

**(3) Horticultural Botany**

The candidate must show a satisfactory elementary knowledge of the following, based on observation and simple experiments. He should have practice in the use of the hand-lens and the drawing-pencil:—

- A. The structure and contents of the living plant cell, with special reference to protoplasm and nucleus; the structure of plants, based on a study of the organs of a typical fern, herb, shrub, and tree. The main life-forms of flowering plants (*e.g.*, annuals, biennials, perennials, rhizomatous plants, creeping plants, climbing plants, &c.).
- B. Modifications of plant organs for special functions, with particular reference to water- and food-storage organs, drought resistance, climbers, symbiosis.
- C. The processes of nutrition, with special reference to (a) absorption, translocation, and transpiration of water, together with the intake of food materials from the air and soil; (b) carbon assimilation, nitrogen assimilation, respiration; (c) the elaboration of foods within the plant, especially carbohydrates and proteins, their consumption and storage, and the elimination of waste products.
- D. Methods of reproduction, asexual and sexual, with special reference to their importance for plant propagation and plant breeding.
- E. The relation of the plant to its environment, including the influence of soils, water, light, temperature, wind. The chief resultant plant formations (*e.g.*, forest, scrub, grass-land, swamps, with reference to their horticultural significance).

**(4) Principles of Plant Protection**

A general knowledge of the morphology and life history of an earthworm, an earwig, a wood-louse, an aphid, a scale insect, a beetle, a house fly, a moth, and a mite.

A general knowledge of the morphology and life history of a bacterium, a downy mildew, a powdery mildew, a mould, a polypore, an agaric, rusts, and common virus diseases of potato and tomato.

The methods of preparation, strength, and times of application of sprays in general use, including Bordeaux mixture, Burgundy mixture, lead arsenate, lime sulphur, nicotine, oil, and sulphur.

Methods of treating the soil by steam or by chemical substances to control fungous and insect or other animal pests.

Glasshouse hygiene and the effects of temperature, humidity, and soil moisture on pest and disease control in glasshouses.

Seed and bulb disinfection by chemicals and by hot-water treatment.

Pests and disease control by hygiene, elimination of weeds, crop rotation, and cultural methods.

**(5) Oral and Practical Examination I**

Propagation of plants by seeds, hard-wood and soft-wood cuttings, division, and layering.

Garden tools and implements, including those motor-driven, their care and use.

Common operations in the garden (*e.g.*, pricking out seedlings, potting up or potting on, use of water-can and hose, wrenching and lining out, digging and trenching, preparation of seed-beds, staking and tying plants).

Identification of common pests and diseases, and their control. Identification of commoner trees, shrubs, and herbaceous plants, including weeds, especially plants indigenous to New Zealand and amenable to cultivation.

**Intermediate Examination****(6) Principles of Botanical Classification**

The divisions of the plant kingdom, with special reference to the major distinctions between the following groups: Bacteria, algæ, fungi, mosses, liverworts, ferns, gymnosperms, monocotyledons, dicotyledons.

Elementary knowledge of the commoner families of flowering plants met with in horticulture, especially—

Coniferae.	Myrtaceae.
Gramineae.	Umbelliferae.
Amaryllidaceae.	Ericaceae.
Liliaceae.	Primulaceae.
Iridaceae.	Gentianaceae.
Orchidaceae.	Convolvulaceae.
Caryophyllaceae.	Boraginaceae.
Ranunculaceae.	Labiatae.
Cruciferae.	Solanaceae.
Saxifragaceae.	Scrophulariaceae.
Rosaceae.	Cucurbitaceae.
Leguminosae.	Campanulaceae.
Geraniaceae.	Compositae.

And the recognition of the more important genera of the above cultivated in gardens.

**(7) Principles of Horticulture I**

**Soils.**—The origin and classification of soils; chief constituents and their physical properties (*e.g.*, water-holding power, heat-absorbing power, porosity, capillarity, texture; chemical constituents of soil, and of the soil solution; function of sand, clay, and humus in various forms).

**Garden Operations.**—The principles underlying various operations, the tools and implements used, and their general effect; digging, trenching, hoeing, cultivating; preparation of soil for various crops; drainage in garden, field, and nursery; mulching, watering.

**Plant Propagation.**—Structure of stem, root, and seed; principles underlying propagation by seed, cutting, budding, grafting, layering, subdivision, and by tubers, corms, and bulbs; conditions necessary for propagation in each case.

**Pruning.**—The general principles governing the pruning of common plants of all classes and kinds for various purposes.

**(8) Practice of Horticulture I**

**Operations connected with the soil**, including cuts and fills, levels, and grades.

**Drainage** of surface and sub-soil on hills and flat country.

**Cultural operations for the year** in different parts of the country, as regards herbaceous plants, including lawn grasses.

**Propagation, planting, and care** (including pruning) of hard-wood plants.

**Glasshouse construction**, ventilation, heating, and management.

**Land surveying**, areas up to half an acre, moderately level, locating objects thereon, putting in level and grade pegs.

**Garden design**, including layout and planting.

**Plant pathology**, including spraying, fumigation, and other means of controlling plant diseases and pests.

**(9) Special Subject I**

Chosen from the list of special subjects set out in clause 7.

**(10) Oral and Practical Examination II**

Propagation of plants by budding, grafting, inarching, and more difficult types of hard-wood cuttings; also the different types of stocks.

Pruning and planting trees and shrubs for different purposes.

Lawns—preparation, sowing, turfing, and maintenance.

Glasshouse construction and heating.

Drainage and formation of yards, paths, and drives.

Identification of pests and diseases; and their control.

Identification of trees, shrubs, and other plants, their propagation and use, especially plants indigenous to New Zealand and amenable to cultivation.

The student should submit for discussion a garden plan, including planting list.

**Diploma Examination****(11) Principles of Horticulture II**

The substance of prescription No. (7) and the following:—

**Fertilizers and Manures.**—The physical and chemical properties of the various fertilizers available and of lime; the method of use and function of each in plant growth and its effect on the soil; the composition and valuation of fertilizers; the composition and value of common animal manures; the manufacture and use of compost.

**Soil biology**, with reference to the normal flora and fauna of good loam; nitrification and denitrification; decomposition of humus, and value of leguminous crops.

**Rotation of Crops.**—Its object and methods, with particular reference to the vegetable garden.

**Plant Breeding.**—The methods of raising new types and varieties by selection and controlled pollination.

**Climate.**—Relation of heat, light, moisture, and wind to the growth of plants and to the spread and control of pests and disease.

**Horticultural Geography of New Zealand.**—A knowledge of the principal soil types and climatic regions within New Zealand and the plants associated with them. The garden as a plant association.

**(12) Practice of Horticulture II**

In addition to prescription No. (8), the following is included:—

**Trees and shrubs**, their planting and management for the production of fruit, timber, shelter, or ornament.

**Herbaceous plants**, especially those grown for cut flowers, fruit, and vegetables, including selection and seed production.

**Glasshouse and frames**, the propagation and cultivation of ornamental and food crops therein.

**Packing and storing flowers, fruit, and vegetables** for sale, transport, or future use.

**Land surveying and mapping** areas up to 5 acres, necessary instruments, their use and care.

**Garden design and specification**, properly inscribed, showing layout and planting, with specification, including terraces, steps, dry walls, ponds, and rock gardens.

**Irrigation and watering systems.**

**(13) Special Subject II**

(Normally the same subject as chosen for the Intermediate Examination.)

The candidate will be expected to show a deeper and more complete knowledge than that required in the Intermediate Examination.

**(14) Oral and Practical Examination III**

**Tree surgery** and pruning of specimen and avenue trees.

**Acclimatization** of plants (including bulbs) from the Northern Hemisphere and elsewhere.

**Storage and packing** of fruit and flowers, vegetables, and seeds.

**Self-pollination and cross-pollination** of flowers.

**Instruments and equipment** used in survey and mapping small areas, their use and care.

**Official soil surveys** and their use in horticultural planting and cropping.

**Simple estimates in garden construction** (*e.g.*, amount of soil to raise level of given area, or amount of metal for specified path or road).

**Sprays and spraying** for control of plant diseases and pests.

**Identification of plants**, their propagation and use.

**Submit for discussion** an original survey and coloured plan of an existing orchard, or market-garden, or private garden of at least 5, 3, and  $\frac{1}{2}$  acres respectively, including homestead to scale and properly inscribed.

**Special Subject.****(15) Thesis**

As prescribed in clause 9 hereof.

W. O. HARVEY, Clerk of the Executive Council.