R E P O R T R E S U M E S

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USING AND CARING FOR ORNAMENTAL PLANT MATERIALS AND LANDSCAPE STRUCTURES. HORTICULTURE-SERVICE OCCUPATIONS, MODULE NO. 11.
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ONE OF A SERIES DESIGNED TO PREPARE HIGH SCHOOL STUDENTS FOR HORTICULTURE-SERVICE OCCUPATIONS, THIS MODULE HAS AS ITS MAJOR OBJECTIVE TO DEVELOP THE ABILITIES NEEDED TO USE, CARE FOR, AND MAINTAIN ORNAMENTAL PLANT MATERIALS AND LANDSCAPE STRUCTURES. IT WAS DEVELOPED ON THE BASIS OF DATA FROM STATE STUDIES BY A NATIONAL TASK FORCE. SUBJECT MATTER AREAS ARE (1) PLANT WOUND TREATMENT, (2) WOODY PLANT SUPPORT, (3) SAFETY IN CLIMBING TREES, (4) POISONOUS PLANT RECOGNITION AND AVOIDANCE, (5) BASIC FIRST AID, (6) PHYSICAL FITNESS AND LABOR EFFICIENCY, (7) CONCRETE PREPARATION AND USE, (8) PAINT APPLICATORS AND PAINT, (9) FENCE CONSTRUCTION, AND (10) MASONRY CONSTRUCTION. SUGGESTIONS ARE INCLUDED FOR INTRODUCTION OF THE MODULE, SPECIFIC UNIT OBJECTIVES, SUBJECT MATTER CONTENT, INSTRUCTIONAL MATERIALS AND REFERENCES, AND EVALUATION CRITERIA. THE MODULE IS SCHEDULED FOR 45 HOURS OF CLASS INSTRUCTION, 116 HOURS OF LABORATORY EXPERIENCE, AND 60 HOURS OF OCCUPATIONAL EXPERIENCE. TEACHERS WITH A BACKGROUND IN HORTICULTURE MAY USE THIS GUIDE IN PREPARING A UNIT FOR LESS ABLE HIGH SCHOOL STUDENTS WITH AN OCCUPATIONAL GOAL IN ORNAMENTAL HORTICULTURE. THIS DOCUMENT IS AVAILABLE FOR A LIMITED PERIOD AS PART OF A SET (VT 000 619 - 000 631) FOR $7.25 FROM THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION, THE OHIO STATE UNIVERSITY, 980 KINNEAR ROAD, COLUMBUS, OHIO 43212. (JM)

USING & CARING FOR

ORNAMENTAL PLANT MATERIALS & LANDSCAPE STRUCTURES

One of Twelve Modules in the Course Preparing for Entry In
HORTICULTURE - SERVICE OCCUPATIONS

Module No. 11

The Center for Research and Leadership Development
in Vocational and Technical Education

The Ohio State University
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Columbus, Ohio, 43212

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M E M O R A N D U M

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DATE: August 7, 1967

RE: (Author, Title, Publisher, Date) Module No. 11, "Using and Caring for Ornamental Plant Materials and Landscape Structures," The Center for Vocational and Technical Education, August, 1965.

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USING AND CARING FOR ORNAMENTAL PLANT MATERIALS AND LANDSCAPE STRUCTURES

CONTENTS

USING AND CARING FOR ORNAMENTAL PLANT MATERIALS AND LANDSCAPE STRUCTURES

Major Teaching Objective

To develop the ability to use, care for, and maintain ornamental plant materials and landscape structures.

Suggested Time Allotment

At school

Class instruction	45 hours	
Laboratory experience	116 hours	
Total at school		161 hours
Occupational experience		60 hours
Total for module		221 hours

Suggestions for Introducing the Module

In order to be effective in grounds maintenance, a worker needs skills and abilities in different areas. Many of the practices used to grow plants are also used to maintain plants, (watering, fertilizing, mulching, cultivating, etc.). The following practices which have been treated in previous modules are skills horticulture service workers must have:

1. Seeding, planting, or transplanting flowers, ornamental shrubs, lawns, and trees appropriate to the crop or landscaping situation
2. Potting, repotting, or "canning" ornamental plants
3. Fertilizing lawns, flowers, shrubs, and trees
4. Recognizing and controlling weeds in the landscape
5. Pruning shrubs and trees
6. Using pesticides safely and effectively
7. Using mulches effectively
8. Watering plants correctly
9. Operating small powered equipment safely and effectively
10. Controlling erosion

In addition to the above skills, grounds maintenance personnel should have competency in the following areas covered by this module:

1. Treating plant wounds
2. Supporting woody plants by guying, staking, cabling, and bracing
3. Climbing and working in trees
4. Recognizing, avoiding, and destroying poisonous plants in the landscape
5. Using first aid procedures
6. Mixing and using concrete

7. Using paint and paint applicator equipment
8. Laying concrete block, brick, and stone
9. Erecting fences
10. Safely lifting or moving heavy objects and materials

The students should be acquainted with the skills that a grounds maintenance worker is expected to have. Develop a lift, such as the one on the preceding page, with the class, explaining how knowledge in each of these competency areas will be of benefit to them.

Discuss with the students the need for dedicated, faithful landscape maintenance personnel. Use the approach that appeals to the student's sense of pride and beauty.

Show two pictures, one of a beautiful, well-maintained landscape and the second of an area littered with trash, possibly even the city dump or an area used by some citizens as a dump.

Pose the question, "Do we want our communities, our states, our country to look like this--(draw class attention to the picture of the well-maintained landscape) or-- like this (draw class attention to the picture of the city dump)?"

Such examples of extremes in landscape maintenance should draw comments and stimulate students' thinking. Compare pictures or specimens of well-maintained plants with pictures or specimens of unpruned, untrained plants. For example, different hedges may be used. Which plants are more valuable?

Compare a picture of a well-maintained brightly painted fence, with a picture of one that is unpainted or dull with cracking and peeling paint. Which fence is most valuable? What is happening to the owner's investment in each case?

When your family goes on a picnic, what kind of a park do you select? One that is insect infested, dirty, and littered, where most of the structures are ready to fall down, or a clean, well kept, insect free, pleasant park? Who keeps our parks clean, well kept, insect free, and in good repair? What is this service worth to our public? What is this service worth to you?

Have you seen poorly kept cemeteries? What is your reaction to them?

Have you seen poorly kept athletic fields?

Do you like to travel down littered highways?

These and similar examples should set the stage for the teaching which is to follow.

Competencies to be Developed

I. To develop the ability to treat plant wounds

Teacher Preparation

Subject Matter Content

When humans or animals are wounded, appropriate action is taken to prevent infection and promote the healing process. The process involves such actions as

1. Washing or cleaning the wound
2. Applying an antiseptic
3. Stitching the wound closed
4. Applying a dressing
5. Waiting for nature to take its course

Sometimes plants are wounded or damaged. The damage or wound may result from

1. Lightning
2. High winds
3. Ice
4. Animals with sharp teeth
5. Little boys with axes or hatchets
6. Misdirected machinery
7. Improper pruning

Since plants do not have flesh and blood, is there any need to give attention to their wounds? Is there anything that can be done to help heal plant wounds? If so, what are the procedures?

A major cause for decay and the premature death of trees can be traced to neglected wounds made years earlier.

In order to prevent infection by fungi, bacteria and other parasites, promote healing, and to reduce the loss of many valuable woody plants, certain procedures are followed.

1. All large wounds should be smoothed over by removing stubs or lips of wood and shaped by carving to a point at the top and bottom to promote rapid callus formation. For the procedure for shaping the wound see pp. 81-82 in the Grounds Maintenance Handbook.

2. Every cut more than one and one half inches in diameter should have a protective coating of a wound dressing. Wound dressing on a living woody plant helps to protect exposed surfaces and facilitate healing. A good wound dressing should

    a. Encourage callus formation
    b. Be antiseptic
    c. Be water tight
    d. Be long lasting
    e. Be elastic
    f. Be inconspicuous
    g. Be cheap

No one material meets the above specifications for a wound dressing. Some of the dressings commonly used are given below.

1. Orange shellac--used to cover traced bark and adjacent sapwood

2. Asphaltum paints--dry and weather slowly

3. Creosote paints--used in the interior of a cavity where fungi may have become established

4. Grafting waxes--prepared with alcohol, these are satisfactory for treating small surfaces.

5. House paints--not as durable as asphaltum and will injure tender tissues

6. Lanolin paints--allow wound callus to develop unchecked

7. Commercial tree paints--commonly found in aerosol cans

Wound dressings are best applied when the wound is thoroughly dry.

Bark deep wounds, where the cambium layer is not disturbed, will heal more quickly if the wounded area is covered promptly with a material such as burlap or polyethelene film.

Tree wounds heal by the formation of layers of callus tissue around the edge of the wound. The callus tissue originates from the cambium layer. Callus tissue can be formed at the rate of 1/2 inch per year, consequently, the smaller wound heals more rapidly.

Comparing Human and Plant Wounds

Item	Human Wounds	Plant Wounds
Protective covering	skin	bark
Healing by	scar tissue	callus tissue
Subject to infection by	bacteria, fungi	bacteria, fungi
Dressings	antiseptics, bandages	antiseptics, wound dressing
Time of healing	Related to amount of care and size of wound	Related to amount of care and size of wound

As bark injuries are neglected, the chances for cavities to develop increase. Cavities are likely to occur where

1. Considerable injury has occurred
2. There is wind breakage
3. Stubs are left from pruning operations

Major cavities occur in the

1. Trunk
2. Branch
3. Root
4. Crotch
5. Base

The steps in treating cavities include

1. Cleaning out the cavity
2. Shaping the cavity
3. Bracing the cavity
4. Sterilizing and dressing

Cavities may be

1. Left open
2. Covered with sheet metal and coated
3. Filled with filler material that has the following characteristics:
   a. Durability
   b. Safety
   c. Flexibility
   d. Plasticity
   e. Water proofness

In deciding whether or not to fill a cavity, consider the following points:

1. Age of the tree
2. Size of the cavity
3. Vitality of the tree
4. Life span of the tree
5. Susceptibility of the tree to insects and fungi

For detailed subject matter content concerning cavity treatments, see pp. 85-103 in Tree Maintenance.

In this competency area the students should learn about

1. The importance of treating plant wounds
2. Techniques for treating plant wounds
3. Materials for treating plant wounds
4. Techniques of treating cavities

Suggested Teaching-Learning Activities

1. Discuss the nature of plant (basically tree) wounds with the class. Students may enjoy comparing plant wounds and their treatment with human wounds and their treatment. Move from the known to the unknown.

2. Display as many of the tools and materials used in treating plant wounds and cavities as possible. Discuss and demonstrate the use of the tools giving the advantages and disadvantages of the various wound dressings.

3. Make arrangements with the local parks superintendent or arborist for the class to take a field trip to a wooded area where the class can observe professional arborists at work.

4. If tools are available, bring in sections of trunk or large branches with cavities hollowed out so that the students may practice the treatment of cavities.

Suggested time needed to develop the competency

In the classroom	2 hours
In the laboratory	2 hours
Total	4 hours

Suggested Instructional Materials and References

Instructional Materials

1. Tools used in tree surgery

   a. Wooden or composition rubber mallet

   b. Chisel

   c. Gouges

   d. Knives

   e. Brace and bits

   f. Saws

   g. Air compressor

   h. Paint brush

2. Wound dressings

3. Damaged plants for inspection and possible laboratory work

II. To develop the skills and abilities required to support woody plants by guying, staking, and cabling

Teacher Preparation

Subject Matter Content

The concept of support should not be new to the students. Some of the following examples might set the stage for this competency.

1. Financial support is given to
   a. Our schools (tax levies, bond issues, foundation programs, etc.)
   b. Our students (scholarships, assistantships, etc.)
   c. Our space program
   d. Our unemployed
   e. Our aged (pensions)
2. Moral support is given to
   a. Our favorite football team
   b. The hero in the movie or play
3. Mechanical support is given to
   a. Bridges, buildings
   b. Roads
4. Clothing is supported with
   a. Suspenders
   b. Garters
   c. Belts

5. Medical support

   a. Splints

   b. Casts

   c. Slings

   d. Traction

   e. Braces

We can readily understand the need for support in various forms. Even plants require support, though it takes a different form. Plants, too, have their share of troubles in their struggle for existence. Some plants have a naturally weak structure. Plants are subject to human and animal damage, disease, and temperature extremes. Therefore, plants may be weakened to the point where it is necessary for man to support them artificially. Sometimes, man anticipates that support will be required to prevent damage and uses artificial supports as a preventive measure at planting time.

Plants are supported by

1. Guying

2. Staking and tying

3. Bracing and cabling

Guying

Guying is a procedure used to prevent newly planted trees from being swayed excessively by wind, which can disturb their roots and impair normal function and development.

Two important considerations in guying trees are

1. Trees up to four inches in diameter should be guyed, though larger trees may also require this type of support.

2. Guy trees only in non-traffic areas, since the guy wires can be quite hazardous to pedestrians.

Procedure for guying trees

1. Obtain three, four-foot stakes which can be driven into the ground without being broken or split.

2. Drive the stakes into the ground at a slight angle away from the tree. Space the stakes evenly around the tree outside the planting pit. Allow sufficient space between the top of the stake and ground surface to secure the bottom of the guy wires.

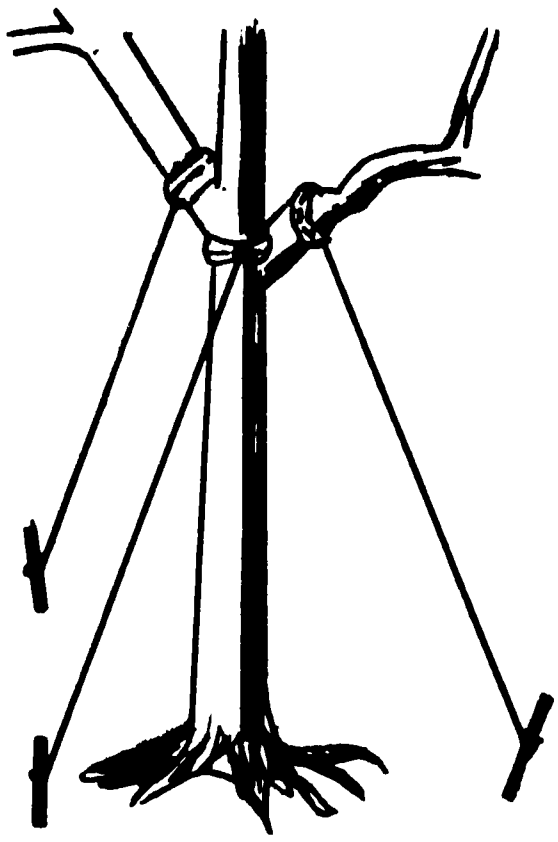
3. Place scrap rubber hose or another suitable collar about half way up the trunk.

4. Run a single strand of No. __ wire through or around the collar twisting the loose end of the wire around the wire to be fastened to the stake. Allow sufficient wire for fastening to the stake and permitting the stake to be driven will into the ground. In come cases it may be necessary to use turnbuckles to tighten the wires properly.

5. Repeat this procedure for the remaining two stakes.

6. Adjust the tension in each of the three wires so that the tree is properly aligned and well braced against the force of winds from any direction.

7. Normally guy wires can be removed the second year after planting.



Staking and Tying

Plants are staked and tied to prevent them from being damaged during storms and periods of high winds.

Some suggestions for staking and tying plants

1. Stake plants soon after planting in order to avoid damaging the roots. (It may be desirable to set the stake before planting.) Keep the plant straight, to allow the foliage of the plant to help mask the stake.

2. Put the supporting stake or stakes on the side of the prevailing winds. Use 2 stakes (2" x 4" x 6' or 8' long) set parallel with the main axis - (road or street). Set approximately 30" to 36" apart. Nail a 6" width board to the 2 x 4's at the ground line, to prevent damage to tree by mowers.

3. Adapt the staking technique to the plant's growth habit.

4. Try to keep the stake and tie as inconspicuous as possible. Use #9 wire to tie the tree to the top of the stakes. Draw the wire through an old rubber hose which will serve as a collar to protect the tree from injury.

5. Take care not to make the tie too tight.

6. The stakes should be driven into the ground until solidly anchored.

7. Paint stakes a dark, fadeless green color to blend with the landscape.

   Resource materials pertaining to staking and tying plants may be found in the following:

   a. Grounds Maintenance Handbook, pp. 90-91.

   b. Basic Gardening Illustrated, pp. 58-59.

Cabling and Bracing

The use of iron braces and wire cables is a valuable practice in tree maintenance. These braces tend to

1. Prevent branch breakage

2. Prevent crotch splitting

3. Prolong life of trees after decay and damage threaten to destroy the tree

4. Provide a measure of safety to people passing near the tree

Braces and cables are used when trees have a natural susceptibility to breakage or have crotches.

Types of artificial supports used are

1. Rigid bracing--this is used to support weak crotches, cracks in trunks or branches, and cavities. This technique for supporting damaged or weakened parts utilizes long bolts and threaded rods.

2. Flexible bracing--this is used to strengthen weak crotches and brace trees together. The technique of supporting weakened tree structures involves the use of wire cables. Several systems of flexible bracing are used, such as

   a. Simple direct

   b. Box

   c. Hub and spoke

   d. Triangular

For techniques in supporting with rigid and flexible bracing, see Tree Maintenance, pp. 109-111.

Suggested Teaching-Learning Activities

1. Introduce the concept of support as suggested at the beginning of the subject matter content. Stress that plants have need for support due to

   a. Inherent structural weaknesses associated with woody plants

   b. Damage resulting from insects and disease

2. Develop with the class various ways in which plants can be supported. Point out that each procedure will be studied in turn.

3. In the land laboratory or school forest, practice guying, and staking trees. The class may be divided into several teams at different stations. Be sure that each team has an opportunity to both stake and guy trees. Teacher or teacher-coached demonstrations should precede any attempts by students to support trees. Particular emphasis should be placed on safety in using sledge hammers to drive stakes, in using wire cutters, and in using sharp tools for cutting old hose into collar segments. A lab assistant should be on hand to assist the teacher in this exercise.

4. Exhibit, discuss, and demonstrate the use of cable, cable clamps, turnbuckles, brace and bits, threaded rods, washers and nuts, lag bolts, and block and tackle.

5. Have the students practice boring holes in branches, inserting threaded rods and lag screws to either hold two limbs together or to separate two branches. Have students apply cable clamps to cable. Use undesirable trees for this practice session.

6. Have students preparing for jobs in greenhouses use plantnet or wires and strings for supporting such crops as chrysanthemums, carnations, tomatoes, and cucumbers. (This experience will be good occupational experience.)

Suggested time needed to develop the competency

In the classroom	2 hours
In the laboratory	4 hours
Total	6 hours

Suggested Instructional Materials and References

Instructional Materials

1. Twenty 2" x 2" x 8' stakes
2. One roll No. 12 wire
3. One roll 1/4" wire cable
4. Two 5 lb. sledge hammers or post drivers
5. Wire cutters

6. One roll used rubber garden hose

7. Six sets of turnbuckles

8. Assortment of hooked lag bolts, flat washers, and threaded rods

9. Block and tackle

10. Twelve-4 foot wood or steel posts

11. Brace and bits

References

1. Pirone, P. P. Tree Maintenance, Chapter 7.

2. Sunset, Basic Gardening Illustrated, p. 59.

3. Ball, The Ball Red Book, p. 147.

Suggested Occupational Experience

The students should receive on-the-job experience in the greenhouse or landscape in supporting plants. The teacher should arrange for this type of experience with the cooperating employer.

III. To learn to safely climb and work in trees

Note: Due to the hazards involved, it is suggested that this competency area be taught only in situations where this type of training is essential and appropriate.

Teacher Preparation

Subject Matter Content

People have various ways of getting to their work. They walk, take a bus, drive a car, or climb to work.

Those who climb to their work include acrobats or aerialists, electric and telephone company polemen, painters, roofers, tree maintenance workers.

Many workers must climb to their work because this is the most efficient way to get to the place where their work is to be done, in order to prune or to do other maintenance work on a high branch in a maple tree. For example, one must first get near enough to work on the branch safely and effectively. After the necessary work is finished, one must return safely to the ground.

The National Park Service has produced a bulletin entitled, "Tree Preservation Bulletin No. 2" giving rules for safe practice for tree workers. These rules are also found in Grounds Maintenance Handbook, pp. 109-124.

The students should receive instruction in

1. General safety rules
2. Knot tying. These should include
   a. Bowline
   b. Bowline-on-a-bight
   c. Running bowline
   d. Square knot
   e. Clove hitch
   f. Timber hitch
   g. Taut-line hitch
   h. Figure-of-eight knot
   i. Double half hitch
   j. Sheepshank
3. Type of clothing to wear
4. Types and uses of rope
5. Rules of climbing
6. Types and uses of ladders
7. Recognizing electrical hazards

8. Tree maintenance tools

9. Tree felling

10. Brush and wood removal

See Grounds Maintenance Handbook, pp. 109-124.

Suggested Teaching-Learning Activities

1. Introduce the subject of climbing and working in trees as found in the Subject Matter Content.

2. Work with one of the students in preparing a knot display board of the various knots which the tree maintenance worker uses. Retain the display for future use. The knot display can be used for reference by the students as they work in laboratory periods following teacher demonstration on tying and using various knots. The teacher may want each student to turn in a knot display board in order to evaluate the student at the conclusion of the instructional period.

3. Show one of the USDA safety films

   a. "Do it With E's." (Color, 23 minutes)

   b. "Safety for Sure." (Color, 10 3/4 minutes)

4. In the school forest, conduct practice sessions in tree climbing. Emphasize the following:

   a. Trees should not be climbed or worked when wet.

   b. Workers should stay out of trees in high winds.

   c. Trees are no place for horseplay or for showing off.

   d. Workers must be physically fit before climbing trees.

   e. One person should work in a tree at a time.

   f. Proper clothing is important when working in trees.

   g. Limbs should be checked before placing the entire weight of the body on them.

   h. Care should be exercised when placing full body weight on one limb.

i. Shinny only those trees under 15 feet in height.

j. The safety sling must always be used for tree work.

5. In class, discuss safety procedures in using ladders.

6. Take the class on a field trip to observe tree felling procedures.

7. Acquaint the class with the tools used in tree maintenance work.

Suggested time needed to develop the competency

Classroom instruction	5 hours
Laboratory experience	10 hours
Occupational experience	40 hours
Total time	55 hours

Suggested Instructional Materials and References

Instructional materials

1. 300 feet first grade, 3-strand, rot treated, one-half inch manila rope

2. 50 feet of clothesline for practice in knot tying

3. 16 foot extension ladder

4. Chain saw

5. 3 axes

6. 6 steel wedges

7. 2 pole pruners

8. 2 pole saws

9. 4 handsaws

10. 3 sledge hammers

Reference

Conover, Grounds Maintenance Handbook, pp. 109-124.

Suggested Occupational Experience

A student going into forestry or park work should secure summer employment with a tree expert service, or should be placed with the park service as a part of a tree maintenance crew.

IV. To develop the ability to recognize and avoid poisonous plants in the landscape

Teacher Preparation

Subject Matter Content

Many poisonous substances are clearly marked informing one of the potential danger of using the materials improperly. Materials so marked include insecticides, medicines, and various cleaning compounds.

Unfortunately, no labels, such as the skull and crossbones, are found affixed to many plants in the landscape, which potentially cause rashes, blisters, or more serious injuries to the unwary person who comes into direct contact with them. Susceptibility to poisonous plants varies with individuals.

Since the duties of many landscape maintenance personnel place them in locations where poisonous plants may be encountered, it is appropriate to include a competency area in this module which deals with the recognition, avoidance, and destruction of poisonous plants. Knowledge of poisonous plants may reduce "lost time" from the job due to the inconveniences and complications of contact with poisonous plants. The only poisonous plants considered are those that are poisonous on contact and produce dermatitis. Some of the more common poisonous plants in the landscape include

1. Poison ivy (Toxicodendron radicans)
2. Poison oak (Toxicodendron species)
3. Poison sumac (Toxicodendron vernix)
4. Parsnip (Pastinaca) (Wild parsnip, Pastinaca sativa)

5. Mustard (Brassica)

6. Poisonwood (Metopium)

7. Snow-on-the-mountain (Euphorbia marginata)

8. Stinging nettle (NettlesOUrtica gracilis, Urtica diocia), Common nettle (Urtica urenz), and Wood nettle (Laportea canadensis)

9. Specific plants of importance in local area will need to be stressed by the teacher.

Information Helpful in Identifying Poisonous Plants

Poison ivy is the name commonly given to primarily white fruited, trifoliate species of woody vines or shrubs of the genus Toxicodendron of the cashew or sumac family. Common poison ivy is a vine and may have either of two growth habits.

1. It may climb high over fences or trees. The vine tends to be held in place by aerial roots.

2. It may grow low, creeping along the ground with underground stems and branches.

Poison ivy is often confused with other plants such as the harmless woodbine or Virginia creeper.

A Comparison of Poison Ivy and Virginia Creeper

	Poison Ivy	Virginia Creeper
Type of leaves	compound	compound
Number of leaflets	three leaflets	five leaflets
Color of fruit (berries)	white	blue
Affect on humans	poisonous in varying degrees	harmless

Poison ivy is common to the eastern United States and is most often encountered

1. In fertile soils

2. In poorer soils close to water

3. Fence rows

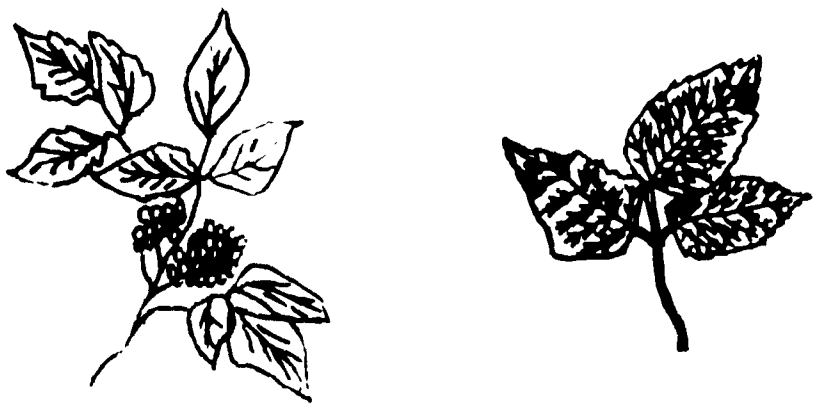
4. Hardwood forests (especially along the margins)

5. Flood plains

Individuals differ in their reaction to poison ivy depending upon the susceptibility and degree of contact.

The juice of the poison ivy plant is generally not irritating or poisonous on first contact. However, after one or more contacts, most persons become sensitized or allergic and will react to subsequent contacts by developing a rash.

Some persons can be immune to poisoning by one species but susceptible to poisoning by another species. The immunity may be partial or complete and it can be lost or acquired over the years.



Persons are most susceptible to poison ivy during warm weather when perspiration is considerable. The sap must get on the skin for the rash to develop. The rash may develop within 6-12 hours or as late as a week after exposure. Generally, the rash develops within two or three days after contact. Symptoms of poisoning are

1. Reddening, slight swelling, and itching of the affected skin

2. The appearance of tiny, closely set blisters

3. In some cases, severe swelling

If the blisters are broken, the fluid may carry the poison to other areas, spreading the irritation.

The toxin from poison ivy may be carried from the plant by clothing, shoes, tools, soils, animals, and smoke from burning plants.

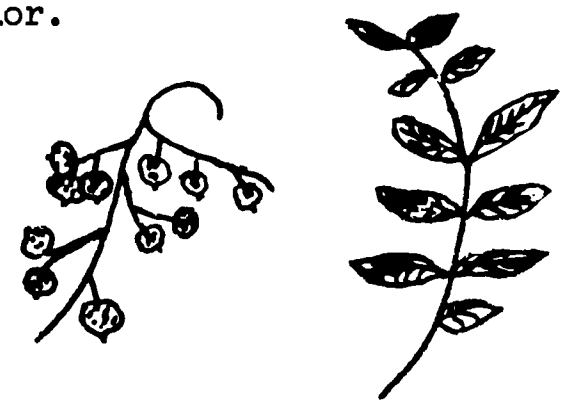
It is interesting to note that poisoning may be contacted from clothing worn up to a year after the clothing was brought into contact with poison ivy.

Poison Oak

Poison oak is the name given to a low growing bushy form of poison ivy, having lobed, trifoliate leaflets and white fruit. It is most common in the western United States. Symptoms of poison oak poisoning are the same as those for poison ivy.

Poison Sumac

Poison sumac is native to swamps from Quebec to Minnesota and south to Texas and Florida. It is a small bush or tree which may grow to be 20 feet in height, with pinnately compound leaves having 7-15 entire leaflets. The plant has drooping axillary clusters of white fruits. The hairless leaf stalk is usually reddish in color.



Symptoms of poison sumac poisoning are similar to those given for common poison ivy.

Treatment for Poison Ivy Poisoning

1. Skin creams applied before exposure to the plant are of little value.

2. Washing the skin with soaps or detoxicants is not effective unless performed within a few minutes after contact.

3. ACTH and cortisone drugs given either by injection or taken orally are the only treatments controlling the rash.

The best protection against poison ivy is to avoid it.

Control of poison ivy is accomplished after several applications of 2,4-D, 2,4,5-T ester, or aqueous foliage spray. Ammate may be applied as 1.5 lbs. dry material per square yard or an aqueous foliage spray.

Suggested Teaching-Learning Activities

1. Secure good color photographs of the poisonous plants which may be encountered in the landscapes of the geographical area where the course is being offered. Discuss the specific characteristics which identify the plants. Plastic models of several of the poisonous plants have been made and may be found on display in offices or waiting rooms of some physicians. These could make valuable training aids. A field trip to areas where the poisonous plants can be found is desirable, but considerable caution will be necessary on the part of the participants.

2. Discuss the preventive measures and first aid techniques for treating rashes due to poisonous plants. Stress that being able to recognize and avoid poisonous plants is the most effective way to prevent plant poisoning.

Suggested time needed to develop the competency

In the classroom	2 hours
In the laboratory	1 hour
Total	3 hours

V. To develop the ability to use basic first aid procedures

Teacher Preparation

Subject Matter Content

Since horticulture service workers will be involved in a great number of activities which are potentially dangerous, it is suggested that first aid procedures be learned by the first aid students. In many cases, it will be necessary to arrange for instruction from a school faculty member, qualified as a first aid instructor and certified to teach the subject to others.

Considering the nature of the work which the horticulture service worker will be required to do, it is suggested that first aid instruction pertaining to the following topics be presented as a part of the training program.

1. Splinters
2. Cuts
3. Burns (rope, engine mufflers, fires)
4. Foreign objects in eyes
5. Puncture type wounds
6. Antidotes for poisoning due to pesticides, (snake and insect bites or stings)
7. Broken limbs
8. Large animal bites
9. Amputations
10. Heat exhaustion
11. Shock

For assistance in organizing this portion of the horticultural course, it is suggested that the instructor work with the school nurse and/or first aid instructor. Various agencies such as the Red Cross, Y. M. C. A., or Boy Scouts, may be able to provide valuable resource materials, training aids, and resource personnel for presenting this portion of the course.

Suggested time needed to develop the competency

In the classroom	10 hours
Laboratory experience	5 hours
Total	15 hours

VI. To understand the importance of physical fitness and labor saving techniques in horticultural service work

Teacher Preparation

Subject Matter Content

Maintaining physical fitness is important to all workers. Fitness can mean the difference between

1. Comfortable and aching muscles
2. Safe and unsafe
3. Overtime and sick leave
4. Success and failure

Physical fitness involves

1. Following a physician's advice in correcting any defects revealed by a physical examination
2. Learning to sleep and relax
   a. Avoid noises such as loud radios and honking horns.
   b. Wear well fitting, comfortable clothing and shoes.
   c. Relax a few minutes before, during, and after meals.
3. Developing a healthy, wholesome attitude toward the job
4. Steady activity in moderate amounts

Some hints for making the physical jobs easier

1. Lift with the back straight.
2. Use simple machines such as inclined planes, pulleys, wheels, levers, jacks, and rollers. These devices supply a mechanical advantage which can be of great assistance in moving heavy objects.
   a. For the worker
      1) Use both hands productively.
      2) Start and stop hands together.
      3) Move arms opposite, symmetrical, and simultaneously.

4) Use smooth continuous motions.
5) Put momentum to work.
6) Use rhythm in movement.

b. For the work place

1) Keep tools and materials in a fixed place.
2) Keep tools and materials close to and in front of the operator.
3) Locate tools and materials for best sequence of motions.
4) Deliver the product close to point where it will be used.
5) Provide an orderly means of disposing of waste.
6) Provide work space height for sitting and standing.
7) Provide adequate light and ventilation.

c. For tools and equipment

1) Use jigs for holding materials instead of hands.
2) Pre-position tools and materials.
3) Combine tools where possible.
4) Handles should have a safe grip.
5) Locate controls where the operator can easily reach them.
6) Distribute the load to fit the capacity of structural members

d. For mobile work or material handling

1) Move materials in quantity.
2) Combine units to reduce handling.
3) Avoid unnecessary storage.
4) Provide orderly storage with access to each product.
5) Do as much processing as possible at a fixed work place.
6) Make mobile equipment as complete as work place as possible for jobs done on the move.
7) Provide ease of movement and adequate storage before and after each operation.
8) Don't rehandle materials
9) Use power equipment to replace muscle work.
10) Minimize distance of product movement in loading and unloading.
11) Load with a view of unloading.
12) Push, don't pull.
13) Follow a fixed pattern.
14) Avoid congestion.

Back injuries due to improper lifting

Many back injuries occur as a result of improper lifting techniques. Persons picking up objects from the floor or ground level with the knees relatively straight must rock backward on the heels to balance the weight; this tends to pull the body forward. When lifting in this manner, the trunk of the body is the moving lever, and weaker back muscles must lift the trunk; consequently, danger of injury to the lower back is probable.

Horticulture service workers will be called upon to do many jobs which involve lifting and moving heavy objects. Instruction should be offered concerning the proper way to lift and move heavy objects, since many duties of a horticultural service worker requires lifting. Some examples are

1. Lifting balled and burlapped plants, fertilizer bags, lawn mowers, etc., onto trucks

2. Carrying stones and bricks for patic construction

3. Lifting trees and shrubs during planting

4. Shoveling soil into soil shredders

5. Emptying refuse cans in the park

6. Loading fertilizer into spreaders

The Industrial Commission of Ohio, Division of Safety and Hygiene, offers these suggestions for correct lifting procedure.

1. Get a good footing.

2. Remove all foreign objects and obstacles from the floor which might cause one to lose their footing.

3. Place the feet about a shoulder width apart.

4. Bend the knees to grasp the weight.

5. Keep the back straight.

6. Get a firm hold.

7. Keep the back as upright as possible.

8. Lift gradually by straightening the legs.

In setting the load down, bend the legs and truck of the body at the waist. Make the leg muscles, not the back, do the work.

Suggested Teaching-Learning Activities

1. Using the opaque projector, show the correct way to lift heavy objects. Lightweight objects could be used to demonstrate correct lifting procedures.

2. Discuss various loads which horticulture service workers may be required to lift. Discuss and demonstrate the correct way to lift heavy objects.

3. Insist that the students use good lifting techniques as they perform the various tasks as a part of the course work.

4. Encourage the students to utilize labor saving devices and techniques.

Suggested time needed to develop the competency

In the classroom	1 hour
In the laboratory	2 hours
Total time	3 hours

Suggested References

1. Sunset Publication, Basic Gardening Illustrated.

2. Publications available from the State Industrial Commission.

VII. To develop the ability to mix and use concrete

Teacher Preparation

Subject Matter Content

In this module the students should develop

1. An understanding of the adaptability of concrete

2. An understanding of the properties of cement and concrete, the importance of good materials, and proper mixing for obtaining a satisfactory product

3. The ability to select suitable materials for making quality concrete

4. The ability and skill in constructing forms and adequately bracing concrete structures. (It is suggested that this ability be developed in the carpentry course suggested as supporting education required for the course)

5. The ability to make reinforced concrete

6. The ability to proportion and mix quality concrete

7. The ability to place concrete

8. The ability to finish and cure concrete for maximum appearance and endurance

The Portland Cement Association, 33 West Grand Avenue, Chicago, Illinois, 60610, has developed a 264 page publication entitled, "Concrete Technology Instructor's Guide," which includes subject matter, teaching-learning activities, reference materials, and audio-visual aids.

It is suggested that this publication be used by the teacher to help develop the competence necessary in the area of concrete work. Below is an example of how to adapt the material to the module format.

Subject Matter Content

Adaptability of Concrete

Slides showing

Concrete fence posts
Concrete highway
Concrete buildings
Concrete sidewalks
Concrete bridges
Concrete picnic benches
Concrete furniture (lawn and patio)

What are some similarities you have observed from these pictures? Why was concrete used?

Advantages of Using Concrete

1. Inexpensive
2. Can be molded before hardening takes place
3. Durable
4. Attractive
5. Sanitary
6. Weather resistant
7. Fireproof
8. Readily available
9. May be mixed in assorted colors
10. Low maintenance cost

The Properties of Concrete

The structures and objects made from concrete don't "just happen!" Perhaps other materi[illegible] depends so much for its success upon the user.

Making concrete is just like baking a cake. Certain basic ingredients must be available and combined in specified amounts using approved procedures to obtain quality.

Concrete is made up of 3 basic ingredients

1. Cement
2. Aggregate
3. Water

Quality concrete depends upon

1. Quality of materials
2. Proportioning of the materials
3. Workmanship

The economy of use depends upon the manner in which the materials are combined to secure a dense, compact mass with a minimum binder.

Cement

What is cement?

Refer to Concrete Technology Instructor's Guide, p. 31, 1a and b; p. 33, 1f (1)-(4); p. 34, 2a (1), (7), (9), and (10).

Aggregate

Aggregates for Concrete, p. 57, 1a-1c.

Characteristics of Aggregates, p. 57, 2a-2e.

Good Aggregates Essential, p. 58, 3a and 3b.

Necessity of Clean Aggregates, p. 58, 4a-4d.

Aggregate Size, Gradation and Handling, p. 59, 60, 61, and 62 inc.

Water

Water

The water mixed in concrete has direct influences on the quality of concrete manufactured. Ref. p. 45 Concrete Tech. Instructor's Guide. "Introduction" Subject Matter Content: pp. 45 and 46, topics 1 and 2.

Suggested Teaching-Learning Activities

1. Develop student's interest by showing slides of various uses of concrete. Question the students about the slides. Discuss various uses of concrete.

2. Ask the class, "What are the advantages of using concrete?" Develop a list of advantages on chalk board (See concrete advantages in the content).

3. Identify and discuss basic ingredients of concrete. Show samples of each ingredient (cement, aggregates, and water).

   a. What is cement? Discuss student ideas concerning concrete. Show the movie "From Mountains to Microns" (24½ min.). Summary statement - Concrete is nothing more than gravel and sand glued together with cement.

4. Question the class: What does the term aggregate mean? Have several samples including sand, bank run, crushed rock, large stone and cinders on display. Ask: Are all of these aggregates? Will they all make quality concrete? Why or why not? Now discuss desirable characteristics, essentials, and necessities for clean aggregates.

5. Have several samples of aggregates available for students to run colormetric and silt tests to determine quality (refer to Concrete Technology Instructor's Guide, p. 67).

Laboratory Work Sheet #1

Sample No.	Organic Content	Silt Content	% Fine and Course	Comments

Mark each sample according to this rating scale.

a. Good - Use for top quality concrete

b. Average - Some undesirability but still acceptable

c. Poor - Not suitable for use

6. Pour and finish some patio blocks.

7. Place or replace sections of walkways around the school grounds.

8. Pour and finish bumper blocks for school parking lot.

Suggested Instructional Materials and Reference

Instructional Materials

1. 8 pint jars with lids
2. Samples of aggregates and cement
3. Clean water
4. Distilled water
5. Sodium hydroxide (household lye)
6. Empty sacks or paper toweling

Reference

Portland Cement Association. Concrete Technology Instructor's Guide.

VII. To develop the ability to use paint and paint applicator equipment

Teacher Preparation

Subject Matter Content

As a part of their duties, maintenance personnel are called upon to paint various structures on the grounds. These structures might include buildings, lawn furniture, fences, signs, and equipment. The student should be prepared to handle these painting tasks by receiving instruction in the following areas:

1. The reasons for painting
2. The need for doing high quality work
3. The tools and materials available for doing different painting jobs
4. Properly mixing paints
5. Techniques of painting using various types of painting equipment
6. Procedures to be used in avoiding painting defects
7. The care and maintenance of painting equipment

The Reasons for Painting

1. To protect wood, metal, concrete, and other surfaces from being damaged by natural elements. Paint seals pores of wood, keeps out moisture, and prevents rotting. Paint also prevents corrosion of metal surfaces, and helps to preserve or beautify the surfaces of wood and masonry construction such as brick, cement, and concrete structures.

2. Paint is used for improving the appearance of structures

3. Paint is used to help keep structures clean, since the smooth, washable surface provided by a good layer of paint tends to prevent the accumulation of dirt.

4. Painting helps to protect investments in buildings and equipment by preventing deterioration of the structures and implements.

Tools and Materials Used in Painting

1. Brushes - There are many types and qualities of brushes. The brushes of primary concern to the horticultural service worker are

   a. Flat wall brush

   b. Whitewash brush

   c. Roof painting brush

   d. Dutch calcimine brush

2. Ladders

   a. Step ladders

   b. Long ladders

   c. Extension ladders
   (Instruction in the safe use of ladders should be given.)

3. Putty and scraping knives

4. Spray guns - The spray gun mixes air and paint together mechanically, thus creating a spray of paint which is discharged by compressed air.

5. Air compressors

6. Paint

The Nature of Paint

Paint is an oil or binding liquid mixed with a powder, either dry or in paste form, known as pigment.

Composition of paint

1. Pigment material (solid, finely divided part of the paint which colors or absorbs surface)

   a. Opaque white pigment

   b. Opaque colored pigment

   c. Transparent pigment

2. Vehicle (used to suspend the pigment)

   a. Linseed oil

   b. Linseed oil modified by other vegetable oils such as soybean oil, penilla oil, tung oil, specially treated fish oil

3. Thinners and driers

   a. Turpentine (used to secure penetration of the paint into the pores of the wood) causes the paint to spread evenly and smoothly and speeds up drying). Turpentine may be gum, wood, or distilled product.

   b. Other liquids or oil are often used. Some are synthetic compounds.

Differences between high and low quality paints

Good quality paints contain a high percentage of film-forming pigments and oils and a low percentage of volatile liquid by volume. Poor quality paints, on the other hand, contain a low percentage of film-forming pigments and oils and a high volume of volatile liquid. High quality paints are also durable, self-cleaning, colorfast, and easy to apply, and in most cases, washable.

Types of Paints

Water thinned

a. Cement and concrete paints

b. Rubber and latex base

c. Acrylic

d. Polyacetate

e. Oil emulsion

Oil base

a. Flat

b. Semi-gloss

c. Enamels (may be either wood or implement types)

Primers

a. Fish oil base (rust inhibiting for use on sound, rusted surfaces)

b. Zinc chromate (for use on unrusted metal)

c. Galvanized metal

d. Wood primers

Polyurethanes

a. Varnish

b. Enamels

Using the right paint for the job to be accomplished

1. House paint can be used for painting the following surfaces, if the appropriate primer is used prior to applying the finishing coat.

a. Cement and cinder block

b. Brick

c. Stucco

d. Asbestos cement

e. Metal siding

f. Wood frame windows

g. Aluminum windows

h. Shutters and other trim

i. Galvanized surfaces

j. Iron surfaces

2. Cement base paint is also used on

a. Stucco

b. Cement and cinder block

c. Brick

3. Rubber base paint is used on

a. Cement floors

b. Stucco

c. Cement and cinder block

d. Brick

4. Wood stain is used on

a. Wood shingle roofs

b. Natural wood siding and trim

5. Aluminum paint is used on

a. Iron surfaces (should be primed first)

b. Galvanized surfaces (should be primed first)

c. Aluminum windows

d. Steel windows (prime first)

e. Wood frame windows

f. Metal siding (prime first)

g. Stucco

h. Cement and cinder block

i. Brick

6. Transparent sealers are used on

a. Stucco

b. Cement and cinder block

c. Brick

7. Exterior clear finish is used on

a. Natural wood siding and trim

8. Roof coating is used on

a. Coal tar felt roof

9. Metal primer is used on

a. Iron surfaces

b. Galvanized surfaces

c. Metal roof

d. Aluminum windows

e. Steel windows

f. Metal siding

10. Porch and deck paint are used on

a. Cement floor

b. Wood floor

11. Primer or undercoater is used on

    a. Shutters and other trim

    b. Wood frame windows

    c. Stucco

    d. Asbestos cement

    e. Cement and cinder block

    f. Brick

Preparing the Surface for Painting

Wood surfaces

1. The surface to be painted should be absolutely dry. The ideal times of the year for painting exteriors are summer, fall, and early winter. Paint should never be applied to any exterior surface when the thermometer registers 40° F. or below. At these temperatures, moisture is likely to condense on the surface; the paint will not stick and may eventually scale and peel off. Don't start painting a surface until the dew has dried from the surface. Paint during fair weather.

2. Prior to applying paint, dust off the surface with a brush or clean cloth.

3. Remove all blisters and loose paint before applying a new coat. A wire brush, and a putty or scraping knife are quite useful for this job.

4. Fill nail holes, cracks, and other openings with putty or caulking after the primer (or first coat of paint) is dry.

5. Weatherbeaten surfaces should be cleaned with a wire brush.

6. Remove stains such as rust with coarse sandpaper prior to painting.

Metal surfaces

1. Remove all rust with wire brushes and steel wool. For paint or enamel to stick to clean, unrusted metal, it is necessary to paint it first with a zinc chromate primer.

2. Smooth slightly roughened surfaces with sandpaper.

3. Remove all grease and dirt prior to painting.

4. Allow galvanized metal to weather approximately six months before painting or else apply a galvanized primer.

Masonry surfaces

1. Remove dirt, dust, and loose particles with a wire brush.

2. Clean out and fill any cracks. Use a thick cement paste for filling the small cracks and glazing or caulking compound for filling the larger cracks.

Mixing Paint

To prepare paint for application, follow the manufacturer's directions found on the label of the container.

Applying Paint by Brush

1. Be careful about getting too much paint on the brush when dipping it into the paint container. Never dip the brush into the paint less than a half inch from the metal ferrule. Any excess paint can be freed by bringing the bristles of the brush lightly across the rim of the can. Too much paint in a brush will result in considerable dripping.

2. Paint must not be merely laid on the surface but thoroughly brushed into it. Apply paint from the end, not the sides of the brush. Wrist action is important to develop a smooth back-and-forth stroke that works the paint into the surface.

3. Hold the paint container in one hand or support it in a location very near the work. Dip the brush into the paint and take the loaded brush to the surface to be painted, spreading it only enough to empty the brush. Spread the paint with long strokes and take care to brush out the lap marks.

4. Stir the paint occasionally to keep the oil and pigment uniformly mixed. This will provide a uniform concentration of pigment and will result in uniform thickness and better wearing properties.

5. Be sure that the lid of the can is secure before storing the can.

Applying Paint With Spray Equipment

Excellent material is available on spray painting. For subject matter content see the following publications:

1. The ABC's of Spray Equipment and Spray Gun Motion Study, distributed by the De Vilbiss Company, Toledo, Ohio.

2. Selection and Use of Spray Painting Equipment, Iowa State University Cooperative Extension Service, circular 266, Ames, Iowa.

3. Spray Painting Visuals, Vocational Agriculture Service, 434 Mumford Hall, Urbana, Illinois.

The above materials provide instruction in

1. The nomenclature and functions of the spray gun
2. Spray gun troubles and remedies of functioning parts
3. Material containers and pumps
4. Hose and hose connections
5. Transformers, regulators, and condensers
6. Air compressors
7. Preparing paint for spraying
8. Spray technique
9. Care and maintenance of spray painting equipment

The "Do's" and "Don'ts" of Brush Care

DO -

1. Before storing the brushes, thoroughly wash with paint thinner those used for oil paint, varnish or enamel. Then wash out the bristles with soap and warm water. Wash until all the color is gone. Comb the bristles straight and shake out the excess water. After the brush is dry, wrap it in paper to keep the bristles clean and in good condition.

2. Suspend brushes in the proper thinner with the bristle a short distance from the bottom of the container. Do this by drilling a 1/8" hole through the upper handle, passing a heavy wire through the hole, resting the ends of the wire on the edges of the container. Several brushes can be suspended from the same wire.

3. Buy good quality brushes and take care of them. Brushes are useful until the bristles are worn to about one half of their original length.

DON'T -

1. Allow brushes to rest on the ends of the bristles for any length of time. This procedure will warp or kink the bristles so that they will deliver an uneven flow of paint.

2. Suspend or soak brushes in water. This practice will result in soft, flabby bristles and will swell the handle or divider of the brush, causing it to spread out like a mop.

3. Attempt to clean old brushes with strong soap powders, lye, or strong cleaners.

4. Put a brush on a hot radiator to dry. This practice results in inflexible brushes.

Painting Failures

Defect	Cause	Appearance	Remedy or Prevention
Alligatoring	This failure results from applying a relatively fast drying coat (hard coat) over another coat that is too soft (soft primer). The condition will also occur if the finish coat has been applied before the primer has had sufficient time to dry thoroughly.	The breaks in the paint are rather large and have the the appearance of an alligator hide.	To avoid this failure mix the paint properly so that each preceding coat is harder than the one following. Also be sure that each coat dries thoroughly before applying another coat.
Bleeding over knots	This failure is caused by a substance in the knot which rises to the surface when dissolved by the linseed oil in the paint.	A dirty stained appearance around knots appear.	Coat the knot with resin free shellac or marine varnish after priming it with white lead.
Blistering and peeling	Blistering results from moisture in the wood. Heat from the sun draws this moisture to the underside of the paint film. The resulting pressure raises the paint from the surface in blisters. Peeling usually follows.	Bubbles or blisters develop on the painted surface.	Good paint will not blister and peel if the wood is thoroughly dry before the paint is applied, and if the back side remains dry after application of the paint.

Defect	Cause	Appearance	Remedy
Blotching and fading	This condition occurs as a result of the natural shrinking and hardening of the paint film to such an extent that it can no longer expand or contract.	Blotching and fading show up where the wood has absorbed all the oil from the paint.	Use at least three coats of properly formulated paints of the appropriate color.
Chalking	Chalking is when most of the original gloss of the paint job has disappeared. The combined effects of light, heat, and moisture tend, over a period of time, to destroy the surface oils in the paint and loose particles that are called chalking appear.	Pigment particles slough off when lightly rubbed by the fingers.	Use high quality paints.
Checking, cracking, flaking and scaling	These failures are a result of the natural shrinking and hardening of the paint film to such an extent that the film can no longer expand or contract with changes in atmospheric condition.	Checks are short, narrow breaks that appear on the surface. If the breaks are long and deep, they are called cracks.	Avoid the application of heavy coats of paint. Use high grade, reliable brands of paint.
Running, streaking, and sagging	These conditions result when the paint contains too much oil or is applied too thickly.	Heavy, thick, scum-like deposits of paint are found in various areas of the painted surface.	Use correctly formulated paint and approved practices for applying paint.

Defect	Cause	Appearance	Remedy
Washing	The condition occurs when the paint film either contains soluble in water or, as a result of chemical reactions, forms soluble compounds.	Washing is observed in the form of streaks near the lower edge of siding and in accumulations on footings and foundations of buildings.	Use correct paint formulation.
Wrinkling	This is caused by the application of too thick a coat of paint. The surface of the heavy coat dries quickly and leaves an undried portion underneath. As the under coat begins to dry it contracts and the top surface wrinkles.	The surface has a wavy wrinkled appearing surface.	Brush the paint out to a thin film and thin the paint with thinner as necessary.

Mixing and applying masonry paint

1. Mix according to manufacturer's directions.

2. Apply two coats of Portland cement paint, prime coat and finish coat.

3. Dampen the surface prior to applying each coat.

4. Avoid applying paint in the direct sun.

5. Paint mortar joints first to insure complete sealing.

6. To cure a cement base paint, keep the seal coat in moist condition for 24 hours.

7. Apply the second or finish coat after the seal coat has hardened sufficiently (at least 24 hours.) Maintain a uniform consistency by frequent stirring.

8. For a better appearance, plan to complete the finish coat in one operation.

9. Keep the finish coat moist for at least 48 hours.

Suggested Teaching-Learning Activities

1. To help develop a concept of protection, use the following approach:

   a. Band aids are placed on cuts to help protect against infection.

   b. Cities have police forces to protect the citizens from criminal acts.

   c. Musical instruments are carried in special cases to protect them from damage.

   d. Sandwiches are placed in waxed paper to protect them from drying out.

   e. Wood, masonry, and metal surfaces must be protected against the elements of the weather if they are to continue to be valuable.

   f. Point out that paints are useful as protectors.

2. Help develop a concept of beauty and appearance by using the following:

   a. Ladies wear lipstick and other cosmetics to enhance their beauty.

   b. Attractive covers are placed on magazines, books, and records

   c. Point out that paints are useful in improving the appearance of buildings and equipment.

3. Prepare a display of the various paints and equipment used in painting. Discuss the correct way to use each item.

4. Develop with the students a list of the types of paints and the surfaces on which each can be used.

5. Demonstrate the proper way to use a paint brush stressing:

   a. The procedure for dipping the brush into the paint and freeing the brush of excess paint.

   b. The procedure for brushing paint well into the surface using good wrist action.

   c. The procedure for getting paint into difficult locations.

   d. The procedure for avoiding lap marks, helping to give the surface an attractive finish.

6. Demonstrate the proper way to care for a brush in each of the following situations:

   a. over the lunch hour

   b. overnight

   c. over a prolonged period of disuse.

7. Provide instruction on the use and care of the spray gun by using the spray painting visuals on the overhead projector.

8. Take the class on a field trip which will provide experience in:

   a. preparing wood, metal and masonry surfaces for painting.

   b. using and cleaning paint brushes.

   c. using and cleaning spray painting equipment.

9. Each student should be assigned to prepare a specimen board of paint failure. In order to do this, the students should study the conditions under which the failure results, create these conditions, and proceed to paint the board to obtain the failure. The various student results should then be assembled and discussed stressing the procedures for avoiding each failure.

10. Have each student paint a project.

Suggested time to develop this competency.

Classroom instruction	6 hours
Laboratory experience	12 hours
Occupational experience	20 hours
Total	38 hours

Suggested Instructional Materials and References

Instructional materials

1. National Paint, Varnish and Lacquer Association Materials

2. Display of the various type of paint brushes

3. Spray gun, air compressor, and accessories

4. Samples of the various paint materials used for painting wood, metal, and masonry surfaces.

5. Electric drill

6. 1/8" drill bit

7. Several pieces of stiff wire for suspending paint brushes

8. Dust brush
9. Several clean cloths
10. Putty and scraping knives
11. Caulking gun and caulking
12. Sandpaper, both fine and coarse sheets
13. Opaque or overhead projector
14. Paint thinner

References

1. The ABC's of Spray Equipment
2. Selection and Use of Spray Painting Equipment
3. Spray Painting Visuals

Suggested Occupational Experience

Job placement with a professional painter for a two week period would be highly desirable.

IX. To develop the ability to erect fences in the landscape or park

Teacher Preparation

Subject Matter Content

Fences are used in the landscape to provide:

1. Privacy
2. Protection
3. Background
4. Control of traffic patterns

5. Guardrails

6. Restraint of animals

For subject matter content concerning the building of woven wire or wooden fences, see the Southern Association for Agricultural Engineering and Vocational Agriculture Publication, Building Farm Fences, 1962 Edition, or Republic Steel Wire Division publication, "How to Erect Farm Fence." These publications will provide the necessary instructions for building woven wire or board fences to enclose part acreage or areas of residential and commercial landscapes.

Information pertaining to guard rail construction is to be found in Conover's Grounds Maintenance Handbook pp. 387-388.

Wooden fences in the landscape may be of several types:

1. Slat
2. Picket
3. Rail
4. Lattice
5. Basketweave
6. Solid board
7. Rustic
8. Horizontal louver
9. Vertical louver

Other information pertaining to wooden fence construction may be found in Nelson's Landscaping Your Home.

Instruction in this competency should deal with the following areas:

1. Assembling tools and materials
2. Laying out fence line
3. Clearning fence line
4. Staking fence line
5. Setting line posts
6. Preparing and attaching boards
7. Setting anchor and brace
8. Installing brace wire
9. Stretching fence
10. Attaching fence to posts

Suggested Teaching-Learning Activities

The skills and abilities required to install a fence will be best developed those months when weather is favorable. During the spring and fall months, practice in fence building could be provided at the school site if land laboratory facilities and fencing materials are available. The students could receive instruction in the areas of:

1. laying out fence line
2. setting anchor and brace assemblies
3. installing wire brace
4. setting line posts
5. splicing wire
6. preparing and attaching boards

It is suggested that demonstration of the above procedures take place prior to student participation.

Suggested time to develop this competency:

In the classroom	2	hours
In the laboratory	30	hours
Total time	32	hours

Suggested Instructional Materials and References

References

1. How To Erect Farm Fence. Republic Steel Company Wire Division publication.
2. Building Farm Fences. Southern Association for Agricultural Engineering and Vocational Agriculture publication.

Instructional materials

1. Post hole digger
2. Post auger .

3. Tamping bar
4. Spade
5. Long handled shovels
6. Axe
7. Hand saw
8. Brace with bits
9. Steel dowels
10. Steel post driver
11. Wire splicer
12. Wire cutting pliers
13. Steel tape
14. Fence stretcher (double jack)
15. Wire clamps
16. Staples
17. Block and tackle
18. Gloves

Suggested Occupational Experience

Due to limitations at the school site, it may not be feasable to provide experience in some phases of fence building (clearing fence line, stretching fence, attaching fence to posts, etc.) Therefore, it is suggested that occupational experience be provided. It is likely that any opportunities for the students to obtain this kind of experience will have to be obtained from fencing speciality companies, or farmers, landscapers, highway departments, or park systems. The teacner will need to be alert to opportunities to provide students experience in fence building.

X. To develop the ability to use bricks, concrete block, and stone

Teacher Preparation

Subject Matter Content

Horticultural service workers will have numerous opportunities to work with bricks, concrete block, and stone. Bricks, block or stone are not always laid with mortar.

Situations where mortar would be used in laying the blocks	Situations where mortar might not be used in laying the blocks.
building walls	laying stepping stone
building outdoor fireplaces and barbecues	building certain types of patios
water fountain construction	building certain types of retainers
chimney construction	

Perhaps the students will be most concerned with using bricks, blocks, and stone in structures and locations where mortar is not required. However, if it is considered desirable for the students to develop such skills and abilities, the following companies should be contacted concerning the availability and use of the publications:

1. Louisville Cement Company, Department 22, Louisville, Kentucky. "Type of Workmanship Recommended to Secure Dry Brick Walls."

2. Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois "Recommended Practices for Laying Concrete Block."

Suggested Teaching-Learning Activities

1. Prepare a 15' x 20' practice patio construction area and arrange the bricks in various patterns such as herring-bone and basketweave using a sand bed. The bricks may be laid either flat or on edge.

2. Have the students participate in any school improvement projects that arise involving the use of blocks, bricks, and stone.

3. The students may practice laying blocks using imitation mortar made from sand and hydrated lime. This material won't set up but has the same consistency as mortar.

Suggested time to develop this competency

In the classroom	5	hours
In the laboratory	20	hours
Total time	25	hours

Suggestions for Evaluating Educational Outcomes of This Module

This module has been concerned with the various skills and abilities required in effectively maintaining landscape plantings and structures. As a result of the teachings of this module, the students should be able to perform the basic tasks listed below with a minimum of additional instruction by the employers.

1. Treat plant wounds
2. Support woody plants by guying, staking, cabling and bracing.
3. Mix and use concrete in small quantities.
4. Use paint and paint applicator equipment.
5. Lay concrete block, brick, and stone.
6. Erect fence.

In addition, the student should be able to:

1. Safely climb and work in trees.
2. Recognize and avoid poisonous plants in the landscape.
3. Use first aid procedures.
4. Safely life and move heavy objects and materials.

Whether or not the students can competently perform the above tasks will best be determined by using a check list such as the one below.

_____ High School
DEPARTMENT OF VOCATIONAL AGRICULTURE

Check List for Evaluating Student Ability to Perform the Various Grounds Maintenance Tasks

Treating Plant Wounds

1. Does the student use the necessary tools safely and skillfully?
2. Does the student recognize and correctly apply the various wound dressings?
3. Does the student correctly shape the wounds?
4. Does the student understand why wounds must be treated?

Supporting Woody Plants

1. Does the student use sledge hammers or other post driving equipment safely?
2. Is a collar used to protect the plant against girdling or injury when using wire supports?
3. Is equal tension placed on all guy wires or is the tree pulled out of position by unequal tension in the wires?
4. Is care to avoid injury exercised in handling the loose ends of wires and cables.
5. Is the plant tied too tightly to the stake?
6. Does the student know how to install and use turnbuckles?

Mixing and Using Concrete

1. Does the student measure carefully to insure a properly proportioned mix?
2. Are the concrete ingredients thoroughly mixed or is most of the sand or gravel undisturbed at the bottom of the mortar box?
3. Is too much water added to the mix at one time?

4. Does the student guess at the amount of ingredients to be used?

5. Does the student use clean aggregate in preparing the mix?

6. Does the student splash a great deal of material out of the mortar box during the mixing operation?

7. Can the student effectively assist in installing forms?

8. Does the student use a trowel correctly, leaving the desired surface finish?

9. Does the student recognize the various tools used by the concrete worker?

Painting

1. Does the student keep the paint well stirred to maintain uniformity?

2. Does the student waste the paint by overloading the brush or through carelessness.

3. Does the student leave lap marks on the surface being painted?

4. Does the student neglect to fill small holes and pores in the wood with paint?

5. Does the student skil areas which are hard to reach when painting?

6. Is the paint uniformly applied?

7. Does the student understand how spray gun and air compressor operates?

8. Can the student use a spray gun effectively? Does he:

   a. hold the gun perpendicular to the surface at all times?

   b. feather the ends of the strokes by triggering the gun?

   c. spray both surfaces at a corner at once?

9. Does the student take proper care of a paint brush? Does he:

   a. clean the brush with thinner?

   b. wash the brush with soap and water?

c. thoroughly dry the brush?

d. suspend the brush in thinner by a wire?

10. Is the spray gun thoroughly cleaned?

11. Does the student properly prepare the surface prior to painting?

12. Can the student recognize paint failures, understand the causes for the failure? Does he take appropriate action to prevent paint failures from occurring?

Laying concrete block, brick, and stone

1. Does the student know how to use a level?

2. Are the corners plumb?

3. Does the student break joints?

4. Is the mortar for the bed joint spread at the correct thickness?

5. Is the furrow in the mortar made too deep?

6. Are the blocks or bricks laid straight and level?

7. Is the mortar of proper consistency?

8. Does he do good quality work?

Erecting Fence

1. Does the student know of the various fences that can be used?

2. Can the student line up posts?

3. Can the student use the fence stretcher?

4. Can the student install and brace a corner post?

5. Can the student splice fencing material?

6. Can the student properly set fence posts?

7. Can the student prepare and attach boards to board fences?

Additional Check List Items

1. Can the student identify poison ivy, poison oak, and poison sumac?
2. Can the student:
   a. Administer artificial respiration
   b. Apply a tourniquet
   c. Splint a limb
   d. Treat a burn
   e. Treat for shock
3. Does the student climb and work safely in trees?
4. Does the student lift weight correctly?
5. Does the student use simple machines to assist in doing heavy moving or does he rely chiefly on physical strength alone?

Sources of Suggested Instructional Materials and References

1. Christopher, E. P. The Pruning Manual. New York: The MacMillan Company, 1961. $6.95.
2. Conover, H. S. Grounds Maintenance Handbook. Second Edition, New York: McGraw-Hill Book Company, Inc, 1958. $15.
3. Nelson, William R. Landscaping Your Home. University of Illinois, College of Agriculture, Cooperative Extension Service Circular 858, University of Illinois, Urbana, Illinois.
4. Pirone, P. P Tree Maintenance. Third edition. New York: Oxford University Press, 1959. $11.
5. American Red Cross. First Aid Textbook. Fourth Edition. Available from any Red Cross Chapter.
6. Concrete Technology Instructor's Guide. Portland Cement Association Publication.
7. How to Erect Farm Fence. Republic Steel, Wire Division publication. 332 South Michigan Avenue, Chicago 4, Illinois.

8. "Selection and Use of Spray Painting Equipment." Iowa State University Cooperative Extension Service Pamphlet 266.

9. Southern Association for Agricultural Engineering and Vocational Agriculture Publication, Building Farm Fences. 1962.

10. "Spray Painting Visuals." (A series of illustrations for use with an opaque projector, for making transparencies for overhead projection, or for direct viewing.) Vocational Agriculture Service, University of Illinois, 434 Mumford Hall, Urbana, Illinois.

11. Sunset Series. Basic Gardening Illustrated. Menlo Park: Lane Book Company, 1963. $1.95.

12. The De Vilbiss Company Publication, The ABC's of Spray Equipment. Third edition, 1954.

13. Several publications dealing with paints and painting are available from the National Paint, Varnish, and Lacquer Association, 1500 Rhode Island Avenue, N. W., Washington, D. C. 2005.

THE CENTER FOR RESEARCH AND LEADERSHIP DEVELOPMENT
IN VOCATIONAL AND TECHNICAL EDUCATION
THE OHIO STATE UNIVERSITY
980 KINNEAR ROAD
COLUMBUS, OHIO, 43212

INSTRUCTOR NOTE: As soon as you have completed teaching each module, please record your reaction on this form and return to the above address.

1. Instructor's Name_____

2. Name of school_____State_____

3. Course outline used: _____Agriculture Supply--Sales and Service Occupations
_____Ornamental Horticulture--Service Occupations
_____Agricultural Machinery--Service Occupations

4. Name of module evaluated in this report_____

5. To what group (age and/or class description) was this material presented?____
_____

6. How many students:
a) Were enrolled in class (total) _____
b) Participated in studying this module _____
c) Participated in a related occupational work experience program while you taught this module _____

7. Actual time spent teaching module:

		Recommended time if you were to teach the module again:
_____hours	Classroom Instruction	_____hours
_____hours	Laboratory Experience	_____hours
_____hours	Occupational Experience (Average time for each student participating)	_____hours
_____hours	Total time	_____hours

(RESPOND TO THE FOLLOWING STATEMENTS WITH A CHECK (✓) ALONG THE LINE TO INDICATE YOUR BEST ESTIMATE.)

	VERY APPROPRIATE	NOT APPROPRIATE
8. The suggested time allotments given with this module were:	
9 The suggestions for introducing this module were:	
10. The suggested competencies to be developed were:	
11. For your particular class situation, the level of subject matter content was:	
12. The Suggested Teaching-Learning Activities were:	
13. The Suggested Instructional Materials and References were:	
14. The Suggested Occupational Experiences were:	

(OVER)

15. Was the subject matter content sufficiently detailed to enable you to develop the desired degree of competency in the student? Yes_____No_____
Comments:

16. Was the subject matter content directly related to the type of occupational experience the student received? Yes_____No_____
Comments:

17. List any subject matter items which should be added or deleted:

18. List any additional instructional materials and references which you used or think appropriate:

19. List any additional Teaching-Learning Activities which you feel were particularly successful:

20. List any additional Occupational Work Experiences you used or feel appropriate:

21. What do you see as the major strength of this module?

22. What do you see as the major weakness of this module?

23. Other comments concerning this module:

_____ _____
(Date) (Instructor's Signature)

_____
(School Address)