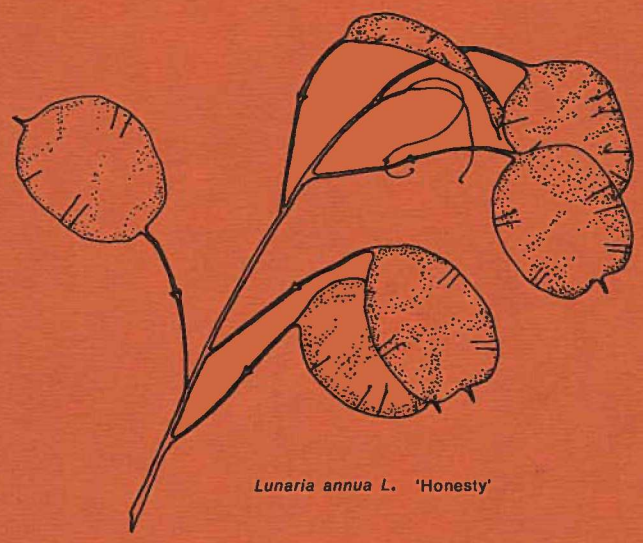
DAVIDSONIA

VOLUME 1 NUMBER 4 *Winter 1970*

Cover

Summer condition of *Pseudotsuga menziesii* illustrating aspect of mature female seed bearing cones with prominent three-pronged bracts.



Lunaria annua L. 'Honesty'

DAVIDSONIA

VOLUME 1 NUMBER 4 *Winter 1970*

Davidsonia is published quarterly by The Botanical Garden of The University of British Columbia, Vancouver 8, British Columbia, Canada. Annual subscription, four dollars. Single numbers, one dollar. All editorial matters or information concerning subscriptions should be addressed to the Director of the Botanical Garden.

Acknowledgements

The pen and ink illustrations are by Mrs. Lesley Bohm. Material for discussion on *Pseudotsuga menziesii* was provided in part by Dr. O. Sziklai, Faculty of Forestry, The University of British Columbia.

A National Botanical Gardens of Canada – Why Not Now!

ROY L. TAYLOR

The question of a national botanical garden in Canada has had a long and checkered career. If one looks at the botanical gardens currently listed in the International Directory of Botanical Gardens published in 1969 we see that there are nine Canadian gardens and this does not include the recent development of the Arboretum at the University of Guelph.

The development of botanical gardens in Canada has been outlined by Dore (1967) in which he brought to the attention of botanists that the first botanical garden in Canada was established at Queen's University in Kingston, Ontario in 1861 by Professor George Lawson. This garden declined immediately after Professor Lawson moved to Halifax in 1863 although still operative in 1868. However, the garden can no longer be considered a viable entity.

In 1886, 465 acres were purchased for the Central Experimental Farm at Ottawa and 65 acres were set aside for the purposes of an arboretum and botanical garden. In 1887 Dr. James Fletcher was appointed Director of the garden and this garden has continued to prosper through to the present time.

The next major development of a botanical garden in Canada occurred in 1912. Land was set aside for a provincial botanical garden in Essondale near Vancouver and in 1916 this garden was moved to the present University of British Columbia site where Professor John Davidson was appointed Director. The University of British Columbia Botanical Garden represents the oldest continuously operated university garden in Canada today. In 1939 under the stimulus of frère Marie-Victorin the Montreal Botanical Garden was established at its current site. In 1941 the Royal Botanical Gardens were established at Hamilton. The Morgan Arboretum at Macdonald College of McGill University has been established for fourteen years. Two recent innovations were the establishment of a botanical garden and field laboratory at the University of Alberta in Edmonton in the late 1960's and the recently developed program for an arboretum at the University of Guelph.

There have been numerous major developments of extensive park gardens and commercial gardens in Canada but these cannot be defined as botanical gardens if we comprehend the definition correctly i.e. a botanical garden is a collection of plants both living and preserved on which qualified staff conducts teaching and research and promotes education through public information in the broad sense. A botanical garden which does not possess teaching or research undoubtedly falls into the category of a display park and this distinction should be clearly kept in mind in discussing the development of a national botanical garden.

A recent meeting was convened in Ottawa, in October 1970, to discuss with the Science Secretariat, the science advisory body to the Prime Minister, the background for the development of a national botanical garden in Canada as well as the need for a new approach to such development. Dr. A. Chan, Director of the Plant Research Institute of the Canada Department of Agriculture, provided a summary of the history of the proposals which his Department has made since 1926 through to the present day on the development of a national botanical garden in Ottawa. Much of this history revolves around the internal distinction of responsibility for botanical work in Canada by the federal Department of Agriculture and the closely related National Museum of Canada.

I think it important to point out that the Massey Commission in 1951 in their report on The National Development in the Arts, Letters and Sciences, clearly recommended *"that there be established in the Ottawa area a National Botanical Garden under the Department of Agriculture; and that the Federal Government assist in the establishment or support of other botanical gardens in certain of the various climatic regions of Canada"* (p. 326). No action has been taken on this recommendation. In 1954 the Royal Botanical Garden in Hamilton approached the government for a grant in line with the recommendation of the Massey Commission. The question of a national garden was discussed but the Deputy Minister of Finance stated that the government would be unwilling to make expenditures for a botanic garden at that time.

In 1962/63 the Glassco Royal Commission on government organization recommended that the botany section of the National Herbarium of the National Museums of Natural Science be attached to the appropriate Research Institute of the Canada Department of Agriculture. This was followed by a proposal from the Department of Agriculture to the Cabinet for the establishment of a botanical garden. This

proposal was submitted to the Centennial Commission for consideration in 1967. No action has been taken by the federal government on either the recommendations of the Glassco Commission or the Massey Commission relating to the proposal for the establishment of a botanical garden in the Department of Agriculture.

At our meeting in Ottawa, in October 1970, I expressed the concern of the University of British Columbia on behalf of other gardens in Canada about the federal policy regarding recognition and support of gardens and I emphasized that in a country the size of Canada a new approach and an overall policy should be established by the federal government for the support of a national botanical garden, which would consist of a number of regional entities. There is good reason for the establishment of such policy at the federal level because of the national nature of the collections and research activities of the various gardens and because of the environmental differences between the various geographical regions of Canada. The United States recognized such regional differences in 1964 when they established the Pacific Tropical Garden in Hawaii. However, the federal policy in the United States is in a similar state of lethargy as that in Canada in regard to support of gardens.

One could ask the question why the federal government should be concerned with the establishment of a regional system of gardens which would be collectively called The National Botanical Gardens of Canada. I think it is apparent to anyone who is aware of the environmental problems which are pressing upon us today that we are far from obtaining the degree of expertise in the knowledge of our natural resources that we must have in order to meet some of the new problems of the seventies. In particular there is an urgent need for the development of sound planning for the utilization and conservation of our natural resources in the latter half of this century.

This lack of knowledge of our plant resources has been clearly indicated in recent studies sponsored by the Biological Council of Canada and which appears in the "Panel Reports of the Study of Basic Biology in Canada" issued in 1970. In the Panel Report on Plant Systematics and Plant Geography it is stated *"the systematist needs large areas in test gardens or under glass where many individual plants may be grown and studied, or alternatively, if working with preserved specimens, he needs a large herbarium for storage and maintenance of the collections"*. This report goes on to state that one of the problems which these people working in the plant sciences today encounter is that we do not have adequate provision for botanical information, for the identification of plants and for consultation of problems pertaining to botanical matters. Thus there is a great need for information services on a Canada-wide scale and these would be best provided by a series of regional information centres linked together by a co-ordinating centre. As the report continues *"there should be a national botanical garden and a small number of regional botanical gardens in the different climatic zones in Canada"*. In this way the obvious lack of trained personnel in this general field of plant sciences could be overcome by the development of centres of excellence. As the Panel members indicate *"Centres of strength in systematics should be developed at certain universities to prevent further costly duplication of facilities, but this must not be done at the risk of eliminating basic instruction in this field at the other universities"*.

A second Panel Report on Plant Ecology indicates, *"There is an urgent need for more work on the composition, structure, dynamics and environment of the vegetation of Canada. This could be accomplished best by a national ecosystem inventory, co-ordinated and balanced in approach, with support committed for five to ten years"*. Again a system of regional gardens could provide the impetus for the development of such an inventory.

The development of an inventory of our natural resources requires a better biological understanding of the relationships of our plants to their environment. The problem of dissemination of this knowledge not only to the science fraternity but also to the general public is one which cannot be over-emphasized today. We must be concerned with an increasingly more effective role for our research and educational activities in relation to the plant sciences to meet new problems of resource management. This is not only a local municipal responsibility, but more important a national responsibility and one in which the federal government must assume its proper role of leadership by the development of a clear cut science policy relating to the support and development of a strong consortium of botanical gardens.

One of the associated activities of a botanical garden and an integral part is the development of preserved specimens. In a recent review of "The Herbarium: Past, Present and Future", Shetler (1969) outlined the various phases through which the field of plant taxonomy has evolved:—(1) descriptive exploratory phase; (2) floristics and phytogeography; (3) systematics relating to the philosophy of relationships; (4) biosystematics and (5) ecosystematics. We are currently in the fourth and fifth phases with emphasis now on the most recent ecosystematic phase. The latter will obviously bring about a greater synthesis of

knowledge between the plant systematist and other branches of plant science. This phase in contrast with the previous ones will be less concerned with the absolute precision of plant identification and the phylogenetic hierarchy of plants and more with the general statistical aspects of distribution as they can relate with environmental factors including newly emerging dominance of pollutants. Researchers in this field of ecosystematics will be especially concerned with the interrelationships and co-evolution of plants with animals, particularly man.

The role of the herbarium and the strategy for the development and use of herbaria must undergo some harsh changes if we are to fully meet the demands of this new field of systematics. As Shetler has pointed out *"There are those today—and their number is growing—who see the herbarium as an economic millstone and an intellectual dinosaur in the modern scheme of science. The truth, however, is that the herbarium is beginning to be tapped for a whole new generation of scientific and public questions. As the concern rises about the quality of our natural environment and the ecological principles that control this quality, public officials are being forced to come up with instant ecological histories and forecasts"*.

Herbariums, museums and botanical gardens represent repositories of vast amounts of raw data about the vegetation of the earth. It is therefore important that these facilities are properly managed and efficiently run in order to provide an easy entrée to the data which they contain. The old adage of the scientific and service functions of the herbarium being performed by one and the same staff is long outdated. As Shetler correctly points out, *"The herbarium should be organized like a modern library and staffed by a cadre of professionally trained, librarian-like technical experts and aides who specialize in herbarium functions. . . . Non-research personnel, whose professional rewards do not depend on publication, can be trained to perform most if not all curatorial and public service functions of the herbarium just as well as, if not better than, research scientists"*. This same philosophy must pervade the botanical garden field so that a strong link and intimate co-operation can be maintained between the technical personnel operating the garden and the scientists and teachers who will use it to further knowledge in plant sciences and direct the course of garden development.

This emphasis on technical operation will of necessity involve the introduction of computerized accession, storage and retrieval systems to relieve the burden of the many repetitive operations that accompany the development of any major collection or repository of plant materials. Much progress has been made in this field to date and the Plant Records Center sponsored by the American Horticultural Society is endeavouring to overcome the laborious maintenance of an up to date inventory for both management and accession purposes in the botanical garden. The development of a national system of botanical gardens in Canada with federal support could handle the rapid expansion of a comprehensive inventory of our vegetational natural resources.

In conclusion, if Canada is not only to maintain its present status but increase its knowledge significantly about its plant resources we must have a clear federal policy relating to the establishment of The National Botanical Gardens of Canada. The federal government must recognize its responsibilities to provide support for regional gardens in various environmental regions in Canada. Concurrently there is a need for the federal government to put its own house in order in Ottawa and the recommendations of both the Glassco and Massey Commissions should seriously be considered. If these two proposals were carried out we would then possess a wide ranging but truly national botanical garden in Canada, with a central agency in Ottawa to serve as a co-ordinating body. I would hope that I speak on behalf of the other non-government organizations in Canada in that this development is long overdue and that the Minister responsible for the newly established Department of Environmental Affairs should give this matter serious consideration. Such a development would provide a sound scientific research and teaching program to provide the necessary information we need at the present time about our vegetation in Canada in order to achieve effective long range planning in the utilization and conservation of our resources.

REFERENCES

Dore, W. G. 1967. Canada's First Botanic Garden. Greenhouse-Garden-Grass. Vol. 6, No. 2. Canada Department of Agriculture Publication, Ottawa.

Fisher, K. C. 1970. Panel Reports of the Study of Basic Biology in Canada. Biological Council of Canada, Ottawa.

Fletcher, H. R., D. M. Henderson, & H. T. Prentice. 1969. International Directory of Botanical Gardens II. International Bureau of Plant Taxonomy and Nomenclature of the Int. Assn. for Plant Taxonomy, Utrecht, Netherlands.

Glassco, J. G. 1963. Royal Commission on Government Organization. Vol. 4, p. 249. Queen's Printer, Ottawa.

Hartt, C. E. & W. W. G. Moir. 1964. The Pacific Tropical Botanical Garden. Plant Science Bulletin 10(1):1-3.

Massey, The Rt. Hon. Vincent. 1951. Royal Commission on National Development in the Arts, Letters and Sciences. Edmond Cloutier, Ottawa.

Shetler, S. G. 1969. The Herbarium: Past, Present and Future. Proceedings of the Biological Society of Washington 82:687-758.

Rose Garden 1970

KEN WILSON

The warm, dry weather which occurred in the last two weeks of February and early March provided ideal conditions for planting the renovated beds in the upper section of the Rose Garden.

By mid March all the 700 plants, with the exception of 'Vienna Charm', were actively growing. However, the cool weather that stayed until mid May seemed to adversely affect the growth and many blind shoots were evident. Complete removal of this growth and the development of strong sturdy basal growth produced an excellent overall display by mid June. Flower production and quality were excellent throughout the summer and fall.

The cultivars, 'Iceberg' and 'Europeana' were eye catching in full bloom, the latter outlasting all others in flower by four days. Its closest rival, 'First Prize' lasting twelve days, had the largest blooms of all cultivars. 'Polynesian Sunset', equal in lasting quality, headed the individual petal count with fifty-nine petals. The fragrance of 'Silver Star' was surpassed only by 'Fragrant Cloud', or perhaps it was the mass flowering display of the latter which gave it its overpowering fragrance.

Insects caused little trouble during the summer. However, mildew was an everpresent threat and only weekly sprays of Karathane held it in check. 'Miss All-American Beauty' was the only one of thirty-four cultivars planted in 1970 fully resistant to the disease.

This winter the lower section of the garden will be renovated and replanted. New plantings will include the three 1971 AARS 'Aquarius', 'Command Performance' and 'Red Gold', together with such recent introductions as 'Mr. Chips', 'Red Planet' and 'Silent Night'.

Annuals at International House

KEN WILSON

Today's annuals, such as petunias, antirrhinums, marigolds and zinnias give us a wide range of colorful flowers that are easy to grow and care for and can be relied upon to give a display from June until heavy frosts remind us winter is just around the corner. Often forgotten is another long list of annuals, perhaps not as striking to the casual eye but, nevertheless, attractive and interesting.

In 1970 the beds in the front of International House were planted to some of these less well-known native annuals of other countries. This planting program is in keeping with the concept of the development of the gardens at International House. When it was first opened it was hoped that each year representative ornamental plants from countries of students at the University could be established in the gardens to provide an international ornamental atmosphere for the area. This year we returned to that original planting concept and established several annual trials in the ornamental garden areas.

The following is a summary of observations taken throughout the growing season. Seed was sown in the greenhouse in March, transplanted to flats, hardened off in a cold frame, and bedded out on May 21st. *Linaria maroccana* from Morocco produced its delicate 2′ spires set with flowers of purple, violet, white and gold from early June to late fall, seeding itself profusely, so now in mid December the bed is completely covered with new plants. Unfortunately the plant tends to fall over so some inconspicuous support is needed. For two weeks in June the shell pink *Crepis rubra* from Italy and Greece with flowers resembling those of a small dandelion on 15″ high compact plants could not have been more spectacular. The twinspur or *Diascia barberae* 'Pink Queen' from South Africa, growing 6 to 8 inches high on uniform plants and flowering until the end of August, proved an excellent subject for the front of the border or a low display bed. *Gilia tricolor* from California with its funnel shaped flowers of violet and white tinged with yellow in the throat flowered until mid September. Two compositae, *Helipterum humboldtianum,* an everlasting flower from Australia and *Lonas inodora* the African Daisy are similar in appearance and growth habit. The dense golden yellow corymbs flowered from May to late August. From Argentina the sky-blue star-like flowers of the *Oxypetalum caeruleum* were most attractive. Although it did not flower until the first week of July, bloom continued until late September. The upright bean-like seed pods stayed on the plants until mid December, adding another point of interest.

A few subjects were disappointing. The crimson flowered *Adonis aestivalis* and the orange-scarlet *Emilia sagittata* were too rampant and weedy except during their initial flowering period. The South African Kingfisher Daisy *Felicia bergeriania* made a good ground cover. The gentian blue daisy-like flowers with a central disc of gold, blue or black were colorful and pleasing to the eye, but as there was no uniformity of flowering amongst the individual plants, the overall effect was generally lost.

In 1971, these trials will be expanded and will include plants native to Portugal and Spain, Mexico, Chile and Great Britain.

Pseudotsuga menziesii (Mirbel) Franco

'DOUGLAS FIR'
Member of the Family Pinaceae

Natural Distribution

Pseudotsuga menziesii occurs throughout the Rockies west to the Pacific from central British Columbia (latitude 55°) to central California and locally from New Mexico and Arizona to northern Mexico (latitude 19°15′), from sea level to midmontane or even to the timber line in the Rockies. In British Columbia the Douglas fir occurs on coastal islands to latitude 50°30′ and to 4200′ elevation at Elk River. On the mainland it is found west of the Coast Mountains as far north as the Skeena River, while east of the Coast Range it reaches northward to Babine Lake and Talka Lake and eastward to the eastern slope of the Rockies.

Habitat

This species is found in vast, almost pure, even-aged stands in the drier central area of its range, but it merges with ponderosa pine, sugar pine, incense cedar and various oaks to the south and with the western hemlock, western red cedar and Sitka spruce to the north. It prefers climates with a long vegetative season. The climate is characterized as humid or superhumid (up to 100″ of rain per year), usually with mild temperatures and dry summers. The average annual temperature varies from 32° to 55°F—with an absolute maximum of 110°F and a minimum of about −30°F. It grows best where the precipitation and relative humidity is greatest. It prefers fresh well-drained deep porous loam with a pH of 5 to 5.5, but can be quite tolerant of other types provided there is ample atmospheric moisture. Prefers a northern or western exposure.

Description

A tree, 150-200 feet high (up to 300 ft. in forests) with a DBH of 3-6 feet (10-17 ft. have been recorded). Young trees have an open pyramidal shape while older trees have a flattened crown caused by lengthening of the upper branches. The branches curve down and then gracefully ascend at the tip. In dense forests the lower portion of the trunk, up to ⅓ of the height, may be devoid of branches. Otherwise they are retained down to ground level.

The root system is strong and widespreading in deep loam soils.

The bark is smooth, thin, rather lustrous, whitish marked and has resin blisters when young, but becomes thick, deeply and widely fissured and reddish brown with age.

Twigs are spreading on young trees, horizontal or even drooping on old. The branchlets are slightly pendulous, yellowish green or yellowish grey, sometimes brownish, minutely pubescent or almost glabrous.

Buds are pointed, ovate, dark orange red, ¼ inch long when terminal, ⅛ inch long when lateral.

Mature needles are obtuse to bluntly acute at the apex, flexible, rounded or grooved on the upper surface and with two longitudinal white bands of stomata separated by a prominent midvein on the lower surface. Needles are 2-3 cm long, 2 mm or less wide with a short petiole. Needles are a dark yellowish green or bluish green especially in var. *glauca* and grow around the branch giving it a full rounded appearance. They are usually shed after 6-10 years although they are occasionally persistent to the 16th year. There is a smell of camphor when bruised.

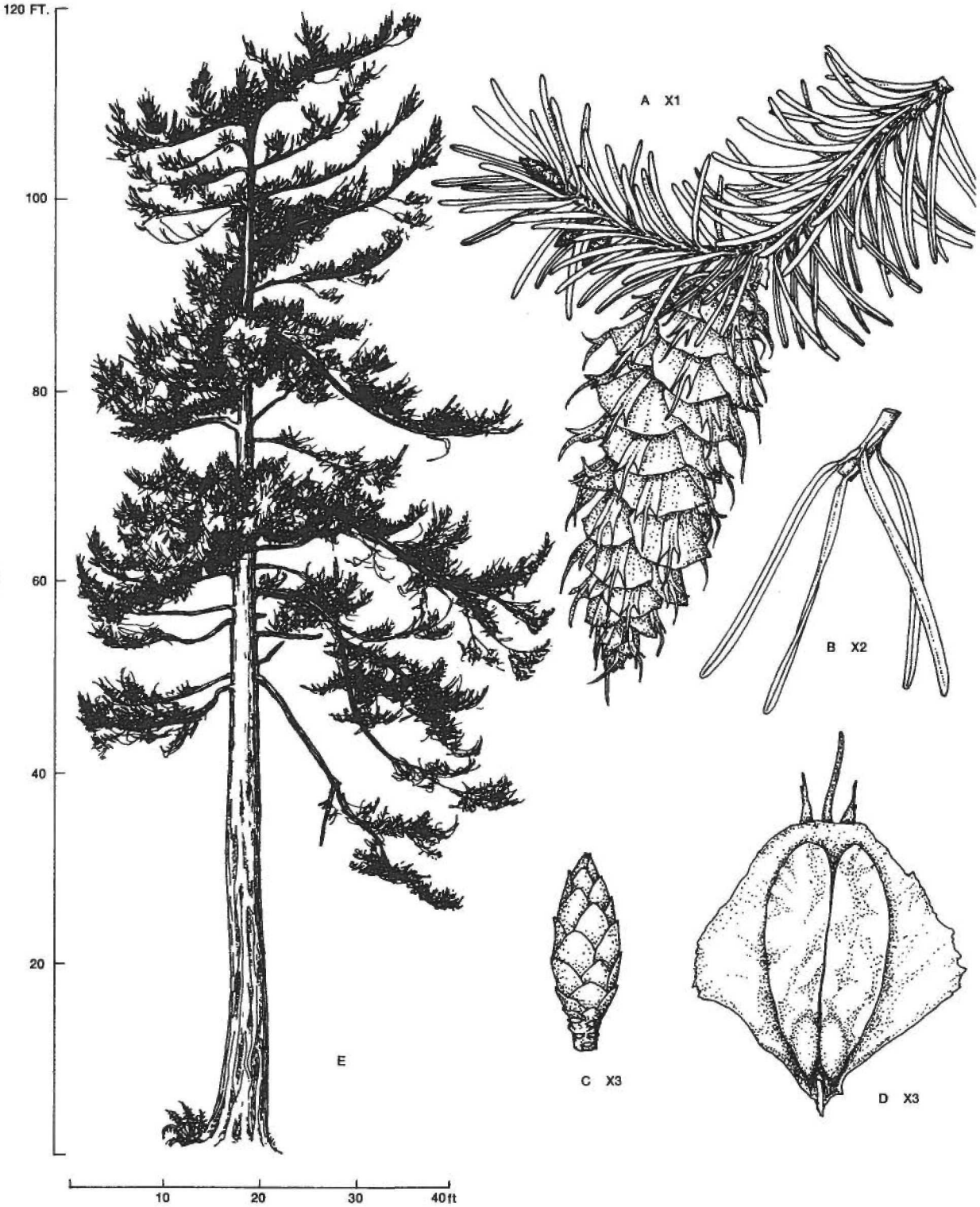


FIGURE 1. A. mature female cone with prominent three-pronged bracts, B. detail of needle arrangement, C. immature male cone, D. seeds on ovuliferous scale, E. habit of mature coastal tree.

Wood is usually yellowish to light red with a narrow band of nearly white sapwood. It is fairly light, strong, firm, works well and is fairly durable.

Flowers in early spring (March-April on the coast) from buds formed the previous autumn. Monoecious (male and female flowers on different parts of the same tree). The female or pistillate flowers are erect to drooping, subterminal, short stalked, 4-10 cm long, yellowish to purplish green when young becoming reddish brown. The scales are rounded, pubescent and stiff. Bracts are longer than the scales, prominently 3-lobed with the middle lobe much the longest. The male flowers are oblong-cylindrical, axillary on the lower side of the branchlet, nearly or quite sessile, (5)6-10 mm long, yellow to reddish and contain many short stalked pollen sacs.

The cones are ovate to oblong, pendant, reddish-brown, 4-10(-15) cm long with 3-pointed bracts extending beyond the scales. The cone buds form on the current year's growth in late summer then remain inconspicuous until they swell the following spring. They mature during one growing season, ripening in early August or early September, dissemination by wind begins about two weeks later, dependent on dry weather. Trees begin to produce cones at about 12 years and continue annually, with particularly heavy crops every fourth or fifth year.

Seeds are 5-6 mm long, rounded-triangular with a wing up to twice as long, plump, lustrous brown on the upper surface but pale and marked with large irregular white spots beneath.

Propagation

Seeds grow readily from spring sown seed but seedlings are susceptible to damping off, therefore well-ventilated beds in which the soil is rather dry at the surface are necessary. Shade is also necessary for young seedlings. Stratification seems to be unnecessary, although it is claimed (Allen, 1960) that germination can be accelerated by 6 weeks treatment at 0-5°C. Trial seeds were soaked overnight in cold water before sowing, almost 100% germination occurred within 2 weeks. Seedlings need mulching in winter for protection. Sowing in containers facilitates transplantation.

Cuttings may be taken in winter, or early spring just before growth starts, or in summer. Early spring is probably the best.

Transplantation

Transplants fairly well with a ball of soil around the roots. If the root system seems poor on a balled tree it may be necessary to remove part of the top to offset the loss of the roots. Trees from natural stands may be difficult to move successfully, and usually cannot be moved from low to high elevations or southern to northern latitudes.

Conditions for cultivation

The growth rate is slow at first increasing steadily to a uniform rate at 6 to 10 years, after which it may average more than 2 feet annually but after 20 years the rate falls again. The greater part of height growth is made during the first 75 years, at 150 years on the average, the tree has practically reached maximum height. The largest trees may be 400-1,000 years old—the oldest tree on record is believed to be on the Shawnigan Division of MacMillan Bloedel in Lake Cowichan District, 1,300 years old. It is next in size to the giant sequoia and redwood. The recommended hardiness zone for *Pseudotsuga menziesii* in Canada is zone 7b. Trees are best planted in some shade, particularly if there is ample moisture. The soil should be deep, loamy, moist and well-drained, although poorer soils are tolerated if there is ample moisture. If pruning is necessary such as for a lopsided tree pinch out the buds from the side showing vagrant growth. Do not prune so that cuts are made beyond foliage. Do not interplant with Colorado spruce, see Diseases and Problems of Cultivation.

Landscape Value

Trees provide moderately dense shade, and make attractive ornamental plantings in a garden as specimen trees, windbreaks or tall hedges. Small trees which are dense foliaged and symmetrical with branches growing down to the ground are particularly attractive ornamentals. Douglas fir withstands city conditions better than most other conifers. Trees are fairly resistant to wind because of their wide-spreading roots, although high winds following heavy rainfall may cause windthrow in young saplings.

Availability

This species is only moderately available in British Columbia from local nurseries because of lack of demand.

Varieties and Ornamental Cultivars

The Rocky mountain form with bluish green leaves is often separated as var. *glauca* from the coastal form var. *menziesii*. A large number of cultivars have been developed from both forms in the past, although

several of these are now either very rare or lost to cultivation. At the present time about 35 cultivars are known (den Ouden, 1965).

An allopolyploid variant occurs as a natural stand (Sziklai, personal communication). Normal leader development is absent as in bonsai trees so that after 25 years the tree only attains a height of 6 feet instead of the normal 40 feet. This habit, together with self-pollination and true-breeding, suggests that this may be a cultivar of good potential horticultural value.

Other Uses

Compared with other American woods Douglas fir is strongest in terms of weight. It is used for all kinds of construction, railway ties, piles etc. It is resistant to decay and can be attractively stained for interior trim or furniture. The bark has been used in tanning leather. In addition, Douglas fir is being used increasingly for Chirstmas trees because the needles hold long after the tree is cut down.

Diseases and Problems of Cultivation

The trees may suffer damage during the winter due to heavy snow or extreme low temperatures when excessive moisture may be lost from the leaves leading to windkill or windburn. Mulching the soil helps to prevent freezing, particularly in the early years. The use of outdoor Christmas lights of more than 10 watts intensity may cause scorching of the needles on a live tree. Otherwise the tree may be attacked by a long list of insects, fungi and mistletoe but is little affected by most of them, particularly if it is kept in good vigor by watering and fertilizing when needed, and if wounds by machinery are avoided. Trees up to 50 years old are usually safe from attack. The following are probably the most important insect and fungus diseases:

Gillette'ella cooleyi or *Chermes cooleyi*—'Douglas fir woolly aphid' or 'Sitka spruce gall aphid' has the Douglas fir and Sitka spruce trees as alternate hosts, therefore Sitka, Colorado Blue or Engelmann spruce should not be interplanted with Douglas fir. Infestations can be treated by using a dormancy oil spray while the tree is dormant and the temperature is above 45°F.

Dendroctonus pseudotsugae—'Douglas fir beetle', a small reddish- or blackish-brown bark beetle which usually attacks injured or dying trees, hardly ever mature healthy trees. Keep trees growing vigorously; cut down seriously weakened trees.

Scolytus unispinosus—'Douglas fir engraver", a very small shiny black beetle which makes galleries in bark of normal, injured or dying wood. Keep trees growing vigorously, spraying with an insecticide at 2-3 week intervals may control.

Other diseases which may be mentioned are:

Poria weirii, root disease; *Fomes subroseus*, 'heart rot', usually gains entrance through broken tops; *Fomes pini*, 'heartwood decay'; *Polyporus schweinitzii*, 'heartwood decay'; *Rhabdoclina pseudotsugae*, 'leaf coast' or 'leaf cast'.

Origin of the name

The generic name *Pseudotsuga* means the 'false hemlock'—pseudo is the Greek for false and tsuga the Japanese for hemlock. The specific name *menziesii* commemorates Dr. Archibald Menzies, a naturalist-surgeon, who discovered the tree on the West coast of Vancouver Island. The common name of Douglas fir comes from David Douglas who introduced it into England in 1827. The other common names are lumbermen's terms. The old name was *Pseudotsuga taxifolia* Britton, which means 'false hemlock with yew-like leaves'.

REFERENCES

Fenska, R. R. 1959. The Complete Modern Tree Experts Manual. Dodd, Mead and Company, New York.

Allen, G. S. 1960. Factors affecting the viability and germination behavior of coniferous seeds. IV. Stratification period and incubation temperature, *Pseudotsuga menziesii* (Mirb.) Franco. Forestry Chronicle. 36(1): 18-29.

Hitchcock, C. L. et al. 1969. Vascular Plants of the Pacific Northwest. Part 1. Vascular Cryptogams, Gymnosperms and Monocotyledons. Univ. of Wash. Press, Seattle and London.

Hosie, R. C. 1969. The Native Trees of Canada. 7th ed. revised. Canadian Forestry Service, Dept. of Fisheries and Forestry. Queen's Printer, Ottawa.

den Ouden, P. 1965. Manual of Cultivated Conifers. Martinus Nijhoff, The Hague.

Pirone, P. P. 1970. Diseases and Pests of Ornamental Plants. 4th ed. Ronald Press Company, New York.

Silvics of Forest Trees of the United States. 1965. USDA Agriculture Handbook #271.

Sudworth, G. B. 1908. Forest Trees of the Pacific Slope. 1967 republication by Dover Publications Inc., New York.

Westcott, Cynthia. 1946. The Gardener's Bug Book: 1,000 Garden Pests and How to Control Them. The American Garden Guild and Doubleday & Company, Inc., N.Y.

Krajina, V. J. 1969. Ecology of Forest Trees in British Columbia. Ecology of Western North America. 2(1): 1-147.

Botanical Garden News and Notes

Mrs. Francis Perry visits Garden—The Botanical Garden was pleased to have Mrs. Francis Perry a member of The Royal Horticultural Society Council visit the University in November. She was kind enough to present a public lecture on "Fragrance in the Garden" which was enjoyed by many.

Seed Exchange 1970—The Index Seminum for 1970 has now been distributed to 466 institutions throughout the world. In 1969 we received some 9,319 requests of which 7,147 were filled. Some 290 institutions requested seed and the greatest demand was for native conifers followed by ornamental native trees and flowers such as *Cornus nuttallii, Erythronium, Fritillaria, Lilium* and *Trillium*. The Botanical Garden has a policy of destroying previous years seed and sending out only new seed for most genera except for those for which proved records indicate that the seeds may be held for more than one year. The new Index Seminum for 1970 segregates native taxa from introduced and ornamental taxa and a new format was developed for the Index.

American Association of Botanical Gardens and Arboreta annual meeting—Both the Director and the Supervisor of Operations attended the recent annual meeting of the AABGA in Miami and this was followed by a tour to a number of gardens in the eastern United States. It is hoped that at the 1971 annual meeting some special program may be developed to enable botanical gardens associated with universities and colleges to discuss mutual problems. There was a notable absence of representatives from university gardens and a special program designed to interest these people may well increase the participation of university orientated gardens at another meeting.

Climatological Summary for 1970*

A summary of the 1970 weather conditions and a comparison with those of the past ten years has been made.

Temperatures in 1970 ranging from a high of 86°F in June to a low of 21°F in November were average for the ten year period. The last frost was recorded on March 9th and the first on November 20th. Grass minimum temperatures below freezing occurred in nine months of the year compared to eight months in the ten year average. The monthly minimums were generally a little lower than normal.

Total rainfall at 38.13" was the lowest in the past ten years and 9.6" below the average. While the summer was dry with 4.52" of rain falling between May 1st and August 31st, it was not as dry as the same period of 1967. Snowfall at 14.14" was about one third less than the average total fall.

In 1970, 2058.5 hours of bright sunshine was recorded. This was 197 hours above the ten year average and the highest total recorded in this period.

There was no significant difference in the monthly mean mileage of wind. At the 40 foot level the mean mileage was generally 35-45 miles greater than at the 3 foot level.

Data	*September*	*October*	*November*	*December*
Mean temperature	55.30°F	49.0°F	43.0°F	37.8°F
Highest temperature	71°F	70°F	58.0°F	49°F
Lowest temperature	41°F	32°F	21°F	23°F
Grass minimum temperature	26°F	21°F	8°F	16°F
Total rainfall/No. days with rainfall	3.36/12	3.24/14	5.16/18	8.36/22
Total snowfall/No. days with snowfall	NIL	NIL	1.6/2	8.3/4
Total hours bright sunshine/possible	188/372.22	144.9/318.43	68.4/268.23	39.8/253.11
Mean mileage of wind at 3'	76.3	77.7	75.1	101.1
Mean mileage of wind at 40'	115.5	117.4	111.2	143.8

**Site: The University of British Columbia, Vancouver, B.C., Canada..*
Position: lat. 49°15'29"N; long. 123°14'58"W. Elevation: 342.6'.

Ilex aquifolium L.
'English Holly'

DAVIDSONIA

Volume 1 Number 4 *Winter 1970*

Contents

A National Botanical Gardens of Canada—Why Not Now! 33

Rose Garden 1970 36

Annuals at International House 36

Pseudotsuga menziesii 'Douglas fir' 37

Botanical Garden Notes and News 41

Climatological Summary for 1970 41

PRICE PRINTING LTD.