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Forest
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**Northeastern
Station**

General
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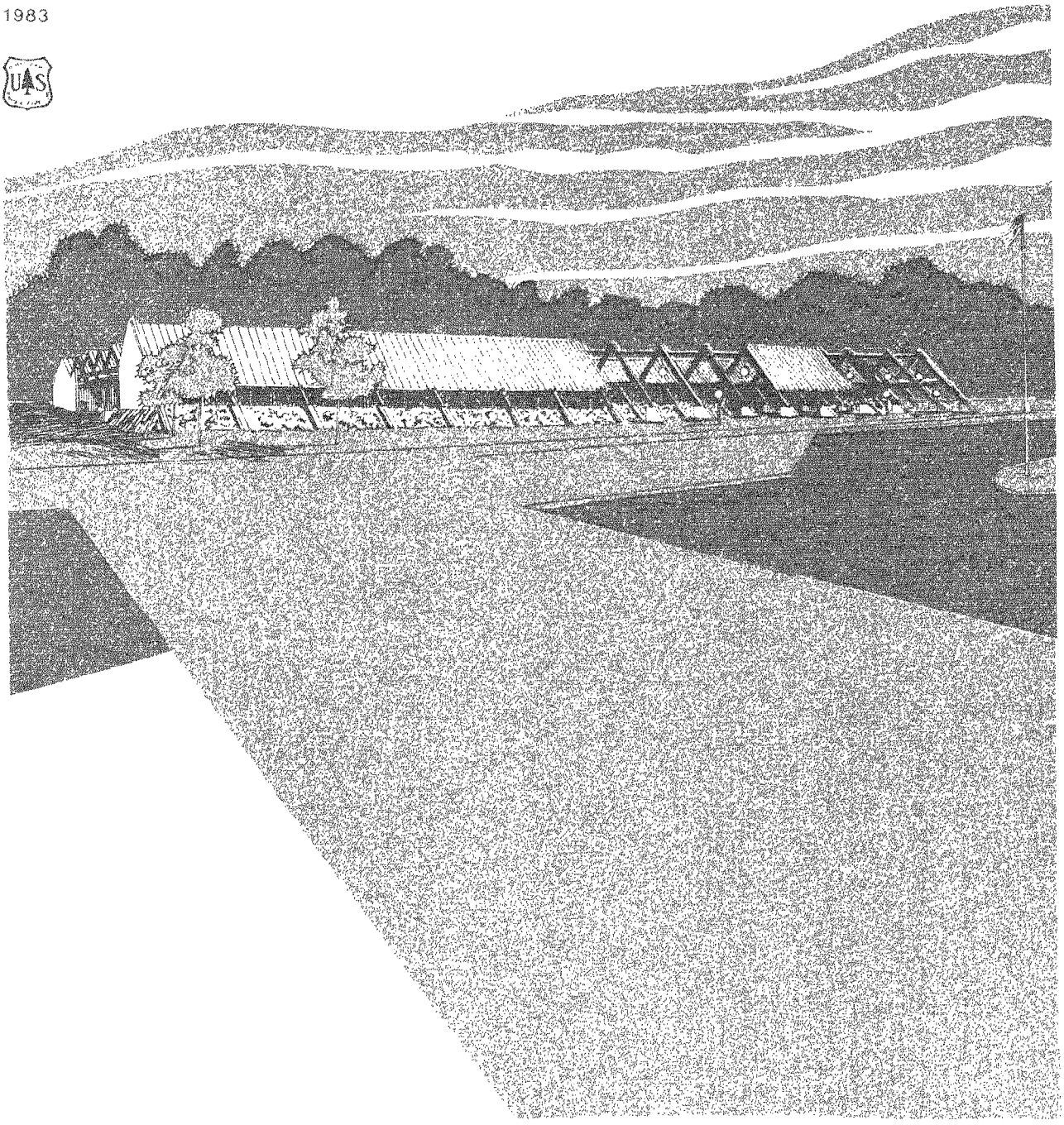
Report
NE-81

1983

Progress in Forestry Research in the Northeast, 1980-81



Foreword

Progress in Forestry Research in the Northeast, 1980-81, presents highlights and publications of the 57th and 58th years of the Northeastern Forest Experiment Station. The trend in these years was obvious from most perspectives around the Station. It can be summed up as increasing emphasis on greater accountability, expressed by one Station assistant director as a "fine-tuning of programs and goals."

Of course, even before our current budget cuts, travel limitations and careful spending in general were second nature to the Forest Service. To meet these challenges, the Station has taken steps to make sure that we carry out our various missions. Both 1980 and 1981 have been years of hard choices. Along the line, some new emphases have been established; some once-prominent interests have been dropped.

Certain types of research emerged as preeminent. These included wood energy research, air pollution and acid rain studies, and the eastern hardwood research program. Those areas that focus on practical solutions to existing problems balance the more theoretical ones. No research has been cut or ignored, but emphases are being realigned. This is what is meant by a fine-tuning. The result is intended to be a more responsive program that benefits the public.

An office-laboratory building that features both attractive design and a high degree of energy efficiency was completed at Berea, Ky., in early 1981. The new facility is shared by research, state and private forestry, and national forest employees. It features solar heating and cooling, passive energy conservation, and innovative uses of wood. Despite some initial problems with the systems, the occupants report significant savings in energy.

Meanwhile, all was not quiet on the eastern front in 1981. In May and June, the Hamden, Conn., laboratory, a center for gypsy moth research, was beseiged by a crush of inquiries from concerned, suffering citizens. Their questions weren't the usual ones about how to protect trees from the voracious insect. This time people were worried about their own skin, literally. The gypsy moth had caused an outbreak of allergic reactions. People in Connecticut, Massachusetts, and Rhode Island crowded into emergency rooms and doctors' offices. They were complaining of welts, rashes, and itching. Some even thought they had been bitten by the larvae. Hamden scientists quickly determined that the real culprits were tiny irritating hairs that cover the caterpillar's body.

The year 1981 marked a change of Station directors. David Thorud spent 2 years at the Northeastern Station before leaving in June 1981 to become dean of the College of Forest Resources at the University of Washington in Seattle. I arrived as his successor in December 1981. Formerly, I was deputy director of the North Central Station in St. Paul, Minn.

Highlights of the research conducted in the last 2 years, which appear in this publication, are evidence of a strong, productive organization. The next few years will no doubt bring further changes in the content of our programs and in staffing and organization, but the research and the activities supporting it go on.

Denver P. Burns

DENVER P. BURNS
Station Director

Cover: The Forestry Sciences Laboratory and Berea Ranger Station, Berea, Kentucky, was dedicated on August 18, 1981.

Progress in Forestry Research in the Northeast, 1980-81

Highlights

The following highlights represent the wide range of research activities engaged in by the Northeastern Forest Experiment Station in 1980-81.

A Gypsy Moth Management System

The gypsy moth is one of the most destructive hardwood defoliators in the northeastern United States. Scientists at the Northeastern Station have combined different approaches to controlling gypsy moth populations into a promising one-two punch.

Here's how it works. A week prior to hatch, gypsy moth egg masses are sprayed with Gypchek, a registered virus which is harmless to people, animals, and other insects. Many of the emerging larvae will injest the virus and die. Meanwhile, populations of mice and other small animal predators of the gypsy moth are encouraged with protected nesting in brush piles and supplemental feeding in winter. The gypsy moths that survive the virus attack will be easy prey for the mammalian predator population.

Preliminary tests of the technique are encouraging. More than 85 percent of emerging larvae have been killed by the virus, the mammalian predators get many of the remainder, and it appears that the number of predators can be increased through management. Scientists will conduct additional trials over the next 2 years to fully evaluate this unique method of controlling the gypsy moth.

The Value of Cooperative Forestry

Every year nearly 50,000 woodland owners in the Northeast ask for help with forestry-related problems. Their questions on matters ranging from timber sales to shade tree protection are handled by a network of cooperative foresters. Knowing where, how much, and what kind of assistance is given will help to plan and manage these assistance programs.

Working with the cooperative forestry staff of the Northeastern Area State and Private Forestry (S&PF), Station scientists developed a sampling system to inventory forestry assistance efforts. They came up with a comprehensive profile of state and regional activity, which will serve as a basis for comparison. In this way, administrators can identify strengths and weaknesses in their program, and make changes to improve service to nonindustrial private woodland owners.

Part of the inventory concerned timber sales on these lands. Prices obtained for timber on the northeastern market vary substantially. A more complete picture of timber prices in the 20-state region and its subdivisions will help cooperative foresters better serve woodland owners.

This pioneering, two-part regional survey is a prototype for nationwide S&PF surveys. It measures what has been accomplished, and provides guidelines for continued effectiveness of the program.

Air and land attacks form a promising system for controlling the gypsy moth.

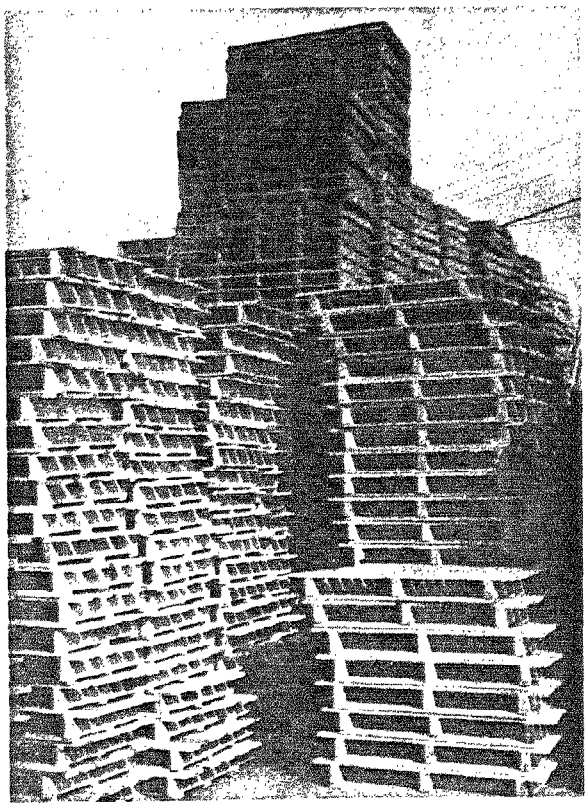
The Potential of Young Hardwoods

Forest managers can readily measure the quantity of wood in a high-value hardwood stand, but determining quality has always presented problems. Without this information, managers can only partially evaluate the efforts of silvicultural treatments.

Scientists at the Northeastern Station found that trees exhibit characteristics that indicate relative quality and product potential. These characteristics can be counted and compiled to describe a tree, or an entire stand.

Tree size, crown ratio, stem curvature, limb-related defects, and internal defects provide clues to the potential quality of sapling and pole-size stands. Researchers are now using this method to measure the relative quality of trees on research plots that have received silvicultural treatments. These observations will enable them to predict changes in quality and relate it to change in product potential.

USDA grade A prime or choice? Researchers can now measure the quality of trees as well as the quantity.



Forecasts for Wood Products Markets

What wood products will we use in the future, and what prices will we pay? To find out, Northeastern Station researchers developed econometric models to quantify domestic and foreign factors that affect supply and demand for insulation board, hardboard, and pallets.

The models for high-quality hardwood lumber are nearly complete. When ready, they will mathematically explain supply-demand interrelations within each market, and provide flexible techniques for making annual consumption and price forecasts.

With these econometric models, study of wood products markets will gain clarity, objectivity, and flexibility. Users will be able to measure the cause and effect of changes within the market, and to determine the impact of market change.

The data will be valuable to decision-makers when formulating forest policies and programs, establishing long-run timber production and multiple-use goals, and assessing the impact of export and import activities on the domestic market.

Econometric models help foresters better understand the wood products market.

Stands Free of Wild Grape

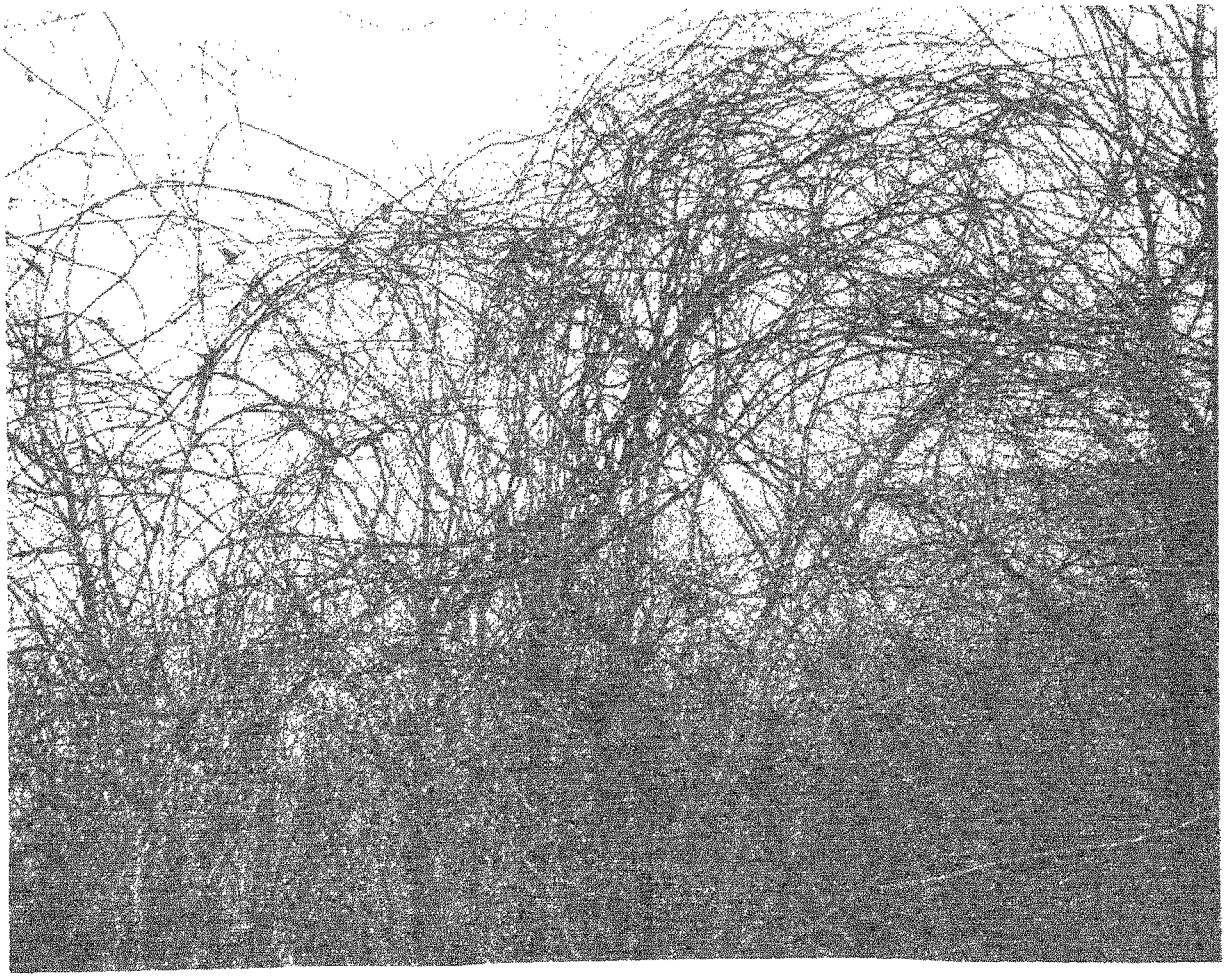
Wild grapes are valuable food for wildlife, but the vines they grow on can cause serious problems on good Appalachian hardwood sites. Often more than 300 and occasionally as many as 1,000 grapevines per acre choke young hardwood stands. Left to grow uncontrolled, grapevines can quickly reduce highly productive sites to non-productive ones.

Based on their knowledge of the factors effecting grapevine growth, Northeastern Station researchers have developed silvicultural guidelines for controlling grapevines in stands ranging in age from saplings to mature trees.

One major influence is light. Shade causes grapevine foliage to die. Researchers recommend that grapevines be cut near ground level where there is dense overhead shade. The cut vines will sprout again, but most sprouts will die within a few years. In partial cuts where shading is common, grapevines can be cut anytime and the sprouts will die. The guidelines also state that if an area is to be clearcut, grapevines should be cut 4 to 5 years before the major removals are made.

Herbicides are effective in older stands where vines are often fewer and larger, and in young stands that are almost overrun with grapevines. Researchers warn that no herbicide will kill only grapevines. Silvicultural treatments are considered the best alternative to using herbicides. Forest managers should periodically examine areas known to have grapevines and to apply the necessary control treatments, since grapevine seeds remain viable in the soil for many years.

Grapevines benefit wildlife but can damage young Appalachian hardwoods.

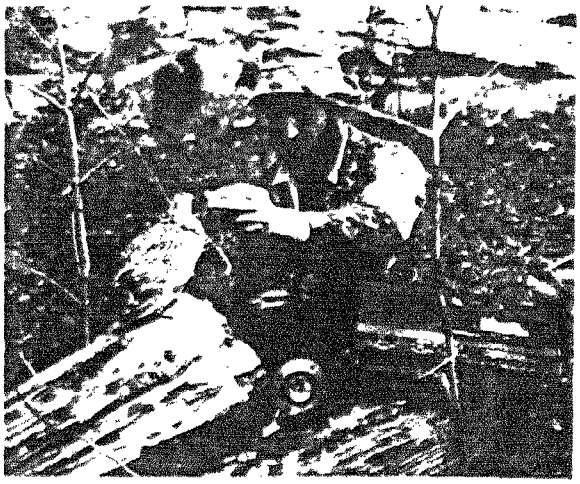


The Ruffed Grouse

If the key to better grouse production is seeing how they live, the challenge is to find the broods in the first place. Wildlife biologists have grappled with the problem of locating the elusive grouse for years.

Now scientists at the Northeastern Station have developed a new way to locate broods efficiently with little or no risk to the chicks. They play tape-recorded calls of a "lost" chick. The calls for help attract grouse hens with broods. Hens respond throughout thebrooding period, which makes the recorded call useful for locating and capturing grouse to be transplanted, as well as for observational studies.

Scientists have also used the tape to measure and evaluate various kinds of grouse habitat. Though its audience is small and a major recording contract is unlikely, the tape has been popular and very useful among individuals and agencies that work with ruffed grouse.



Researcher records the call of a ruffed grouse.

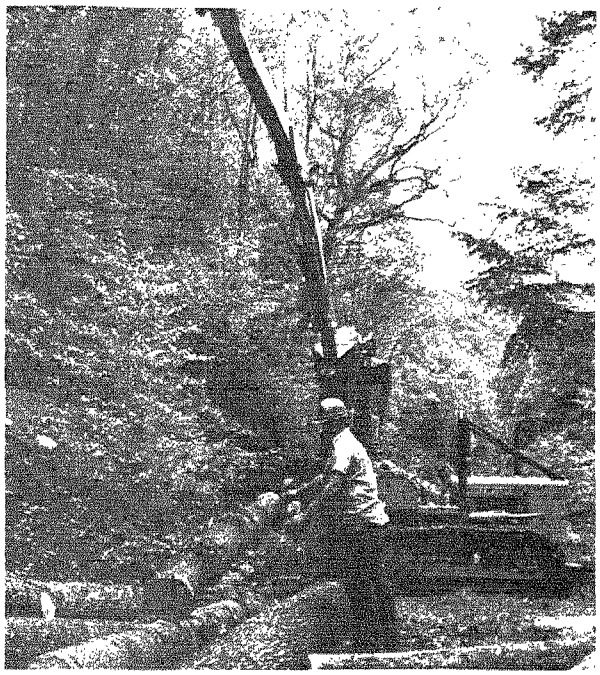
Yellows-Type Diseases

Scientists at the Northeastern Station have investigated the possible causes of yellows-type diseases in native trees for a number of years. In 1967, Japanese scientists startled the scientific world when they discovered a link between certain yellows diseases and mycoplasmas. Mycoplasmas, the smallest known living cell, have been associated with diseases of animals since 1895, but the link with plant diseases was unexpected.

The discovery spurred a great deal of new research worldwide. Forest Service scientists at Delaware, Ohio, began an extensive series of cytological investigations to determine the possible connection between mycoplasmas and certain important forest tree diseases. They produced the first scientific reports on mycoplasma-caused diseases of native forest trees.

Mycoplasmas were found to be present in elm phloem necrosis, walnut and pecan bunch diseases, and witches'-broom of black locust. All are yellows-type diseases characterized by overall yellowing and dwarfing of foliage, or the development of witches'-broom in the crowns. Of the four diseases studied, only elm phloem necrosis is known to be transmitted by an insect. All four have been experimentally transmitted by grafting.

Elm phloem necrosis has caused widespread damage in the eastern United States.



The Appalachian Thinner operates economically on steep Appalachian slopes.

A Yarder for Steep Terrain

Mobility is the key to successful yarding on steep Appalachian slopes. A Northeastern Station research engineer at Morgantown, West Virginia, invented a cable yarder called the Appalachian Thinner that is sufficiently mobile to operate economically in selection cuts on small woodland properties.

The device consists of a single drum winch, mounted on a knuckleboom loader assembly which is attached with a quick-disconnect mounting bracket to a crawler tractor. Unlike other cable yarding systems, the Appalachian Thinner requires no guylines. For stability during uphill yarding, the operator can lower the blade on the tractor or stabilizing legs on the yarding device.

The Station published a popular brochure (Peters and others 1980) last year that presented principal features of the Thinner and preliminary production figures of the yarder working in a clearcut, a diameter limit thinning, and a sanitation thinning.

To give it added exposure in the logging community, researchers loaned the Thinner to contractors for 6-week field trials. They are collecting data during these periods on the production achieved with different crews working on various terrain.

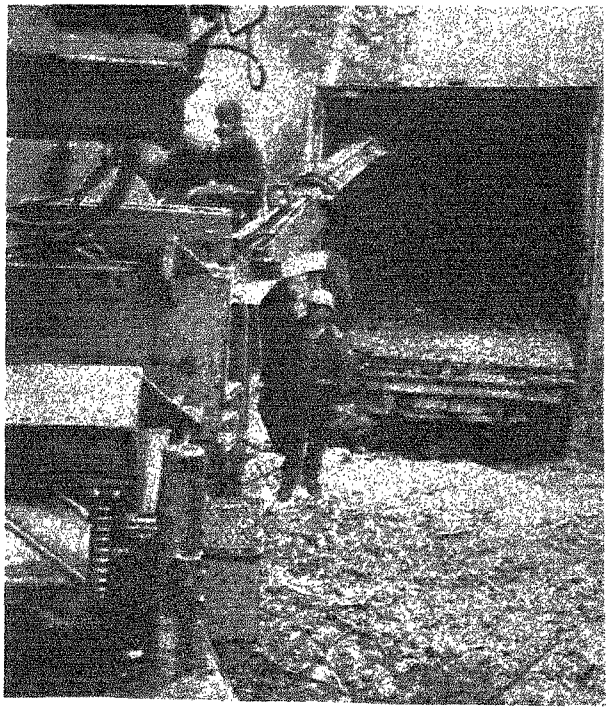
The Costs of Whole-Tree Chipping

Hardwood forests cover approximately 32 million acres of land in the eastern United States. Most of the original forest has been cut. The second generation forest growing there now is overstocked with saplings, pole trees and small sawtimber stands. Their growth would much improved if large amounts of low quality undesirable species were removed. But, up to now, such precommercial thinning was uneconomical because of a lack of markets for this type of wood.

Now, the increased interest in using wood for energy offers an opportunity to improve our forests. One example of an outlet for low-quality wood fiber is the proposed 50 megawatt electrical plant in Burlington, Vermont. This plant would use approximately 500,000 green tons of wood chips annually, 50 to 75 percent of which would probably come from whole-tree chips. One major question facing managers of the proposed plant was the cost of obtaining these chips.

Northeastern Station researchers conducted a cost-analysis of whole-tree chipping and delivery. They estimated a capital outlay of over half a million dollars for a completely mechanized system including a feller-buncher, grappler skidder, and 22-inch chipper. The contractor produced chips at the landing at a base cost of $11.52 per green ton. Transportation to Burlington added $.104 per ton-mile, or about $3.80 per green ton. This put the total cost at $15.32 per green ton, exclusive of stumpage, landing preparation, tree marking, management and other incidental costs. The operation ran for 9.75 hours per day before reaching the break-even point at the current market price of $15.75 per green ton.

With wood energy markets expanding, whole-tree harvesting has gained economic appeal.



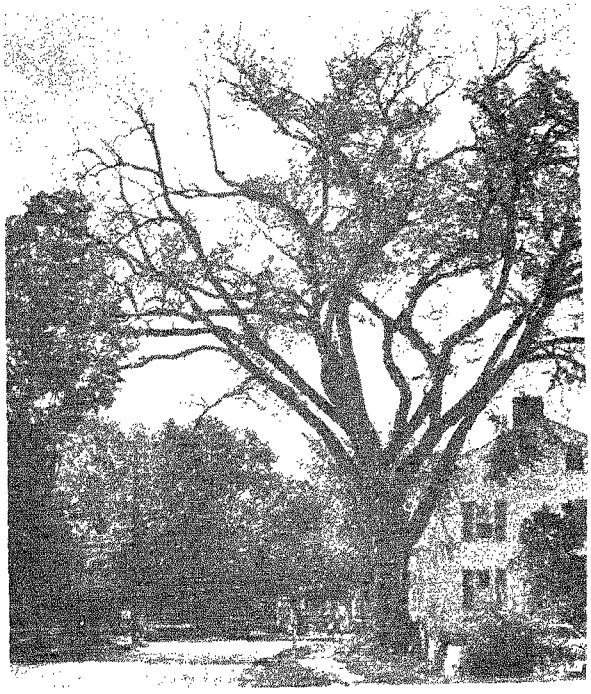
Healthier Elm Trees

Dutch elm disease kills about 400,000 elms every year. Though losses cannot be measured precisely, they are estimated at more than $200 million per year.

Still, an estimated 10 million mature elms shade city streets throughout the United States. They are favored for their rapid growth, graceful limb structure, tolerance of adverse environments, and vaselike form.

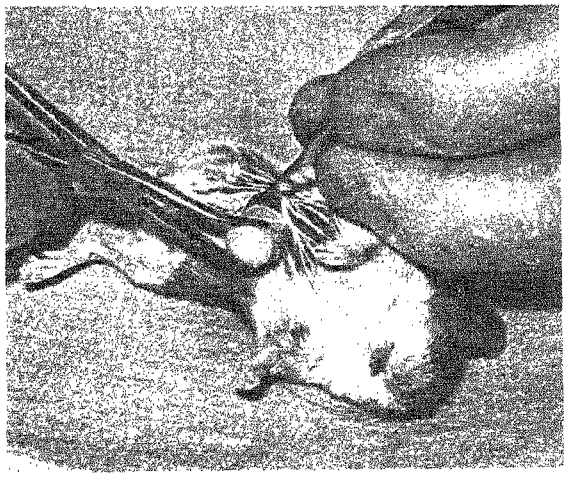
Research has provided much useful information on control of the disease and its vectors. The methods developed include intensive sanitation procedures, insecticide sprays, and fungicide injections. Conscientiously applied, these techniques provide a cost-effective means of disease control for high value urban trees.

Intensive research continues in an effort to improve available techniques. Northeastern Station scientists are contributing to this effort, which will result in a number of integrated pest management strategies. These strategies will provide users with options that take into account such variables as budget, manpower, owner attitudes, importance of elm in the landscape, and severity of the disease.



Researchers develop integrated strategies to combat Dutch elm disease, a major killer.

Mouse receives an implant that will help scientists trace its fate.



The White-Footed Mouse

This tiny, nocturnal, elusive mammal is an important predator of the gypsy moth, feeding on larvae, pupae and adult moths. To get the most benefit from an effective natural enemy of the gypsy moth, scientists at the Northeastern Station are trying to determine the factors responsible for mortality of the mouse.

Because of its size and habits, it is difficult to track and observe. So scientists decided to "bug" the rodents with heat-sensitive radio transmitters connected to a radio telemetry monitoring system. Mice weighing as little as 0.9 grams were implanted with a miniature device that sent out a signal when a mouse died and its body temperature dropped.

Transmitted from a grid of antennas 15 meters on center, the signal triggered an alarm that led researchers to its location, and thus to evidence of the cause of death.

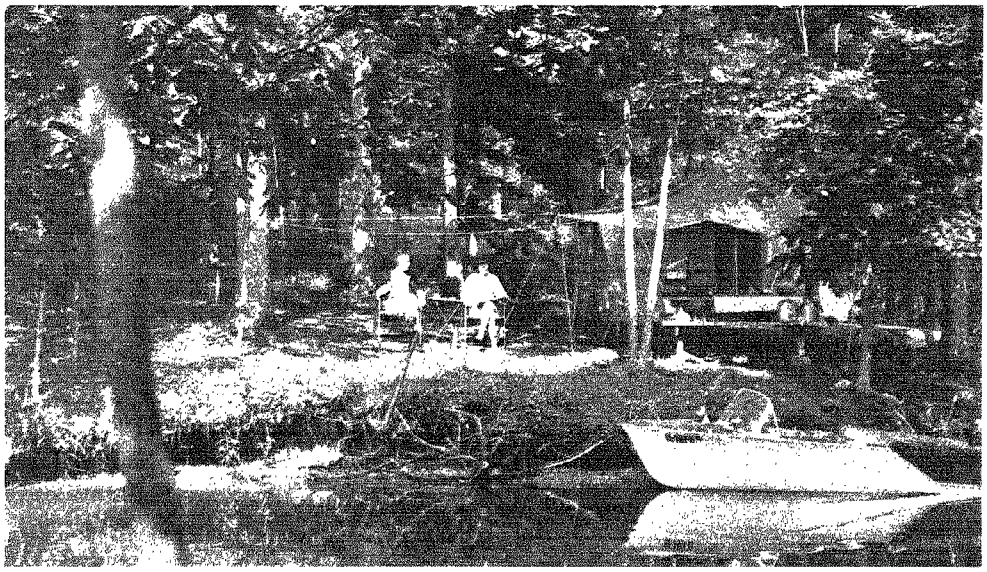
This technique has been adapted for use in monitoring beaver, otter, and even sharks. White-footed mice showed no adverse effects from the implants; eating habits, growth, reproduction, activity, and survival remained normal. Scientists successfully implanted transmitters into preweaned mice, the smallest mammals known to receive the device.

Camping Trends

Camping and recreational vehicle use continue to gain in popularity. According to a 1979 survey, camping now ranks third among outdoor recreation activities, outdistanced only by swimming and bicycling.

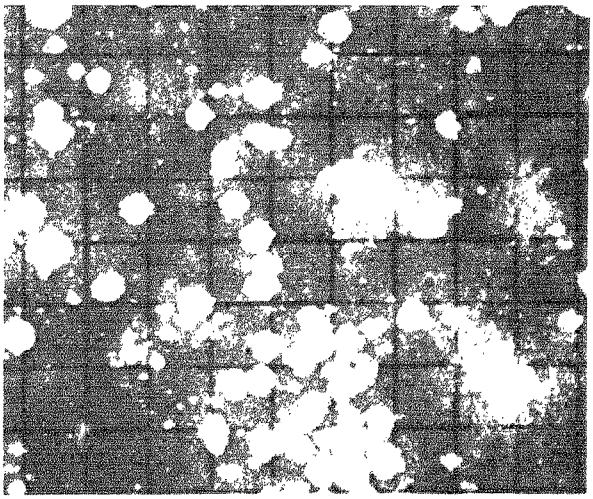
Other statistics show continual changes in the camping market. For instance, figures showed that by 1978 inactive campers--those who have, but don't now camp —outnumbered active campers nationwide, with people under 30 showing the greatest tendency toward nonparticipation. Overall, the industry slowed in the 1970s, but the share of sites in franchised campgrounds increased. In 1979, campground occupancy fell 14 percent, an apparent result of gasoline shortages. But 1980 saw partial recovery of occupancy rates in all areas except the north central states.

Recently, researchers at the Northeastern Station began to look beyond numbers of visitors as the only measure of success in recreation resource management. Using a simple 2 or 3 minute report card distributed to randomly selected visitors throughout the camping season, the researchers are measuring visitor satisfaction based on 14 elements of a campground visit. Each element is graded on a scale from "A" (excellent) to "E" (poor). These letter grades are converted to numeric scores. Campground managers use a sensitive 8-point scale to monitor the slightest change in the level of satisfaction of visitors at a given campground or throughout the system. Tested at public campgrounds in three states, the system is now in its fourth year of operation at all New Hampshire state parks.



Camping continues to be a favorite recreational activity.

Colonies of Bt are cultured after spraying to evaluate the spray deposits.

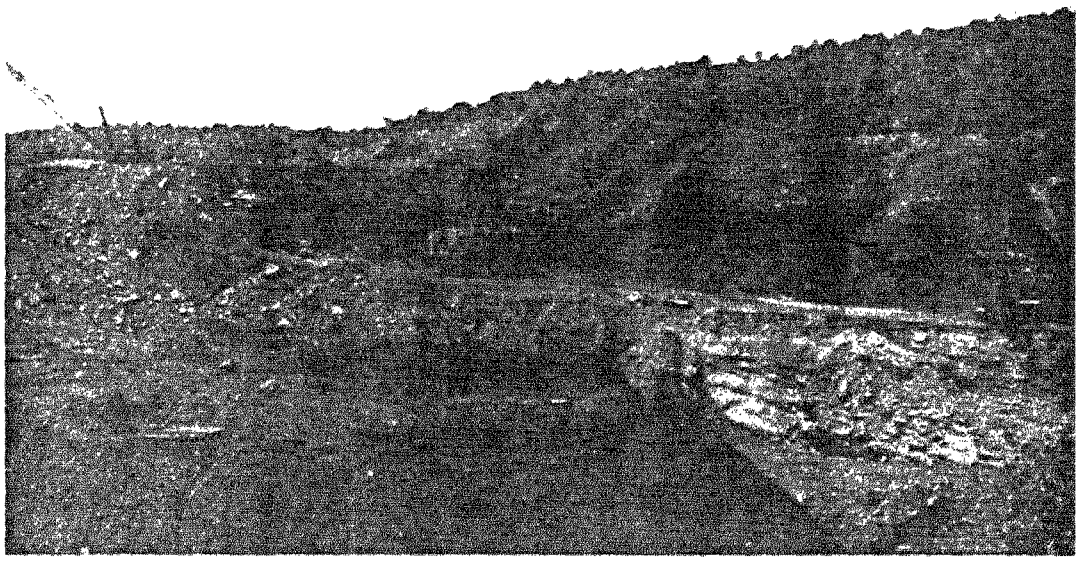


Better Biological Controls for Forest Pests

A primary goal of Northeastern Station research is to incorporate biological control measures into pest management systems for the gypsy moth and spruce budworm. Microbial materials, particularly the bacterium Bacillus thuringiensis (Bt), have shown tremendous potential, but often give erratic results.

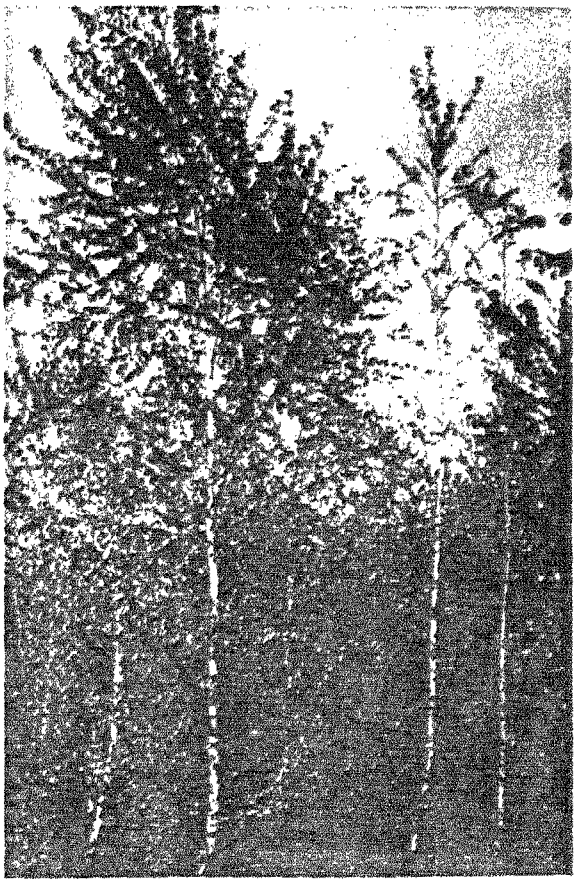
Scientists at the Forest Insect and Disease Laboratory in Hamden, Connecticut, have identified several strains of Bt that appear to be 10 to 20 times more potent than the strain that is currently on the market. Commercial concerns are eager to test these new strains in the field.

As far as we know, the Hamden unit is the first to discover these more potent strains of Bt. The prospect of more effective and uniformly active biological controls, though yet to be proven in field use, is an encouraging development for the gypsy moth and spruce budworm control efforts.



Strip-mining often creates an environmental wasteland.

Grey birch grows on a reclaimed mine spoil in Pennsylvania.



Revegetated Spoil Banks

In Pennsylvania's bituminous region, approximately 240,000 acres of abandoned coal-mined land lie unreclaimed. Similar areas are scattered throughout other Appalachian states. Alongside these lands are some that have been successfully reclaimed, mostly with plantings of black locust.

To aid revegetation efforts and assure a good selection of plantings, scientists at the Northeastern Station grew and evaluated trees and shrubs on 10 types of acid strip mine spoils in Pennsylvania during an 11-year period. They found that grey birch and European white birch survived and grew better than other species on extremely acid minespoils—those with pH 3.1 to 3.6. Scotch pine and locust grew well on spoils with pH 3.5 or higher. Sawtooth oak, black locust, autumn olive, Japanese fleeceflower, and one strain of European alder flourished on only a few plots.

From greenhouse studies, they learned that yellow-poplar seedlings grew best on soils collected from sites reclaimed with black locust, rather than those where ash, white pine, or other yellow-poplar grew. They attribute the superior growth to higher levels of nitrogen in the black locust soils.

This information will help agencies, industries, or individuals responsible for revegetating old surface-mine sites, or those who are interested in converting black locust stands to yellow-poplar for wood products.

Bibliography

Single free copies of all entries marked with an **A** are available upon request from the Northeastern Forest Experiment Station, 370 Reed Road, Broomall, PA 19008.

For copies of other articles, contact a university library or the Northeastern Forest Experiment Station's author or co-author. Boldface capital letter to the right of the last line in each annotation is the key (inside back cover) to the NEFES's author's location.

Addley, Robin G.; Nolley, Jean W., compilers. **Connecticut's Secondary Wood Industry: a utilization summary and directory.** Hartford, CT: Connecticut Department of Environmental Protection; 1981. 50 p.
Identifies secondary wood-using markets in the State of Connecticut that are available to primary wood producers, and buyers and sellers of manufactured wood products. **K**

Alekseyev, V. A.; Dochinger, L. S. **Forest ecosystems and air pollution.** USSR Mose. Acad. Sci. For. 5:64-71; 1981.
To evaluate and predict the interaction between forest ecosystems and air pollutants, it is necessary to know diagnostics of plant and community damage; problems of pollutant phytoindication; chemism of precipitation and its transformation under tree canopy; absorption of pollutants by forest communities and soils; structural-functional mechanisms of plant resistance to pollutants; and changes in composition, structure, and productivity of forest communities. **E**

Allison, J. R.; Gregory, G. F. **How to save Dutch elm diseased trees by pruning.** Broomall, PA: USDA For. Serv. Northeast. Area, State and Priv. For.; 1979; NA-GR-9. 4 p.
Results of a 1976 research project to evaluate pruning and fungicide injection showed that success in freeing elm of Dutch elm disease by pruning depends on the extent of foliar symptoms and whether all limbs with streaking can be pruned out. Describes the steps to follow when pruning. **A**

Anderson, R. Bruce. **Potential for upgrading of low-valued hardwoods.** In: Proceedings of the ninth annual hardwood symposium of the Hardwood Research Council; 1981 May 25-28; Pipestem, WV. Asheville, NC: Hardwood Research Council; 1981: 72-77.
More than half of all available hardwood timber presently cannot be harvested and sawed into standard hardwood lumber at a profit. Current research efforts seek to increase the use of this low-valued resource. Research results include alternatives to conventional technology and development of higher-value end products from this resource. Short-log and short-lumber systems are outlined that provide a high-value end product—furniture dimension cuttings or standard-size blanks from small-diameter logs. Gang ripping first of 2 Common lumber is discussed as an alternative to the traditional crosscut-first cutup procedure for lumber. These areas provide great opportunity for better use of the available hardwood resource. **K**

Anderson, R. Bruce; Reynolds, Hugh W. **Simulated sawing of squares: a tool to improve wood utilization.** 1981; USDA For. Serv. Res. Pap. NE-473. 7 p.
Manufacturers of turning squares have had difficulty finding the best combination of bolt and square sizes for producing squares most efficiently. A computer simulation technique has been developed for inexpensively determining the best combination of bolt and square size. Ranges of bolt diameters to achieve a stated level of yield are given. The manufacturer can choose which bolt sizes to use for sawing squares based on sawing method used, the range of bolt diameters available, and the size of square to be produced. **A**

Arntman, P. A. **Standard-sized blanks instead of lumber—a potential market for tropical hardwoods.** In: Proceedings Symposium on Technical and Economical Development in Furniture Industry; 1979 Nov. 5-10; Poznan, Poland. 9 p.
Standard-size kiln-dried hardwood blanks of specific length, width, thickness, and quality can be used instead of lumber to produce furniture and kitchen cabinet parts. Standard sizes for blanks were developed by analyzing rough-dimension part requirements from 20 furniture companies and 12 kitchen cabinet companies. By producing blanks instead of lumber for the U. S. furniture and kitchen cabinet markets, countries that produce tropical hardwood could increase revenues and provide additional jobs by making higher value products, reducing shipping costs, and using the resulting waste for energy or other products. **K**

Arner, Stanford; Seegrist, Donald W. **"Missing": A computer program for the maximum likelihood estimates of the parameters of the multivariate linear model with incomplete measurements.** 1980; USDA For. Serv. Gen. Tech. Rep. NE-56. 19 p.
Describes a computer program that obtains maximum likelihood estimates of the parameters of a multivariate linear model in which all variates may not be measured on each experimental unit. The variates can be: (1) repeated measurements on the same characteristic, (2) different characteristics, or (3) a mixture of repeated measurements and different characteristics. **A**

Auchmoody, L. R. **Growth and nutrition of planted Allegheny hardwoods.** (Abstr.) In: Johnson, Paul S.; Garrett, H. E., compilers. Workshop on seedling physiology and growth problems in oak planting;

1981; USDA For. Serv. Gen. Tech. Rep. NC-62. p. 22.
Research conducted in northwestern Pennsylvania during the past 5 years has shown that intensive browsing by deer as well as severe nitrogen and phosphorus deficiencies in the soil are inimical to the success of planted Allegheny hardwoods. Planted seedlings must be protected against browsing and must be fertilized if they are to survive and grow at acceptable rates. **N**

Barnard, Joseph E. **Accessing existing data.** In: Royer, J. P.; Convery, F. J., eds. Nonindustrial private forests: Data and information needs. Durham, NC: Sch. For. and Environ. Studies, Duke Univ.; 1981: 121-122.
Data describing the forest resource and the owners of that resource are available. Obtaining this information is a time consuming and often frustrating process. A logical framework for obtaining the needed data is presented. **A**

Barnes, Robert B. **Wildlife habitat from a forest resource inventory: is it possible?** In: 1979 Transactions of the Northeast Section The Wildlife Society 36:151-159; 1979.
The USDA Forest Service, Northeastern Forest Experiment Station, is investigating wildlife habitat evaluation in conjunction with the continuing resource inventory efforts of the Forest Survey. Building on past work by project scientists, and ideas from the literature, current efforts include: (1) using timber resource data in habitat evaluations, (2) refining field procedures for collecting nontimber resource data, (3) reviewing techniques for evaluating land use patterns, and (4) developing specific habitat evaluation procedures. **A**

Barnes, Robert B. **A procedure to develop location coordinates for sample points from inventory sampling.** Fort Collins, CO: USDA For. Serv., Rocky Mt. For. and Range Exp. Stn. and Denver, CO: USDI Bur. Land Manage.; 1980; Resour. Eval. Newsl. May:1-3; 1980.
Describes a procedure for assigning UTM coordinates to air photo sample points from an extensive resource survey. Two methods for subsequent selection of sample points by coordinate location are mentioned. **A**

Barnes, Robert B.; Barnard, Joseph E. **A wildlife habitat survey as part of a multi-resource evaluation procedure.** In: Forest resources inventories, workshop proceedings; Vol. I; 1979 July 23-26; Fort Collins, CO. Fort Collins, CO: Colorado State University; 1979:77-89.
The Resource Evaluation Unit of the Northeastern Forest Experiment Station is developing a wildlife habitat survey and evaluation program to be included in their ongoing forest resource assessments. This paper addresses: (1) a short review of the history of wildlife oriented studies in Resource Evaluation, (2) the present status of the Northeastern wildlife habitat survey and evaluation process, and (3) the future objectives of this program. A brief critique of the program is presented. **A**

Barnes, Robert B.; Porter, William F. **Application of existing land use and natural resource surveys to regional wildlife habitat evaluation.** (Abstr.) In: Midwest Fish and Wildlife Conference 42:130-131; 1980. **A**

Batzer, Harold O.; Jennings, Daniel T. **Numerical analysis of a jack pine budworm outbreak in various densities of jack pine.** Environ. Entomol. 9:514-524; 1980. **I**

Bauch, J.; Shigo, A. L.; Starck, M. **Wound effects in the xylem of Acer and Betula species.** Holzforschung 34:153-160; 1980. **F**

Baumgras, John E. **Biomass yields from Allegheny hardwood thinning.** 1980; USDA For. Serv. Res. Pap. NE-466. 7 p.
To determine the yield of whole-tree biomass available from thinning Allegheny hardwoods, 64 sample plots were thinned in poletimber--small sawtimber stands located near Elkins, West Virginia. Biomass yields were derived from cut stand data and whole-tree weight equations, and averaged approximately 60 green tons per acre. Regression equations are given for predicting per-acre green-weight and dry-weight biomass yields from the square feet of basal area and the number of trees removed per acre of thinning. **A**

Baumgras, John E. **Logging systems analysis: finding the weak link in your operation.** In: Proceedings of the Rocky Mountain Forest Industries Conference; 1980 May 7-10; Jackson, WY. Saratoga, WY: Wyoming Timber Industry Association; 1980.
The Weak Link Logging Systems Analyzer is a management tool that loggers can use to locate production bottlenecks, determine expected production, and estimate harvesting costs. With data supplied by the user, the Weak Link process develops cost rates for the machines and the logging system, and production rates for each phase of the operation. This information is combined in a production-cost analysis that determines logging costs in dollars per M bm. The three-part Weak Link process can be adapted to most timber harvesting systems. **K**

Baumgras, John E. **The yield of sawbolts and sawlogs from the thinnings in Appalachian hardwoods.** In: Proceedings of the ninth annual hardwood symposium of the Hardwood Research Council; 1981 May 25-28; Pipestem, WV. Asheville, NC: Hardwood Research Council; 1981.
Seventeen stands of Appalachian hardwoods in West Virginia and Virginia were sampled to determine product yields available from thinning. Roundwood yields averaged 1,319 ft^3 per acre. The average per-acre yield of sawable products was 4,142 board feet, International 1/4-inch Log Scale, including 2,658 board feet of Factory Grade sawlogs, and 1,484 board feet of

sawbolts. Results include the distribution of sawlog and sawbolt volume by log diameter, length, and grade. The development and application of thinning yield models is discussed. K

Berry, Frederick, H. **Evaluation of chestnut test plantings in the Eastern United States.** 1980; USDA For. Serv. Res. Pap. NE-454. 5 p.
In the spring and summer of 1978, 15 chestnut test plots that had been established between 1947 and 1955 were reexamined and all living chestnut trees critically evaluated. Ten percent of the 250 surviving hybrid chestnuts were blight resistant, and had the timber form and rapid growth of the American chestnut, Castanea dentata. A

Berry, Frederick H. **Decay in oak trees inoculated with four decay fungi.** Phytopathology 71(2):203; 1981.
In 1969, 80 trees each of scarlet oak (Quercus coccinea Muenchh.), black oak (Q. velutina Lam.), and white oak (Q. alba L.) were inoculated with cultures of Polyporus compactus Overh., Laetiporus sulphureus (Bull. ex Fr.) Bond. et Sing., Phlebia chrysocrea (Berk. et Curt. in Berk.) Burds., and Inonotus andersonii (Ell. et Ev.) Cerny. Forty trees of each species were felled in 1974 and decay development after 5 years reported. In 1979, the remaining trees were felled, sectioned, and examined for decay. After the 10-year development period no significant difference was found between the upward and downward spread of decay from the point of inoculation. E

Bevington, John M.; Hoyle, Merrill C. **Temperature and light interactions in the germination of seeds of paper birch (Betula papyrifera Marsh.).** (Abstr.) Plant Physiol. Suppl. 65(6):102; 1980. F

Birch, Thomas W. **Private forest-land owners in Ohio. Characteristics and attitudes.** Ohio Woodlands 19(2):7-9.
Ninety-four percent of Ohio's 6.9 million acres of commercial forest land is held by 332,600 private owners. These landowners are an important link between the population and the land. Forty-eight percent of the forest land is in ownerships of fewer than 50 acres. Individual and joint ownerships hold 5.2 million acres of commercial forest land. Benefits other than timber production are important to most landowners. The availability of these lands for timber production remains good. An estimated 36,000 owners have received some type of forestry assistance; these owners hold 1.6 million acres. A

Birch, Thomas W.; Dennis, Donald F. **The forest-land owners of Pennsylvania.** 1980; USDA For. Serv. Resour. Bull. NE-66. 90 p.
A statistical analytical report of a mail canvass of private commercial forest-land owners in Pennsylvania. The study was conducted in conjunction with the third forest survey of Pennsylvania by the USDA Forest Service. Discussion includes landowner characteristics, attitudes, and intentions of owners regarding reasons for owning, recreational use, timber management, and harvesting. A

Blum, Barton M. **Red spruce.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 19.
Describes the red spruce forest type, including associated tree species, geographic distribution, type variants, and associated understory vegetation. I

Blum, Barton M.; Frank, Robert M.; Gordon, Alan G. **Red spruce—yellow birch.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 21.
Describes the red spruce—yellow birch type, including associated tree species, geographic distribution, type variants, and associated understory vegetation. I

Blum, Barton M.; Klaiber, Harold M.; Randall, Arthur G. **Northeastern spruce-fir.** In: Choices in silviculture for American forests. Washington, DC: Society of American Foresters with cooperation of the Wildlife Society; 1981:11-15.
Discusses the general characteristics of the northeastern spruce-fir forest, and briefly describes alternative silvicultural systems and their advantages and disadvantages for the production of all forest products. Written primarily for the layman. I

Blum, Barton M.; Solomon, Dale S. **Growth trends in pruned red spruce trees.** 1980; USDA For. Serv. Res. Note NE-294. 6 p.
The diameter growth of red spruce with 1/6, 1/3, and 1/2 crown removed was compared with that of unpruned trees for 18 growing seasons. Although removal of 1/6 of the live crown did not adversely affect annual radial growth, compared with that of the controls, removal of 1/3 and 1/2 had a significant effect on the cumulative radial growth for 2 and 9 growing seasons, respectively. A

Blyth, James E.; Bones, James T. **Pulpwood production in the Northeast and North Central States in 1979.** North. Logger 29(4):16-17; 1980.
Twenty-one Northeastern and North Central States produced 14.2 million cords of pulpwood in 1979. Seventy-seven percent of the pulpwood came from roundwood. Six states—Maine, New York, Pennsylvania, Michigan, Minnesota, and Wisconsin—produced four-fifths of the region's pulpwood. A

Bones, James T. **Availability of wood for energy production in Kentucky.** South. Lumberman 241(2992):99-102; 1980.

Forest biomass is a renewable source of energy. It can be burned directly or converted to gas, oil, and char. To achieve the aboveground biomass potential of Kentucky timber stands, existing sources of energy wood were identified and their availability was assessed. Primary sources of biomass for energy production included harvesting and manufacturing residues, growing stock mortality, and wood from forest land clearing. Reserve sources, which depend on the development of efficient extraction techniques and a conscious reordering of current government policies, included rough and rotten trees, low-quality trees, and the uncommitted portion of net annual growth on commercial forest lands. **A**

Bones, James T. **Time series analysis of monthly pulpwood use in the Northeast.** 1980; USDA For. Serv. Res. Note NE-288. 4 p.

Time series analysis was used to develop a model that depicts pulpwood use in the Northeast. The model is useful in forecasting future pulpwood requirements (short term) or monitoring pulpwood-use activity in relation to past use patterns. The model predicted a downturn in use during 1980. **A**

Bones, James T. **Forest-land clearing and wood recovery in Maryland.** 1980; USDA For. Serv. Res. Note NE-290. 6 p.

Changing land use often results in removal of the existing forest cover. During a resurvey of Maryland's timber resources, a study was conducted to measure the losses of wood fiber attributable to forest-land clearing. An estimated 107 million cubic feet of growing stock were destroyed on 164,000 acres of commercial forest land cleared between 1961 and 1972. For fuel purposes, this represents a gross energy loss of 24.1 trillion Btu. Much of the recovered industrial wood came from forest lands cleared in rural areas, and much of the recovered firewood came from forest lands cleared in urban-suburban areas. **A**

Booker, C. Edith. **Free and bound amino acids in the ectomycorrhizal fungus Pisolithus tinctorius.** Mycologia 72(5):868-881; 1980.

Amino acids produced in vitro by ectomycorrhizal fungus Pisolithus tinctorius were analyzed by gas-liquid chromatography. The synthesis exhibited by P. tinctorius suggests that alanine as well as glutamic acid may be a route by which amino compounds are formed from inorganic nitrogen. The presence of arginine, citrulline, ornithine, and free ammonia in the free pool may be an indication that the ornithine cycle is operative in this fungus. The pattern of free ammonia production suggested urease activity resulting from the reduction of arginine.

Brann, Thomas; Solomon, Dale S.; Triandafillou, Peter H. **Spruce budworm growth impact study 1980 report.** Orono, ME: University of Maine; 1981; Misc. Rep. 257.

Mortality was higher in all forest types in 1980 as compared to that of 1976. The major cause of mortality in both forest types was attributed to spruce budworm activity. With the exception of balsam fir, harvest removals exceed budworm mortality for that period. After budworm mortality and harvest removals, blowdown was the largest contributor to losses through mortality. **I**

Bringi, Sreedevi K.; Seliga, Thomas A.; Dochinger, Leon S. **A method of selecting forest sites for air pollution study.** 1981; USDA For. Serv. Res. Pap. NE-472. 15 p.

Presents a method of selecting forested areas suitable for meaningful assessments of air pollution effects. The approach is based on the premise that environmental influences can significantly affect the forest-air pollution relationship, and that it is, therefore, desirable to equalize such influences at different sites. From existing data on environmental factors and air pollution monitoring data, a method of placing transparent overlays on maps was developed to identify forested areas that have common environmental characteristics but significantly different potential for air pollution. **A**

Brush, Robert O. **Forests can be managed for esthetics: A study of forest-land owners in Massachusetts.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. I; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 349-360.

A large proportion of forest-land owners in the Northeast derive primarily esthetic and recreational benefits from their properties. Yet few of these owners seek out foresters for advice in managing their land. Results of a recent study in Massachusetts show that many owners find managed stands to be more attractive than unmanaged stands. More private owners might agree to place their woodlands under scientific management if they could see how their holdings would appear when managed for a diversity of stand structures. **L**

Brush, Robert O. **Forest esthetics: as the owners see it.** Am. For. 87(5):15-19, 46; 1981.

Forest management on private woodlands can produce a variety of attractive settings for outdoor recreation and visual enjoyment along with desired and useful wood products. A random sample of owners in Massachusetts was used to rate 20 forest sites on attractiveness, and showed that the appearance of managed stands and small clearings were among the most attractive. **L**

Brush, Robert O. **Land forms and scenic preference: a research note.** Landscape Plann. 8(3):301-306; 1981. **L**

Brush, Robert O. **Review of "Nature in cities: the natural environment in the design and development of urban green space."** Urban Ecol. (4):339-340; 1980. **L**

Brush, Robert O. **The visual experience in forests used for dispersed winter recreation.** In: North American symposium on dispersed winter recreation; 1980 February 27-29; St. Paul, MN. St. Paul, MN: University of Minnesota; 1980:91-94.
The forest setting used for winter recreation could be made more interesting by managing stands for their spatial qualities. Various silvicultural treatments are suggested that could vary the spatial quality of forest stands along recreational trails. L

Brush, Robert O.; Neville, Leo R. **The visual screening potential of forest vegetation in urban areas.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. I; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 824.
Poster session display on the results of a study to estimate quantitatively the screening potential of different forest types in Massachusetts. L

Brush, Robert O.; Palmer, James F. **Measuring the impact of urbanization on scenic quality: Land use change in the Northeast.** In: Elsner, Gary H.; Smardon, Richard C., Tech. coord. Proceedings of our national landscape; 1979; USDA For. Serv. Gen. Tech. Rep. PSW-35. p. 358-364.
The changes in scenic quality resulting from urbanization are explored for a region in the Northeast. The relative contributions to scenic quality of certain landscape features are examined by developing regression models for the region and for town landscapes within that region. The models provide empirical evidence of the importance of trees for maintaining high scenic quality in areas undergoing urbanization. L

Butin, Heinz; Shigo, Alex L. **Radial shakes and "frost cracks" in living oak trees.** 1981; USDA For. Serv. Res. Pap. NE-478. 21 p.
Dissections of hundreds of living, mature oak trees over a 25-year period revealed that radial shakes (or "frost cracks") and ring shakes are associated with a variety of wounds and stubs of branches and basal sprouts. A more intensive study of radial shakes confirmed earlier findings, and provided additional data on radial shakes. Radial shakes were most common in mature oaks that had been wounded, and where basal sprouts died when the dominant tree was less than 20 cm in diameter at 1.4 m aboveground. Radial shakes—frost cracks—are not caused by frost, though frost can be major factor in their continued development. Radial shakes can be prevented by proper management procedures that minimize basal wounds and by early pruning of branches and basal sprouts. A

Cameron, E. A.; McManus, M. L. **The gypsy moth (Lymantria dispar) in the United States: Current status of pest management.** In: 1980 International Symposium on Integrated Control in Agriculture and Forestry; 1979 October 8-12; Vienna, Austria. 1980:537-538. G

Cameron, E. A.; McManus, M. L.; Mason, C. J. **Dispersal and its impact on the population dynamics of the gypsy moth in the United States of America.** Bull. Entomol. Soc. Suisse 52:169-179; 1979. G

Cannon, William N., Jr.; Worley, David P. **Dutch elm disease control: performance and costs.** 1980; USDA For. Serv. Res. Pap. NE-457. 8 p.
Municipal programs to suppress Dutch elm disease have had highly variable results. Performance as measured by tree mortality was unrelated to control strategies. Costs for control programs were 37 to 76 percent less than costs without control programs in the 15-year time-span of the study. Only those municipalities that conducted a high-performance program could be expected to retain 75 percent of their elms for more than 20 to 25 years. This is an updated revision of USDA Forest Service Research Paper NE-345. A

Capen, D. E.; Cooper, R. J.; DeGraaf, R. M. **Population trends of northeastern birds.** Trans. Northeast Fish and Wildl. Conf. 36:69-75; 1979. B

Carey, Andrew B. **Multivariate analysis of niche, habitat, and ecotype.** In: Capen, David E., ed. The use of multivariate statistics in studies of wildlife habitat; 1981; USDA For. Serv. Gen. Tech. Rep. RM-87. p. 104-113.
Comprehension of the components of a species' response to an environmental complex can be achieved best by partitioning the full range of environmental factors potentially affecting the species (the ecotope hyperspace) into intercommunity factors (the niche hyperspace). Hyperspaces, and the parts of hyperspaces occupied by a species (hypervolumes), are defined by multidimensional coordinates. Reduction in the number of dimensions of these hyperspaces and hypervolumes to increase comprehension of a species' response to them can be accomplished through multivariate analyses. H

Carey, Andrew B.; Gill, John D. **Firewood and wildlife.** 1980; USDA For. Serv. Res. Note NE-299. 5 p.
The increased demand for firewood threatens the habitat of many wildlife species. Dead or dying trees that commonly are cut for firewood are vital to wildlife species that nest in tree cavities. Likewise, healthy trees of many species preferred for firewood are important components of wildlife habitat. Tree species or species groups are value-rated for both firewood and wildlife so that the ratings can be used to decide how to manage a woodland for fuel and wildlife. A

Carey, Andrew B.; Healy, William M. **Cavities in trees around spring seeps in the maple-beech-birch forest type.** 1981; USDA For. Serv. Res. Pap. NE-480. 7 p.
We examined 913 trees of 15 species in the vicinity of eight spring seeps in a second-growth maple-beech-birch forest. We found that 18 percent of the trees had large dead limbs that indicated top rot. We found 37 cavities in 27 trees (3.0 percent). Only seven cavities were being used by wildlife, and mice (Peromyscus sp.)

used these as dens. The low density of cavities was not sufficient to maintain "fair" populations of cavity-nesting birds, and cutting trees to improve the seeps for wildlife would have little overall effect on cavity-using wildlife. **A**

Carey, Andrew B.; Sanderson, H. Reed. **Routing to accelerate tree-cavity formation.** Wildl. Soc. Bull. 9(1):14-21; 1981.
Tree routing, as a means of accelerating the formation of cavities in trees, has potential as a habitat management technique for a variety of cavity-nesting wildlife species. To evaluate routing as a technique, cavities were routed in 48 red maples, 48 northern red oaks, and 48 white oaks. After 3 years, 139 trees were still structurally sound, but 5 red maples had fractured at the routing site. About a third of the cavities contained standing water; 18 percent were closed by callus. Partially closed cavities (about 80 percent of all cavities) were used by southern flying squirrels for feeding and denning. Further research is needed before routing can be recommended as a habitat management technique. **H**

Carroll, J.; Tattar, T.; Wargo, P. M. **Root starch content in declining urban maples.** (Abstr.) Phytopathology 71:558; 1981. **H**

Cokendolpher, James C.; Horner, Norman V.; Jennings, Daniel T. **Crab spiders of north-central Texas (Araneae:Philodromidae and Thomisidae).** J. Kans. Entomol. Soc. 52(4):723-734; 1979.
Over 2,000 specimens representing 20 species and four genera of Philodromidae and 19 species and eight genera of Thomisidae were examined from north-central Texas. A mature female Xysticus robinsoni Gertsch is reported for the first time. New state records and natural history data are presented. Thirty-seven species of plants from 14 families were utilized by Philodromidae and Thomisidae. **I**

Cole, Gerald L.; LaPage, Wilbur F. **Camping and RV travel trends.** In: LaPage, Wilbur F., chairman. The 1980 national outdoor recreation trends symposium; Vol. 1; 1980; USDA For. Serv. Gen. Tech. Rep. NE-57. p. 165-177.
Summarizes the results from industry sources and several regional and national camping market surveys conducted between 1960 and 1979. Growth of the industry, together with pricing practices, energy impacts, and occupancy data also were examined. By 1978, the number of inactive campers outnumbered active campers nationwide, with persons under 30 years of age showing the greatest tendency to become inactive. Growth of the industry slowed in the 1970's, but franchised campgrounds provided an increased share of sites. A decline in campground occupancy was noted in 1979 and appeared to be correlated with gasoline shortages. **F**

Considine, Thomas J., Jr. **West Virginia's wonderful woodlands.** Wonderful West Va. 44(4):2-3, 4-6; 1980.
A look at the past shows how fortunate West Virginians are to have today's "Wonderful Woodlands." **A**

Considine, Thomas J., Jr. **Maryland's forests--past and present.** Md. Conserv. 57(2):22-25; 1981.
Briefly describes changes in Maryland's commercial timber resource. Emphasizes that the value of Maryland's forests are closely related to a number of plentiful resources: water, soil, fish, and wildlife, which, in turn, create a large number of outdoor recreational opportunities. **A**

Considine, Thomas J., Jr.; Powell, Douglas S. **Forest statistics for Pennsylvania--1980.** 1980; USDA For. Serv. Resour. Bull. NE-65. 88 p.
A statistical report on the third forest survey of Pennsylvania conducted in 1977 and 1978. Statistical findings are based on data from remeasured 1/5-acre plots and both remeasured and new 10-point variable-radius plots. The current status of forest-land area, timber volume, and annual growth and removals is presented. Timber products output by timber industries, based on a 1976 updated canvass of manufacturers, is presented. **A**

Corbett, E. S. **Hydrologic evaluation of the stormflow generation process on a forested watershed.** Washington, DC: U.S. Dep. Inter. Off. Water Res. Technol.; 1979. Available from: NTIS, Springfield, VA; PB80-129133.
Under dry antecedent soil moisture conditions, the rising limb and hydrograph peak were produced by stormflow contributions from the channel and base slope zones, primarily in the front 30 percent of the watershed. Under wet antecedent soil moisture conditions, the front half of the watershed was the major stormflow generating area for the rising limb and the initial hydrograph peak. The back half contributed substantially to the delayed but maximum peak and the recession portion of the storm hydrograph. **M**

Corbett, E. S. **Water resources in the urban forest environment.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. 1; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 361-367.
Urban areas require large amounts of water to satisfy both domestic and industrial needs. The national water supply situation is reviewed along with the urban impact on water resources. Particular attention is given to new water quality problems and the importance of managing water source areas. The role of the forested municipal watershed in meeting the needs of urban residents is discussed. **M**

Corbett, Edward S. **Employing the urban forest for water quality and quality control.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. 1; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 431-432.
Summarizes the main thrust of papers presented during the National Urban Forestry Conference on the topic of employing the urban forest for water quantity and quality control. **M**

Cormier, Paula L.; Nystrom, Peggy S. **Trends in New Hampshire private campgrounds during the seventies.** 1981; USDA For. Serv. Res. Pap. NE-489, 12 p.
The findings of a 1980 census of commercial camping enterprises in New Hampshire are presented, including the growth of commercial camping enterprises from 1964 to 1980, campground characteristics, services and facilities, and the average costs and returns of operating a campground. This represents the third census of the New Hampshire campground industry. The data presented reflect the 1979 calendar year and are based on a survey of 138 campgrounds conducted by the USDA Forest Service in cooperation with the campground owners of New Hampshire. A

Corner, Sandy. **Christmas trees: A bibliography (1980 Supplement).** Am. Christmas Tree J. 24:38-40; 1980.
An annotated list of most recently published information on Christmas trees in North America. K

Cowling, Ellis B.; Dochinger, Leon S. **Effects of acidic precipitation on health and the productivity of forests.** In: Proceedings of symposium on effects of air pollutants on Mediterranean and temperate forest ecosystems; 1980 June 22-27; Riverside, CA. p. 165-173.
This brief paper summarizes certain important principles concerning the phenomena of acid precipitation and atmospheric deposition and their beneficial and detrimental effects on the health and productivity of forests. E

Craft, E. Paul. **Pallet stock yields from hardwood thinnings.** In: Proceedings of the ninth annual hardwood symposium of the Hardwood Research Council; 1981 May 25-28; Pipestem, WV. Asheville, NC: Hardwood Research Council; 1981.
Twenty-nine acres of hardwood poletimber—small sawtimber stands—were thinned. The trees removed produced an average of 3,000 board feet of sawable roundwood. Seventy percent was suitable for pallet production, 30 percent was of a higher quality than required for pallets. When the sawable roundwood is bucked into 4- and 6-foot long bolts, there is a gain of 11 percent in sawn materials per tree as compared to sawing 8-foot lengths. The gain is 17 percent compared to sawing 10-foot lengths. Fifty-two percent of the cubic volume of saw bolts can be recovered in pallet parts. K

Craft, E. Paul; Emanuel, David M. **Yield of pallet cants and lumber from hardwood poletimber thinnings.** 1981; USDA For. Serv. Res. Pap. NE-482. 6 p.
Four- and six-foot long bolts from poletimber thinnings were classified into five quality classes and three sweep classes. Cants and lumber for pallet parts were sawn. The effects of sweep and sound defects in the bolts on pallet part quality are described. A

Crawford, H. S. **Environmental impacts of uncontrolled budworm feeding.** Maine For. Rev. 13:16-18; 1980.
There are gains and losses to forest resources when stands are defoliated by spruce budworm. To evaluate environmental impacts of spray programs, the consequences of not controlling the insect must be evaluated. I

Crawford, H. S.; Hooper, R. G.; Titterington, R. W. **Songbird population response to silvicultural practices in central Appalachian hardwoods.** J. Wildl. Manage. 45(3):680-692; 1981.
We determined the relationship of functionally similar habitat variables that resulted from forest cutting to functionally responsive groups of birds. Discriminant analysis was used to separate bird species into five groups based on habitat selection. The most important habitat features were degree of canopy closure of trees greater than 7.3 m tall and density of vegetation less than 1.8 m tall. The bird groups were (1) closed canopy obligatory, (2) skewed toward open canopy, and (3) obligatory open canopy species. Multiple regression analysis was used to further explain the relationship of species to habitat. The response of each group to different silvicultural practices is described. I

Crawford, Hewlette S.; Titterington, Richard W. **Effects of silvicultural practices on bird communities in upland spruce-fir stands.** In: DeGraaf, Richard M.; Evans, Keith E., compilers. Proceedings of the workshop on the management of Northcentral and Northeastern Forests for nongame birds; 1979; USDA For. Serv. Gen. Tech. Rep. NC-51. p. 110-119.
Composition and density of bird populations in upland spruce-fir stands are influenced by the admixture of hardwoods with softwoods, the vertical and horizontal structure of the stand, and the extent of spruce budworm infestation of the stand. Silvicultural practices modify all three factors and influence bird populations. I

Crow, G. E.; Graber, R. E. **Research indicates hikers threaten endangered alpine plant.** Appalachia 47(5):7-8; 1981. F

Crow, Thomas R.; Jacobs, Rodney D.; Oberg, Robert R.; Tubbs, Carl H. **Stocking and structure for maximum growth in sugar maple selection stands.** 1981; USDA For. Serv. Res. Paper NC-199. 16 p. F

Cuppett, Donald G. **A modified inserted sawtooth for small log headrigs.** South. Lumberman 242(3016):113-114; 1981.
Results indicate that the modified tooth design would be advantageous for small log headrigs, especially on mills sawing cants from small unwashed or unbarked logs and bolts. Further experimentation is needed to fully evaluate the modified teeth. K

Cuppett, D. G.; Moore, C. H.; Craft, E. P. **Experimental and commercial drying 4/4 southern lowland red oak.** South. Lumberman 240(2973):8-10; 1980.

Because of excess drying degrade encountered by commercial users of southern lowland oak lumber, we investigated a variety of air drying, predrying, and kiln-schedule modifications designed to reduce degrade losses. We found that 4/4 southern lowland red oak can be dried successfully by carefully controlled predrying or air drying, followed by kiln drying on the standard T2-C1 schedule. Successful kiln drying from the green condition requires about twice the time as that for 4/4 upland red oak, and would be prohibitively expensive. Drying southern lowland oak separately from upland stock allows the use of the optimum schedule for each type of lumber, and results in more economical, better quality drying. K

Curtis, Willie R. **Planning surface mining activities for water control.** In: Youngberg, Chester T., ed. Forest soils and land use. Proceedings of the Fifth North American Forest Soils Conference; 1978 August 6-9; Fort Collins, CO. Fort Collins, CO: Colorado State University; 1980:366-375.

Planning surface mining activities for water control requires an understanding of basic hydrologic processes, including infiltration, soil water storage, surface storage runoff, peak flows, water yield, groundwater, and water quality. Discussed are results of research relating to surface mining and the conditions that affect various hydrologic processes. Several suggestions are offered on ways to control the water on surface-mine areas. C

Czapowskyj, M. M. **Intensive culture increases biomass of black spruce and white spruce planted on chipharvested clearcut in Maine.** Agron. Abstr. 1980:200; 1981.

Biomass production of planted black and white spruce was studied in relation to cultural and fertilization treatments on strongly acid spodosols that developed from glacial till derived from dark colored rocks. Treatments included: lime (L) LN, LP, LNP, and LNPK laid out in a randomized block design, with blocks split between two cultural levels: (a) chopping the slash and vegetation before planting and (b) as above, plus mowing for 3 consecutive years. I

Czapowskyj, Miroslaw M.; Safford, L. O.; Briggs, Russell D. **Foliar nutrient status of young red spruce and balsam fir in a fertilized stand.** 1980; USDA For. Serv. Res. Pap. NE-467. 16 p.

Average dry weight and nutrient levels in current foliage from red spruce and balsam fir saplings in the understory of a 25-year-old aspen birch stand were observed 3 years after N, P, and lime treatments were applied. Elemental concentrations were plotted as a function of needle weight and quantity of element per needle. A

Dale, Martin E. **The effect of thinning on growth and value development of young hardwood stands in the Eastern United States.** In: Biological, technical, and economic aspects of intensive thinning of young stands. Proceedings IUFRO Conference; 1980 October; Gottingen, W. Germany. p. 310-327.

Response in terms of quantity, value, and rate of return is given for an 80-year-old white oak stand thinned in 1959 to four density levels. At this stage of stand development, the compounded rate of return over 20 years compared favorably with total returns investors would have received from common stock in many of the largest U.S. corporations. Particular attention is placed on tree quality change and the large influence this has on the dollar value of yields. Stresses the need for more long-term growth and yield research data, particularly the need to quantify the rate of tree quality change associated with different thinning intensities. E

Davidson, Walter H. **Direct seeding for forestation.** In: Trees for reclamation; 1980; USDA For. Serv. Gen. Tech. Rep. NE-61. p. 93-97.

Direct seeding, an attractive alternative to planting, is not a simple method of forestation. Past experiences show far more failures than successes. Well documented procedures must be followed to ensure any degree of success. In general, conifers have given the best results. Black walnut and black locust are notable exceptions. Current research suggests that other hardwoods may be successfully direct-seeded. A

Davidson, Walter H. **Direct seeding for forestation.** In: Proceedings 1980 direct seeding of trees; 1981 April 8-10; Madisonville, KY. Madisonville, KY: Madisonville Community College; 1981; Reprinted from: Trees for reclamation; 1980; USDA For. Serv. Gen. Tech. Rep. NE-61.

Direct seeding, an attractive alternative to planting, is not a simple method of forestation. Past experiences show far more failures than successes. Well documented procedures must be followed to ensure any degree of success. In general, conifers have given the best results. Black walnut and black locust are notable exceptions. Current research suggests that other hardwoods may be successfully direct seeded. C

Davidson, Walter H. **Erosion control measures on Appalachian strip-mines.** In: Forest regeneration: proceedings of the symposium on engineering systems for forest regeneration; 1981; Am. Soc. Agric. Eng. Publ. 10-81:10-14.

Reviews the soil stabilization problem and gives examples of techniques to accomplish the various phases of a complete program. Soil stabilization consists of water diversion and soil protection through mulching, vegetation establishment, and chemical binders. The soil stabilization program in conjunction with sediment ponds must be established to attain the objectives of erosion control on surface mines: first to keep as much soil as possible on the site and second to trap or control any soil that is eroded to prevent off-site damage. C

Davidson, Walter H. **Rooting characteristics of grasses on topsoiled surface mines.** In: Graves, Donald H., ed. Proceedings, 1981 symposium on surface mining hydrology, sedimentology, and reclamation; 1981 December 7-11; Lexington, KY. Lexington, KY: University of Kentucky; 1981.

The effectiveness of topsoiling as a reclamation practice to enhance the establishment of herbaceous plants on surface mines was evaluated. Ground cover and root penetration were examined at 390 random sample points located on five sites in the bituminous region of Pennsylvania. Reclamation treatments for each site were documented. Topsoil depth was measured at each point and soil samples were collected for chemical analysis. C

Davidson, Walter H. **Timber volumes of old Pennsylvania surface mine reclamation plantations.** 1981; USDA For. Serv. Res. Note NE-303. 5 p.
Surface mine reclamation plantings established in Pennsylvania from 1919 to 1934 were evaluated to determine merchantable volume, presence and volume of volunteer species, and soil development since planting. The evaluation showed that planted conifers had a total volume of 744 M bm on the 150 acres of reclaimed surface mines. In addition, there were 356 M bm of volunteer hardwood species on the area. Examination of soil profiles showed development of distinct soil horizons in all the plantations. **A**

Davis, Weston; Shortle, Walter; Shigo, Alex. **Potential hazard rating system for fir stands infested with budworm using cambial electrical resistance.** Can. J. For. Res. 10(4):515-544; 1980.
Describes index values that may be useful in developing a hazard rating system for fir stands infected with spruce budworm. **F**

DeGraaf, R. M.; Evans, Keith E., compilers. **Management of north central and northeastern forests for nongame birds.** 1979; USDA For. Serv. Gen. Tech. Rep. NC-51. 268 p. **B**

DeGraaf, R. M.; Stihler, C. W. **Nesting habitats of five common suburban bird species.** Trans. Northeast Fish and Wildl. Conf. 36:52-59; 1979. **B**

DeGraaf, R. M.; Tilghman, Nancy G., compilers. **Management of western forests and grasslands for nongame birds.** 1980; USDA For. Serv. Gen. Tech. Rep. INT-86. 535 p. **B**

DeGraaf, R. M.; Witman, G. M.; Lanier, J.; Hill, B.; Keniston, J. **Forest habitat for birds of the Northeast.** USDA For. Serv., Northeast. For. Exp. Stn. and Eastern Region; 1981; 182 p. **B**

Demeritt, Maurice E., Jr. **50 years of hybrid poplar research in the Northeast.** In: Proceedings of the Twenty-seventh Northeastern Forest Tree Improvement Conference; 1980 July 29-31; Burlington, VT. Burlington, VT: University of Vermont; 1981:166-183.
Summarizes hybrid poplar research in the Northeast, including distribution, what we know and do not know about growing hybrid poplars, what studies are underway by the USDA Forest Service, and what is planned for the future. **F**

Demeritt, Maurice E., Jr. **Growth of hybrid poplars in Pennsylvania and Maryland clonal tests.** 1981; USDA For. Serv. Res. Note NE-302. 2 p.
Average 4-year height of 199 hybrid poplar clones ranged from 5.1 to 26.0 feet in Pennsylvania and 5.6 to 22.7 feet in Maryland. Several rapid-growing clones grew well at both locations, but height growth was affected by interactions of clones and location. The clones that grew best on both sites averaged 4 to 6 feet of height growth per year. **A**

Demeritt, M. E., Jr.; Garrett, P. W. **The Northeast pitch x loblolly pine hybrid program.** In: Research needs in tree breeding. 15th North Am. Quant. For. Gen. Group Workshop; Coeur d'Alene, ID. 1981:71-79. **F**

Dennis, Donald F. **Estate planning and forestry.** Consultant 25(2):43-45; 1980.
Estate planning can be extremely important for many forest-land owners. It is especially essential to owners of large tracts who have invested in forest management and want to pass the managed stand on to the next generation, and it must be considered when developing a forest plan. **A**

Dennis, Donald F. **Increasing timber volume enhances benefits from Kentucky's forests.** For. Farmer 39(3):8-9, 16-17; 1980.
A report on the present condition and trends of the forest resources of Kentucky. Both timber and nontimber values are considered as well as forest landowners attitudes toward their land. Past management practices are examined to determine their effect on the development of Kentucky's forest resource. The report is based primarily on data collected by the Resource Evaluation Unit. **A**

Dennis, Donald F. **Estate planning for forest-land owners.** Am. For. 87(1):11-14; 1981.
Explains why estate planning may be the most important element of a forest plan for many landowners. It is especially essential to owners of large tracts who have invested in forest management and want to pass the managed stand on to the next generation. **A**

Dennis, Donald F. **Maryland's forest-land owners.** Md. Conserv. 57(2):5-7; 1981.
Describes who owns Maryland's forests and why they own woodland. Private landowners hold the key to unlocking the great potential that Maryland's forests have to offer. **A**

Dennis, Donald F.; Birch, Thomas W. **Hunting and fishing clubs as woodland managers.** Pa. Game News 51(7):42-43; 1980.
Summarizes data from 53 questionnaires completed by Pennsylvania hunting or fishing clubs. The questionnaires were part of a larger ownership survey of the state's private forest-land owners, conducted by the Resource Evaluation Unit of the USDA Forest Service's Northeastern Forest Experiment Station. **A**

Dennis, Donald F.; Birch, Thomas W. **Forest statistics for Ohio—1979.** 1981; USDA For. Serv. Resour. Bull. NE-68. 79 p.
A statistical report on the third forest survey of Ohio conducted in 1978 and 1979. Statistical findings are based on data from remeasured and new 10-point variable-radius plots. The current status of forest-land area, timber volume, and annual growth and removals is presented. Timber products output by timber industries based on a 1978 updated canvass of manufacturers is presented. **A**

Despard, T. L.; Vogel, W. G. **Greenhouse and geochemical studies.** In: A study of geologic factors influencing reclamation of federal coal bearing lands in northern Alabama. Lexington, KY: University of Kentucky; 1981; p. 27-37. **C**

de Steiguer, J. E. **Landholding behavior of private forest owners and implications regarding productivity.** (Abstr.) In: 35th annual meeting, Forest Products Research Society; 1981:22. **K**

de Steiguer, J. E.; Massey, J. G. **Forestry research priorities of various user groups.** (Abstr.) In: 34th annual meeting, Forest Products Research Society; 1980: **K**

de Steiguer, J. E.; Massey, J. G. **Forestry research priorities of various user groups.** For. Prod. J. 31(10):86-88; 1981.
Nonparametric statistical procedures were used to compare the forestry research priorities of users from government, professional societies, industry, and environmental and consumer groups. The research priorities of industry were clearly at odds with those of the other four groups. Thus, special care must be taken to ensure that the views of industrial users are adequately represented in research planning. The study results will be helpful in obtaining representative public involvement for the planning of publicly administered forestry research. **K**

de Steiguer, J. E.; Merrifield, R. G. **The impact of the environmental era on forestry education in North America.** Unasylva 23(123):21-25; 1979.
Probably the most significant social phenomenon to have an impact on the professional forestry curricula was the era of environmental concern that began in the early 1960's. Educators in the United States and Canada capitalized on this new interest by marketing a variety of forestry courses dealing with environmental issues. The rapid expansion of new environmental course offerings seems to have subsided. Nevertheless, the environmental era has made a permanent mark on forestry education. **K**

DeWalle, D. R. **Manipulating urban vegetation for residential energy conservation.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. I; 1980; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 267-283.
Vegetation around a house can be used to reduce energy consumption for space heating and cooling. In winter, windbreaks are effective in reducing wind velocity and the infiltration of cold outside air. Shade trees are used to reduce the conduction of heat into the house in summer.

DeWalle, David R.; Heisler, Gordon M. **Landscaping to reduce year-round energy bills.** In: Cutting energy costs, The 1980 Yearbook of Agriculture. Washington, D.C.: U.S. Dep. Agric.; 1980:227-237. **M**

DeWalle, David R.; Heisler, Gordon M. **Water vapor mass balance method for determining air infiltration rates in houses.** 1980; USDA For. Serv. Res. Note NE-301. 7 p.
A water vapor mass balance technique that includes the use of common humidity-control equipment can be used to determine average air infiltration rates in buildings. Only measurements of the humidity inside and outside the home, the mass of vapor exchanged by a humidifier/dehumidifier, and the volume of interior air space are needed. This method gives results that compare favorably with those obtained with standard methods that include the use of CO_2 as a tracer gas. **A**

Doane, Charles C.; McManus, Michael L., eds. **The gypsy moth: Research toward integrated pest management.** U.S. Dep. Agric.; 1981; Tech. Bull. 1584. 757 p.
Assembles all known information on the gypsy moth into a single source. This work is a result of the Combined Forest Pest Research and Development Program enacted in 1974 to develop coordinated short-term programs to reduce chronic forest insect problems caused by the gypsy moth. Although it does not contain all the answers to the gypsy moth problem, it does contain new or improved methods for control. Equally important, this work defines continuing research and development needs essential to improve the methods for coping with this destructive insect. **G**

Dochinger, Leon S. **Book review: Effect of acid precipitation on terrestrial ecosystems.** BioScience 30(11):776-777; 1980.
The book presents an authoritative cross-section of current research on an important environmental problem. Numerous scientific disciplines were discussed and experts in these disciplines can provide reciprocal contributions in resolving the acidity dilemma. This publication is recommended as a standard reference for the uninitiated audience and those engaged in scientific exploration or teaching. **E**

Dochinger, Leon S. **Interception of airborne particles by tree plantings.** J. Environ. Qual. 9(2):265-268; 1980.
The ability of tree plantings to abate overland movement of particulate pollutants was examined. Estimates of deposition of dust and of total suspended particles indicated that, in comparison to clearcut sites, tree plantings in both urban and rural locations

were effective in reducing the amount of particulate matter in the atmosphere. E

Dolan, Paul C.; Nolley, Jean W. **Rhode Island's secondary wood industry.** Providence, RI: Rhode Island Department of Environmental Management, Division of Forest Environment; 1979. 22 p.
Identifies secondary wood-using markets in the State of Rhode Island that are available to primary wood producers, and buyers and sellers of manufactured wood products. K

Donley, David. **Logging residue removal: relationships with cold-blooded animals.** In: Brooks, Maurice L.; Hall, Carter S.; Luchok, John, eds. Proceedings of the logging residue conference; 1975 June 4-6; Morgantown, WV. Morgantown, WV:West Virginia University; 1980:44-47.
Cold-blooded animals, an important living component of Appalachian forests, are affected by timber harvesting when logging residues are removed. The role each cold-blooded animal species plays in forest perpetuation is unknown. However, the cumulative effect of these animals as they interact with trees, forest soils, and higher animals forces us to be concerned about their welfare. Though logging residue removal probably will not eliminate many species of cold-blooded animals, it will reduce their food and shelter. E

Donley, David E. **Control of the red oak borer by infested tree removal.** J. For. 79(11):731-733; 1981.
The red oak borer, Enaphalodes rufulus Haldeman, was controlled in even-aged, 45-year-old stands by removing infested trees. Up to 6 percent of the basal area of red (Quercus rubra L.), black (Q. velutina Lam.), scarlet (Q. coccinea Muenchh.), and white (Q. alba L.) oak was sacrificed per stand. Borer populations were reduced by about 50 percent in the first generation after treatment and by about 90 percent in the second generation after treatment. Treatments were carried out during the winter of 1974-75 and required 2 to 5 man-hours per acre. E

Donley, D. E. **Number, size and location of red oak borer, Enaphalodes rufulus Haldeman, attack sites on red oaks in Indiana.** In: Proceedings, 1980 Central Hardwood Forest Conference III; Columbia, MO. 1980:458-465. E

Donley, D. E. **Pennsylvania oak borers.** Pa. For. 71(2):9-10; 1981. E

Donley, D. E.; Acciavatti, R. E. **Red oak borer.** U.S. Dep. Agric. For. Serv.; 1980; For. Insect and Dis. Leafl. 163. 7 p. A

Doskotch, R. W.; Cheng, H. Y.; ODell, T. M.; Girard, L. **Nerolidol: antifeeding sesquiterpene alcohol for gypsy moth larvae from Melaleuca leucadendron.** J. Chem. Ecol. 6(4):845-851; 1980. G

Doskotch, Raymond W.; ODell, Thomas M.; Girard, Lorraine. **Phytochemicals and feeding behavior of gypsy moth larvae.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:657-666.
A study of the natural products that affect the feeding behavior of the gypsy moth larvae. G

Dubois, Normand R. **Bacillus thuringiensis.** In: Doane, Charles C.; McManus, Michael L., eds. The Gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:445-453.
Presents an account of the development and registration of Bt for use against gypsy moth larvae. G

Dubois, Normand R.; Lewis, Franklin B. **What is Bacillus thuringiensis.** J. Arboric. 7(9):233-240; 1981.
Bacillus thuringiensis is a bacterium that belongs to the genus Bacillus. It is pathogenic to insect larvae, mainly Lepidoptera species. Several insecticidal toxins can be produced by the different strains of Bt. The most important one is the crystal (delta-endotoxin) which, alone or in conjunction with the spore, will kill the insects. Parasites and predators of Lepidoptera and beneficial insects are generally unaffected by Bt. In the U.S., commercial products of Bt are produced with the HD-1 strain and contain only the spore and crystal as their entomopathogenic ingredients. To be effective these must be ingested. Therefore timing of the application and thorough coverage of the treated foliage are important. Bt can be applied by conventional means. Highly alkaline water should not be used for mixing and excessive heat during storage should be avoided. A brief listing of Bt formulations for gypsy moth control is included. G

Dubois, Normand R. **Natural virus detection.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:512-514.
Describes three procedures that are a first step in the development of predicting virus diseases in natural populations. G

Duchacek, H.; Laing, F. M.; Sendak, P. E. **New sugaring equipment.** New Engl. Farmer; March 1980:11-12. E

Dulmage, H. T.; and others. **Insecticidal activity of isolates of Bacillus thuringiensis and their potential for pest control.** In: Burges, H. D., ed. Microbial control of pests and plant diseases 1970-1980. New York: Academic Press; 1980. Chapter 11, p. 193-222. G

Echelberger, H. E. **Secrets of the skier survey.** In: Ski Area Manage. 19(6):16, 18, 32; 1980. F

Echelberger, H. E. **The semantic differential in landscape research.** In: Elsner, Gary H.; Smardon,

Richard C., Tech. coord. Proceedings of our national landscape; 1979; USDA For. Serv. Gen. Tech. Rep. PSW-35. p. 524-531.
On-site reactions of groups of viewers to six timber harvesting procedures were measured by direct and indirect measuring techniques. For the direct technique, groups recorded scales ranging from very favorable to very unfavorable. For the indirect technique, semantic differential procedures were used. Factor scores developed from the evaluative factor of the semantic differential reactions were highly correlated with overall impression scores for the harvested tracts. F

Echelberger, Herbert E. **Using knowledge of citizen reaction to logging practices.** In: Brooks, Maurice L.; Hall, Carter S.; Luchok, John, eds. Proceedings of the logging residue conference; 1975 June 4-6; Morgantown, WV. Morgantown, WV: West Virginia University; 1980: 61-64.
Describes a research study of viewer reactions to different logging practices in northern hardwood stands. Viewers preferred results of individual tree selection systems over patch- and strip-clearcutting systems. Patch clearcuts were preferred over strip practice on clearcuts in which utilization was not too intensive. Results should be most useful to managers of small woodlots in which esthetic and recreation considerations are an integral part of forest management. F

Echelberger, H. E.; Adler, S.; Canon, Lance K.; Leonard, R. E. **The backcountry campsite selection process.** In: Proceedings Wilderness Psychology Group Annual Conference; 1980 August 14-15; University of New Hampshire, Durham, NH. 1980; 162-166. F

Echelberger, H. E.; Leonard, R. E.; Plumley, H. J. **Validation of trailside registration boxes.** J. Soil & Water Conserv. 36(1):43-54; 1981.
Managers of backcountry recreation areas have a need to know use levels and traffic patterns on some of their more heavily used trails. Trailside registration boxes are an effective means of obtaining that information. However, each registration box must be validated and a compliance rate established for it. This report describes three validation techniques. F

Echelberger, Herbert E.; Wagar, J. Alan. **Noncommodity values of forests and woodlands.** In: Planning the uses and management of land. Chapter 17. Agron. Monogr. 21:429-433; 1979.
Noncommodity values are becoming increasingly important in the planning and management of forests and woodlands. These values include scenic amenities, recreation benefits, and wildlife resources which are not normally bought and sold in a marketplace. How these values conflict with or complement timber production is described and also the relevant research that addresses these issues. Some land-use planning problems that involve commodity and noncommodity values are explored. F

El-Naggar, S. F.; Doskotch, R. W.; ODell, T. M.; Girard, L. **Antifeedant diterpenes for the gypsy moth larvae from Kalmia latifolia: isolation and characterization of ten grayanoids.** J. Nat. Prod. 43(5):617-631; 1981. G

Etter, Daniel O., Jr. **Pest management systems development.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:697-727.
Discusses the design of a comprehensive gypsy moth pest management system and the use of models of various kinds. G

Etter, D. O.; Wallner, W. E.; Houston, D. R. **Integrated protection of oak forests with emphasis on gypsy moth and oak wilt.** In: Proceedings IX International Congress of Plant Protection; 1979 August 5-11; Washington, DC. Minneapolis, MN: Burgess Publishing Co.; 1981:623-627. (Vol. 2). G

Falk, Gary D. **A comparison of cable logging system configurations.** In: Proceedings, Cable Yarding Conference, 1980 September 9-10; Asheville, NC. Sponsored by the Hardwood Research Council and TVA; 1980:24-57. H

Falk, Gary D. **Predicting the payload capability of cable logging systems including the effect of partial suspension.** 1981; USDA For. Serv. Res. Pap. NE-479. 29 p.
Presents a systematic procedure for predicting the payload capability of running, live, and standing skylines. Three hand-held calculator programs are used to predict payload capability that includes the effect of partial suspension. The programs allow for predictions for downhill yarding and for yarding away from the yarder. Presents equations and the basic principles involved in analyzing skyline systems for allowable payload. A

Falk, Gary D.; Peters, Penn A. **A preliminary analysis of the lateral yarding forces in a cable thinning.** In: Proceedings IUFRO mountain logging symposium; 1979 September; Seattle, WA. Seattle, WA: University of Washington; 1979:70-75.
Mainline force was measured during lateral yarding operations in a cable thinning. Two force levels selected for analysis were the breakout force at the instant the logs began to move and the lateral inhaul force during the steady state movement of the logs toward the carriage. A satisfactory predictor equation for the lateral inhaul force was obtained. Breakout force was typically several times the magnitude of lateral inhaul force. A satisfactory predictor equation for breakout force was not obtained. H

Federer, C. Anthony. **Frequency of agricultural and forest drought in New Hampshire: 1926-1975.** Durham, NH: Univ. of NH; 1980; Univ. NH Water Resour. Res. Center Res. Rep. 26. 37 p.

A hydrologic circulation model called BROOK was used to estimate daily soil-water deficits for 50 years at three New Hampshire locations—Berlin, Durham, and Keene. Deficits large enough to cause water stress in plants occurred on about half the days in late summer at all locations. Various types of analyses gave the possibilities of occurrence of droughts of different intensities and durations. F

Federer, C. A. **Paper birch and white oak saplings differ in response to drought.** *For. Sci.* 26:313-324; 1980.

Paper birch and white oak differ as much as any northeastern hardwoods in how their stomata close to limit water loss. Studies on adjacent 28-year-old trees in southern Maine showed that birch closed stomata a few days sooner and more markedly than oak after several weeks with little rain. Birch also dropped its leaves in response to drought while oak did not. But drought limited diameter growth similarly in both species. Stand composition apparently is not determined by drought survival in sapling trees. F

Federer, C. A. **Subjectivity in the separation of organic horizons of the forest floor.** (Abstr.) Agron. Abstr. 1980:201. F

Field, Rebecca; Leonard, R. E.; Spencer, E. L.; van Steenberg, Vicky. **Role of volunteers in research.** In: Bureh, Wm. R., Jr., ed. *Long distance trails.* New Haven, CT: Yale University; 1979:33-37.

Fisher, Edward L.; Gibson, Barry G.; Biller, Cleveland J. **Production and cost of a live skyline cable yarder tested in Appalachia.** 1980; USDA For. Serv. Res. Pap. NE-465. 8 p.

Logging systems that are profitable and environmentally acceptable are needed in Appalachian hardwood forests. Small, mobile cable yarders show promise in meeting both economic and environmental objectives. One such yarder, the Ecologger, was tested in the Jefferson National Forest near Marion, Virginia. Presents production rates and costs for the system along with a discussion of the complete operation. A

Frank, Robert M. **Methods for modifying stand composition to minimize the impact of spruce budworm infestations.** In: Michigan Cooperative Forest Pest Management Program Workshop. Vol. 79-1; 1979 December 13; Escanaba, MI.

Discusses a silvicultural option for minimizing the impact of spruce budworm (Choristoneura fumiferana Clemens) infestations for owners and managers of forest stands containing varying amounts of balsam fir (Abies balsamea (L.) Mill.) and the spruces—red (Picea rubens Sarg.), white (P. glauca (Moench) Voss), and black (P. mariana (Mill.) B.S.P.). I

Frank, R. M.; Majcen, Zoran; Gagnon, Gilles. **Balsam fir.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 10-11.

Describes the balsam fir type, including definition and composition, geographic distribution, ecological relationships, and type variants and associated vegetation. I

Gabriel, William J. **Trees for future sugarbushes.** *Cuttings* 40(1):15; 1980.

New sugar maple trees that are twice as sweet as average sugar maples may be only a few years away. Through a program of selective breeding, work is being carried out to develop trees that are genetically superior in sap sugar production. Roguing of currently established seed orchard, based on progeny test results, will mark the initiation of the production of genetically superior sweet trees in about 5 years from now. D

Gilford, Jimmy R. **Bait bucket trapping for red oak borers (Coleoptera: Cerambycidae).** 1980; USDA For. Serv. Res. Note NE-293. 2 p.

Forty baits were tested in buckets to attract the red oak borer, Enaphalodes rufulus (Haldeman). Only six beetles were caught. A low beetle population and above normal rainfall may have reduced the catch. However, many other cerambycids were trapped. A

Gilford, Jimmy R. **Use of a pheromone to cause copulation between two species of cerambycids.** 1980; USDA For. Serv. Res. Note NE-289. 2 p.

The painted hickory borer, Megacyllene caryae (Gahan), and the locust borer, Megacyllene robiniae (Forster), will not attempt to interbreed in the laboratory. However, male locust borers copulated with painted hickory borer females painted with an alcohol extract of female locust borers. No eggs were laid by treated or untreated beetles, though females were full of eggs. A bacillus disease may have prevented egg deposition. A

Galoch, Elzbieta; Michniewicz, Marian; Zatorska, Zofia. **Dynamics of endogenous auxins, cytokinins and abscissic acid-like inhibitor in embryonic shoots of young Scots pine (Pinus silvestris L.) at the time of flower primordia initiation.** Acta Soc. Bot. Pol. 48:473-482; 1979. (PL-480 Proj. PL-FS-63 in Toruń, Poland, in cooperation with J. A. Romberger).

Gansner, D. A. **Estimating forest stand vulnerability to gypsy moth.** In: Hazard-rating systems in forest insect pest management: symposium proceedings; 1981; USDA For. Serv. Gen. Tech. Rep. WO-27. p. 159-164.

Traces the investigative steps that produced for forest pest management a risk-rating system aimed at gypsy moth control. Recent studies show that while most forest stands come through outbreaks with little or no tree loss, a few suffer heavy damage. Models for predicting stand losses have been developed and are now being tested and refined. These models make use of easy-to-measure key characteristics of stand condition such as tree vigor, species, elevation, tree size distribution, and position on slope. A

Gansner, David A.; Herrick, Owen W. **Cooperative forestry assistance in the Northeast.** 1980; USDA For. Serv. Res. Pap. NE-464. 8 p.
Summarizes results of a recent inventory of service forester activities in 20 northeastern states. Each year some 500 local state foresters give one-half million hours of technical assistance and advice about the management of forest resources to nearly 50,000 woodland owners. Yearly on-the-ground help with activities ranging from timber sales to shade tree protection involves more than 2 million acres of nonindustrial private forest. **A**

Garrett, Lawrence D. **Efficiency of using solid wood fuels in maple syrup evaporators.** 1981; USDA For. Serv. Res. Pap. NE-486. 10 p.
A study of commercial, wood-fired evaporators revealed that normal expected thermal efficiencies are between 35 to 50 percent. The moisture content and quality of wood fuels used on the design and method of firing the evaporator are critical in determining evaporator efficiency and the economic implications of using wood. **A**

Garrett, Lawrence D. **Evaluating feedstock requirements for a 50-megawatt wood-fired electric generating plant.** For. Prod. J. 31(1):26-30; 1981.
An electric power generating facility planning to operate on wood fuels in New England should be aware of the variability of these fuels. Roundwood, whole-tree chips, and mill residues can vary significantly in moisture content and costs. This variability can cause fluctuations in feedstock requirements of 10 to 15 percent. For a 50-megawatt plant, annual variation in requirements could be 50,000 to 75,000 green tons, representing approximately $1 million in fuel costs. **D**

Gatchell, Charles J. **Conversion of low-grade, small hardwoods to a new raw material for the furniture industry with System 6.** In: Utilization of low-grade southern hardwoods: Forest Products Research Society Symposium; 1980 October 6-8; Nashville, TN. Madison, WI: Forest Products Research Society; 1980:89-93.
Low-grade, small-diameter (7-1/2 to 12-1/2 inches) hardwood trees can be converted into a new, high-valued intermediate product called standard sized blanks. Used in place of high-grade lumber, these blanks serve as raw material for the furniture and kitchen cabinet industries. The process of turning logs to cants, cants to boards, and boards to blanks is called System 6. A System 6 mini-mill, which contracts for kiln drying and uses the sales and administrative staff of a parent company, can show a return on a $937,000 investment of 32.8 percent. **K**

Gatchell, Charles J. **A new end joint for the hardwood furniture industry—serpentine end matching.** Paper presented at meeting of International Union of Forestry Research Organization for S5.04 for Wood Processing and Tropical Woods Subject Groups; 1977 October 2-9; Merida, Venezuela. Merida, Venezuela: Laboratorio Nacional de Productos Forestales M.A.R.N.N. - U.L.A.; 1980:6 p.
Serpentine end matching is a new machining technique for end joining wood in an esthetically pleasing manner. A numerically controlled router is used, and glue joints in the shape of a sine wave can be machined in red oak (Quercus rubra Du Roi), black walnut (Juglans nigra L.), and black cherry (Prunus serotina Ehrh.). Machining variables necessary to produce joint thicknesses of 0.001 inch or less are listed and discussed. Evaluations of strength, dimensional stability, and joint visibility are mentioned. **K**

Gatchell, Charles J.; Peters, Curtis C. **The Serpentine end-matched joint: evaluating strength and stability.** 1981; USDA For. Serv. Res. Pap. NE-485. 8 p.
The Serpentine end-matched (Sem) joint is a precisely machined butt joint with a sine wave shape. The joint is not readily visible to the eye and performs well in panels made of sugar maple, red oak, black walnut, and black cherry. The Sem joint is unaffected by changes in equilibrium moisture content from 6 to 12 to 18 to 6 percent. Panels containing Sem joints have about the same stiffness as panels without Sem joints. When tested to failure in bending, panels with Sem joints were weaker than control panels. However, the panels had to bend much farther than nonstructural applications would dictate before failure occurred. When making the joint, some side pressure and end pressures of 60 to 240 psi are needed. **A**

Gibbs, J. N.; Houston, D. R.; Smalley, E. B. **Aggressive and non-aggressive strains of Ceratocystis ulmi in North America.** Phytopathology 69(11):1215-1219; 1980.
Three hundred isolates of C. ulmi collected from numerous locations in eastern and central North America in 1977, and 70 isolates collected in 1970, were readily separated into the "aggressive and non-aggressive" strains. Their patterns of distribution suggest that the aggressive strain is migrating into the Northeast from the Central States. This phenomenon is discussed in relation to current theories on the origin of the two strains. **G**

Gibson, Lester Paul; Hastings, Arthur R.; LaMadeleine, Leon A. **How to differentiate Dutch elm disease from elm phloem necrosis.** Broomall, PA: USDA For. Serv., Northeast. Area, State and Priv. For.; 1981; NA-FB/P-11. 9 p.
Describes field symptoms for Dutch elm disease and elm phloem necrosis. Lists management considerations for both diseases. **E**

Gill, John D. **Dual submission of manuscripts (editorial).** J. Wildl. Manage. 44:771; 1980.
Provides guidance to authors on what constitutes dual submission, especially when the manuscript includes information that has been or will be in another of their manuscripts. **H**

Gill, John D. **Editorial: Transition among editorial staffs.** J. Wildl. Manage. 44:968; 1980. H

Gill, John D. **Editorial news.** J. Wildl. Manage. 44:299; 1980.
Gives a brief update on personnel and style changes for the Journal of Wildlife Management. H

Gill, John D. **Tree farming—for the birds?** W. Va. Tree Farm News 4:7; 1980.
Timber management usually has little effect on total bird populations but may benefit some species at the expense of others such as those that use tree cavities. More different species usually occur where there are many different kinds of habitat, ranging from seedlings and shrubs through old-growth forest. That condition can be achieved by managing timber so that small stands, 1-3 acres, represent several different age classes. Stands on the more moist and fertile sites are more important to birds than those on dry sites. H

Gill, John D.; Healy, Georgette B. **Guidelines for Journal of Wildlife Management manuscripts, 1980.** Washington, DC: The Wildlife Society; 1980. 28 p.
Guidelines for authors and typists to follow in preparing manuscripts are presented in the form of a manuscript typed and annotated as if it were to be submitted to the Journal. The manuscript includes tables showing commonly misused words, terms to be used in tables and figures, and standard abbreviations. Appendixes show the Journal's guidelines for referees and format outlines for feature articles and short communications. H

Gill, John; Worley, Dave. **Forest land and objectives inventory.** In: Proceedings Ohio Private Woodlands Workshop 1979. Columbus, OH: Ohio Dep. Nat. Resour.; 1980:10-19. H

Gochenour. D. L., Jr.; Fisher, E. L.; Gibson, H. G. **I.E. principles applied to forest conservation.** Ind. Eng. 12(1):14-19; 1980.

Godwin, Paul A.; ODell, Thomas M. **Blepharipa pratensis (Meigen) (Diptera: Tachinidae).** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:375-394.
Describes research conducted to determine whether there was an aspect of the life history or behavior of this fly that would lend itself to manipulation so that the species could be managed as a biological control agent. G

Gottschalk, Kurt W.; Marquis, David A. **Overstory density, stock size, and deer browsing affect survival and growth of planted red oak.** (Abstr.). In: Johnson, Paul S.; Garrett, H. E., compilers. Workshop on seedling physiology and growth problems in oak planting; 1981; USDA For. Serv. Gen. Tech. Rep. NC-62. p. 23.
Lack of adequate oak advance regeneration in Pennsylvania is due mainly to loss of viable acorns to insects, rodents, and deer, and of seedlings to deer. Poor survival and growth of planted seedlings in clearcuts and uncut stands led to this test of planting northern red oak (Quercus rubra L.) under three levels of overstory density (100, 60, and 30 percent stocked), using two sizes of nursery stock, with and without deer protection. After 3 years, the residual overstory trees were removed. N

Gotwols, T. A.; Blanchard, R. O.; Shortle, W. C. **Some factors affecting canker formation in American beech inoculated with Nectria coccinea var. faginata.** Eur. J. For. Pathol. 10:365-370; 1980. F

Gove, William G.; Nolley, Jean W., compilers. **Vermont's secondary wood industry: a utilization summary and directory. Montpelier, VT: Vermont Agency of Environment Conservation; Department of Forests, Parks, and Recreation.** 41 p.
Identifies secondary wood-using markets in the State of Vermont that are available to primary wood producers, and buyers and sellers of manufactured wood products. K

Graber, R. E. **The life history and ecology of Potentilla robbinsiana.** Rhodora 82(829):131-140; 1980.
Describes the life history and ecology of Potentilla robbinsiana and documents population changes of the only existing colony on Mt. Washington. Discusses causes of its decline and suggests protective measures which would ensure its survival.

Graber, Raymond E. **Pin cherry.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 17-18.
Describes the pin cherry type, including composition, geographic distribution, type variants, and associated vegetation. F

Green, D. J.; Shortle, W. C.; Shigo, Alex L. **Compartmentalization of discolored and decayed wood in red maple branch stubs.** For. Sci. 27(3):519-522; 1981.
Branch stubs from 12 red maples (Acer rubrum L.) were studied to determine differences in tree response to such injuries. Two basic patterns emerged from the 110 stubs dissected. Some stubs (type A) had a clearly visible green boundary, which separated the discolored and decayed wood of the protruding stub from sapwood inside the stem. Other stubs (type B) lacked this boundary, and discolored wood extended into the stem. Fungi and bacteria were more abundant in sapwood and discolored wood of type B stubs than type A stubs. The green boundary was enriched with phenols, and appeared to prevent movement of bacteria and fungi into the stem. This boundary should not be removed when a tree is pruned. F

Greene, John L. **The increment contract.** South. J. Appl. For. 3(3):82-85; 1979.
Long-term timber management contracts give forest industry firms most of the advantages of fee-simple land ownership and avoid most of the disadvantages. The increment contract, a management contract already used by several pulp and paper firms in the South, is a unique method for determining and making payments to woodland owners based on the average annual increment of wood fiber their land is capable of producing. It is particularly attractive to woodland owners, and it gives firms that use it a competitive advantage in seeking raw materials.

Gregory, Garold F. **Problems in control of Dutch elm disease by injection of systemic fungicides.** 1978 October 9-11; East Lansing, MI. East Lansing, MI: Michigan State University; 1979:195-202.
Controlling Dutch elm disease is basically a management problem. Management means considering all resources that can be put at our disposal and using them effectively and efficiently to combat the problem. This requires decisions to select the disease control strategies that are best for specific situations. Thus, fungicide injection may be a viable part of a disease control program in one situation but not in another. This paper discusses the problems involved in deciding whether to inject elms with systemic fungicides. **E**

Gregory, Robert A. **Annual cycle of shoot development in sugar maple.** Can. J. For. Res. 10(3):316-326; 1980.
Cytohistology and the development and morphogenesis of short and long sugar maple (Acer saccharum Marsh.) shoots were studied. Two types of long shoots were recognized: those entirely (Epf long) and those partially (heterophyllous) preformed in the bud. The three shoot types varied not only in the size and number of internodes and leaves but also in the development of terminal buds. The beginning of embryonic shoot formation began about the same time (late July) for all shoot types. **D**

Gregory, Robert A. **A rapid method of estimating the relative amount of vascular ray tissue.** IAWA Bull. 2:2-3; 1981. **D**

Grimble, David G. **CANUSA: The Canada-United States spruce budworms program.** Maine For. Rev. 13:21-23; 1980.
Describes the organization, goals, and management of the CANUSA program with emphasis on the eastern United States segment of the program. Funding of research and applications efforts, including demonstration areas, working group organizations, and technology transfer are discussed. **A**

Grimble, D. G. **CANUSA: Mid-Program Report.** Broomall, PA: Northeast. For. Exp. Stn.; 1981; Misc. Publ. 13 p.
Discusses progress and research results for each of the program's six major target areas. Research studies initiated during the period 1978-80 are listed, along with publications emanating from the research and the approximate distribution of program funds. **A**

Hacskaylo, E. **Mycorrhizae.** In: Stipes, R. J.; Campana, R. J., eds. Compendium of elm diseases. 1981. p. 66.

Hacskaylo, E. **Mycorrhizae: Fundamental approaches to their physiology.** Allegheny News; Winter:3-4; 1979.
Although research on mycorrhizae is relatively new to many, it has been in progress for nearly a century. Until recently, major research centers were located abroad. The Forest Service has maintained a research program for the past 20 years. In the Pioneering Research Unit on Mycorrhizae at Beltsville, Maryland, the staff probes for answers to basic physiological phenomena occurring in mycorrhizae including carbohydrate metabolism, effects of photosynthesis on mycorrhizal development, production of growth regulating substances and studies on nitrogen, fatty acid, and lipid metabolism.

Hager, Barbara C.; Cannon, William N., Jr.; Worley, David P. **Street tree policies in Ohio towns.** J. Arboric. 6(7):185-191; 1980.
Fourteen small- to medium-size Ohio towns were visited to determine their street-tree policies and programs. Their street trees were assessed for kinds of trees, size, density, and general condition. Towns with long-term, well-founded programs had superior street trees as evidenced by more kinds of trees in better condition, a more consistent and greater density, a more balanced distribution of sizes. **E**

Halverson, Howard G.; Heisler, Gordon M. **Soil temperatures under urban trees and asphalt.** 1981; USDA For. Serv. Res. Pap. NE-481. 6 p.
An asphalt cover increased summer soil temperatures throughout a 60-cm profile but did not affect winter soil temperatures. Horizontal and vertical temperatures were consistent within a site type. The rate of heat transfer between the atmosphere and the soil apparently was increased. **A**

Halverson, Howard G.; Mawson, Joseph C.; Payne, Brian R. **A computer program to map tree crown shadows in the urban forest.** 1980; USDA For. Serv. Gen. Tech. Rep. NE-59. 16 p.
This FORTRAN IV program maps the location of tree crown shadows. The tree crown profile must be approximately spherical or elliptical. Site and tree data are required, and the operator specifies the date and frequency of mapping. An example shows that the maps are accurate if the tree data are recorded and entered accurately. **A**

Halverson, Howard G.; Potts, Donald F. **Water requirements of honeylocust (Gleditsia triacanthos f. inermis) in the urban forest.** 1981; USDA For. Serv. Res. Pap. NE-487. 4 p.

Honeylocust in the urban forest requires more water than the same tree growing on a homogeneous site. Water requirements averaged 1.55 times rural water requirements in the urban environment. Additional water demand was apparently due to advected energy. A

Hanks, Leland, F. **Cubic-foot appraisal—The new kid on the block.** North. Logger 28(11):16-17; 1980.
Cubic-foot measure is more consistent than board-foot measure when appraising trees for several products. Actual cubic-foot volumes of lumber, sawdust, and sawmill residue were determined for 49 northern red oak and 50 sugar maple trees. Total cubic-foot volume of the sawlog portion of the trees was also calculated. These actual volumes were compared with predicted volumes reported in USDA Forest Service Research Paper NE-380, and possible reasons for differences were identified.

Hanks, Leland F. **Predicted cubic-foot yields of sawmill products for black cherry trees.** 1980; USDA For. Serv. Res. Note NE-295. 8 p.
Presents equations and tables for estimating the cubic-foot volumes of lumber, sawdust, and sawmill residue for black cherry trees. Also included are cubic-foot and board-foot predictions for the sawlog portion of the trees. A

Hanks, Leland F.; Gammon, Glenn L.; Brisbin, Robert L.; Rast, Everette D. **Hardwood log grades and lumber grade yields for factory lumber logs.** 1980; USDA For. Serv. Res. Pap. NE-468. 92 p.
Describes the USDA Forest Service Standard Grades for Hardwood Factory Lumber Logs, and lumber grade yields for 16 species and 2 species groups are presented by log grade and log diameter. The grades enable foresters, log buyers, and log sellers to select and grade those logs suitable for conversion into standard factory grade lumber. By using the appropriate lumber grade yields, log buyers and sellers can appraise the logs in terms of expected lumber grade volume and value. This report supersedes an earlier report on hardwood log grading, USDA Forest Service Research Paper FPL-63. A

Hansen, Bruce G. **Changes and challenges in the U.S. Christmas tree industry.** Christmas Trees 8(2):4-7; 1980.
During the past 25 years, wild trees have almost totally disappeared from the market. But even though the total use of natural trees has declined, plantation growers generally have prospered along with manufacturers of artificial trees. This article provides not only a brief review of the changes that have taken place but of the challenges faced by producers of natural trees. To meet these challenges, growers are advised to do a better job of identifying and responding to specific consumer interests. K

Hansen, Bruce G.; Reynolds, Hugh W. **The SHOrt-LOg process for producing pallet parts and pulpwood chips from southern hardwoods.** In: Utilization of low-grade southern hardwoods: Forest Products Research Society Symposium; 1980 October 6-8; Nashville, TN. Madison, WI: Forest Products Research Society; 1980:75-81.
Wood pallets use about 15 percent of the total U.S. consumption of sawn wood products and nearly 40 percent of United States hardwood consumption. Between 1960 and 1975, pallet production increased by 271 percent. Similar increases are expected in the future, placing increasing pressure on traditional supplies of raw material. We believe, however, that raw material supplies can be extended to meet the growing demand through direct conversion of short, low-grade logs to pallet parts. Our analysis suggests that a daily production rate of 20 Mbf of pallet parts from short logs between 5.5 and 11.5 inches in diameter can achieve a before-tax return on investment of nearly 38 percent. K

Harris, R.; Angliss, D.; Morrison, T.; Ohlsson, B.; Goswami, P.; Wartluft, J. **Report of the Bangladesh north-western forestry project preparation mission.** Rome, Italy: Food and Agriculture Organization; 1981; FAO Confidential Rep. No. 14/81 DDC-BGD.25. 2 v.
Organized to seek more efficient uses of Bangladesh wood fuels. Discusses a wood fuel consumption study. Outlines a program of improving cookstoves (chulas). Eighty-eight percent of wood fuel was used in domestic cooking, but only 36 percent of domestic cooking fuel was wood. Outlines a 5-year program of chula improvement including training, research, extension, and evaluation. The fifth year benefits alone were estimated to be several times greater than the 5-year program costs. K

Hawksworth, F. G.; Shigo, A. L. **Dwarf mistletoe on red spruce in the White Mountains of New Hampshire.** Plant Dis. 64:880-882; 1980. F

Hay, C. John; Solomon, J. D. **A selective bibliography on insects causing wood defects in living eastern hardwood trees.** U. S. Dep. Agric.; 1981; Bibliogr. and Lit. of Agric. No. 15. 36 p.
This bibliography contains 833 references selected primarily from papers dealing with some aspect of original research on wood-damaging insects that attack living eastern hardwood trees. Includes a list of host trees that are commercially important. I

Healy, William M. **Habitat requirements of wild turkeys in the southeastern mountains.** In: Habitat requirements and habitat management for the wild turkey in the Southeast. Elliston, VA: Virginia Wild Turkey Foundation; 1981:24-34. H

Healy, William M.; Kimmel, Richard O.; Holdermann, David A.; Hunyadi, William. **Attracting ruffed grouse broods with tape-recorded chick calls.** Wildl. Soc. Bull. 8(1):69-71; 1980.
Biologists need to find grouse to assess habitat quality and improve it through forest management practices. Brood habitat may be the key to grouse production, but

the broods have been particularly difficult to find. Grouse hens with broods were attracted to tape-recorded calls of a "lost" chick. Hens responded throughout the brood-rearing period; hence, the recorded call was useful for locating broods and for capturing hens. H

Healy, William M.; Nenno, Edward S. **Growth parameters and sex and age criteria for juvenile eastern wild turkeys.** In: Sweeney, James M., ed. Fourth national wild turkey symposium proceedings; 1980 March 2-5; Little Rock, AR. Arkansas Chapter, The Wildlife Society; National Wild Turkey Federation; and Arkansas Game and Fish Commission; 1980:168-185.
Most information on the growth and development of juvenile wild turkeys (Meleagris gallopavo) has been obtained from game-farm stock and little data are available for young poults. One or more of the following data were recorded from hatching to approximately 210 days of age for 97 hand-reared wild turkeys: body weight, leg length, primary molt patterns, and length of postjuvenile primaries 7 and 8. H

Heisler, Gordon M. **Report: Session I, Workshop C.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. I; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 421-425.
Summarizes in the form of a dialogue four papers on various aspects of urban vegetation. M

Heisler, Gordon M.; Halverson, Howard G.; Zisa, Robert P. **Solar radiation measurements beneath crowns of open-grown trees.** In: Fifteenth conference on agriculture and forest meteorology and fifth conference on biometeorology; 1981 April 1-3; Anaheim, CA. Boston, MA: American Meteorological Society; 1981:162-165.
Global and diffuse short-wave radiation was measured in the shade of several individual, isolated 12-m tall deciduous trees. Regression models were developed to predict total and diffuse radiation in shadows as a function of the independent variables total radiation in the open, solar altitude, sky radiation fraction, and species. Total radiation in shade as a percent of open radiation averaged only 48 percent for leafless London plane trees and 66 percent for leafless pin oak trees. M

Hejnowicz, Z. **Tensional stress in the cambium and its developmental significance.** Am. J. Bot. 67:1-5; 1980. (PL-480 Proj. PL-FS-64 in Katowice, Poland, in cooperation with J. A. Romberger).

Helvey, J. D. **Flood frequency and culvert sizes needed for small watersheds in the Central Appalachians.** 1981; USDA For. Serv. Gen. Tech. Rep. NE-62. 7 p.
Estimates of peak discharge from small watersheds (more than 100 acres) within the Central Appalachians are presented for recurrence intervals of 5, 10, 20, and 50 years. Drainage area was well correlated with estimated peak discharge for each recurrence interval. Peak discharge was significantly greater from two watersheds that had been farmed for many years than from the drainages of similar size that had never been cultivated. Also presents culvert sizes needed to carry the expected flow rates. A

Helvey, J. D. **Opportunities for increasing water yield through vegetation management.** In: An assessment of forest and range land situation in the United States. U.S. Dep. Agric. For. Serv.; 1980; FS-345:492-500. J

Henderson, G. S.; Hornbeck, J. W.; Swank, W. T. **Impact of atmosphere sulfur deposition on the quality of water from forested watersheds.** In: Schriner, D. S.; Richman, C. R.; Linberg, S. E., eds. Atmospheric sulfur deposition: Environmental impacts and health effects. Ann Arbor, MI: Ann Arbor Science, Inc.; 1980:431-442. F

Herrick, O. W. **Damage susceptibility ratings as a catalyst to cost-effective forest pest management.** In: Hazard-rating systems in forest insect pest management: symposium proceedings; 1981; USDA For. Serv. Gen. Tech. Rep. WO-27. p. 165-168.
Traces the merger of forest damage susceptibility rating and economic theory to a decision framework for forest pest management aimed at gypsy moth control. For efficient forest pest management, the size and intensity of outbreak, subsequent physical and economic impacts, and the cost of control need to be considered jointly as a system. A model indicates the optimal degree of pest management (acreage to be treated) and the optimal dollars to be spent on control. The model also identifies a pest control strategy that gives priority to the kind and amount of forest land where treatment could do most to avert damage in the planning unit. A

Herrick, O. W. **Economics of pitch x loblolly pine hybrids.** Silvae Genet. 30(1):1-7; 1981.
Promising results from developmental testing of pitch x loblolly pine hybrids prompted an evaluation of the economic potential for investment in hybrid seed production. A least-total-cost model was derived to provide guides for cost effective investment in seed orchard and planting phases of hybrid production. The incremental analysis, based on least-cost-plus-loss economic theory, indicates that pitch X loblolly hybrid seed production would yield net gains at interest rates up to 9 percent. The model can be used to find the combination of annual planting area, seed orchard capacity, and expenditure that increased forest yields would justify at different interest rates. A

Herrick, Owen W. **Forest pest management economics--application to the gypsy moth.** For. Sci. 27(1):128-138; 1981.
The use of resources is needed to reduce the level of undesirable impacts caused by forest pest infestation. Pest management systems give results that are in the form of a reduction of impact rather than a physical product. Thus, management costs should be balanced

against the reduction of impact. An adaptation of least-cost-plus-loss economic theory, using gypsy moth control, illustrates incremental analysis of impacts and costs as one way to pursue maximum effectiveness vis-a-vis investment in forest pest management. **A**

Herrick, Owen W.; Gansner, David A. **Timber prices in the northern United States—1978.** 1980; USDA For. Serv. Res. Note NE-300. 8 p.
Sawtimber and cordwood prices (1978) and the range in price per unit from sales on nonindustrial private woodlands are reported for the northern United States and subareas. **A**

Herrington, Lee P. **Microclimate and the urban forest.** In: Proceedings Symposium on Urban Forestry; 1978 May; Berkeley, CA. 1980.

Herrington, L. P. **Urban vegetation and microclimate.** In: Hopkins, G., ed. Proceedings of the national urban forestry conference; Vol. I; SUNY Coll. Environ. Sci. and For.; 1980; ESF Publ. 80-003. p. 256-266.
Discusses how microclimate modification or "street climate" can be changed through design and management of urban vegetation. The importance of street climate to people varies with geographic location, but generally street climate management attempts to achieve one or more of three objectives: people's comfort, energy conservation, or plant comfort or survival. Discussion is focused on people's comfort.

Hilt, Donald E. **Taper-based system for estimating stem volumes of upland oaks.** 1980; USDA For. Serv. Res. Pap. NE-458. 12 p.
A taper-based system for estimating stem volumes is developed for Central States upland oaks. Inside bark diameters up the stem are predicted as a function of dbh_{ib}, total height, and powers of relative height. A Fortran IV computer program, OAKVOL, is used to predict cubic and board-foot volumes to any desired merchantable top dib. Volumes of test trees were predicted with acceptable accuracy. Other uses for the taper-based system are discussed. **A**

Holbrook, Herman L.; Healy, William M. **Wild turkeys.** In: Byrd, Nathan B., compiler. Something's been using my habitat. A forester's guide to observing wildlife use of forest habitat in the South. Atlanta, GA: U.S. Dep. Agric. For. Serv., Southeast. Area, State and Priv. For.; 1981:32-34. **H**

Holt, Coleman. **Impacts of high deer population on forest regeneration and herd condition in the Allegheny hardwood region of Pennsylvania.** Allegheny Sect., Soc. Am. For.; The Allegheny News, Winter 1980:15-17. **N**

Homola, R.; Czapowskyj, M. **Ectomycorrhizae of Maine. 2. A listing of Lactarius with the associated hosts, with additional information on edibility.** Life Sciences and Agr. Exp. Stn., Univ. Maine, Orono; Bull. 779:1-13; 1981. **I**

Hornbeck, James W. **Acid rain: facts and fallacies.** J. For. 79(7):438-443; 1981.
Acid rain is a complex environmental problem; the lack of long-term records has made it difficult to determine how fast rainfall acidity is changing, whether the problem is worsening, and whether it is expanding in geographical scope. Although the sources of acid rain are thought to be largely urban, long-range transport of emissions by weather systems has made acid rain a potential threat to forest and aquatic ecosystems in rural settings. Foresters must stay abreast of this environmental problem and help ensure that any impacts are minimized. **F**

Hornbeck, J. W. **Forest management.** In: Sybil B. Parker, ed. McGraw-Hill 1981 Yearbook of Science and Technology. New York: McGraw-Hill Book Co.; 1981:184-187. **F**

Hornbeck, J. W. **Review of "Forest Hydrology" by Richard Lee.** J. For. 78(9):574-575. **F**

Hornbeck, J. W.; Kropelin, W. **Impacts of whole-tree harvesting on the nutrient status of a northern hardwood ecosystem.** (Abstr.) Bull. Ecol. Soc. Am. 62(2); 141; 1981. **F**

Horowitz, Sylvia; DeFusco, Mary. **Publications of the Northeastern Forest Experiment Station 1966-76.** 1980; USDA For. Serv. Gen. Tech. Rep. NE-58. 131 p.
A list, by authors, of 2,472 publications by staff members of the Northeastern Forest Experiment Station and their cooperators during the period 1966-76. **A**

Horsley, Stephen B. **Decomposition of the cyianogenic glycoside of Prunus serotina: A possible allelopathic mechanism.** Bot. Soc. Am. Misc. Publ. 157:41; 1979. **N**

Horsley, Stephen B.; Meinwald, Jerrold. **Glucose-l-Benzoate and Prunasin from Prunus serotina.** Phytochemistry 20(5):1127-1128; 1981.
β-D-Glucopyranose l-benzoate and prunasin have been isolated from the leaves of Prunus serotina. Both can yield benzoic acid, a potential allelopathic inhibitor of Acer rubrum. **N**

Houseweart, Mark W.; Jennings, Daniel T.; Berkett, Lorraine P.; Brann, Thomas B. **Parasitic mites (Acari:Erythraeidae) on spruce budworm moths (Lepidoptera:Tortricidae).** Can. Entomol. 112:193-197; 1980.
At least two species of parasitic larval mites of the erythaeid genus Leptus were found on male spruce budworm, (Choristoneura fumiferana (Clem.), moths attracted to pheromone-baited traps. Mites were found on 28.5 percent of 2,298 male moths captured during 3 trapping days in July 1977. Numbers of mite-infested moths were positively correlated with catch density. Percentage mite infestation increased with time. Red larval mites were also collected from both male and female free-flying budworm moths. **I**

Houseweart, Mark W.; Jennings, Daniel T.; Sanders, C. J. **Variables associated with pheromone traps for monitoring spruce budworm populations (Lepidoptera: Tortricidae).** Can. Entomol. 113:527-537; 1981.
The effects of three trap variables (age, saturation, and density) on catches of male spruce budworm moths were tested using Pherocon ICP traps baited with synthetic sex attractant in high-density budworm populations in Maine and low-density populations in Ontario. Pherocon ICP traps can be used for detecting and monitoring spruce budworm populations. However, influences of trap age, timing of trap placement, trap saturation, spacing of traps, and lure strength should be taken into account. **I**

Houston, David R. **Beech bark disease: what we do and do not know.** Ann. Sci. For. 4/80; 1980. **G**

Houston, David R. **Forest stand relationships.** In: Doane, Charles C.; McManus, Michael, L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:267-293.
Presents a model to classify forests as susceptible or resistant to gypsy moth. **G**

Houston, David R. **Oak decline and mortality.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:217-219.
Provides an historical background of oak decline and mortality associated with gypsy moth defoliation in the United States. **G**

Houston, David R. **Stress triggered tree diseases--the diebacks and declines.** Broomall, PA: Northeast. For. Exp. Stn.; 1981; NE-INF-41-81. 36 p.
Provides a basis for understanding and coping with dieback and decline diseases. Discussed are concepts relating to: (1) diagnosing the factors that initiate the disease; (2) describing symptoms and disease development; (3) determining the role of secondary-action organisms; and (4) developing appropriate control measures. **A**

Houston, David R. **The trouble with beech is...** Conn. Woodl. 46(1):12-14; 1981.
Beech trees have a unique beauty attributable to their large stature and to their straight stems encased in smooth grey bark. But beech trees have their troubles, too. The peculiar nature of beech bark renders the boles of these trees especially vulnerable to mechanical injury and to attacks by many organisms. Beech bark disease caused by the beech scale insect and Nectria bark canker fungi is the most serious problem of beech. **G**

Houston, David R. **Understanding the game of the environment.** U. S. Dep. Agric.; 1979; Agric. Inf. Bull. 426; 174 p.
Summarizes major ecological principles and concepts viewed as a game in which living organisms interact with each other and their non-living environment. The book is designed to provide stimuli for classroom discussion and review of ecological principles and their relevance to our daily existence. **A**

Houston, David R.; Valentine, Harry T. **Identifying forests susceptible to the gypsy moth initiating agent.** (Abstr.) Proc. IX International Congress of Plant Protection and 71st Annual Meeting, American Phytopathological Society, Washington, D.C.; 1979:109. **G**

Hoyle, Merrill C. **Isoelectric focusing: Start-up and problem solving suggestions.** Am. Lab. 11:32-43; 1979.
Scientists faced with the problem of separating an array of proteins may wish to seek the higher resolution obtainable from isoelectric focusing (IEF) over that of electrophoresis. Discusses several problems connected with analytical IEF, in thin slabs of polyacrylamide gel, and suggests ways to get started at minimal cost. **F**

Hunter, Malcolm; Hacker, Susanne C.; Jennings, Daniel T; Knight, Fred B. **Spruce budworms thesaurus.** Orono, ME: University of Maine; 1979; Canada/United States Spruce Budworms Program and Maine Life Science and Agriculture Experiment Station Misc. Rep. 220. 41 p.
Serves as a guide to help investigators select terms for keywording. Also serves as a supplementary index and directory for finding information in the "Spruce budworms bibliography". **I**

Hydorn, Susan B.; Rabeni, Charles F.; Jennings, Daniel T. **Effect of forest spraying with acephate insecticide on consumption of spiders by brook trout (Salvelinus fontinalis).** Can. Entomol. 111:1185-1192; 1979.
Stomachs of mature brook trout, Salvelinus fontinalis Mitch., from sprayed and unsprayed streams were analyzed for arthropods. Within 48 hours after exposure to aerial applications of 560 g/ha acephate (Orthene^{R}) against spruce budworm, Choristoneura fumiferana (Clem.), fish consumed many more spiders and other arthropods. Caged spiders in an acephate-sprayed forest behaved abnormally and had low survival. **I**

Janerette, C. A. **The effects of water soaking on the germination of sugar maple seeds.** Seed Sci. Technol. 7:341-346; 1979.
The length of time sugar maple seeds were soaked in water before they were stratified significantly influenced the time required to surpass 90 percent germination. Fourteen days were found to be the optimum soak time. After seeds were soaked for 14 days, 96 percent germinated within 14 days after the onset of germination; with the current method, soaking seeds overnight, germination takes 35 days or longer to reach 96 percent.

Jenkins, W. Lyman. **Maple jelly.** Natl. Maple Syrup Dig. 19(3):11-13; 1979.
There has always been a demand for good maple spread. The maple products that are currently available, such as maple cream and maple taffy, require further boiling of the syrup, are difficult to make, and do not store well. There are gelled maple products but they require pectin for gelling. Highly acidic conditions are needed for pectin to form a gel, and the true maple flavor cannot be detected in an acidic formulation. D

Jennings, Daniel T. **Forest protection research.** In: 1980 Annual Report. Forest Resources Research Advisory Committee, School of Forest Resources, Life Sciences and Agriculture Experiment Station, University of Maine; 1981; Misc. Rep. No. 238:16-20. I

Jennings, Daniel T.; Hacker, Susanne C.; Knight, Fred B.; McKnight, Melvin E. **Spruce budworms bibliography (Supplement 1).** Orono, ME: University of Maine; 1981; Canada/United States Spruce Budworms Program and Maine Life Science and Agriculture Experiment Station Misc. Rep. 255. 139 p.
Supplement 1 contains nearly 700 references to literature on coniferophagous budworms. The general format follows that of the original bibliography, except that summaries and abstracts are not included due to stringent copyright laws. Citations are numbered consecutively; authors are listed alphabetically and chronologically by senior author. Author and keyword indexes follow citations and are cross referenced by citation number. I

Jennings, Daniel T.; Stelzer, Milton J. **A method for collecting soil-pupating Rhyacionia pine tip moths.** 1979; USDA For. Serv. Res. Note RM-380. 4 p.
Plastic foam cups filled with soil and placed beneath infested shoots are used to collect soil-pupating Rhyacionia. The pupation cups are inexpensive, easily installed, and easily removed for rearing pupae, pupal parasitoids, and adult moths. I

Jensen, Keith F. **Air pollutants affect the relative growth rate of hardwood seedlings.** 1981; USDA For. Serv. Res. Pap. NE-470. 5 p.
One-year-old seedlings of yellow-poplar (Liriodendron tulipifera L.), eastern cottonwood (Populus deltoides Bartr.), and white ash (Fraxinus americana L.) were divided into four groups. One group served as the control, and the other groups were fumigated for 12 hours per day with either 0.1 ppm O_3, 0.2 ppm SO_2, or 0.1 ppm O_3 plus 0.2 ppm SO_2. Two or three seedlings of each species were harvested twice a week for 6 weeks, and leaf area and new growth weight were determined. Data on leaf area and new growth were transformed to natural logarithms and fitted with a linear regression model. Relative growth rate was positive in all species-treatment combinations, but varied with fumigation treatment. A

Jensen, Keith F. **Ozone slows the growth rate of silver maple leaves.** (Abstr.) Phytopathology 71:562; 1981. E

Jensen, Keith F.; Patton, Roy L. **Leaf growth of silver maple seedlings fumigated with SO_2 and ozone.** (Abstr.) Phytopathology 70(5):463; 1980.
Silver maple seedlings were fumigated for 12 hours per day for 30 days with either 25 pphm O_3, 50 pphm SO_2, or both. Leaf length was measured three times a week throughout the study. At the end of the treatment period, leaf length, leaf width, leaf area and leaf dry weight were measured. Fumigation with SO_2, O_3, or both gases tended to retard leaf initiation, while fumigation with O_3 and O_3 plus SO_2 markedly reduced leaf length, width, area, and dry weight. Leaf shape and the leaf weight area ratio were not affected by fumigation. The reduction in leaf size of photosynthetic area caused by air pollutants may reduce the amount of photosynthate available for plant growth and result in slower growth of the entire plant. E

Johnson, D. W.; Hornbeck, J. W.; Kelly, J. M.; Swank, W. T.; Todd, D. **Regional patterns of soil sulfate accumulation: Relevance to ecosystem sulfur budgets.** In: Shriner, D. S.; Richman, C. R.; Linberg, S. E., eds. Atmospheric sulfur deposition: Environmental impacts and health effects. Ann Arbor, MI: Ann Arbor Science, Inc.; 1980:507-520. F

Jones, Martin J. **The spruce-budworm disaster: an integrated approach.** Am. For. 86(6):17-20, 45; 1980.
Despite vast, costly, controversial spray projects, some 150 million acres in eastern North America are now infested. Developing technology includes refined spray-and-harvest combinations, viruses and wasps that can make the worm turn, and even computer modeling that may compress 100 years of natural interaction into a few minutes. A

Jones, Martin J. **Research station in Penn's Woods. Multiple use studied.** Pa. For. 71(5): 6-9; 1981.
Summarizes forest research by the Northeastern Forest Experiment Station in Penn's Woods, including multiple-use research, forest resources, gypsy moth damage, Allegheny hardwoods, watershed management, and urban forestry protection. The wise use of Penn's Woods remains the objective of forest research. A

Kallio, Edwin; Tubbs, Carl H. **Sugar maple (Acer saccharum Marsh.).** U.S. Dep. Agric.; 1980; Am. Wood Ser. FS-246. 5 p.
Describes the growth characteristics and properties of sugar maple (Acer saccharum Marsh.). The natural range of this species and the principal uses of sugar maple also are discussed. Supply and production data are included. F

Kennedy, Bruce H. **Oviposition by Dendrosoter protuberans (Hymenoptera: Braconidae) on larvae of Scolytus multistriatus (Coleoptera: Scolytidae) occupied by larvae of Entedon leucogramma (Hymenoptera: Eulophidae).** Great Lakes Entomol. 14:109-112; 1981. E

Keys, Roy N.; Cech, Franklin C.; Davidson, Walter H. **The performance of Austrian pine seed sources on various sites in West Virginia and Pennsylvania.** In: Proceedings of the twenty-seventh Northeastern Forest Tree Improvement Conference; 1980 July 29-31; Burlington, VT. Burlington, VT: University of Vermont; 1981:103-114.

Twelve sources of Austrian pine were tested on six sites (5 mine spoils and 1 agricultural site). Lime or fly ash application enhanced the planting survival on extremely acid sites. In West Virginia, the survival of Austrian pine was best at about 2,500 feet above sea level. Yugoslavian source 66-105 and Austrian source 66-87 are recommended for planting in Pennsylvania and West Virginia. P. brutia is not recommended for planting in the study region. And sources 66-94 are not recommended for planting at elevations greater than 3,000 feet above sea level. C

Kingsley, Neal P. **Management of nonindustrial private forest lands: the owner's viewpoint.** In: Multiple-use management of forest resources symposium proceedings; 1979 September 17-20; Clemson, SC. Clemson, SC: Clemson University; 1980:204-209.

Nonindustrial private forest-land owners seldom manage their lands for a number of reasons. These include conflicting ownership objectives, financial deterrents, and lack of knowledge. The need for management on these lands is imperative if projected demands for timber are to be met. This may require a change in attitude toward and approach to the private owner by many foresters. A

Kingsley, Neal P. **The 1980-81 forest survey of Maine.** In: The forest and Maine's future: Proceedings of the Blaine House Conference on Forestry; 1981 January 21-22; Augusta, ME: State of Maine, Department of Conservation; 1981:80-84. A

Kingsley, Neal P. **The nonindustrial forest-land owner: Who? Where? Why?** In: Proceedings of the eighth annual hardwood symposium of the Hardwood Research Council; 1980 April 23-26; Cashiers, NC. Asheville, NC: Hardwood Research Council; 1980: 13-31.

It is estimated that there are nearly 1.6 million forest landowners in 11 northeastern states. These owners, who have diverse backgrounds, are seldom interested in timber management. But, they will cut timber, particularly when they need money. If foresters wish to encourage timber management on these ownerships, they need to address the owners' objectives be they for nontimber products or for reducing the carrying costs of the land. By seeking to satisfy the owners' objectives, foresters can encourage timber management. A

Kingsley, Neal P. **The Northeastern forest landownership study.** In: Royer, J. P.; Convery, F. J., eds. Nonindustrial private forests: Data and information needs. Durham, NC: School of Forestry and Environmental Studies, Duke University; 1981:83-96.

The background, development, and methods used in the northeastern forest landowner studies are discussed. Results of canvasses in 11 states are presented and discussed. Concludes with a discussion of the Northeastern Station's plans to continue area-based landowner studies and to develop trend analyses. A

Kingsley, Neal P. **In response to: Maine's timber supply by Lloyd Irland.** In: Proceedings of the Blaine House Conference on Forestry; 1981 January 21-22; Augusta, ME. Augusta, ME: State of Maine, Department of Conservation; 1981:65-69.

Summarizes the third forest inventory of Maine. A brief history of the previous inventories and the legislative mandate for USDA Forest Service inventories is given. Also discussed are the new concerns of the inventory including—wildlife habitat evaluation, recreation potential evaluation, soils data, digitization of field plot locations, and the canvass of forest landowners. Planning for the inventory and the use of planning task forces is also discussed as are planned publications of inventory results. A

Kingsley, Neal P.; Birch, Thomas W. **The forest-land owners of Maryland.** 1980; USDA For. Serv. Resour. Bull. NE-63. 78 p. A statistical analytical report of a mail canvass of the owners of privately owned commercial forest land in Maryland. The study was conducted in conjunction with the third forest survey of Maryland by the USDA Forest Service. Statistical findings are based on responses supplied by owners to a mail questionnaire. Discussion includes trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, and timber harvesting recreational use. A

Kleinschmidt, Steven; Baskerville, Gordon L.; Solomon, Dale S. **Foliage weight distribution in the upper crown of balsam fir.** 1980; USDA For. Serv. Res. Pap. NE-455. 8 p.

A model was developed to predict the weight of foliage at each age on a branch for a given whorl from undefoliated balsam fir. The normal weight of foliage by age classes can be compared to the weight of foliage remaining on a branch to estimate recent, annual defoliation by spruce budworm. A

Kleinschmidt, Steven M.; Baskerville, Gordon L.; Solomon, Dale S. **Reduction of volume increment in fir-spruce stands due to defoliation by spruce budworm.** Fredricton, NB: University of New Brunswick; 1980; CANUSA Misc. Publ. 37 p.

Volume-growth response of balsam fir and spruce to varying levels of defoliation by spruce budworm was examined on 20 plots in 12 stands between 40 and 70

years of age in northwestern Maine. Growth loss from 5 years of light defoliation was minimal, but it increased as defoliation increased. As severe defoliation continued, up to 40 percent of periodic annual increment was lost. Effective spray protection reduced these losses but did not eliminate them. I

Kochenderfer, J. N.; Wendel, G. W. **Costs and Appalachia with a truck-mounted crane.** 1980; USDA For. Serv. Res. Pap. NE-456. 9 p.
A truck-mounted crane was used to yard and load timber from a 30-acre sale in a 140-acre watershed in the mountains of north-central West Virginia. A total logging cost, excluding road costs, of $44.35/M bm for logs delivered to a mill 20 miles away was comparable to that reported for wheeled skidders. Road costs with gravel would add $55/M bm, without gravel $26/M bm. Roads built to these standards held sediment production within the range (.05 to .10 ton/acre/year) expected for undisturbed forested watersheds. Residual stand damage caused by this system was also comparable to other systems and was concentrated on small trees.
A

Krawczyszyn, J.; Romberger, J. A. **Interlocked grain, cambial domains, endogenous rhythms, and time relations, with emphasis on Nyssa sylvatica.** Am. J. Bot. 67(2):228-236; 1980.
Interlocked grain in wood of Nyssa sylvatica Marsh is a lapse-time record of cyclical changes in inclination (rightward or leftward) of fusiform initial cells in the cambium. Typically the inclination cycles have periods of a decade or more. Such cycles can be interpreted as manifestations of long-term endogenous rhythms. Interlocked grain in N. sylvatica is not the result of whole-stem spiral grain that reverses periodically. As wavy grain in other species is a record of wavelike migration of orientational domains along the cambium, interlocked grain in N. sylvatica can be interpreted as being related to a more complex system of domains having long axial dimensions. These domains migrate or change their efficacy and directional sense in place in such a way that some regularity of inclination cycles is maintained at the various stem levels.

Kubowicz, D. G. **The possible relation between cytokinins and secondary xylem formation in Pinus silvestris.** I. Seasonal correlations. Acta Soc. Bot. Pol. 48:295-303; 1979. (PL-480 Proj. PL-FS-72 in Warsaw, Poland, in cooperation with J. A. Romberger).

Kurtz, William B.; Bradway, Carol J. **Understanding nonindustrial private forest landowner management decisions.** In: Southern Timber Supply Constraints on NIPF Lands: Proceedings Southern Forests Economic Workshop; 1981 March 17-19; Mountain View, AR; 1981:40-54.
Management decisions by nonindustrial private forest owners are made within the framework of their motivations and objectives subject to various constraints--market, resource, personal, and societal. Four types of owners have been distinguished on the basis of management attitude: timber agriculturist, timber conservationist, forest environmentalist, and range pragmatist.

Lamson, Neil I. **Effect of fertilization on four species in mature Appalachian hardwood stands.** In: Garrett, Harold E.; Cox, Gene S., eds. Proceedings of the Third Central Hardwood Conference; 1980 September 16-17; Columbia, MO. Columbia, MO: University of Missouri; 1980:449-457.
Four 70-year-old, even-aged Appalachian hardwood stands in north-central West Virginia were studied for their response to fertilization. The red oak site index of four stands was about 65 feet. Two stands were fertilized with 300 pounds per acre N as ammonium nitrate plus 100 pounds per acre P_2O_5 as triple superphosphate. Red oak showed a 17-percent increase in periodic diameter growth during the 4 years after fertilization. Basal-area growth increased by about 21 percent during the same period. For black cherry, periodic diameter and basal-area growth increased by about 40 percent. Fertilization did not increase the growth of red maple and yellow-poplar. J

Lamson, Neil. **Site index prediction tables for oak in northwestern West Virginia. 1980; USDA For. Ser. Res. Pap. NE-462.** 5 p.
Prediction tables for even-aged stands of white, chestnut, northern red, scarlet, and black oaks can be used to estimate the site index of forest land in 13 counties of northwestern West Virginia. The half width of the 95 percent confidence interval of the predicted site index is included; it can be used to determine the number of sample trees necessary to attain given levels of precision, or to determine the precision of a site index prediction for a known number of sample trees.
A

Lanier, Gerald N.; Peacock, John W. **Vectors of the pathogen.** In: Stipes, R. Jay; Campana, Richard J., eds. Compendium of elm diseases. St. Paul, MN: American Phytopathological Society; 1981:14-16.
E

LaPage, W. F. **The camping market and the camping industry.** In: Campgrounds & camping 1980; 1978 November; Brandon Spring, TN. Carbondale, IL: Southern Illinois University; 1980:56-62.
With all of the data from previous studies at hand, it should be relatively easy to describe trends in the sophistication of research, and trends in the number and variety of developed camping resources, and trends in camper demands. Except for a few very general and obvious trends, this is not true. This paper describes a very small handful of studies that have attempted to look at shifting patterns in supply and demand. P

LaPage, W. F. **A further look at the informal interview as a technique for recreation research.** J. Leisure Res. 13(2):174-176; 1981. F

LaPage, Wilbur F., chairman. **Proceedings 1980 national outdoor recreation trends symposium; Vol. I.** 1980; USDA For. Serv. Gen. Tech. Rep. NE-57. 249 p.
Proceedings (in two volumes) of a national symposium on recreation trends held at Durham, New Hampshire, April 20-23, 1980. Volume I contains papers on trends in selected recreation activities and in recreation

Marquis, David A. **Removal or retention of unmerchantable saplings in Allegheny hardwoods: Effect on regeneration after clearcutting.** J. For. 79(5):280-283; 1981.
Residual saplings left after a 1937 chemical wood clearcutting in a northern hardwood stand in Pennsylvania had a major impact on the development of the new stand. In plots where these saplings were mowed down, the new stand is highly stratified by species, with intolerant black cherry dominating the overstory and slower growing tolerant sugar maple and beech relegated to the understory—even though the tolerants were present as advance seedlings before cutting. Tolerant species are represented in the larger diameters and upper crown strata only where they were retained as saplings up to 5 or 6 inches d.b.h. after cutting. Plots with residual saplings have higher average stand diameter and higher basal areas in merchantable sized trees 35 years after cutting than plots on which stems over 0.5 inch d.b.h. were mowed. **N**

Marquis, David A. **Survival, growth, and quality of residual trees following clearcutting in Allegheny hardwood forests.** 1981; USDA For. Serv. Res. Pap. NE-477. 9 p.
A study of residual saplings and poles left after clearcutting indicates that sugar maple and beech are capable of surviving and growing well after this type of drastic release. Retaining 30 to 80 such trees per acre at the time of clearcutting can provide the head start needed for tolerants to reach mature size at the same time as new intolerant regeneration. This would produce a stand that is more nearly even-sized than a truly even-aged one. **A**

Marquis, David A.; Brenneman, Ronnie. **The impact of deer on forest vegetation in Pennsylvania.** 1981; USDA For. Serv. Gen. Tech. Rep. NE-65. 7 p.
Browsing of tree seedlings by white-tailed deer in the heavily forested regions of Pennsylvania has had a major effect on forest vegetation. In some areas, deer browsing has completely prevented the reestablishment of forest trees following cutting. In other areas, deer have altered species composition, reduced vegetation density and growth, limited the kinds of forest management that can be practiced, and reduced the amount of favorable habitat for other wildlife species such as grouse, rabbits, hare, turkey, and many non-game species. Attempts to protect seedlings from deer are either ineffective or prohibitively expensive. The only long-term solution to this resource management problem is to bring the deer herd into better balance with its habitat. **A**

Marquis, D. A.; Redding, J. C. **Regenerating Allegheny hardwoods.** University Park, PA: Pa. State Univ.; 1980; Pa. For. Resour. No. 75. 4 p.
Allegheny hardwoods are difficult to regenerate because of excessive deer browsing and other problems. A series of guidelines have been developed to identify stands that have a high probability of success and to assist in the selection of the most appropriate regeneration cutting method or cultural practices. Guidelines are presented in a simplified form for nonprofessional forest-land owners. **N**

Marquis, David A.; Somerville, James; Johnson, Eli. **Northern hardwoods.** In: National Forest Landscape Management, Volume 2, Chapter 5. U.S. Dep. Agric.; 1980; Handb. 559:117-145. **N**

Martens, David G. **A brief on the furniture industry in the USA.** In: Proceedings of the Symposium on Technical and Economical Development in the Furniture Industry; 1979 November 5-10; Poznan, Poland. 1979. 14 p.
Describes the structure of the domestic furniture industry and analyzes future trends. The trends toward larger firms and increasing quantities of imports are expected to continue. Although 1980 is expected to show little market increase, the decade of the 80's is anticipated to be major growth years in the furniture market. Factors, such as the WW II baby boom reaching maturity, higher petroleum prices, and changing lifestyles, are cited as the principal determinants of the anticipated demand. Manufacturers are warned to begin building additional capacity soon, or it may be too late to meet the anticipated increased demand. **K**

Martens, David G.; Hansen, Bruce G. **Manufacturing hardwood parquet flooring from southern hardwoods.** In: Utilization of low-grade southern hardwoods: Forest Products Research Society Symposium; 1980 October 6-8; Nashville, TN. Madison, WI: Forest Products Research Society; 1980:94-102.
Hardwood parquet flooring provides a growing market for wood products. Made predominantly from low-grade oak lumber, it uses clear pieces less than 6 inches long. The highly mechanized process crosscuts, planes, and rips boards automatically into strips, called fingers, less than an inch wide by 5/16 inch thick. After the fingers are graded, they are assembled semi-automatically into the normal mosiac pattern and bonded together with a backing material. A plant employing 36 people and operating one line with two shifts can be expected to earn a return on investment before taxes of better than 30 percent. **K**

Martin, A. Jeff. **Volume of logging residue available for harvesting in Appalachia.** In: Brooks, Maurice L.; Hall, Carter S.; Luchok, John, eds. Proceedings of the logging residue conference; Morgantown, WV. 1975 June 4-6; Morgantown, WV: West Virginia University; 1980:31-32.
In 1973, the Forest Products Marketing Laboratory, initiated a study to determine the characteristics of logging residues in Appalachia. Sampling with the line-intersect method on 40 logged-over areas provided an estimate of 677 gross cubic feet of residue per acre (including bark), and about 74 percent of this was sound chippable wood. Volumes varied most with degree of utilization and species and least with type of cutting and ownership. **K**

Martin, A. Jeff. **Taper and volume equations for selected Appalachian hardwood species.** 1981: USDA For. Serv. Res. Pap. NE-490. 22 p.
Coefficients for five taper/volume models are developed for 18 Appalachian hardwood species. Each model can be used to estimate diameter at any point on the bole, height to any preselected diameter, and cubic foot volume between any two points on the bole. The resulting equations were tested on six sets of independent data and an evaluation of these tests is included. A wide variety of volume tables can be constructed with the models; some examples are given. **A**

Martin, C. Wayne; Pierce, Robert S. **Clearcutting patterns affect nitrate and calcium in streams of New Hampshire.** J. For. 78(5):268-272; 1980.
Streams draining seven forested watersheds in the White Mountains of New Hampshire were found to have average annual nitrate and calcium ion concentrations of about 1.8 ± 1.0 mg per liter between 1971 and 1973. Nitrate concentrations in streams from nine watersheds that had been clearcut (all stems larger than 5.0 cm cut) rose to maximum levels of 25.1 ± 4.2 mg per liter. In all streams, the maximum occurred during the second year after cutting. Calcium concentrations in these same nine streams rose to maximum levels of 6.5 ± 1.5 mg per liter during either the first or second year after cutting. Nitrate and calcium concentrations generally returned to reference levels within 5 years after clearcutting. **F**

Martinat, Peter J.; Wallner, William E. **Notes on the biology and damage of two Acrobasis species (Lepidoptera: Pyralidae) on black walnut in Michigan.** Great Lakes Entomol. 13(1):41-48; 1980.
Acrobasis juglandis (LeBaron), and A. demotella Grote cause extensive damage to black walnut foliage and branchlets, and are potential threats to commercial production of walnut trees in Michigan. Both species are univoltine in Michigan and overwinter in hibernacula. Instars I-III are morphologically indistinguishable between species and have similar feeding habits. In the spring, A. demotella was active about 2 weeks earlier, caused more damage, and was more abundant than A. juglandis. Five parasitoids were reared from A. juglandis including Trathala plesia (Cushman), a new record. No parasitoids were reared from A. demotella. **G**

Mason, Conrad J.; McManus, Michael L. **Larval dispersal of the gypsy moth.** In: Doane, Charles C.; McManus, Michael, L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:161-202.
Provides a brief overview of the importance of dispersal in arthropods and a review of the literature on gypsy moth dispersal. Describes in detail the approach used to elucidate the role of dispersal in the spread of the gypsy moth, beginning with the development of a conceptual model and resulting in the development and field evaluation of an atmospheric dispersion model. **G**

Mastro, Victor C.; Schwalbe, Charles P.; ODell, Thomas M. **Sterile-male techniques.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:669-679.
Outlines objectives and strategy of the sterile-male technique and presents speculations on preliminary results. **G**

Mattingly, George E.; Harrje, David T.; Heisler, Gordon M. **The effectiveness of an evergreen windbreak for reducing residential energy consumption.** In: Transactions ASHRAE 1979. Am. Soc. Heating, Refrigerating and Air Conditioning Engineers 2:428-444; 1979. **M**

Mazzone, H. M.; Engler, W. F.; Wray, G.; Groner, A.; Zerillo, R. T.; Bahr, G. F. **Electron microscope analysis of a cabbage moth virus.** In: Bailey, G. W., ed. Thirty-ninth Annual Proceedings Electron Microscopy Society of America; Atlanta, GA; 1980; 398-399. **G**

Mazzone, H. M.; Engler, W. F.; Wray, G.; Szirmae, A.; Conroy, J.; Zerillo, R.; Bahr, G. F. **High voltage electron microscopy of viral inclusion bodies.** In: G. W. Bailey, ed. Thirty-eighth Annual Proceedings of the Electron Microscopy Society of America; Reno, NV; 1980; 486-487. **E**

Mazzone, H. M.; Wray, G.; Engler, W. F.; Bahr, G. F. **High voltage electron microscopy of cells in culture and viruses.** In: Kurstak, E.; Maramorsch, K.; Dubendorfer, A., eds. Invertebrate systems in vitro. Amsterdam: Elsevier/North-Holland Biomed. Press; 1980:511-515.
The high voltage electron microscope was used to observe changes in larval blood cells of the gypsy moth, Lymantria dispar, L., as a result of virus infection. **E**

Mazzone, H. M.; Wray, G.; Zerillo, R. T. **Studies on the fungal pathogen of Dutch elm disease.** In: Bailey, G. W., ed. Thirty-ninth Annual Proceedings Electron Microscopy Society of America; Atlanta, GA; 1981; 400-401. **G**

Mazzone, Horace M.; McCarthy, William J. **Biochemistry and biophysics.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:487-495.
Describes identifying characteristics of NPV—the polyhedral inclusion body (PIB) and its proteins, and the virions consisting of protein and nucleic acid. **E**

Melhuish, J. H., Jr.; Haeskaylo, E. **Fatty-acid content of Pisolithus tinctorius in response to changing ratios of nitrogen and carbon source.** Mycologia 72(5):1041-1044; 1980.
In studies on the metabolism of Pisolithus tinctorius we examined its response to nitrogen and carbon source ratios as they affect the total lipid and fatty-acid

content. Gas chromatographic evidence suggests that at the higher NH_4 tartrate concentrations there is a conversion of 18:1 fatty acid to 18:2 fatty acid. The conversion of 18:1 to 18:2 could be a desaturation response to high NH_4 + levels required for greater membrane biosynthesis. In general, high levels of available N tend to suppress ectomycorrhizal development. We suspect that modifications of fatty-acid content that result in changes in membrane permeability and possible changes of internal pH could be involved in this response. C

Melhuish, J. H., Jr.; Hacskaylo, E. **Fatty acids of selected Athelia species.** Mycologia 72(2):251-258; 1980.
Mycelia of Athelia epiphylla, A. decipiens, A. neuhoffi, A. borealis, A. bombycina, and A. bicolor growing in vitro were analyzed for fatty-acid composition by GLX and TLC methods. The major fatty acid in each fungus was a diunsaturated 18-carbon acid with lesser amounts of 16:0, 18:0, and 18:1. An unidentified 18:2 was detected in A. bicolor. The fungi could be identified by their fatty-acid patterns. C

Melhuish, J. H., Jr.; Janerette, C. A. **The effects of carbon-nitrogen ratios on carbohydrate, protein, lipid and fatty-acid production in Pisolithus tinctorius.** (Abstr.) In: Fourth North American Conference on Mycorrhiza, Program and Abstracts; 1979 June 24-28; Fort Collins, CO. Fort Collins: Colorado State University; 1979.
The mycorrhizal fungus Pisolithus tinctorius was grown in vitro on a glucose-ammonium tartrate medium at various carbon-nitrogen ratios. The mycelia were freeze-dried at harvest and subsequently analyzed for carbohydrate, protein, lipid, and fatty-acid content. C

Melhuish, J. H., Jr.; Janerette, C. A. **A comparison of total carbohydrate, protein, and lipid of the three mycorrhizal fungi Pisolithus tinctorius, Cenococcum graniforme and Thelephora terrestris.** (Abstr.) In: Fourth North American Conference on Mycorrhiza, Program and Abstracts; 1979 June 24-28; Fort Collins, CO. Fort Collins: Colorado State University; 1979.
Pisolithus tinctorius, Cenococcum graniforme, and Thelephora terrestris were grown on glucose-ammonium tartrate media at 29°C and analyzed for total carbohydrate, total protein, total lipid, and total fatty-acid content. The total protein of P. tinctorius was 20 times greater than that of C. graniforme or T. terrestris and the ratio of protein to lipid in P. tinctorius was greater than 1. The ratio was much less than 1 for C. graniforme and T. terrestris. Carbohydrate levels were comparable for all three fungi. C

Melillo, J. M.; Aber, J. D.; Federer, C. A. **Decomposition dynamics of leaf litter in an age sequence of northern hardwood stands.** (Abstr.) Bull. Ecol. Soc. Am. 61:113; 1980. F

Merrill, William; Shigo, Alex L. **An expanded concept of tree decay.** Phytopathology 69:1158-1160; 1979.
Clarification of the decay processes to include compartmentalization and succession provides new opportunities to regulate tree decay. A tree is constructed in an orderly manner, and when it is injured and infected, it responds in an orderly way (compartmentalization). When microorganisms infect trees, they do so in an orderly manner (succession). The more completely the nature of compartmentalization and succession are understood, the better are our chances for regulating the processes of tree decay. F

Miller, David R.; Heisler, Gordon M. **Amenity values of urban trees.** In: Husband, T. P.; Lawrence, J. M., III; Knight, A. R., eds. Street trees: A guide for communities in southern New England. Kingston, RI: University of Rhode Island; 1980:7-14. M

Miller, David R.; Heisler, Gordon M.; Toedter, Robert M. **Classification of shelterbelt effectiveness.** In: Fifteenth conference on agriculture and forest meteorology and fifth conference on biometeorology; 1981 April 1-3; Anaheim, CA. Boston, MA: American Meteorological Society; 1981:125-127. M

Moeller, George H.; Mescher, Michael A.; More, Thomas A. **The informal interview as a technique for recreation research.** J. Leisure Res. 12(2):174-182; 1980.
Comparisons of data obtained from a sample of campers at two public campgrounds in New York State revealed significant differences in data on willingness to pay collected by formal and informal interviews. These differences could only partially be accounted for by the characteristics of the respondents. Evaluation of the informal interview procedure indicates that although it may have limited application, it provides a useful way to validate research data collected through more formal procedures. L

Moeller, George H.; Mescher, Michael A.; More, Thomas A.; Shafer, Elwood L. **A response to a second look at the informal interview as a technique for recreation research.** J. Leisure Res. 12(2):187-188; 1980. L

Monahan, Ralph T.; Wartluft, Jeffrey L. **Prospectus: Firewood manufacturing and marketing.** Broomall, PA: USDA For. Serv., Northeast. Area, State and Priv. For.; 1980; NA-FR-17. 25 p.
Three mechanized firewood processing systems were timed to give production data on 750 logs. Raw material procurement, labor requirements, production rates, and nonproductive time are discussed. From market survey data, production information, and company records, a hypothetical production scheme was developed to assess the investment potential of manufacturing and marketing firewood. The profit from the investment required in firewood manufacturing is better than interest from a

government bond yielding 11 percent annually as long as nonproductive time does not exceed 15 percent. **A**

More, Thomas A. **Emotional responses to recreation environments.** 1980; USDA For. Serv. Res. Pap. NE-461. 8 p.
Data on the moods of visitors to state parks, golf courses, and museums were compared. The results indicated that (1) visitors arrived at all of the areas with moderate levels of positive moods and low levels of negative moods; (2) the levels of both positive and negative moods tended to decline during the experience (3) while there were differences in moods between individual areas, it is not possible to attribute these differences solely to the type of recreation environment. Instead, there may be a process of anticipation and consummation that pervades recreation experiences and tends to outweigh differences between environments. **A**

More, Thomas A. **Trail deterioration as an indicator of trail use in an urban forest recreation area.** 1980; USDA For. Serv. Res. Note NE-292. 4 p.
The average width of a trail was used to predict trail use in an urban forest recreation area. Results show that width indicates use only very generally at best. Consequently, simply inspecting the physical condition of a trail may lead to erroneous conclusions about its use. Managers requiring more than a simple light use/heavy use classification should adopt more elaborate schemes to determine use levels. **A**

Morselli, M. F.; Sendak, P. E. **Maple syrup containers: effect of storage on the stability of three table grades.** 1980; Univ. Vt. Agric. Exp. Stn. Res. Rep. 6. 12 p.
Three table grades of maple syrup were packed in six types of containers and stored under two controlled temperatures in light and in darkness. Analysis of covariance on the changes that occurred over time in the syrup indicates that: 1) cool temperature minimized the changes in the syrup; 2) the initial chemical and physical characteristics of the syrup determined the changes in the stored syrup; and 3) storage for 3 months affected syrup color, but not flavor, in all containers except one in which syrup flavor deteriorated rapidly. **D**

Mott, D. Gordon. **Spruce budworm protection management in Maine.** Maine For. Rev. 13:26-33. **I**

Mulhern, J.; Stavish, B. M.; Shortle, W.; Shigo, A. **Voltage changes along geranium petioles after leaf blade excision.** J. Exp. Bot. 32:573-579; 1981. **F**

Nenno, Edward S. **The history and role of the northeast wild turkey committee.** In: Trans. Northeast Fish and Wildl. Conf. 37:249-257; 1980. **H**

Nenno, Edward S.; Lindzey, James S. **Wild turkey poult feeding activity in old field, agricultural clearing, and forest communities.** Trans. Northeast Fish and Wildl. Conf. 36:97-109; 1979.
An understanding of early brood range requirements is needed to develop management guidelines to help reduce the fluctuations in annual productivity of wild turkeys. Human-imprinted poults were observed feeding in an old field, agricultural clearing, and forest communities. Invertebrates accounted for from 57 to 99 percent of the number of items eaten by 1- to 4-week-old poults. Feeding rates for June-hatched poults were similar in old fields and an agricultural clearing, but July-hatched broods had higher feeding rates and found a greater variety of food items in old fields. Poults ate more in old fields and an agricultural clearing than in a forest community. Management recommendations include maintenance of savannahlike old field communities and creation of structurally similar wildlife clearings. **H**

Nevel, Robert L., Jr.; Bones, James T. **Northeastern pulpwood, 1978: An annual assessment of regional timber output.** 1980; USDA For. Serv. Resour. Bull. NE-62. 27 p.
This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast. Presents tabular data on roundwood and chips from plant residues produced in and received by 14 Northeastern states in 1978. This includes pulpwood production by state, county, and selected species; pulpwood receipts from roundwood by state and selected species; pulpwood chip receipts by state and selected species; and production of total-tree chips. From 1977 to 1978, pulpwood production increased by 3 percent; roundwood production rose by 7 percent; and chipped residue production declined by 8 percent. Current record levels are discussed and trends in pulpwood production for the past 16 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1978 is included. **A**

Nevel, Robert L., Jr.; Bones, James T. **Northeastern pulpwood—1979: An annual assessment of regional timber output.** 1981; USDA For. Serv. Resour. Bull. NE-67. 28 p.
This annual assessment of regional timber output is based upon a canvass of the pulpmills in the Northeast. Presents tabular data on roundwood and chips from plant residues produced and received in the 14 Northeastern states in 1979. This includes pulpwood production by state, county, and species group; pulpwood receipts from roundwood by state and species group; pulpwood chip receipts by state and species group, and production of total-tree chips. From 1978 to 1979, pulpwood production increased by nearly 4 percent to a record high. Roundwood production remained about the same, while chipped residue production jumped by 14 percent. Current record levels

The benefits of urban forests are great, but they will gain full recognition only if they are quantified, preferably in monetary units. Economic studies have shown that saving trees around new homes is a good investment. Urban forest managers must understand urban economics, and they must become as skillful at working with people as they are with trees.

Peters, Penn A. **Physical requirements of cable logging configurations.** In: Proceedings, Cable Yarding Conference; 1980 September 9-10; Asheville, NC. Hardwood Research Council and TVA. 1980:58-82. H

Peters, Penn A. **Road and landing spacing models.** In: Corcoran, Thomas J.; Jeij, William B., eds. Forest Operations Analysis—Techniques for Planning and Control. IUFRO World Congress; 3.04.01; 1981 September 6-12; Kyoto, Japan. 1981:51-68.
Presents solutions for optimum road and landing spacing for rectangular harvest units and simple yarding patterns: yarding directly to a road, yarding directly to a landing, and yarding in an L-pattern to a landing. In the last section of the chapter is a brief discussion of computer programs that determine optimal design for more complex harvest units. H

Peters, Penn A.; Biller, C. J.; Fisher, E. L.; Shea, L. N. **Harvesting on rough terrain with the Appalachian Thinner.** Broomall, PA: Northeast. For. Exp. Stn.; 1980; NE-INF-38-80. H

Peters, Penn A.; Kellogg, Loren D. **Smallwood harvesting using a Trailer Alp cable yarder system.** Trans. ASAE 23(5):1080-1083; 1980. H

Phares, Robert E. **Future challenges for hardwood utilization—a summary of the ninth annual hardwood symposium.** In: Proceedings of the 9th annual hardwood symposium of the Hardwood Research Council; 1981 May 25-28; Pipestem, WV. Asheville, NC: Hardwood Research Council; 1981:7-13.
Summarizes papers presented at the 9th Annual Hardwood Symposium which included separate sessions on: (1) opportunities and problems in using hardwoods in the construction industry; (2) new directions in processing and production of hardwood resources; (3) ways of upgrading the use of hardwoods; and (4) opportunities for investment in the hardwood resource. A number of problem areas for future hardwood utilization research are also discussed. H

Phares, Robert E.; Larsson, H. Cedric. **Silver maple—American elm.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 48.
Describes the silver maple—American elm forest type, including associated tree species, geographic distribution, type variants, and associated understory vegetation. H

Pierce, R. S.; Keller, H. M. **Forest land use impacts on upstream water sources.** In: Duncan, N.; Rzoska, J., eds. Land use impacts on lake and reservoir ecosystems; Proc. MAB project 5 regional workshop; Warsaw, Poland. Facultas-Verlag; 1980:112-128.
Discusses possible impacts of various forest-land uses on stream water quantity and quality. The most visible impacts are likely to be in stream water yields: storm peak flows, low flow during drought periods, and production of particulate matter. Less visible but still important impacts may include increased concentrations of nutrients leached from the land, changes in acidity and temperature, and introduction of heavy metals, pesticides, and pathogenic organisms. F

Plumley, Harriet J.; Leonard, Raymond E. **Composting human waste at remote recreation sites.** Parks 6(1):18-22; 1981.
Human waste is being composted in small bins at high-elevation mountain sites in New England and at canoe camping sites in northern Michigan where the soils are unsuitable for leaching waste safely and where alternative disposal systems would have been more costly. The decomposition process is discussed, and a detailed and illustrated step-by-step procedure for using the bin composting system is provided. Factors affecting the operating costs and the annual composting capacities are also described. F

Podgwaite, John D. **Early production techniques.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:462.
Describes pioneering production techniques involved in field collecting gypsy moth caterpillars from populations that were undergoing NPV epizootics. G

Podgwaite, John D. **Environmental persistence of gypsy moth NPV.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:479-481.
Presents results of studies to determine how long, where, and in what quantities NPV persists in the environment. G

Podgwaite, John D. **Introduction.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:461.
Introduction to "NPV production and quality control" in Chapter 6.3:Microbials. G

Podgwaite, John D. **Large-scale productions.** In: Doane, Charles C.; McManus, Michael L., eds., The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:462-464.
Describes efforts to produce NPV more efficiently and economically on a large scale. G

Podgwaite, John D. **Natural disease within dense gypsy moth populations.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward

integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:125-134.
Describes a study designed to determine the components of disease operating in dense gypsy moth populations and to relate the variation in disease incidence to both biological and physical variation in the environment. G

Podgwaite, J. D.; Mazzone, H. M. **Development of insect viruses as pesticides: the case of the gypsy moth (Lymantria dispar L.) in North America.** Prot. Ecol. 3:219-227; 1981.
Biological control, one component of integrated pest management, encompasses the use of several types of biological agents to control insect pest populations. Of these biological control agents, the insect viruses appear to offer one logical alternative to the chemical insecticides. One such virus, the nucleopolyhedrosis virus of the gypsy moth, Lymantria dispar (Linnaeus), is discussed in depth in regard to the research leading to its approval as an insecticide against its host. G

Podgwaite, John D.; Shields, Kathleen S.; Lautenschlager, Richard A. **Epidemiology.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:482-487.
Discusses several mechanisms of NPV transmission: physical factors such as wind and rain, mammalian and avian predators, entomophagous parasites, and the gypsy moth itself. G

Podgwaite, J. D.; Smith, H. R.; Zerillo, R. T. **Feasibility of integrating nucleopolyhedrosis virus treatment of egg masses with small mammal management for control of the gypsy moth, Lymantria dispar L.** (Abstr.) In: Program of the XIV Annual Meeting, Society for Invertebrate Pathology; 1981 August 17-21; Bozeman, MT. 1981. G

Pogge, Franz L. **Book review: Trees, shrubs, and vines for attracting birds,** by Richard M. DeGraaf and Gretchen M. Whitman. Castanea 45:193; 1980. H

Powell, Douglas S. **White pine—hemlock.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 26-27.
Describes the white pine—hemlock forest type, including associated tree species, geographic distribution, type variants, and associated vegetation. A

Powell, Douglas S.; Barnard, Joesph E. **Identifying regional timber management opportunities by computer.** In: Forest resource inventories, workshop proceedings; Vol. I; 1979 July 23-26; Fort Collins, CO. Fort Collins, CO: Colorado State University; 1979:486-498.
Explores a technique for coupling extensive resource data with a stand-specific management prescription model to identify regional opportunities for improving timber management. The resource data base was 3.6 million acres of forest land in eastern Kentucky, and involved data from 303 oak/hickory sample plots. The silvicultural prescription model, developed for even-age oak/hickory management, gives guidelines for achieving the best stand growth by adjusting stocking levels through intermediate and regeneration cuts. A

Powell, Douglas S.; Erdmann, Gayne, G. **Northern pin oak.** In: Eyre, F. H., ed. Forest cover types of the United states and Canada. Washington, DC: Society of American Foresters; 1980. p. 35.
Describes the northern pin oak forest type, including associated tree species, geographic distribution, type variants, and associated vegetation. A

Powell, Douglas S.; Kingsley, Neal P. **The forest resources of Maryland.** 1980; USDA For. Serv. Resour. Bull. NE-61. 103 p.
A statistical and analytical report on the third forest survey of Maryland conducted in 1975 and 1976. Statistical findings are based on data from remeasured-acre plots and both remeasured and new 10-point variable-radius plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber products output by forest industries, based on a canvass of industries in 1975, and the importance of timber to the economy of Maryland also are discussed. The report includes a discussion of the outlook for timber supplies through 2006, and forest-management opportunities in the state. The status and importance of the nontimber forest resources of Maryland are also discussed. A

Quink, Thomas F.; Descamps, Peter B.; Nolley, Jean W., compilers. **Massachusetts' secondary wood industry. A utilization summary and directory.** Boston, MA: MA Dep. Environ. Manage., Div. For. and Parks; 1980. 79 p.
Identifies secondary wood-using markets in the Commonwealth of Massachusetts that are available to primary wood producers, and buyers and sellers of manufactured wood products. K

Quink, Thomas F.; Nolley, Jean W. **Boston's secondary wood industry. A utilization summary and directory.** Boston, MA: MA Dep. Environ. Manage., Div. For. and Parks; 1979. 27 p.
Identifies secondary wood-using markets in the Boston, Massachusetts metropolitan area that are available to primary wood producers, and buyers and sellers of manufactured wood products. K

Quink, Thomas F.; Nolley, Jean W. **Eastern Massachusetts' secondary wood industry. A utilization summary and directory.** Boston, MA: MA Dep. Environ. Manage., Div. For. and Parks; 1979. 37 p.
Identifies secondary wood-using markets in eastern Massachusetts that are available to primary wood producers, and buyers and sellers of manufactured wood products. K

Rast, Everette D.; Chebetar, Vincent P., Jr. **Technique for estimating yield of furniture squares and flat stock from flitches.** 1980; USDA For. Serv. Res. Note NE-287. 4 p.
A grading technique developed to predict the yield of furniture squares and random-width stock from flitches is presented. A

Rexrode, C. O. **Gum spots in black cherry caused by natural attacks of peach bark beetle.** 1981; USDA For. Serv. Res. Pap. NE-474. 5 p.
Peach bark beetles, Phloeotribus liminaris (Harris), made abortive attacks on healthy black cherry, Prunus serotina Ehrh., trees. The beetle attacks caused five types of gum spots in the wood and a gummy exudate on the bark. The most extensive and common types of gum spot were single and multiple rows of interray gum spots that encircled the lower 3 m of the tree. Three to four attacks per 6.5 cm^2 of bark surface caused enough gum flow to produce a continuous ring of gum spot in the wood. A

Rexrode, Charles O. **Insects that deform black cherry.** J. N.Y. Entomol. Soc. 88(1):67-68; 1980. E

Rexrode, Charles O.; Allison, J. R. **How to identify oak wilt.** Broomall, PA: USDA For. Serv., Northeast. Area, State and Priv. For.; 1981; NA-GR-4. 7 p.
Describes oak wilt disease. Gives symptoms for the red oak and white oak group. Illustrates two methods for isolating the oak wilt fungus. A

Rexrode, C. O.; Baumgras, J. E. **Gum spots caused by cambium miners in black cherry in West Virginia.** 1980; USDA For. Serv. Res. Pap. NE-463. 9 p.
Six types of gum spots in black cherry, Prunus serotina Ehrh. were associated with parenchyma flecks caused by the cambium miner Phytobia pruni (Gross). The number of parenchyma flecks and associated gum spots increased with the height of the tree. Four percent of the flecks produced gum spots in the first 18 to 20 feet of the trees; 8 percent of the flecks produced gum between 20 and 60 feet. Most parenchyma flecks and associated gum spots occurred during the first 10 to 15 years of cambial growth. A

Rexrode, Charles O.; Krause, Charles R. **Sexing Phloeotribus liminaris adults (Coleoptera:Scolytidae).** Proc. Entomol. Soc. Wash. 83(4):759-762; 1981.
Morphological differences on the front of the head and on the propygidium and pygidium can be used to determine the sex of adults of the peach bark beetle, Phloeotribus liminaris (Harris). The propygidium is an excellent diagnostic character, and the differences between sexes are easily distinguished by inexperienced observers. E

Reynolds, Hugh W.; Gatchell, Charles J. **Marketing low-grade hardwoods (Part II).** Furniture Des. Manuf. 51(11):56, 58; 1979.
There is a shortage of high-grade hardwood lumber and a surplus of low-grade hardwood timber. For the surplus to correct the shortage, a new manufacturing system and a new marketing technique would be required. A new system for converting low-grade hardwood for furniture use has been developed. The manufacturing steps can be integrated with the existing marketing system from the timber grower to the logger, to the sawmiller, to the dimension maker, to the furniture producer. K

Riddle, J.; Wargo, P. M. **Northeastern Forest Experiment Station - Who we are and what we do.** Newsletter, New England Chapter International Society of Arboriculture; 1981. G

Ring, Merle E., Jr.; Nolley, Jean W. **Maine's secondary wood industry. A utilization summary and directory.** Augusta, ME: ME Dep. Conserv., Bur. of For.; 1979. 46 p.
Identifies secondary wood-using markets in the State of Maine that are available to primary wood producers, and the buyers and sellers of manufactured wood products. K

Roach, Benjamin A. **Black locust.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 44-45.
Describes the black locust forest type, including associated tree species, geographic distribution, type variants, and associated vegetation.

Romberger, J. A. **Fundamental aspects of normal organismal growth in plants.** In: Kaiser, H. E., ed. Neoplasms—Comparative pathology of growth in animals, plants, and man. Baltimore, MD: Williams & Wilkins; 1981:187-206.

Rowntree, Rowan A.; Sanders, Ralph A. **The urban resources of New York State.** Albany, NY: New York State Department Environmental Conservation; 1981; Report No. 13. 19 p. L

Rowntree, Rowan A.; Wolfe, Judith L., compilers. **Abstracts of urban forestry research in progress—1979.** 1980; USDA For. Serv. Gen. Tech. Rep. NE-60. 72 p.
Summary of research in progress on urban forestry. Abstracts inform researchers of ongoing work and help urban forest managers anticipate results of interest to them. A

Safford, L. O. **Correlation of greenhouse bioassay with field response to fertilizer with paper birch.** Agron. Abstr. 1979:218; 1979. F

Safford, L. O. **Paper birch.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 18.
Describes the paper birch forest type, including associated tree species, geographic distribution, type variants, and associated vegetation. F

Safford, L. O. **Thinning and fertilizer affect foliar nutrient status of paper birch in Maine.** Agron. Abstr. 1980:205. F

Sanders, Ralph A. **Diversity in the street trees of Syracuse, New York.** Urban Ecol. 5:33-43; 1981. L

Sanders, Ralph A. **Urban forestry: a movement afoot.** (Abstr.) Los Angeles, CA: Association of American Geographers; 1981:210. L

Sanderson, H. Reed; Nixon, Charles M.; Donohoe, Robert W.; Hansen, Lonnie P. **Grapevines--an important component of gray and fox squirrel habitat.** Wildl. Soc. Bull. 8(4):307-310; 1980.
The importance of grapevines (Vitis spp.) to anchor gray and fox squirrel (Sciurus carolinensis and S. niger) leaf nests was examined on study areas in West Virginia, Ohio, and Illinois. On each area, more leaf nests were anchored to grapevines than would be expected by chance (P less than 0.05). Hickories (Carya spp.), beech (Fagus grandifolia), or oaks (Quercus spp.) usually were selected for building leaf nests.

Santamour, Frank S., Jr.; Garrett, Peter W.; Paterson, David B. **Oak provenance research: The Michaux Quercetum after 25 years.** J. Arboric. 6(6):156-160; 1980.
Growth and survival data after 25 years are given for trees representing 92 seedlots from known geographic origins of 12 eastern American oak species. Both survival and growth depended more on the genetic characteristics of the parent tree than on its geographic origin. No single species was clearly superior to others in either growth or survival, and there was sufficient variation within all species to allow for meaningful selection for higher survival and more rapid growth. Growth at age 25 was significantly correlated with growth at age 13, so the selection process could begin at the earlier age. F

Scharf, C. S.; Smith, H. R. **Gypsy moth avian predators along an altitudinal gradient.** (Abstr.) In: Proceedings, 99th Meeting of the American Ornithologists Union; 1981 August 24-27; University of Alberta, Edmonton. G

Schimel, J. P.; Stendler, P. A.; Melillo, J. M.; Aber, J. D.; Federer, C. A. **Denitrification potentials in a successional sequence of northern hardwood forest ecosystems.** (Abstr.) Bull. Ecol. Soc. Am. 62:105; 1981. F

Schmitt, M. D. C.; Czapowskyj, M. M.; Safford, L. O.; Leaf, A. L. **Biomass distribution of fertilized and unfertilized Populus grandidentata Michx. and Betula papyrifera Marsh.** In: Forest resource inventories, workshop proceedings; Vol. II; 1979 July 23-26; Fort Collins, CO. Fort Collins, CO: Colorado State University; 1979:695-704. I

Schmitt, Mark D. C.; Czapowskyj, Miroslaw M.; Safford, Lawrence O.; Leaf, Albert L. **Biomass and elemental uptake in fertilized and unfertilized Betula papyrifera Marsh. and Populus grandidentata Michx.** Plant and Soil 60:111-121; 1981.
Estimates were made of the aboveground biomass and contents of N, P, K, Ca, Mg, Mn, Na, Fe, Zn, Al, and Cu in fertilized (N 448 kg/ha, P 112 kg/ha, lime 4480 kg/ha) and unfertilized white birch and bigtooth aspen. For individuals of both species, fertilization increased the average aboveground biomass increment and the N and P content increment by 150 percent and 300 percent, respectively, but decreased uptake of Mn and Zn. The allocation of biomass and elements differs not only between species, but within species under untreated and fertilized conditions. I

Schreiber, L. R.; Gregory, G. F. **Influence in a benzimidazole-tolerant isolate of Ceratocystis ulmi on the control of Dutch elm disease with methyl 2-benzimidazole carbamate phosphate.** Phytopathology 70(5):444-446; 1980.
Lignasan BLP injection (4 g/2.5 cm d.b.h.) reduced Dutch elm disease (DED) symptoms in American elms inoculated with benzimidazole-sensitive strain of the pathogen, Ceratocystis ulmi. However, when comparably injected 10- to 20-cm d.b.h. elms were inoculated with a benzimidazole-tolerant strain, DED symptoms were not significantly reduced. The fungitoxicant was recovered more frequently from branches of trees inoculated with benzimidazole-sensitive than those of the tolerant strain. E

Schuler, Albert T.; Wallin, Walter B. **Report on an econometric model for domestic pallet markets.** For. Prod. J. 30(7):27-29; 1980.
Summarizes an econometric model of the domestic pallet market. This model is the first in a series being developed to describe the economic structure of the pallet market and to provide a means for projecting future consumption and price levels. D

Scott, Charles T. **Midcycle updating: some practical suggestions.** In: Forest resource inventories, workshop proceedings; Vol. I; 1979 July 23-26; Fort Collins, CO. Fort Collins, CO: Colorado State University; 1979:362-370.
Midcycle updating of large-scale forest surveys is often used when radical changes in the resource have occurred. Several subsampling approaches to midcycle surveys are described, including both equal and unequal probability selection. Unequal probability subsampling of plots is recommended. Subsampling individual trees had been suggested in the literature but was not found to be cost-effective in this study. A

Scott, Charles T. **Northeastern forest survey revised cubic-foot volume equations.** 1981; USDA For. Serv. Res. Note NE-304. 3 p.
Cubic-foot volume equations are presented for the 17 species groups used in the forest survey of the 14 northeastern states. The previous cubic-foot volume equations were simple linear in form; the revised cubic-foot volume equations are nonlinear. A

Scott, Charles T. **Simplified estimators for sampling with partial replacement on multiple occasions.** St. Paul, MN: University of Minnesota, Department of Forest Resources; 1981; Coll. For. Agric. Exp. Stn. Staff Pap. Ser. 23. 48 p. A

Seliskar, Carl E. **Virus and viruslike diseases in Europe.** In: Stipes, R. Jay; Campana, Richard J., eds. Compendium of elm diseases. Am. Phytopathol. Soc.; 1981:51-52. E

Sendak, Paul E. **Estimating the potential resource for maple sap production using forest survey data.** In: Forest resource inventories, workshop proceedings; Vol. II; 1979 July 23-26; Fort Collins, CO. Fort Collins, CO: Colorado State University; 1979:937-942.
Presents a method for assessing the potential for maple sap production based on existing forest survey data. A computerized screening procedure is explained and applied to the forest survey data for Vermont to estimate that state's potential for maple sap production. Two minimum-diameter rules for selecting trees in the screening process were tested by ground survey. D

Sendak, Paul E.; Morrow, Robert R.; Staats, Lewis J. **Modified oil burners.** Natl. Maple Syrup Dig.(1):15-18; 1981.
Fuel oil is an important source of heat to fire maple syrup evaporators. One possible method for increasing the efficiency of an oil-fired boiler is a burner modification called the Vapormid. A study was designed to test the Vapormid on a standard oil-fired evaporator. The results show an average increase in evaporator efficiency of 3.8 percent—not large enough to justify the additional investment. D

Sherald, James L.; Gregory, Garold F. **Dutch elm disease therapy.** J. Arboric. 6(11):287-290; 1980.
Methyl 2-benzimidazole carbamate (MBC) injection coupled with removal of symptomatic limbs was evaluated for Dutch elm disease (DED) therapy. Trunk plus symptomatic limbs of DED American elms were injected with either hydrochloride or phosphate salt of MBC followed by removal of symptomatic limbs. The study was conducted on high value elms in the National Capital Region—central of Washington, D.C. Elms with up to 30 percent foliar symptoms were treated from 1975 through 1977. The average survival at the end of 1979 was 55 percent. E

Shigo, Alex L. **Branches.** J. Arboric. 6(11):300-304; 1980.
Pruning is not a cure all. When done properly, it can be the best thing you can do for a tree. When done improperly, it is the worst thing you can do to a tree. To prune properly requires a great amount of skill and understanding about branches. The purpose of this paper is to provide a pictorial review of branches on hardwoods so that better decisions can be made for pruning. F

Shigo, A. L. **Dags for ny syn pa tradbeskarning.** Vtemiljo 7:9; 1981. F

Shigo, A. L. **Discoloration and decay.** In: Stipes, R. J.; Campana, R. J., eds. Compendium of elm diseases. St. Paul, MN: American Phytopathological Society; 1981:48-49. F

Shigo, Alex L. **If it ain't broke, don't fix it.** In: Proceedings of the National Agricultural Science Information Conf.; Ames, IA. 1979:11. F

Shigo, Alex L. **New developments in tree care in USA.** In: Proc. Int. Urban For. Symp. Laval University, Quebec. p. 320-327.
The 10 most important new developments in tree care are: Awareness: A tree hurts too; trees can withstand only so much stress. Urban forestry; Professionalism; Training; Arboriculture as a science; Chemicals and "Cures"; Regulations: some help; some are cumbersome and may hurt. Company changes; Modern machines: bring new problems; will not reduce people problems. A new look at old procedures: Tree care has come of age. F

Shigo, Alex L. **Professional home study course session 3 CODIT.** National Arborist Assoc., Inc. 1981. F

Shigo, Alex L. **Proper pruning of tree branches.** In: The garden. J. R. Hortic. Soc. 106(11):471-473; 1981.
Pruning is not a cure all for trees. Proper pruning is the best thing you can do for your tree; improper pruning is the worst thing you can do to your tree. Information is given on proper and improper pruning. F

Shigo, Alex L. **Rx for damaged trees.** Landscape & Turf 5(4):34-37, 53; 1980.
Landscapes that have beautiful, healthy, and safe trees are sights to behold! But, more and more, we are seeing landscapes with sick, unsightly, and even hazardous trees. There is much that can be done to help trees stay beautiful, healthy, and safe for many years. Too often there is a very fine line between help and harm. Altering a procedure or treatment ever so slightly could make the difference. This paper gives some examples. F

Shigo, Alex L. **Some myths and misconceptions about trees and tree care.** N.H. For. Notes, Summer:2-7; 1980.

It is time to make some changes in the way we think about trees and their proper care. It is time for adjustments based on results of experiments. If we really want to help our trees, we should start by getting rid of some longstanding myths and misconceptions. F

Shigo, Alex L. **To paint or not to paint.** In: Handbook on pruning. Brooklyn Bot. Gard. Rec./Plants and Gard. 37(2):20-23; 1981.
Wound dressings do not prevent or stop decay. Results of experiments over a 7-year period that involved dissections of over 400 wounds on 100 trees showed no difference in amount of decay. F

Shigo, Alex L.; Campana, Richard; Hyland, Fay; Anderson, Janet. **Anatomy of elms injected to control Dutch elm disease.** J. Arboric. 6(4):97-100; 1980.
This paper gives some information on the compartmentalization of wound-altered tissues associated with injection wounds made for the prevention of Dutch elm disease in American elm, Ulmus americana L. F

Shigo, Alex L.; Felix, Robert. **Cabling and bracing.** J. Arboric. 6(1):5-9; 1980.
Dissections of tree sections that contained screw rods, lag screws and bolts, and the use of the Shigometer method on living trees that have rods and screws, gave new information and confirmed preliminary data on cabling and bracing published in this journal. When hardware is put into sound wood, the discolored wood associated with the wound is compartmentalized. When hardware penetrates decayed wood, decay spreads out to the previously sound wood surrounding the decayed wood. This reduces the holding power of the hardware. Where there is decayed wood, rods or eye bolts should go entirely through the stem and oval washers should be placed on each end. F

Shigo, A. L.; Hawksworth, F. G. **A dwarf mistletoe on red spruce in New Hampshire.** For. Notes, fall :22-23; 1980. F

Shigo, A.; Tippett, J. T. **Compartmentalization of tissues infected by Ceratocystis ulmi.** Plant Dis. 65(9):715-718; 1981.
American elm trees compartmentalized tissues infected by Ceratocystis ulmi where the cambium was not killed. After infection, the cambium that was not killed formed a barrier zone that separated infected xylem from newly developing healthy xylem. The barrier zones in the sections studied were tangential sheets of axial parenchyma bridging swollen ray parenchyma cells. Recovery of an elm tree after infection may depend on its ability to compartmentalize infected wood rapidly to small volumes, and to regenerate new healthy tissues. F

Shigo, Alex L.; Tippett, Joanna T. **Compartmentalization of decayed wood associated with Armillaria mellea in several tree species.** 1981; USDA For. Serv. Res. Pap. NE-488. 20 p.
Decayed wood associated with Armillaria mellea was compartmentalized according to the CODIT (Compartmentalization Of Decay in Trees) model. Compartmentalization in the sapwood began after the tree walled off the area of dead cambium associated with the infection of the fungus. The fungus spread into dying sapwood beneath and beyond the area of killed cambium, but the fungus did not spread radially outward into new wood that formed later. A

Shortle, Walter C. **New ideas in tree care, 1979.** Turf Bull. 15(3):3-5; 1979.
Provides an update of new ideas in tree care that have been developed as a result of research on discoloration and decay in living trees. Highlights of the CODIT model system, which shows how trees compartmentalize following wounding, are presented along with specific recommendations about how to prevent, diagnose, and treat decay in trees. Some useful publications are listed. F

Shortle, W. C. **Tree injections and wound response.** In: Proceedings of the Tree Wardens, Arborists, and Utilities Conference; 1979 March 13-15; Chicopee, MA. Amherst, MA: University of Massachusetts; 1979:36-37.
A variety of materials are injected into trees in attempts to prevent or minimize damage caused by insects and diseases. Injections cause wounds to which the tree must respond. Response to injection-type wounds in hybrid poplar appeared to be genetically controlled. Some trees responded well to minimize injury, other trees did not. Response also varied in elms injected by various systems. Response varied with material and dosage in trees treated with the Mauget systems. Internal effects of injection treatments require careful consideration. F

Slick, Bernard M. **Revegetation for aesthetics.** In: Trees for reclamation; 1980; USDA For. Serv. Gen. Tech. Rep. NE-61. p. 75-84. A

Smith, H. Clay. **Beech—sugar maple.** In: Eyre, F. H., ed. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters; 1980. p. 33-34.
Describes the beech—sugar maple forest type, including associated tree species, geographic distribution, type variants, and associated vegetation. J

American Forest Soils Conference; 1978 August 6-9; Fort Collins, CO. Fort Collins, CO: Colorado State Univ.; 1980:516-535.
A review article drawing together the current understanding of how cutting in eastern deciduous forests for any of a variety of purposes affects soil and streamflow. Results are summarized from five experimental areas: Coweeta, North Carolina; Fernow, West Virginia; Walker Branch, Tennessee; Leading Ridge, Pennsylvania; and Hubbard Brook, New Hampshire. **F**

Tabor, Christopher A. **Microforks for transferring small organisms, organs, or tissues into culture.** In Vitro 16(1):11-14; 1980.
Techniques have been developed for making microforks from the eyes of sewing needles. Details are presented for constructing, sterilizing, and manipulating these durable, simply designed transfer tools.

Tabor, Christopher A. **Improving the suitability of glass fiber filters for use as culture supports.** In Vitro 17(2):129-132; 1981.
Commercially available glass fiber filters are useful as physical supports for cultures; however, as received from the manufacturers, the filters frequently contain substances that render them unsuitable for some types of experimental studies. These substances contribute to the formation of precipitates in the culture media, alter the media pH, and repress synchronous development among embryo cultures of eastern white pine (Pinus strobus L.). A simplified technique was developed to remove the contaminants and to saturate the cation exchange sites on the glass fibers with specific ions.

Talerico, Robert L. **Defoliation as an indirect means of population assessment.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:38-49.
Describes ground and aerial methods to assess defoliation levels. **A**

Talerico, Robert L. **Detecting populations.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:31-32.
Describes methods for egg-mass detection, use of gypsy moth pheromone for survey purposes, and quarantine areas. **A**

Talerico, Robert L. **Evaluating populations.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:32-34.
Discusses the factors to consider in deciding if an area should be scheduled for control. **A**

Talerico, Robert L. **Introduction.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:31.
Introduction to Chapter 3: Methods of gypsy moth detection and evaluation. **A**

Talerico, Robert L. **Management tools.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:50.
Discusses two methods for predicting exactly what a specific population will do in terms of subsequent defoliation and mortality to forested community. **A**

Talerico, Robert L. **Summary.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:61-62.
Summary of Chapter 3: Methods of gypsy moth detection and evaluation. **A**

Thompson, Jeffrey L.; Nolley, Jean W., compilers. **Maryland's secondary wood industry. A utilization summary and directory.** Annapolis, MD: Maryland Forest Service; 1981. 70 p.
Identifies secondary wood-using markets in the Maryland and Washington, D.C. area that are available to primary wood producers, and buyers and sellers of manufactured wood products. **K**

Tiedemann, Arthur R.; Conrad, Carol E.; Dieterich, John H.; Hornbeck, James W.; Megahan, Walter F.; Vierech, Leslie A.; Wade, Dale D. **Effects of fire on water: a state of knowledge review.** 1979; USDA For. Serv. Gen. Tech. Rep. WO-10. 28 p.
Discusses the current state-of-knowledge about the effects of prescribed burning and wildfire on forest streams and lakes. Fire exerts pronounced effects on basic hydrologic processes, leading to increased sensitivity of the landscape to eroding forces and to reduced land stability. Sedimentation, increased turbidity levels, and mass erosion appear to be the most serious threats to water resources following fire. **A**

Tilgham, Nancy G. **The black tern survey, 1979.** Passenger Pigeon 42:1-8; 1980.
The author organized a statewide survey to determine the distribution and relative abundance of black terns in Wisconsin. Wetlands were surveyed in all but 14 counties in the state by more than 60 volunteers. Black terns were observed at more than 205 of these wetland areas. Highest populations were reported at the major wetland areas in the state. Descriptive information on nesting habitat and nest sites is given. The statewide monitoring of black tern populations is recommended at selected sites, and specific investigations into the nesting ecology of the species are suggested. **B**

Timson, Floyd G. **The quality and availability of hardwood logging residue based on developed quality levels.** 1980; USDA For. Serv. Res. Pap. NE-459. 10 p.

Hardwood logging residue was examined for salvageable quality material. Four quality levels (QL 1 to QL 4) based on four sets of specifications were developed. The specifications used surface indicators, sweep, center decay, and piece size to determine quality. Twenty-six percent of the total logging residue from sawlog only harvesting operations met the lowest of the four quality levels (QL 4); QL 4 could best be described as local use logs. The acceptability of residue at QL 4 increased to 36 percent if bolewood only was considered. Only 9 percent of the residue would be salvageable at the QL 1 level. **A**

Tippett, Joanna T.; Shigo, Alex L. **Barrier zone anatomy in red pine roots invaded by Heterobasidion annosum**. Can. J. For. Res. 10(2):224-232; 1980.
Resin production and decay were localized or, more specifically, compartmentalized in roots of red pine invaded by Heterobasidion annosum Fr. Bref. (formerly Fomes annosus (Fr.) Krast). Distinctive tissues constituted the barrier zone which separated the resin-impregnated or decayed wood from the younger rings of normal, unaffected wood. The barrier zone tissues included distinctive tangential bands of parenchyma, many resin ducts, and disordered abnormal tracheids. The first cells of the barrier zone were thin-walled, unlignified, and contained polyphenols. These cells were remarkably similar to the secondary phloem parenchyma. **F**

Tippett, Joanna; Shigo, A. L. **Barriers to decay in conifer roots**. Eur. J. For. Pathol. 11:51-59; 1981.
The process of compartmentalization, including the formation of barrier zones, localized discolored and decayed wood in roots of balsam fir, red spruce, eastern hemlock, white pine, and tamarack. The decay was caused by Armillaria mellea and unidentified hymenomycetes. The most effective "walls" to decay were composed of resin ducts and parenchyma cells. Cylindrical patterns of decay formed due to tangential bands of resin ducts and parenchyma. In response to injury, conifer roots increase production of parenchyma cells which accumulate polyphenols. Three types of parenchyma may be produced: that associated with resin ducts, xylem rays, and tangential rings of cells resembling marginal parenchyma. **F**

Trimble, G. R., Jr. **Management of stand factors affecting residue in the woods.** In: Brooks, Maurice L.; Hall, Carter S.; Luchok, John, eds. Proceedings of the logging residue conference; 1975 June 4-6; Morgantown, WV. Morgantown, WV: West Virginia University; 1980:13-14.

Tritton, L. M.; Hornbeck, J. W. **Biomass estimation for northeastern forests.** (Abstr.). Bull. Ecol. Soc. Am. 62(2):106; 1981. **F**

Tryon, E. H.; Powell, D. S.; Harner, E. J. **Predicting root age of advance growth beneath hardwood canopies.** Can. J. For. Res. 10(3):264-268; 1980.
Determining root age of advance hardwood regeneration beneath tree canopies, which can help in guiding silvicultural practices, can be difficult, especially for seedling sprouts. To find an easy yet satisfactory method, independent variables such as root diameter, stem age, stem diameter, and certain site characteristics were used in regression analysis to predict root age. Data were collected for eight hardwood species from stands in northeastern West Virginia. The results were that for most species, root age could be predicted to within $\pm$ 4 or $\pm$ 5 years, with root diameter and stem age generally contributing the most to R^2. **A**

Tubbs, Carl H. **Application of shelterwood methods in some forest types of northern Appalachian highlands of Northeastern United States.** In: Proceedings of the national silviculture workshop; 1979 September 17-21; Charleston, SC. Washington, DC: USDA, For. Serv.; 1979:201-211.
Reviews principles of shelterwood cutting and the details of application in northern hardwoods and conifer types of the northern Appalachian Highlands of the Northeastern United States. **F**

Tubbs, Carl H. **Comments on current and projected U.S. timber and wood use situation in the north.** In: Timber supply: Issues and options, Proceedings FPRS Conference; San Francisco, CA. 1979. p. 93. **F**

Tubbs, Carl H. **Northern hardwood ecology.** Proceedings 1978 joint convention SAF and Canadian Institute of Forestry. St. Louis, MO. 1979. p. 329-333.
A general discussion of the composition of "climax" and secondary succession by region, soil, and other topographical features. Brief characterizations of mechanisms important for forestry practice are included. **F**

Tubbs, Carl H. **Stand analysis and silvicultural implications.** In: Proceedings John S. Wright Conference, Purdue University, West Lafayette, IN. 1980. **F**

U. S. Department of Agriculture, Forest Service. **Growth potential of the skier market in the National Forests.** 1979; USDA For. Serv. Res. Pap. WO-36. 31 p.
Nationwide study of the skier market, based on 1978 telephone survey, includes regional descriptions of active, inactive, and potential skiers, both downhill and cross-country. Included are estimates of the size of these market classes and detailed descriptions of public images of and attitudes toward skiing, its cost, attractions, facilities, and market needs. The skier market's potential for short term growth is estimated, both regionally and nationally, and the perceived adequacy of the existing developed ski area resource is assessed in terms of its ability to attract, and hold, new participants. **A**

U. S. Department of Agriculture, Forest Service. **Gypsy moth program accomplishment report.** U.S. Dep. Agric.; 1980; Agric. Inf. Bull. 421. 21 p.

This report summarizes the activities of the 4-year Expanded Gypsy Moth Program (1975-78), and highlights important accomplishments toward predicting pest populations and impacts, managing gypsy moth populations, and developing an integrated pest management system.

Valentine, Harry T. **A model of oak forest growth under gypsy moth influence.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:50-61.
Discussion of the forest growth model and the differential equation model called the gypsy moth submodel. G

Valentine, Harry T.; Houston, David R. **Stand susceptibility to gypsy moth defoliation.** In: Hazard-rating systems in forest management: symposium proceedings; 1981; USDA For. Serv. Gen. Tech. Rep. WO-27. p. 137-144.
Susceptible stands of Quercus and associated species are defoliated frequently by Lymantria dispar (L.) and possibly serve as outbreak foci. These stands, typically on dry upper slopes and ridgetops, sandy plains, and areas of recent disturbance, contain trees that abound with refuges used by endemic populations of L. dispar for larval resting, pupation, and oviposition. Resistant stands are infrequently defoliated, primarily by immigrant populations established by wind-dispersed larvae. Because trees in these stands tend to have few refuges, L. dispar seek refuge in forest litter, where they often fall prey to animals of the forest floor. We developed discriminant functions that identify stand susceptibility from counts and measurements of refuges on trees of the white oak group and other preferred and nonpreferred food species. G

Valentine, Harry T.; Talerico, Robert L. **Gypsy moth larval growth and consumption on red oak.** For. Sci. 26(4):599-605; 1980.
During feeding trials conducted on mature trees, consumption of red oak (Quercus rubra L.) foliage by gypsy moth (Lymantria dispar (L.)) larvae averaged 6.68 percent of average larval dry weight per degree day (threshold = 4.4° C). Average larval dry weight increased from 0.2 mg at hatch to 113.1 mg after 646.7 degree days spanning 43 days. The average accumulative consumption of red oak foliage was 1116.1 mg per larva during this period. Simple biological growth functions, which are useful in modeling defoliation, were developed to predict average larval dry weight growth and consumption. G

Vilkas, Ann; Nolley, Jean W. **Delaware's secondary wood industry: a utilization summary and directory.** Dover, DE: Delaware Forest Service; 1981. 19 p.
Identifies secondary wood-using markets in the State of Delaware that are available to primary wood producers and buyers and sellers of manufactured wood products. K

Vogel, Willis G. **Are trees neglected plants for reclaiming surface mines?** Proc. W. Va. Acad. Sci. 51(3):127-138; 1980.
Reclaiming surface-mined lands with trees has been neglected in recent years because of economic, social, and legal reasons. Yet, many of the tree plantings made 30 to 50 years ago are now productive forests. Especially notable is the favorable growth of some high-value species such as black walnut, white ash, and red oak. Some plantings are not producing quality timber but provide excellent habitat for wildlife, watershed protection, and sometimes, recreational uses. Significant in many of the plantings is the overall vegetational development that includes planted and volunteer trees and a complex vegetative understory. Results of some of the recent reforestation research are also discussed. C

Vogel, Willis G. **Revegetating surface-mined lands with herbaceous and woody species together.** In: Trees for reclamation; 1980; USDA For. Serv. Gen. Tech. Rep. NE-61. p. 117-126.
Herbaceous cover is required for erosion control on surface-mined lands even where forests are to be established. Where planted with trees, herbaceous species usually cause an increase in tree seedling mortality and retard tree growth, especially in the first few years after planting. Planting trees in existing stands of herbaceous cover usually resulted in poor survival. Planting trees and seeding herbaceous species in alternate strips appear feasible for combination plantings on areas where the appropriate seeding and fertilizing equipment can be used. A

Vogel, Willis G. **A guide for revegetating coal minesoils in the Eastern United States.** 1981; USDA For. Serv. Gen. Tech. Rep. NE-68. 190 p.
Provides information, recommendations, and guidelines for revegetating land in the Eastern United States that has been disturbed by coal mining. Includes brief descriptions of major coal mining regions in the East, and a discussion of minesoil properties and procedures for sampling, testing, and amending minesoils. Plant species used in revegetating surface-mined lands are identified. Selection criteria for plant species and methods and requirements for seeding and planting are explained. A

Wahl, Thomas H.; Nolley, Jean, W., compilers. **New York's secondary wood industry: a utilization summary and directory.** Albany, NY: NY Dep. Environ. Conserv., Bur. For. Market. Econ. Dev.; 1981. 148 p.
Identifies secondary wood-using markets in the State of New York that are available to primary wood producers, and buyers and sellers of manufactured wood products. K

Wallin, Walter B. **Durability is key to pallet economics.** Pallet Enterp. 1(1):20-21; 1981.
Durability of pallet structures is one of two measures of pallet performance. The other measure is the load-

carrying capacity. The cost of using pallets may be reduced significantly if more attention is given to designing for life and cost as well as for strength. K

Wallner, William E. **Anastatus ?kashmirensis Mathur.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.: 1981; Tech. Bull. 1584:398-399.
A study was designed to compare Anastatus ?kashmirensis with the most effective gypsy moth egg parasite, Ooencyrtus kuvanae, in the United States. G

Wallner, William E. **Introduction.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:86.
Introduction to "Natural regulating factors" in Chapter 4: Population dynamics. G

Wallner, William E. **Introduction.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:145.
Introduction to "Meteorological influences" in Chapter 4: Population dynamics. G

Wallner, William E.; Gregory, Robert A. **Relationship of sap sugar concentrations in sugar maple to ray tissue and parenchyma flecks caused by Phytobia setosa.** Can. J. For. Res. 10(3):312-315; 1980.
Sap sugar levels were determined for 300 sugar maple trees. The 10 trees highest and lowest in sap sugar were sacrificed and correlations were made with abundance and size of parenchyma flecks caused by Phytobia setosa (Loew) and ray tissue/unit of xylem. Flecks comprised up to 0.2 percent of the xylem, but there was no significant correlation between fleck number or xylem-fleck ratio and sap sugar levels. Trees high in sap sugar had significantly more ray tissue per unit of xylem than those low in sap sugar, a major factor in determining sap sugar concentrations. Fleck numbers decreased with tree height. G

Wallner, William E.; McManus, Michael L. **Summary.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:202-203.
Summary of Chapter 4: Population dynamics. G

Wallner, W. E.; Valentine, H. T.; Wargo, P. M. **Gypsy moth-host interactions: Effects of defoliation upon foliage constituency and insect dynamics.** (Abstr.); International Congress Entomology Proceedings; 1980 August 1-13; Kyoto, Japan. 1980:297. G

Wallner, W. E.; Walton, G. S. **Biological considerations in street tree maintenance.** In: Husband, T. P.; Lawrence, J. M.; Knight, A. R., eds. Street trees: A guide for communities in southern New England. Kingston, RI: University of Rhode Island; 1980. 74 p.
Presents concepts and procedures on the relationship of shade tree maintenance to pest management for the city forester or arborist, including principles of biological control, pest management, species diversity, and host-pest interactions. G

Wallner, William E.; Walton, Gerald S. **Host defoliation effects upon the gypsy moth.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:134-145.
Report on studies designed to compare the effect upon gypsy moth of feeding on two hosts undefoliated or artificially defoliated, for 1 or 2 years in Killingworth, Connecticut. G

Walters, Russell S. **Vacuum transfer system.** Maple Syrup Dig. 21(2):22-25; 1981.
Yields of sugar maple sap collected from three plastic pipeline systems by gravity, vacuum pump, and a vacuum pump with a transfer tank were compared during 2 years in northern Vermont. The transfer system yielded 27 percent more sap one year and 17 percent more the next year. Higher vacuum levels at the tapholes were observed in the transfer system. D

Ward, T. M.; Donnelly, J. R.; Carl, C. M., Jr. **Effects of container and media on sugar maple seedling growth.** Tree Plant. Notes 32(3):15-17; 1981. D

Wargo, Philip M. **Armillaria mellea colonizes roots of oak injected with ethanol.** (Abstr.) Phytopathology 71:565; 1981.
Ethanol stimulates the growth of Armillaria mellea in vitro. To determine whether it promotes colonization in vivo, roots of black and white oaks were injected with ethanol in various concentrations. A. mellea colonized tissues that had been killed by the higher concentrations of ethanol, but was effectively walled off in both bark and wood by vigorous trees. G

Wargo, Philip M. **Armillaria mellea: An opportunist par excellence.** Proc. Midwest. chapter Int. Shade Tree Conf.; 34:65-67; 1979.
Describes how A. mellea, because of its unique rhizomorphs, is able to live on dead plant tissue as well as living tissues, and to take advantage of nearly every stress that weakens trees. G

Wargo, Philip M. **Armillaria mellea: an opportunist.** J. Arboric. 6(10):276-278; 1980.
Describes how A. mellea, because of its unique rhizomorphs, is able to live on dead plant tissue as well as living tissues, and to take advantage of nearly every stress that weakens trees. G

Wargo, Philip M. **Defoliation and secondary-action organism attack with emphasis on Armillaria mellea.** J. Arboric. 7:64-69; 1981. G

Wargo, Philip M. **Defoliation and tree growth.** In: Doane, Charles C.; McManus, Michael L., eds. The

gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:225-240.
Discusses the effects of defoliation and leaf production, wood production, and food reserves. G

Wargo, Philip M. **Defoliation, dieback, and mortality.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:240-248.
Describes the dieback of crowns and death of trees as related to defoliation. G

Wargo, Philip M. **Defoliation: How it weakens a tree.** Proc. Midwest. chapter int. Shade Tree Conf.; 34:11-18; 1979.
Describes the physical and physiological changes that occur in trees in response to defoliation, and discusses how the effects of defoliation depend on the severity (% of leaf tissue removed), frequency (number of successive years), and timing (when in the growing season) of defoliation, weather conditions during and after defoliation, and the physiological condition or health of the tree. G

Wargo, Philip M. **Interaction of glucose, ethanol, phenolics, and isolate of Armillaria mellea.** (Abstr.) Phytopathology 70:470; 1980.
Fifteen isolates of A. mellea were challenged with hydrolyzable tannin and gallic acid at various levels of ethanol and glucose. Some combinations inhibited and some stimulated the fungus. The interactions help explain how stresses predispose trees to attack by aggressive strains of A. mellea. G

Wargo, Philip M. **In vitro response to gallic acid of aggressive and nonaggressive "isolates" of Armillaria mellea.** (Abstr.) Phytopathology 71:565; 1981.
Highly pathogenic isolates of A. mellea were inhibited by 0.5% gallic acid in agar medium and some were killed. Less pathogenic isolates from western hardwoods, like those from eastern hardwoods, were inhibited by gallic acid only when ethanol was present. This suggests that growth on gallic acid could be used to distinguish aggressive from nonaggressive isolates. G

Wargo, Philip M. **Measuring response of trees to defoliation stress.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:248-267.
Evaluation of starch content of the roots, stem biopotential, and resistance of the stem cambial tissues to electric current as potential indicators of tree vigor and tree response to stress. G

Wargo, Philip M. **Root starch content indicates effects of defoliation.** (Abstr.) In: Johnson, Paul S.; Garrett, H. E., compilers. Workshop on seedling physiology and growth problems in oak planting; 1981; USDA For. Serv. Gen. Tech. Rep. NC-62. p. 8.
Starch content in roots of oak trees, which is easily measured by the histological iodine test, not only shows the effects of defoliation but may also predict survival of additional defoliation. Starch reserves are critical to degree of crown damage and mortality in defoliated oak. G

Wargo, Philip M.; Houston, David R. **Root rot and damping off.** In: Stipes, R. Jay; Campana, Richard J., eds. Compendium of elm diseases. St. Paul, MN: American Phytopathological Society; 1981:45-48.
Elms in North America are relatively free of major root disease. Ironically, this has contributed to the massive epiphytotics of Dutch elm disease by encouraging elm monocultures in many urban areas. G

Wartluft, Jeffrey L. **Wood-burning stoves. An older answer to newer energy and fuel shortages.** Wonderful W. Va. 43(11):7-8; 1980.
This is a case study of home heating with wood based on actual measurements of firewood used, stoking frequency, ashes generated, indoor and outdoor temperatures, and all associated costs to determine economics relative to electric resistance heat. K

Weisenfluh, G. A.; Ferm, J. C.; Bailey, A.; Despard, T. L.; Vogel, W. G. **A study of geologic factors influencing reclamation of Federal coal bearing lands in northern Alabama.** In: Graves, Donald H., ed. Proceedings, 1981 symposium on surface mining hydrology, sedimentology, and reclamation; 1981 December 7-11; Lexington, KY. Lexington, KY: University of Kentucky; 1981:151-156.
Presents the results of an investigation of geochemical-mineralogical, fertilizer treatment, and plant growth properties of rock types comprising potential overburden materials of surface minable coal seams in the Federal lands in the Warrior coal field of Alabama. C

Wendel, G. W. **Growth and survival of planted northern red oak seedlings in West Virginia.** South. J. Appl. For. 4(1):49-54; 1980.
Survival and growth of planted northern red oak seedlings were studied in relation to top pruning, fertilizing, mulching, and age and size of seedlings at planting time. Top pruning at 1 and 2 years after planting suppressed growth. Fertilizer—N, P, and combinations—and mulches did not produce significant growth. Seedlings of above average height at planting time retained their height advantage during the study. Survival of all ages of stock was high. J

Wendel, George W. **Eastern white pine.** In: Eyre, F. H., ed. **Forest cover types of the United States and Canada.** Washington, DC: Society of American Foresters; 1980:25-26.
Describes the eastern white pine forest type, including associated tree species, geographic distribution, type variants, and associated vegetation. J

Wendel, G. W. **Longevity of summer grape seed stored in the forest floor.** Wildl. Soc. Bull. 9(2):157-159; 1981.

Seeds of summer grape were still viable after 11 years' storage in the forest floor under a mature central Appalachian hardwood stand. Germination averaged 19 percent for envelope-stored seed and about 1 percent for broadcast-stored seed. J

Wendel, G. W. **Red oak growth affected by age of planting stock, mulching, top pruning, and fertilization.** (Abstr.) In: Johnson, Paul S.; Garrett, H. E., compilers. Workshop on seedling physiology and growth problems in oak planting; 1981; USDA For. Serv. Gen. Tech. Rep. NC-62. p. 17. J

Wendel, G. W.; Gabriel, W. J. **Sugar maple provenance study: West Virginia outplanting—10-year results.** 1980; USDA For. Serv. Res. Pap. NE-460. 5 p.
After 10 years, survival of sugar maple (Acer saccharum Marsh.) provenances outplanted in West Virginia did not differ significantly. Total height, height growth, and d.b.h. measurements were significantly different among provenances. Fifty percent of the trees had major forks below 9.0 feet. Thirty-eight percent of the trees had no forks, but 71 percent of these were in the intermediate or overtopped crown class. Forking was not related to provenance. Latitude, longitude, and elevation of provenances were not strongly correlated with provenance performance. A

Wharton, Eric H.; Bones, James T. **Trends in timber use and product recovery in Pennsylvania, 1966-1977.** 1980; USDA For. Serv. Res. Note NE-297. 4 p.
Repeated timber utilization studies in Pennsylvania suggest that the recovery of growing-stock timber has improved over the years. Currently 95 percent of the inventory growing stock volume is being recovered from harvested trees. There are many opportunities to recover additional amounts of biomass from nongrowing-stock trees and logging residues. Until recently, these operations were regarded as unprofitable. A

White, David E. **Manpower training in eastern forest industry: A review and assessment.** 1980; USDA For. Serv. Res. Pap. NE-453. 20 p.
Most training in forest industry takes place on the job and is more effective in sawmilling than in logging. Many training programs for woods workers have been ineffective because the rewards of the work are insufficient to attract capable people, leaving the industry to operate in a secondary labor market. Some characteristics of the work and of the technology suggest a need for training of machine operators in the industry, but others do not. An upgrading of pay and working conditions might attract workers of higher quality, thus reducing the need for training. The need for training of mechanics and managers will increase in the future. A

Wiant, Harry V., Jr.; Fountain, Michael S. **Oak site index and biomass yield in upland oak and cove hardwood timber types in West Virginia.** 1980; USDA For. Serv. Res. Note NE-291. 2 p.
More biomass was present in 46-year-old cove hardwood than upland oak types on the West Virginia University Forest near Morgantown. Oak site index was a poor predictor of biomass yields. A

Wilkinson, Ronald C. **Relationship between cortical monoterpenes and susceptibility of eastern white pine to white-pine weevil attack.** For. Sci. 26(4):581-589; 1980.
Cortical monoterpene composition of 590 eastern white pines from 27 geographic seed sources originating throughout the species range and of varying susceptibility to repeated white-pine weevil attack was examined. Groups of trees, categorized by number of successful weevil attacks sustained (leader killed) after 3, 7, and 11 years following termination of chemical control when the trees were 12 years old, differed significantly in mean alpha-pinene and limonene concentrations. Concentrations of these two monoterpenes could be useful criteria in indirect selection for reducing susceptibility to weevil attack. F

Wilkinson, Ronald C. **White-pine weevil attack susceptibility of western white pine in the Northeast.** 1981; USDA For. Serv. Res. Pap. NE-483. 3 p.
White-pine weevils killed the leaders of western white pines only 13 percent as frequently as they killed the leaders of eastern white pine in the same 10-year-old test plantation. Eastern white pine was the taller of the two species, but four families of western white pine of low to moderate susceptibility to weevil attack were almost as tall or taller than eastern white pine. A

Willis, Raymond B. **Reduction column for automated determination of nitrate and nitrite in water.** Anal. Chem. 52:1376-1377; 1980.
Describes the replacement of a glass column used in a common procedure for determining nitrate plus nitrite with a copy of Teflon tubing containing a cadmium wire treated with copper sulfate. A more suitable wire used was made of an alloy of 95 percent cadmium and 5 percent silver. The silver-cadmium wire had a reduction efficiency of 100 percent. C

Wilson, Robert W.; Ivanowsky, Stephen M.; Talerico, Robert L. **Direct evaluation.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:34-38.
Describes methods for detecting gypsy moth egg mass: fixed- and variable-radius plot (FVP) method, 5-minute walks for observing egg masses, actual vs. observed egg masses. A

Wilson, Robert W.; Talerico, Robert L. **Egg-mass density/defoliation relationships.** In: Doane, Charles C.; McManus, Michael L., eds. The gypsy moth: Research toward integrated pest management. U.S. Dep. Agric.; 1981; Tech. Bull. 1584:49-50.
Depicts relationship between egg-mass density obtained by the FVP method and defoliation the following year. A

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania, in cooperation with the Pennsylvania State University.
- Warren, Pennsylvania.