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 percentaes 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, colums 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*

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