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Publications

Most Station publications (Research Papers, Notes, General Technical Reports, and Resource Bulletins) are available from Station headquarters in Broomall, PA. For copies of articles not published by the Station, contact a university library or the Northeastern Forest Experiment Station author or co-author. A list of Station authors by location follows the citations. Full mailing addresses for headquarters and field locations are located on the inside back cover.

Adams, Edward L. **DESIM: A system for designing and simulating hardwood sawmill systems.** Gen. Tech. Rep. NE-89. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 10 p.

DESIM is a new system for designing and simulating the operation of hardwood sawmill systems. Sections are presented on: (1) the system, (2) required inputs, and (3) resulting outputs. This computer system is relatively easy to use for even a very complex sawmilling situation.

Adams, Edward L. **DESIM user's manual: a procedural guide for designing and simulating hardwood sawmill systems.** Gen. Tech. Rep. NE-94. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 58 p.

A procedural guide for using the DESIM computerized system for designing and simulating the operation of hardwood sawmill systems. Instructions are provided for everything from setting up the DESIM system on a computer to simulating the operation of a proposed sawmill system. This user guide makes the system relatively easy to use for even complex sawmill situations.

Anderson, R. Bruce; Luppold, W. G.; Wallin, W. B. **Assessing pallet industry use of the low-grade southern hardwood resource.** In: Payoffs from new techniques for managing and processing southern hardwoods: 1984 Southern Forest Economics Workshop; 1984 March 13-15; Memphis, TN. Raleigh, NC: SOFEW; 1984: 87-97.

In the next two decades, we will see an increase in the utilization of the southern low-grade hardwood resource because of the continued growth in the use of pallets in materials handling systems. This growth is encouraged by the great cost savings realized in shipping and handling of products on pallets. Cost savings are due, in part, to the availability of low-cost raw materials for pallet production. The low-grade sawtimber, poletimber, and pulpwood portion of the resource, underutilized at present, will become increasingly important in meeting the needs of the pallet industry in the decades to follow.

Araman, Philip A.; Dempsey, Gilbert P. **The U.S. hardwood forest resource situation and our hardwood lumber and dimension market potentials in Europe.** In: Dickerhoof, H. Edward, ed. International forest products trade: resources and market opportunities. Proceedings of a conference; 1983 November 7-9;

Arlington, VA. Madison, WI: Forest Products Research Society; 1984: 124-132.

Reviews the hardwood resources in standing sawtimber and at sawmills, and describes the grade distribution of lumber produced. Looks at the history of hardwood exports to Europe and the economic conditions that both aid and hinder export efforts. Presents some projections of future demand along with thoughts on the United States' potential to meet these expectations, as well as action to take to increase hardwood exports.

Araman, Philip A.; Reynolds, Hugh W. **Producing standard-size blanks from lower grade hardwoods: A case report.** In: Dempsey, Gilbert P.; Price, Karen S., eds. Governor's conference on West Virginia's forest industry. Workshop proceedings; 1983 November 7-8; Charleston, WV. Charleston, WV: Governor's Office of Economic and Community Development and West Virginia Forests, Inc.; 1984: 123-126b.

Ashby, W. C.; Vogel, W. G.; Kolar, C. A.; Philo, G. R. **Productivity of stony soils on strip mines.** In: Proceedings, Erosion and productivity of soils containing rock fragments; 1982 November 28-December 3; Anaheim, CA. SSSA Spec. Publ. No. 13. Madison, WI: Soil Science Society of America; 1984: 31-44.

Stone content is only one of many factors changed during mining and reclamation. Because so many factors are changed, assessments of the role of stone must often be partly or largely inferred. Experimentation with presence or absence of stones on mine soils as a single variable has not been carried out to our knowledge. The potential for productive mine soils with stones has been well documented. The purpose of our study was to determine how much rock fragment is found in mine-soils, and how the fragment content affects vegetative productivity. We concluded that mine soils with differing content of coarse fragments may have productivity equal to or greater than pre-mining soils.

Auchmoody, L. R.; Rexrode, C. O. **Black cherry site index curves for the Allegheny Plateau.** Res. Pap. NE-549. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 5 p.

Black cherry site index curves were developed for the Allegheny Plateau in northwestern Pennsylvania. They show for this region that height rises less sharply prior to the index age and is maintained for a longer period thereafter than described by existing curves. An equation to predict site index from height and age is furnished to allow the use of these curves in computer processing. For field use, a table of site indexes by 2-foot heights and 2-year ages is provided.

Baker, C. Jacyn; Melhuish, John H., Jr. **Separation of unsaturated fungal fatty acid methyl esters by reversed-phase liquid chromatography for further evaluation by gas chromatography.** Journal of Chromatography. 284: 251-256; 1984.

The objective of this study was to optimize conditions for separation and recovery of unsaturated C₁₆ and C₁₈ fatty acid methyl esters. Two reversed-phase columns

were tested, a Perkin-Elmer C₈ and a DuPont Zorbax ODS (C₁₈). The latter column was better suited for our particular needs. The optimal system was then used to separate fatty acids extracted from *Athelia bicolor*.

Barger, J. H. **Hydraulic sprayer applications of methoxychlor on American elm.** In: Mayo, Z. B., compiler. Proceedings, 39th annual meeting, North Central Branch of Entomological Society of America; 1984 March 26-29; Wichita, KA. College Park, MD: North Central Branch of Entomological Society of America; 1984. Abstract 100.

Barger, Jack H. **Evaluation of hydraulically applied methoxychlor to protect American elms from feeding by the European elm bark beetle (Coleoptera: Scolytidae).** Journal of Economic Entomology. 77: 794-797; 1984.

American elm trees were sprayed by hydraulic sprayer with various concentrations of methoxychlor, with and without stickers, in different seasons and cities to determine chemical deposit and efficacy against the smaller European elm bark beetle, a vector of the Dutch elm disease fungus. Gas-liquid chromatography assays and beetle bioassays were used to quantify methoxychlor deposits. Methoxychlor deposit was unaffected by the addition of spray sticker but weathering, season sprayed, concentration and skill of the spray crew significantly affected deposit.

Barger, Jack H.; Cuthbert, Roy A.; Cannon, William N., Jr. **Numbers of *Scolytus multistriatus* (Coleoptera: Scolytidae) caught on multilure-baited sticky traps increase with Methoxychlor.** Journal of Economic Entomology. 77: 1251-1253; 1984.

Multilure-baited sticky traps were attached to various methoxychlor-sprayed and unsprayed trap sites to determine the effect of the insecticide treatments on catches of the smaller European elm bark beetle. Significantly more bark beetles were captured by baited sticky traps attached to the boles of sprayed healthy American elms, and also by traps attached to the boles of sprayed elms infected with the Dutch elm disease fungus, than were captured by traps on comparable unsprayed elms. Bark beetle catches on traps attached to sprayed and unsprayed utility poles and tree trap sites other than elms were not significantly different. These tests suggest that other beetle attractants associated with healthy and diseased elms and the presence of methoxychlor on the trap sites significantly affected trap catches.

Barnard, Joseph E. **Forest inventory and analysis in the Northeast.** In: Proceedings of the forest land inventory workshop, Preparing for the 21st Century; 1984 March 26-30; Denver, CO. Washington, DC: USDA Forest Service, Division of Timber Management; 1984: 79-85.

The Northeastern Forest Experiment Station has conducted forest resource inventories since the mid-1940's. The third cycle of these inventories is nearing completion. All cycles have used double sampling procedures that involved both the photo interpretation of many points and the ground examination and measurement of a subsample of these photo locations. Since 1960, the Station has used the Sampling with Partial Replacement

design as the basic framework of each state reinventory. Details of the application of the design and modifications to increase the level of resolution of the data are discussed in detail.

Baumgras, John E. **Predicting product yields from thinnings in Appalachian hardwoods.** Journal of Forestry. 82(1): 43-46; 1984.

Equations have been developed for estimating the volume per acre of sawlogs, sawbolts, and pulpwood or fuelwood that can be harvested by thinning hardwood stands of poletimber or small sawtimber size. These equations were derived from actual roundwood yields obtained by thinning 17 stands of Appalachian hardwoods in Virginia and West Virginia, and measuring the product volume of each cut tree 5.0 inches d.b.h. and larger. If the amount of basal area to be removed per 2-inch d.b.h. class is known, the equations facilitate estimates of alternative yields from thinnings and help identify opportunities for multiproduct harvesting.

Beckjord, P.; Melhuish, J., Jr.; McIntosh, M. **Influence of nitrogen and phosphorus fertilization on ectomycorrhizal formation of *Quercus alba* and *Q. rubra* seedlings by *Pisolithus tinctorius* and *Scleroderma auranteum*.** In: 6th North American conference on mycorrhizae; 1984 June 25-29; Bend, OR. (Place of publication unknown): (Publisher's name unknown); 1984.

The purpose of the study was to determine what optimum amount of nitrogen or phosphorus (or both in combination) would be necessary to maximize ectomycorrhizal formation on oak seedlings.

Beckjord, Peter R.; McIntosh, Marla S.; Hacsckaylo, Edward; Melhuish, John H., Jr. **Inoculation of loblolly pine seedlings at planting with Basidiospores of ectomycorrhizal fungi in chip form.** Res. Note NE-324. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p.

Basidiospores of the ectomycorrhizae-forming fungi *Pisolithus tinctorius* and *Scleroderma auranteum* incorporated into an organic hydrocolloid can be used successfully in field inoculation. Containerized loblolly pine seedlings were inoculated during outplanting by this method. This study showed that basidiospore chips were effective inocula in this investigation.

Benzie, John W.; Smith, Thomas M.; Frank, Robert M. **Balsam fir.** In: Final environmental impact statement for regional guide—Eastern Region. Milwaukee, WI: U.S. Department of Agriculture, Forest Service, Eastern Region; 1984: D22-28.

Biller, Cleveland J. **Testing the FMC-180CA high-speed steel track logging vehicle.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 215-225.

The FMC FT-180CA high-speed steel track logging vehicle was field tested on the George Washington National Forest near Covington, Virginia. Pulpwood and sawlogs were harvested in the clearcut operation. The average volume per turn was 102 cubic feet of Appalachian hardwoods. Skidding was uphill; maximum

adverse grade was 44 percent. An average skid of 1,190 feet took 14.9 minutes.

Billar, Cleveland J.; Fisher, Edward L. Whole-tree harvesting with a medium capacity cable yarder.

Transactions of the ASAE. 27(1): 2-4; 1984.

A time study was conducted to monitor productive and nonproductive times during logging with a medium-capacity cable yarder harvesting whole hardwood trees in a clearcut. Prediction equations were developed to estimate the cycle time for the yarder, and yarding cost was calculated at \$3.33/m³ (\$7.33/cord @ 78 ft³/cord) for whole-tree chips.

Birch, Thomas W. The private forest-land owners of the United States. In: New forests for a changing world: Proceedings, Convention of the 1983 Society of American Foresters; 1983 October 18-20; Portland, OR. SAF Publ. 84-03. Bethesda, MD: Society of American Foresters; 1984: 626-630.

Nearly 7.8 million private owners have 333 million acres of forest land in the United States. A 1978 survey shows that half of the forest land is in ownerships of greater than 500 acres and this land is owned by less than 1 percent of the owners. An additional 30 percent of the private forest land is in ownerships of 100 to 500 acres, many of these ownerships could produce substantial amounts of timber on a continuing basis. Quantifying the diversity of ownerships is the first step to better understanding this important group of decision-makers. Matching compatible owner objectives with opportunities for intensive timber management has been perceived as a major stumbling block to increased productivity. This issue can now be addressed in a more quantitative context.

Birch, Thomas W. Private forest-land owners of New York. National Woodlands. 7(5): 8-10; 1984.

Ninety-four percent of New York's 15.4 million acres of commercial forest land is in 506,500 private ownerships. Of the private owners, 53 percent have fewer than 10 acres of forest land, and they own 6 percent of the private forest land. Fewer than 1 percent of the owners have more than 500 acres of forest, and they own 20 percent of the forest land in New York. Benefits other than timber production are important to most landowners. However, these owners are not opposed to harvesting trees from their land. The availability of private land for timber production has improved since 1968.

Blum, Barton M. Selection system of silviculture in spruce-fir. Forest Technique. 84(8): 10; 1984.

Describes the advantages and disadvantages of the selection system in spruce-fir stands. When used properly, the selection method perpetuates a well-stocked stand of the more vigorous, fast-growing, and well-formed trees distributed among all age classes.

Blum, Barton M. U.S. Forest Service research—alive and well in Maine. National Woodlands. 7(4): 8-10; 1984.

The Orono, Maine, Research Unit of the USDA Forest Service's Northeastern Forest Experiment Station has been conducting research activities in the forests of Maine since 1950. This research has concentrated pri-

marily on the spruce-fir forest type, including associated species such as white pine, hemlock, and northern hardwoods. The Orono unit is responsible for planning, establishing, and maintaining research studies on the Penobscot Experimental Forest, and administering logging operations and maintaining roads and boundaries.

Brann, Thomas B.; Solomon, Dale S. Spruce budworm growth impact study. In: Houseweart, Mark W.; Seymour, Robert S., eds. 1983 annual report of the Cooperative Forestry Research Unit. Orono, ME: University of Maine at Orono, Maine Agricultural Experiment Station; 1984; Misc. Rep. 298. 33 p.

Branson, Branley A.; Batch, Donald L.; Curtis, Willie R. Small-stream recovery following surface mining in east-central Kentucky. Transactions of the Kentucky Academy of Science. 45(1-2): 55-72; 1984.

Analyses of physio-chemical, piscine, and macrobenthological data secured from two small-stream drainages affected by surface mining in eastern Kentucky are presented.

Brewer, Les; Berrier, Debbie. Photographic techniques for monitoring resource change at backcountry sites. Gen. Tech. Rep. NE-86. Broomall, PA: U.S.

Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 13 p. Resource change can be monitored using photographic methods. Both microsite and macrosite techniques suitable for backcountry use are described and discussed in detail. The microsite techniques, including quadrat photography, trail mosaics, and photographic trail transects, are generally the more expensive, requiring more time or specialized equipment in the field or lab than microsite techniques. The data obtained are detailed and quantifiable to a degree that may be acceptable for research purposes. Macrosite techniques, including panoramas and the monoscopic perspective grid technique, are less likely to provide research data, but are useful for qualitative assessments.

Briggs, Russell D.; Czapowskyj, M. M.; White, E. H. Effects of fertilization on the nutrient distribution of aboveground components of *Abies balsamea* (L.) Mill. Plant and Soil. 80: 433-439; 1984.

The following fertilizer treatments were applied to a 20-year-old aspen/birch/spruce-fir stand in southeastern Maine: N at 448 kg/ha, P at 112 kg/ha, N and P applied as above in addition to 1,751 kg/ha Ca and 27 kg/ha Mg. Five years after treatment, foliar concentrations of N, P, and Ca for understory balsam fir exhibited significant increases in response to fertilization with those nutrients. Mean 5-year height growth, adjusted for pretreatment differences, increased 36 percent in response to fertilization with N alone and in combination with P and lime.

Brooks, Robert T.; Rowntree, Rowan A. Forest area characteristics for metropolitan and nonmetropolitan counties of three Northeastern states of the United States. Urban Ecology. 8: 341-346; 1984.

Analysis of county-level forest area statistics for 208 counties in New York, Pennsylvania, and Ohio shows: (1) All counties have substantial forest acreage regardless of the degree of urbanization; even counties with

urban centers are more than 30 percent forested; and (2) forest area distribution by stand-size class shows no clear association with the degree of urbanization in the county.

Brooks, Robert T.; Sykes, Karen J. **Sampling land use edge from aerial photographs—line transect vs. circular pattern.** Res. Note NE-321. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 9 p. Compares the diagonal line-transect and circular pattern for sampling land use edge. There were no significant differences in sampling efficiency.

Bullard, Allan T.; Donley, David E. **Current status and potential spread of the gypsy moth to the southern Appalachians.** Tech. Pap. 84-P-9. Washington, DC: American Pulpwood Association, Inc.; 1984. 3 p. The range of the gypsy moth is expanding and will continue to expand until it eventually occupies all of the hardwood production areas of the United States. Our challenge as managers is to plan for this and to learn when and how to intervene to protect our resources.

Buso, Donald C.; Martin, C. Wayne; Hornbeck, James W. **Potential for acidification of six remote ponds in the White Mountains of New Hampshire.** Res. Rep. No. 43. Durham, NH: Water Resources Research Center, University of New Hampshire; 1984. 157 p.

The chemical characteristics of six remote ponds and their inlet streams in the White Mountains of New Hampshire were measured to estimate susceptibility to acid precipitation. All ponds experienced short-term acidification during snowmelt events. Historic pH and alkalinity data from these ponds are inadequate to determine if they are acidifying. Each pond is unique and to characterize them based on only one or two parameters is inadequate.

Cain, M. D.; Yaussy, D. A. **Can hardwoods be eradicated from pine sites?** Southern Journal of Applied Forestry. 8(1): 7-13; 1984.

Intensive mechanical and chemical treatments were used annually for 12 years to eradicate hardwoods from a selectively managed loblolly/shortleaf pine stand in south Arkansas. Although temporarily effective, a succession of indigenous shrubs and trees followed the cessation of eradication treatments. Improved pine diameter distribution from natural regeneration and an increase in radial growth of overstory pines were benefits of this temporary hardwood eradication.

Cannon, W. N., Jr. **Effects of adult density and temperature on development of *Scolytus multistriatus*.** In: Proceedings, 39th annual meeting of the North Central Branch, Entomological Society of America; 1984 March 26-29; Wichita, KS. College Park, MD: Entomological Society of America, North Central Branch; 1984. Abstract 94.

Through infestation, beetle densities of either 10 or 50 females per 100 cm³ of phloem were established on American elm bolts held at either 25°C or 30°C. After infestation, the elm bolt samples were randomly selected weekly for 6 weeks from each treatment to determine beetle development. At the low density, mean

development time varied inversely with temperature; 58 hours longer at 25°C than at 30°C. At the high density, mean development time was only 7 hours more at 2°C than at 30°C. The shortest development time occurred at 30°C in low-density populations. The next longest time was for low-density populations at 25°C followed by the high-density populations at 30°C and at 25°C.

Cannon, William N., Jr.; Schroeder, Herbert W. **Visual impact of street trees in Ohio residential neighborhoods.** The Buckeye Arborist. 15(5): 7-9; 1984.

Research on esthetics of urban landscapes has shown that vegetation is an important feature adding to the visual quality of urban environments. In a recent investigation, people who viewed 35-mm color slides of residential streets rated those showing large, older street trees higher than those showing smaller trees or no trees. Apparently, street trees are very important for the appearance of the street, but newly planted young trees need to grow some before they have a significant impact on esthetic quality.

Carey, A. C.; Miller, E. A.; Geballe, G. T.; Wargo, P. M.; Smith, W. H.; Siccama, T. G. **Armillaria mellea and spruce decline in northern forests.** Plant Disease. 68(9): 794-795; 1984.

Roots of 288 red spruce trees in mixed hardwood, transitional, and montane boreal forests in New England and New York were excavated and examined for colonization by *Armillaria mellea* (Vahl. ex Fr.) Kummer. The fungus was associated with declining and dead spruce in all geographic locations. The percentage of roots colonized by the fungus increased with increasing severity of decline symptoms but decreased with increasing elevation. In high-elevation montane boreal forests, where the decline has been documented to be most intense, 75 percent of the recently dead and severely declining trees were not colonized by *A. mellea*. Although *A. mellea* is involved in red spruce decline, it is not the major cause of the current regional episode of spruce decline and mortality.

Collins, Judith A.; Jennings, Daniel T. **A simplified holder for eumenid nesting blocks (Hymenoptera: Eumenidae).** Entomological News. 95: 58-62; 1984.

Cosidine, Thomas J., Jr. **An analysis of New York's timber resources.** Resour. Bull. NE-80. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 70 p.

A comprehensive analysis of the current status and trends of the forest resources of New York. Topics include forest area, timber volume biomass, timber products, timber growth and removals. Forest management opportunities for increasing the production of major forest resources and enhancing the benefits derived from New York forests are identified.

Crawford, H. S. **Silvicultural practice and bird predation on spruce budworm.** Forest Technique. 84(9): 12; 1984.

Crawford, Hewlette S. **Wildlife habitat management and changing forest practices in the Northeast.**

Northern Journal of Applied Forestry. 1(1): 12-14; 1984.

Increasingly intensive management of northeastern industrial forest lands will substantially affect wildlife habitat. Opportunities for increasing wildlife habitat values on the best forest sites may be impractical because high timber management costs preclude loss of wood products to favor wildlife. Wildlife habitat can be enhanced on low-quality timber sites, but inherent site productivity will limit gains. The most practical opportunity for increasing wildlife habitat values usually is on intermediate-quality sites. Increased habitat value can be accomplished by coordinating timber and wildlife-habitat management goals. Gains in wildlife habitat value must be quantified to help offset losses in timber values.

Crews, Jerry T. **Effect of minesoil compaction on growth and yield of KY-31 tall fescue and sericea lespedeza.** Res. Note NE-320. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 5 p.

Kentucky 31 tall fescue and sericea lespedeza were sown on clay loam minesoils that had been screened through a No. 10 sieve and compacted to densities of 1.6, 1.8, and 2.0 g/cm³. Stands of sericea lespedeza were more difficult to establish than fescue on both minesoils and were more susceptible than fescue to increased levels of compaction. Dry-matter yields averaged over all densities were greater on the clay than on the loam minesoil.

Crews, Jerry T.; Dyer, Kenneth L. **Evaluation of Bentonite for the control of acid drainage from surface mined lands.** In: Surface mining and water quality: 5th annual West Virginia surface mine drainage task force symposium; 1984 March 21-22; Morgantown, WV. Charleston, WV: West Virginia Mining and Reclamation Association; 1984: 9 p.

Bentonite is a montmorillonitic clay known for its water sealing action. Bentonite when wet expands to form a mass of crystalline sheets largely impenetrable by water. Bentonite is evaluated by developing a bentonite/minesoil seal over a layer of toxic minewaste which was underlaid by PVC plastic lining. In addition to three control plots containing no bentonite, three plots contain 1 pound of bentonite per square foot and three plots contain 2 pounds of bentonite per square foot. The plots are approximately 16 x 16 feet. Drains above and below the bentonite layer are connected to 55-gallon barrels. Volume of runoff is measured in the barrels.

Cushwa, C. T.; Barnard, J. E.; Gravatt, G. R.; DuBrock, C. W. **A preliminary assessment of forest wildlife habitat in Pennsylvania.** In: Proceedings, Renewable resources management applications of remote sensing; 1983 May 22-27; Seattle, WA. Falls Church, VA: American Society of Photogrammetry; 1984: 110-115.

This report is based on the integration of data from the Pennsylvania Game Commission's wildlife data base and the USDA Forest Service's Pennsylvania forest resource data base. The forest resource data base contains information from 1,000 permanent plots--79,373 points on recent aerial photos and 1,743 new plots as a sub-

sample of photo points. The wildlife data base contains information for 844 resident or common migrant animals in Pennsylvania. Data were analyzed to make a preliminary assessment of forest wildlife habitat in the Commonwealth.

Czapowskyj, M. M.; Safford, L. O. **Hybrid poplar response to fertilization and control of competition.** Agronomy Abstracts. 1984: 258. Abstract.

Unrooted cuttings of clones NE-41 and 388 were planted on a clearcut, drum-chopped, hardwood site in eastern Maine. On half the area, competing vegetation was mowed annually for the first 3 years after planting. Plots were treated with lime, alone and combined with N, P, NP, and NPK. After 8 growing seasons, biomass and nutrient content of hybrid poplar were increased substantially by fertilization plus control of competing vegetation.

Dale, Martin E.; Sonderman, David L. **Effect of thinning on growth and potential quality of young white oak crop trees.** Res. Pap. NE-539. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 12 p.

Relative changes in several types of stem defects were studied over a 16-year period to determine the effect of thinning intensity on the development of tree quality. Sixty-six sample white oak crop trees represented each of five density levels created by thinning a young white oak stand in Kentucky in 1961. Occurrence of branch-related and other stem defects on the butt 16-foot section was studied from stereo pairs of photographs taken in 1961 and 1977. The number of live and dead branches greater than 0.3 inch in basal diameter increased on all density plots. Except for extremely heavy thinnings, those below C-level stocking, tree quality was not markedly affected by residual stand density.

Davidson, Walter H.; Hutnik, Russell J.; Parr, Delbert E. **Reforestation of mined land in the Northeastern and North-Central U.S.** Northern Journal of Applied Forestry. 1(1): 7-12; 1984.

Reviews the state of the art of surface mine reclamation for forestry in Pennsylvania, Maryland, West Virginia, Ohio, Indiana, and Illinois. Legislative constraints, socioeconomic issues, factors limiting the success of reforestation efforts, post-mining land-use trends, species options, and establishment techniques are discussed. Sources of assistance to landowners or managers are given and major publications on reclamation methods are cited.

Davis, Donald D.; Millen, Amy A.; Dochinger, Leon, eds. **Air pollution and the productivity of the forest.** Proceedings of the symposium; 1983 October 4-5; Washington, DC. Arlington, VA: Izaak Walton League of America; 1984. 344 p.

Reviews pertinent literature relating to effects of air pollution on forest productivity, and discusses current research directions in this area. Emphasis was directed toward effects of oxidants (primarily ozone) and acid rain on forest productivity.

DeBell, D. S.; Harms, W. R.; Marquis, D. A.; Curtis, R. O. **Trends in stand management practices for U.S. forests.** In: New forests for a changing world: Proceedings, 1983 convention of the Society of American Foresters; 1983 October 16-20; Portland, OR. SAF Publ. 84-03. Bethesda, MD: Society of American Foresters; 1984: 47-51.

Current stand management practices in mixed hardwood, southern pine, and Douglas-fir forests are described. Silvicultural activities attained greater importance in many forest management organizations during the past 10 to 15 years; growing-stock control and fertilizer application have become common practices in some forest types. In the future, prescriptions for stand management practices will become more site-specific and more concerned with both wood quality and nontimber resources.

DeGraaf, Richard M. **Urban wildlife and fisheries.** In: Wenger, Karl R., ed. *Forestry handbook*. New York, NY: John Wiley & Sons; 1984: 945-957.

The urban wildlife and fisheries section of the *Forestry Handbook* presents the effects of urbanization on wildlife, and provides information to improve urban wildlife habitat. Bird species are listed where populations are either significantly increased or decreased as a result of urbanization. Area-sensitive species and their requirements are listed. Trees are rated as to their wildlife food, nesting, or cover value; site requirements of valuable wildlife shrubs are provided, as well as information on retention of cavity or den trees, unmowed borders, understory development and reduction of forest fragmentation. Nest box dimensions and landscape plants are listed. Fish habitat management includes brief list of species tolerant of urban water conditions, weed control, and bank stabilization.

DeGraaf, Richard M.; Chadwick, Nan L. **Habitat classification: a comparison using avian species and guilds.** *Environmental Management*. 8(6): 511-518; 1984.

Results of breeding bird censuses in 1979 and 1980 were used to compare the relationships of species and guilds to forest habitats in the White Mountains of New Hampshire. Several age classes of 11 forest cover types were studied: northern hardwoods, spruce, spruce-fir, birch, swamp hardwoods, pine, balsam fir, aspen, northern red oak, oak-pine, and hemlock. Results of ordinations based on censuses of 74 bird species indicate that foraging guilds are more related to general cover types than nesting substrate guilds, but bird species reflect habitat differences to a greater degree than either guild scheme. Bird species distribution greatly overlaps between hardwoods and mixed forests; softwoods show little overlap with other types.

DeGraaf, Richard, M. **Managing New England woodlands for wildlife that uses tree cavities.** Amherst, MA: University of Massachusetts Cooperative Extension Service; 1984; Bulletin C-171. 16 p.

Cavity trees are used by one-fourth of terrestrial New England wildlife for shelter, caching food, escape from predators, and producing and rearing young. Good forestry includes marking such trees for retention before treatment or harvest is begun. This bulletin is a guide

to wildlife use of cavity trees, and provides woodland owners and managers with information to maintain habitats for these species.

Dempsey, Gilbert P.; Price, Karen S., eds. **Governor's conference on West Virginia's forest industry.** Workshop proceedings; 1983 November 7-8; Charleston, WV. Charleston, WV: Governor's Office of Economic and Community Development and West Virginia Forests, Inc.; 1984. 208 p.

The goals of the 1983 Governor's conference on West Virginia's forest industry were to identify the issues and recommend policies, ways, and means for developing West Virginia's forest resources to: (1) secure economic contributions commensurate with its potential; and (2) concurrently, promote the wise management and use of the forest resource to enhance other important values such as water, wildlife, recreation, and esthetics. An agenda for the forest community and public institutions has been developed.

Denig, Joseph; Wengert, Eugene M.; Brisbin, Robert; Schroeder, James. **Dimension lumber grade and yield estimates for yellow-poplar.** *Southern Journal of Applied Forestry*. 8(3): 123-126; 1984.

Equations that predict the dimension lumber grade yield from yellow-poplar trees and sawlogs that are manufactured into 2 x 4's using the Saw-Dry-Rip system are presented. These equations require the measurement of d.b.h. and merchantable height measured to an 8-inch top diameter. To predict the dimension lumber yield from yellow-poplar logs, a grading system that incorporates limiting defects with the clear-face concept used in southern pine log grading is utilized to stratify the logs. Once the logs have been graded, scaling diameter is used to predict the dimension lumber yield.

Dimond, J. B.; Mott, D. G.; Kemp, W. P.; Krall, J. H. **A field test of mating-suppression using the spruce budworm sex pheromone.** *Tech. Bull.* 113. Orono, ME: Maine Agricultural Experiment Station, University of Maine at Orono; 1984. 15 p.

Spruce budworm sex pheromone was dispersed from aircraft over forest land in Maine in late June, 1980. A major goal was to sample pheromone concentrations in air, through chemical means, to determine whether the Hercon flake formulation would provide the steady, sustained release of chemical believed required for interfering with the mating process of the moths. We believed that the opportunity of studying some behavioral effects on spruce budworm populations should be exploited also. This report describes these studies.

Dimond, John B.; Seymour, Robert S.; Mott, D. Gordon. **Planning insecticide application and timber harvesting in a spruce budworm epidemic.** *Agric. Handb.* 618. Washington, DC: U.S. Department of Agriculture, Forest Service, Cooperative State Research Service; 1984. 29 p.

Donley, David E.; Feicht, David L. **Relationship between dead oak value and associated wood borers.** In: Miller, A. R., ed. *National gypsy moth review: Proceedings of a symposium*; 1984 November 26-29; Charleston, WV. Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 103-105.

Mature oaks killed by gypsy moth defoliation should be removed promptly to avoid loss of timber value to borer damage.

Donley, David E.; Feicht, David L. **Sawtimber losses associated with gypsy moth defoliation in central Pennsylvania.** In: Miller, A. R., ed. National gypsy moth review: Proceedings of a symposium; 1984 November 26-29; Charleston, WV. Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 106-109.

Between 1978 and 1982, the "front" of defoliation by the gypsy moth swept over central Pennsylvania. In the 5-year period, defoliation of individual stands was neither complete nor continuous, but most of the study areas were defoliated at a level of over 50 percent for at least 2 years. In 1983, more than half the trees on some 6,000 acres died. Oak volume and value estimates were obtained from salvage sale data and a series of prism point samples collected in 1983 and 1984. Dead oak volume ranged from 3.5 to 11.0 M bf per acre. Values ranged from a low of \$281 an acre to a high of \$914. Dead oak trees averaged 246 board feet per tree. Timber buyers are biased against dead trees. This bias is justified because trees dead more than 2 years are riddled with galleries of the oak timberworm.

Donley, David E.; Rast, Everette. **Vertical distribution of the red oak borer, *Enaphalodes rufulus* (Coleoptera: Cerambycidae), in red oak.** Environmental Entomology. 13(1): 41-44; 1984.

Red oak borer attack height was directly related to red oak size in immature oak stands. Attack density was inversely related to tree size. Borer density within size classes did not differ significantly when trees from Pennsylvania stands were compared with trees from Indiana stands. Median attack height was always ≤ 5 m for trees up to 30.0 cm d.b.h. Almost 75 percent of the attacks were found in the economically important basal 4-m trunk portion in all size classes of trees.

Dubois, Normand R. ***Bacillus thuringiensis* NRD-12: Selection of a more potent strain of Bt for use against the gypsy moth.** In: Miller, A. R., ed. National gypsy moth review: Proceedings of a symposium; 1984 November 26-29; Charleston, WV. Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 94-95.

Duggin, M. J.; Schoch, L. B.; Rowntree, R. **Can multi-channel remotely sensed spectral radiance data augment higher resolution aerial photography in urban studies?** In: Technical papers of the 50th annual meeting of the American Society of Photogrammetry; 1984 March 11-16; Washington, DC. Falls Church, VA: American Society of Photogrammetry; 1984: 157-163. Vol. 1.

Describes a modest experiment performed over the Syracuse, New York, area in which a combination of aerial photography, ground reflectance measurements, and simulation modeling was used to predict spectral signatures from Landsat pixel-sized areas in various urban and suburban regions of importance to urban natural resource management. By obtaining digital data from the Landsat multispectral scanner (MSS) over the same area during the same season, we showed that

the calculated and observed relative spectral signatures are sufficiently similar to suggest that information obtained by photointerpretation may be augmented, on a repetitive basis, by the spectral radiance information obtained from the MSS.

Dyer, Kenneth L. **Water, friend or foe in the control of acid mine drainage.** In: Surface mining and water quality: 5th annual West Virginia surface mine drainage task force symposium; 1984 March 21-22; Morgantown, WV. Charleston, WV: West Virginia Mining and Reclamation Association; 1984: 16 p.

Water traditionally has been considered an enemy in the battle to halt the formation and transport of acid mine drainage; so, efforts and laws have been directed at keeping water away from toxic spoil materials. It is becoming increasingly clear that even the most stringent measures for keeping water from toxic spoils have not fully prevented formation and transport of acid mine drainage. There is ample evidence that immersing toxic spoils under water cannot only prevent the formation of acid mine drainage, but, under some circumstances, can remove it from solution.

Dyer, Kenneth L.; Curtis, Willie R.; Crews, Jerry T. **Response of vegetation to various mulches used in surface mine reclamation in Alabama and Kentucky—7-year case history.** Gen. Tech. Rep. NE-93. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 11 p.

Five different mulches and one mulch-amendment combination were evaluated in the reclamation of two different mine spoils, one in western Kentucky and one in northern Alabama. The treatments evaluated were bark, hardwood chips, straw, hay, hydromulch, and hydromulch plus Petroset SB emulsion. After 7 years, the effects of the different mulch treatments were readily apparent at the Alabama site where the hardwood-chip plot had strikingly superior cover. Differences were not so apparent at the Kentucky site.

Echelberger, H. E. **X-C monitor.** Ski Area Management. 23(3): 58; 1984.

Echelberger, Herbert E. **First report shows X-C business up.** Ski Area Management. 23(2): 22; 1984.

Echelberger, Herbert E. **Skier visits up.** Ski Area Management. 23(1): 28, 30; 1984.

Echelberger, Herbert. **Monitor's measure.** Ski Area Management. 23(1): 26-28, 30, 70, 73; 1984.

Eck, Ronald W.; Burks, Randall S.; Morgan, Perry J.; Phillips, Ross A. **Economic analysis of broad-based dips versus conventional drainage structures on forest roads—preliminary results.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 193-200.

Presents preliminary results of an on-going study conducted to address the issue of broad-based dips versus conventional drainage structures. A decisionmaking framework was developed that can be used as a general

guide to factors to consider in selecting a dip or culvert in a particular application. Specific questions that the engineer should address relative to soils/geology, hydrology, construction, maintenance and road-user factors were identified. The experimental design to be used to collect detailed data at a number of field sites in the Monongahela National Forest in West Virginia was outlined.

Eli, Robert N.; LeDoux, Chris B.; Peters, Penn A. **MAP — A Mapping and Analysis Program for harvest planning.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 48-63. The goal of this computer software package is to significantly improve the planning and harvest efficiency of small to moderately sized harvest units located in mountainous terrain. The intention is to develop an interactive user-friendly system to be implemented on the Hewlett-Packard 9845 computer system.

Emmons, Cheryl D.; Noble, Reginald D.; Jensen, Keith F. **Effects of simulated acid mist on *Liriodendron tulipifera*.** Plant Physiology. 75(1): 67; 1984. Abstract.

Emmons, Cheryl D.; Noble, Reginald D.; Jensen, Keith F. **Effects of simulated acid mist on *Liriodendron tulipifera*.** In: Proceedings, 93rd annual meeting, The Ohio Academy of Science; 1984 April 27-29; (Location of meeting unknown). The Ohio Journal of Science. 84(2): 1984. Abstract.

Yellow-poplar saplings were treated with acid mists created from solutions of sulfuric and hydrochloric acids at pH levels of 2.3, 3.0, and 4.5 for 6 hours a day for 2 weeks. Visible damage was apparent at pH levels of 2.3 and 3.0, and consisted of necrosis of marginal and intra-veinal tissues. The pH effects were apparent on diffusive resistance (pH 3.0 lowest, $p = 0.0658$), net photosynthetic rate (pH 3.0 lowest, $p = 0.0724$), and dark respiration rate (pH 3.0 greatest, $p = 0.0018$). Sulfuric acid treated trees showed significantly different responses at all pH levels from those treated with HCl in terms of ribulose 1,5-bisphosphate carboxylase activity (H_2SO_4 lower than HCl, $p = 0.0390$). No significant effects of pH nor treatment were found for chlorophyll content, chlorophyll a:chlorophyll b ratio, or protein content, but in all treatments pH 3.0 caused either the highest or lowest levels of response and H_2SO_4 treatments caused lower levels of response than HCl treatments (except for protein content).

Federer, C. Anthony. **Organic matter and nitrogen content of the forest floor in even-aged northern hardwoods.** Canadian Journal of Forest Research. 14(6): 763-767; 1984.

Organic content of the forest floor decreases for several years after clearcutting, then slowly recovers. Thickness, bulk density, organic matter, and nitrogen were measured in forest floors of 13 northern hardwood stands in the White Mountains of New Hampshire. Stands ranged in age from 1 to about 100 years. Forest-floor thickness varied significantly with stand age, but bulk density, organic fraction, and nitrogen fraction were independent of age. Some of the initial decrease in organic matter and nitrogen content of the

forest floor may be caused by organic decomposition and nitrogen leaching, but mechanical and chemical mixing of floor into mineral soil during and after the harvest operation may be important.

Fege, Anne S.; Brown, Gregory N. **Carbohydrate distribution in dormant *Populus* shoots and hardwood cuttings.** Forest Science. 30(4): 999-1010; 1984. Stems from two hybrid *Populus* clones were collected from September to May to determine the effect of harvest date and sampling position on carbohydrate availability. Total sugars increased to a December maximum of 25 percent of dry weight in the shoot tip, then declined through early spring. Maximum starch content of 7 percent was measured in clone 5262 in early October and 12 percent in clone 5334 in early September. Total carbohydrates ranged from 4.3 to 27.2 percent of dry weight, with significantly lower levels in September and May. Concentrations of sugars and starch were significantly greater at upper shoot positions.

Fernandez, I. J.; Czapowskyj, M. **Forest floor heavy metal levels in low elevation commercial forests of Maine.** Agronomy Abstracts: 258; 1984.

Concern in the Eastern United States for the effects of long-range transported air pollutants has focused on the possible role of acid precipitation, ozone, or heavy metals in forest growth. Several studies have shown evidence of heavy metal accumulations in the surface organic horizons of northeastern forest soils.

Fisher, Edward L.; Gochenour, Donald L.; Biller, Cleveland J. **Significant factors affecting performance of Urus Cable yarder.** Transactions of the ASAE. 27(4): 962-967; 1984.

The Urus Cable yarder, rigged as a multispan skyline system, yarded tree length hardwood logs uphill 430 feet at a cost of \$72 per thousand board feet. The silvicultural prescription was a diameter limit, partial cut that removed 5,770 board feet per acre. Regression analysis yielded the following equation for cycle time: cycle time, min = $2.95 + 0.0045$ (slope yarding distance in feet) + 0.02404 (lateral yarding distance in feet); $R^2 = 0.46$, SE = 1.93 min.

Frank, Robert M. **Shelterwood system of silviculture in spruce-fir forests.** Forest Technique. 84(8): 9; 1984.

Describes the shelterwood sequence: a mature forest in which seedlings are absent or not well established is partially harvested; seedlings are well established 5 to 10 years after first partial harvest; about 5 years after final harvest of shelter trees, new trees are ready for initial thinning.

Fridley, J. L.; Garbini, J. L.; Jorgensen, J. E.; Peters, P. A. **Functional requirements and design parameters of swing-to-bunch feller-bunchers for forest thinning.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 363-372.

Interactive simulation is used to obtain data relating design parameters to functional requirements of swing-to-bunch feller-bunchers. Design parameters include

reach ratio, operating rates, boom/machine weight ratio, and boom support locations. Functional requirements include thinning selectivity, productivity, tipover stability, bunching capability, structural integrity, and boom-tip control.

Gabriel, William J.; Garrett, Peter W. **Pollen vectors in sugar maple (*Acer saccharum*)**. Canadian Journal of Botany. 62(12): 2889-2895; 1984.

To determine whether insect vectors alone are responsible for all of the pollination that occurs in sugar maple, pistillate flowers of three trees in Vermont were covered with fine mesh bags. This procedure provided evidence that this species can receive sufficient pollen for pollination by wind alone, though both insects and wind are factors in pollen distribution under optimal weather conditions.

Galford, Jimmy R. **Selection for a nondiapausing strain of artificially reared red oak borers**. Res. Note NE-319. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p.

The incidence of nondiapauses in artificially reared red oak borers increased from 4 to 61 percent in five generations. Fecundity dropped by more than 50 percent, but fertility was unaffected. Sixty percent of the nondiapausing larvae formed prepupa by the 12th week of development in the F₁ and in the F₄ generations.

Galford, Jimmy R. **The locust borer**. For. Insect & Dis. Leaflet 71. Washington, DC: U.S. Department of Agriculture; 1984. 6 p.

The locust borer attacks the black locust, a popular shade tree. This tree is used extensively in reforestation and land-reclamation plantings. Native to North America, the locust borer is found from Eastern Canada, south to the Gulf States and west to Washington, Colorado, and Arizona. Only black locust and its cultivars are attacked.

Gansner, Dave; Casey, Lloyd. **Value growth rates**. The American Tree Farmer. 3(1): 10-11; 1984.

Presents an easy method for estimating the current rate of value growth for trees and timber stands. Wise woodland owners keep close tabs on the financial earnings of their timber. All they need is a diameter tape, an increment borer, and the table shown in this paper.

Gansner, David A. **Predicting forest stand losses to gypsy moth**. In: Minutes 28th Southern forest insect work conference; 1983 August 8-11; Biloxi, MS. Baton Rouge, LA: Louisiana State University; 1984: 26.

Gansner, David A.; Herrick, Owen W. **Guides for estimating forest stand losses to gypsy moth**. Northern Journal of Applied Forestry. 1(2): 21-23; 1984.

People who have to make decisions about cost-effective management for gypsy moth need help in predicting and evaluating its effects. Field plot data collected during recent outbreaks in Pennsylvania are being used to develop guides for predicting forest stand losses to the pest. Presented here are some of the more useful products of that effort to date. Easy-to-measure data for forest characteristics such as species composition

and crown condition can be collected and applied in models that estimate potential stand and tree mortality and changes in timber value.

Gansner, David A.; Herrick, Owen W. **Guides for estimating forest stand losses to gypsy moth**. The Allegheny News. Summer 1984: 11-13.

Garrett, Peter W.; Funk, David T.; Hawley, Gary J.; Wendel, G. W. **Heritability of response to wounding in sugar maple (*Acer saccharum* Marsh.)** In: Lanner, R. M., ed. 8th North American forest biology workshop: Proceedings of a symposium; 1984 July 30 - August 1; Logan, UT. Logan, UT: Utah State University; 1984: 168. Abstract.

A combined provenance/progeny test of sugar maple was established on the Fernow Experimental Forest. Three-year-old seedlings were planted on a clearcut mixed-hardwood site; 112 open-pollinated families, 8 from each of 14 provenances, were planted at random in two-tree plots in each of five blocks. After 14 years, the plantation was fully stocked. In plots with two surviving trees, the smaller or poorer formed individual was marked for thinning. Marked trees were wounded by drilling a 1.0-cm hole, 2.5 cm deep at breast height. The marked trees were harvested 7 months later, and a 30-cm sample of the bole removed for analysis. There was no significant variation in response to wounding related to geographic origin, though the 14 provenances were well distributed over the northern part of the natural range of sugar maple.

Gatchell, Charles J. **Make money with small-diameter logs and No. 2 Common lumber**. Southern Lumberman. 245(3048): 21-23; 1984.

Describes new approaches to the use of small-diameter logs and No. 2 Common lumber for furniture and cabinets. Complete, new manufacturing schemes require standard-size blanks as a new intermediate product. Sizes for these blanks are based on the actual needs of manufacturers. Log-run lumber can be made to blanks in a conventional, crosscut-first rough mill. The conversion of small-diameter logs (7-1/2 to 12-1/2 inches) to blanks requires a new approach: System 6. The use of gang saws to break down cants and crosscut and rip System 6 boards is essential for removing 80 percent or more of the defects before operators make cut-to-length decisions. For minor changes in a conventional rough mill, the potential for using No. 2 Common lumber by gang-ripping first and a method for making long pieces from short with Serpentine end matching are discussed.

Gatchell, Charles J. **Make money with small-diameter logs and No. 2 Common lumber**. Furniture Production. 47(390): 27-29; 1984. See previous entry.

Godwin, Paul A. **Two bees or not two bees**. Citizens' Bulletin. 12(2): 9, 19-20; 1984.

A brief, nontechnical discussion of insect mimicry with several examples found among Connecticut insects. The well-known Monarch butterfly and its mimic Viceroy butterfly are cited. Also described are less well-known examples that have greater consequences for humans. These are flies disguised as bees and wasps.

Godwin, Paul A. On "katydid" and other onomatopoeia. *Citizens' Bulletin*. 12(3): 14-15; 1984.

Gottschalk, Kurt W. Effects of temperature on germination of northern red and black oak acorns. In: R. M. Lanner, ed. 8th North American forest biology workshop: Proceedings of a symposium; 1984 July 30 - August 1; Logan, UT. Logan, UT: Utah State University; 1984: 149. Abstract.

Constant and alternating temperatures ranging from 0° C to 30° C were tested for their effects on germination of northern red and black oak acorns. No significant differences in total germination were found between the temperature treatments; however, the time to initial germination was shorter and the duration of germination was shorter for warmer temperatures.

Gottschalk, Kurt W. Modifying silvicultural decisions to deal with the gypsy moth: A decision tree approach. In: Changing markets - Changing forestry, Abstracts of proceedings, 64th annual winter meeting, New England Society of American Foresters; 1984 March 7-9; Worcester, MA. SAF Publ. #84-04. Bethesda, MD: Society of American Foresters; 1984: 11.

Describes a decision tree that enables foresters and land managers to modify silvicultural decisions to minimize the impacts of tree mortality due to gypsy moth defoliation. Potential silvicultural treatments are discussed. The decision tree is based on imminence of defoliation, relative stand density, percentage of basal area in preferred food species, advance regeneration stocking, and stand-size susceptibility-vulnerability ratings.

Gottschalk, Kurt W. Research on silvicultural options for the gypsy moth. In: Miller, A. R., ed. National gypsy moth review: Proceedings of a symposium; 1984 November 26-29; Charleston, WV. Charleston, WV: West Virginia Department of Agriculture, Plant Pest Control Division; 1984: 96-98.

Grace, Linda S.; Biller, Cleveland J.; Means, Kenneth H. A survey of tractor stability analysis. In: Proceedings, 1983 winter meeting American Society of Agricultural Engineers; 1983 December 13-16; Chicago, IL. Pap. No. 83-1618. St. Joseph, MI: American Society of Agricultural Engineers; 1983. 21 p.

A comprehensive literature review was made of tractor stability analysis. The review includes work done on articulated tractors. The bibliography includes 128 references.

Gregory, G. F.; Schreiber, L. R.; Ichada, J. Microorganisms antagonistic to or producing antibiotic inhibitory to *Ceratocystis ulmi*. *Phytopathology*. 74(7): 804-805; 1984. Abstract.

Studies were conducted to identify organisms antagonistic to the Dutch elm disease fungus. The colonizing ability of candidates was determined by introducing them into the vascular system of American elm seedlings and then isolating periodically from leaf petioles. *Trichoderma* and *Bacillus* spp. are the most promising. *B. subtilis* and *B. coagulans* were isolated from the xylem of elms inoculated with the pathogen. When

mixtures of *B. subtilis* and *C. ulmi* spores, impregnated into blank bioassay discs, were placed on PDA, bacterial growth was dominant even when the bacterium was a very low proportion of the mixture.

Gregory, Robert A.; Wong, Betty L.; Tabor, Christopher A. Characterization of vernal sap from shoots of five tree species. *Plant Physiology*. 75(1): 150; 1984. Abstract.

Extracted sap from shoots containing 1- and 2-year-old secondary xylem of *Acer*, *Betula*, *Populus*, *Abies*, and *Picea* was analyzed to determine the content of the sap during vernal activity. Two to three shoots were collected from the lower crown of each tree at weekly intervals from March 2 through June 1, 1983. Sap extracted from each species on a given date was pooled and stored at -20°C prior to analyses. Mean values for the concentration of inorganic and organic sap solutes and for sap pH were determined throughout the period and referenced to phenological events. The relatively high concentration of sap solutes, presumably mobilized from storage tissues, varied according to vernal activities such as bud opening. Although sap pH differed considerably between species, all showed a steady decline from late winter (pH 7-8) to late spring (pH 5-7).

Grimble, David G.; Kucera, Daniel R., co-chairmen. Proceedings, new and improved techniques for monitoring and evaluating spruce budworm populations; 1983 September 13-15; Burlington, VT. Gen. Tech. Rep. NE-88. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 71 p.

Presents new or improved methods available for monitoring and evaluating spruce budworm populations.

Halverson, Howard G.; DeWalle, David R.; Sharpe, William E. Contribution of precipitation to quality of urban storm runoff. *Water Resources Bulletin*. 20(6): 859-864; 1984.

Precipitation and runoff samples were collected for 13 storms in a nonindustrial urban area in central Pennsylvania between July 1980 and June 1981. Analysis of the water samples showed that 10 to 25 percent of the nitrogen, 25 percent of the sulfate, and less than 5 percent of the phosphorus, potassium, and calcium in water below a tree were deposited by the precipitation. The sample from a residential roof showed insignificant changes in water chemistry. The results for four paved areas showed that all the nitrogen; and from 16 to 40 percent of the sulfate; and 13, 4, and 2 percent of the phosphorus, potassium, and calcium, respectively, in runoff was deposited by the precipitation.

Hansen, Bruce G.; Reynolds, Hugh W. System 6 alternatives: an economic analysis. Res. Pap. NE-551. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 14 p.

Three System 6 mill-size alternatives were designed and evaluated to determine overall economic potential for producing standard-size hardwood blanks. Internal rates of return ranged from about 15 to 35 percent after taxes. Cost per square foot of blanks ranged from about \$0.88 to \$1.19, depending on mill size and the amount of new investment required.

Hansen, G. D. **A computer simulation model of uneven-aged northern hardwood stands maintained under the selection system.** Syracuse, NY: State University of New York College of Environmental Science and Forestry; 1984; Misc. Publ. No. 3 (ESF 84-017). 21 p.

A computer simulation model representing the growth of uneven-aged northern hardwood stands was developed to study the effects of different diameter distributions on stand productivity. A model user can specify initial distributions in terms of total stand basal area, maximum tree size, and a Q ratio. The model projects model stand growth over one cutting cycle and provides a summary of several growth measures. This paper outlines the general features of the model and describes the subroutines representing mortality, survivor growth, and ingrowth. Model limitations are also discussed.

Harris, Margaret M.; Spearing, Ann M., eds. **Research in forest productivity, use, and pest control; Proceedings of a symposium; 1983 September 16-17; Burlington, VT. Gen. Tech. Rep. NE-90.** Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 95 p.

Proceedings of a symposium sponsored by the Civil Rights Action Committee of the Northeastern Forest Experiment Station and the University of Vermont School of Natural Resources to provide a forum for the presentation of current research in natural resource fields by women scientists.

Harris, Margaret; Fege, Anne S. **Women scientists: Contributions and connections.** *Women in Forestry.* 6(1): 15-16; 1984.

An account of the symposium "Research in forest productivity, use, and pest control" held in Burlington, Vermont, September 16-17, 1983, in which almost 100 researchers from universities, state and Federal agencies, and the private sector participated.

Heisler, Gordon M. **Planting design for wind control.** In: McPherson, E. Gregory, ed. *Energy-conserving site design.* Washington, DC: American Society of Landscape Architects; 1984: 165-183.

Briefly discusses heat transfer processes in buildings and basic mechanisms of windbreak effects on windflow and air temperature. A brief discussion of methods of economic evaluation of windbreak energy savings and then other benefits lead naturally to recommendations for design of windbreaks, including evaluation of wind climatology, tree density and spacing, space requirements, and species selection. Two design examples are illustrated.

Heisler, Gordon M.; DeWalle, David R. **Plantings that save energy.** *American Forests.* 90(9): 13-16; 1984. Trees in proper locations around houses can save 20 percent and more, sometimes much more, of the energy required for air conditioning in conventional homes. Windbreaks may also yield large savings, typically 10 to 12 percent but sometimes more, of total heating energy use in houses that are otherwise exposed to high winds. Trees can waste energy if they shade substantially more in winter than they do in summer. This can be avoided and savings throughout the year maximized by carefully

selecting species and locations for trees, shrubs, and vines around houses.

Heisler, Gordon M.; DeWalle, David R. **Technical update: Tree management for energy savings.** *The National Urban and Community Forestry Forum.* 4(4): 5-6; 1984.

Helvey, J. D. **Reply to Discussion -"Sampling accuracy of pit vs. standard rain gages on the Fernow Experimental Forest," by John A. Kay.** *Water Resources Bulletin.* 20(2):277-278; 1984.

Herrick, Owen W. **Rate of value change in Pennsylvania timber stands.** Res. Pap. NE-547. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 5 p.

Data from remeasured Pennsylvania forest inventory plots revealed that during a 13-year period the compound rate of value change in uncut hardwood forest stands was 4.7 percent, and ranged from -5.5 to 18.8 percent. No well-defined means for predicting a stand's rate of value change could be identified. However, some measures of initial stand condition can be used to get a general indication of what to expect in stands with management potential. For example, stands with the highest rates of value change (averaging 7.5 percent) have (1) trees of average basal area less than 5 inches in diameter; (2) less than 10 percent of their basal area in large sawtimber-size trees; and (3) some yellow-poplar, northern red oak, and/or black oak.

Hertel, Gerard D. **Gypsy moth research program, Northeastern Forest Experiment Station.** In: Miller, A. R., ed. *National gypsy moth review: Proceedings of a symposium; 1984 November 26-29; Charleston, WV.* Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 83-88.

With a substantial increase in funding for gypsy moth research, the Northeastern Forest Experiment Station began a new and exciting research initiative this year. The goal of this initiative is to obtain the knowledge necessary to manage gypsy moth populations so that outbreaks of the pest occur less frequently or are prevented.

Hornbeck, James W.; Corbett, Edward S.; Duffy, Paul D.; Lynch, James E. **Forest hydrology and watershed management.** In: Wenger, Karl F., ed. *Forestry Handbook.* New York, NY: John Wiley & Sons; 1984. 1335 p.

This chapter is for the field forester. The first half discusses the hydrologic cycle as applied to forest lands; the second half centers on water quality. Methods are given for sampling water quality and components of the hydrologic cycle. Impacts of forest utilization and disturbance on water yield and water quality are summarized.

Horsley, S. B.; Gottschalk, K. W. **Photosynthesis in developing leaves of black cherry (*Prunus serotina*) seedlings.** In: *Proceedings, 8th North American forest biology workshop; 1984 July 30-August 1; Logan, UT.* Logan, UT: Utah State University; 1984: 170-171. Abstract.

We determined net photosynthetic (Pn) activity of leaves at different ontogenetic stages of development on plants ranging in age from 7 to 20 plastochrons.

Horsley, Stephen B. **Ferns: Shapers of tomorrow's northern hardwood forests?** *Adirondac*. 1984 October/November: 20-24.

Houseweart, Mark W.; Jennings, Daniel T.; Lawrence, Robert K. **Field releases of *Trichogramma minutum* (Hymenoptera: Trichogrammatidae) for suppression of epidemic spruce budworm, *Choristoneura fumiferana* (Lepidoptera: Tortricidae), egg populations in Maine.** *The Canadian Entomologist*. 116(10): 1357-1366; 1984.

Trichogramma minutum Riley was released to suppress epidemic spruce budworm egg populations in Maine from 1977 to 1981. The California strain of *T. minutum* was released from the ground in 1977. In 1978, we found that the native Maine strain performed better than the California strain. In 1979, broadcast and multiple releases from the ground gave slight improvement. In 1981, three closely timed, aerial releases from the ground gave slight improvement. In 1981, three closely timed, aerial releases yielded parasitism rates significantly higher than those in control plots, but not sufficient to suppress epidemic spruce budworm populations.

Houston, David R. **What is happening to the American beech?** *The Conservationist*. 38(6): 22-25; 1984. Beech bark disease is a complex problem that begins when beech bark is attacked by the beech scale, and ends when infested bark is invaded and killed by fungi of the genus *Nectria*. In 1934, 44 years after it was accidentally brought to Nova Scotia, the scale was discovered in Nassau and Westchester Counties near New York City. In the 1940's, the disease agents and resultant tree mortality appeared in the Catskills. Moving northward from there, and westward from Vermont and Massachusetts, the disease reached the eastern Adirondacks in the 1950's. Today, heavy losses are occurring in many forests of the Adirondack Preserve and in some mid-state counties. The scale is now well entrenched throughout the state. Research is being conducted to determine how to reduce the losses caused by the disease.

Houston, David R. **Stress related to diseases.** *Arboreal Journal*. 8(2): 137-149; 1984. Diebacks and declines are diseases triggered by the predisposing effects of biotic or abiotic stress factors and culminated by the attack of organisms of secondary action. In the forest, the primary stress factors are insect defoliation and extremes of moisture and heat. Of the many stresses in urban situations, drought is probably the most important. Organisms of secondary action are facultative parasites and are common inhabitants of natural habitats. Control of dieback and decline diseases usually requires preventing or reducing the effects of the stress agents rather than controlling the secondary-action organisms that cause mortality.

Hoyle, Merrill C. **Plantation birch: What works, what doesn't.** *Journal of Forestry*. 82(1): 46-49; 1984. In a 10-year pilot test of plantation management in the White Mountains of New Hampshire, fertilization and

brush control caused small or no increases in height or diameter growth of yellow birch; mortality was 50 percent and a high proportion of the stems was of poor quality. In contrast, paper birch showed increases of 16 percent in height over the control and 75 percent in diameter growth. As a result, basal-area growth of paper birch increased by 282 percent. Paper birch mortality was 10 percent, and all stems were of high quality. Estimates are that paper birch could average 52 feet in height and 13 inches in diameter at 30 years. The conclusion is that paper birch is well suited to intensive plantation management and that yellow birch is not.

Huyler, Neil K. **Test results of the Vermont cable yarder.** In: Vermont cable yarder project: a cooperative demonstration. Montpelier, VT: Vermont Department of Forests, Parks and Recreation; 1984: 18-31.

Reports the study results of a cost and productivity analysis conducted for the Vermont Cable Yarding System. The results are based on detailed time studies of the operation on four sites and overall operating time and cost records provided by the contractor. The research objectives of the study were to evaluate the production capabilities and cost of production under varied stand and site conditions, and to evaluate residual stand age.

Huyler, Neil K.; Kotten, D. E.; Quadro, A. P. **Productivity and cost of three small fuelwood skidders.** *Journal of Forestry*. 82(11): 671-674; 1984.

Three small tractors--a Holder A-60, Pasquali 993, and Forest Ant--were tested for suitability in skidding fuelwood from a thinning in mixed northern hardwoods. At a 400-foot skidding distance, the Holder ranked the highest in production at 1.67 cords per scheduled hour; skidding cost averaged \$12.67 per cord. Values for the Forest Ant were 0.868 cord per scheduled hour at \$12.86 per cord; for the Pasquali they were 0.69 cord at \$18.12 per cord.

Jennings, D. T.; Frank, R. M.; Houseweart, M. W. **Attraction of male spruce budworm moths, *Choristoneura fumiferana* (Clemens), to pheromone-baited traps in small-tree thinnings.** *Journal of Chemical Ecology*. 10(10): 125-133; 1984.

Mean catches of spruce budworm moths were not significantly different among four small-tree thinning treatments of young spruce-fir hemlock regeneration. Significant inverse relationships were found between trap catches and distances to nearby spruce-fir hemlock overstory. Prevailing wind directions indicated that moths were attracted anemotactically to upwind pheromone sources. No definite trends were detected between catches and temperature or precipitation.

Jennings, Daniel T. **Automated counter for detecting and counting egg masses of the spruce budworm.** In: Spruce-fir management and spruce budworm: Region 6 technical conference of SAF; 1984 April 24-26; Burlington, VT. Bethesda, MD: Society of American Foresters; 1984: 143-145. Abstract. An optical-electronic counter (Prototypes I and II) was designed and developed for detecting and counting egg masses of the spruce budworm and the western spruce

budworm. The counter scans foliage samples, detects the presence of egg masses based on their characteristic fluorescing properties, and counts the egg masses electronically.

Jennings, Daniel T. **Automated egg mass counter.** In: Proceedings, new and improved techniques for monitoring and evaluating spruce budworm populations; 1983 September 13-15; Burlington, VT. Gen. Tech. Rep. NE-88. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984: 35.

Reviews the design and development of an automated egg mass counter. The counter scans foliage samples, detects egg masses based on their characteristic fluorescence, and counts the egg masses electronically.

Jennings, Daniel T.; Fellin, David G.; Batzer, Harold O.; Houseweart, Mark W.; Beckwith, Roy C. **Techniques for measuring early-larval dispersal of spruce and jack pine budworms.** Agric. Handb. 614. Washington, DC: U.S. Department of Agriculture, Forest Service; 1984. 33 p.

Early-instar larvae of the spruce budworm, the western spruce budworm, and the jack pine budworm disperse periodically within and from their host trees. Some larvae disperse by crawling, but most dispersal occurs when the small larvae "spin down" from trees on silken threads. The larvae spin silk from glands located near their mouthparts. The silk threads are anchored to branches or other attachment sites, and the larvae continue to spin silk as they descend from the tree. Frequently, the threads break at the point of attachment, and larvae are carried by winds, sometimes for great distances.

Jennings, Daniel T.; Houseweart, Mark W. **Predation by Eumenid wasps (Hymenoptera: Eumenidae) on spruce budworm (Lepidoptera: Tortricidae) and other Lepidopterous larvae in spruce-fir forests of Maine.** Annals of the Entomological Society of America. 77(1): 39-45; 1984.

Four species of eumenids, *Ancistrocerus adiabatus* (Saussure), *A. antilope* (Panzer), *A. catskill* (Saussure), and *Euodynerus leucomelas* (Saussure), accepted and provisioned trap-nesting blocks placed in a spruce-fir forest of Maine. The wasps preferred open habitats with abundant floral forage to dense spruce-fir stands. Two species, *A. catskill* and *E. leucomelas*, preyed on late instars of *Choristoneura fumiferana* (Clemens) and on other lepidopterous defoliators of northeastern hardwoods and softwoods. Spruce budworm comprised 3 to 38 percent of the total observed prey in strip clearcuts. Nest associates included parasites of provisioned prey larvae and both parasites and predators of eumenids.

Jennings, Daniel T.; Houseweart, Mark W.; Cokendolpher, James C. **Phalangids (Arachnida: Opiliones) associated with strip clearcut and dense spruce-fir forests of Maine.** Environmental Entomology. 13: 1306-1311; 1984.

Five genera and at least seven species of phalangids were collected by pitfall traps in a spruce budworm-infested forest in northern Maine. More than 90 percent of the specimens were *Leiobunum calcar* (Wood). Significantly more individuals and species were trapped

in uncut residual strips and in dense spruce-fir stands than in clearcut strips. Peaks in seasonal activity for individuals and species coincided with spruce budworm egg and early larval stages. Species diversity indices were low; individuals were distributed unevenly among the forest conditions investigated. However, coefficients of community and percentage similarity generally were >80 percent for strip clearcuts and dense stands. Greater disparities were noted among uncut residual and clearcut strips. Neither age of strip clearcut (1 to 6 years) nor depth of litter had much influence on mean catches and mean numbers of species of phalangids per trap per week.

Jensen, K. F.; Noble, R. D. **Impact of ozone and sulfur dioxide on net photosynthesis of hybrid poplar cuttings.** Canadian Journal of Forest Research. 14(3): 385-388; 1984.

Softwood cuttings of hybrid poplar clone No. 207 were fumigated with either charcoal-filtered air (control), 0.5 ppm SO₂, or 0.5 ppm SO₂ + 0.25 ppm O₃ for 12 hours each day for 3 weeks. The net photosynthetic rate and CO₂ compensation point were then measured in a closed-loop gas assimilation system with an infrared gas analyzer. Net photosynthesis was measured at light intensities of 430 and 730 $\mu\text{E} \cdot \text{m}^{-2} \cdot \text{s}^{-1}$ (photosynthetically active radiation) and in CO₂ concentrations of 300, 500, and 1,000 ppm. Net photosynthesis increased with an increase in light intensity and CO₂ concentration but was significantly reduced by the SO₂ + O₃ treatment. The leaves were classified into five groups on the basis of visible injury. There were no significant differences in the net photosynthetic rates among uninjured leaves in the three fumigation treatments. However, analysis of the data from the SO₂ + O₃ treatment, which separated the leaves into injury classes, showed that the CO₂-injury class interaction was significant. At 300 ppm CO₂, there were no significant differences in the net photosynthetic rates among the five injury classes. At 500 and 1,000 ppm CO₂, there were significant differences in the photosynthetic rates between leaves without visible injury and those with injury. Photosynthesis in the injured leaves may have been suppressed by an increase in the respiration rate and a decrease in the photosynthetic area. The increased respiration rate is suggested by the CO₂ compensation point data that were significantly higher in all of the fumigated leaves. There were no significant differences in the chlorophyll content of the leaves from the three treatment groups.

Jensen, K. F.; Yaussy, D. **Growth analysis of yellow-poplar seedlings calculated by two growth functions.** In: Proceedings, 8th North American forest biology workshop; 1984 July 30 - August 1; Logan, UT. Logan, UT: Utah State University; 1984: 178. Abstract.

The growth of 1-year-old yellow-poplar seedlings was used to compare growth analysis variables calculated by the third order polynomial. In May, 250 seedlings were potted in 15-cm pots and placed on benches in a greenhouse. At budbreak and each week for 22 weeks thereafter, 10 randomly selected seedlings were harvested. Leaf area, leaf weight, and new stem weight for each seedling were measured. After transforming the data to natural logs, a third order polynomial and Gompertz

function were calculated for leaf area expansion and new growth weight increase over time. Relative growth rates (RGR), leaf area ratio (LAR), and net assimilation rate (NAR) were then calculated from each function.

Jensen, Keith F. **Interaction of humidity and atmospheric pollutants on stomatal resistance of *Liriodendron tulipifera* seedlings.** American Journal of Botany. 71(5) Part 2: 124; 1984.

Stomatal resistance usually decreases with an increase in humidity but may increase or decrease in the presence of atmospheric pollutants depending on the pollutant dose. To determine the impact of humidity and atmospheric pollutants on the stomatal resistance of *Liriodendron tulipifera* seedlings, 1-year-old seedlings were fumigated with either 0.15 ppm ozone, 0.25 ppm SO₂ or both for 5 hours a day for 5 consecutive days at either 40 or 80 percent relative humidity. Stomatal resistance was measured each day 1 hour before fumigation started, at the beginning of the fumigation period, after 2 and 5 hours of fumigation, and 2 hours after the end of the fumigation. At low humidity the daily cycle in the stomatal resistance of the control seedlings followed the same general pattern. Stomatal resistance of the fumigated seedlings in the high humidity fluctuated over a wider range with an increase in length of fumigation. It is probable that the higher humidity caused the stomata to open so pollutants could enter the leaves and modify the stomatal mechanism.

Kennedy, Bruce H. **Effect of multilure and its components on parasites of *Scolytus multistriatus* (Coleoptera: Scolytidae).** Journal of Chemical Ecology. 10(2): 373-385; 1984.

Several hymenopterous parasites of *Scolytus multistriatus* are attracted to components of its aggregation pheromone, multilure. *Cheilopachus colon*, *Entedon leucogramma*, *Dendrosoter protuberans*, *Spathius benefactor*, and *Cerocephala eccoptogastris* are attracted in various degrees to multilure, its components (multistriatin, 4-methyl-3-heptanol, and cubebene), and component combinations. *C. colon* was trapped in greatest numbers, yet was usually less numerous than *E. leucogramma* and *D. protuberans* in the study area. Impact of traps on *C. colon* may conceivably be reduced by multistriatin content in baits and/or by withholding traps until *S. multistriatus* flight begins.

Kingsley, Neal P. **A profile of the Pennsylvania forestland owner or beware of meadowlarks.** Pennsylvania Forests. 74(3): 10-11; 1984.

Kingsley, Neal P.; Dale, Martin E. **Thirty years at Vinton Furnace Experimental Forest. Part I.** Ohio Woodlands. 22(2): 10, 13, 26, 32, 34-35; 1984. The Vinton Furnace Experimental Forest, established in 1952, has been the site of a number of significant forestry research studies and findings. This is the story of "the Vinton," its background, establishment, and research.

Kochenderfer, J. N.; Helvey, J. D. **Soil losses from a "minimum-standard" truck road constructed in the Appalachians.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Mor-

gantown, WV: West Virginia University; 1984: 215-225.

Soil losses from 11 road sections in the central Appalachians were measured. Nine of the sections were located on a newly constructed "minimum-standard" truck road, and two were on a graveled higher standard road. Average annual soil losses on the "minimum-standard" truck road ranged from 44 tons per acre for ungraveled road sections to 5 tons per acre for sections surfaced with 3-inch clean limestone gravel. Soil losses on the graveled sections of the "minimum-standard" road were similar to those measured on the higher standard road.

Kochenderfer, J. N.; Wendel, G. W.; Smith, H. Clay. **Cost of and soil loss on "minimum-standard" forest truck roads constructed in the central Appalachians.** Res. Pap. NE-544. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 8 p.

A "minimum-standard" forest truck road that provides efficient and environmentally acceptable access for several forest activities is described. Cost data are presented for eight of these roads constructed in the central Appalachians. The average cost per mile excluding gravel was \$8,119. The range was \$5,048 to \$14,424. Soil loss was measured from several sections of a minimum-standard road. Traffic was regulated the first year and unrestricted the second year. Losses ranged from 44 tons per acre on ungraveled road sections to 5 tons per acre on graveled sections. Soil loss from the graveled sections on the minimum-standard road was about the same as that from higher standard graveled roads.

Kostichka, Charles J.; Cannon, William N., Jr. **Costs of Dutch elm disease management in Wisconsin communities.** Journal of Arboriculture. 10(9): 250-254; 1984.

In 1980, communities participating in the Wisconsin Dutch Elm Disease Demonstration Program spent about \$2.62 per capita for Dutch elm disease management. The percentage of the total program expenditure for each control practice was: tree removal and disposal, 79 percent; systemic fungicide injections, 11 percent; sanitation and symptom surveys, 7 percent; and root-graft barriers, 3 percent.

Koten, Donald E.; Peters, Penn A.; Hubner, Steven A. **HARDAT a universal harvesting data storage and retrieval system.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 65-78.

HARDAT is a computerized information storage, retrieval, and analysis system developed to provide a standardized harvesting data base for use in research and equipment evaluation. Each individual record of the data base describes a timber harvesting system and operational performance data on a specific harvesting unit. Each record follows a classification system which includes variables describing the harvesting system, the characteristics of the timber stand and harvest site, the products produced, the production levels achieved, the equipment employed, and the supplemental data identified. Analysis of the records on file in the data base

and the summary output are achieved through the Statistical Analysis System (SAS).

Lamson, Neil I.; Rosier, Robert L. **Wires for long-term identification of trees.** *Journal of Forestry*. 82(2): 110-111; 1984.

A wire technique is described for long-term identification of individual trees. Wires in place 25 years show little sign of deterioration and should last at least another 15 years.

Lamson, Neil I.; Smith, H. Clay; Miller, Gary W. **Residual stocking not seriously reduced by logging damage from thinning of West Virginia cherry-maple stands.** Res. Pap. NE-541. Broomall, PA: U.S.

Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 7 p.

In north-central West Virginia, unmanaged 60-year-old cherry-maple stands were thinned to 75, 60, and 45 percent residual stocking. Cut trees were skidded tree length by a rubber-tired skidder. Logging destroyed or severely bent 22, 23, and 45 percent of the unmarked stems in the 75, 60, and 45 percent stocked plots, respectively. Because 99 percent of the destroyed and bent trees were less than 5.0 inches d.b.h., the effect on basal area and residual stocking was slight. Damage reduced the stocking by 5, 8, and 8 percent in the 75, 60, and 45 percent plots, respectively. For the 75, 60, and 45 percent plots, 18, 38, and 42 percent, respectively, of the residual stems received wounds that exposed sapwood. Study results indicate that marking guidelines for trees larger than 5.0 inches d.b.h. do not need to be adjusted to account for logging damage.

Laurence, J. A.; Reynolds, K. L.; MacLean, D. C., Jr.; Hudler, G. W.; Dochinger, L. S. **Effects of sulfur dioxide on infection of red pine by *Gremmeniella abietina*.** In: Manion, Paul D., ed. *Scleroderris canker of conifers: Proceedings of a symposium*; 1983 June 21-24; Syracuse, NY. Netherlands: Martinus Nijhoff/Dr. W. Junk; 1984: 122-129.

Relatively low doses of SO₂ significantly reduced the growth of red pine and inhibited infection of trees by *G. abietina* in field plots that received low concentrations of inoculum. Under conditions of high inoculum density, SO₂ did not affect infection or disease development.

Lea, Russ; Auchmoody, L. R.; Carmean, Willard H. **Hardwood forest soils: Past, present, and future.** In: Stone, Earl, ed. *Forest soils and treatment impacts: Proceedings, 6th North American forest soils conference*; 1983 June 19-23; Knoxville, TN. Knoxville, TN: The University of Tennessee; 1984: 1-15.

Detailed knowledge about hardwood forest soils is vital as management of the vast hardwood forest resource intensifies. In the future, we need to develop: detailed forest-oriented soil and landform inventories that will enable us to predict responses to a wide variety of silvicultural and management activities, more precise site quality and yield information for important hardwood forest species, and practices that will maintain or improve the productivity of these forest lands. Also, we need a more complete understanding of nutrient cycling and budgets, nutrient requirements, and the use of nitrogen-fixing plants for enhancing fertility and improving forest yields.

LeDoux, Chris B. **Break-even zones for cable yarding by log size.** In: *Proceedings, Mountain logging symposium*; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 311-322. The use of cable logging to extract small pieces of residue wood may result in low rates of production and a high cost per unit of wood produced. However, the logging manager can improve yarding productivity and break even in cable residue removal operations by using the proper planning techniques. In this study, break-even zones for specific young-growth stands were developed with data from a field study, break-even analysis, and a simulation model called THIN. Results suggest that logging contractors can break even by developing and using residue removal guidelines for various combinations of piece sizes and slope yarding distances. Simulation analysis was used to explore the effect on production rates of slope yarding distances, piece size distributions, and numbers of pieces per acre. For the \$76-per-hour machine used, the results of break-even analysis were most affected by piece size. Slope distance also had a strong impact. The number of pieces per acre had the least effect on production rates and costs.

LeDoux, Chris B. **Cable yarding residue after thinning young stands: a break-even simulation.** *Forest Products Journal*. 34(9): 35-40; 1984. See previous abstract.

LeDoux, Chris B. **Production rates and costs of cable yarding wood residue from clearcut units.** *Forest Products Journal*. 34(4): 55-60; 1984.

Calculates incremental production rates and costs for yarding and loading logging residue in clearcut old-growth Douglas-fir/western hemlock forests in western Oregon. Cable yarding machines were used in the following configurations: highlead, shotgun skyline, running skyline, and skyline with haulback. Regression equations were developed for productive yarding time as a function of slope yarding distance, number of merchantable logs per turn, number of residue pieces per turn, merchantable volume per turn, and residue volume per turn. The average yarding production rate for turns containing both merchantable logs and residue pieces was 1,832 ft³/hr at a cost of \$0.18/ft³.

Leonard, R. E.; Conkling, P. O.; McMahon, J. L. **Recovery of a bryophyte community on Hurricane Island, Maine.** Res. Note NE-325. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p. Recovery of a bryophyte community on an artificially denuded granite ledge was monitored for 4 years on Hurricane Island, Maine. Predominant bryophyte species were *Dicranum polysetum*, *Polytrichum juniperinum*, *Dicranum flageliare*, *Polytrichum piliferum*, and *Dicranum fuscescens*. Site factors such as nutrient supply, moisture, and availability of reproductive material were considered in relation to bryophyte growth to assess the ability of a specific island plant community to recover from a major disturbance. Recovery of the bryophyte community was rapid, with 60 percent bryophyte coverage over a bare rock surface by the end of the study. There was a strong relationship between the amount of needlefall from a nearby spruce-fir stand

gested, the calculator can be used without a printer in the field to generate on-the-spot estimates.

Mazzone, H. M.; Engler, W. F.; Bahr, G. F. **Quantitative transmission electron microscopy for the determination of mass-molecular weight of viruses.** *Methods in Virology*. 8: 103-142; 1984.

Describes a method for obtaining the mass-molecular weight of viruses. Determining the mass of a virus particle after exposing it untreated in the electron microscope adds an important dimension to size and shape. Two transmission values are recorded for each virus particle: 1) transmission through the viral image plus background, and 2) transmission through the background (clear area). Subtracting the latter from the former gives the transmission of the virus. If a standard particle, i.e., one whose mass-molecular weight is known, is treated in an identical manner, the mass-molecular weight of the virus particle can be calculated.

Mazzone, H. M.; Wray, G. **High-voltage electron microscopy of insect capsule viruses.** In: Bailey, G. W., ed. *Proceedings of the 42nd annual meeting of the Electron Society of America*; 1984 August 13-17; Detroit, MI. San Francisco, CA: San Francisco Press, Inc.; 1984: 224-225.

The High-Voltage Electron Microscope (HVEM) affords the researcher an opportunity to study insect virus inclusion bodies, intact, without resorting to physical thin-sectioning or chemical degradation procedures. In this manner polyhedral inclusion bodies, isolated from insects infected with nucleopolyhedrosis viruses (NPVs) were observed with the HVEM, and the numerous viruses lying internally, clearly delineated.

Melhuish, J. H.; Wade, G. L. **Changes in fatty-acid content of *Pisolithus tinctorius* due to common soil phenolic compounds.** *Transactions of the Kentucky Academy of Science*. 45(1-2): 98; 1984. Abstract.

Mycorrhizal development on surface mine spoils may be inhibited by compounds produced by some herbaceous covers. Ferulic, p-coumaric, and vanillic acids inhibited in vitro growth of *Pisolithus tinctorius*. All these compounds are produced by some grasses. Concomitant effects included an increase in total lipids and the conversion of 18:1 fatty acid to 18:2. Changes in concentration of phenolic compounds influenced leakage of materials from the mycelium into the media. This suggests that allelopathic effects initial *P. tinctorius* early in ecosystem development. Increasing media nutrient content, although itself toxic to fungal growth, nullified the effects of ferulic acid.

Melhuish, J. H., Jr.; Wade, G. L. **Degradation of synthetic glucose-ammonium tartrate liquid medium during autoclaving.** *Mycologia*. 76(1): 161-162; 1984.

Glucose-ammonium tartrate has been used for decades in culture media for fungi. We autoclaved large volumes of a glucose-ammonium tartrate in flasks. Upon cooling, a patchy oil-like film formed on the surface of the medium that developed into a dark brown, short, thread-like precipitate. When the ratio of the media surface area to air volume in the flasks fell below 0.16, a film and/or precipitate was observed. Preventing

precipitate formation by keeping the media surface area to air volume ratio above 0.16 may preclude undesirable effects on the results of microbial development on glucose-ammonium tartrate media.

Miller, Gary W. **Costs of reducing sapling basal area in thinned cherry-maple stands in West Virginia.** Res. Pap. NE-540. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 6 p.

Unmanaged 60-year-old cherry-maple stands in West Virginia were thinned to three levels of stocking according to the Allegheny hardwoods stocking guide. After the merchantable timber was removed, the basal area in saplings was reduced to less than 10 ft² per acre, as the guide recommends for stands with dense understories. A detailed timber study revealed that cutting saplings with chain saws costs about \$17.00 per acre. This amount may be recoverable in increased yield, tax deductions, and fuelwood sales.

Miller, Gary W. **Releasing young hardwood crop trees—use of a chain saw costs less than herbicides.** Res. Pap. NE-550. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 5 p.

A crown-touching release of 12-year-old black cherry and yellow-poplar crop trees on a good site required removing an average of 14 trees for every crop tree. An average of 80 crop trees per acre was left free-to-grow with an average growing space of 4.7 feet on all sides of the crown. Basal spraying cost \$0.80 per crop tree, stem injecting cost \$0.61 per crop tree, and chain saw felling cost \$0.42 per crop tree. Recommendations on release methods and suggestions for cost savings are provided.

Miller, Gary W.; Lamson, Neil I.; Brock, Samuel M. **Logging damage associated with thinning central Appalachian hardwood stands with a wheeled skidder.** In: *Proceedings, Mountain logging symposium*; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 125-131.

In north-central West Virginia, unmanaged 53-year-old, mixed oak-cove hardwood stands were thinned to 75, 60, and 45 percent residual stocking. Cut trees were skidded tree-length with a rubber-tired skidder. Logging destroyed or severely bent 26, 29, and 34 percent of the unmarked stems in the 75, 60, and 45 percent stocking plots, respectively. Because 94 percent of the destroyed and bent trees were less than 5.0 inches d.b.h., the effect on basal area and residual stocking was slight. Damage reduced the stocking by 6, 4, and 5 percent in the 75, 60, and 45 percent stocking plots, respectively. All plots combined, 14 percent of the residual stems sustained broken tops, which affected only 3 percent of the residual basal area. Less than 10 percent of the residual stems received wounds that resulted in exposed sapwood. Study results indicate that marking guidelines in the merchantable portion of the stand do not need to be adjusted to account for logging damage.

Montgomery, Michael E. **Is the effect of tannins on gypsy moth caterpillars digestion inhibition?** In: *Proceedings, Phytochemistry Society of America*. 24(2): 27; 1984. Abstract.

Addition of either tannic acid or condensed tannin to artificial diets fed to gypsy moth resulted in up to 50 percent reduction in growth rate. Tannin levels from 0.1 to 1 percent dry weight were increasingly active. Tannin levels from 1 to 10 percent, a range frequently found in host leaves, did not differ in activity. Reduction in diet consumption, growth rate, or nitrogen utilization efficiency did not occur until after 5 days of continuous feeding on tannin diets. These results do not indicate that tannin was adversely affecting food digestion, but are suggestive of an effect such as interference with absorption of trace minerals or vitamins. Effect of tannins on gypsy moth proteolytic enzymes is also being examined. These results raise questions about the appropriateness of currently used astringency tests to estimate the biological activity of tannins to caterpillars.

Montgomery, Michael E. **Review of: Variable plants and herbivores in natural and managed systems;** Denno, Robert F.; McClure, Mark S., eds. Bulletin of the Entomological Society of America. 30(4): 60-61; 1984.

Montgomery, Michael E.; Czapowskyj, M. **Nitrogen as an indicator of foliage quality to the spruce budworm.** In: Abstracts, Spruce budworms research symposium; 1983 September 16-20; Bangor, ME. Washington, DC: U.S. Department of Agriculture, Forest Service, Canada-United States Spruce Budworms Program; 1984: 26. Abstract.

It has been hypothesized that population fluctuations of foliage-eating insects are a result of changes in food supply. The level of nitrogen and chemicals in foliage influencing nitrogen utilization are often cited as factors that determine the nutritional quality of foliage. Spruce budworm outbreaks have been associated with host species, host maturity, site condition, and weather-induced tree stress.

More, Thomas A. **Hunting: A theoretical explanation with management implications.** Wildlife Society Bulletin. 12: 338-344; 1984.

Discusses a mathematically based theory of hunting behavior that integrates concepts from the multiple-satisfactions theory of hunting with concepts from the theory of achievement motivation and expectancy-value theory. The theories are used to explain how individual hunters differ, how their attitudes can change with time, and how they select a hunting site. The analysis is extended to other sources of satisfaction such as esthetics and companionship.

More, Thomas A. **Municipal forest management: A Massachusetts survey.** Journal of Forestry. 82(7): 117-119; 1984.

In New England, municipalities control substantial amounts of forest land that could benefit from management. A survey of municipalities in Massachusetts estimated that they administer some 288,000 acres. Many municipal officials are interested in placing their land under forest management, but are not sure how to obtain forestry information. Urban and community forestry programs operated by the states can provide a valuable service to communities, helping municipal officials understand and evaluate forest-management options.

Morin, Michael J.; Demeritt, Maurice E., Jr. **A nursery guide for propagating poplars.** NE-INF-56-84. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 19 p.

The guide presents basic techniques for nursery propagation of unrooted and rooted poplar cuttings.

Norris, Logan A.; Montgomery, M. L.; Loper, B. R. **Movement and persistence of 2,4,5-trichlorophenoxyacetic acid in a forest watershed in the eastern United States.** Environmental Toxicology and Chemistry. 3: 537-549; 1984.

Approximately 98 percent of a 22-ha watershed in West Virginia was sprayed with 2.24 kg/ha of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) in August 1975. Herbicide residues in four species of vegetation, forest floor soil, and stream water were monitored for 2 years and found to be substantially below levels likely to cause any adverse effects in animals.

O'Brien, James T. **Historical and current Scleroderris situations in the United States.** In: Manion, Paul D., ed. Scleroderris canker of conifers: Proceedings of a symposium; 1983 June 21-24; Syracuse, NY. Netherlands: Martinus Nijhoff/Dr. W. Junk; 1984: 26-31.

Scleroderris canker was first noticed in North America in the Upper Peninsula of Michigan in 1951. When the causal organism, *Gremmeniella abietina* (North American race), was identified in 1964, the disease was already widespread there and in northern Wisconsin, and in 1969 it was discovered in Minnesota. Most infection was traced to a nursery in Michigan, and spread declined once nursery infection was arrested. In 1959, the disease, later attributed to the European race, was discovered in New York, where it now occupies 16,300 km²; it has also been found in Vermont, New Hampshire, and Maine. Quarantines apparently prevent artificial spread, but natural spread will continue.

ODell, Thomas M.; Bell, Robert A.; Mastro, Victor C.; Tanner, John A.; Kennedy, Leonard F. **Production of the gypsy moth, *Lymantria dispar*, for research and biological control.** In: Advances and challenges in insect rearing. Washington, DC: U.S. Department of Agriculture, Agricultural Research Service; 1984: 156-166.

The first attempt to rear the gypsy moth in the laboratory in the United States occurred in 1868 and resulted in its escape and establishment in Medford, Massachusetts. This notorious European forest pest was brought to the United States from France by Professor Leopold Trouvelot, an astronomer and naturalist who was trying to breed a new silkworm. His experiment led to the creation of a pest-control industry that has flourished since the first major outbreak in 1889.

ODell, Thomas M.; Godwin, Paul A. **Host selection by *Blepharipa pratensis* (Meigen), a tachinid parasite of the gypsy moth, *Lymantria dispar* L.** Journal of Chemical Ecology. 10(2): 311-320; 1984.

The host selection process of *Blepharipa pratensis* (Meigen), a tachinid parasite of the gypsy moth, was investigated. Once in the host's habitat, and following contact with a recently damaged leaf edge (cut, torn,

eaten), the fly orients perpendicular to the edge and moves back and forth with the front tarsi grasping the damaged edge. Ovipositing (oviposition intention) may occur. Leaf exudates appear to arrest the fly on the leaf and increase tarsal examination (searching). If an edge of a gypsy moth-eaten leaf is contacted, oviposition usually occurs. A host selection sequence is suggested and discussed.

Ostrowsky, W. D.; Shortle, W. C.; Blanchard, R. O.
Bark phenolics of American beech (*Fagus grandifolia*) in relation to the beech bark disease. European Journal of Forest Pathology. 14: 52-59; 1984.

The amount of total extractable phenols was determined for bark sections obtained from behind cankers naturally induced by *Nectria coccinea* var. *faginata* and from behind mechanically inflicted wounds on stems of American beech. Healthy bark from susceptible trees was found to contain a similar level of phenolics as bark from trees determined to be resistant to the beech bark disease. Six months after wounding, wound-altered bark from susceptible trees was found to be lower in phenols than wound-altered bark from resistant trees. Inoculation of wounds with *N. coccinea* var. *faginata* resulted in decreased phenolic levels in bark sections nearest the wound surface, and increased phenolic levels in sections nearest the vascular cambium, several mm distant. Phenolic levels in injured or infected bark appear to follow similar patterns as those resulting from injury or infection of xylem tissues.

Palmer, James F. **Neighborhoods as stands in the urban forest.** Urban Ecology 8(4): 229-241; 1984.

This paper reports the results of a study investigating the neighborhood stand concept for describing the variation in the character and perceptions of the urban forest in three neighborhoods identified by 22 community service workers in Syracuse, New York. We interviewed 261 people in these neighborhoods. Neighborhoods are investigated for patterns with respect to: (1) household demographics; (2) evaluations of city-wide issues; (3) perceived neighborhood characteristics; (4) desired house and yard qualities; and (5) the physical condition of structures and vegetation. Several neighborhood-related patterns are found to exist. In particular, the perception of neighborhood quality is more related to neighborhood location than respondent characteristics and most related to the physical condition of the immediate surrounding environment.

Patric, James H.; Evans, James O.; Helvey, J. David.
Summary of sediment yield data from forested land in the United States. Journal of Forestry. 82(2): 101-104; 1984.

Statistical analyses were made on 812 forest soil erosion measurements and estimates of sediment yield in forest streams. More than 100 of those reports showed that streams draining forested land along the Pacific Coast yield far more sediment per unit area of watershed than do streams of forested regions elsewhere in the nation. The nationwide results are consistent with regional compilations. A long-term average of not more than 0.25 ton per acre per year in streams of the eastern and western United States can provide a first approximation of sediment yield from predominantly forested land.

Peacock, John W.; Wright, Susan L.; Ford, Robert D.
Elm volatiles increase attraction of *Scolytus multistriatus* (Coleoptera: Scolytidae) to multilure. Environmental Entomology. 13(2): 394-398; 1984.

Traps baited with multilure and bolts of healthy American elm captured significantly more beetles than traps baited only with multilure. The elm bolt-multilure combination was 2 to 3 times as attractive as multilure and 4 to 18 times as attractive as elm bolts alone. The increased attraction from the presence of healthy elm tissue suggests that additional host volatiles, other than those formulated in multilure, contribute to the aggregation of beetles on host trees.

Peters, Penn A. **Steep slope clearcut harvesting with cable yarders.** In: 1984 Proceedings, Harvesting the South's small trees; 1983 April 13-20; Biloxi, MS. Madison, WI: Forest Products Research Society; 1984: 69-78.

Presents a procedure to estimate the yarding production and cost of cable yarders harvesting clearcuts on steep slopes. A mathematical equation for the production that can be obtained by the cable yarder is derived. The procedure is applied to a typical cable yarder operating in the eastern United States. The effect of harvest unit geometry and volume per acre on production and cost is discussed.

Podgwaite, J. D. **The status of nucleopolyhedrosis virus in gypsy moth management.** In: Miller, A. R., ed. National gypsy moth review: Proceedings of a symposium; 1984 November 26-29; Charleston, WV. Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 92-93.

Podgwaite, John D.; Rush, Peter; Hall, David; Walton, Gerald S. **Efficacy of the *Neodiprion sertifer* (Hymenoptera: Diprionidae) nucleopolyhedrosis virus (Baculovirus product, Neochek-S).** Journal of Economic Entomology. 77: 525-528; 1984.

Neodiprion-sertifer (Geoffroy) larval populations were treated with high and low doses of a nucleopolyhedrosis virus (NPV) product, Neochek-S. Larval population reduction due to Neochek-S was well over 90 percent in all sprayed plots 28 days after application, whereas overall protection of *Pinus resinosa* (Ait.) foliage was 94.0 ± 1.6 percent. The difference between doses was insignificant with respect to population reduction or foliage protection. A dose rate of 2.5×10^9 polyhedral inclusion bodies of *N. sertifer* NPV/ha, by ground application, provided acceptable control in a plantation infested with moderate to dense populations of the insect.

Powell, Douglas S. **Yankee ingenuity and the hardwood resource.** Northern Logger. 32(10): 34-35, 54, 56-59; 1984.

The hardwood timber resource of New England has been largely overlooked by the nation and the region itself. The size and quality of the timber may not be high, but the quantity and potential for more is overwhelming. Forest industry is important in certain localities, but it has not reached its full potential. Utilization is on the rise, and New England is pioneering new opportunities for efficient and profitable use of this renewable resource. Research is continuing along several fronts.

The outlook for this resource and this region looks bright.

Powell, Douglas S.; Dickson, David R. **Forest statistics for Maine: 1971 and 1982.** Resour. Bull. NE-81. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 194 p.

A statistical report on the third forest survey of Maine (1982) as well as reprocessed data from the second survey (1971). Results of the surveys are displayed in 169 tables containing estimates of forest and timberland area, numbers of trees, timber volume, tree biomass, timber products output, and components of average annual net change in growing-stock volume for the period between surveys. These estimates were developed by several classifications including forest type, ownership, species, size, and quality. Data are presented at three levels: state, geographic sampling unit, and county.

Rademacher, P.; Bauch, J.; Shigo, A. L. **Characteristics of xylem formed after wounding in Acer, Betula, and Fagus.** IAWA Bulletin. 5(2): 141-151; 1984. Characteristics of xylem formed after wounding were determined for *Acer saccharum*, *Betula alleghaniensis*, and *Fagus grandifolia*. There was a basic pattern of changes in xylem formed after wounding in all trees studied. The xylem formed after wounding contained more ray and axial parenchyma and less fibers and vessels than xylem present at the time of wounding. The axial tissues were disoriented. The vessels were smaller in length and diameter than normal vessels and the fibers were shorter. In some trees, normal xylem did not begin to form until 2 years after wounding. Some individual trees within each species compartmentalized discolored wood effectively to small columns while other trees had large columns.

Rast, Everette D. **How to recognize and assess surface defect indicators of logs and trees.** In: Corcoran, Thomas J.; Fosbroke, David E., eds. Changing markets--changing forestry: Abstracts of proceedings; 1984 March 7-9; Worcester, MA. SAF Publ. No. 84-04. Bethesda, MD: Society of American Foresters; 1984: 13. Abstract.

Remington, Susan B.; Sendak, Paul E. **Massachusetts timber economy: A review of the statistics.** Boston, MA: Massachusetts Department of Environmental Management, Division of Forests and Parks; 1984. 28 p.

Summarizes current information available on the forests of Massachusetts and the State's timber-based industries.

Remington, Susan B.; Sendak, Paul E. **New Hampshire's timber economy: A review of the statistics.** Durham, NH: University of New Hampshire, New Hampshire Cooperative Extension Service; 1984. 28 p.

More than 87 percent of the land area of New Hampshire is forested. It is second only to Maine as the most heavily forested state. The forest provides a base for many of New Hampshire's timber-based industries and those that depend on tourism. The first section pre-

sents information on the timber resource and the timber-based industries; the second, measures the economic significance of timber, especially in relation to the other industries in New Hampshire.

Remington, Susan B.; Sendak, Paul E. **New York State's timber economy: A review of the statistics.** Albany, NY: New York State Department of Environmental Conservation, Division of Lands and Forests, Bureau of Forest Marketing and Economic Development; 1984. 30 p.

Remington, Susan B.; Sendak, Paul E. **Potential effects of the fuelwood market on wood-using industries in northern New England and New York.** Res. Note NE-323. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p.

The increased use of fuelwood in northern New England and New York has raised concern about future supplies of manufactured wood products. Direct effects were measured by estimating the competitive advantages of the kraft pulp, waferboard, and oriented strand board industries in purchasing wood. Increased stumpage prices in the region would have the greatest impact on the reconstituted board industries.

Rexrode, C. O.; Baumgras, J. E. **Distribution of gum spots by causal agent in black cherry and effects on log and tree quality.** Southern Journal of Applied Forestry. 8(1): 22-28; 1984.

Gum spots were studied in 116 black cherry trees in West Virginia. Bark beetles are the major cause of gum spots in both black cherry poletimber and sawtimber trees. Approximately 90 percent of all gum spots in the bole sections are caused by bark beetles. Cambium miners cause few gum spots in the lower 6 m of the trees and virtually none in the quality zone. Bark beetle-caused gum spots are grade defects in both veneer and factory grade sawlogs. Cambium miner-caused gum spots cause little degrade in veneer logs and none in factory grade 1 and 2 sawlogs.

Reynolds, Hugh W. **System 6: Rough-mill operating manual.** Res. Pap. NE-542. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 27 p. Includes operating instructions for the System 6 rough mill. Techniques are shown for making standard-size blanks, in all lengths, for each of 13 blank quality/width/thickness combinations.

Reynolds, Hugh W. **Using West Virginia's lower grade hardwood resource.** In: Dempsey, Gilbert P.; Price, Karen S., eds. Governor's conference on West Virginia's forest industry. Workshop Proceedings; 1983 November 7-8; Charleston, WV. Charleston, WV: Governor's Office of Economic and Community Development and West Virginia Forests, Inc.; 1984: 118-112.

Reynolds, Hugh W.; Hansen, Bruce G. **A sample plant design for System 6.** Gen. Tech. Rep. NE-87. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 8 p.

A plant to make standard blanks from cants by System 6 can be assembled from off-the-shelf equipment with few modifications. From the production rates and man-power requirements of each piece of equipment, we designed a typical plant and determined by economic analysis that it could return 21 percent on an investment of \$2 million by making blanks for sale from purchased cants.

Rice, William W.; Gatchell, Charles J. **Kiln drying procedures for northern red oak.** In: Proceedings, Western dry kiln clubs; 1983 May 4-6; Corvallis, OR. Corvallis, OR: Oregon State University; 1984: 80-88.

Robison, D. J.; Czapowskyj, M. M.; Abrahamson, L. P.; White, E. H. **Spruce budworm characteristics and foliar nutrient—Site relationships in black spruce.** In: Abstracts, Spruce budworms research symposium; 1983 September 16-20; Bangor, ME. Washington, DC: U.S. Department of Agriculture, Forest Service, Canada-United States Spruce Budworms Program; 1984: 23. Abstract.

Relationships between spruce budworm characteristics and site influences including foliar organic and inorganic nutrient levels, soils, and silvicultural treatments were investigated in a young (ca. 25 years) black spruce stand in northern Maine. The influence of foliar N, P, K, Ca, Mg, phenols, flavonoids, and sugars; soil N, P, K, Ca, and Mg; and silvicultural treatments of fertilization, drainage, thinning, and slash removal on budworm population, pupal size, and sex ratio were statistically analyzed from a replicated field experiment. Foliar, soil, and budworm data are presented.

Rothwell, Frederick M.; Victor, Barbara J. **A new species of Endogonaceae: *Glomus botryoides*.** Mycotaxon. 20(1): 163-167; 1984.

Glomus botryoides, a new species of the Endogonaceae, was observed in wet-sieved stomach contents of two small mammalian mycophagists that were trapped in a wildlife management area in which oak was the predominant plant cover. Chlamydozoospores of the new species have a distinct toughened surface and a separable outer wall, and often form in tight, grape-like clusters from bulbous endings of hyphae.

Rowntree, Rowan A. **Ecology of the urban forest - Introduction to part I.** Urban Ecology. 8: 1-11; 1984.

This first of two special issues on urban forest ecology offers new empirical work describing forest structure and composition. Four avenues of inquiry are pursued in this introductory paper with the purpose of setting the contributions of the special issue in context of the existing literature. First, in temperate regions of the world, it is likely 60 to 80 percent of a city's area supports enough trees to meet conventional definitions of "forest." Second, the geographical distribution of canopy cover is understood best as dependent upon the historical development of the city and its division into land-use sectors. Third, physiognomy is poorly understood and varies widely depending on the amount and kind of human intervention in the colonization and regeneration processes. Fourth, dominance and diversity are likely to be hotly debated questions of urban forest

structure because of lack of agreement as to what constitutes a "good" composition. Finally, a typology of urban forest structure is needed to be followed by historical explanations of how biology and human agency combine to bring about these structures.

Rowntree, Rowan A. **Forest canopy cover and land use in four eastern United States cities.** Urban Ecology. 8(1/2): 55-67; 1984.

Four cities in the Eastern United States were divided into 10 land-use classes and measured for canopy cover with black-and-white, monoscopic aerial photographs. Mean citywide canopy cover is 24 to 37 percent, with a range of 5 to 60 percent for the mean canopy coverage of 10 land uses. Available space for growing trees is 55 to 66 percent of the sample cities' area; the percentage of that space filled with canopy is 37 to 57 percent. The dominant land-use class, one- and two-family residential covering an average of 46 percent of the cities' area, shows little variation in both canopy cover and canopy stocking within the sample and, where available growing space increases, so does canopy stocking. Vacant land is second in areal coverage (14 percent of cities' area), and varies only moderately in canopy cover and stocking when the values in this class are divided into abandoned and undeveloped land. Regularities in the spatial distribution of canopy, among the sample cities, occur as a result of the location and extent of land use.

Sarles, Ray; Reid, Stuart. **Tannery solves air pollution problems.** Northern Logger. 32(11): 6-7; 1984.

Locally abundant wood residues, more economical than coal, are used to produce high-pressure steam for generating power and processing hides and leather in a modern wood-burning plant of 60,000 lb/h capacity. Stack emissions meet or exceed West Virginia air-pollution standards, and fuel cost savings and boiler performance surpass management's expectations.

Sarles, Raymond L.; Wartluft, Jeffrey L.; Whitenack, Kenneth R. **Chain-saw felling in hardwood thinnings.** In: Harvesting the South's small trees: FPRS conference; 1983 April 18-20; Biloxi, MS. Madison, WI: Forest Products Research Society; 1984: 141 p.

Production and efficiency rates were computed from time study and stem measurement data from four hardwood thinning operations in the central Appalachians. Felled trees averaged 9 to 10 inches in d.b.h. and 38 to 45 feet in merchantable length. Hourly production rates were determined from a regression equation expressing productive felling time as a function of merchantable volume and distance between successively felled trees. The average production rate for the combined operations was 2.4 cords per hour at an average felling efficiency of 49 percent. Efficiency was inversely related to delay time. Causes of delay—the largest time block in each felling cycle—were analyzed. Specialized training in thinning methods and techniques was recommended to increase worker efficiency and productivity.

Sarles, Raymond L.; Whitenack, Kenneth R. **Costs of logging thinnings and a clearcutting in Appalachia using a truck-mounted crane.** Res. Pap. NE-545. Broomall, PA: U.S. Department of Agriculture,

Forest Service, Northeastern Forest Experiment Station; 1984. 9 p.

Investigates the effects of thinning and clearcutting on the cost of logging using a truck-mounted crane for yarding and chain saws for felling. Work measurement studies of the harvesting operations were conducted on three 4-acre blocks of timber marked for thinning and on a 2-acre clearcut. Worker efficiency and productivity were higher for thinning than for clearcutting. Reasons for the difference are discussed. Comparisons of logging costs among the four cuttings showed that the cost of wood delivered to roadside was less for logs removed from the thinned blocks than from the clearcut. Silvicultural and environmental aspects of truck-crane logging are discussed.

Schaefer, Paul W.; Jingjun, Yan; Xilin, Sun; Wallner, William E.; Weseloh, Ronald M. **Natural enemies of the gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae) in China.** *Scientia Silvae Sinicae*. 20(4): 435-440; 1984.

A 2-month survey of the natural enemies of the gypsy moth in Beijing and the northeastern People's Republic of China confirmed the presence of 22 parasitic species in the genera *Hexameris*, *Exorista*, *Carcelia*, *Parasetigena*, *Chetogena*, *Blepharipa*, *Elachertus*, *Anastatus*, *Tyndarichus*, *Rogas*, *Meteorus*, *Glyptapanteles*, *Cotesia*, *Apanteles*, *Phobocampe*, *Casinarina*, *Ilyposoter*, *Campoletis*, and *Ephialtes*, and 12 predatory species in *Araneus*, *Harpactor*, *Epidaus*, *Pieromerus*, *Dimorhynchus*, *Pinthaeus*, *Xylodrepa*, *Carabus*, and *Calosoma*. Species diversity was greatest at Menjiagang, Heilongjiang Province. Populations were low in 10 other collection sites. Nucleopolyhedrosis virus was moderately abundant while the fungus *Entomophthora aulicae* was found in some collected larvae and was evident in year-old cadavers.

Schaefer, Paul W.; Wallner, William E.; Ticehurst, Mark. **Incidence of the black-backed larval mutant of *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae) in Ukrainian SSR.** *The Journal of Research on the Lepidoptera*. 23(1): 103-104; 1984.

Scott, Charles T. **A new look at sampling with partial replacement.** *Forest Science*. 30(1): 157-166; 1984. Estimators for use with sampling with partial replacement (SPR) on two occasions are reviewed. Estimation of both current values and change in those values is considered. Given that population variances and covariances are unknown, estimators are presented that are improvements over those suggested in the literature. An example of the use of the estimators is provided.

Scott, Charles T. **A case for point samples.** In: Proceedings of the forest land inventory workshop, Preparing for the 21st century; 1984 March 26-30; Denver, CO. Washington, DC: USDA Forest Service, Division of Timber Management; 1984: 252-257.

Point sampling is a method of locating sample plots in a sampling frame. Point sampling as defined here differs from Bitterlich horizontal point sampling. Point sampling is compared with mapped sampling, and advantages and disadvantages described. Recommendations are given for estimating mapped area characteristics using point sampling techniques.

Sendak, P. E.; Morselli, M. F. **Reverse osmosis in the production of maple syrup.** *Forest Products Journal*. 34(7/8): 57-61; 1984.

Reverse osmosis (RO), a membrane process for separating water from a solution, was evaluated for use in the production of maple syrup. The process had lower costs compared to all thermal evaporation over the range of annual production studied. The difference in cost increased with increasing size of production from 2,000 taps (15,000 gallons of sap) to 20,000 taps (150,000 gallons). The syrup made from RO concentrate was equal in color and flavor to syrup made conventionally. Synthetic-membrane technology offers an alternative to thermal separation and had many applications.

Sheehan, Katharine A. **Development of forest-gypsy moth models.** In: Miller, A. R., ed. *National gypsy moth review: Proceedings of a symposium*; 1984 November 26-29; Charleston, WV. Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 99-102.

Development of forest-gypsy moth models is an important part of the mission of a new Northeastern Forest Experiment Station Research Work Unit titled "Silvicultural Options for the Gypsy Moth." This effort focuses on the need to develop a decision-support system to assist resource managers in evaluating management strategies for the gypsy moth. Computer models that simulate forest growth and yield (under a range of management practices), gypsy moth population dynamics, and forest-gypsy moth interactions will be key components of such a system. This review will briefly describe the current model and will outline future plans for model development.

Shields, K. S. **An association between microtubules and nucleocapsids in nucleopolyhedrosis virus-infected hemocytes and fat body in the gypsy moth.** In: Bailey, G. W., ed. *Proceedings of the 42nd annual meeting of the Electron Microscopy Society of America*; 1984 August 13-17; Detroit, MI. San Francisco, CA: San Francisco Press, Inc.; 1984: 222-223.

An unusual relationship was observed between microtubules and nucleocapsids in nucleopolyhedrosis virus-infected hemocytes and fat body cells in the gypsy moth. Nucleocapsids were parallel to, and closely associated with, microtubules in both the cytoplasm and the nucleus. These findings suggest that this virus might utilize the filament system of the host cell for movement within the cell.

Shigo, Alex L. **Compartmentalization: A conceptual framework for understanding how trees grow and defend themselves.** *Annual Review of Phytopathology*. 22: 189-214; 1984.

Describes a conceptual framework for understanding how trees grow and how they and other perennial plants defend themselves.

Shigo, Alex L. **Homeowner's guide for beautiful, safe, and healthy trees.** NE-INF-58-84. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 8 p.

The topics covered are: proper planting, wound dressings, correct pruning, potential hazards, and insects and microorganisms.

Shigo, Alex L. **How to assess the defect status of a stand.** Northern Journal of Applied Forestry. 1(3): 41-49; 1984.

The defect status of trees in a stand is a major factor affecting the value of trees. Understanding the cluster effect of tree defects allows rapid assessment of the defect status of trees in a stand. Some common tree defects that occur in clusters are: stem stubs, poorly closed stubs, canker rots, perennial cankers, basal cracks, root rots, bird pecks, sugar maple borer and ambrosia beetle injuries, defects in sprouts, and wounds made by logging, fire, and animals. The information is illustrated and should help you determine the quality of the wood in the stand, and the best treatment for the stand.

Shigo, Alex L. **The right treatments for troubled trees.** American Forests. 90(2): 13-16; 1984.

Many myths and misconceptions about trees and treatments have developed over the centuries--such as the beliefs that wound paints stop rot, that frost starts the long deep cracks called "frost cracks," that heartwood is a dead tissue, and many more. Some basic information about trees and treatments may help. It is time to go back to the basics and attack tree problems from the view of the tree, rather than from the view of the problem. We must focus not on what makes trees sick, but on what keeps them healthy.

Shigo, Alex L. **Tree decay and pruning.** Arboricultural Journal. 8(1): 1-12; 1984.

Trees respond to injuries and infections by setting boundaries to resist the spread of microorganisms. The boundaries also resist the spread of microorganisms from dying branches into the joining stem. Pruning cuts should not be made behind the branch bark ridge. Such cuts remove the protective boundaries, allowing microorganisms to spread rapidly into the stem. When branches are pruned properly, there is no need for wound dressings. When branches are pruned improperly, no amount or type of wound dressing will help.

Shigo, Alex L. **Tree survival after injury and infection.**

In: Proceedings, 8th North American forest biology workshop; 1984 July 30 - August 1; Logan, UT.

Logan, UT: Utah State University; 1984: 11-23.

Trees survive after injury and infection so long as they have the time, energy reserves, and genetic capacity to compartmentalize injured and infected tissues rapidly and effectively to small volumes, and to generate enough new tissues in new spatial positions to store enough energy to maintain the tree. Trees have many protection features and a defense system. The defense system is centered about compartmentalization, which is a boundary-setting process to resist spread of pathogens. Tree pathogens survive so long as they can spread fast and far enough to gain enough space and energy to reproduce. Trees and pathogens interact under the constant pressure of the ever-changing environment. A tree is reexamined from the view of its boundary-setting defense system. When branch development is clarified, proper pruning methods become obvious. When boundary-setting is understood to be under strong genetic control, trees resistant to spread of decay can be selected for our forests. When tree decay is clarified, the major cause of damage to trees worldwide can be reduced.

Shigo, Alex L. **Trees and discoloured wood.** IAWA Bulletin. 5(2): 99; 1984.

Discoloured wood is wood altered by injury and infection. The wood usually is a colour different from sound, normally aging wood--sapwood or heartwood. The cell contents in discoloured wood usually are altered and cell walls may be coloured but not digested; there is no reduction in specific gravity. Discoloured wood may be more protective or less protective than contiguous wood. Discoloured wood is wood in transition--a long gradation of irreversible changes as moisture content, concentration of ions, and the succession of many organisms change over time. Tree and wood-inhabiting organisms interact over time and space as all are affected by the ever-changing environment.

Shigo, Alex L. **Trees and treatments: Time for some adjustments.** Tuin & Landschap. 17: 13-15; 1984.

Advancements in science take place as sound old information is connected with new information. The new connections lead to expansions of concepts. And from expanded concepts come new approaches to old problems. This is the normal path for improvements of all treatments. Trees and many treatments designed to help trees are reexamined in this paper.

Shigo, Alex L. **Wood problems start in the living tree.**

Forest Notes. Fall (15): 20-22; 1984.

Long before the log reaches the mill, the quality of the wood is set, and little can be done to change it. Major attempts to utilize low-quality wood more effectively center about chipping, grinding, or reducing the wood to smaller pieces, and then putting the pieces back together to make some usable product. The steady increase in these techniques attests to the increasing amount of low-quality wood that must be used by industries. Indeed, the best utilization of low-quality material is an admirable venture. It must be done. But, when low-quality trees are replaced with more low-quality trees, this ceases to be forestry.

Shigo, A. L.; van der Zwet, T. **Patterns of barrier zone formation in *Pyrus* wood tissues infected with *Erwinia amylovora*.** Phytopathology. 74(7): 851; 1984. Abstract A491.

Longitudinal dissections of 30 fire blight cankers representing scores 1 to 9 on the USDA fire blight scoring system were collected from 100 6-year-old pear trees. Following bark removal from 25 stems, the internal cankers showed that patterns of blight-infected wood followed the CODIT model for compartmentalization of decay in trees. Most cankers were associated with branch crotches. When infected leader stems died, the boundary between living and dead tissues farther down on the stem usually occurred above a healthy lateral branch. Further spread of the infection below a healthy branch was limited to wood connected to the leader stem and not to the healthy branch.

Shortle, W. C. **Biochemical mechanisms of discoloration, decay, and compartmentalization of decay in trees.** IAWA Bulletin. 5(2): 100-104; 1984.

Lists, in chronological order, 100 papers by Shigo, Shortle, and their associates. Thirteen review papers from 1965 to 1984 recognize the contributions of many scientists and attempt to expand our thinking about how

trees decay and how trees respond to limit the internal spread of decay. The 87 research papers cited, published from 1962 to 1983, form the foundation for ongoing research into biochemical mechanisms of discoloration, decay, and compartmentalization of decay in trees.

Smith, H. Clay. **Forest management guidelines for controlling wild grapevines.** Res. Pap. NE-548. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 15 p.

Grapevines are becoming a major problem to forest managers in the Appalachians, especially when clear-cutting is done on highly productive hardwood sites. Where present, grapevines can reduce tree quality and growth, and eventually kill the tree. Silvical characteristics of grapevines are discussed as background for grapevine control. Forest management guidelines are given for controlling growth of grapevines.

Sonderman, David L. **Quality response of even-aged 80-year-old white oak trees after thinning.** Res. Pap. NE-543. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, 1984. 6 p.

Stem defects were studied over an 18-year period to determine the effect of thinning intensity on quality development of 80-year-old white oak trees. Seventy-nine white oak trees from a thinning study in Kentucky were analyzed from stereo photographs taken in 1960 and 1978. Stem-related defects were measured on the butt 8-foot and second 8-foot sections of each tree. The number of defects per square foot of surface area increased significantly at the heaviest thinning level. The data suggest that heavy thinning has a detrimental effect on potential stem quality.

Sonderman, David L. **Quality response of 29-year-old, even-aged central hardwoods after thinning.** Res. Pap. NE-546. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 9 p.

Describes the quality response of a 29-year-old upland hardwood stand grown for 6 years under different levels of residual stand density. Both the number of defects per square foot of surface area and the number of epicormic branches changed under different stocking levels. The results suggest that the effect of stocking on potential stem quality of certain species may be substantial even after a few years of treatment.

Strickland, David N.; Sneckenberger, John E.; Biller, Cleveland J. **Loadings in a cable logging system in Appalachia.** In: Proceedings, 1983 winter meeting American Society of Agricultural Engineers; 1983 December 13-16; Chicago, IL. Paper No. 83-1628. St. Joseph, MI: American Society of Agricultural Engineers; 1983. 11 p.

Results obtained from a mathematical model and the loading in a medium-sized European yarder are presented. These results are used to discuss strengths of selected components. Also, moments that might cause tipping are correlated with lateral and downhill yarding distances.

Swift, Bryan L.; Larson, Joseph S.; DeGraaf, Richard M. **Relationship of breeding bird density and diversity to habitat variables in forested wetlands.** Wilson Bulletin. 96(1): 48-59; 1984.

Breeding bird populations were studied in eight deciduous forested wetlands located in the Connecticut Valley region of Massachusetts. Singing male birds were counted on 10 circular 0.25-ha plots in each study area in June 1978 and 1979. A total of 46 species was observed, with estimated densities varying among study areas from 134 to 720 males per 40 ha. Avian community parameters (total breeding bird density, bird species richness, and abundance of three foraging guilds) were related to 15 habitat variables by multiple regression and simple correlation.

Tattar, Terry A.; Shigo, Alex L. **Mower wounds kill trees.** Weeds Trees & Turf. 23(4): 36, 41; 1984.

Thompson, Ralph L.; Vogel, Willis G.; Taylor, David D. **Vegetation and flora of a coal surface-mined area in Laurel County, Kentucky.** Castanea. 49: 111-126; 1984.

A descriptive study was made in 1981 and 1982 of the vegetation and flora on an 18-year-old surface-mined area near Lily in Laurel County, Kentucky. More than 100 woody and herbaceous taxa were planted on about 25 percent of the area in 1965 and 1966. Some of the planted area and most of the unplanted area subsequently were revegetated by natural plant succession. The natural plant community was sampled by the belt transect and quadrat methods; the vascular flora was documented by field reconnaissance; and planted experimental plots were inventoried for surviving species. A Virginia pine-mixed hardwoods community was the major natural vegetation type. The vascular flora comprised 350 taxa from 84 families; 77 of these were non-indigenous taxa. Thirty-seven indigenous and 41 non-indigenous species have persisted from the original experimental plantings.

Tilghman, Nancy G. **Deer densities and forest regeneration.** In: Research in forest productivity, use, and pest control: Proceedings of the symposium; 1983 September 16-17; Burlington, VT. Gen. Tech. Rep. NE-90. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984: 45-50.

Preliminary results of a study of the effects of five deer densities and three cutting treatments on development of tree seedling reproduction on the Allegheny Plateau of northwestern Pennsylvania show that higher deer densities reduce the height growth made by seedlings in clearcut and thinned stands. Moreover, there are fewer tree seedling species, less *Rubus*, and more fern at higher deer densities.

Tilghman, Nancy G. **Deer browse and forest regeneration.** Pennsylvania Forests. 74(3): 6-8; 1984.

Preliminary results of a study of the effects of five deer densities and three cutting treatments on development of tree seedling reproduction on the Allegheny Plateau of northwestern Pennsylvania show that higher deer densities reduce the height growth made by seedlings in clearcut and thinned stands. Moreover, there

- are fewer tree seedling species, less *Rubus*, and more fern at higher deer densities.
- Tritton, L. M.; Siccama, T. G. **Population dynamics of dead trees in the Northeast.** *Bulletin of the Ecological Society of America*. 65(2): 249; 1984. Poster Session.
- Tryon, E. H.; Powell, Douglas S. **Root characteristics of advance hardwood reproduction.** *Forest Ecology and Management*. 8: 293-298; 1984.
Advance reproduction is important in naturally regenerating stands of hardwood tree species. Well-established root systems are considered essential in assuring such regeneration. This paper reports results from four studies conducted in northern West Virginia that obtained data on the ages and diameters of roots of nine hardwood species. Samples were taken from understory trees with maximum diameters below the root collar of 5.08 cm. We found that ages ranged from 1 to 50 years and averaged 12.6; diameters ranged from 0.15 to 5.03 cm and averaged 0.76 cm. Indications are that root systems of advance reproduction may often exceed the 50 years of age documented.
- Tubbs, Carl H. **Silviculture.** In: Wenger, Karl F., ed. *Forestry Handbook*. New York, NY: John Wiley & Sons; 1984: 414-455.
The purpose of the section is to provide a basis for the development of prescriptions for silvicultural procedures to meet multiple-use goals. General explanations of silvicultural systems and procedures are followed by specific examples. Descriptions of site preparation include a listing of herbicides, species affected, and method of application. Tree planting techniques are illustrated. The section includes a brief explanation of financial maturity.
- Tubbs, Carl H.; Reid, Bruce D. **Logging season affects hardwood reproduction.** *Northern Journal of Applied Forestry*. 1(1): 5-7; 1984.
The Rochester District of the Green Mountain National Forest has kept records of regeneration following clearcut and shelterwood harvesting since 1969. Harvesting was in winter and summer. The records show that season of logging did not affect the number of stands with adequate stocking but that winter logging resulted in somewhat better stocking of sugar maple and yellow and paper birch. Shelterwoods were better stocked with sugar maple than clearcuts, which on average were better stocked with the birches. The year of cut seemed to have the greatest influence on the relative proportion of birches and sugar maple after clearcutting.
- Valentine, Harry T.; Houston, David R. **Identifying mixed-oak stand susceptibility in gypsy moth defoliation: An update.** *Forest Science*. 30(1): 270-271; 1984.
Two discriminant functions for the identification of mixed-oak stand susceptibility to gypsy moth defoliation are presented. One function uses variables that reflect gypsy moth habitat; the other uses only standard inventory variables.
- Valentine, Harry T.; Tritton, Louise M.; Furnival, George M. **Subsampling trees for biomass, volume, or mineral content.** *Forest Science*. 30(3): 673-681; 1984.
A procedure for estimating aboveground biomass, woody volume, or mineral content of a tree uses randomized branch sampling and importance sampling, a technique of Monte Carlo integration. Both techniques involve sampling with selection probabilities proportional to estimated size and produce unbiased estimates of tree components and their variances. The results of a field test of the procedure for the estimation of fresh weight are presented.
- Vodak, Mark C.; Wellman, J. Douglas. **Visual impacts are important to private landowners in managing eastern hardwoods.** *National Woodlands*. 7(3): 10-12; 1984.
Describes a study designed to measure esthetic consequences of any management practice in a stand. Objectives of the study were to: (1) quantitatively describe general landowner preferences for approaches and levels of hardwood management ranging from clearcut to unmanaged stands, (2) develop statistical models that use standard forest measurements to predict landowner preferences for the visual aspects of the site, and (3) make practical management recommendations and suggest further research initiatives based on these analyses.
- Vogt, Albert R.; Redett, Robert B.; Foulger, Albert N.; Barnard, Joseph E. **Ohio's forests are growing.** *Ohio Woodlands*. 21(4): 4-5, 9; 1984.
- Wallner, William E. **Gypsy moth ecology and management research.** In: Miller, A. D., ed. *National gypsy moth review: Proceedings of a symposium; 1984 November 26-29; Charleston, WV*. Charleston, WV: West Virginia Department of Agriculture Plant Pest Control Division; 1984: 89-91.
The major recent emphasis of the USDA Forest Service's Ecology and Management research unit is to elucidate the concept of gypsy moth outbreak foci. Historical evidence and recent research has demonstrated that stands susceptible to gypsy moth exist but their relationship to areawide outbreaks is not known. If they serve as epicenters from which outbreaks emanate, control can be initiated prior to outbreaks on a limited geographic area. This would change current control strategies and increase the options for management. At the very least, they can serve as predictors for population upsurges that would be useful for land managers, pest control personnel, and for development of Integrated Pest Management systems.
- Wallner, William E.; Carde, Ring T.; Xu-Chonghua; Weseloh, Ronald M.; Xilin, Sun; Jingjun, Yan; Schaefer, Paul W. **Gypsy moth (*Lymantria dispar* L.) attraction to disparlure enantiomers and the olefin precursor in the People's Republic of China.** *Journal of Chemical Ecology*. 10(5): 753-757; 1984.
Pheromone traps baited with disparlure, cis-7,8-epoxy-2-methyl-octadecane, captured males of the gypsy moth, at two widely separated locations in the People's Republic of China. The (+) enantiomer of disparlure attracted significantly more males than the racemate;

addition of olefin reduced captures. The duration of the flight period was longer (8 weeks) and peaked earlier near Beijing than farther north near Dunhua (5 weeks).

Walters, Russell S. **Black cherry provenances for planting in northwestern Pennsylvania.** Res. Pap. NE-552. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1985. 6 p.

After 14 years, survival of 8 of 25 planted black cherry sources is greater than 70 percent, and there are no significant differences in height. These sources offer the greater potential for planting in northwestern Pennsylvania; they include four Pennsylvania sources plus one each from Tennessee, West Virginia, Ohio, and Virginia. Planted trees did not grow better than nearby natural seedlings.

Walters, Russell S.; Yawney, Harry W. **Treat your maple trees well.** *New England Farmer*. 8(3): 12-15; 1984.

Ward, Richard E.; Leslie, A. Cameron; Biller, Cleveland J.; Peters, Penn A. **Field studies and analysis of a feller-buncher operation.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 229-242.

Describes field studies and the subsequent analysis of production data of a Feller-Buncher unit. The studies were conducted in conjunction with the harvesting of two different hardwood stands. Time standards and cost estimates are presented.

Wargo, Philip M. **After the gypsy moth: What you can expect.** In: Proceedings, Tree wardens, arborists, and utilities conference; 1984 March 13-15; Danvers, MA. Amherst, MA: Cooperative Extension Service, University of Massachusetts; 1984: 87-94.

What you should expect after the gypsy moth has defoliated your forests and disappeared depends on how much foliage was eaten, the number of successive years of defoliation, growing conditions, the physiological condition of the tree when it was defoliated, and the presence of aggressiveness of pathogens and insects.

Wargo, Philip M. **Changes in phenols effected by *Armillaria mellea* in bark tissue of roots of oak, *Quercus* spp.** In: Kile, G. A., ed. Proceedings, 6th international conference on root and butt rots of forest trees; 1983 August 25-31; Melbourne, Victoria, and Gympie, Queensland, Australia. IUFRO S2.06.01. Melbourne, Australia: CSIRO; 1984: 198-206.

The effect of *A. mellea* on phenols in bark tissue of roots of oaks was determined in vivo by analyzing bark tissues from roots of black oak and white oak that were defoliated by insects and naturally colonized by the fungus. Results indicate that *A. mellea* (sensu lato) can oxidize and grow in the presence of oxidized phenols but only on weakened tissues.

Wargo, Philip M. **How stress predisposes trees to attack by *Armillaria mellea*—a hypothesis.** In: Kile, G. A., ed. Proceedings, 6th international conference on root and butt rots of forest trees; 1983

August 25-31; Melbourne, Victoria, and Gympie, Queensland, Australia. IUFRO S2.06.01.

Melbourne, Australia: CSIRO; 1984: 115-121.

Stress predisposes trees to infection by *Armillaria mellea*. Stresses such as drought, waterlogging, and defoliation induce changes in root physiology and chemistry that are beneficial to the fungus. The nature of these changes and their interaction with the fungus are described and discussed. A hypothesis on how roots are predisposed to infection by *A. mellea* is presented.

Weik, Bruce R.; Wengert, Eugene M.; Schroeder, James; Brisbin, Robert. **Practical drying techniques for yellow-poplar S-D-R flitches.** *Forest Products Journal*. 34(7/8): 39-44; 1984.

The objectives of this study are to determine: (1) the duration of predrying heat or steam treatment needed to relax growth stresses adequately in yellow-poplar S-D-R flitches, (2) the effect of these predrying treatments followed by solar- and air-drying on grade losses in yellow-poplar S-D-R studs, and (3) the cost of applying successful predrying treatment and drying methods as compared to the cost of high-temperature drying in the S-D-R process.

Wendel, George W.; Kochenderfer, James N. **Aerial release of Norway spruce.** *Northern Journal of Applied Forestry*. 1(2): 29-32; 1984.

Restrictions on use of 2,4,5-T have created a need for herbicides that can be used for conifer release. Seven-year-old Norway spruce was released from competing vegetation with aerially applied Roundup. A wide spectrum of competing species was controlled and most hardwoods did not resprout during the 2-year evaluation period following treatment. Norway spruce seemed to respond to treatment and suffered negligible damage. Roundup as applied in this study seems to be a safe, effective herbicide that can be used to release Norway spruce.

Wharton, Eric H. **Identifying aboveground wood fiber potentials in New York State.** *Resour. Bull. NE-82*. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 25 p.

A statistical analytical report on the biomass resources of New York. The study was conducted in conjunction with the third forest survey of New York by the USDA Forest Service. Statistical findings are based on new 10-point variable radius plots, a canvass of wood manufacturers, timber utilization plots, and a mail canvass of private, commercial, forest-land owners; all conducted in 1978 and 1979. Presents total aboveground biomass supplies, the use of biomass in the state for forest products, and sources of wood from residues and standing trees that can be used to improve wood fiber recovery.

Wharton, Eric H. **Predicting diameter at breast height from stump diameters for northeastern tree species.** *Res. Note NE-322*. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p.

Presents equations to predict diameter at breast height from stump diameter measurements for 17 northeastern tree species. Simple linear regression was used to

develop the equations. Application of the equations is discussed.

Wharton, Eric H.; Raile, Gerhard K. **Biomass statistics for the Northern United States.** Res. Note NE-318. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 3 p.

The USDA Forest Service now estimates biomass during periodic resource inventories. Such biomass estimates quantify more of the forest resource than do traditional volume inventories that concentrate on tree boles. More than 48 percent of the aboveground tree biomass in the northern United States can be found in woody material outside of the boles. Tree biomass in the Northeastern and North Central regions of the United States is compared by state.

Wharton, Eric H.; Brooks, Robert T. **Southern New England's forest resources inventory.** Connecticut Woodlands. 48(4): 6-7, 15; 1984.

During 1984, the Forest Inventory and Analysis staff will conduct an inventory of the Forest Resources of Connecticut, Massachusetts, and Rhode Island. Although many of the traditional measures of timber will be used, this new inventory will include more multi-resource information. Biomass, wildlife habitat, and recreational potentials will be reported on once the forest resource inventory is completed.

Wiant, Harry V., Jr.; Knight, Robert; Baumgras, John E. **Relation of biomass to basal area and site index on an Appalachian watershed.** Res. Note NE-315. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p.

The biomass of 50-year-old cove hardwood and upland oak stands on an Appalachian watershed was more strongly related to basal area than the site index. Equations are presented for predicting the green and dry weight per acre of biomass components with basal area as the independent variable.

Widmann, Richard H.; Blyth, James E. **Pulpwood production in the Northeast and North Central States in 1982.** Northern Logger. 32(8): 10-11; 1984.

Twenty-one Northeastern and North Central states produced a total of 14.3 million cords of pulpwood in 1982. This total was the same as 1981, but its components showed a shift from residues to roundwood.

Wilson, G. Edward; White, David E.; Biller, Cleveland J. **The influence of site factors on production cost predictions for the Appalachian thinner.** In: Proceedings, Mountain logging symposium; 1984 June 5-7; Morgantown, WV. Morgantown, WV: West Virginia University; 1984: 323-335.

Small cable yarding systems have great potential for logging small tracts in mountainous terrain. One such yarding system is the Appalachian thinner. This paper describes an economic model designed to predict harvesting cost based on the capabilities of the Appalachian Thinner and the characteristics of the site. Actual and predicted harvesting costs are compared in order to evaluate the model.

Wisniewski, M.; Bogle, A. L.; Shortle, W. C.; Wilson, C. L. **Interaction between *Cytospora leucostoma* and host-phenolic compounds in dormant peach trees.** Journal of American Society of Horticultural Science. 109(4): 563-566; 1984.

The interaction between *Cytospora leucostoma* (causal agent of peach canker) and host-phenolic compounds in dormant peach trees was examined. Initially, inoculated samples had significantly higher phenolic levels than uninoculated samples. The levels in inoculated samples decreased dramatically in tissues closest to the point of inoculation, however, while the phenolic levels in uninoculated samples remained relatively stable through time. The data suggested that *C. leucostoma* degraded host-phenolic compounds. Maximum phenolic enrichment was observed in the branch collar region of the main stem of inoculated samples. It was concluded that the presence of *C. leucostoma* in host tissue played a significant role, over and above the wounding response, in establishing levels of host-phenolic compounds. Levels of phenolics in host tissue seemed to increase in advance of the fungus, and this increase may function as a mechanism that slows the pathogen's advance.

Yaussy, Daniel A.; Sonderman, David L. **Multivariate regression model for partitioning tree volume of white oak into round-product classes.** Res. Note NE-317. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 4 p.

A plant to make standard blanks from cants by System 6 can be assembled from off-the-shelf equipment with few modifications. From the production rates and manpower requirements of each piece of equipment, we designed a typical plant and determined by economic analysis that it could return 21 percent on an investment of \$2 million by making blanks for sale from purchased cants.

Yawney, Harry W. **How to root and overwinter sugar maple cuttings.** American Nurseryman. 160(8): 95-102; 1984.

Procedures are presented for the rooting and overwintering of sugar maple cuttings. Rooting can vary from 0 to 100 percent depending upon the rooting potential of a given genotype, and a period of trial-and-error will establish which genotypes are good rooters. The major obstacle to a successful propagation program has been overwintering failure of the rooted cuttings. The methods presented have resulted in overwintering survival rates approaching 100 percent. This is achieved by forcing the newly rooted cutting to flush and produce new foliage prior to overwintering by applying gibberellic acid (7500 ppm) to the terminal bud daily for a period of 2 weeks.

Zinn, Gary W.; Miller, Gary W. **Increment contracts: Southern experience and potential use in the Appalachians.** Journal of Forestry. 82(12): 747-749; 1984.

Increment contracts are long-term timber management contracts in which landowners receive regular payments based on the average annual growth of wood their land is capable of producing. Increment contracts have been used on nearly 500,000 acres of private forests in the

South. Southern experience suggests that several changes in the contract would improve its utility: the contract period should be shortened, the percentage of annual growth used to determine payments to landowners should be reduced, and payments should be based on published stumpage or product price reports. With these changes, there would be opportunities for, and benefits of, using increment contracts in the central Appalachians. In the near future, increment contracts may be used in parts of the Appalachians where competition for stumpage is keen.

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An annotated list of publications by Northeastern Forest Experiment
Station scientists in 1984.

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