the selections and introductions of species that concerned Brewer that night in Middletown 99 years ago. The three pests have rightly occupied much of the Station's attention, and they occupy arborists.

When the gypsy moth appeared in Connecticut in 1906, Britton was ready. Although he and his colleagues waged war on the gypsy moth for four decades, the moth was still here in 1945, and Britton's successor, Roger Friend, concluded in both defeat and hope, "The gypsy moth in Connecticut has attained the status of a native insect pest with natural factors of control."

Friend's hope of natural control was dashed. Severe outbreaks occurred in 1957 and 1961-1964. Then in 1972 the gypsy moth, aided by the elm spanworm, ate the foliage from a record acreage of our suburban forest.

At the darkest time, however, there was a glimmer. A parasitic wasp eradicated the elm spanworm as if by magic, and the mystery and fear of unknown numbers of oaks dying in the train of the defoliators was recently allayed when Station scientists learned that it takes a borer to give the coup de grace. Learning to grow the gypsy moth in confinement at the Station smoothed the way for studying parasites, and knowledge grows.

Meantime a glimmer has also appeared in the darkness of the two fungal diseases. After decades of faithful labor to prove that chemotherapy of plant disease was at least a possibility, chemotherapy even seems probable now for Dutch elm disease.

This summer a Connecticut arborist loaned a "cherry picker" for Station scientists to observe the movement of a chemotherapeutant to the tops of elms on the Trinity campus in Hartford. Fortunately, the chemical moved further than the grease and sulfur put in elms in 1890 and excoriated in the first report of the TPX.

The best beginning for the Station's new century is, however, a discovery that may make Brewer's 1876 prophecy come true. He said, "The chestnut will some day become more popular than now." Last year Station scientists found that a non-pathogenic strain of the blight fungus could stop the pathogenic fungus. Now cankers in the forests of Hamden, Connecticut are healing because that non-pathogenic fungus has been inserted into the canker.

As the second century of American agricultural experiment stations dawns, so too dawns hope for solving the problems of trees that have perplexed the Station and vexed arborists.

The Connecticut Agricultural Experiment Station
New Haven, Connecticut

TASKS ESSENTIAL FOR A TREE SERVICE WORKER
by Paul H. Waddy, Edgar P. Yoder and J. David McCracken

Occupational information is needed to develop and revise vocational and technical education curricula. Teachers and curriculum developers generally determine which skills might be taught in a program based upon teacher expertise, advisory committee input, informal and formal community surveys, and/or task inventories.

The Agricultural Education Department at The Ohio State University has utilized and revised a system for obtaining and using occupational information as an effective aid in planning, improving, and updating occupational education curricula. This report presents the results of a survey of the occupation, tree service worker. The information contained herein may be used by curriculum development specialists, teachers, local and state administrators, and others involved in planning and conducting vocational and technical programs in agriculture.

The major purpose of the occupational survey was to identify the skills which are performed and essential for success as a tree service worker. The specific objectives of this survey were as follows:

1. Develop and validate an initial task inventory for the tree service worker.
2. Identify the specific tasks performed by the tree service worker.
3. Determine the relative importance of the specific tasks to successful employment as a tree service worker.

The tree service worker is employed in privately owned tree service firms which contract services with the public sector. The specific duties performed by the tree service worker will vary with the size and type of business. The tree service worker is usually involved with maintenance of trees and shrubs. In general, the tree service worker prunes trees and shrubs; repairs damaged trees; treats diseased and decayed trees; removes dead or undesirable trees; and maintains the tools and equipment used in his work. In some of the larger firms where the work may be divided between many employees, the tree service worker may have more definitive job titles such as tree trimmer, tree pruner, or tree surgeon.

Methodology

Objectives were accomplished by constructing an initial task inventory, validating the initial inventory, selecting a sample of workers, collecting data, and analyzing data.

Duty areas and task statements for the tree service worker were identified by searching existing task lists, job descriptions, curriculum guides, and reference publications. Additionally, contacts with several industry personnel aided in clarifying the specific responsibilities of the tree service worker. All the tasks that the project staff thought to be performed were assembled into one composite list.

The initial tasks were grouped into functional areas called "Duties". After the task statements were grouped under the proper duty areas, each task statement was reviewed for brevity, clarity, and consistency.

The 25 questionnaires which were returned were checked for completeness and accuracy by the project staff. Information from the 24 usable responses was coded on Fortran coding sheets for key punching. In addition to coding appropriate respondent background information, each specific task statement was coded as to whether it was performed (1 = Task performed by respondent; blank = Task not performed by respondent) and the level of importance of the task (3 = essential; 2 = useful; 1 = not important). The information was keypunched on IBM cards and verified by personnel at the Instruction and Research Computer Center at The Ohio State University.

Findings

Objectives of the study resulted in the compilation of basic sample background information, the determination of tasks performed by the tree service worker, and the identification of tasks essential to successful performance as a tree service worker.

The 158 tasks were grouped under 14 duty areas. Each respondent indicated whether he performed the specific task in his current position as a tree service worker. The percentages of respondents performing each task were averaged for all tasks under each duty area. The mean percentage of incumbents who performed specific tasks in specified duty areas is presented in Table I, columns 2.

A level of importance rating was obtained for each task. The respondent could rate the task as essential, useful, or not important for successful performance as a tree service worker. A ranking of essential was assigned a numerical rating of "3", useful a numerical rating of "2", and not important a numerical rating of "1". The level of importance ratings for each task were averaged for all tasks under each duty area. The average level of importance ratings for the specific tasks in the specified duty areas are presented in Table I, column 3.

It is recommended that the results for each specific task be examined by educators and others who are developing educational programs to determine curriculum content for preparing tree service workers. Specific tasks with a high level of performance and a high level of importance rating should be given more emphasis in the educational program than specific tasks with a low level of performance and a low level of importance rating.
Table I. Percentage Performance and Average Rating of Importance of Specific Tasks of Tree Service Workers*

<table>
<thead>
<tr>
<th>Task statements</th>
<th>Percent</th>
<th>Average level of forming importance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performing General Office Work</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>File various forms and records</td>
<td>50</td>
<td>2.0</td>
</tr>
<tr>
<td>Use telephone</td>
<td>66</td>
<td>2.5</td>
</tr>
<tr>
<td>Write memos, notes, and letters</td>
<td>58</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>58.0</strong></td>
<td><strong>2.2</strong></td>
</tr>
<tr>
<td><strong>Recording Information</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record maintenance information on equipment</td>
<td>62</td>
<td>2.4</td>
</tr>
<tr>
<td>Record information on customer orders</td>
<td>66</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>64.0</strong></td>
<td><strong>2.4</strong></td>
</tr>
<tr>
<td><strong>Inventorying Products and Supplies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assist in taking physical inventory</td>
<td>37</td>
<td>1.8</td>
</tr>
<tr>
<td>Determine inventory on hand</td>
<td>50</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>43.5</strong></td>
<td><strong>1.9</strong></td>
</tr>
<tr>
<td><strong>Following Legal Regulations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow laws relating to chemical use</td>
<td>54</td>
<td>2.7</td>
</tr>
<tr>
<td>Follow regulations regarding planting and trimming various trees in municipalities</td>
<td>66</td>
<td>2.7</td>
</tr>
<tr>
<td>Secure parking permits for street work</td>
<td>25</td>
<td>1.8</td>
</tr>
<tr>
<td>Interpret local street laws and traffic regulations</td>
<td>41</td>
<td>2.5</td>
</tr>
<tr>
<td>Obtain chemical application permit</td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>38.0</strong></td>
<td><strong>2.3</strong></td>
</tr>
<tr>
<td><strong>Following General Safety Precautions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply first aid to minor cuts, bruises, and burns</td>
<td>75</td>
<td>2.8</td>
</tr>
<tr>
<td>Identify potential safety hazards</td>
<td>75</td>
<td>2.9</td>
</tr>
<tr>
<td>Store chemicals</td>
<td>41</td>
<td>2.3</td>
</tr>
<tr>
<td>Use fire extinguishers</td>
<td>58</td>
<td>2.7</td>
</tr>
<tr>
<td>Wear appropriate protective clothing</td>
<td>70</td>
<td>2.8</td>
</tr>
<tr>
<td>Ventilate work areas</td>
<td>29</td>
<td>2.0</td>
</tr>
<tr>
<td>Interpret information on labels &amp; signs</td>
<td>66</td>
<td>2.8</td>
</tr>
<tr>
<td>Use proper lifting and carrying methods</td>
<td>68</td>
<td>2.8</td>
</tr>
<tr>
<td>Store inflammable materials</td>
<td>58</td>
<td>2.5</td>
</tr>
<tr>
<td>Wear appropriate work clothes</td>
<td>75</td>
<td>2.8</td>
</tr>
<tr>
<td>Dispose of chemical containers</td>
<td>50</td>
<td>2.5</td>
</tr>
<tr>
<td>Install safety devices</td>
<td>58</td>
<td>2.5</td>
</tr>
<tr>
<td>Determine when climatic conditions</td>
<td>79</td>
<td>2.8</td>
</tr>
<tr>
<td>provide unsafe work situations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct potential safety hazards</td>
<td>75</td>
<td>2.9</td>
</tr>
<tr>
<td>Remove debris from work areas</td>
<td>75</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>63.3</strong></td>
<td><strong>2.6</strong></td>
</tr>
<tr>
<td><strong>Planning and Organizing Work</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule daily work</td>
<td>62</td>
<td>2.4</td>
</tr>
<tr>
<td>Establish priorities on various jobs</td>
<td>54</td>
<td>2.3</td>
</tr>
<tr>
<td>Work with customer in determining work dates</td>
<td>54</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>56.6</strong></td>
<td><strong>2.3</strong></td>
</tr>
</tbody>
</table>

Selling Products and Services
Preparation advertising announcements | 41 | 1.9
Mean | 41.0 | 1.9

Maintaining Equipment and Vehicles
Add coolant to radiators | 70 | 2.5
Add oil to equipment | 75 | 2.7
Adjust carburetors | 54 | 2.1
Bleed diesel fuel system | 20 | 1.6
Change oil and oil filters | 66 | 2.5
Change thermostats | 45 | 2.0
Clean debris from equipment | 75 | 2.7
Grease equipment | 75 | 2.6
Inflate tires | 70 | 2.5
Inspect cooling system for leaks | 66 | 2.4
Install and adjust belts | 54 | 2.5
Install and adjust chains | 66 | 2.5
Service and install battery | 54 | 2.3
Interpret maintenance instructions in operator's manuals | 70 | 2.7
Remove equipment from storage | 50 | 2.1
Repack bearings | 50 | 2.1
Replace and adjust spark plugs | 62 | 2.4
Replace bearings and seals | 58 | 2.1
Replace diesel fuel nozzles | 16 | 1.3
Replace spark plug wires | 54 | 2.2
Replace radiator hoses | 58 | 2.3
Service air cleaners | 62 | 2.5
Service fuel strainer, filters, and sediment bowl | 62 | 2.4
Prepare equipment for storage | 50 | 2.2
Mean | 55.2 | 2.2

Using and Maintaining Hand and Power Tools
Adjust tools | 75 | 2.7
Clean tools | 83 | 2.8
Identify tools | 79 | 2.7
Interpret tool operation instructions | 70 | 2.7
Recondition tools | 58 | 2.3
Select tools for specific jobs | 75 | 2.7
Sharpen tools | 75 | 2.8
Store tools | 75 | 2.5
Use hand tools safely | 83 | 2.9
Use power tools safely | 83 | 2.9
Set up tools | 62 | 2.3
Mean | 74.3 | 2.6

Fertilizing Trees and Shrubs
Determine amount of fertilizer to apply | 83 | 2.9
Select appropriate kind of fertilizer materials to apply | 70 | 2.7
Determine when to fertilize | 70 | 2.7
Identify nutrient deficiency symptoms in growing trees and shrubs | 62 | 2.6
Interpret labels on fertilizer materials | 70 | 2.7
Mix fertilizer materials | 70 | 2.5
Select appropriate method to apply fertilizers | 66 | 2.5
Foliage feed fertilizer | 58 | 2.4
Root feed fertilizer | 70 | 2.6
Mean | 68.7 | 2.6
Operating Power Equipment and Vehicles
Interpret gauge readings on equipment 83 2.8
Operate equipment and vehicles on public highways 87 3.0
Add wheel and front end weights 29 1.7
Adjust equipment safety shields 45 2.3
Connect front end operated equipment 29 1.9
Connect hydraulic systems and hydraulic operated equipment 50 2.3
Connect 3-point hitch equipment 45 2.1
Hitch towed equipment 79 2.7
Identify potential equipment safety hazards 75 2.8
Install safety shields and safety devices 58 2.5
Interpret hand operating signals 75 2.7
Interpret safety instructions in operator's manuals 66 2.7
Interpret safety symbols on equipment 70 2.8
Operate equipment under work conditions 70 2.9
Refuel power units 79 2.8
Use appropriate power equipment and vehicles for specific jobs 77 2.7
Mean 63.5 2.5

Controlling and Preventing Insects and Diseases
Determine amount of chemical to apply 54 2.4
Determine when to apply chemicals 50 2.4
Evaluate influence of diseases and pests on life of trees and shrubs 45 2.3
Evaluate life cycle of insects to determine appropriate control procedures 50 2.5
Identify common diseases 50 2.5
Identify common insects 58 2.5
Identify damage caused by insects and diseases 54 2.6
Identify various means by which insects and diseases are spread 50 2.4
Mix chemicals with appropriate carriers 50 2.3
Select appropriate chemicals to control insects and diseases 50 2.5
Use appropriate method to apply chemicals 45 2.3
Use mechanical means to control insects and diseases 41 1.9
Inspect trees and shrubs to determine when infestations require control 54 2.4
Mean 49.3 2.3

Establishing Trees and Shrubs
Burlap trees 50 2.2
Determine if planting area should be drained 45 2.3
Determine size of planting hole needed 54 2.3
Determine soil texture 45 2.3
Determine when various trees should be moved 45 2.4
Determine which trees may be transplanted 50 2.5
Describe appearance of trees & shrubs 50 2.4
Dig planting hole 54 2.4
Dig tree with soil ball 50 2.4
Heel in trees and shrubs 54 2.4
Identify trees and shrubs 70 2.7
Identify parts of trees 75 2.6
Incorporate soil amendments into soil 37 2.1
Install drain in planting area 33 2.1
Mulch planting area 62 2.4
Plant trees and shrubs 62 2.4
Root prune large trees 33 2.0
Spray trees with anti-transpirants 33 2.0
Store balled trees and shrubs 33 2.0
Support trees with stakes and braces 58 2.5
Tie in tree branches 54 2.3
Transport trees to planting sites 62 2.5
Water trees 54 2.5
Wrap bare tree roots 50 2.3
Wrap trees 54 2.3
Mean 48.5 2.6

Maintaining Trees and Shrubs
Apply chemicals for pruning purposes 37 2.0
Apply dressing to cuts and wounds 66 2.5
Clean out tree cavities 70 2.5
Climb trees 79 2.7
Cord wood to sell 45 1.8
Cut trees 70 2.6
Dehorn trees 62 2.5
Determine feasibility of filling cavity 62 2.5
Determine final shrub and hedge form when trimming for appearance 70 2.6
Determine final tree form when pruning for appearance 79 2.8
Determine type of injury suffered by trees 70 2.8
Determine when to prune 66 2.8
Dispose of pruned branches and limbs 79 2.6
Fill tree cavities 62 2.3
Identify branches to be pruned 83 2.8
Install cable and braces to support weak limbs and cavities 75 2.7
Prune suckers or watersprouts 83 2.6
Remove broken & storm damaged limbs 83 2.8
Remove brush and weeds 79 2.4
Remove dead branches 83 2.8
Remove girdling roots 75 2.5
Remove stumps 70 2.5
Remove torn or ripped bark 70 2.5
Trim trees for utility line clearance 70 2.4
Remove V-crotches 58 2.3
Select appropriate bracing materials 62 2.7
Select appropriate materials to fill cavities 62 2.5
Shape tree cavities 66 2.4
Sterilize and dress tree cavities 50 2.3
Mean 68.5 2.6

* Average rating of importance may range from 1-3 with 3 being the highest.

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