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COMMERCIAL ARBORICULTURAL PRACTICES IN NORTH AMERICA¹

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Arboriculture in North America developed concurrently along academic and commercial lines at the end of the nineteenth century. Today this is an industry of thousands of small businesses (two to five employees) servicing residential, commercial, industrial, governmental and utility customers. Only four commercial arboricultural firms do business on a national scale: Asplundh Tree Expert Company, Bartlett Tree Expert Company, The Davey Tree Expert Company and Southeast Public Service Corporation.

Academic

Dr. George Stone, Professor of Botany at Massachusetts State College, Amherst (now University of Massachusetts) began teaching a course in arboriculture in 1895. This course, which was taught until 1917, placed emphasis on the effects of illuminating gas on trees, cavity treatments and other tree care subjects. This probably was the first arboricultural course in the western hemisphere at a college or university.

The research and observations of Dr. Stone were published principally in botanical scientific journals. He founded the Massachusetts Tree Wardens and Foresters Association in 1901 — the first technical arboricultural organization in the United States.

Dr. Stone's course evolved to an Arboricultural and Park Management Curriculum on a two-year, four-year and graduate level at the University of Massachusetts. The two-year arboricultural course at the Stockbridge School of Agriculture, University of Massachusetts, Amherst, has probably graduated more college-trained arborists than any other university or college.

Dr. L.C. Chadwick, Professor of Horticulture, Ohio State University, began teaching arboriculture in the landscape horticulture curriculum during the 1930's. Dr. Karl Dressel, Professor of Forestry, Michigan State University, also began teaching courses in arboriculture as part of the Municipal and Recreation Forestry curriculum in the same period.

Commercial education

John Davey published his book, *The Tree Doctor*, in 1901. It was intended to educate the general public about trees. He was the first to assemble tree sciences of the time into a popular book and build them into what was then identified as "tree surgery."

A "Davey School of Practical Forestry" was established in 1906, at Kent, Ohio, to teach men how to provide tree maintenance. This evolved to the "Davey Institute of Tree Surgery" (DITS) in 1909. The original Davey Institute was patterned after a college with three four-month terms given during three consecutive winters. The curriculum included business, technical and vocational subjects relating to tree surgery. At one time there were 350 men enrolled.

The Bartlett School of Tree Surgery was established in 1923 at Stamford, Connecticut. Its purpose was to also provide technical training for that company's field forces.

Davey developed a correspondence course in 1909 on "Tree Surgery" patterned after the DITS curriculum. It was intended for field men who could not attend the Davey Institute. A similar course is still offered. Today the Bartlett Tree Expert Company and the National Arborist

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Association also provide correspondence courses for field forces.

Schools by the Davey and Bartlett Tree Expert Companies were the principal source of technically and vocationally trained arborists for many years. Arboricultural instruction at two and four year colleges, vocational agricultural schools and other institutions has increased the number of technically and vocationally trained arborists available today. The scope of training by Bartlett and Davey is only a fraction of that previous because of rising costs, competition, manpower, etc.

It is interesting to note that both John Davey and Francis A. Bartlett (the founder of the Bartlett Tree Expert Company) were influenced by Dr. Stone's teachings at Massachusetts State College. According to Gordon S. King, Professor of Arboriculture and Park Management at the University of Massachusetts, both men visited with Dr. Stone on campus discussing arboriculture or tree surgery as it was then called. John Davey arranged in the spring of 1906 for some of the students from Massachusetts Agricultural College, who had previously worked for him, to join crews under his son's direction in the Hudson Valley of New York State.

Commercial arboriculture needs more trained personnel — trained for jobs at all levels. Many commercial concerns state the volume of their business is restricted by the "difficulties in obtaining trained help." Training is needed at the vocational-horticultural level, the technical school level, the university level, and there is need for personnel with advanced degrees for research, teaching and consultation.

Commercial companies

The demand for the scientific tree care proposed in his book, "The Tree Doctor," led John Davey into the tree care business. As the demands for service expanded, "The Davey Tree Expert Company" was incorporated in 1909 as the first scientific tree care concern. Within a few years others (Frank, White, Frost and Higgins and others) had incorporated recognizing an opportunity to capitalize on the need for such service.

This industry is characterized today as:

... consisting of many small concerns employing two to five persons on a somewhat seasonal basis.

... having most businesses performing landscaping, nursery or garden center operations to complement arboriculture.

... bidding a large majority of services on a competitive basis. (It is not unusual for a home owner to solicit three or more prices on removal of an individual tree. Price cutting is rampant, and most home owners are not aware of the standards for quality work.)

... providing generally low wages and benefits in the commercial sector. (Many arborists leave the commercial phase for municipal or utility arboriculture with its greater security and benefits.)

... requiring expensive equipment to provide a complete tree care service — aerial lifts, chippers, chain saws, sprayers, stump removers and tree spades, etc. Consequently, the present capital investment has restricted the number of new businesses starting out.

However, arboriculture is still an industry where an industrious individual with a pickup truck, chain saw, ropes, pruners and other necessary equipment can start out and make a good living.

Commercial arboricultural industry

Tree care, utility trimming and landscaping are the major operations of the arboricultural firms. Tree care is estimated at \$100 to \$150 million per year in North America. Utility trimming is estimated at \$450 to \$500 million per year. Landscaping has been estimated at \$2.4 billion annually. However, arboricultural firms supply a very minor portion of that service.

The National Arborists Association, Inc., annually conducts a survey of commercial arboricultural practices by its 270 member companies. NAA is a trade association which represents all phases of the arboricultural industry.

A total of 124 companies employing a total of 3,269 people responded to the 1975 survey. Some of the companies which do line clearing exclusively did not respond to the NAA survey; consequently, these figures are not complete.

Here are the 1975 arboricultural service category statistics by dollar volume:

A. Pruning	37%	G. Tree Moving	2%
B. Spraying	18%	H. Bracing	2%
C. Removal	16%	I. Planting	2%
D. Utility Trimming	8%	J. Cavity Work	1%
E. Landscaping	7%	K. Diagnosis	1%
F. Fertilizing	6%		

Actual tools and equipment utilized in arboricultural operations are four or five times the reported totals in the National Arborist Association industry survey.

NAA statistics indicated those 124 companies utilized 5,700 chain saws, 460 hydraulic sprayers, 25 mist blowers, 686 aerial lifts, 41 tree cranes, 40 log loaders and 1,900 chippers. Pesticide purchases of \$910,000 were reported by 93 of the companies. The largest single expense item was Workmen's Compensation insurance, with an average rate of \$10.80 per \$100 of payroll. Workmen's Compensation is insurance that covers workers while on the job and pays both hospital and medical expense as well as employees wage benefits while they are off the job as a result of an industrial accident.

The development of the aerial lift truck, chipper, pneumatic and hydraulic pruner, and to some extent the power saw, were all in response to the need to mechanize line clearing operations because of increasing labor cost. These units are utilized in all phases of arboriculture today, but if there had not been a large line clearing market for these units to subsidize the development, it is questionable if they would have been developed as rapidly. We operate in a free society where the manufacturer responds to the potential market for a new product.

Tree care

Tree care is the pruning, spraying, fertilizing, cabling, bracing and tree moving on residential, institutional and governmental properties. This work is quite seasonal in the northern part of North America. Peak activity is during the spring and early summer spray season. Generally the coldest winter months are slow work periods.

Initially, tree care work was performed principally for large estates. Present income tax laws

have taxed many of these out of existence. Cavity treatments on large old decayed trees were very much the vogue during that period.

That era has passed and today most tree care is performed by middle income families in the suburbs on a one-half to one-acre property. Today pruning, spraying, and fertilizing are the principal services the client purchases.

Shade tree spraying

Spraying of shade and ornamental trees and shrubs in the urban-suburban environment is a substantial part of the commercial arborist's business in North America. Trees in this artificial environment seem to be especially vulnerable to attack by insects and diseases. Many times they are under stress to the extent that they succumb to the influence of additional adverse conditions very easily.

The Federal Environmental Pest Control Act of 1972 (Public Law 92-516) has imposed strict regulations on the pesticide industry in the United States, both distributor and user, in response to increasing concern about pollution of the environment.

Most significant to the commercial arborist is the requirement that all pesticide applicators must be licensed by October 21, 1977, in order to use restricted materials. A farmer *cannot* spray his own fields with a restricted pesticide after that date unless he has been licensed after passing a pesticide examination.

All pesticides (insecticides, fungicides, herbicides, rodenticides) must be classified as either "general use" or "restricted use" by the Federal EPA.

"General use" materials will be available to anyone. These are materials which the EPA determines "will not generally cause unreasonable adverse effects on the environment."

"Materials which could cause unreasonable adverse effects on the environment" will be classified as "restricted" by the EPA. Restricted use materials will be available to licensed applicators *only*.

The states are working hard to prepare the study material, examination, regulations and other stipulations specified by the Federal En-

vironmental Pest Control Act.

The spraying of large mature shade trees is beyond the physical capabilities and equipment available to the average home owner. Therefore, the property owner must rely on the commercial arborist with spray equipment large enough to perform the service.

Large hydraulic, truck mounted sprayers with a 30 to 50-gallon-per-minute capacity, utilizing pressures of 600 to 800 pounds, and a hose and gun are the principal spray tools.

It is difficult to prevent the drift of the spray material onto adjacent plants or property utilizing a high-capacity, hydraulic sprayer. Treatment of a host tree for specific maladies without contaminating adjacent vegetation is one of the future arboricultural research requirements. Chemical injection in plants is being utilized increasingly, but there are concerns with phytotoxicity, translocation within the plant and residual effectiveness.

The future of shade and ornamental tree and shrub spraying is uncertain at the present time. This operation is the most profitable of those performed by the average commercial arborist.

Utility arboriculture

As the use of electricity expanded, tree branches interfering with overhead electric wires became a major consideration. Initially, the utilities' linemen removed the branches where necessary. Their climbing was done using climbing hooks, which injured the bark of the tree, and the branches were pruned without regard to the future health of the plant. The public very soon became enraged at the mutilation and destruction of the shade trees lining its streets. Consequently, the utilities were forced by public opinion to employ trained tree experts to prune branches interfering with overhead wires, with due regard for the beauty and future health of the tree.

Vegetation management utilizing herbicides on distribution and transmission rights of way is a major service of tree companies. Today a large portion of the work is performed by helicopter application with specially developed low drift formulations. Ground spraying with wheeled or

tracked vehicles is a minor portion of that at this time.

A number of utilities have converted from chemical vegetation management (herbicides) to mechanical control using large rotary mowing equipment such as the Hydro-ax.

Master street tree plans and replacement tree plantings are among the operations utilities are promoting to stabilize a continuously rising tree trimming cost.

Landscaping, grounds care, erosion control seeding, groundline pole treating, soil sterilization, growth retardant spraying and right-of-way clearing are some of the varied services commercial arboricultural firms provide for utilities.

Future of commercial arboriculture

First priority is the increased mechanization to reduce labor requirements and spread the work load to provide continuous year-round employment. The physical requirements of manual tree pruning definitely make it a young man's vocation. Laying off portions of the work force during the slack season makes it difficult to attract and retain highly motivated and stable people.

All of the present tree care practices are based on keeping the tree healthy. If a tree becomes infected with a disease or virus there are not chemotheraputants to arrest or cure the malady.

Electronic, chemical or other techniques need to be perfected which will monitor the condition of a tree and indicate specific abnormalities. In many instances, similar symptoms are produced by entirely different causal organisms or environmental conditions.

Pesticide manufacturers view arboriculture as a minor crop use compared to agronomic or horticultural crops. They are not interested in expending hundred of thousands of dollars in registering use for insecticides or fungicides that have sales limited to tens of thousands of dollars. This problem has not yet been satisfactorily resolved. There is a state registration remedy available which could overcome problems but not without the additional difficulty of registering a product in each state separately.

The largest single item of expense is Work-

men's Compensation insurance. Improved and new safety equipment must be developed to safeguard the worker on the job. New training programs and methods are necessary also. How long can we tolerate an average 10.8% Workmen's Compensation insurance rate?

There are a limited number of researchers in North America who are concerned exclusively with arboriculture and urban forestry. A total of three scientists are working on genetic improvement of shade and ornamental trees compared to 231 scientific man-years devoted to research and application in the genetic improvement of forest trees for timber production.

Only 25 scientific man-years are dedicated to arboricultural research within all the federal and state governments research agencies.

Commercial arboriculture has never sold the middle class public on the need, necessity and advantages of its services. Many people view arborists as fly-by-night, get-rich-quick schemers, or they do not appreciate the technical requirements. There are no doubt three or four times the number of people presently subscribing to tree care who need and can afford the service but do not utilize it.

Licensing of pesticide applicators, insurance requirements, Occupational Safety and Health Act (OSHA), safety considerations, mandated union-government-employer safety training programs, environmental regulations, sophisticated equipment and techniques all contribute to an increased need for arboricultural technical and vocational expertise. The time when a commercial arborist with the physical

ability to climb a tree, a rope and hand saw could start out successfully in business is almost over.

Increasing awareness of the aesthetic, amenity, conservation, ecology values of trees, shrubs and landscape will promote a greater demand for tree care services. The rising cost of gasoline means people will be staying home more and consequently making improvements on their property. Indications are the nursery business continues to expand rapidly. As more trees and shrubs are planted there is greater need for the commercial arborists services.

Instead of viewing pesticide licensing, arborist licensing, OSHA regulations, pesticide registration, training programs, etc., as measures that will destroy the commercial arborists, they should be viewed as opportunities for professional upgrading of the entire industry.

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ABSTRACT

Lister, C.K., J.M. Schmid, C.D. Minnemeyer, and R.H. Frye. 1976. **Refinement of the lethal trap tree method for spruce beetle control.** J. Econ. Ent. 69(3): 415-418.

The lethal trap tree method is a recent modification of the original trap tree method of Nagel et al. Lethal traps are created by introducing Silvisar 510 (cacodylic acid) into the xylem of living Engelmann spruce. Injected trees are later felled, and when attacked by spruce beetles, the subsequent brood fails to survive. Full- and half-strength Silvisar 510 injected trap trees gave mortalities of 94 and 90%, respectively. Half-strength treated trees received more attacks than did the full-strength treatments. The tenth- and quarter-strength treatments resulted in spruce beetle mortalities of 40 and 70%, respectively. Injection of trees in late August, followed by felling one month later, is preferable to earlier or later injection and felling times.