16-4116-A

QUEBEC GOUVERNEMENT

DEPARTMENT OF EDUCATION

Directorate of Elementary
and Secondary Education

COURSE OF STUDY FOR SECONDARY SCHOOLS

TECHNICAL AND VOCATIONAL EDUCATION

ORNAMENTAL HORTICULTURE

4T 51

ORNAMENTAL HORTICULTURE

Objective

The objective of ornamental horticulture is to study the cultivation and utilization of ornamental plants.

Purpose

The purpose of this course is to offer 4th and 5th year students a specialized training in ornamental horticulture.

Employment possibilities

Now in rapid progress throughout the Province of Quebec, urbanization makes provision for vast open areas which must be properly landscaped for efficient use. Private home-owners and administrators of commercial centres often call upon landscape specialists to improve the appearance of their property. Other possible employers of landscape specialists: cities and towns for work in public parks and gardens, (including botanical and zoological gardens), highway departments and other government agencies (e.g. parks and tourist facilities such as camping grounds), churches, school boards, golf courses, turf farms, landscape companies, greenhouses, experimental farms, etc.

Timetabling of [illegible] in the Ornamental Horticulture

Course in Fourth and Fi[illegible] School.

	[illegible]	4th year	5th year
	[illegible]	525	875
Soil science	40	[illegible]	
Fertilizers and Amendments	[illegible]	[illegible]	
Irrigation and Drainage	20	20	
Botany and Ecology	[illegible]	[illegible]	
Plant propagation	15	15	
Floral Arrangement	[illegible]		30
Outdoor plants	260		
General		60	
Trees			40
Shrubs and roses			40
Annual and biennial flowers			35
Perennial flowers			35
Rock gardens			10
Flower boxes			10
Lawns			[illegible]
Indoor plant-growing	150	60	90
Introduction to [illegible]	[illegible]		[illegible]
Crop protection	150		
General		20	
Entomology		15	45
Plant Pathology		15	40
Weed control		[illegible]	[illegible]
Initiation to business management	90		90
Carpentry and mechanics	180	[illegible]	90
Small animals	10	10	
Field trips and visits	[illegible]	[illegible]	[illegible]

I - [illegible]

1. [illegible]
2. [illegible]
3. [illegible]

II - [illegible]

1. [illegible]
   (i) [illegible]
   (ii) [illegible]
2. [illegible]
3. Air [illegible]

III - [illegible]

1. [illegible]
2. [illegible]

IV - [illegible]

FERTILIZERS AND AMENDMENTS

I - Introduction
  1. Historical
  2. Definition

II - Chemical Equilibrium in soil
  1. Plant requirements
  2. Nutrients: Types and Selection
  3. Deficiency symptoms
  4. Law of the Minimum (Liebig)
  5. Mitscherlich's Equation

III - Manure
  1. Composition and value
  2. Nutrient losses and means of conservation
  3. Characteristics of various kinds of manure
  4. Utilization of manure
  5. Special advantages of manuring

IV - Lime and other organic amendments
  1. Green manure
  2. Straw
  3. Compost
  4. Peat
  5. Lime
  6. Mold
  7. Others: Sawdust, bone dust, etc.

V - Other soil-conditioning agents
  1. Sand
  2. Clay
  3. Perlite
  4. Terralite
  5. Krillium
  6. Oil

VI - Nitrogen fertilizers

VII - Phosphate fertilizers

VIII - Potash fertilizers

IX - Mixed fertilizers

1. Dry
2. Liquid

X - Addition of insecticides and/or herbicides

XI - Trace elements

XII - Liming

1. pH and acidity
2. What makes soils acid
3. Acidity tests
4. Types of lime and their value
5. Role of lime
6. Need to lime
7. Quantity recommended
8. Plant species and their liming needs
9. Government subsidies
10. Economic value

XIII - Moulds

1. On-the-spot preparation
2. Compost
3. Artificial soil

REFERENCES

1. Soil Survey Reports of the various counties of the Province of Quebec. Quebec Dept. of Agriculture

2. Miller and Turk. Fundamentals of Soil Science. John Wiley & Sons.

3. Scott. Les Sols. Librairie Beauchemin.

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5. Raymond. Notions élémentaires de pédologie. Bull. 294. Quebec Dept. of Agr.

6. Tisdale and Nelson. Soil Fertility and Fertilizers. MacMillan.

7. Berger. Introduction Soils. MacMillan.

8. McVickar. Using Commercial Fertilizers. Interstate.

9. Buckman and Brady. The Nature and Properties of Soils. MacMillan.

10. Boynton. Chemistry and technology of lime and limestone. Interscience.

11. Manures and Compost. Bull. 868 Can. Dept. of Agr.

12. Lime and other Soil Amendments. Bull. 869 Can. Dept. of Agr.

13. Soil Erosion by Water. Bull. 1083 Can. Dept. of Agr.

14. Soil Erosion by Wind. Bull. 1266 Can. Dept. of Agr.

15. The Engineering Aspects of Land Levelling. Bull. 1145 Can. Dept. of Agr.

DRAINAGE AND IRRIGATION

I - Introduction

1. Soil water: General
2. Drainage needs of Quebec soils
3. Results of drainage
4. Advantages and disadvantages of drainage
5. Various types of drainage

II - Open drains

1. Reasons for making them
2. Chief components of an open-drain system: streams, ditches, furrows, ridges

III - Tile drains

1. Reasons for installing them
2. Signs of poor drainage
3. Factors to consider in planning a drainage project
4. Partial drainage
5. Draining foothills
6. Lay-out and conditions governing efficiency of system
7. Location of drains and choice of slope
8. How to dig trenches and lay tile drains
9. Care of tile drains
10. General information
11. Government subsidies to encourage farm drainage

IV - Irrigation

1. Crop irrigation
2. Inventory of resources needed for irrigation
3. Modern methods of irrigation
4. How to install a sprinkler irrigation system
5. Cost of sprinkler irrigation
6. Special uses of sprinkler equipment
7. Study of a sprinkler system of irrigation in operation

REFERENCES

1. Irrigation water: Its use and application. Bull. 1199 Can. Dept. of Agr.

2. Principles of drainage. Handbook 15, Soil Conservation Service, U.S.D.A.

3. Measurement of irrigation water. Handbook 16, Soil Conservation Service, U.S.D.A.

4. Drainage of Agricultural land. Misc. Pub. 713, U.S.D.A.

5. Ayres and Scoates. Land drainage and reclamation. McGraw-Hill

6. Sprinkler Irrigation. Bull. 476, U.S.D.A.

7. Farm drainage. Bull. 501. Ont. Dept. of Agr.

8. Farm drainage. Bull. 875, Cornell Univ.

9. Les cours d'eau municipaux: législation et amélioration. Bull. 134, Quebec Dept. of Agr.

10. Forevert et al. Soil and Water Conservation Engineering. John Wiley & Sons.

BOTANY

Chapter I Introduction

I - Living organisms: General

1. Similarities between animals and plants
2. Special characteristics of plants
3. Chemical composition of living organisms
4. Origin of cultivated plants
5. Agricultural botany

II - Plant composition

1. Basic description of the cell
2. Cell development and multiplication
3. Plant tissue

Chapter 2 MORPHOLOGY AND PHYSIOLOGY

I - Germination

1. Internal and external factors of seed germination
2. The various steps of germination
3. Development of an adult plant

II - Root growth and development

1. External characteristics of roots
2. Various types of roots
3. Root structure
4. Root growth
5. Essential functions of roots

III - Stem

1. External characteristics of the stem
2. Various types of stems
3. Structure of one-year-old stems
4. Stem growth

III - Stem

5. Size and strength of stem
6. Adaptation of stem to various functions
7. Phototropism
8. Maturation

IV - Leaves

1. General description of a leaf
2. Various types of leaves
3. Internal structure of the leaf
4. How leaves grow and fall
5. Evaporation
6. Photosynthesis
7. Respiration
8. Secondary functions of the leaf

V - Flowers

1. General description of a flower
2. Sheath
3. Stamen
4. Pistil
5. Flowering
6. Various types of flowers

VI - Pollination and breeding

1. Pollination
2. Processes preceding breeding
3. Breeding
4. Cross-breeding

VII - Fruit and seed

1. Definition
2. External and internal structure
3. Classification
4. Description and examples

Chapter 3 CLASSIFICATION

I - General classification of plants

II - Study of several individual families

Chapter 4 ECOLOGY

I - Plants and their environment

II - Applications of climatology
1. Wind and frost protection
2. Pollution
3. Irradiation

III - Influence of temperature on growth
1. Heat
2. Cold
3. Hardiness

IV - Influence of light on growth

V - Effects of CO_2 and other gases

VI - Relation between water and plants

VII - Relation between soil and plants

VIII - Growth regulators.

REFERENCES

1. Weeds of Canada. Bull. 948. Can. Dept of Agr.

2. Weeds. Pub. 505. Ont. Dept. of Agr.

3. Meyer and Anderson. Plant physiology. Van Nostrand.

4. Bonner and Galston. Principles of Plant Physiology. Freeman.

5. Louis-Marie. Flore-Manuel de la Province de Québec. Centre de Pédagogie et de Psychologie.

6. Serb and Owen. General Genetics. Freeman.

7. Greulach and Adams. Plants: an introduction to modern botany. Wiley

8. Benson. Plant taxonomy. Ronald.

9. Lemon and Russell. The Plant Kingdom: a laboratory manual. Mosby.

10. Clarke. Elements of Ecology. Wiley.

PLANT PROPAGATION

I - Introduction

1. Advantages and disadvantages
2. Other general considerations

II - Means of propagation

1.

1. Sexual
   (a) Collecting and cleaning seeds
   (b) Dormancy and germination
   (c) Seed treatment
   (d) How to succeed
   (e) Environment
   (f) Disinfection

2. Asexual
   (a) Reasons
   (b) Sources
   (c) Means
      -Cuttings
         (1) Organs: Roots, stems and leaves
         (2) Rooting conditions
         (3) Cutting preparation
         (4) Rooting media

      -Layering
         (1) Types: Runners, suckers
         (2) Care
      -Division
         (1) Time
         (2) How to succeed
      -Grafting
         (1) How to succeed
         (2) Selection and storage of shoots and buds
         (3) Various types of grafts
         (4) Stock
         (5) Uses
         (6) Incompatibility
      -Bulbs, tubers, rhizomes, stolons.

III - Characteristics of certain plants

IV - Plant care

1. Humidity
2. Watering
3. Shade
4. Transplantation
5. Heat
6. Storage

V - Characteristic structures of propagation

REFERENCES

1. Garner. The Grafter's Handbook. Faber.

2. Van Den Heede and Lecourt. L'art de bouturer. Maison Rustique.

3. Effects of Ionizing Radiations on Seeds. Int. Atomic Energy Agency. Vienna.

4. Wells. Plant Propagation Practices. MacMillan.

5. Mahlstede and Haber. Plant Propagation. Wiley

FLORAL ARRANGEMENT

1. Design and color in floral arrangement.

2. Preservation of plants and flowers (water, heat, soil, etc.) Use of such material as styrofoam, perlite, cedar.

3. Wiring and taping flowers.

4. Flower waxing and dyeing.

5. Uses of ribbon in floral arrangement

6. Bouquets and wreaths for funeral homes

7. Flower baskets for churches, corsages, boutonnières

8. Wedding bouquets, sprays

9. Center pieces, hospital arrangements

P.S. This is essentially a practical course which will teach the student the various basic operations of floral arrangement.

TREES

I - Leafy

1. General
   (a) Use of trees in landscaping:
   wind-brakes, shade and ornamentation
   (b) Botanical description: ornamental, fruit-bearing, flowering
   (c) Ecology
      (a) Trees for shady and sunny sites
      (b) Trees for wet, dry, rocky, sandy and heavy soils
      (c) Trees for cities, country, boulevards, etc.
      (d) Indigenous trees
      (e) Laws concerning trees.

2. Soil analyses and preparation
   (a) Knowledge of subsoil and topsoil on which trees will grow
   (b) Recommended soil
   (c) Special conditions: screens and trenches for aeration.

3. Planting

   Spring and fall planting: advantages and disadvantages, special care before planting, planting large trees.

4. Pruning

   Time, pruning before and after planting. Annual pruning. Special pruning (large branches, change of shape etc.)

5. Fertilization

   At and after the time of planting. Nutrient solutions. Time and frequency. Equipment.

6. Tree care

   Weeding, protection against insects and diseases, winter protection, tree surgery.

7. Propagation

   (a) Sexual : seed
   (b) Asexual: Cutting, layering, grafting

8. Where to buy trees

(a) Nurseries
(b) Farm woodlots
(c) Forest

II - Coniferous

1. General

(a) Botanical description

(b) How to use coniferous trees in landscaping:
Foundation
Clumps or isolated
Background
Hedges
Coniferous trees for sunny and shady sites, for dry and wet soils etc.
Erosion control
Indigenous plants

2. Soil preparation

Importance, subsoil, PH, drainage, etc.

3. Planting

Spring and fall planting
Distance between plants
Care at and after time of planting

4. Pruning

For shape and maintenance
Time

5. Fertilization

Organic and mineral fertilizers
Time
Liquid fertilizers

6. Tree Care

Insects, diseases, winter damage

7. Propagation

Sexual: Seed
Asexual: summer and winter cuttings, layering, grafting.

SHRUBS

I - General

(a) Botanical description

(b) Uses of shrubs in landscaping

Foundation, focal point, background, boundary lines, screening and beautifying

(c) Choice

Ornamental, flowering and fruit-bearing shrubs. Shrubs for sunny and shady sites and for hedges.

II - Soil preparation

Recommended soil types, subsoil, mixtures, leaf-mould, compost, analysis, PH and liming.

III - Planting

Spring and fall
Distance and depth
Care before planting
Fertilization

IV - Trimming

For shape: before planting
For maintenance: after planting
Radical trimming

For spring-flowering and fall-flowering species. Stylized forms.

V - Fertilization

Organic and mineral fertilizers, nutritive solutions, time and frequency

VI - Care

Cultivating, weeding, insects, diseases, winter damage, spraying, rodents.

VII - Propagation

(a) Sexual: seed
(b) Asexual: Division, layering, cutting (soft and hard wood), use of hormones for better rooting.

ROSES

I - General

Origin of the rose bush and importance in landscaping

II - Types of roses

Shrub, bush, climbing, miniature.
Description, uses and location.

III - Buying roses

Nurseries
Stores of various types - advantages and disadvantages:
late purchase.

IV - Soil

Sandy, heavy, chalky, nervious subsoil. PH lower than 6.5.

V - Planting

Care before planting
Spring and fall planting
Preparing ditch
Depth and distance according to the type of rose. Care after planting.

VI - Trimming

Hybrid tea, polyanthas, floribundas, climbing. Radical trimming.

VII - Fertilization

Organic, mineral fertilizers and mixtures. Water-soluble salts.
When and how often to fertilize.

VIII - Care

Watering, weeding, removal of faded blossoms, insect and disease control

IX - Propagation

Cutting, budding, grafting etc.

X - Winter protection

Stop weeding in September
Straw, leaf-mold, leaves, peat moss, snow fences, trenches, rodents.

ANNUAL AND BIENNIAL FLOWERS

I - General

(a) Use of annual flowers in landscaping
Flower-beds, clumps, borders, flower-boxes, hedges, rock-gardens, baskets, trellises.

Flowers for shady and sunny sites
Color combination.

(b) Life cycles
9 to 10 weeks
12 to 13 weeks
13 to 15 weeks
15 to 20 weeks

II - Soil

Light, sandy, compost, peat-moss, drainage

III - Seeding

(a) Hot beds or greenhouse:

Date, light, ventilation, watering, transplanting, nipping, flats, sale

(b) Garden: Soil preparation and date of seeding

IV - Planting

Date, distance and arrangement

V - Care

Cultivating, weeding, watering, clipping, insect and disease control.

VI - Fertilization

PERENNIAL FLOWERS

I - General

Botanical description
Use of perennial flowers in landscaping

Borders, flower-beds, hedges, clumps, rock-gardens
Perennial flowers for sunny and shady sites.

II - Soil

Requirements, drainage

III - Planting

Spring and fall
Depth, distance and arrangement

IV - Care

Weeding, insect and disease control, winter protection.

V - Propagation

(a) Sexual: Seed

(b) Asexual: Divi[illegible] cuttings, layering.

ROCK-GARDENS

I - General

Definition, location, construction, choice and arrangement of rocks and plants.

II - Preparation of ground

Solid and well-drained foundation

III - Soil

Mixture recommended

IV - Planting

Arrangement of plants in view of continuous blooming
Flowers for sunny and shady places

V - Care

Watering, cultivating, weeding, climbing, fertilization, winter protection, straw.

VI - Choice of species

VII - Propagation

(a) Sexual
(b) Asexual

LAWNS

1. General

   Definition. Importance in landscaping

2. Grasses

   Description and characteristics of the various species used for lawns
   Major species forming basis of all mixtures
   Mixtures for sunny and shady sites

3. Soil

   Sandy loam soil, free of stones, well-drained, PH neutral to slightly

4. Preparation of ground

   Levelling, slope 3" per 100 feet, filling, topsoil, rolling

5. Seeding

   Spring or fall, depth, amount of seed per 1,000 square feet

6. Care after seeding

   Rolling, watering and mowing

7. Seeding equipment

   Dry seed: (on flat ground or gentle slopes: Brillion, Cyclone, Gandy)
   Wet seed (on steep slopes: Finn and Bowie)

8. Using sods

   Time, soil preparation, laying sods, rolling and mowing.

9. Plugging

10. Lawn protection after seeding

    Straw, hay, cellulose filler, wood chips, asphalt, bentonite etc.

11. Fertilization

    For new and old lawns. Organic, mineral and liquid fertilizers.
    Frequency.

12. Care

    Watering: when, how and how often to water
    Mowing: height, last cutting in the fall

13. Pest control

    Rodents, insects, diseases, weeds.

FLOWER-BOXES

I - How to make them

Materials, sizes, drainage, various types of boxes.

II - Soil

Preparation of compost

III - Care

Watering, clipping, fertilization, weeding

IV - Choice of species

Shady and sunny sites

Climbing and drooping plants

Species for baskets

Various types of arrangements.

INDOOR PLANT-GROWING

I - Introduction

1. Specialized production
2. Consumers' needs
3. Marketing

II - Choice of species

III - Choice of location of site

IV - Buildings

1. Orientation
2. Types
   (a) Greenhouses
   (b) Greenhouses
   (c) Cellar
   (d) Hotbeds
   (e) Storage
3. Systems of heating, lighting, ventilation, insulation, watering
4. Cost

V - Successful plants

1. Chrysanthemum
2. Gerbera
3. Matthiola
4. Primula
5. Saintpaulia

VI - Annual flowers

1. [illegible]
2. Begonia
3. Cineraria
4. [illegible]
5. [illegible]
6. [illegible]
10. Lobularia
11. Tagetes
12. Tropaeolum
13. Verbena
14. Alyssum
15. Stock
16. Asters
17. Dahlias
18. Cosmos

VI - Annual Flowers

19. Clarkia
20. Phlox
21. Delphinium
22. Balsamine

VII - House plants

VIII - Care of greenhouses

1. Humidity and watering
2. Temperature
3. Aeration
4. Natural and artificial light
5. Crop protection

IX - Special crops

1. Identification
2. Propagation
3. Soil mixture
4. Fertilizers
5. Planting
6. Transplanting or potting
7. Crop care
8. Special problems

CROP CLASSIFICATION

I - Major crops

II - Various crops

1. Potted plants
   (a) Flowering
   (b) Decorative foliage
   (c) Succulent; Cactus

III - Forced flowering

1. Bulbs
2. Ligneous species

IV - Annuals

CHOICE OF CROPS

I - Major crops

Geraniums
Chrysanthemums
Carnations
Snapdragons

II - Bulbs

Calla

II - Bulbs

Freesia
Lilies
Tulips

III - Potted plants

1. Azalea
2. Begonia
3. Cyclamen
4. Hydrangea
5. Poinsettia
6. Solanum pseudo-capsicum
7. Zygocactus

IV - Species with decorative foliage

1. Coleus
2. Ficus
3. Philodendron
4. Tradescantia
5. Ferns
6. Dieffenbachia
7. Fittonia
8. Peperomia

V - Arrangement

Tables
Shelves
Cupboards
Counters
Sinks
Refrigerators

VI - Equipment and tools

1. Alarm system
2. Automatic sprinklers
3. Pots
4. Flats
5. Stands
6. Sterilizers
7. Fertilizer (mixer)
8. Reservoirs (CO_2,etc.)
9. Pulverizers
10. Wheelbarrows
11. Motors

VII - Harvesting plan

Space saving and efficient use. Rotation

VIII - Greenhouse management

1. Growing Media

(a) Soil mixtures
(b) Peat
(c) Nutritive solutions

2. Fertilizers

Solid, liquid and gaseous fertilizers

REFERENCES

1. Canham. Electricity in Horticulture. Macdonald.

2. Kull. Secrets of flowers. Stephen Green Press.

3. Frese. Annual flowers in color. Grosset and Dunlap.

4. Morris. Flower arranging and floristry. National Landscape Institute.

5. Porter. Taxonomy of flowering plants. Freeman.

6. Kinlinger. Commercial flower forcing. McGraw-Hill.

7. Pfahl. The retail florist business. Interstate.

8. Good. The geography of the flowering plants. Wiley.

9. Symonds. The tree identification book. Barrows.

10. Symonds. The shrub identification book. Barrows.

11. Pirone. Diseases and pests of ornamental plants. Ronald Press.

12. Noyal. The pictorial encyclopedia of plants and flowers. Crown.

INTRODUCTION TO LANDSCAPING: PART 1:

THEORETICAL

I - Introduction

1. Definition
2. Past
3. Present
   - Tendencies
   - Resources

II - Principles of landscaping

1. Search for natural beauty
2. Balance
3. Best use of forms and colors
4. How to be functional
5. Good planning and minimum care

III - Site study

1. General observations (topography etc)
2. Special observations: (trees, rocks)
3. Natural land use
4. Survey and sketches

IV - General arrangement (according to natural features and future use of site)

- [illegible]
- accessibility
- traffic
- parking
- limit

1. Public or private garden
2. Hospital
3. Factory
4. Cemetery

V - Parcelling

Taking into consideration:

1. Lawn
2. Various types of gardens:
   rock, aquatic, vegetable, rose, fruit, invalid's, children's
3. Games
4. Various buildings
5. Plants available

VI - Plants

1. Trees
   (a) Classification according to size, shape, type of foliage, flowers, fruit.
   (b) Purpose: Shade, framing, screening, natural beauty
   (c) Arrangement: Single, grouped, wind-brakes.

N.B. Look for pest resistance.

2. Shrubs
   (a) Classification according to same characteristics as trees
   (b) Purpose: Individual beauty, screening, dividing lines, transition between buildings and land, framing entrances, covering steep slopes, shade.

3. Climbing plants
   Slopes, walk, fences, various constructions, for shade, screening or decorating.

4. Herbaceous plants
   (a) Perennial (including bulbs and rhizomes.
      (1) Classification according to shade resistance, size, shade, foliage, duration, hardiness.
      (2) Arrangement of flower-beds and groupings
      (3) Spacing
   (b) Biennials
      Choosing and using them
   (c) Annuals (including bulbs)
      Classification according to size, foliage and flowers
      What to use in flower-beds and groupings.
      Use of flower-boxes and rock-gardens.

5. Lawns
   (a) Spaciousness
   (b) Lay-out

       Outer delineation
       Cut-outs

6. Soil cover

       Classification
       Utilization

7. Use of indigenous plants.

VII - Buildings

Houses, garage, roads, paths, patios and walls, parking lots, fences, stairways, barbecue pit, screens, shelters, swimming pool, lighting.

VIII - Various accessories

Tables, chairs, benches, statues, bird baths, sundials, urns

IX - Games

X - Rearrangement of an existing garden

PART 2: PRACTICAL

I - Examination of various sites

Topographical survey
Rough sketch

II - Visit of various well-planned sites

III - Study of a landscaping plan

Specifications, symbols, draftman's techniques

IV - Designing various forms. Combining these forms. Combining colors.

V - Carrying out of an actual project. Planting hedges, groupings. Hiding ugly objects.

VI - Composition of a flower-bed

On paper, laboratory scale model, bench-test

VII - Setting up a rock-garden, a rose-garden, a path, a patio and a wall

VIII - Evaluation of cost

CROP PROTECTION

I - General

A. Pests

1. Insects and other invertebrates
   (a) Definition
   (b) Distribution
   (c) Useful and harmful insects
   (d) Economics

2. Diseases
   (a) Definition
   (b) Distribution
   (c) Damages
   (d) Economics

3. Weeds
   (a) Definition
   (b) Distribution
   (c) Damages
   (d) Economics

4. Rodents and birds
   (a) Definition
   (b) Distribution
   (c) Damages
   (d) Economics

B. Control

1. Biological methods

Parasites, predatory insects, antibiotics, hormones, etc.

2. Cultural methods

Rotation, fertilization, plowing, burning refuse, selection, aeration, drainage etc.

3. Physical methods

Temperature, washing, electricity, ultrasounds, thinning, fire, protective paper, glue, light etc.

4. Chemical methods
   (a) Pesticides

Nature, concentration, form, compatibility, dosage, application, precautions.

4. Cowical methods
   (b) Insecticides

   Contact, oral, endotherapic, fumigants

   (c) Fungicides

   Eradicative, protective, defoliants, desiccants, disinfectants

   (d) Herbicides

   Cost of
   selection
   pre-emergence
   post-emergence

   (e) Rodenticides, avicides etc.

   (f) Acaricides

   (g) Molluscicides

   (h) Nematicides and viricides

   (i) Others etc

5. Use of hormones

   Interrelation of the various methods of protection

6. Tree and shrub surgery

   Treatment of wounds, frost damage and other types of damage

7. Disinfection

   (a) Equipment: Brooms, electric vipis, electrodes
   (b) Steam
   (c) Hot water
   (d) Chemical products

   Aerosols: Application, disinfectant powders and packing
   Liquid: Spraying

8. How to proceed in plant protection
   (a) Identification of the various pests
   (b) Availability of all needed ingredients
   (c) Verification
   (d) Preparation of mixtures
   (e) Following instructions regarding dosage
   (f) Precautions with mixtures are dangerous
   (g) Equipment kept in order
   (h) Use suitable timing and adequate coverage.

9. Laws and rules

Plant protection
Pesticides
Miscellaneous

C. Equipment

1. Pulverizers

(a) On shoulders: continuous pumping or preestablished pressure
(b) On wheelbarrows
(c) Horse-drawn
(d) On motor cultivator or tractor
(e) Tractor-drawn (or semi-drawn)
(f) Pneumatic pulverizers
(g) Centrifugal pulverizers
(h) Manual pulverizers

2. Dusters

(a) Fan-type
(b) Ventilation-type
(c) Manual or power-drawn
(d) Wide coverage

3. Domestic and other types of apparatus

4. How to calculate output

5. Calibration

6. Care

7. Aerosol sprayers

D. Plant protection guides

Every year, the various provincial Departments of Agriculture in Canada publish Plant Protection Guides for the various crops grown within their areas.

In addition, the Canada Department of Agriculture has prepared several bulletins dealing with the control of ornamental crop pests.

Lastly, throughout the growing season, the Quebec Department of Agriculture sends notices and broadcasts warnings concerning the occurrence and dissemination of plant pests.

II - Entomology

A. Insects

1. Anatomy
2. Morphology
3. Metamorphosis
4. Physiology
5. Classification
6. Economics

B. Life cycle

Most important insects

C. Damages

1. Injuries: Roots, stems, leaves, flowers, and fruit
2. Propagation of diseases.
3. Deterioration of food value.

III - Plant pathology

A. General

1. Definition and history
2. Economic importance at the national, provincial and local levels.
   (a) Due to the number and diversity of diseases.
   (b) Due to the damages which they cause: Yield decrease, poor quality, degeneration and soil contamination.
3. Classification
   (a) Parasitic diseases: mushrooms bacteria, viruses and nematodes.
   (b) Non-parasitic diseases
4. Disease symptoms: Necrotic, hyperplastic, hypoplastic.

B. Mushrooms

1. Nature
2. Fleshy and microscopic mushrooms
3. Saprophytic and parasitic mushrooms
4. Structure of mushrooms: mycelium, fructification and spores.
5. Dissemination and infection
6. Development factors
7. Classification (mycology)
8. Fungus diseases due to seed contamination, crop refuse and other external causes.
9. Fungus diseases:

Host plants
Symptoms
Organisms responsible
Resistant varieties
Control measures

.". Purpose and the various aspects to be studied for each disease.

C. Bacteria

1. Nature
2. Pathogenic and saprophytic bacteria
3. Bacterial multiplication
4. Dissemination and mode of infection
5. Symptoms of bacterial diseases
6. Sources of infection
7. Development factors
8. Most important bacterial diseases

Hosts
Particular symptoms
Organisms responsible
Control measures

D. Viruses

1. Nature and characteristics of virus diseases.
2. Transmission: insects, crop refuse, seed, soil, weeds.
3. Some virus diseases:
Occurrence, importance, symptoms, differentiation, transmission, control measures.

E. Nematodes

1. Nature
2. Pathogenic effects
3. Dissemination
4. Examples of some nematode diseases.
5. Specific measures of control.

F. Non-parasitic diseases

1. Nature
2. Causes
(a) Low or high temperature
(b) Wind
(c) Nutrition: major element deficiencies
(nitrogen, phosphorus and potassium)

Minor element deficiencies (magnesium, manganese, boron, molybdenum, copper and zinc)

Excessive acidity, alkalinity or salinity.

(d) Water: excess, shortage, poor distribution
(e) Air (pollution)
(f) Pesticides, phyto-toxicity
(g) Storage diseases.

IV - Weeds

A. Nature

Annual
Biennial
Perennial

B. Why are they harmful?

Competition for nutrients, water, light
Production of toxic substances

C. Control

1. Mechanical means
2. Biological means
3. Chemical means

(a) Classification
(b) Principle
(c) Time of application
(d) Use
(e) Precaution

CARPENTRY

1 - Plans

2 - Materials

3 - Marking

Various types of lines curves and angles
Marking tools.

4 - Cutting out

Saw (hand, power, circular)
Other tools.

5 - Adjusting

Plane, chisel, jointer

6 - Assembling

Nails, screws, glue, hinges etc.

7.- Finishing

Paint, varnish.

SMALL ANIMALS

1 - Introduction

Advantages

Types

2 - Facilities

Cages

Ponds

Pens

Stables

3 - Biology

Feeding

Reproduction (oviparous - viviparous)

Wintering

INITIATION TO BUSINESS MANAGEMENT

I - Objective

A. Familiarize the student with the various elements of organization and administration of an enterprise.

B. Initiate the student to the principles involved in personnel management and relationships between individuals.

II - Contents

A. The enterprise and its official constitution

1. Generalities and definitions
2. Constitution of private and collective enterprises

B. Chances of success based on demand

1. Generalities and definitions
2. Factors responsible for success
3. Evaluation of demand
4. Buying power
5. Choice of a product

C. Location of an enterprise

Factors involved in choosing site

D. Budgeting

General
Budget for the organization period
Regular budget

How to draw up a budget

E. Credit

General
Short and long-term credit
Precautions to be taken when buying and selling on credit

F. Purchasing, supplying and storing

1. Purchasing methods and control
2. Stocking up and disposing of supplies: permanent inventory
3. Quantity to be stocked and ordered in relation to sales
4. Where to purchase

G. Selling

1. General rules
2. Various types of sales
3. Conditions permitting sale on credit

H. Laws and regulations regarding insurance

1. Life and general insurance: General
2. Federal, provincial and municipal laws and regulations

Taxation, legislation etc.

I. Bankruptcy and insolvency

1. Definition
2. Causes
3. Possible solutions

J. Principles of modern management

1. Direction: Importance and qualifications of management personnel
2. Delegation of responsibilities for greater efficiency
3. Study of the various ways by which business men can improve their qualifications
4. What is an efficient business manager?

K. Planning

Definition, role, objective and essential elements
Short and long-term planning
Various types of planning
How to establish a long-term plan?

L. Structure and personnel

1. Importance of a good structure
2. Causes and effects of a poor organization
3. Relation between the administration and production sections
4. Recruiting personnel
5. Efficiency rating
6. Training and re-training

Methodology

This course should cover 60 hours, i.e. one hour per day throughout one semester, and should be open to all high school students (no prerequisite).

At the beginning of the year the teacher responsible for this course should familiarize himself with the syllabus and textbook, before deciding how much time to devote to each chapter.

The purpose of this course is not to train administrators, but to familiarize the student with the organization and administration of a firm, so that he may at least understand its structures.

LABORATORY PRACTICE

ORNAMENTAL HORTICULTURE IN THE SENIOR HIGH SCHOOL

I - Introduction

Laboratory practice is an extremely important aspect of the training of specialists in landscaping. If the high school graduate is to qualify for a job in this field, he must be of immediate value to his employer. Hence, a certain amount of theory must be given, the aim here being to instil in the student certain basic priciples - making him aware of what he is doing and why - and not merely to stuff his head with facts. Yet the practical aspect of the course is of equal importance, and it is imperative that the person supervising laboratory work be fully competent and experienced in the field of gardening. Therefore, if the teacher responsible for the course works in close cooperation with the person in charge of laboratory work, the purpose of the course will be attained: The student will be prepared, immediately upon graduation from high school, to earn his living as a gardener.

II - Qualities and Antitudes To Be Developed

A student who wishes to succeed in ornamental horticulture should, first of all, like this particular field of activity

and not be afraid of manual labor. In addition to this he must, if he is to have any chance of promotion, possess two basic qualities: a keen sense of observation and a high degree of manual dexterity. For he is who is not observant cannot see the problems related to his work, and he who does not have manual dexterity will not be able to work well and fast. Lastly, the student must have a good memory in order to absorb the body of knowledge (including a rather extensive terminology) of which he will constantly be making use in his everyday work.

III -

Since, in a school, instruction takes place mainly during the cold season, practical work will have to be done not only in greenhouses and outside, but also in laboratories and shops. It would, in fact, be advisable to have the students spend one entire summer - preferably that between their 4th and 5th years - working at the school.

These two types of practice will be discussed again further on in this outline.

The following, in a month-by-month plan, are the various activities about which the student must be informed and which, he must, above all, have the opportunity to actually carry out.

CALENDAR OF PRACTICAL WORK

(a) Laboratory

(b) Shop

(c) Field

SEPTEMBER

1. Detailed visit of the garden, nursery and greenhouse (overall view of the set-up).
2. Surveying
3. Excursion: collect plant specimens (wild and cultivated) to be studied later.
4. Visit a number of commercial enterprises
5. Weeding
6. Use of pesticides (herbicides, fungicides and insecticides)
7. Bring in house plants and other plants
8. Prepare cuttings
9. Prepare of compost and purchase of fertilizer
10. Mowing
11. Fertilize lawn

OCTOBER

1. Apply fertilizer
2. Clean the garden
3. Prepare flower-beds
4. Take cuttings on new wood
5. Pick up leaves and prepare compost
6. Transplantation
7. Bring in tender plants
8. Plant bulbs
9. Storing
10. Dividing a number of perennials
11. Forcing a number of bulbs
12. Take down climbing roses

NOVEMBER

1. Clipping and trimming
2. Cleaning
3. Mechanical protection
4. Protection against rodents
5. Storage of equipment
6. Storage of plants needed for demonstration during the winter
7. Take cuttings on hardwood
8. Bring in roots for grafting
9. Forcing some bulbs

DECEMBER

1. Forcing of hortensias
2. Plant propagation
3. Christmas decoration
4. Greenhouse fumigation
5. Plant protection
6. Inspection and cleaning of stored plants
7. Take cuttings on coniferous trees
8. Visit flower shops (retail and wholesale)
9. Repair various pieces of equipment
10. Trimestrial balance-sheet

JANUARY

1. Treatment of plants received by the public as Christmas gifts
2. Make flower-boxes
3. Study plants collected in the fall
4. Forcing plants for Easter (tulips)
5. Make plan for coming year
6. Budget
7. Organize summer work
8. Plant gloxinias and tuberous begonias

FEBRUARY

1. Grafting on roots
2. Layering
3. Seeding

FEBRUARY cont'd

4. Potting
5. Repotting
6. Treatment of parent plants
7. Inspection
8. Examine catalogues
9. Tests to be made
10. Prevent damages due to rodents and glazed ice

MARCH

1. Transplantation
2. Cuttings
3. Plant bulbs (gloxinias)
4. Timming
5. Repair damages (rodents and glazed ice)
6. Forcing of plants for Mother's Day

APRIL

1. Take off (gradually) protection devices
2. Trimming
3. Plant trees and shrubs
4. Clean lawns
5. Fertilize
6. List flowers to be planted
7. Seed or repair spotted lawns
8. Observe plant development
9. Plant dahlias and cannas

MAY

1. Hoeing of flower-beds
2. Repair lawns (end of April, May and June)
3. Plant annual flowers (end of May and early June)
4. Cut grass
5. Cut lawn edges
6. Plant grafts and cuttings
7. Remove suckers
8. Put shading material over greenhouses
9. Put cuttings in pots
10. Weeding

JUNE

1. Clip hedges
2. Chemical weeding
3. Cuttings
4. Prepare everything for September
5. Take out house plants
6. Botanical excursions
7. Plant gladioli

IV - A. Facilities

If the student is to be initiated to the various activities mentioned and to the techniques involved, certain requirements must be fulfilled:

1. A school which wishes to offer the course in Ornamental horticulture as an option must have at its disposal a piece of land (large enough for a nursery and demonstration plots), two or three greenhouses, a workroom containing storage space as well as a cold room. Moreover, the school campus must be spacious enough to contain, in as well-balanced layout, a specially-selected collection of plants.
2. In planning the teaching programme for the year, the school must take into account the facilities and needs of the region in which the school is located. Its emphasis on certain points, the use it will make of available resources will affect the budgeting of this particular item.
3. The collection of living plants mentioned above is essential if the students are to learn about the plants with which they will have to work. An herbarium is useful but of limited value in this case. The school must have a nursery large enough to contain 50 to 100 species, the number of plants for each species depending on the number of students and on the type of work they will be required to do (e.g. building a hedge, planting trees and shrubs, building a flower-bed, laying out a lawn, etc). This calls for an extensive piece of land organized accordingly.

V - GENERAL PROGRAMMING

A. 4th Year

1. At the beginning of their 4th year, the students should be asked to write a short essay on their experience in the field of ornamental horticulture. This should give a good idea of the student's motivation in taking the course.

2. Organize a visit of all the facilities (greenhouses, buildings) which they will use during the course.

3. Show the students the tremendous possibilities which this course offers them and lead them to discover the means of making the most of it.

4. Encourage the students to observe plants, climate, etc., and to ask questions.

5. Organize a study group among students, [illegible] them the opportunity to use their initiative and to express themselves.

6. Encourage teamwork and rotate [illegible] leaders as often as possible.

7. Have the students themselves collect (in fall and spring) the material which they will need during fall and winter.

8. Organize excursions and visits with potential [illegible].

9. Encourage the students to take notes and collect [illegible] biblio[illegible]ical material as possible.

10. If possible, have the students spend one [illegible] in [illegible] on the campus.

B. [illegible] Year

1. Report on summer practice (to [illegible] submit [illegible].

2. Study group should resume activities.

3. Some of the above suggestions for the 4[illegible] apply to 5th-year students.

4. Encourage and facilitate contacts between students and potential employers. Invite them to exhibits, conferences etc.

The fact of spending a complete year (minus normally two weeks' vacation in the summer) at school will enable the student to acquire a certain degree of experience before taking a job. Such experience will, it should be noted, be much more valuable [illegible] he might acquire during the summer at the service of a private [illegible] cial firm, experience of the latter type being restricted to a short and not necessarily the most propitious - period, and to activities which are seldom interesting or profitable from the educational point of view. Hence, the school should attempt to make as effective as possible this period of practice, rewarded as compulsory to that prescribed for 5th year.

These are the activities which should be accomplished during the summer:

1. Seeding perennial and biennial flowers
2. Pest control
3. Watering
4. Grass mowing
5. Hedge clipping
6. Dig tulips
7. Divide and replant irises
8. " " peonies
9. Remove faded blooms
10. Collect material for compost
11. Take cuttings on new wood
12. Harvest seed of some species
13. Collect plants for botany collection
14. Repair lawns
15. Plant calla lilies and poinsettias
16. Treat against earthworms
17. Shade chrysanthemums
18. Harvest strawflowers and other species to be dried and kept inside
19. Collect insects and damaged plants
20. Collect diseased plant parts or whole specimens

TOOLS AND MINOR EQUIPMENT

1. Prongs and stakes
2. Lawn rakes
3. Spades
4. Wheelbarrow
5. Grass shears
6. Hedge shears
7. Hand cultivator
8. Power-driven cultivator
9. Pruning hook
10. Pruning shears
11. Grass edger
12. Hoes
13. Turf-renovator
14. Dibber or planting kit
15. Various spades and shovels
16. "Planet Junior" (farm tractor)
17. Various rakes
18. Lawn roller
19. Mechanical lawn mower
20. Felco secateurs
21. Saw (retractable blade)
22. Reversible saw
23. Rotary scythe
24. Trowels
25. Pulverizer.