We will be sponsoring a Forest Insect and Disease Management Workshop near Cody, Wyoming at the Northwest College Field Station on June 18 & 19, 1997. Lia Spiegal, Pete Angwin, and possibly others will be assisting us in presenting the instructional material. The session will be half classroom and half field exposure in identification and management of common forest insects and diseases in the central Rockies. (Jeri Lyn, Judy, Kurt)

TECHNOLOGY DEVELOPMENT PROJECTS

1. **GIS-Based Landscape-Scale Root Disease Hazard Rating System**--This technology development project is being conducted in cooperation with Colorado State University to develop a hazard rating system for Armillaria root disease in the Black Hills. Over 75 miles of chain-wide transect lines were surveyed by RCSC and CSU field crews to collect recent incidence data. Graduate student Melanie Kallas and CSU professors R. Reich and W. Jacobi are developing a rating system by coupling past and recent data on Armillaria root disease occurrence with SCS soil classifications, stand inventories, site disturbances, habitat types, and meteorological data in a GIS data base. The CSU cooperators are currently analyzing the data base using a statistical spatial approach to develop the Armillaria root disease hazard rating system.

Preliminary models of Armillaria root disease incidence in the Black Hills have been developed from the data collected for this project. The first model correlates elevation and percent slope with Armillaria infection. The second model incorporates average annual precipitation, percent slope, and aspect with the root disease fungus. Both models have been spatially cross-correlated with site index. Overall model performances estimate disease density to within approximately 98% accuracy. Three areas of high incidence rating have been found in the Black Hills due to these models.

To finish the project, we still need to:

- -obtain and manipulate data on Black Hills stand disturbances, habitat types; and
- -couple the Armillaria incidence/severity data with the GIS maps of soils, stand disturbances, and habitat types data to develop a hazard rating map.

The GIS-based system relating Armillaria root disease hazard on a landscape scale should be completed by August 1997. The hazard rating will incorporate

existing disease occurrence with, site characteristics (soils, topography, meteorological variables), and harvesting history.

The conclusion of this project in 1997 will provide a GIS-based landscape-scale hazard rating system for Armillaria root disease in the Black Hills National Forest. Some other beneficial products that this project will contribute are: a complete soil map for the Black Hills National Forest, past disturbance intensity maps, meteorological maps of the forest, and possibly an analysis of mountain pine beetle outbreaks in relation to Armillaria disease occurrences. This project also demonstrates several useful techniques that could be used to create other hazard rating models, and study interactions between Armillaria root disease and other disturbances. (Jeri Lyn, Tom)

2. Pest Trend Impact Permanent Plots for Comandra Blister Rust in Wyoming-- Permanent plots were established in 1982 - 1986 to study the effects of Comandra Blister Rust on lodgepole pine stands of the Bighorn, Medicine Bow, and Shoshone National Forests. Thirty plots were resurveyed in 1995 and 1996 and the data collected will be tested this fall in mortality and growth loss models for this rust. A technical report on lodgepole pine growth and comandra blister rust associations is currently being prepared. (Jeri Lyn, Tom)

RECENT RCSC PUBLICATIONS

Pasek, J.E. and W.C. Schaupp, Jr. 1995. Emergence and overwintering brood of Douglas-fir beetle six years after the Clover Mist Fire on the Clarks Fork Ranger District, Shoshone National Forest, Wyoming. USDA Forest Service, Rocky Mountain Region, Biological Evaluation R2-95-02. 17 p.

Schaupp, W.C., Jr. and J.E. Pasek. 1995. Emergence and overwintering brood of Douglas-fir beetle five years after the Clover Mist Fire on the Clarks Fork Ranger District, Shoshone National Forest, Wyoming. USDA Forest Service, Rocky Mountain Region, Biological Evaluation R2-95-01. 19 p.