

## EMPLOYER PERSPECTIVES ON ARBORICULTURE EDUCATION

by E. Gregory McPherson

**Abstract.** A questionnaire was sent to employers of arborists and urban foresters in the Mountain West Region to determine their perspective as to the level of training and specific skills that should be taught to students of arboriculture and urban forestry. Skills employers frequently found lacking were also assessed. Results of the survey indicate that arborists and urban foresters should receive a minimum of two years and four years of academic training, respectively. Both groups should receive over six months of field experience. Skills deemed most important for arborists are basic tree-care skills, although private and public sector employers differ as to the relative importance of some skills. Respondents report that urban foresters frequently lack public relations and management related skills. These and other findings may especially benefit individuals involved with the development and evaluation of educational training programs in arboriculture and urban forestry.

A primary goal of every academic program in arboriculture/urban forestry is to educate and equip students with the skills needed to obtain employment and perform their assigned tasks in a competent and professional manner. Employers of arborists and urban foresters are an important source of information for educators concerned with curriculum development in arboriculture. Their ideas can provide critical input to the evaluation of the adequacy of existing programs and formulation of new programs. The purpose of this study was to learn employer perspectives on education in arboriculture for use in assessing the need and developing a curriculum for arboriculture/urban forestry.

### Research Design and Conduct

A questionnaire was developed to collect information to assess the need for an academic program in an eight state region of the Mountain West. Specific objectives were to determine (1) the present status of community forestry, (2) if there is a perceived need for individuals academically trained in arboriculture/urban forestry, (3) the projected number of employment opportunities for graduates in the next five years, and (4) the level of academic training and types of

skills regional employers consider desirable for potential arborists and urban foresters. This report addresses results pertaining to the last objective.

**Sample.** The target population consisted of all individuals of the study area responsible for hiring arborists and urban foresters. The public sector sample consisted of 171 municipalities. This included all cities with a population greater than 25,000 and smaller cities employing city planners or planning directors as listed in each state's *Municipal Directory*. The assumption in both cases was that cities included in the sample employ tree-care personnel.

The private sector portion of the sample consisted of 98 tree-care firms. Firms were selected from the Yellow Page section of telephone books for each city in the study area with a population greater than 25,000. The sample included all eligible tree-care firms from every state except Colorado. Twenty-five of 81 total tree-care firms were drawn at random from Colorado. This resulted in a 31% sample of all firms in Colorado cities with a population larger than 25,000.

**Respondents.** Respondents received a two-page questionnaire, letter of transmittal, and return envelope. Two follow-up letters were also sent to non-respondents. To clarify the distinction between arborists and urban foresters, the following definition appeared at the top of each questionnaire: *Arborists are defined as individuals responsible for hands-on tree care and maintenance. Urban foresters are more directly responsible for the planning and management of the community or urban forest (i.e. a city forester).*

Of the 269 questionnaires mailed out, 175 or 65% were returned. Eighteen questionnaires were returned undeliverable. The response rate of those receiving questionnaires was 70%. The public sector response rate was 82.5% and the private sector response rate was 42.5%. Figure 1 shows the number of public and private sector respondents by city size.

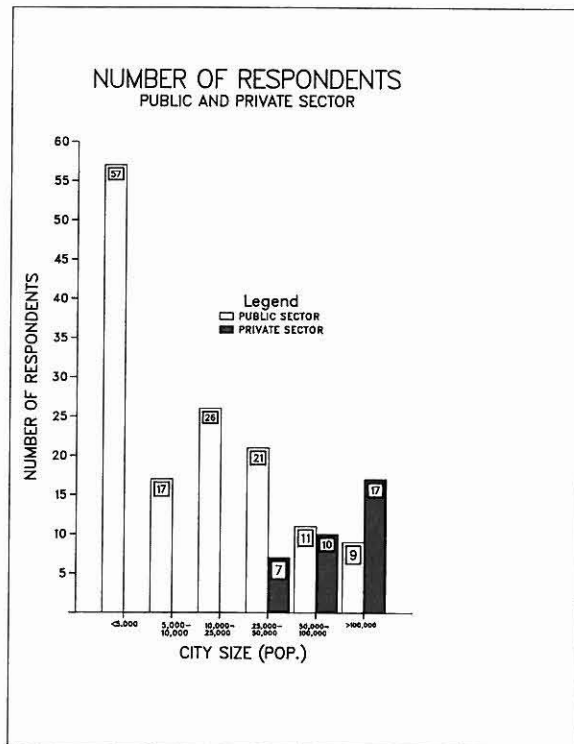


Figure 1. Number of public and private sector respondents by city size.

### Results and Discussion

Following are survey results from questions concerning employer's perspectives on (1) minimum level of training, (2) necessary skills for graduates, and (3) skills employees most frequently lack. Although these results apply directly to the Mountain West Region, arborists, urban foresters, and educators throughout the country may find the conclusions applicable to educational programs in their locale.

**Minimum level of training.** Examination of Andresen's (1980) inventory of North American arboriculture and urban forestry programs suggests that there is a wide range of curriculum options available at present. He reports that there are currently twelve undergraduate and two graduate curricula in arboriculture. Undergraduate programs are primarily 4-year options within ornamental horticulture departments.

Two-year technical programs are also available. Coufal (1979) conducted a survey of 69 two-year forest technician schools and found a total enroll-

ment of 3,600 students. He noted that technicians were having greater success in finding employment than baccalaureate graduates (4-year degree). Andresen surveyed 54 selected schools offering forest technology and found that 10 arboriculture and related programs or options were underway. Many others offer courses in arboriculture/vegetation management.

Andresen's survey results indicate that there are currently eighteen undergraduate and nine graduate curricula in North American urban forestry. Undergraduate programs are usually associated with forestry departments and are 4-year programs.

Table 1 shows combined public and private sector response to the question, "What *minimum* level of *academic training* do you think a program graduate should have to qualify for current and anticipated job openings in arboriculture and urban forestry?"

Half of the respondents state that a two-year technical degree is the minimum necessary for students preparing to be arborists. Approximately half of the respondents report that students preparing for jobs as urban foresters need a minimum of four years academic training.

Field experience is widely recognized as an essential component of the arboriculture/urban forestry educational experience. Duration of field experience varies with programs and there is little documentation on what employers consider to be a desirable amount of field experience. Table 2 shows the respondents' attitudes to the question, "What *minimum* level of *school supervised field experience* do you think a program graduate should have to qualify for current and anticipated job openings in arboriculture and urban forestry?"

Seventy-six percent of the respondents believe

Table 1. Minimum level of academic training for students studying arboriculture and urban forestry.

Minimum level of academic training	Arboriculture program (%)	Urban forestry program (%)
Less than a 2 year technical degree	19.4	13.2
2 year technical degree	49.6	34.9
4 year bachelors degree	28.1	48.8
Graduate degree	2.9	3.1

Table 2  
experier  
forestry.

Minimum  
exp

Less than  
3 months  
6 months  
9 months  
More than

that stu  
six mor  
that m  
Employ  
as urba  
time ga  
borists.

**Nece**  
specific  
forestry  
need to  
fession  
employ  
acquire  
"Which  
graduat  
program  
prepare  
checke  
urban f  
provide  
could b

Table  
thought  
to enter  
both the  
skills ar  
percent  
shown i

Differ  
sector  
certain  
private  
counting  
and bus  
public  
percent



**Table 2. Minimum level of school supervised field experience for students studying arboriculture and urban forestry.**

Minimum level of field experience	Arboriculture program (%)	Urban forestry program (%)
Less than 3 months	6.0	4.9
3 months	18.0	14.7
6 months	26.3	33.3
9 months	16.5	15.7
More than 9 months	33.1	31.4

that students in arboriculture should receive over six months of field experience, and 33% indicate that more than nine months is necessary. Employers report that students preparing for jobs as urban foresters should spend only slightly less time gaining field experience than should future arborists.

**Necessary skills.** Academic programs and specific courses in arboriculture and urban forestry should teach students the skills they need to obtain employment and function in a professional manner. To determine what skills employers deem most important for graduates to acquire, the following question was asked, "Which of the following skills do you feel a graduate of an arboriculture and urban forestry program should have in order to be adequately prepared to pursue a career?" Respondents checked those skills applicable for an arborist and urban forester from a list of 38 skills. Space was provided so that other skills not included on the list could be written in.

Table 3 provides a rank ordering of skills thought necessary for graduating arborists about to enter the job market. Because employers from both the private and public sector hire arborists, skills are ranked separately for each sector. The percentage of respondents selecting each skill is shown in parentheses.

Differences exist between private and public sector responses regarding the importance of certain skills for arborists. A larger percentage of private sector employers regard tree surgery, accounting, cabling and bracing, public speaking, and business law skills as necessary than do public sector respondents. However, a larger percentage of public sector employers regard

knowledge of irrigation systems, landscape design, dendrology, tree inventory techniques, and plant ecology as necessary for arborists than do private sector employers. This may be due to the fact that arborists in many smaller western communities are expected to be jacks-of-all-trades, and do things other than tree care work.

Table 4 shows a rank ordering of skills public sector respondents indicate graduating urban foresters should possess. Only public sector responses are shown because relatively few urban foresters are hired by the private sector.

The planning and management role of urban foresters is reflected by the large percentage of respondents who feel that necessary skills include general botany, shade and street tree selection, public relations, writing skills, budgeting, and landscape management. The need for competency in tree surgery, cabling and bracing, and wound repair is regarded as less important for urban foresters than for arborists.

**Skills lacking.** Employers often find that their employees lack necessary training in certain areas. Once these areas are identified, courses, curricula, and training programs can be evaluated and, if necessary, changed to place greater emphasis upon teaching these skills. Responses to the following question provide data regarding this issue. "Which of the above skills that you have checked [as necessary] do you find frequently lacking in individuals that secure positions in arboriculture and urban forestry?"

Table 5 shows a rank ordering of skills reported as frequently lacking for arborists and urban foresters. Private sector responses were used to rank order arborists' skills lacking. Only public sector responses were used to rank order urban foresters' skills often lacking because most urban foresters are hired by public sector employers.

The data indicate that arborists are reported to often lack sufficient training in basic tree-care skills and equipment operation. In addition, greater training emphasis is needed in the areas of public relations and public speaking skills. Employers of urban foresters report that public relations and management related skills are most frequently lacking. This may reflect the fact that most urban foresters are expected to promote as well as manage urban forestry programs. Com-

munication skills are necessary if this is to be done effectively.

**Table 3. Skills a graduate of an arboriculture program should have to be adequately prepared to pursue a career.**

<i>Private sector</i>	<i>Frequency</i> %	<i>Public sector</i>	<i>Frequency</i> %
Tree surgery	96.6	Transplanting techniques	95.9
Pruning & tree removal techniques	93.1	Pruning & tree removal techniques	93.1
Cabling & bracing	86.2	Insect/disease control	91.8
Equipment operation	86.2	Fertilization techniques	90.8
Fertilization techniques	86.2	Plant materials	89.8
Insect/disease control	86.2	Tree problem diagnosis	89.8
Transplanting techniques	86.2	General botany	88.8
Tree problem diagnosis	86.2	Equipment operation	86.7
Safety procedures	80.6	Wound repair	81.6
Plant materials	79.3	Safety procedures	80.6
Wound repair	79.3	Shade & street tree selection	80.6
General botany	75.9	Tree surgery	79.6
Shade & street tree selection	72.4	Cabling & bracing	72.4
Tree appraisal techniques	65.6	Tree appraisal techniques	71.4
Creative problem solving	62.1	Plant physiology	68.4
Public relations	58.6	Plant ecology	67.3
Soil science	55.2	Soil science	67.3
Plant physiology		Dendrology	64.3
Landscape management	48.3	Landscape management	64.3
Writing skills	44.8	Irrigation systems	62.2
Plant ecology	44.8	Public relations	62.2
General ecology	44.8	Tree inventory techniques	62.2
Public speaking skills	41.4	Landscape design skills	61.2
Budgeting	41.4	General ecology	60.2
Tree inventory techniques	34.5	Creative problem solving	56.1
Dendrology	34.5	Writing skills	55.1
Accounting	34.5	Budgeting	49.0
Teaching skills	31.0	Turfgrass science	48.0
Turfgrass science	31.0	Public speaking skills	31.6
Landscape design skills	31.0	Silviculture	28.6
Irrigation systems	24.1	Teaching skills	25.5
Business law	20.7	Computer science	23.5
Silviculture	20.7	Urban wildlife management	20.4
Computer science	17.2	Public administration	18.4
Urban wildlife management	13.8	Accounting	18.4
Political science	6.9	Business law	10.2
Public administration	6.9	Political science	10.2
Sociology	3.4	Sociology	6.1

#### *Private sector*

#### *Public sector*

#### **Additional skills listed**

CPR & first aid	Personnel management
Rescue procedures	Climbing techniques, ropes & knots
Time management skills	Contract administration
Personnel management	CPR & first aid
Sales ability	Principles of electrical conductivity
Tree law/statutes & ordinances	Water law
Saw maintenance & operation	Landscape construction
	Chemistry

#### **Conclusions**

A majority of respondents report that students preparing to be arborists should receive a minimum of two years academic training and over six months of field experience. Students preparing to be urban foresters should receive at least four years of academic training and approximately the same amount of field experience as students of arboriculture.

Although employers of arborists agree that graduates of an arboriculture program should be taught basic tree care skills such as pruning and tree removal techniques, fertilization techniques, insect and disease control, etc., private and public sector employers differ in opinion as to the relative importance of some skills. Public sector employers expect arborists to perform a wider range of tasks than do commercial tree-care firms. Arborists seeking employment in Mountain West municipalities might be expected to demonstrate competencies in irrigation systems, landscape design, and tree inventory techniques.

Employers of urban foresters report that students should develop competencies in areas such as shade and street tree selection, plant materials, public relations, and budgeting, as well as in traditional tree-care procedures. They also indicate that urban foresters most frequently lack public relations and management related skills, which are essential to the promotion and perpetuation of urban forestry programs. Greater emphasis needs to be placed upon development of these skills for arborists and urban foresters alike.



Table 4. Skills a graduate of an urban forestry program should have to be adequately prepared to pursue a career.

Public sector	Frequency %
Insect & disease control	89.8
General botany	88.8
Shade & street tree selection	88.8
Plant materials	87.8
Transplanting techniques	85.7
Tree problem diagnosis	82.7
Fertilization techniques	81.6
Pruning & tree removal techniques	81.6
Public relations	79.6
Tree inventory techniques	79.6
Soil science	78.6
Safety procedures	77.6
Equipment operation	76.5
Writing skills	76.5
Budgeting	75.5
Landscape management	75.5
Tree appraisal techniques	75.5
Plant ecology	74.5
Plant physiology	73.5
General ecology	73.5
Irrigation systems	71.4
Landscape design skills	70.4
Tree surgery	68.4
Creative problem solving	67.3
Wound repair	64.3
Dendrology	62.2
Public speaking skills	61.2
Cabling & bracing	60.2
Turfgrass science	54.1
Computer science	52.0
Public administration	50.0
Silviculture	49.0
Urban wildlife management	48.0
Teaching skills	44.9
Accounting	40.8
Political science	34.7
Business law	20.4
Sociology	20.4
<b>Other skills listed</b>	
Employee/personnel management	
Technical specification writing	
Urban planning	
Contract administration	
CPR	
Land use planning	
Landscape construction	
Park administration/management	
Principles of electrical conductivity	
Time management skills	
Water law	
Tree nursery management	

Table 5. Skills most frequently lacking in individuals that secure positions as arborists and urban foresters.

Arborists (Private sector only)	Frequency %	Urban Foresters (Public sector only)	Frequency %
Pruning & tree removal techniques	47.4	Public relations	35.4
Insect & disease control	31.6	Budgeting	27.1
Equipment operation	26.3	Public speaking skills	16.7
Public relations	26.3	Writing skills	16.7
Safety procedures	21.1	Public administration	14.6
Tree problem diagnosis	15.8	Creative problem solving	12.5
Tree surgery	15.8	Landscape design skills	12.5
Public speaking skills	10.5	Equipment operation	10.4
Soil science	10.5	Accounting	8.3
Wound repair	10.5	Insect/disease control	8.3
Plant materials	5.3	Irrigation systems	8.3
Plant physiology	5.3	Computer science	6.3
Shade & street tree selection	5.3	General botany	6.3
Tree appraisal techniques	5.3	Safety procedures	6.3
Turfgrass science	5.3	Tree problem diagnosis	6.3
Writing skills	5.3	Urban wildlife management	6.3
<b>Other skills lacking</b>		Business law	4.2
Work experience		General ecology	4.2
First aid & CPR		Plant ecology	4.2
Rescue procedures		Pruning & tree removal skills	4.2
Time management skills		Shade & street tree selection	4.2
Personnel management skills		Transplanting techniques	4.2
General management skills		Tree appraisal techniques	4.2
		Tree surgery	4.2
		Turfgrass science	4.2
		Fertilization techniques	2.1
		Plant materials	2.1
		Soil science	2.1
		Teaching skills	2.1

**Acknowledgements**

Support for this project was provided by the Utah Division of State Lands and Forestry. I would also like to acknowledge technical assistance from Jerry Sempek and the Department of Landscape Architecture and Environmental Planning at Utah State University. Copies of the complete study are available upon request at the following address: Urban Forestry Coordinator, Division of State Lands and Forestry, Room 3100, State Office Building, Salt Lake City, UT 84114

**Literature Cited**

Andresen, J.W. 1980 North American Urban Forestry Perspectives Including a Catalog of Urban Forestry and

Arboriculture Courses. Cooperative Forestry Branch, U.S. Forest Service.

Coufal, J.E. 1979 *How many technician schools and students? How much employment?* J. Forestry 77(2): 99-101.

*Forest Resources Department  
UMC 52  
Utah State University  
Logan, UT 84322*

**ABSTRACTS**

WOLFE, R.D. 1983. **The community vs. the gypsy.** Am. Forests 89(6): 16-19, 52-53.

People, communities, and government agencies have reacted in various ways to the gypsy moth ever since it was unintentionally released in Massachusetts in 1869. Over the years, responses to the spread of the insect and the damage it causes have ranged from attempts at total eradication to no action at all, plus every level of activity in between. In the final analysis, the level of government action is controlled by the amount of public concern, and that, in turn, is controlled by the amount of damage that the gypsy moth causes or that people expect it to cause. As an illustration of how public concern influences local decision-making, we present this fictitious account of how Arborville, an imaginary small town in the Northeast, reacted to the threat. Though fictional, the story is typical and occurs annually in the heavily defoliated areas of the Northeast. Further, it illustrates the importance of a well-planned and coordinated county/state program in achieving realistic gypsy-moth-suppression objectives. Such coordinated programs are cost-effective, reduce unnecessary insecticide treatments, ensure proper timing of treatments, and minimize environmental damage.

VOLNEY, W.J.A., C.S. KOEHLER, L.E. BROWNE, L.W. BARCLAY, J.E. MILSTEAD, and V.R. LEWIS. 1983. **Sampling for California oakworm on landscape oaks.** California Agriculture 37(9 & 10): 8-9.

California oakworm populations periodically erupt, defoliating both deciduous and evergreen oaks over widespread areas of coastal California. Causes of oakworm population fluctuations are not well understood, but population declines have been variously attributed to natural enemies, naturally occurring diseases, starvation, and changes in genetic "quality" of larvae in the outbreak phase. Most lepidopterous larvae produce rather hard, ovoid to cylindrical fecal pellets whose appearance and shape are often quite specific to insect species, genus, or family, and whose size increases as larvae grow. It occurred to us that timely collections of larval feces on sticky cards placed beneath trees might accurately indicate oakworm activity above and facilitate control decisions. Most oakworm pellet collections in the field and laboratory followed predictable patterns, coinciding with the considerable literature and observations already accumulated on the biology of this insect in coastal California. Pending the outcome of additional field and laboratory trials already in progress, we believe the card device will become a practical, useful tool for homeowners and others in detecting and sampling oakworm larvae to decide whether, or when, treatment is needed.