M A C D O N A L D C O L L E G E

Faculty of Agriculture

T H E S I S

On Ornamental Shrubbery of the Montreal District.

By

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Taken in

Department of Horticulture

Approved:-

1. [redacted]

2. [redacted]

3. [redacted]

THE HORTICULTURAL BUILDING.

"Shrubs often relieve the angularities of buildings, and help to tie them to the ground." p. 2.

God Almighty first planted a garden; and indeed, it is the purest of human pleasures; it is the greatest refreshment to the spirits of man; without which buildings and palaces are but gross handiworks: and a man shall ever see that when ages grow to civility and elegancy men come to build stately, sooner than to garden finely; as if gardening were the greater perfection. I do hold it, in the royal order of gardens there ought to be gardens for all the months in the year in which, severally, things of beauty may then be in season.

Lord Bacon.

Essay XLVII of Gardens.

FOREWORD

This thesis falls into two parts:

1. A compilation of important facts and principles which may be found in various texts in Botany, Plant Relation, etc., as is evident from Bibliography. The only merit claimed for this part of thesis is that it puts into a short space much information scattered through many books.

2. The writer's observations and deductions therefrom, of the shrubbery on the Campus of Macdonald College. For this she can claim originality and the tables should be of some value for reference purposes.

Thanks are due to Professor Bunting and Mr. A. W. Walker of the Horticultural Department for much help in field work.

OUTLINE OF THESIS

SUBJECT - Ornamental Shrubbery of the Montreal district.

OBJECT - To study the shrubbery of Macdonald College and surrounding neighbourhood.

PLAN - Introduction: General information.

(a) Shrubbery: its aesthetic function.

(b) Grouping and arrangement.

(c) Varieties.

(d) Nurseries in Canada.

(e) Nursery catalogues and listed varieties.

BODY - (a) A study will be made: of shrubs in regard to their foliage, flowering and fruiting habit - amount of bloom, hardiness, susceptibility to disease and insect attacks;

(b) of the different groups of shrubs in regard to methods of pruning;

(c) of the natural versus formal grouping of shrubbery in regard to the purpose for which they may be used.

This thesis will be suitably illustrated with photographs.

Approved:-

INTRODUCTION

Nature has used shrubbery in the glades of her woods, along the edges of her waterways, softening the angles, changing them into graceful curves. This shows us that if we are to have beautiful surroundings we must copy nature, and use shrubs liberally around our homes, in our public parks and playgrounds.

Shrubs are used near buildings on lawns of large areas, and in gardens. The flowering period of shrubs is usually of short duration; their foliage, therefore, must be given consideration in order that a good appearance can be maintained the greater part of the year. This fact also necessitates other than flower-bearing shrubs in our garden scheme:

1. Berry-bearing shrubs;
2. Autumn-colouring;
3. Shrubs with attractive twigs or berries throughout the winter.

Shrubs are divided into two groups:

1. Deciduous: these lose their leaves in the autumn, and are divided into two sub-groups: (a) flowering and (b) those with ornamental foliage.
2. Non-deciduous or evergreens: these shed their leaves or needles at any time during the year.

The chief value of shrubs is aesthetic rather than useful, although some have edible fruits. They are used according to their especial attractiveness; variety in foliage, flowers, fruit and habit of growth. These things make it possible to very

extended use in the developement of landscapes.

There are two distinct methods of using shrubs - (1) individual or isolated specimens and (2) masses:

1. The individual specimen is grown for the beauty of the single plant, to produce and exhibit its characteristics to the fullest extent. They should not be wholly isolated, but planted somewhere near a border or a building in order to have a back ground. These plants should be of the finest species, of moderate size, of graceful habits of growth and handsome foliage.

2. The massed shrubbery emphasises particular parts, allowing bold and broad contrasts. It usually has an irregular outline, and practically always contains more than one species. Shrubs should be massed along boundaries leaving the centre open. They should not be scattered over lawns as they destroy the unity and purpose and the meaning of the lawn is lost. One of the fundamental concepts of landscape gardening is that the centre of an area shall be open. Shrubs often relieve the angularities of buildings and help to tie them to the ground. The effect of a group of shrubbery should be a continuous mass of varying foliage. The taller growing shrubs should generally be placed in the centre of a group or when against buildings the farthest back and the lower growing species near the front. If not arranged in this way the lower ones will be shaded, crowded

and hidden.

A variety of shrubs should be used to avoid monotony and to help in irregularity of outline - an important point. If the line is not irregular it is unpleasant to the eye.

In the last few years shrubs have become better known, as there has been a concentrated effort on the part of nurserymen and hybridists to put their plants before the public. Many beautiful trees and shrubs have been introduced, and their number is increasing, as the art of hybridizing becomes more perfected. The price of well-formed, healthy plants is not prohibitive, and as a result of this many amateurs are planting named varieties and taking special care with their grounds. There is an immense variety of shrubs to be had for every purpose, and the choosing of them gives a keen delight to the gardener, and arouses an interest and enthusiasm in their welfare that he would not have otherwise. Most people do not know shrubs by their proper names. They know that they are shrubs perhaps, but they are very vague as to their blooming period, or any of their other characteristics that are necessary to know in order to plant them in the correct place, and to give them the proper care.

In this country the usual custom is to build a house and then do nothing else but live in it. But if we are to have a beautiful country and develop a higher sense of beauty, we must pay attention and correct the ugliness of our streets, our front and backyards, our parks and our play grounds.

To help us do this we have our native plants.

They can be got in the woods at any age and are easily transplanted. They can also be got from the nurserymen, but, of course, it is much cheaper to get them from the woods yourself. They can be transplanted in Spring or Autumn, just as we do with our other shrubs.

Next, we can use foreign native plants. These we get from the nurserymen, and they get them from the various countries to which they are indigenous. They propagate them in various ways, put them in their nursery rows and get good, healthy, well-formed shrubs. Mr. Ernest H. Wilson has introduced a very large number of these foreign native plants to this country from North China, Siberia, Russia and North India. These places have climates similar to our own, and so they can grow under practically the same conditions as in their native land.

Some of these foreign native plants have been growing in our gardens for centuries, so that we have forgotten the fact that they do actually some from other countries. Instances of this would be, The Philadelphus, the Snowball and some of the Spireas.

Thirdly, we have the horticultural varieties. These are produced by plant breeding. Our ancestors understood this to some degree. They selected seed, but did not cross, or hybridize them. Although this idea has come down to us from the the dawn of civilization, it has only been improved in the last few years, and there still are infinite possibilities. Examples of horticultural varieties would be the different Lemoine Species of Lilac, Spirea, Snowball, etc.

We have few nursery firms in Canada in comparison

with the United States and France, Holland and England. The ones we have are practically all situated in the Niagra peninsula of Ontario. Some of them are:

E. M. Mitchell,	Port Hope, Ont.
Dupuy & Ferguson	Montreal Que
E. D. Smith	Winona, Ont.
Wm. Ewing & Co. Ltd.	Montreal. Que.
Brown Bros. Nurseries	Welland Co., Ont.
Wm. Rennie & Co,	Toronto, Ont.
Stone & Wellington	
"Fonthill Nurseries"	Toronto, Ont.
John A. Bruce & Co. Ltd.	Hamilton. Ont.
Sheridan Nurseries	Sheridan, Ont.
Steel, Briggs' Seed Co, Ltd,	Toronto . Ont.
Eric Erickson	
"Douglas Gardens"	Oakville, Ont.
J. A. Simmers & Co.	Toronto, Ont.
John Connon Co., Ltd.	Hamilton, Ont.
Hull, A.G. & Son.	St. Catherines, Ont.

The Niagra peninsula is better adapted for growing nursery stock than perhaps anywhere else in Canada. They have an early Spring, a mild Winter, hot Summer; light loamy soil, easily worked; good drainage, excellent shipping facilities and near large markets: hence the nurseries located in this particular part of the country.

They send out catalogues every year and list their different varieties. They carry those that are in demand, and usually do not have many varieties of one species, selecting the hardiest and most easily grown. The different nurserymen according to their size have a large or small assortment:-

E. D. Smith, one of the largest, lists Fruit and ornamental trees, Shrubs, Roses, Paeonies, Hardy Border Plants, etc.

The Sheridan Nurseries' list Perennials, Shrubs, Trees, Evergreens, Climbers and Roses.

The Fonthill Nurseries - large and small fruits, ornamental and shade trees, evergreens, flowering shrubs, vines, roses, prennials.

A. G. Hull & Son - fruits and ornamental trees, roses, shrubs, vines and a very few herbaceous perennials

So we have in E. D. Smith's catalogue for 1920 regarding shrubs a long list of roses, grouping them under:

Hybrid perpetuals

Hybrid tea

Tea

Austrian Briars and their hybrids

Moss

Climbing

Rosa rogosa and Wild Roses

One variety of Amygdalus (Flowering Almond)
Communis Flore Rosea Pleno

Two varieties of Berberis (Barberry)
Purpurea - Thunbergii

One variety of Calycanthus (Carolina allspice)
Floridus

Two varieties of Caragana (Pea Tree)
Arborescens - Frutescens

One variety of Caryopteris (Blue Spirea)
Mastacanthus

One variety of Cephalanthus (Button Bush)
Occidentalis

One variety of Clethra (White Alder)
Alnifolia

Four varieties of Cornus (Dogwood)
Alba - Elegantissima variegata
Spaethii - Stolonifera

Three varieties of Corylus (Hazel Or Filbert)
Americana - Avellana
Maxima purpurea

Four varieties of Cydonia (Pyrus Japonica - Japanese quince)
Alba - Atrococcinea Plena
Japonica - Maulei

One variety of Daphne - Mezereum

Seven varieties of Deutzia - Candidissima - Waterii
Crenata Flore pleno
Gracilis - Lemoineii
Pride of Rochester - Scabra

Ten varieties of Diervilla (Weigela)
Abel Carriere - Candida
Conquete - Rosea
Hybrida Eva Rathke - Lavallei
Stelzneriі - Sieboldii alba marginat
Nana foliis variegata - verschaffelt

One variety of Elaeagnus (Oleaster)
Longipes

Two varieties of Evonymus (Strawberry bush)
Europaeus - atra purpureus

One variety of Exorchorda (Pearl bush)
Grandiflora

Three varieties of Forsythia (Golden Bell)
Fortuneii - intermedia
Suspensa

One variety of Halesia (Snowdrop or Silver bell)
Tetraptera

Six varieties of Hibiscus (Althea or Rose of Sharon)
Boule de feu - Jeanne d'arc
Purpurea flore pleno - Rubra pleno
Totus albus - variegatis flore pleno

Three varieties of Hydrangea - Arborescens grandiflora alba
Paniculata grandiflora
Otaksa

One variety of Kerria - Japonica

Five varieties of Ligustrum (Privet)
Amurense - Ibota - Vulgare
Ovalifolium - Regelianum

six varieties of Lonicera (Honeysuckle bush)
Albertii - Frangrantissima
Grandiflora - Morrowii
Tatarica rubra - Tatarica alba

One variety of Mahonia (Ashberry)
Aquifolia

Four varieties of Philadelphus (Syringa or Mock Orange)
Coronarius - foliis aureis
grandiflorus - Lemoinei

Four varieties of Prunus (Almonds and Plums)
Japonica flore alba pleno) Almonds
" " rubra ")

Triloba - Pseudo cerasus) Plums

One variety of Rhamnus (Buckthorn)
Catharticus

One variety of Rhodotypus - Kerrioides

Two varieties of Rhus (Smoke Tree or Purple Fringe)
Cotinus - Glabra

Two varieties of Ribes (Currant)
Aureum - Sanquineum

Two varieties of Sambucus (Elder)
Canadensis aurea
Racemosa plumosa foliis aureis

Fifteen varieties of Spirea - Anthony Waterer - Arguta - Aurea
Billardii - Bumalda - Callosa alba
Callosa rosea - Douglasii
Opulifolia - Paniculata rosea
Ruberrima - Reevesii
Prunifolia flore pleno - Thunbergii
Van houttei

Thirty-six varieties of Syringa (Lilac)

Two varieties of Symphoricarpus (Wax Berry)
Racemosus - Vulgaris

Four varieties of Viburnum - Lantana - Opulus - Plicatum
Opulus Sterilis

A much smaller concern, A. G. Hull and Son of the Central Nurseries, list the following:

Two varieties of Symphoricarpus (Wax Berry)
Rubra-alba

Five varieties of Spireas - Spirea Van Houttei - Billardi
Anthony Waterer - Arguta - Aurea

Four varieties of Diervilla (Weigela)
Rosea - Eva Rathke - Candida
Rosea nana variegata

One variety of Philadelphus (Syringa or Mock Orange)

One variety of Golden Leaved Elder

Two varieties of Cornus - Red barked-- Golden barked

One variety of Ribes - Aureum

One variety of Lonicera - Tartarian

One variety of Almond

One variety of Japan Quince

One variety of Forsythia - Viridissima

Three varieties of Hydrangea - Arborescens sterilis
Grandiflora
Tree Hydrangea Paniculata

Two varieties of Viburnum - Sterilis - Plicatum

One variety of Althea or Rose of Sharon

One variety of Purple Fringe or Smoke Tree

Two varieties of Berberis - Thurbergii - Purpurea

Two varieties of Privet (Ligustrum)
Amurnse - Ovalifolium

Ten varieties of Lilacs

One variety of Butterfly bush (Summer Lilac)

Three varieties of Deutzia - Lemoinii - Gracilis
Pride of Rochester

Many varieties of Roses are listed but not specified according to Hybrid Perpetuals, Hybrid Teas or Teas. The Climbing Roses and Bush Roses with their varieties are specified, however.

This very slight review of the varieties listed shows that the larger nursery has the greater number of varieties, and in this particular case, the lists are in better shape, and the varieties are more correctly named than in the smaller nursery.

The nurseries do not have huge tracts of lands and all grow their own materials, but they contract with growers who grow the seed. Again these growers can subcontract to other smaller growers who grow one or more varieties that require similar treatment, and usually produce a uniform crop.

The propagation of nursery stock is done by:

1. Seeds
2. Separation and division
3. Layering
4. Cuttings
5. Grafting.

Cuttings are made of the roots and of the stems - either green or dormant wood.

Grafting may be done in the following ways:

1. Bud
2. Cion
3. Inarching

In the first two they are simply taken from one tree and joined to the tree being grafted; but in the third, the cion remains attached to the parent plant until union takes place.

THE MAIN BUILDING SHOWING

EFFECTIVE GROUPING OF SHRUBBERY

THE BACK OF THE MEN'S RESIDENCE

SHOWING EFFECT OF MASSED PLANTING.

I.

SHRUBS IN REGARD TO THEIR FOLIAGE, FLOWERING AND FRUITING HABIT, AMOUNT OF BLOOM, HARDINESS, SUSCEPTIBILITY TO DISEASE AND INSECT ATTACKS.

We shall now begin a more detailed study of shrubs: considering their foliage, flowering and fruiting habit, amount of bloom, hardiness, susceptibility to disease and insect attacks.

The dictionary meaning of foliage is"a cluster of leaves, flowers and branches;" but from a horticultural view point it means the leaves only, to distinguish them from the flowers. The points to be noted in regard to leaves are: (1) their arrangement; (2) types; (3)function; (4) unfolding in spring; (5)shedding their leaves in the fall; (6) colouring; (7)hardiness; (8) density.

The arrangement of leaves is to secure the best possible exposure to sun and air, and so we find them alternately and oppositely placed. Size, shape, texture and other peculiarities of leaves are modified according to their position on the stem, near the growing point, or at a distance from it. The leaves are separated from each other by nodes and internodes, which may be quite near or far apart. As the branch or shoot grows older the leaves become farther apart. At the tip of the branch they are often so close together as to form a rosette. As I said above the leaves may be arranged alternately or oppositely. If alternately there is one leaf insertion produced at each node and internode - alders, apple, currant. In the opposite arrangement two or more leaf insertions are produced at the same node or internode - lilac, elder. We may have opposite and alternate leaves on the same branch - snowberry, buckthorn. Other shrubs having opposite leaves are:- dogwood, privet

snowball, honeysuckle. Other shrubs having alternate leaves are - barberry, holly, roses, currant, buckthorn, apple, plums, cherry, Russian olive.

Types:

The typical foliage leaf is really "a trap to catch a sunbeam," because if it did not get sunlight it could not manufacture the necessary food to keep growing. The sun furnishes the energy for the chromatophores and chloroplasts to manufacture from water and carbon dioxide the starches and other products which the plant uses for food. For this purpose the leaves are so constructed to have flat surfaces.

In a typical foliage leaf there are three parts: the blade(lamina), the leafstalk(petiole), and the stipules (small appendages at the base of the petiole). Some leaves have no stipules, others have no petiole, but are sessile, that is, sitting on the stem. Leaves may be simple or compound. If simple the blade is more or less entirely united into one piece; if compound, the segments or leaflets seem to be separate leaves, but are articulated together to the leafstalk or rachis. In the autumn when the leaves fall, the leaflets of a compound leaf may fall separately. Examples of simple leaves: lilac, juneberry, honeysuckle. Examples of compound leaves: roses, elder, mahonia, shumach.

F. S. Matthews in his book entitled "Familiar leaves and their Trees," gives a very simple classification. Leaves may be divided into four classes:

I. Simple alternate growing leaves.

II. Simple opposite growing leaves

III. Compound alternate " "

lV. " opposite " "

Sub-classes with teeth

without "

Sub-division.

A. - edge not divided

B. - " divided

I. Simple alternate leaves :

1. Without teeth - edge not divided

- " divided

2. With teeth - edge not divided - Rhamnus coroliona
Amelanchier

edge divided - Crataegus

II. Simple opposite leaves:

1. Without teeth - edge not divided - Cornus
Lonicera

2. With teeth - edge not divided - EVonymus
Vilburnum lentage

edge divided - Ribes-Pyrus

III. Compound alternate leaves:

1. Without teeth - leaflets bordering main leaf stem

2. With " - " " " " "
Sumach

lV. Compound opposite leaves:

1. Without and with teeth- leaflets bordering main leaf stem.

2. With teeth - leaflets radiating.

There are many types or forms of leaves as:

linear - needle shaped

lanceolate - much longer than broad

wedge shaped - when tapering down instead of up.

ovate - when shape of an egg having broadest part below the middle.

obovate - inversely egg shaped -having broadest part above the middle.

oval - with broadest part at middle.

Some leaves have tips shaped so that the water will drip off, as in the Viburnum opulus. Some have the lower surface of leaf densely or sparsely covered with hairs to lessen the evaporation of water through the stomates. There are other modifications and peculiarities too numerous to note here, but most interesting in the study of plants and their adaptations.

Functions:

Leaves have four principle functions to perform:

1. photosynthesis
2. respiration
3. assimilation
4. transpiration

Photosynthesis, as I have before stated, is the manufacture by green leaves, of carbohydrates (starch and sugar) from carbon dioxide and water in the presence of sunlight. It is also called the fixation of carbon or the assimilation of carbon.

This is necessary to help keep the plant in a healthy condition.

Respiration is the breathing in of oxygen and giving off of carbon dioxide. Plants must do this in order to carry on their life cycle. They must have oxygen to oxidize with other substances to produce energy to do their work of assimilation, growth and production. The principal organs for breathing are the stomates, but there are also lenticels in the bark, which do their share. In the winter when the leaves have fallen, the plant is in a resting condition and the function of respiration is greatly diminished. If leaves are covered with dust, they cannot possibly continue vigorous and healthy, because they are unable to breathe or to manufacture food. If it were not for the occasional rains which wash them, our dust-covered shrubs would die of suffocation.

Assimilation is carried on by the leaves, but only to a limited extent, most of it being done by the other parts of the plant. It means the absorption of the manufactured food of the leaves into the plant tissues.

Transpiration is the giving off water in the form of vapor. The plant uses water in many ways, but there is always some to be excreted and this is done by the epidermis of the leaves and stems. Transpiration is affected by the weather: in hot weather it goes on rapidly, and in damp weather it practically ceases. The pores, by which the water is given off, are usually more abundant on the under surface. Many leaves have about the same number above and below. The lilacs have no pores on upper surface. It is well for leaves to transpire,

I. LILACS IN WINTER SHOWING GOOD PLANTING DISTANCE FOR SUCH A GROUP.

II. DENTZIA IN WINTER - SHOWING THE UPRIGHT HABIT AND THE LEAVES STILL HANGING.

III. SPIREA VAN HOUTTEI - SHOWING SIZE AND HABIT OF GROWTH.

I

II

III

but they should not lose too much moisture and so nature has given some plants a protective bloom, which is really an almost invisible coating of wax.

Unfolding of leaves in spring:

In the winter, the leaves are folded over the growing point for protection against the freezing and thawing, and ice and snow. The leaves are also usually protected by scales which hold them together. Further protection is given in the case of some buds by a gummy substance, secreted by the hairs of the scale. The leaves are very small and immature, carefully folded, but with some wrinkling; tightly packed and arranged spirally on the axis. Asthey open, they are incurved and clasp the inner leaves, but gradually developing they turn outwards and backwards. The stalks elongate and gradually the leaves expand, growing more on upper surface than under surface for a time. Then the reverse process occurs and gradually they assume a horizontal position. The lowest leaves have the longest stalks and the largest blades; the highest leaves have the shortest stalks and the smallest blades; the highest leaves have the shortest stalks and the smallest blades. The leaves between these stages vary according to their height on the stalk. By this time the leaf scales have fallen and the leaf is fully expanded, and ready to carry on its many duties.

Shedding of leaves in the fall:

The shedding of the leaves in the fall marks an important change in the life of a plant. The growth for the year is finished. The plant has made enough food in the season to

produce the miniature leaves and blossoms for next year, and has also stored up reserve food. It is now ready for its well-earned rest. The leaves have formed layers of cork cells across the base of the petiole so that when the leaf eventually falls off, a waterproof scar is left, and there is no waste of sap coming from the wound and no chance for disease to enter.

Some plants form the layer of cork cells but the leaves do not fall off, hanging on practically all winter. The leaves become a dark brown, and are quite attractive when the snow piles up around them. These leaves fall off when the new ones unfold in spring.

Before the leaf falls, important changes take place in the cell content. The sugars and protoplasmic materials which they contained have been absorbed by the branches and roots for use the following spring. The chlorohhyll, and some of the cell sap, however, remain, and it is from their chemical changes that we get our brilliant autumn colouring.

Shrubs mature at different times in the fall. Sometimes this is due to cultivation, which activates growth, and sometimes the land is very rich, resulting in rank growth being made during the season, and taking longer to ripen down. The kind of weather in the fall also has its effect on the time of maturity. If warm and bright, the plants will continue growing, thus maturing late.

Colouring:

The autumn colouring of our leaves and shrubs is a continual source of inspiration to our poets and painters. We can easily understand why this should be so, although we ourselves may be neither poets nor painters. There is such an array of colour, that with the bright sunshine we feel that the world is not such a bad place after all, "And every bush's afire with God." Mixed with this glad feeling or restfulness is a bit of sadness, because we realize, that the glories of the year are departing. The next few months will be dreary, and it seems as if nature is having one big farewell party to announce her seclusion for this period. Everywhere is a blaze and riot of colour. Not the pure scarlets, crimsons and purples, but their harmony helps to tone down the brilliancy. So while we are stimulated by them, we are not excited but rested.

The autumn colouring begins about the first of September, but reaches its grandeur in the middle of October. The different shrubs have their own particular colouring, and it is the mixed mass of them that gives us the perfect picture.

The coloration usually begins at the veins of the leaf, extending outwardly till the whole is tinted. This may occur in irregular patches, giving a splashed appearance; or may be tinted fairly uniformly from pale to bright. Reds predominate in shrubs, but we also find yellows, purples, browns and orange.

Many people think that the colouring in the fall is due to the action of frost, but as I have shown before, this is an entirely wrong impression. The frost rather destroys the

colouring, and once touched the leaves turn brown and soon fall to the ground. The most brilliant autumn colouring occurs when there has been a wet summer, a cool autumn and comparatively little frost.

The action of frost and heat on leaves is absolutely the reverse. The frost browns and crisps them, the heat fades them out, giving paler shades. This is very noticeable in a warm fall; the atmosphere, too, seems to take on a pale yellowish tinge, simply because the trees and shrubs have little scarlet, reds, or orange in their colouring.

All shrubs do not materially change their colouring. In fact, some stay practically green until the leaves fall - the alders.

Hardiness: The term hardiness may be applied to leaves, as well as to the roots or branches with exactly the same meaning. In its widest sense it indicates resistance to all kinds of unfavourable conditions, but we generally use it with the meaning that it can withstand certain conditions.

Leaves are tender or hardy, with intermediate stages. They may be smooth, shiny, thick or thin, and they may also have one or more of the above characteristics. Leaves thick and leathery, as a class are not susceptible to insect and fungus diseases, while the tender and succelent offer no resistance whatsoever to them - The mahonia, if planted in an exposed position will sunscald. The roses are very susceptible to rust, lilacs to mildew, and the common barberry to wheat rust.

Density: The density of foliage varies with the variety

of shrub, the fertility of the soil and the weather conditions of the season. In wet seasons we have more dense rank growth than in dry seasons, and if the soil is very fertile we get better growth of the plant and, of course, more foliage. The more leaves on a plant the healthier it is, and the larger it will grow, because there are more leaves to manufacture the necessary food. If there is too much growth in a plant, it can be pruned to produce either buds or leaves. The Lonicera is a dense foliage growing plant, while the Forsythia is a sparsely foliage growing plant.

From the preceding pages you will see that leaves play a very great part in the life history of our shrubs. They are noticed first in spring and last in the fall. We wait patiently in the spring to get a glimpse of the first leaves.because we associate with them the most cheerful and delightful of seasons. In summer we still like them because they are so cool looking. The green colour gives constant pleasure to the sight without producing weariness, and moreover, an important point is that their density affords a hiding place for small birds. There is a healthful freshness in a mass of foliage that appeals to us greatly.

The different colours that foliage assumes could could almost help us determine the time of year - the pale green shades denote the spring; the darker and more uniform green the summer; and the brilliant colouring of red, crimson, gold and

bronze, the autumn.

Foliage gives a background for flowers and fruit - giving harmony and not discord. In nature we find very little variation in the foliage, but some has been produced in the breeding of our horticultural varieties. They do not blend very well with massed shrubs, but are used to better advantage as individual specimens.

Flowering and fruiting habit:

All ordinary shrubs produce flowers, from transformed leaf buds. The organs of the flowers are morphologically leaves. Their form, colouring, texture and venation ,depart but little from those of green leaves, but they do not serve in the function of assimilation or photo-synthesis to nearly as great a degree as do green leaves. Instead, they are especially adapted for the propagation of the species.

The flowers and inflorescences of different shrubs differ conspicuously in complexity. To the essential organs of the flower, the stamens and pistils, there may be added protective or attractive organs, namely; petals and sepals. These may be modified and increased in many ways.

Usually the shoots or branches which immediately bear the flowers, differ in certain respects from those bearing the foliage only. The differences often are: in the manner of branching; in alterations in the length and thickness of the internodes; and in changes of disposition, form, colouring and

texture of the leaves in proximity to the flowers. A complete flower consists of pistils, stamens, petals and sepals. An incomplete flower may have one or more of the above absent. They are usually arranged in successive whorls on a short axis known as the receptacle.

The essential work of the flower is to secure the transferring of pollen grains from the stamens to the stigmas. Pollen may be carried in many ways, by wind, insects, or by special adaptations of the flower in the flower itself. This last is called self-pollination.

Most flowers develope bright colours, scent, and honey to attract insects and many modifications are found in flowers to allure the insect or insects that will pollinate them. It may be a long deep corolla tube, for an insect with a long proboscis, or the honey placed in such a way that before the insect reaches it he has already transferred the pollen from his body to the waiting anthers. There are many modifications and devices too numerous to mention, but with all with a certain idea - to have pollen transferred.

It has been found that the wind pollinated flowers have less complexity in their structure than the insect pollinated flowers; and that the flowers with open cups accessible to the lower order of insects, as the beetle, are not as complex as the flowers with the long tubular corolla, pollinated by the higher order of insects, as bees, moths and butterflies.

Colour changes follow similar lines of development. The simpler flowers are small, green and inconspicuous. A stage, higher they are larger, yellow and white in colour; while the

tubular and more complex flowers are often red, blue or violet.

The flowers pollinated by the wind have usually the following characteristics: the flowers are small, not showy, unscented and without honey; the anthers are large and on long slender filaments; the pollen is dry, powdery and abundant; the stigmas are large and feathery and a large surface is exposed to catch the pollen. Most of the forest trees and some shrubs and wind pollinated - cedars, arbor - hippophae, birch, beech.

The flowers pollinated by insects are the more familiar and attractive species, and have the following characteristics: usually brightly coloured, often scented and have nectaries. The pollen is sticky, readily adhering to the bodies of insects (The bee uses it for food, and is equipped with little baskets on their legs for gathering it.). The stigmas are small and frequently placed in a position favouring pollination. Snails crawling over the flowers may pollinate them. The bright scarlet flowers are often pollinated by humming birds. Most of our shrubs and other flowers are pollinated by insects:-

Berberis, Pyrus, Rosa , Ribes, Viburnum, Mahonia, Prunus, Cotoneaster, Sambucus, Lonicera, Syringa, Ligustrum.

Many flowers merely attack various kinds of small insects by their colour, scent, honey or pollen, but there are some flowers that have nothing especially attractive yet are pollinated. The Sambucus is one of these having neither honey nor any special mechanism. Again, we may have flowers which

are very attractive to insects, because of their honey and sweet odors but minus any special mechanism to insure pollination. The following belong to this group:

Rhamnus	Rhus typhina
Prunus	Cotoneaster
Pyrus	Ligustrum
Syringa	Cornus

The flowers on a shrub may be situated terminally or axillary, either solitary or in various forms of clusters. The different forms of cluster are: racemes, umbels, corymbs, cymes, spikes and panicles, and they may be simple or compound.

Example of a simple raceme -

Prunus padus

Berberis

Mahonia

Example of an umbel -

Prunus Avium

" Amygdalis

" Besseyi

Example of a corymb -

Craetagus

Pyrus

Example of cymes -

Viburnum lantana

Amelanchier

Sambucus

Viburnum Opulus

Example of cymes (continued) :

Lonicera

Rhamnus

Example of a spike -

Harit

Alnus

Populus

Examples of panicles -

Hydrangea grandiflora paniculata

Spireae sorbifolia

The range in colour of flowers is strictly limited. There are very few pure colours, but we have hues; and from the different hues we get out shades and tints. The hues of flowers, roughly described, comprise: yellow, gold-yellow orange scarlet, red, crimson magenta, purple, violet and ultra-marine. The admixture of white with a hue produces a tint, and the admixture of black a shade. The colours of the different shrubs on the Macdonald College Campus are tabulated in Table I.

The fruiting habit of shrubs may be divided into four classes:-

a. "unipistillary"; those which result from the ripening of a single ovary;

b. "aggregate fruits";those which result from the ripening of a cluster of carpels of one flower, massed together;

c. "accessory fruits"; those in which the main bulk of the fruit consists of something else besides the carpels,

for example, the calyx or receptacle added to a simple or aggregate fruit;

d. "Multiple or collective fruits"; those which result from the combination of the ripened ovaries of two or more flowers into one mass considered the fruit is the ripened corpels with their enclosed seeds; and its purpose after protecting the seeds is frequently extended to dispersing them.

There are truefruits and false fruits, and they may be divided into simple or collective or aggregate fruits. Many fruits are dry when ripe, other are fleshy or succulent. Dry fruits that open in various ways splitting down the back and front or by pores near the apex, to allow seeds escape are called dehiscent fruits. Dry fruits that never split open their thick protective coats until germination begins are known as indehiscent fruits. Succulent fruits do not split open when ripe, and their seeds are protected by hard coats. The drupe, berry and pome belong to this class.

Many plants have fruits of the simple or "capsular"type - when the pericarp (fruit wall) remains thin and dry, forming a pod, and opening by one suture only to allow the seeds escape it is called a follicle. When the fruit has the same characteristics as the preceding, but splits down both sutures, it is termed a legume. Some fruits appear pod-shaped, but they open by two valves, leaving the placentae and seeds behind attached to the two sides of a sort of frame. These fruits

belong to the silique type. The Cruciferae have this type of fruit. We have seen that capsules may be pod-shaped, or long and pod-like. They may also be globose or cordate. In particularly all of them the seeds excape and so they are dehiscent. Many of our shrubs have this fruiting habit.

When the ripe fruit contains only one seed, does not dehisce, but the hardened pericarp must rot before germination begins, it is known as a nut. Some of our shrubs have these nuts. Most nuts have a shell-like covering over them called a cupule, and it may be smooth or prickly. Another form of the not type is the achene. An excellent example of it is the Potentilla and the Rose-hip.

The above fruits are dry fruits. We shall now discuss the succulent fruits. The simplest type is the drupe or stone fruit. It comes from a single carpel and the endocarp (inner-wall) forms the stone around the seed.

The berry is another extremely common type of fruit. In it the endocarp and the mesocarp,(fleshy-portion) is succulent. The berberis belongs to this group.

The last class of succulent fruits is known as the pome. To it belong the apples, pears and quinces. It consists of a several-loculed ovary, - the seeds and the tough membrane surrounding them in the core, enclosed by a fleshy edible portion, makes up the main bulk of the fruit.

Fruits are borne solitary or in clusters, either terminally or axillary. They may be dispersed by (1) wind in various ways, (2) water, (3) animals (4) and propulsive mech-

anisms. When dispersed by wind, they must be comparatively light, or aided in some way by a floating device, either a parachute formation, or by wings. Those dispersed by water are usually from plants growing quite near a flowing stream or body of water. Dispersal by animals is a common way. They are eaten by animals and pass uninjured through the food canal. Birds carry seeds great distances in mud adhering to their feet, and they also eat them and they are passed through their food canal unharmed. Sheep and goats may carry them in their coats. Mice and squirrels collect nuts of various kinds for their winter food supply.

The plant itself may have devised a way of dispersing its seed. Tensions are set up in the fruit coat, as the fruit ripens and dries, which results in a sudden bursting, and the seeds are shot out several feet. The Caragana is of this type. The fruiting habit of the different shrubs is tabulated in table I.

Amount of bloom: The value of shrubbery does not depend altogether on the bloom that the shrubs can produce; therefore we must pay attention also to the foliage and habit of the plant.

Bloom: There are a great many early, a few midsummer and a great many late flowering shrubs. The early flowering shrubs may flower before the leaves appear with them, or after them. When the flowers appear before the leaves, as in some of the Prunus group, the limbs and branches are completely hidden with blossoms. This may also occur when the blossoms appear with the leaves, because the blossoms develop more quickly than the

leaves and finish dropping their petals, just about when the leaves are mature.

Take for instance, the Cydonia Japonica, in spring the bush is completely laden down with bright red flowers(that is if it has had proper winter protection). In about one month the flowers are gone, and the foliage which appeared with the flowers is a bright green, still developing in size.

The Forsythia is another early spring flowering plant that excels in bloom. The flowers, golden in colour and bell-shaped, appear long before the leaves. Its blossom buds are easily winter killed and should be given some protection. It normally is covered with bloom, but on the college campus the blossoms only appear below the snow line of the preceding winter. The lower branches have blossoms, but the upper ones have not. The summer foliage of the Forsythia is thin and sporse, therefore its value lies in its early spring flowers. .... The Pyrus group and Spirea prunifolia are other shrubs having the same effect as the preceding.

Shrubs appearing after the leaves are usually borne on long stems, in comparison with the others we have mentioned, which were sessile or practically so. They may be in clusters or solitary, terminally or axillary, just as the others, but in order to have the sunlight, they must extend beyond the leaves. A great many plants do this - Viburnum opulus, Spirea van houttei.

The mid-summer blooming shrubs have their flowers

borne in panicles, cymes, or racemes, rarely solitary. They are not quite so heavily laden with bloom as the early flowering shrubs.

The late-flowering shrubs bear their flowers usually terminally, in flat cymes or panicles, and they are like the mid-summer flowering shrubs in not being completely covered with bloom.

The amount of bloom in all cases depends on the climatic conditions throughout the year. If the winter is severe a great many of the blossom buds may be killed, or the stems themselves may be killed back more or less. But if there is a great deal of snow, or other covering is given to protect them, they will not kill back. Again, if the spring is wet and cold, it may damage the buds and cause loss in bloom. And if it is hot and dry through the blooming period, the flowers may not properly develop, being small or shrivelled up and not opening. One of the objects of pruning is to produce greater quantity of bloom. If summer pruning is practised more blossom buds will form than leaf buds; and, therefore, we will have more bloom, provided the many other conditions are favourable.

Blossom buds are transformed leaf buds, and are determined the season before flowering. I should like to refer you to table I, which shows the amount of bloom of the deciduous shrubs on the Macdonald College campus for the season 1919.

Hardiness : The satisfaction in shrubs as in any other type of plant, lies in their vigor and healthiness. All plants are usually hardy in their own habitat, but may become tender when removed to a colder climate, requiring more or less protection. The general understanding of the word "hardiness" is that the plant is able to withstand the winter of the given place.

Shrubs are usually classified as hardy, half hardy or tender. A hardy plant is supposed to stand an ordinary winter, and the ordinary conditions of the spring and summer. A half hardy plant needs protection in the winter, and may need special cultural attention in the spring and summer, by adding fertilizers or conserving the moisture for it. A tender shrub is usually planted so that it can be easily removed indoors for the winter. However, they should not be planted, because they require a great deal of time and attention. Table I gives the hardiness of the deciduous shrubs on the Macdonald College campus.

Mature shrubs can withstand severe winters much better than two or three year old plants. This fact should be kept in mind when planting a shrubbery, and if protection is given for a few years, the result will be strong healthy specimens. Situations near the sea, or other large bodies of water, are as a rule favourable to tender plants. It is best to find out the varieties that do well in the desired neighbourhood, or where there are similar conditions as to soil, moisture, exposure and altitute. The variation in temperature of the place should be ascertained. The dryness of the atmosphere in

winter has a bad effect on shrubs, often killing them back to the snow line. Exposure to winds is very hard on shrubs, as it activates evaporation. Spring frosts retard the growth of shrubs making them late in blossoming and unfolding their leaves. The temperature is more uniform near large bodies of water, and is therefore not so hard on the plants. It has a retarding effect of frost in autumn, giving the plants time to ripen down, and retards growth in the spring, thus they avoid the severe frosts.

In June and July we have the greatest precipitation, and the greatest amount of development. Droughts sre very disastrous sometimes, especially if prolonged. A plant uses an enormous amount of water and suffers if it does not have it.

Show in winter is the best protection for shrubs; it protects them from the winds, does not allow the cold to penetrate, and they can breathe easily. Rain and ice in winter are very bad for shrubs. The rain thaws the plants out and makes them tender for the next frost. The ice covers them, causing them to break, and if it stays on very long, the chemical reactions of the plant are interrupted, resulting in injury.

To make shrubs harder than they naturally are, grafting is often done. Grafting can be done by cion, bud or root grafting.

The condition of the soil also is one of the requirements for healthy, vigorous, hardy plants. It should be well prepared loamy soil, of sufficient depth and body to retain

moisture during long spells of dry weather. Soil conditions are not always ideal and yet the plant grows vigorously. This is due to many things, one being adaptability or hardiness of the plant to resist the undesirable conditions.

Diseases of Plants:

It is often difficult to distinguish clearly between disease conditions and abnormalities, but "disease in plants may be defined as any derangement or disorganization of the normal structure or physiological functions of the plant." Formation of galls, cankers or distortions, rotting of plant parts or disturbances in the sap system causing wilting, dwarfing, and chlorosis are all disease conditions, and are the results of some injury.

Diseases in plants have been known since the earliest time. They are mentioned in the historical writings of the Hebrews, Greeks and Romans. They were only recognized then under the indefinite terms of blights, rusts, cankers and mildews.

The diseases of plants are constantly becoming more numerous, and the knowledge connected with them more complex: because of the wide dispersal of the parasites into new regions; the increase of food supply due to new and more extended cultural methods and to changes in habits of parasites and hosts as they become acclimatized.

The study and control of fungous diseases is of fairly recent development and known as Phytopathology. Fungi may act locally or generally; restricted, slow and insidious or virulent and rapidly destructive. Fungi are termed Saprophytes and Parasites. They are usually short-lived and the arrangements for reproduction are usually provided for on a very lavish scale. This explains

rapid extension of a disease which has once gained a foothold among similar plants that are grouped together. This rapid type of reproduction is called conidial, and is active in the summer only. The winter form of reproduction is by oospores, and is not nearly so rapid in being distributed. The above are parasitic fungi, obtaining their food from living plants. They are deposited on the leaves, fruit, or other parts of the host-plant germinating at once, and entering the tissue. The spores are carried by wind, insects, birds, snails, slugs, dogs, rabbits, etc.

Saprophytic fungi grow on dead organic matter, and are not injurious to the living plant. Wound parasitic fungi are very detrimental to trees and shrubs. They are not capable of penetrating living tissues so enter by a wounded surface. Fungi need moisture in order to germinate, and are more prevalent in humid than in dry districts. Fungi are perhaps responsible for the greater number of the diseases of plants. However, there are other agents causing disease. Some bacteria are injurious as also myxomycetes or slime molds. Parasitic flowering plants cause more or less injury. Nematodes injure plants by destroying the fine feeding roots and causing galls and swellings. We also have physiological diseases a term used to include all the diseases that cannot be attributed to come organism.

Control of Diseases:

By this we mean a reduction of the losses ordinarily sustained. There are four fundamental methods of plant

disease control: (1) exclusion, (2) eradication, (3) protection, (4) immunization.

Exclusion: is the passing of laws forbidding the importation of plants affected with diseases that have not as yet occured in the country.

Eradication is the eliminating of the diseases already established. This is hardly ever effected.

Protection is used when the disease is generally and very thoroughly established. Spraying is the most commonly employed protective measure, and the spray used is known as a fungicide. Fungicides of various types, and may be applied in liquid form, or in dry form. To be effective fungicides must be applied before the disease appears. Spore germination takes place under moist conditions and, therefore, fungicide must be applied before, and not after rainy weather.

Immunization is giving the plant conditions to render it immune. This is done by selection and propagation of plants naturally immune. The following are the fungicides most commonly used:-

Liquids . The numerous peculiarities as to conditions, types of disease, modes of attack, differences in plants affected, allow us to have special methods in combating or controlling the diseases. The above features if closely studied, often afford means of complete prevention.

The following are the fungicides most commonly used:

Liquids (1) Bordeaux Mixture
(2) Ammoniacal Solution of Copper Carbonate

(3) Solution of potassium sulphide
(4) " " iron sulphate
(5) " " potassium permanganate
(6) Paraffin - Formalin - Lysol.

Dusts (1) Sulphur
(2) Quicklime

The diseases most often found on shrubs are here listed:-

Prunus (Almond)	Leaf Blister - Peach Blight
Amelanchier	Rust - Witches' Broom
Pyrus	Apple Blight - Canker - Scab
Berberis	Rust
Prunus (Cherry)	Brown Rot - Powdery Mildew - Black Knot
Cornus	Twig Blight
Cotoneaster	Rust
Currant	Cane Blight - Mildew - Rust
Forsythia	Leaf Spot
Hydrangea	Leaf Blight
Ligustrum	Anthracnose
Lonicera	Canker
Russian Olive	Limb-Gall or Knot
Potentilla	Leaf Spot
Quince	Rust - Leaf Scald
Rhamnus	Rust
Rhus	Canker - Twig Blight
Rose	Mildew - Stem Blight - Rust
Sambucus	Canker
Spirea	Rust
Syringa	Mildew - Twig and Bud Disease

These diseases were found on Macdonald College Campus:-

Lilac Mildew	(Microsphaera alni)
Rose Rust	(Phragmidium subcorticatum)
Rust on Buckthorn	(Puccinia coronata)
Rust on Barberry	(Puccinia graminis)

Insects.

All insects are not injurious. Some are beneficial. The injurious ones, however, number into the thousands, and the losses incurred through them into the millions of dollars. As it is a most extensive subject, I shall merely take up the injurious insects of the deciduous, ornamental shrubs.

To keep insects from defoliating and in other ways injuring shrubs is a difficult task. Prevention, of course, is the proper way to keep shrubs free from insects, but this again is not easy. However, if we keep the rubbish cleaned up, burn infested twigs and encourage birds we will have done something towards prevention.

Insects differ greatly in their habits and life history, so the methods of control must also vary. Their range of distribution and their number are greatly influenced by temperature, winds, rainfalls, attacks of parasites and predacious enemies, fungous and bacterial diseases, and amount of food to be had. When considering control these things must all be taken into account.

Many injurious insects have been introduced into

Canada by the importation of Nursery stock. Many inspection laws have been passed, and these help in some degree to keep out foreign insects.

The most effective way to control insects injurious to shrubs is by artificial methods, such as:

1. Application of insecticides against(a) biting insects and (b) sucking insects.
2. Use of fumigants.
3. " " repellent substances
4. " " protectors

Our methods of controlling insects are constantly changing as new facts are discovered, new methods and new insecticides invented. The essential requirements for a satisfactory insecticide are:-

1. Effectiveness against insects
2. Safty regarding foliage
3. Cheapness and ease of applying it.

The insecticides which poison by being eaten are used to control the biting insects and insecticides used for corroding or filling up the breathing pores, called contact poisons, are used for sucking insects.

The poisons for biting insects are:-

1. Paris Green
2. Arsenite of Lime
3. Arsenate of Lead
4. " " Lime
5. Hellebore
6. Sodium Fluoride

The above are usually applied in the liquid spray form. Dusting, however, is being very much advocated, and splendid results have been obtained from it, with less cost for labour, but about same for spray material. The mixtures commonly used for dusting are:-

1. Sulphur and Arsenate of Lead
2. " " " " " and finely ground Gypsum
3. Sulphur, Arsenate of Lead and Hydrated Lime.

The contact substances for sucking insects are:-

1. Lime-sulphur wash
2. Whale-oil soap
3. Tobacco decoction
4. Kerosene emulsion
5. Miscible oils
6. Pyrethrum
7. Lime dust
8. Commercial Sodium Fluoride
9 Carbolic Acid Emulsion

The fumigants used are:-

1. Carbon bisulphide
2. Hydrocyanic acid gas
3. Sulphur dioxide
4. Tobacco
5. Formalin
6. Carbon tetrachloride

The repellent substances used are:-

1. Bordeaux mixture
2. Tobacco dust

3. Carbolic acid emulsion
4. Kerosene
5. Turpentine
6. Coal tar
7. Naphthaline
8. Creolin

The protectors used are:-

1. Metal or sticky bands
2. Cheesecloth or muslin screens
3. Wire netting

The insects do the damage usually in their larval stage so the control should come before this. The following is a list injurious to shrubs:-

Prunus (Almond)	Black scale - Cottony cushion scale- Clover mite - Pear thrips - San José scale
Pyrus	Aphids - Curculio - Flea Beetle - Leaf hopper - Leaf roller - Apple maggot - Brown tail moth - Bud moth - Fall canker worm - Spring canker worm - Codlin moth - Green fruit worm, etc.
Berberis	Barberry plant louse
Cornus	Oyster shell scale - San José scale - Borer
Cotoneaster	Pear leaf blister mite
Ribes	Borer - Aphis - Span worm - Currant worm - Oyster shell scale - San José scale - Four striped plant bug.
Evonymaus	Evonymous scale - Red scale
Olive	Black scale - Thrips - Red scale
Ligustrum	Privet web worm
Cydonia	Green Aphis - Curculio - Slug - Round-headed borer.

1. THE VIBURNUM APHIS - SHOWING THE WRINKLING OF THE LEAVES.

2. THE SAMBUCUS BORER - SHOWING THE INJURY OF THE PITH.

I.

II.

Rose	Mealy bug - Rose Aphis - Chafer - Beetle - Leaf hopper - Midge.- Scale - White fly
Rhus	Apple tree borer - Jumping Sumach beetle
Amelanchier	Red spider
Spirea	Sesiid borer - Sawfly -

The shrubs on the Macdonald College Campus injured by insects during the season of 1919 were:-

Amelanchier	Red spider
Sambucus	Borer
Viburnum	Aphis --Cornus - Oyster Shell Scale

The Amelanchier was not seriously injured by the red spider, but it did injure it to a slight degree, by piercing the leaves and sucking the juice from them.

The Sambucus borer did a certain amount of damage to the young growth burrowing through the pith.

The Viburnum Opulus Sterilis was quite badly injured by Aphids making it unsightly. They cause the leave to wrinkle, roll up, and to develop abnormally. The blossoms are also affected by being smaller and not developing normally.

The older twigs on the Cornus shrubs are badly infested with oyster shell scale. The scale does not kill the shrub, but weakens it.

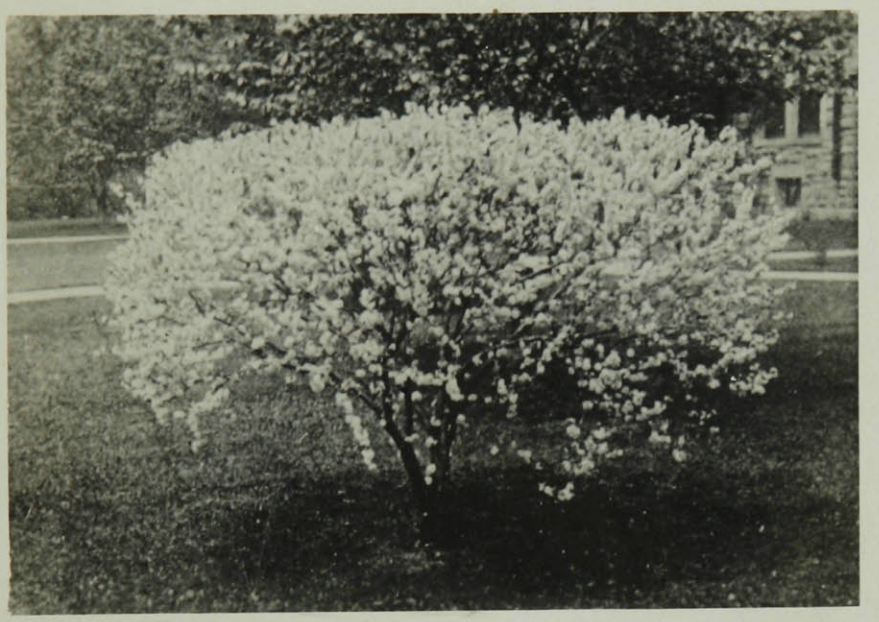
" The orchard trees are white,
For the bright May sun is shining,
And the blossoms show
Like a drift of snow
From a cloud with a rosy lining."

Pyrus

This is one of the many species of Rosaceae and includes all the kinds of pears, apples and crab apples. Many of them are grown for their fruit which fact we greatly appreciate. Others are grown for their handsome fragrant early fflowers, attractive habit of growth, foliage, and little

fruits. The ornamental ones are woody plants, bearing mostly on spurs, The flowers occur in clusters of snowy white or pink, appearing with the leaves or before them. They are native to the cooler climates, and most of them are hardy in Canada. The Asiatic species of crab apples give us the most numerous of the ornamental Pyrus. They bloom profusely when only a few years old, and the pink and white effect of blossoms and buds as the leaves are unfolding or just preceding the leaves is a very beautiful sight. Some of them hold their small berry-like fruits well into the winter. A great deal of hybridizing has been done with this group. They are extremely hardy although the fruit produced is not very large, it is of economic value in the North.

Pyrus Japonica, P. Maulii and P. Ioensis are grown on the College Campus. P. Japonica and P. Maulii are as often classed in the Cydonia group as in the Pyrus group.



"Ah, dainty flowers! Right well ye testify
That 'twixt our sordid earth, our murky sky,
If man so will,
Things pure and fair and sweet may blossom still."

Prunus

These are pink and white flowering shrubs of wide distribution grown for their fruit, and for their ornamental foliage and flowers. Included under Prunus are the plum, cherry, peach, nectarina, apricot and almond. They are all woody plants, mostly flowering in spring, solitary or in clusters either preceding the leaving or appearing with them.

There are probably one hundred and seventy five species mostly in the north temperate zone. Many of the Prunus group are commercially important from their fruiting habit, but the ornamentals are also important, and in them we have double flowering, variegated leaves, coloured leaves and weeping forms. They are very useful for spring gardens as they make great display, but their season of bloom is short.

Some of the species are not grown on their own roots, but are grafted on hardier and cheaper stocks. The stocks used for this purpose are - Prunus domestica, P. cerasifera and P. avium.

The Japanese flowering cherries are particularly beautiful and attractive, but they are not very well known in this country. They produce great masses of showy flowers as large and beautiful as many semi-double roses. Many are being introduced by the Arnold Arboretum.

There is but one Prunus on the College grounds- P. Amygdalus, a flowering almond. It is about fifteen feet high, and is covered in spring with pinkish showy flowers.

Name?

"Delicious symphonies, like airy flowers
Budded, and swell'd, and full-blown,
Shed full shower
Of light, soft unseen leaves of sound divine."

.Keats.

Deutzia

Very ornamental shrubs grown for their showy white or blush flowers appearing in spring or early summer. They belong to our most beautiful and most popular ornamental shrubs. There are about fifty species in Eastern Asia, the Himalayas and in Mexico. They are upright with gently arching

slender branches, and bright green oblong lanceolate leaves. They flower profusely when properly cared for. The flowers are in panicles rarely in racemes or in corymbs, mostly white in colour though sometimes purplish. The fruit is a capsule three to five celled with numerous minute seeds.

The Deutzias thrive in almost any well-drained soil, and are well adapted for borders of shrubberies. They are not very hardy here killing back very badly, but each year vigorous new growth is made. The blossom buds kill back as far as the snow line, and so are not as profusely covered with blossoms as they should be. They are very fragrant, however, and we appreciate even the few that do bloom. They should not be pruned very much only thinning out the old wood. The varieties grown on the College Campus are:

Deutzia Pride of Rochester

" candida

" gracilis

Range

" To raise Flowers is a Common thing
God alone gives them Fragrance."
Oriental Proverb.

Forsythia

Shrubs grown for their wealth of bright yellow flowers, appearing early in spring, and for their handsome dark green foliage. They are commonly known as Golden Bell, and are highly ornamental free flowering shrubs. There are only four species in China, Japan and South East Europe. They belong to the showiest early flowering shrubs, and have handsome clean foliage remarkably free from insects or fungi remaining unchanged until late in fall. Some varieties are upright and some are pendulus. The upright forms are well

adapted for borders, or as individual specimens. The pendulus form is used for covering walls, fences, arbors or porches. They grow in almost any kind of soil, and are fairly hardy north. The flowers are borne in the axils in clusters of one to six and are produced in great profusion along the slender branches in early spring before the leaves appear. The fruit is a two celled capsule containing many winged seeds. They are not hardy here, the blossom buds winter killing down to the snow line, but on the lower branches they blossom freely and are very fragrant. Forsythia fortunei is grown on the College Campus.

Name

" How sweetly smells the Honeysuckle
In the hush'd night, as if the world were one
Of utter peace and love and gentleness."

Walter Savage Lander.

Lonicera

Ornamental deciduous, rarely evergreen shrubs of upright or climbing habit. There are about one hundred and forty species throughout the Northern hemisphere of which about sixty are in cultivation. The foliage is dark green and the flowers white, yellow, pink, scarlet or purple in colour, are very fragrant. They are borne axillary or terminally in spikes or clusters. Following the flowers are the fruits which are very ornamental often staying on the shrubs until mid-winter. They are small berries, red, yellow, blue or black in colour. The bush honeysuckles are valuable for shrubberies. They are quite hardy and thrive in any good garden soil. The varieties grown on the College Campus are:

Lonicera Tatarica Rubra

" Tatarica alba

In early summer they are covered with sweet scented flowers, and in the fall with bright red berries. They have grown to about fifteen feet high and are very beautiful shrubs.

"Rich Syringas, all honey-sweet.

Elizabeth Akers.

Philadelphus

This shrub was named for an ancient Egyptian King, Ptolemy Philadelphus. It is also improperly called Syringa. It is an ornamental shrub grown for its attractive fragrant flowers in early summer. The flowers are mostly white or creamy white, in racemes, solitary or in cymose groups of one to six

flowers. There are about thirty five species growing mostly in Asia and America. They are well adapted to shrubberies. Most of them do not grow very high, the tallest being about twenty feet. Philadelphus coronarius and P. inodorus are grown on the College Campus. P. coronarius has very fragrant flowers in June and is about ten feet high. P. inodorus is similar to the preceeding, but has not the fragrant odor.

"A garden fair, and in the Corners set
An Herbere greene, with Wandis long and small
Railit about."

King James I of Scotland.

Ligustrum

Ornamental shrubs or trees, grown chiefly for their foliage and their use as hedge plants. There are about thirty five species, chiefly in Eastern Asia, and the Himalayas south to Australia, one in Europe and North Agrica. The common name is Privet. They are evergreen or deciduous shrubs with entire leaves. The flowers are whitish, fragrant borne in terminal panicles, and the black berry-like fruits are very decorative, sometimes remaining on the shrubs throughout the winter. They are not very hardy as far north as this, although they will grow fairly vigorously and become good sized shrubs. They are valuable because of their clean, dark green foliage which is rarely attacked by insects or fungi, and which remains unchanged until late in the fall, then becoming dark

reddish. The Privets will grow in any soil, and some species are valuable because they will stand the dust and smoke of cities. The varieties grown on the College Campus are:

Ligustrum vulgare

" variegatum

" ovalifolium

Hydrangea

Ornamental woody plants grown chiefly for their showy white, pink or blue flowers. There are about thirty five species in North and South America, the Himalayas and Central and Eastern Asia. About twenty of them occur in China. They

are highly ornamental mostly low shrubs, rarely vines with medium sized and large leaves. The flowers are small white bluish or pinkish in terminal panicles or corymbs, often with sterile marginal flowers. In some varieties all the flowers are sterile and enlarged. The fruit of the fertile varieties is a two to five celled capsule with many minute seeds. They grow best in a rich porous and somewhat moist soil, and will grow fairly well in partial shade, but flower more freely in full sunshine. All Hydrangeas are well adapted for shrubberies especially H. paniculata and H. opuloides. They are also very showy as single specimens. To get large panicles of flowers severe pruning must be practised. H. paniculata grandiflora is grown on the College Campus. It begins blooming in August and each terminal has it panicle of flowers. They are creamy white, the sterile one later changing to shades of purple.

Ribes

Woody plants grown for their edible fruits chiefly, but also for their handsome foliage, flowers and fruits. They are unarmed and prickly shrubs. The flowers may be solitary, few or many in clustered racemes. The fruit is a many seeded berry, crowned by the remains of the calyx. There are about one hundred and fifty species in the colder and temperate regions of North and South America, and in Central Asia, Europe and North Africa. The ornamental kinds are usually low, upright shrubs, somewhat spreading with fragrant flowers. Their fruits are most attractive and the autumn colouring is brilliant in shades of red, scarlet and orange. The flowers appear in

Spring with the leaves and the fruits ripen in June and July, remaining on the branches till mid-winter. Ribes aureum is grown on the College Campus. It is a low shrub three feet high with slender arching branches simply covered with fragrant bloom in late May.

Its spreading habit?

Rhamnus

Ornamental woody plants grown for their beautiful shiny foliage and attractive fruits. They are very pretty shrubs with bright green large leaves with conspicuous greenish flowers in clusters, usually axillary appearing in June and July, followed by berry-like red or black fruits. There are about one hundred species native chiefly to the temperate regions of the Northern hemisphere. Many of them are hardy and they are particularly useful for planting in shrubberies. They like a fairly moist soil and will grow in part shade. Their especial attractiveness is their fruits, which are first bright red then gradually turn to bluish black. They hang on the trees till Spring. The Buckthorn is the host plant of the oat rust. Rhamnus carthariticus and R. frangula are on the College Campus.

"And the lilacs, overwhelmed with blossoms,
Drooping like a wounded warrior's plume,
Hang their faint heads heavy with perfume."

Elizabeth Akers.

Syringa (Lilac)

Beautiful ornamental woody shrubs grown for their showy, fragrant various coloured flowers. They are large shrubs from twelve to fifteen feet, with bright green, medium sized foliage and covered in their season from late May to June with a profusion of flowers in showy panicles of lilac, purple, white, blue and red. They are very popular, and hardy any garden or park is found without them. They have a very

fragrant odor, but in some varieties it is very heavy. There are about thirty species practically all are hardy north. They are very showy when in bloom especially when massed in groups of only a few species with harmonizing colours. The foliage is bright green and drops earlynin the fall. It is susceptible to a mildew - Microsphaera alni - sometimes effects it very badly. After blooming the inflorescence should be removed, as it is unsightly, and the energy used in producing seeds could be used elsewhere. They grow in almost any soil and are easily transplanted. There are a number of groups on the College Campus including the following varieties:

Marechal de Bassompierre

Madame Lemoine

Bertha Dammann

Alphonse Lavalle

Marie Legraye

Belle de Nancy

Rothomangensis

Gloire de Lorraine

Jonkala

Abel Carvier

Congo

Maxime Cornu

Corinne

Rubra de Marley

Charles X

Princess Marie

"An elder or two
Foamed over with blossoms white as spray."

Lowell.

Sambucus

Ornamental woody plants grown for their handsome foliage, showy clusters of white flowers and attractive red or black berries. They are rather large coarse shrubs, spreading by suckers, having pinnate foliage and large flat or panicled clusters of white or creamy white flowers followed by red, black, green and yellow fruits. They are well adapted for mass planting and are very effective in bloom and in fruit. Some species possess medicinal value in their wood, and the berries are made into wine.

Those grown on the College Campus are:

Sambucus nigra aureum
" racemosa
" laciniata Canadensis
" aurea

"The rose looks fair, but fairer we it deem
For that sweet odor which doth in it live."
Shakespeare.

Rosa Rugosa

Ornamental shrubs grown for their attractive foliage, flowers and fruit. They grow six to eight feet high and in spring are practically covered with fragrant bloom. The flowers pink, dark red or white are solitary or in corymbs at the end of usually short branches. They appear from May till September. The leaves are shiny and dark green above and hairy beneath. It has very dense foliage, and the stems and branches are thickly set with prickles and bristles. The fruit is large, berry-like, called a hip, about one inch across. It is dark red, and stays on the bushes, till late winter and early spring, supplying food for the birds.

They are very hardy, and have beautiful orange and scarlet autumn foliage. A great many hybrids have been produced, some of them producing a distinct new race. There are several clumps of Rosa Rugosa on the College Campus and in the early summer of 1919 were simply covered with bloom.

"Among wild native bushes creeping fast
O'er our neglected fields and pastures bare,
How frequent is the blooming hard hack met!
It's fragrance breathing of a happier past
When in the mother land with thoughtful care
A favoured shrub, 'twas in the hedgerows set!"

Issac Bassett Choote.

Spirea

Ornamental woody plants grown for their profuse handsome white, pink or carmine flowers, There are about seventy species in the temperate regions of the northern hemisphere. They are very popular garden plants, usually low or medium-sized with

rather small foliage and with small white, pink or crimson flowers in thorny corymbs or panicles. Some of them are very hardy and other are more tender. They are divided into groups - early flowering and late flowering. The early ones flower from May to June having white blossoms, and the late ones have pink or white flowers, blooming from June to September. The following are grown on the college grounds:

Spirea Van Houttei
" opuli folia aurea
" augustifolia
" callosa
" Bumalda anthony waterer
" Lindlyana
" sorbifolia
" Billardi
" arguta
" tomentosa

"Like roseate clouds the red buds glow,
And through the woodlands, tinged with hope,
The dogwood's stars as pure as snow
Shine in a happy horoscope."

Ingram Crockett.

Cornus

The Cornus are woody plants that are grown for their attractive flowers and fruits; some species also for the winter effect of their brightly coloured branches. They are highly ornamental shrubs with handsome foliage. Nearly all are very desirable for planting in shrubberies. They grow almost as well in shady places as in sunny positions and they thrive in practically any kind of soil.

The flowers are small, usually white in terminal flat cymes or heads. The fruit is a drupe, being white, red, blue or black in colour.

There are about forty species in the temperate regions of the northern hemisphere and one in Peru.

The name dogwood for Cornus comes from the fact that a decoction of the bark of Cornus sanguinea was used in England to wash mangy dogs.

Most of the species have brilliant fall colouring of red and orange. There are also for winter decoration the red, yellow and green stems, These are most attractive and show up to advantage with snow and an evergreen background. All of them are rank growing shrubs, and should be planted in solid masses or as indivudual specimens with plenty of room for spreading. A number are grown on the College campus of which the following are:

Cornus sanguinea
" variegata
" alberica
" amomum

Potentilla

A large group of perennial, rarely annual herbs and shrubs found throughout the north temperate and frigid zones. They are commonly known as Cinquefoil. They are not very attractive plants, having small flowers. They are long lined, however, will grow in moist or dry soil and are very free bloom-

ing. P.fruticosa is grown on the college campus, is a very low growing shrub, one to four feet high, much branched and with peculiar shreddy bark. It blooms throughout the summer.

Amelanchier

The Amelanchier sometimes known as the Juneberry, Shad-bush, May Cherry, and Service Tree, frequently grows to very large proportions - often as high as thirty feet. The long loose clusters at the end of the branches of white flowers, with petals twice as long as wide, are very pretty and have a delightful odor. The flowers do not last very long, and in a week or ten days the petals have fallen. The fruit sets and ropens fairly quickly being mature the first of July. The ripe fruit is of black purple colour, is sweet and edible, although not very good. The fruit does not ripen at once, and we may have crimson, magenta, plum purple and black on the same tree. This adds to its attractiveness as an ornamental shrub. It is a native to most parts of Canada, and is of striking beauty when covered with blossoms. Leaves are simple and opposite, and in the Spring when unfolding, are reddish in colour, and of very fine texture. Amelanchier Canadensis is grown on the College Campus.

"Earth's crammed with heaven, and
Every common bush
Is afire with God, but only he who sees
Takes off his shoes."

E. B. Browning.

Berberis

Ornamental deciduous or evergreen shrubs grown for their handsome foliage, and their bright yellow flowers and attractive fruit. There are nearly one hundred and seventy-five species in America, Asia, Europe and North Africa.

They are spiny shrubs with yellow flowers in racemes or umbels followed by berry-like fruits of bright red, dark blue, purplish or black colour. Some of the species re-

tain their bright red fruits, fresh and plump until the following spring, while the fruits of other species shrivel and dry up during the winter. The foliage is small, dense and bright green through the spring and summer, changing to bright autumnal colouring. The B. vulgaris and its varieties are hosts for the wheat rust Puccinia graminis.

They are excellent ornamental shrubs, of upright, spreading habit growing from four to eight feet in height, and are valuable for borders of walks and drives and for low ornamental hedges. Those growing on the college campus are B. Thunbergii and B. purpurea.

"Sweet Viburnum, loved of bees,
Wooed by Maytime's softest breeze,
By the fragrant riverside,
Robed in whitness like a bride,
Decked with knots of dainty flowers,
Bathed in springtime's sweetest showers,
Not for thee the withering heat
And the dust of summer's street."

Fred. Lewis Pattee.

Viburnum

The Viburnums are ornamental, woody plants grown for their attractive flowers, fruits and foliage. Mostly deciduous but sometimes evergreens. They are distributed over the northern hemisphere and extend into the tropics. There are

one hundred and twenty species in the world. They are of upright habit usually large shrubs, or small trees, having white or sometimes pinkish flowers in showy flat clusters or in panicles, flowering late May and June. The Viburnums are very handsome shrubs, profusely covered with showy, fragrant bloom. The berries are red, dark blue or black and are very decorative. The foliage is very attractive and takes on beautiful autumnal colouring. Most of them are hardy and very compact in growth. They are well suited for borders of shrubberies and for planting along road sides. The more showy ones can be used for single specimen planting.

The Viburnums will grow in any soil and in part shade, but prefer a moist rich soil and sunny situation.

Viburnum lantana, V.opulus, and V.opulus sterilis are grown on the college grounds. V. lantana, has beautiful clean healthy foliage throughout the season, but the other two are usually badly infested with aphids. This can be avoided by spraying, early in the season about the 1st of May with whale-oil soap, or Nicotine Sulphate, and a second spray, a week to ten days later. If there are aphids after the second treatment a third spray is necessary.

The Viburnum opulus sterilis, in England called the Guelder Rose, has only sterile flowers and so is not as attractive in the fall as the Viburnum opulus which has scarlet berries. These berries stay on till long after the frost and are food for birds. They do not require much pruning but it is better if the very old wood is taken out to encourage new growth. The bush should be kept in neat desirable shape, as it is apt to

"The Sumach dons her jewels
Of garnets glowing hue,
And looks in rustic mirror
The brook, her charms to view."

Ray Laurance.

The Shumach

The Shumach family contains more than fifty genera. Most of them grow in warmer climates than ours. We have, however, a few of them, some growing wild and others cultivated in our gardens. Of these, the most important are, the Staghorn Shumach, the Dwarf Shumach, the Poison Shumach, the Smooth Shumach and the Smoke Tree. The Staghorn and the Smoke Tree are grown on the college campus

The Staghorn Shumach botanically known as Rhus typhina, gets its name from the densely hairy forking branchlets which look very much like the horns of a stag "in the velvet." It is a large shrub, often reaching twenty feet high, taking the form of a tree, but if the suckers are left to grow unchecked they will make a glorious patch. In the spring the mass effect of its fern-like foliage is very beautiful, but in the fall with its autumn colouring it is superb. The flowers are small, greenish yellow, crowded in upright, pyrimid shaped, terminal clusters blooming in June.

The leaves are compound, consisting of eleven to thirty-one leaflets, toothed, whitish and downy underneath, and

towards the ends of the branches a very dense velvet-like crimson tinged down. The fruit is a dry drupe, rounded, somewhat flattened and covered with a crimson down. The fruit is densely crowded like the flowers, forming the staghorn. This often stays on the bush, till late the following spring.

Hippophae

Ornamental woody plants grown for their silvery gray foliage and brightly coloured berries. Two species in Europe, Western and Central Asia. The flowers are dioecious. They are suckering shrubs or small trees with spreading, usually spiny branches clothed with silvery gray narrow linear and rather small foliage with insignificant yellow flowers appearing before the leaves, and followed in the pistillate plant by small, numerous bright orange berries, persisting through the winter. It grows well in almost any kind of soil; in poor soil it stays shrubby, and in good soil it becomes a small tree. The staminate plant is of upright growth, whereas the pistillate one is more spreading and twiggy. The berries are somewhat poisonous, and birds rarely eat them. H. rhamnoides is grown on the college campus.

Eleagnus

Eleagnus (olive) shrubs and small trees are grown chiefly for their handsome foliage and for their ornamental fruits, edible in a few species. They are sometimes spiny,

also having. silvery greenish foliage. The flowers are axillary, solitary or in clusters of three to five somewhat inconspicuous but fragrant, and the fruit, a one-seeded drupe, is bright yellow covered with silvery scales. There are about forty species in Southern Europe, Asia and North America. They grow in almost any well-drained soil. Three species august folia, longipes and edulis are grown on the College campus. Eleagnus "The olive - among the Greeks the olive was sacred to Athena, the goddess of wisdom, and from earliest times it was the emblem of peace. - . A crown of olive twigs was the highest distinction of a citizen who had merited well of his country, and the highest prize of the victor in the Olympic games."

. From - Among flowers and Trees with the Poets.

Cotoneaster

Shrubs, rarely small trees, chiefly grown for their ornamental red or black fruits, or for the brilliant colours of some species in autumn. They are very ornamental, many of them having their decorative fruits remaining through the entire winter. There are about forty species in the temperate regions of Europe and Asia and in Norther Africa. The flowers, pink or white are solitary or in cymes, terminal, on short lateral branches, followed by a red or black berry-like drupe.

Cotoneaster thrive in any good, well-drained garden soil [redacted] dislike very moist and positions.

C. acutifolia and C. microphylla grow on the college campus.

"It all comes back; the odor, grace, me and
Each sweet relation of its life repeated;
No blank is left, no looking for is cheated,
It is the thing we knew."

Adeline D. T. Whitney.

Diervilla

Ornamental deciduous shrubs, grown for their showy flowers, appearing profusely in spring and early summer. The common name is Weigela. There are about ten species in Europe, Asia and North America. They are shrubs of spreading habit with more or less arching branches, rather large leaves and, especially the Asiatic species which have also very showy flowers from pure white to dark crimson. A great deal of hybridizing has been done, and is still being done. Some of the species are very hardy; others are more tender.

The flowers are one to five flowered in axillary cymes, or often panicled at the end of the branches. The fruit is a slender two valved capsule, with numerous minute seeds. These shrubs have very good bright red and orange autumn colouring, and the foliage stays on very late, sometimes right through the winter.

The following Diervillas are on the college Campus:

Diervilla van Houtteii

" amabilis

Diervilla <u>candida</u>

" <u>Madame Lemoine</u>

" <u>descarta</u>

" <u>rosea</u>

"Silently they stood
Hand clasped in hand, in breathless hush around,
And saw her shyly doff her soft hood green
And blossom - with a silken burst of sound."

Margaret Deland.

Caragana

Ornamental shrubs chiefly grown for their bright yellow flowers; some species are also used for hedges. There are more than fifty species from Southern Russia to China, most of them in Central Asia. They are deciduous unarmed or spiny shrubs with yellow, rarely whitish or pinkisk flowers, axillary, solitary or few in a cluster. The pods are linear from one to three inches long with several seeds. The cultivated species are quite hardy except a few Himalayan species. They grow in almost any soil, but do best in a sandy soil and sunny position. They are well adapted for shrubberies, are good hedges and windbreaks. The pods have a peculiar way of distributing seeds. They snap open, throwing the seed for quite a distance. There are quite a number on the college campus, of which the following are:

Caragana - Siberica arborescens

" frutescens

" pendula

" pigmea erecta

" chamlagu

" grandiflora.

Evonymus

Woody plants, erect or climbing, grown chiefly for their handsome foliage and attractive fruits. They are deciduous or evergreen shrubs or small trees, mostly of erect and upright habit. They have rather inconspicuous greenish, whitish or purplish flowers in axillary cymes, very attractive in the fall, with their handsome scarlet, pink or white fruits and brilliant autumn colouring of foliage. There are about one hundred and twenty species in the northern hemisphere, most of them in Central and Eastern Asia extending to Southern Asia and Australia. Practically all of them are hardy. They will grow in any soil, and are well adapted for shrubberies. Enonymus Europaeus is grown on the college campus.

Mahonia

An ornamental evergreen shrub grown for its attractive foliage and decorative berries. Mahonia used to be classed with Berberis but is now an order by itself. The foliage is glossy dark green, the yellow flowers are borne in racemes and the fruit is a one celled berry, red, dark blue or black containing several oblong seeds. They will grow in

any soil, but thrive best in a sandy composite of peat and loam. Mahonia aquifolium is grown on the campus, and is a very handsome evergreen shrub from three to five feet high. If in too exposed a situation the leaves are apt to sun scald. It is a host plant for the aecium stage of Puccinia graminus.

Symphoricarpos

Ornamental shrubs grown chiefly for their attractive fruits. They are commonly known as snow berries, are low or medium-sized shrubs with slender upright, slightly arching stems, spreading more or less by suckers. The leaves are small, generally oval shaped, with small clustered, seldom solitary, white or pink flowers, followed by attractive white berries. Some species have red, pink or bluish black berries. The flowers are insignificant. They are mostly hardy shrubs excellent for borders of shrubberies and for covering the ground under trees. There are about fifteen species in North America and one in Western China, Most of them are closely related and hard to distinguish. Those growing on the college campus are, S. vulgaris, S. racemosus alba and S. occidentalis. S. racemosus albus and occidentalis have heavy clusters of snowy white fruits at the tips, and along their arching branches, remaining plump and firm far into the winter. S. vulgaris, known as Indian currant, has dark red fruits densely clustered along its branches which remains plump and fresh into the winter.

II.

PRUNING

1. SHOWING DOG WOOD WITH THE OLDER BRANCHES THINNED OUT.

II. WEIGELIA WITH THE OLDER BRANCHES THINNED OUT.

III. HONEYSUCKLE THAT SHOULD BE PRUNED.

IV. <u>SYMPHORICARPOS VULGARIS</u> - SHOWING THICK GROWTH - NEEDING A SLIGHT THINNING OUT.

IV

III

II

I

Pruning:

The art of pruning shrubs properly, is acquired only by considerable practise and observation. Practise is necessary so that the work may be well and cleanly done, and observance is necessary to know the time and manner of flowering so that pruning can be done at the psychological moment.

We prune shrubs to regulate their growth, to make them graceful, to accentuate their natural character, to invigorate weak growth, to check over luxuriance and to increase the profusion of bloom.

All shrubs should have an easy, graceful, natural outline. The old gnarly stems and thick stunted branches should be cut out, so that the young healthy shoots have room for development with plenty of firm, well ripened spray twigs for flowers.

The time of pruning shrubs varies considerably, and this is controlled largely by the flower bearing habit of the plant, so for purposes of pruning, flowering shrubs are divided into two groups: (1) those that flower on wood made the previous year (which constitute the great majority) and (2) those that flower on wood produced during the current season. Most early blooming plants develop their flower buds the year before, so that if heavy pruning is practised when the plant is dormant, the amount of bloom for the succeeding year is greatly diminished. They should be pruned just after the flowers are finished, and then the new growth will develop flowering buds for the following year. It is desirable to get as long a season of growth as possible.

In the first group - those that flower on wood made the previous year - such as Philadelphus, Diervilla, Deutiza, Forsythia and Spirea Prunifolia, etc., flower after the growing season has begun. To cut back the shoots of these plants in winter or spring would be to remove the flowering wood, but if they are cut back after flowering, new growth will at once begin. (A difficulty appears here, which will be detailed later - shrubs blooming on one or two year wood). They will be longer, better ripened growths, followed in due season by a more abundant crop of blossom which is often not only more profuse, but larger and more finely coloured. Clipping back for this type of shrub is very bad; it destroys the health as well as the beauty of the plant.

In the second group - those that flower on wood produced during the current season - as a rule from July until the end of autumn - pruning has to be done in winter or early spring before much growth has taken place. The pruning of this type of shrub consists in shortening back the growths that flowered the preceding season; and also if there is any likelihood of the new growths being too crowded, entirely removing some of the old stems. If they are tall they may be clipped back to within a few buds of the old wood, but if they are small, they should be pruned farther back to encourage young growth, so that the whole season of leaf growth is available, and strong vigorous plants will result.

Shrubs are pruned either long or short. By long pruning is meant that more wood is left on the plant than is cut away, and by short pruning, more wood is cut off than is left.

Pruning after the flowers are finished in late spring or early summer is sometimes spoken of as green or summer pruning, and pruning in the winter is termed dry or dormant pruning.

Old wood is that of several seasons growth, not necessarily beginning to die, but having passed the stage of most vigorous production of flowering shoots or foliage. Surplus wood is that which is over crowding the plant, or stands in the way of the development of new growth which, if removed, would give better results.

Pruning after frost injury - when shrubs have been injured by frost.

The majority of our hardy shrubs require no special pruning, but a little pruning should be done every year: for instance, removing unsightly fruit-clusters, broken, winter-killed or diseased wood and suckers. The sole object in pruning should be to improve the general vigor and form of the plant. It should really be a process of thinning out rather than cutting back. Most people who prune do so too severely, so that they mutilate the shrub, destroying its natural beauty. If pruning is restrained, simply cutting out all dead, weak and superfluous wood and branches that are injuring each other, it will accomplish its proper work.

There are exceptions to the general rule, however, Many plants (such as the red - yellow - and green-stemmed dog-woods) that have bright-coloured twigs lose their winter attractiveness as they grow old. These plants could be cut to the ground every three or four years, or practise constant renewal by gradually replacing the old stems by new ones. This maintains the

top in good vigor and form as it is being continually renewed. It is good practice to remove all dead parts as soon as the line of demarcation is evident.

Pruning deciduous hedges consists of the trimming or shaping of a plant into some definite or arbitrary form. This is essentially a method of shearing or heading-in. If it is desired to have a very regular and definite shape, it is well to shear the plant at least two or three times. The common practice in shearing hedges, however, is in the winter only, and usually then very severely. The plant throws up numerous strong shoots very early in spring and it remains shapeless during the rest of the growing season.

"The beauty and value of hedges lies in the thickness of the growth and the uniformity from end to end."

The desirable shape of hedge whether conical-topped, round-topped, or flat-topped, should be desided upon, and then worked to that end.

To make impenetrable hedges, the plants are plashed when young. This consists in bending the main shoots to an oblique or diagonal position, one plant bending over the following one, and wiring them down. Plants that are to be plashed are usually set at an angle when transplanted to their permanent positions.

To get a good formal hedge, the plants should be set close together, from four to twelve inches apart. Then to obtain a good face, pruning should begin at once. Cut back severely, when the plants are set, to induce a thick growth of large branches; and head in once or twice a year until the

plants have attained their normal size. Then shear twice a year or oftener.

An informal hedge has the plants farther apart and it is allowed to assume its natural form, pruning out only the diseased or dead limbs. These are often much more attractive than if headed in.

Root pruning is done in planting or transplanting shrubs. It counteracts a too luxuriant woody growth, but often also results in a sparse amount of bloom. This is not often practise, as the more roots a plants has the more sturdy and healthy it is.

The wound made by cutting off a branch heals by means of a callous which forms from the growing tissue between the bark and the wood. This tissue finally completely covers the wound. It takes a long time to do this, however, and protection should be given the wound, in order to keep the bacteria and fungi from entering and thereby preventing rot. At the present time a great deal of experimentation and discussion is being carried on regarding the proper dressing for wounds, but no decision is final as yet.

Good white lead seems to be the best but paint which has turpentine in it is very injurious. Grafting wax affords a fair protection, if it is applied warm and thin, so that it soaks into the tissue; but if it merely spread over the surface it soon blisters, becomes loose and then it practically of little use.

We have already said that pruning must be done properly. Unless it is done properly so that the wound will

heal over quickly, it will be sure to cause trouble, sooner or later. A clean, smooth cut heals quickly, but if the edge is ragged it heals slowly and it apt to become infected. In dormant pruning the cut should be made just above the bud, but not too close to it, but in summer pruning cut close to the bud because it will heal very quickly. The cut should be made above an outside bud. This will tend to keep the new growth branching outward, giving the plant an open centre with plenty of space and light. The cut should be close up to and parallel with the main branch, trunk or stem. Do not leave stubs but cut very close to the main branch. The shrub then has a neat and tidy appearance. Some authorities prefer a slanting cut, because it does not present a surface for the lodgment of water. Other authorities say a straight cut, because it give less surface to heal over. Many shrubs which have been in one place for years and which have become stunted can be renewed by cutting away the old wood entirely and shortening the remainder. If fertilizers are then added, it will throw up vigorous strong shoots, and the next year it should flower profusely.

The following shrubs have their blossoms on last year's wood and so should be pruned after flowering: -

Berberis (Barberry)
Cornus (Dogwood)
Cydonia (Japan Quince)
Diervilla (Weigelia)
Deutzia
Forsythia (Golden Bell)

Syringa (Lilacs)

Lonicera (Honeysuckle)

Philadelphus (Mock Orange)

Prunus (Flowering Almond) Plum.

Ribes (Flowering Currant)

Sambucus nigra (Golden Elder)

Spirea Prunifolia (Bridal Wreath)

" Thunbergii

" Van Houttei

Viburnum Opulus (Snowball)

Shrubs blooming on this year's wood:-

Dormant pruning in winter or early spring.

Hydrangea paniculata

Rhus cotinus (Smoke Tree)

Roses

Sambucus (Elder)

Spirea Anthony Water

" Bumalda

Viburnum opulus

The Berberis, Lonicera and Mahonia need very little pruning. Individual shrubs need more attention in the way of pruning than shrubs in a border.

Topiary work should be mentioned under pruning. It used to be in vogue in England before the natural grouping of shrubbery was introduced. It consists of clipping the trees and shrubs into elaborate architectural and statuesque forms. Topiary work is only in place in a formal garden and not much used now.

III

NATURAL VERSUS FORMAL GROUPING OF SHRUBBERY

I. MAIN ENTRANCE TO MACDONALD COLLEGE

- SHOWING ATTRACTIVE GROUPING OF SHRUBS.

II. CONCRETE WALK BACK OF WOMEN'S RESIDENCE

- SHOWING THE UNEVEN LINES OF A FOUNDATION BORDER.

I.

II.

Natural versus formal grouping of shrubs:

The natural grouping of shrubs is more common nowadays than the formal grouping. Natural planting is directly opposite to the style which is laid out according to the laws of geometry. The grouping of the shrubs should be interesting and various pictures made by their arrangement. The result should be an improvement on the original surroundings. There should be trees to give the frame work of the picture, shrubs to give the intermediate tones and lawns with open spaces for the ground tone. "Open lawns are the natural foundation of a natural landscape."

The trees and shrubs should be confined to the boundaries mostly but occasional groups are effective. It requires some skill and artistic ability to situate properly the groups used in a lawn. Drives and walks should never cut through the middle of grounds laid out in the natural style. They should be sonstructed in order to give the feeling of leading to their destination without unnecessary curves. Curved lines are natural but must not be made grotesque, or artificial. Clumps of shrubberies planted in the curve, excuse it and help also to give variety of scene. There should not be too many drives and walks, neither should they be prominent.

The use of shrubs in the natural style of landscape is varied. Usually they are restricted to the areas near buildings with an occasional group here and there for landscape effect. They should be massed together, but sometimes individual specimens may be used. They should not be wholly

isolated, however, but should have continuity with the other shrubs. When used as borders close to buildings annual and perennials will help to relieve their monotony.

In discussing the many purposes for which shrubs may be used in the natural grouping, it perhaps would be well to list them, discussing each one separately. They are used for:-

1. Screening effects.
2. Borders and backgrounds for annuals and perennials.
3. Supplying material for hedges.
4. Planting about buildings.
5. Brightening the winter aspect.
6. Early and late blooming effect.
7. Beautifying vistas.
8. Accentuating lights and shadows.
9. Contrast and variety.

Screening effects are used on the boundaries of property to insure privacy, and to exclude undiserable views. They are used also inside the boundaries to screen unsightly objects and to give seclusion. Curiosity is often aroused by partial concealment. When the whole of an object is seen there is no further incentive for investigation. It is well to prolong the interest in this way.

The object desired to be screened would determine the variety and height of shrub to use. They should be high enough to completely hide it, dense enough to really act as a screen, and ornamental enough to transform ugliness into beauty. They may be planted in deep borders or narrow hedge lines.

Trees, shrubs, and vines are all used for this purpose.

Borders and background to annuals and perennals,- Borders are usually planted along driveways and walks, and around buildings to tie them to the ground. In order to make them more interesting and attractive, annuals and perennials are interspersed among them. The shrubs form the background, and should be placed to give an irregular top line. The border should vary in height and width.

In the spring they will give delight and pleasure with their bloom, while the other plants are developing for the summer season. Foliage should be vigorous and healthy with good colour to assist the annuals and perennials with their brilliant colours to show up advantageously. In the fall shrubs again come to the front with their foliage and fruit, adding colour to the autumn landscape. Thus from early spring to late fall the shrubs have a distinct value in the border.

Planting about buildings.- The place where the foundation of a building meets the lawn is harsh and ugly, unless softened by shrubbery. Shrubs are also needed to round off the corners which would otherwise have a hard and ungraceful line. The building should look as if it belonged to the landscape, and in order to do this shrubs should be so planted as to hide and modify the straight lines. The lawns should be carried directly up to the shrubs thus helping to gain naturalness. Tall, broad clumps should be planted in the angles and against wide places between windows, while only low ones should be used under windows. The groups should not be

too much alike, but should vary in height, breadth and texture of foliage.

Hedges are used for wind breaks, screens, and to denote boundary lines of properties. They can be thick, dense and neatly clipped, or allowed to grow naturally. They may be deciduous or evergreen, made up of one variety or where used as a screen, several varieties are used to give color. To be thick and dense they must be planted very closely. Pruning must be done when the plants are young to insure a thick growth at bottom. They must be looked after properly else they become ragged, thin and generally decrepit looking.

When used for wind breaks they are allowed to grow naturally, and must be thick and dense. They should be of a hardy vigorous variety and tall enough to be of use. They are planted quite close together and are seldom pruned, the dead wood only being cut out. If they get ragged and bare at the base, practically all growth can be cut back and in a year or so they will be as good as ever. Clipped hedges can also be treated this way.

Winter aspect. - The landscape in winter contains little but a white expanse. The dogwoods with their red or green stems and the barberry with its crimson clusters of berries add a touch of cheerful color, and when placed against a background of evergreens show up more vividly. Some shrubs occasionally retain their leaves through the winter and these dead brown leaves rustling in the wind help to cheer us and gives variety to the winter scenery.

Early and late blooming effect. - To the shrubs we owe the first touches of green and bloom in the landscape. In

fact, even before the leaves appear the Fosythia produces a profusion of fragrant yellow blossoms, and the Spirea prunifolia is covered with white bloom. After them, the other shrubs, one after another come into flowering, and if properly chosen it is possible to arrange a continuance of bloom. Through September, and sometimes till late October, the Hydrangea bears its dense panicles of varying colored flowers. The shrubs with rich glossy foliage are ornamental even after their time of bloom and those that flaunt brilliant foliage and berries in the autumn, excel if possible their first period of beauty.

Beautifying Vistas. - Shrubs should be planted in such a way as to permit long perspectives. They are then called vistas and must be framed with shrubs and trees, to give delight to the eye. The skyline should be irregular, in order to avoid monotony. We have tall trees with their top line gradually descending to the top line of the shrubs, and with the irregular ground lines we get a vista. The shrubbery should be arranged to give proper relation to the surrounding, and should have a focal point. That is, there should be some outstanding object, a beautiful shrub, road or view, at the end to attract attention. Ugly or uninteresting objects should not be the focal point or terminus of a vista. In order to keep the interests and imagin/ations from flagging a variety of vistas is desirable.

Lights and shadows.- These can be accentuated by careful arrangement of shrubbery, and when so arranged add variety, and give charm and character to the landscape. The

situation and exposure are determining factors in the choice of shrubs. Against a north wall, with a dark aspect, we would plant shrubs to give a bright effect. With a southern exposure we would plant shrubs to soften and tone down the glare of the sun. An expanse of shrubbery with foliage of one shade becomes monotonous. The beauty of lights and shadows is brought out by varying well-arranged shrubbery.

Contrast and variety.- This is necessary in the natural grouping of shrubs. By contrast is not meant in-harmonious grouping, but difference in shape, texture, colour, and size, planted in such a way as to attract attention. There should be a variety of shrubs to add diversity and interest. Contrast and variety together give a feeling of strength and purposiveness. This should be accomplished in an artistic way, and if the bright colours are interspersed, the tendency is for them to neutralize each other. Violent contrasts should be used sparingly as they are apt to jar one, but a charming effect may be produced by their restricted use. The use of different species of shrubs gives us variety in foliage and bloom. They will not all have their prominent period at the same time, thus lengthening their attractiveness.

The natural type of planting is generally to be seen from a distance. The mass is unrestrained in growth and there is a marked degree of colour contrast, not only in bloom but also in foliage. The shrubs are placed according to their height, the tall ones acting as a background for the lower growing varieties. Their boundaries are not precise, but are broken, and the lines should produce easy gradations.

from the lawns to the top of the tallest shrubs. The beauty of natural grouping of shrubs is obtained by the many varied forms and colours and their arrangement.

Deciduous Shrubs useful for screening purposes:-

Berberis Thunbergii

Deutzia gracilis

Ligustrum

Loniceria

Philadelphus

Rhus typhina

Rosa Rugosa

Spirea Bumalda

" Van Houttei

Diervilla

Cornus

Rhamous

Syringa

Viburmum

Shrubs for sunny positions:-

Spirea Van Houttei

" Opulifolia aurea

" Prunifolia

Symphoricarpos Racemosus

Diervilla

Deutzia

Philadelphus

Ribes aureum

Shrubs attractive during winter:-

Berberis Thunbergii - red berries
Cornus Siberica - " wood
Cornus stolonifera - " "
Rhamnus carthariticus - black berries
Cornus flaviramea - yellow stems

Shrubs with bright autumn colouring:-

Berberis Thunbergii -
Evonymus atropurpureus
Rhus typhina
Cotoneaster racemosus
" acutifolia
Lonicera tatarica
Viburnum cassinoides
Symphoricarpos vulgaris
" racemosus

Shrubs with coloured foliage:-

Berberis purpurea
Sambucus aureum
Diervilla Aureum
Cornus

Shrubs suitable for shady places:-

Symphoricarpos vulgaris

" racemosus

Evonymus radicans

Cornus racemosus

Ligustrum ibota

Berberis Thunbergii

Amelanchier alnifolia

Shrubs for Hedges:-

Berberis Thunbergii

Rhamnus cartharticus

Cotoneaster acutifolia

Lonicera tatarica

Eleagnus argentea

Ligustrum ibota

" amurensis

" vulgariss

Rosa rugosa

Spirea Van Houttei

Caragana

Syringa (Lilacs)

Formal grouping of shrubbery.- I have used the word formal,-geometrical, Italian and architectural are other names often used to describe the same type. The formal is directly opposite in stype to the naturalistic type of garden, being a study of lines, orderly and symmetrical, guided by the laws of geometry. It is artifical, the shape of the garden, its general plan, its walls and fences, its walks and arbors, seats, statues, terraces, fountains and waterworks, dials, pleasure houses, etc., tend toward one style of symmetry. It must be designed, there must not be any adding here and there promiscuously. A plan must be drawn up; it is the primary consideration, and the planting and architectural features must follow the plan exactly.

A formal garden, is really the extension of a formal building. If there is one there should be the other in order harmonize the two. A beautifully designed building, with colonnades and loggias is not natural, and it would appear doubly more so if we did not have the formal garden to soften the contrast between it and nature. The type of building, then, should decide the type of garden.

In the formal garden, simplicity, dignity and grace are of supreme importance. A closely clipped lawn is the background and large uninterrupted spaces are essential features in the design. They, with their boundaries, help to form the smaller gardens within the big gardens. Stairways, balustrades, vases, fountains and statues all give pleasure if properly placed, and they must be so in order to give the formal effect.

. The planting materials are used for form and colour, but principally for form. The colours, which are most effective, are the deep green momotones in the clipped hedges and shaped trees and shrubs. The plants are arranged individually or in masses, to set off the form, rather than to harmonize with other plantings.

A formal garden is full of accents. Every part, although being related, must function freely and to the best advantage. The accessories or decorations must be placed to harmonize with their surroundings - a sun-dial should be placed in an open space and a statue in a semi-secluded position where there are shadows. The plantings are restrained, attention is paid to their arrangement, rather than to their individual characteristics. They must be as severe as the enclosing walls divided geometrically by walks, being sharply accentuated, with architecture the dominant note. The arrangements are generally, bilaterally symmetrical that is, one half must be identical with the other half. They must exactly balance, and their entirety is observed at a glance. The axis in the design is very important and the secondary axis should be arranged harmoniously with it.

The material used for grouping in a design with an axis, must be arranged to direct the eye toward an object of interest - a fountain or statue. Buildings and grounds must coordinate, giving the effect that both were planned as part of a whole toward one end, balance and unity.

Terraces, formal beds, water effects and topiary work belong wholly to formal gardens. Terraces must be exactly

parallel and geometrical in outline. They are more desirable near a building, as they give it apparently a firmer foundation. The main terrace should be placed to overlook the principal garden, and descending to it by a short flight of steps. It should be of fair width, as a rule, equal to the height of the house from ground line to the eaves. The turf is of prime importance; thick and velvety, and should always be kept closely clipped. The slightest sign of neglect would spoil the effect of the whole garden.

Formal beds are notable features in the style of formal gardening. They are also termed "pattern-beds", knots or parterres, and can be beautiful or ugly - mostly ugly, bordered with gaudy coleus and other bright leaved exotic plants, all enclosed by small stiff sheared shrubs to show line of demarkation. (Box is often used for this purpose). They are symmetrical and rigid in outline frequently with a flat compact surface. Shields, coats-of-arms and other set designs are often worked out by this method.

Water effects when properly treated are one of the first aid to beauty and give completeness to the design. They may occur naturally in the form of lakes, ponds or streams and can also be artifically introduced by fountains, cascades and architectural objects. Where they occur naturally, they may be altered to suit the design with very little expense, but when artifically introduced it is a very costly undertaking. They may take the form of shallow basins as water-mdrrors in which fishes can be kept. Plants growing along the side will be reflected in the mirror making an attractive picture.

Topiary work is used in three ways:

1. To mark off parterres.

2. To bring out particular features in a design.

3. To add stateliness and dignity to a garden.

The shrubs or trees used for this work may be naturally peculiar in shape,or may be restrained and dwarfed by clipping, budding or binding the roots. The simple designs are usually made with deciduous as well as evergreen shrubs, but for the more intricate designs evergreens are usually used.

Topiary work has been used in gardens for thousands of years. Only a moderate amount of it is done to-day, and the simple designs predominate.

There are many types of the formal garden. The Japanese have their own style which differs from the Moorish style. Again,we have the Italian style not at all like the English style. There are Dutch gardens, Indian gardens, Florentine gardens, etc., each having its predominate characteristics.

From these pages we have seen that the Natural grouping of shrubbery differs entirely from the Formal grouping. Each has its own special use; separately they are beautiful, but a mixture is incongruous.

The location,extent, use and other surroundings determine the style to be employed. The straight, rigid,geometrical lines, are the dominant factors in the formal type; whereas a greater freedom in arrangement and in material characterizes the natural type. The outlines of the areas are subordinate to the mass, and the planted areas, or open lawns are not strictly limited to form or colour. There is not an absolute accurate plan

to be followed as in the formal type, but plans sufficiently in detail to convey the idea only is necessary. In the formal style architectural lines are emphasized, while in the natural style horticultural features dominate. Considerable changes of outline may be made in the natural style without materially altering the general appearance, but this cannot be done in the formal style. The success of a formal garden depends on the plan.

In the Natural and Formal style every part must contribute toward the beauty of the general scheme, and both must conform to the general principles. The aesthetic, as well as the practical must be kept in mind so that the final appearance will be one of finished design. To do this, one must study the different types of gardening and have a thorough knowledge of plant material and their possible uses in order to get the desired effect.

"A garden is a lovesome thing,
God wot!
Rose plot,
Fringed pool,
Ferned grot -
The veriest school
Of peace; and yet the fool
Contends that God is not -
Not God! in gardens; when the even
Is cool?
Nay, but I have a sign;
'Tis very sure God walks in mine."

T. Brown.

Table I.

Shrub	BLOOM Period	Amount	Colour	Habit	Habit of fruiting	Habit of growth	Hardiness	Foliage	How Used	Diseases and Insects
Rosa Rugosa	June 4th July 10th.	Heavy	Red, pink and white	Large flowers solitary, or 2 - 5 in a cluster, fragrant	Hips - bright orange red colour - stay on till mid-winter - food for birds	Upright- stout branches Very thorny 4 - 6 feet high-very vigorous	Hardy	Shiny dark green hairy on under surface	In groups	None
Potentilla Fruticosa	June 17th Aug. 4th.	Profuse	Bright yellow	Small showy, solitary on terminals	Small seeds - not attractive.	Low, much branched, shreddy bark - 1 -3 feet high	"	Dark green pinnate leaves	" "	"
Rhamnus Cathartucus	June 4th July 6th	Heavy	Pale greenish	Inconspicuous flowers - 2 - 5 in clusters - axillary	Black drupes in clusters - stay on all winter	Upright - very twiggy - slightly arching branches 10 - 14 feet high	"	Bright healthy green	" "	"
Rhamnus frangula	June 7th July 10th.	"	"	Inconspicuous sessile unbels axillary	Buds, flowers and fruit on bush at same time. Drupes red then black stay on all winter	Upright arching branches very dense - 10 - 14 feet high	"	Bright shiny green - quite large	" "	"
Ligustrum Vulgaris aureum	June 10th July 16th.	Fairly heavy	Whitish	Dense terminal panicles -fragrant	Black berries - usually staying on all winter.	Upright with spreading branches 10 - 12 feet high.	Half hardy	Very clean healthy foliage - dark green changing to dark red in autumn	" "	"
Philadelphus coronarius	June 11th July 3rd.	Profuse	White	Dense reacemes fragrant-2 - 8 flowered	Many seeded capsule - not attractive	Upright - bark on two year old wood reddish and peels off - short branches numerous 8 - 10 feet high.	Hardy	Dark green thick - hairy under surface bright yellow in autumn	" " and individually	"
Amelanchier	May 23nd June 3rd.	"	"	Many flowered terminal racemes on short branches	Berry-like pome -bluish black in August and Sept.	Upright - slightly spreading rather stiff branched shrub 6 - 8 feet high	"	In spring reddish - later shiny green - autumn colouring red	In groups	Red spider
Berberis Thunbergii	May 23rd June 10th.	"	Pale yellow	Flowers in umbels or solitary	Bright red berries staying on till spring. Bright effect in winter.	Dense low spreading shrub- somewhat spiny, 2 - 5 feet high	"	Dark green - brilliant autumn colouring	" "	Host of Puccinia graminis
Berberis purpurea	May 30th June 18th.	"	"	Flowers in racemes pendulous - rarely solitary	Bright scarlet then purple fruit remaining through the winter	Upright, slightly arching - 4 - 8 feet high	"	Purple	" "	" " " "
Hippophea Rhamnoides	June 13th " 30th.	"	Yellowish	Flowers dioecious- pistillate, small in short recemes - stamenate, sessile appearing before the leaves.	Orange yellow berry-like fruit in September. Somewhat poisoning rarely eaten by birds.	Upright, tree-like 15 - 25 feet high branches grayish	"	Shiny green above, silver gray beneath	Individually and in groups	None
Eleagnus agustifolia	June 10th July 4th.	Quite heavy	Pale Yellowish	Flowers axillary solitary, or in clusters 2 -5.	Fruit, oval yellow, silver scales, splashed over it	Upright shrubs or small tree 20 feet high - somewhat spiny	"	Shiny green above, silver gray beneath and hairy	In groups	"
Loniceria tatarica rubra	June 1st " 28th.	Heavy	Pink	Fragrant in pairs- axillary or termianlly in spikes or clusters.	Small berry, dark red - stays on till mid-winter	Upright shrubs 15 feet high - branches slightly arching	"	Dark green, rather small leaves, red autumn colouring	" "	"
Loniceria tatarica alba	June 6th July 10th.	"	White	"	Bright red berry	"	"	"	" "	"
Hydrangea paniculata grandiflora	Aug. 7th Oct. 3rd.	"	Creamy white later purplish	large, showy terminal panicles, mostly sterile flowers.	2 - 5 celled capsule many seeded	Spreading, dense head 10 - 20 feet high. Severely pruned after flowering.	"	Large green leaves turning slightly reddish yellow in autumn	" "	"

Shrub	BLOOM				Habit of fruiting	Habit of growth	Hardiness	Foliage	How used	Diseases and Insects
	Period	Amount	Colour	Habit						
Spirea lindleyana	July 21st Aug. 6th.	Profuse	White	Terminal loose open panicles 8 - 12" long	Numerous small capsules become very unsightly	Upright - coarse, vigorous growing - 4-8 feet high	Quite hardy	Large bright pinnate leaves - bright autumn coloursing	In groups	None
Symphoricarpos vulgaris	July 19th Aug. 7th.	Fairly heavy	pink	Small dense axillary and terminal spikes	Very attractive red berries which stay on until frost	Upright slender spreads by suckers - dense shrub	Hardy	Healthy dark green leaves do not change colour very much.	" "	"
Symphoricarpos racemosus alba	June 17th July 28th.	" "	"	"	Very attractive large white berries - stay on plump and fresh till mid-winter	Upright slender branches somewhat spreading 3 - 4 feet high.	"	Bluish green leaves - stays green till frost	" "	"
Symphoricarpos occidentalis	July 23rd Aug. 15th.	" "	pinkish white	" Larger flowers than other varieties	Fruit white - stays on till mid-winter	Upright - more stiff than the preceding variety 3 - 4 feet high	"	Gravish green leaves until frost	" "	"
Sambucus laciniata Canadensis	June 12th. July 9th.	Profuse	creamy white	Large terminal cymes 8-10" across	A drupe - very attractive - purplish black	Large coarse growing spreads by suckers - very dense growth 10 - 15 feet high	"	Bright green pinatifid leaves feathery - bright autumn colouring	" "	Sambucus borer
Sambucus nigra aurea	June 4th " 18th.	Sparse	"	" 4-6" across	Attractive drupe - purplish black	Vigorous growing 10 - 15 feet high.	"	Golden yellow	" "	" "
Sambucus racemosa	May 16th June 3rd.	"	"	Large terminal paniculate cymes 3 -4 " across	Attractive drupes - scarlet	Upright - slightly spreading slender branches - dense growth 8 - 12 feet high	"	Dense bright green leaves lanceolate - very attractive.	" "	" "
Syringa vulgaris Caesulea	May 16th June 6th.	Heavy	Blue	In large loose terminal panicles	Oblong capsule - numerous - unsightly	Upright - vigorous 15 - 20 feet high	"	Dark green - large	Individually or in clumps	Mildew (Lilac)
					"	"	"	Bright green - large	"	" "
Syringa vulgaris alba	May 12th June 2nd	"	White	"	Very attractive bright yellow - greenish pome	Spreading - open head 4 feet high	Half hardy	Reddish in spring Glossy-dark green in summer bright autumn colouring	In groups and individually	None
Pyrus Japonica	May 15th June 6th	Sparse	Red	Winter kills and bloom is only below snowline 3 - 5 flowered clusters	Large compressed drupe splits open at maturity light set of fruit	Upright, hardy and vigorous - In spring branches completely hidden with blossom	Hardy	Firm shiny lanceolate leaves	Individually	"
Prunus amygdalus	May 18th June 7th	Heavily Laden	Pinkish white	Blossoms large solitary before leaves.	Very small - sour, pome - stays on tree a long time	Upright - many branched Compact, round headed 10 - 15 feet high	"	Leaves dentate - bright green Young foliage hairy	"	"
Pyrus ioensis (Bechtels crab)	May 28th June 16th.	"	"	Small double flowers like little roses 3 - 4 in a cluster	Yellow pome - edible	Low 1 - 3 feet high branches spiny	"	Dark green glossy	" and in groups	"
Pyrus mauleii	May 15th " 27th.	Heavy	Reddish	Solitary or few in clusters before the leave						

bit of Fruiting	Habit of Growth	Hardiness
upes black	Greenish stems - spreading 3 - 7 feet high	Hardy
oid small black me	Low spreading 4 - 6 feet high	"
ry small compressed upe	Upright 15 - 25 feet high	Not very hardy
rk red hairy upes in panicles rsisting till spring	Erect shrub or small tree 10 - 25 feet high Very picturesque with its stag horns most noticeable when leaves are off	Hardy
5 lobed capsule ight yellow colour	Spreading 4 - 6 feet high	"
nute seeds not attract- e.	Upright - slightly spreading 4- 6 feet high	"
all seeds-brownish	5 - 6 feet high	"
" " t attractive,untidy	Arching branches 6 - 8 feet high	"
ed- larger than other irea - attractive	Coarse shrub -shreddy bark 8 - 10 feet high	"
ed - not attractive - tidy	Vigorous, slender, spreading 4 - 5 feet high	Not very hardy
eds - attractive - ving good brownish ffect	Branches stiff, upright dense - 2 feet high	Quite hardy
"	Upright, vigorous 4 feet high	Hardy
all capsules - ot attractive	Upright - spreads by suckers. 2 - 4 feet high.	"
"	Upright - does not spread by suckers - 2-4 feet high very compact	"

B L O O M

Shrub	Period	Amount	Colour	Habit	Foliage	How Used	Diseases and Insects
Cornus variegata	May 22nd. June 13th.	Sparsely covered	Yellowish White	Dense flat cymes	Coarse - yellow and green	In groups	None
Cotoneaster microphylla	June 9th " 20th.	Heavily Covered	Pinkish white	In corymbs 5 - 10 flowers	Brilliant autumn colouring - dark green	Individually and in groups	"
Rhus cotinus	" 21st " 28th.	Fairly profuse	Purplish brown	Panicles of short hairs terminal	Bright green glossy brilliant autumn colouring	"	"
Rhus typhina	" 10th " 18th.	Fair	Greenish	Dense terminal panicles 6-10" long	Very handsome compound leaves- lanceolate brilliant autumn colour- ing	"	"
Evonymus europeaea	" 6th " 17th.	Fairly profuse	Yellow	3-5 flowered cymes	Bright green - brilliant autumn colouring	"	"
Spirea prunifolia	May 15th June 2nd.	Profusely	White	3-8 flowered umbels - before leaves	Dark green during summer bright oragne autumn colouring	In groups	"
" billardia	July 19th Aug. 4th.	"	Pink	Dense spikes	Dark green bright red autumn colouring	"	"
" Van Houttei	May 26th June 8th	"	White	Many flowered umbels	Dark dull green- various shades of bright autumn colouring	Individually and in groups	"
" Opulifolia Aurea	June 15th " 23rd.	"	"	"	Yellow turning darker in autumn	"	"
Spirea arguta	May 18th " 30th.	"	"	"	Bright green in summer reddish autumn colour- ing	In groups	"
" bumalda Anthony Waterer	July 7th August 5th	"	Bright red	Many flowered dense corymbs	Very pretty - dull green colour	" "	"
Spirea callosa	July 9th " 21st.	Sparsely covered	Pink	Flat loose corymbs			
" sorbofolia	June 30th July 23rd.	"	White	Dense panicles 5 - 10"long	Leaves lanceolate very pretty bluish green	" "	"
" tomentosa	Aug. 3rd " 19th	profusely covered	pink	narrow dense spikes.	"	" "	"
					Leaves with under surface woolly - brown autumn colouring	" "	"

Habit of Fruiting	Habit of Growth	Hardiness
Winged seed	Upright vigorous 3 - 4 feet high.	Not very hardy here
Small blue berries	Spreading 1 - 2 feet high.	Quite - liable to sunscald in winter.
Ovoid oblong group green changing to almost black	Upright 15 - 20 feet high.	Very hardy
No fruit	Upright compact slightly spreading 10 - 15 feet high.	" "
Very attractive scarlet berries in clusters	"	" "
Linear pods with several seeds	Upright 12 - 15 feet high	" "
"	Upright slightly spreading 6 - 8 feet high.	" "
A capsule with numerous minute seeds	Slender arching branches	Half hardy
Slender linear capsules persisting to late winter	Spreading arching branches 3 - 5 feet high	Hardy
Very attractive white drupe	Upright bushy 6 - 10 feet high Stems bright red in winter.	"
Drupes blue	Spreading 3 - 10 feet high. Bright stems in winter	"
" black	Upright 6 - 10 feet high Attractive dark red stems in winter	"
Berries-very attractive bright red to very dark red	Spreading slender arching branches 4-5feethigh	Very hardy

BLOOM

Shrub	Period	Amount	Colour	Habit	Foliage	How Used	Diseases and Insects
Forsythia fortunei	May 10th. June 3rd.	Very Little- Only below snow line	Yellow	Flower solitary on pedicels borne on the branches of previous years growth before leaves.	Dark green - sparse	In groups usually, but individually on the Campus	None
Mahonia aquifolia	May 12th " 28th.	Medium	Yellow	Erect racemes	Dark shiny green - should not be exposed to direct sun in winter - dense.	In groups	Host of Puccinia graminis
Viburnum lantana	" 10th June 8th.	Covered	Creamy white	Dense flat cymes	Dark green-brilliant autumn colouring	" " and individually	None
Viburnum Opulus Sterilis	June 1st " 20th.	Heavily laden	White	In large dense, terminal panicled cymes 3 - 4" broad and deep- sterile flowers.	Bright green-brilliant autumn colouring	In groups	Aphids
Viburnum Opulus	June 3rd " 30th.	"	"	" - but with fertile flowers	Good green colour quite dense	" "	"
Caragana arborescens	May 29th June 6th.	Profusely covered	Bright yellow	2 - 4 flowers on long pedicels in axils of leaves	Bright green - autumn colouring	" "	None
Caragana fructescens	May 31st. June 6th.	"	"	"	Greenish yellow	" "	"
Deutzia gracillis	June 21st July 20th.	Sparsely covered	Showy white	Flowers in racemes	Bright green	" "	"
Diervilla hybrida	June 7th July 15th.	Very free flowering	Deep pink	Erect cymes 2 - 8 flowers	Coarse-brownish autumn colouring	" "	"
Cornus Siberica	May 27th June 16th.	"	White	Dense flat terminal cymes	Coarse-bright autumn colouring	" "	Oyster Shell scale
Cornus Amomum	June 22nd July 20th.	"	"	Dense compact flat cymes	"	" "	"
Cornus Sanguinea	May 18th June 12th	"	Greenish white	Dense flat cymes	"	" "	"
Ribes aureum	May 19th June 4th.	Heavy	Yellow	5-15 flowered long racemes - axillary	Bright green appearing with flowers - bright red autumn colouring	Individually and in groups	None

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