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Guide to the Identification of Poplar Cultivars on the Prairies

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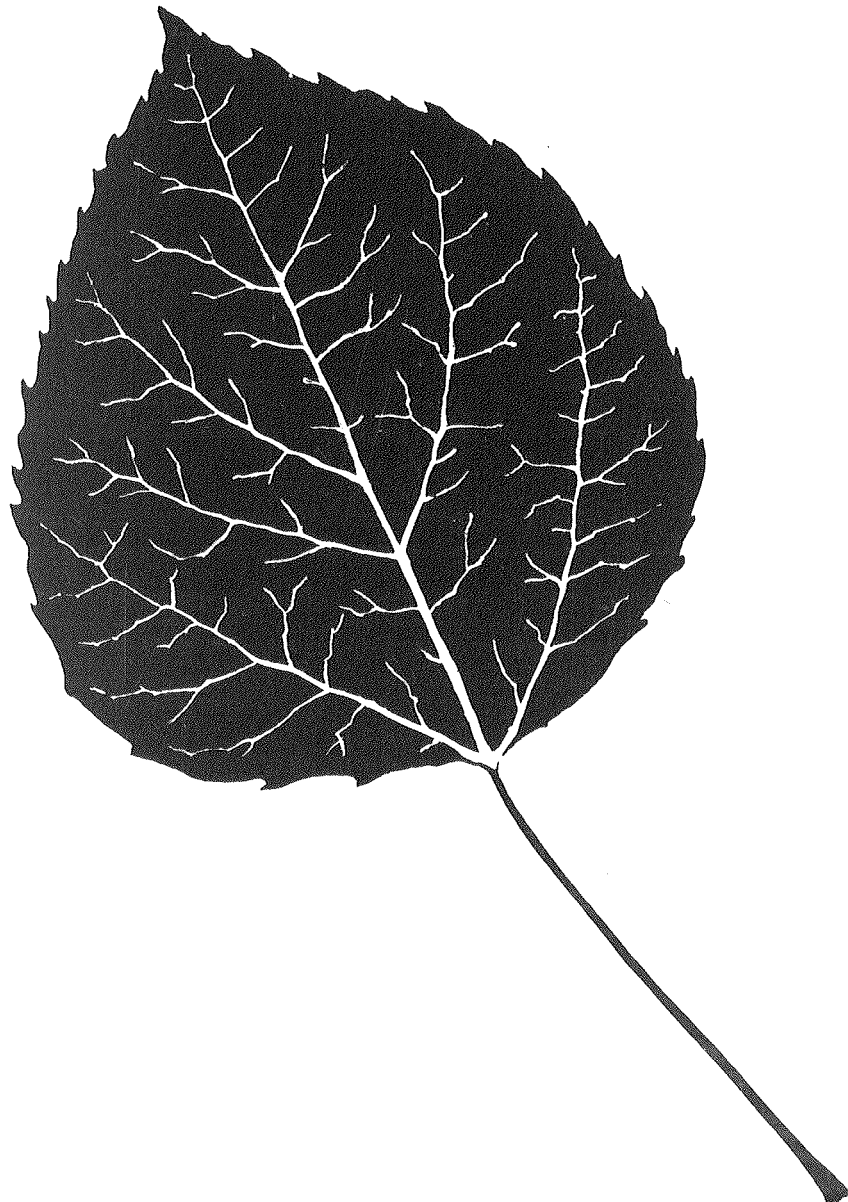


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des Forêts

Guide to the identification of poplar cultivars on the prairies

K. J. Roller, D. H. Thibault, and V. Hildahl



Guide to the identification of poplar cultivars on the prairies

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Résumé en français

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Abstract

This paper provides those who work with poplars in the prairies region of Canada with an easy-to-use leaf and twig key and detailed morphological descriptions of the more commonly planted cultivars. Recommendations for their use, notes on growth, natural pruning, susceptibility to insects and diseases, and tolerance to climatic extremes are also provided.

Résumé

iii

Grâce à ce guide, ceux qui travaillent avec les peupliers dans la région canadienne des Prairies disposeront d'une clé basée sur les feuilles et les rameaux, et de descriptions morphologiques détaillées des cultivars les plus fréquemment plantés. Ils y trouveront aussi des instructions sur leur utilisation, des notes sur leur croissance, leur élagage naturel, leur vulnérabilité face aux insectes et aux maladies et leur résistance aux conditions climatiques extrêmes.

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INTRODUCTION

Poplars have been used for shelterbelt, ornamental, and amenity purposes on the prairies of Manitoba, Saskatchewan, and Alberta since before the turn of the century. Early settlers used the native poplars primarily in farmstead shelterbelts because the species grew readily under various soil, site, and climatic conditions and provided reasonably quick protection from strong winds and drifting snow.

Although the native poplars adequately met the immediate requirements of the early settlers, the species lacked such essential characteristics as low branching crowns, rapid growth, and drought resistance—features considered desirable if maximum benefits were to be attained from the standpoint of protection and amenity.

Pioneer horticulturists and tree geneticists soon recognized the shortcomings of the native poplar species and embarked on programs designed to identify clones and develop hybrids more suitable for prairie plantings. Once planted, however, most of the poplar clones and hybrids were difficult or almost impossible to identify because detailed information on their morphological characteristics was lacking. This paper provides those who work with poplars in the prairies region with an easy-to-use leaf and twig key and detailed morphological descriptions of the more commonly planted poplar cultivars and the three native species (balsam poplar, eastern cottonwood and trembling aspen). Recommendations for their use, notes on growth, natural pruning, susceptibility to insects and diseases, and tolerance to climatic extremes are also provided.

The morphological descriptions are based on samples obtained and observations carried out in representative plantations located throughout the prairie zone. Vegetative parts (except in the cases of the Brooks poplars and the native species) were collected from three test plantings established at Hadashville and Riding Mountain, both in Manitoba. The 1-year-old rooted cuttings for these plantings had been provided by the Prairie Farm Rehabilitation Act (PFRA) tree nursery, Indian Head, Saskatchewan. For the description of sexual parts, mature branches of the cultivars were secured from Skinner's Nursery at Dropmore, Manitoba, from the Department of Natural Resources' plantation at Mortlach, Saskatchewan, and from original plantings at Indian Head.

Plant parts, both vegetative and sexual, of the Brooks cultivars were collected from Griffin's plantation at Brooks, Alberta. Data for the native species were obtained from trees grown under uniform conditions at Hadashville, in southern Manitoba.

The identification and description of the vegetative and sexual parts is based on 20 samples taken from different trees of the same cultivar or species as recommended by the International Poplar Commission, Food and Agriculture Organization of the United Nations.

Growth and phenological characteristics,¹ and the effect of insect and disease attacks were observed by the authors. Recommendations for the use of individual cultivars are based on the information collected and the evaluation of recent publications² by Cram

¹Dates of leaf flushing were recorded as "very early" (before May 15), "early" (from May 15 to 25), and "late" (beyond May 25); those of leaf defoliation as "early" (before October 10), "late" (from October 10 to 20), and "very late" (beyond October 20).

²Included: Roller, K. J., and D. H. Thibault. 1969. Test plantings of poplar cultivars in Manitoba. Can. Dep. Fish. Forest., Forest Res.

(1960), Roller (1970), Skinner (1956), Zalasky, Fenn, and Lindquist (1968), and Zalasky (1970).

Common names for most of the cultivars described in this publication were taken from lists prepared by Cram (1960), Maini and Cayford (1968), and W. A. Cumming (personal communication). The parentage of these cultivars and a detailed description of the morphological and ecological characteristics pertaining to the native poplars are given by Maini and Cayford (1968). The botanical names conform to the International Code of Nomenclature for Cultivated Plants (Anonymous 1969). Five cultivars — Brooks selections, Northwest, Volunteer, Wheeler and 44-52—not previously registered by the International Poplar Commission are named and described.

Diagnostic Features

Although it is difficult to develop a simple and precise key for the identification of the native and hybrid poplars, certain features provide a quick and reasonably accurate method of determining the individual species and cultivars. In the key (Figure 1) the features used³ are diagnostic characteristics of the leaf, petiole, leaf scar, twig, and bud, and the presence of eyelash-like hairs at the bud base. To ensure positive identification it is essential that, after preliminary determination from the key, the sample tree be compared, feature for feature, with the morphological description given. The key, based principally on leaf and twig, is most useful during summer.

Poplars on the prairies exhibit four distinctive leaf shapes: ovate, oval, deltoid, and rhomboid (Figure 2). Although leaf size is variable, the general shape of sample leaves can be determined by direct comparison with the drawings. Leaf tips may be described as being acuminate or pointed (Figure 3); leaf bases as rounded, narrowly rounded, cuneate, broadly cuneate, or straight (Figure 4); and petioles as short (less than one-third leaf length) or long (more than two-thirds leaf length). In cross section, petioles can be cylindrical or flattened, with grooves on the upper side facing the sun. The

upper side can also be pubescent or glabrous, and green, pink, or reddish during the growing season. In late summer, the petioles of all cultivars turn to dark red or light brown. Midribs may be glabrous, pubescent, or downy. On some cultivars the under surface of the leaf is warty and may exhibit rusty-brown blotches. Leaf margins are either finely serrated, serrated or coarsely serrated, and may be gland-tipped and sometimes pubescent (Figure 5). Secretion glands may also be found on the upper side of the leaf at the juncture of the petiole.

³For identification purposes, leaf and twig samples should be obtained from current shoots found in the upper crown of young and mature trees. Samples obtained from the lower crown tend to be more variable and

Leaf and twig key

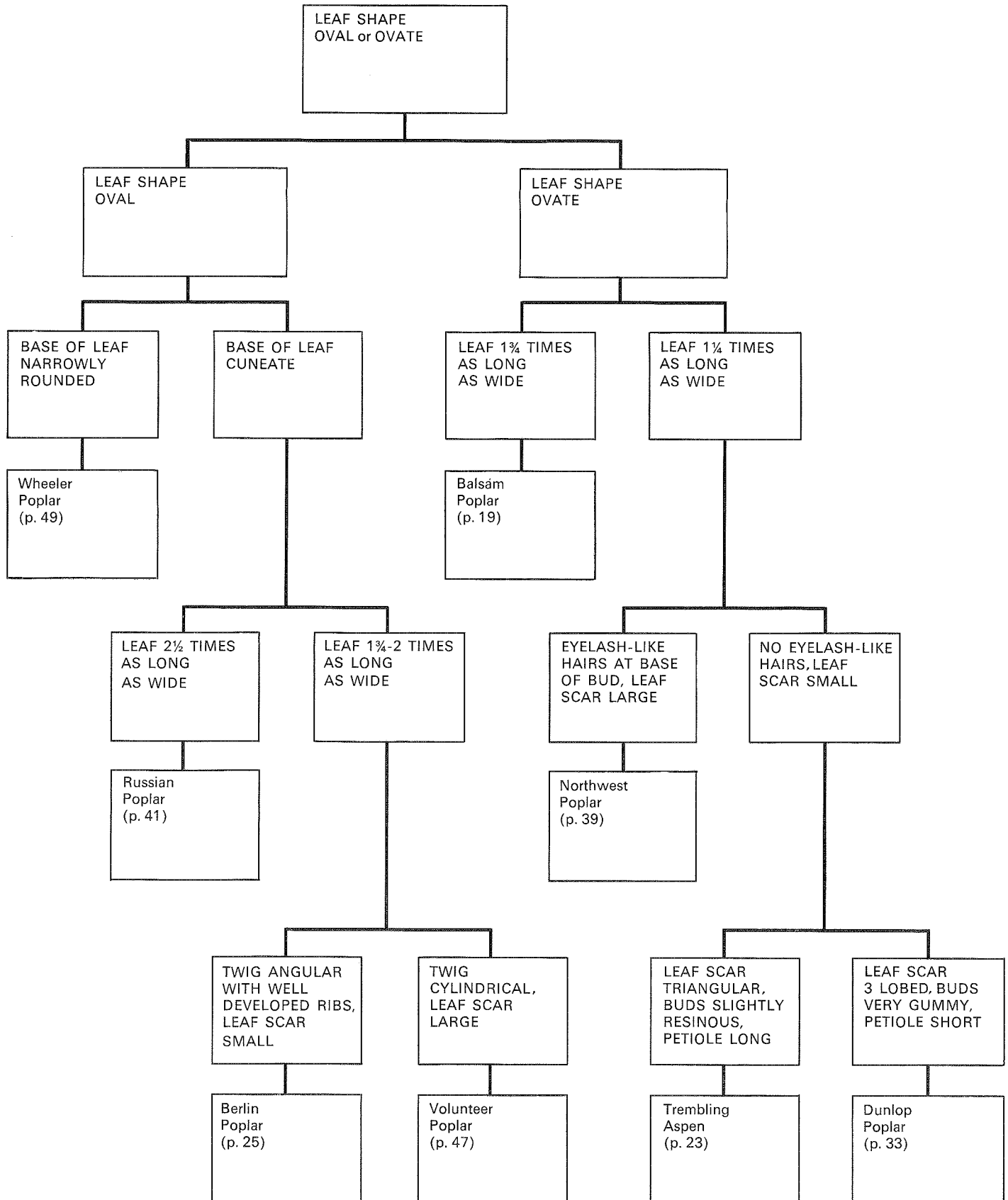
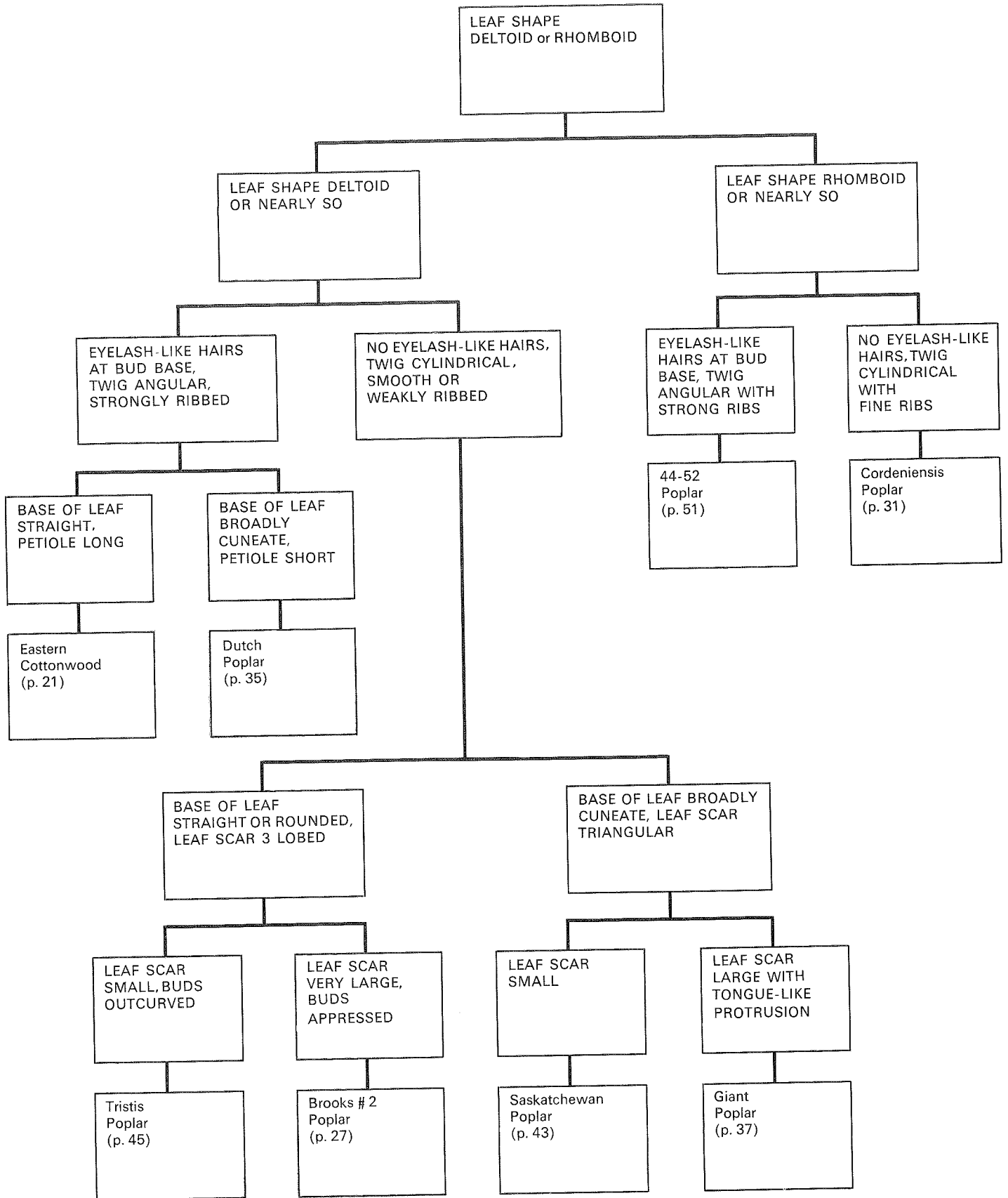
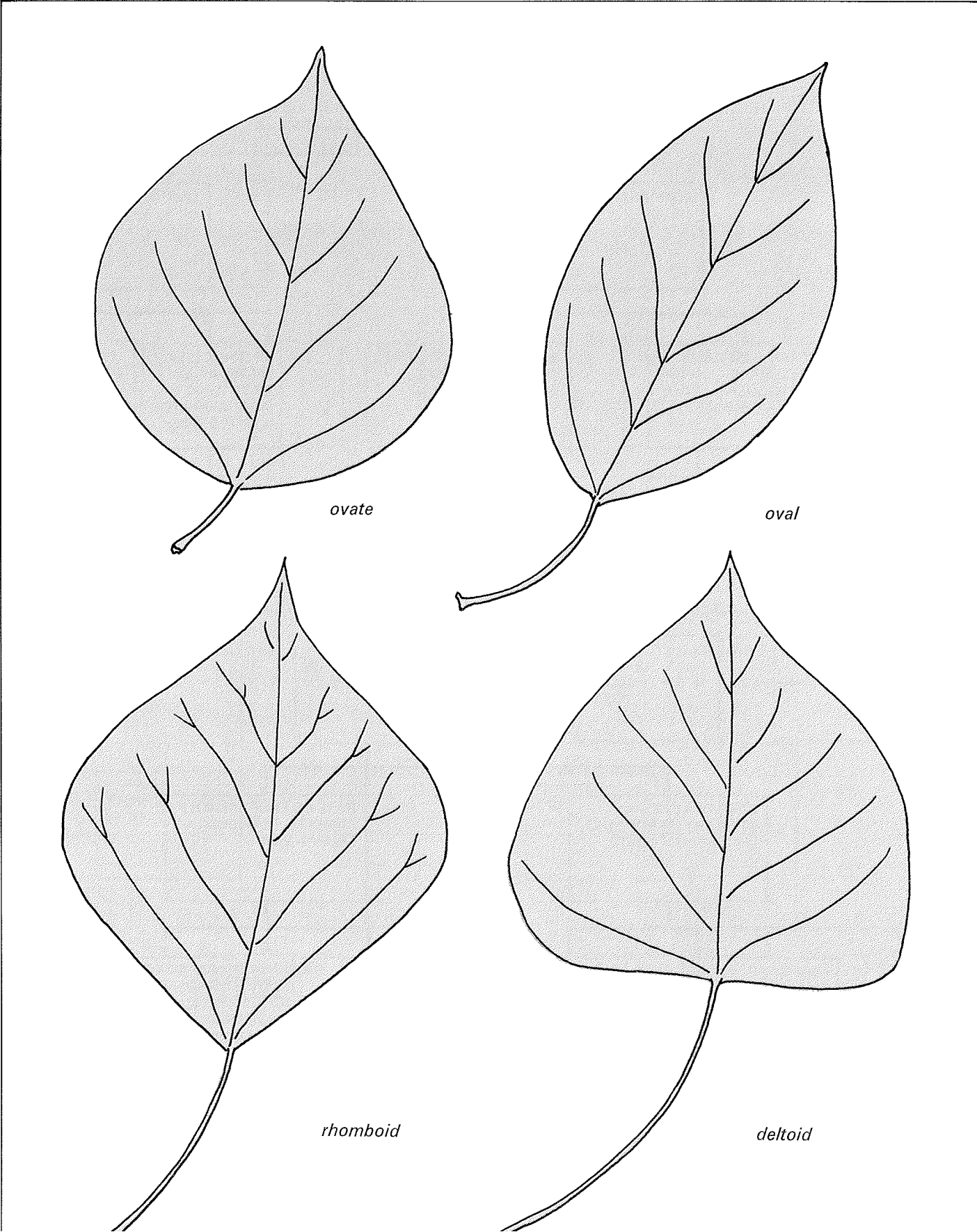


Figure 1



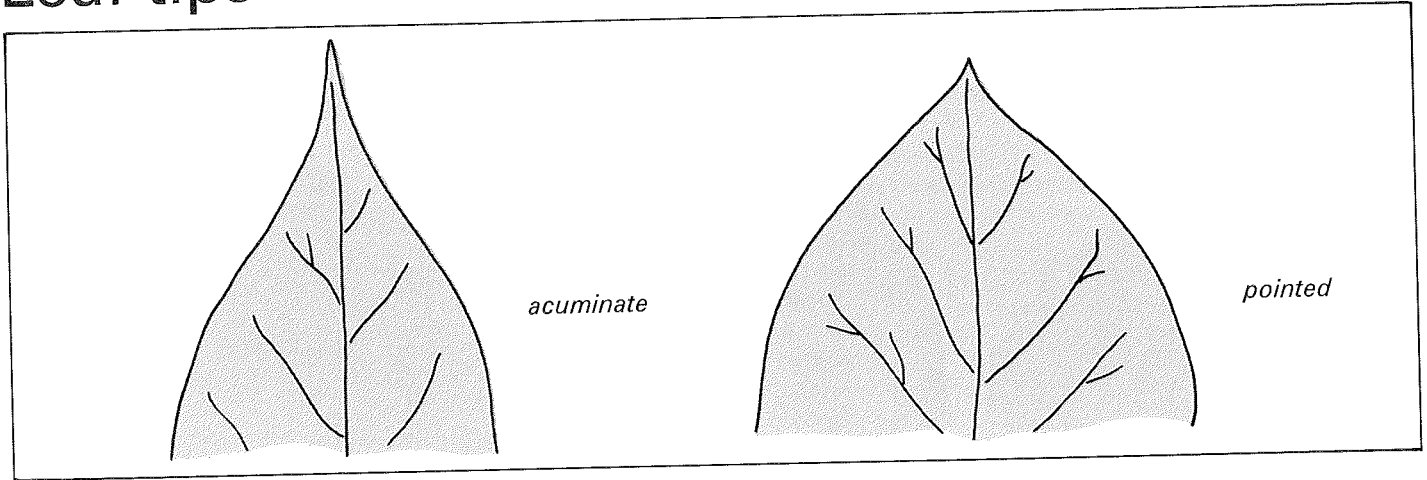
Leaf shapes

Figure 2



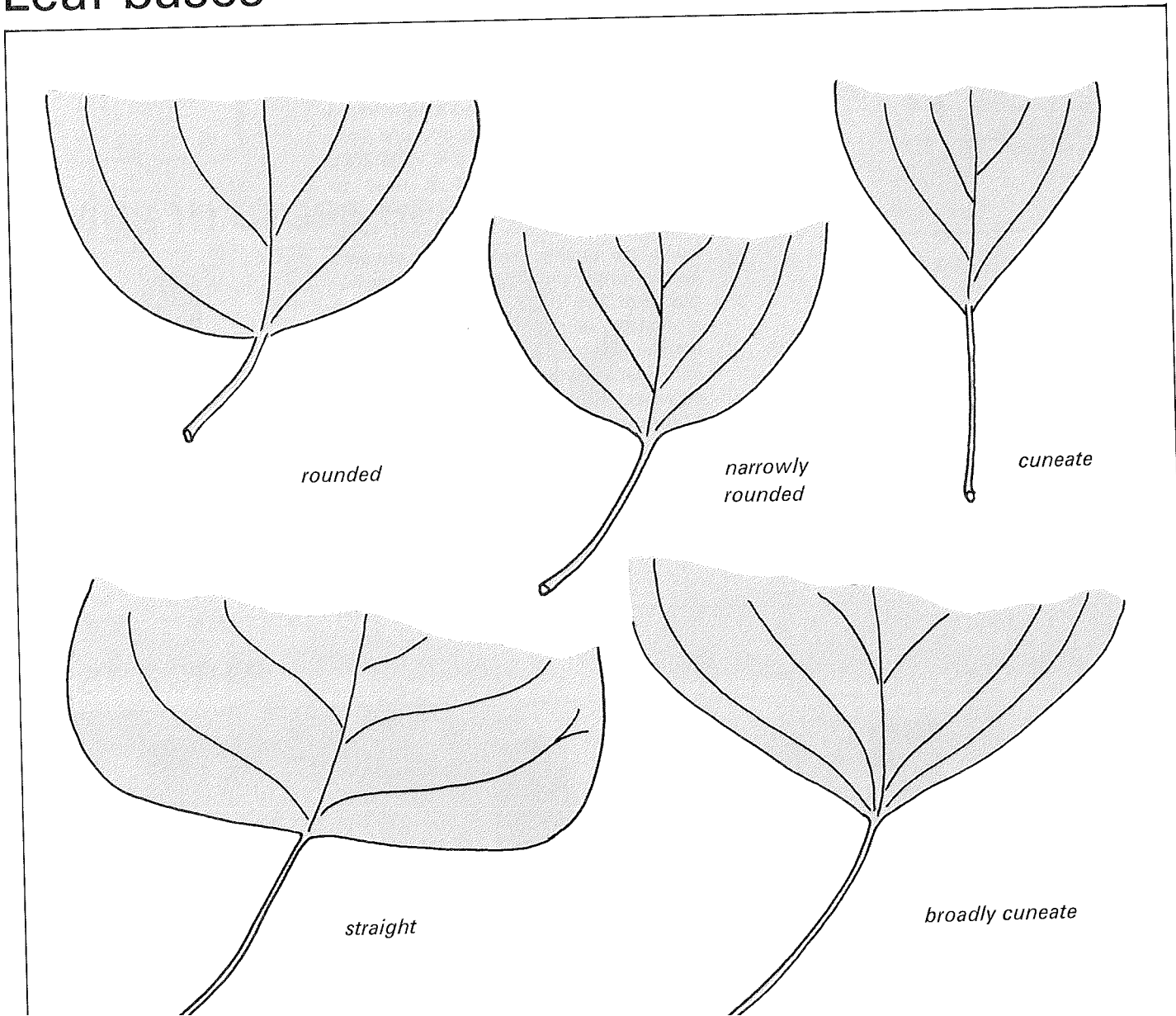
Leaf tips

Figure 3



Leaf bases

Figure 4



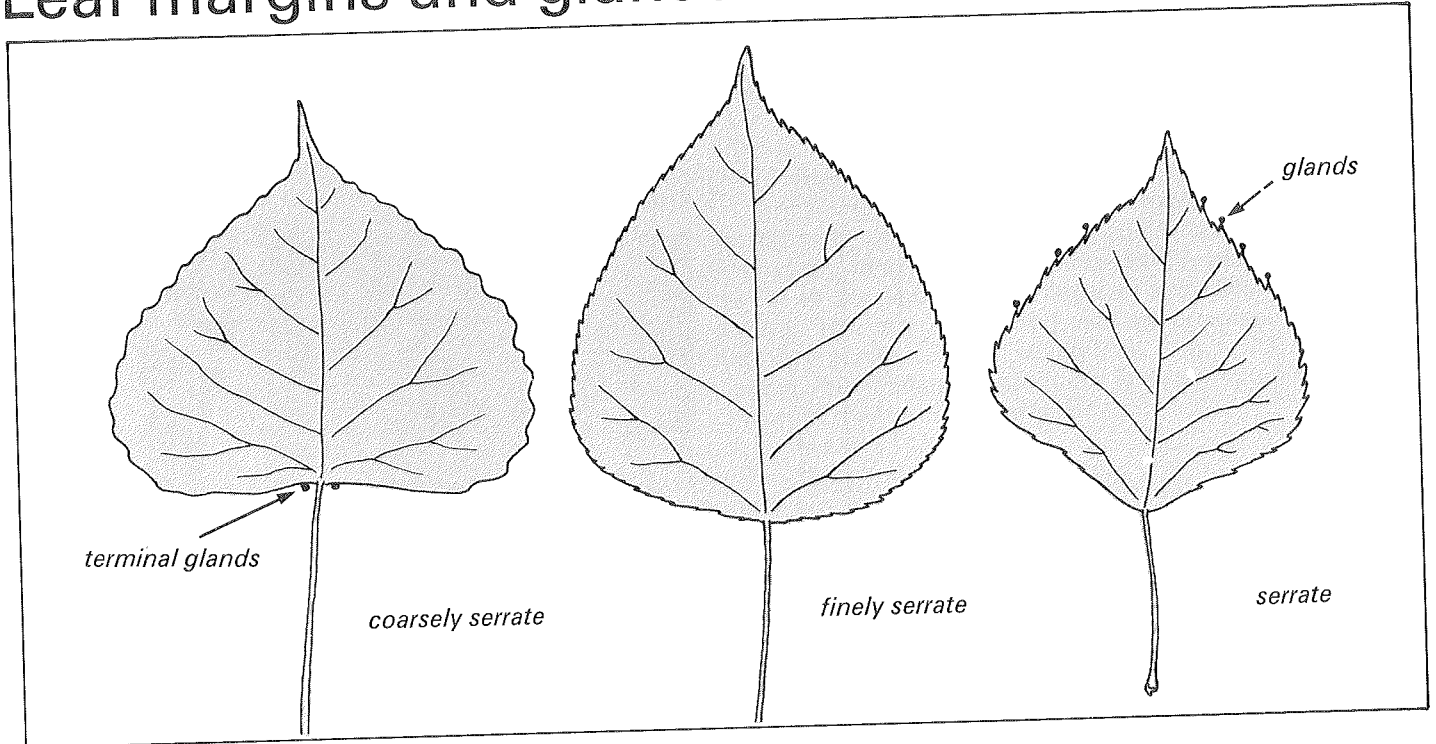
In cross section, the twigs can be cylindrical, angular with grooves and ribs, or angular (Figure 6). The slightly raised leaf scars may be small or large, triangular, 3-lobed with a tongue-like protrusion, or 3-lobed (Figure 7). Although leaf scars are generally variable in size, in this paper they are considered small if 2.0 x 3.5 mm or less in height and width respectively, and large if 3.0 x 4.5 mm or greater in height and width. Stipules (subsequently stipule scars) are found on either sides of the buds (Figure 8).

Vegetative buds are formed in late August and can be pointed or acute; the arrangement can be appressed or outcurved in relation to the stem (Figure 9). On the cottonwood-origin hybrids, eyelash-like hairs are present at the juncture of the bud base and the leaf scar (Figure 10).

Sexual buds are located mainly in the upper half of the crown and are conspicuously larger than the vegetative buds. Their size makes it easy to identify the sex of trees from late September until the buds burst. Male buds are husky, ovoid, and covered with strongly developed scales, particularly at the base. Female buds are elongated, elliptical, more slender, and smaller (Figure 11). Nevertheless, positive identification of sex can only be achieved by using longitudinal sections of male or female buds obtained in the late winter (Figure 12). The cultivars described in this paper are male except for 44-52, Volunteer, and one clone of Dunlop, which are female.

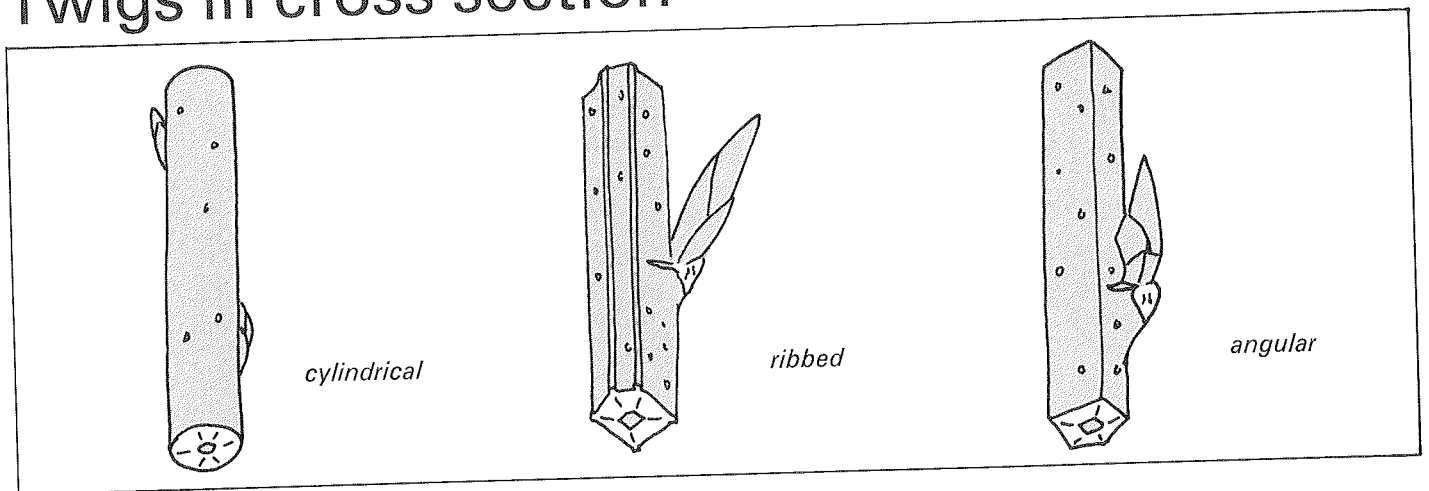
Leaf margins and glands

Figure 5



Twigs in cross section

Figure 6



Leaf scars

Figure 7

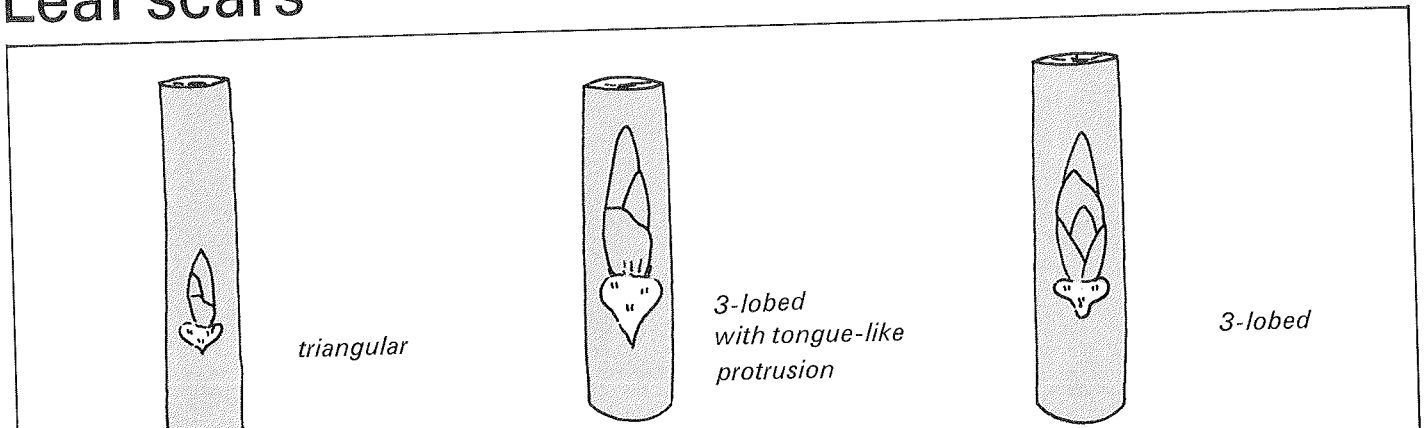


Figure 8

Stipule (Berlin poplar X 4.0)
and stipule scars (Northwest poplar
X 1.6) on young stems.

- a *stipule*
- b *stipule scars*

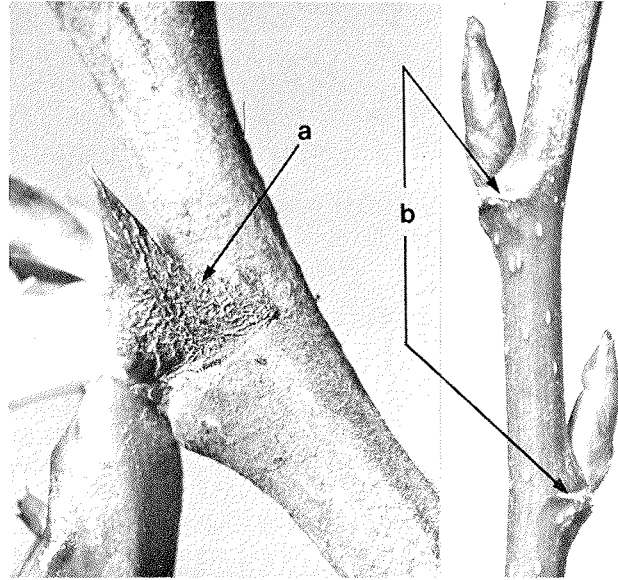
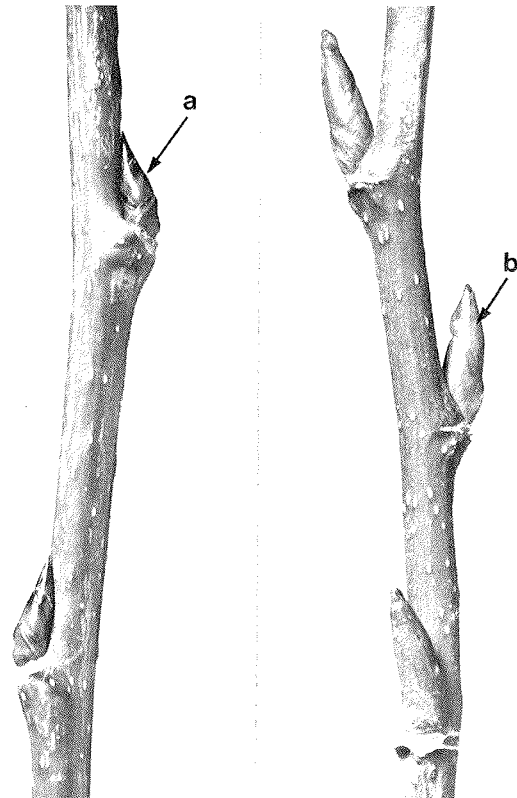


Figure 9

Appressed (trembling aspen)
and outcurved (Northwest poplar)
leaf buds on winter twigs (X 1.4).

- a *appressed leaf bud*
- b *outcurved leaf bud*



The dioecious flowers are borne in catkins (or aments) in the spring before leafing. Male and female catkins, when fully developed, are 10- to 15-cm long (Figures 13 and 14). In the female flower, the numbers of stigmas vary from two to four, their form being either cap- or Y-shaped. In the male flower, the numbers of stamens vary from 30 to 80. The bract has 20 to 30 digits, depending on the cultivar. The central areas of the bracts are light colored, and the digits are dark brown, sometimes tinged black. The number of digits and the extension of the light area of the bract could provide the basis for the development of a more precise taxonomic key. It was noted that the bracts of the native species—i.e., balsam poplar, eastern cottonwood, and trembling aspen—vary markedly.

Pollen grains are spherical with a diameter range of 20 to 40 μ m. Occasionally, some giant pollen grains measuring up to 80 μ m are found (Figure 15).

The seeds, which are borne in small capsules, mature 4 to 6 weeks after fertilization (Figure 16). The capsules split open and release the seeds along with an abundance of cotton. The seeds of cultivars are approximately 2-mm long and 1-mm wide, while those of trembling aspen are about 1-mm long and ½-mm wide. Figure 17 illustrates seeds from the three native species. The 1,000-seed weight of cultivars ranges from 0.5 to 1.0 g, and their color from white to grayish-white to cream.

Some cultivars produce a single central trunk with a conical crown, while others fork and develop a spreading crown. The bark on young stems of cottonwood-like trees is grayish-green; on those of balsam poplars reddish-brown; and on those of trembling aspen dark green. Lenticels, which are wart-like protrusions, may be oval, linear, or stripe-like (round dots in a row), and are prominent on the bark of young trees (Figure 18). The bark of older trees is furrowed and sometimes warty.

Eyelash-like hairs

Figure 10

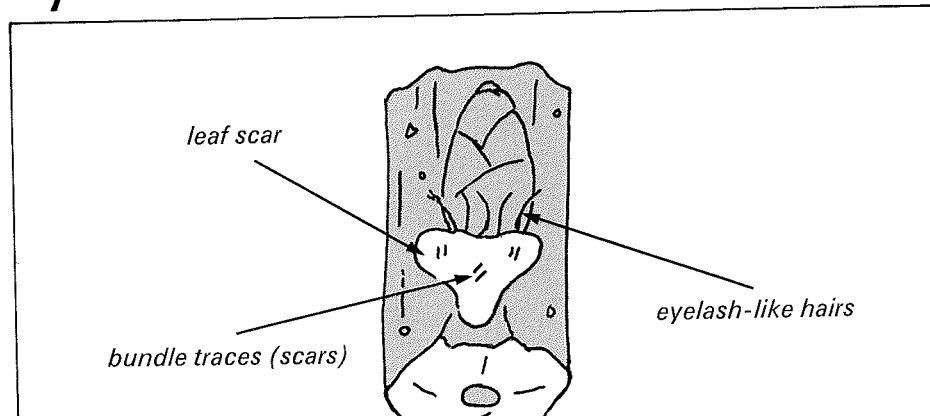


Figure 11

Female (left) and male (right)
buds of eastern cottonwood (X 1.9).

- a *vegetative (terminal) buds*
- b *leaf scars*
- c *sexual buds*

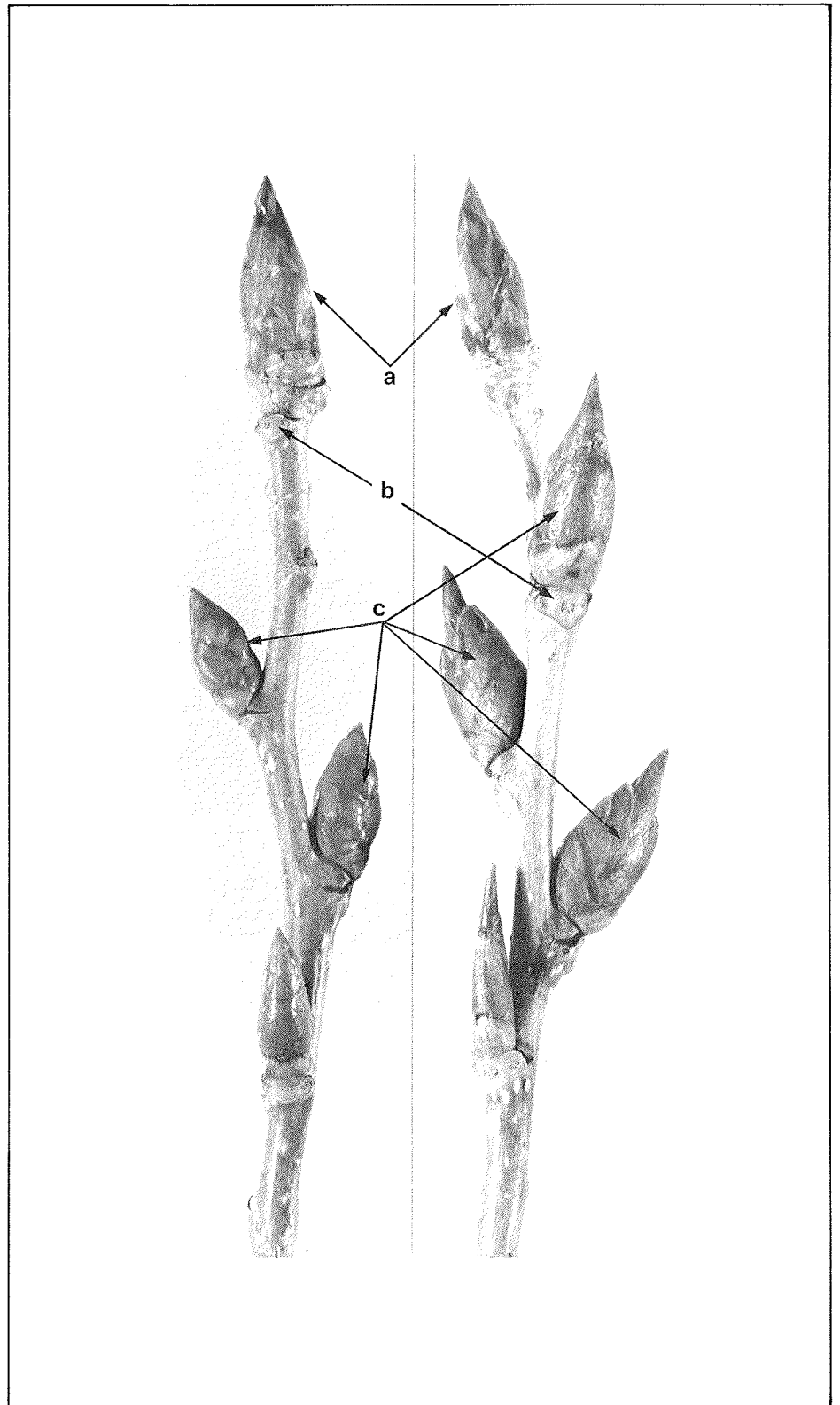


Figure 12

Longitudinal sections of eastern cottonwood female (left) and Berlin poplar male (right) reproductive buds (X 8.0).

- a ovaries
- b anthers (pollen sacs)
- c bract digits

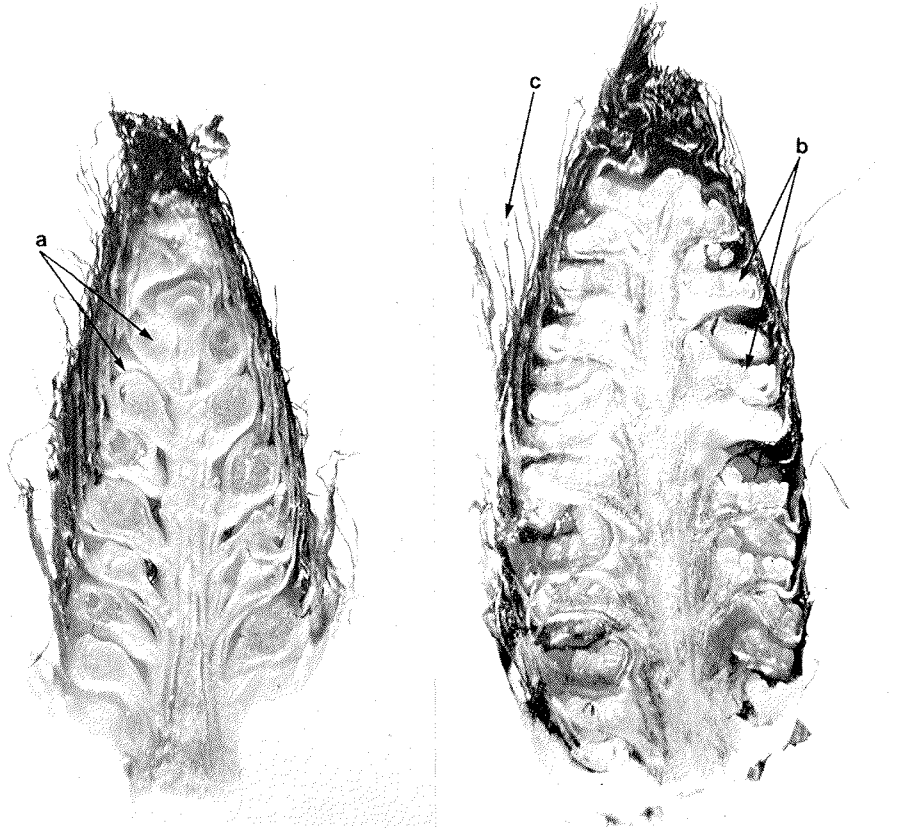


Figure 13

Emerging 44-52 poplar female (left) and eastern cottonwood male (right) catkins (X 2.8).

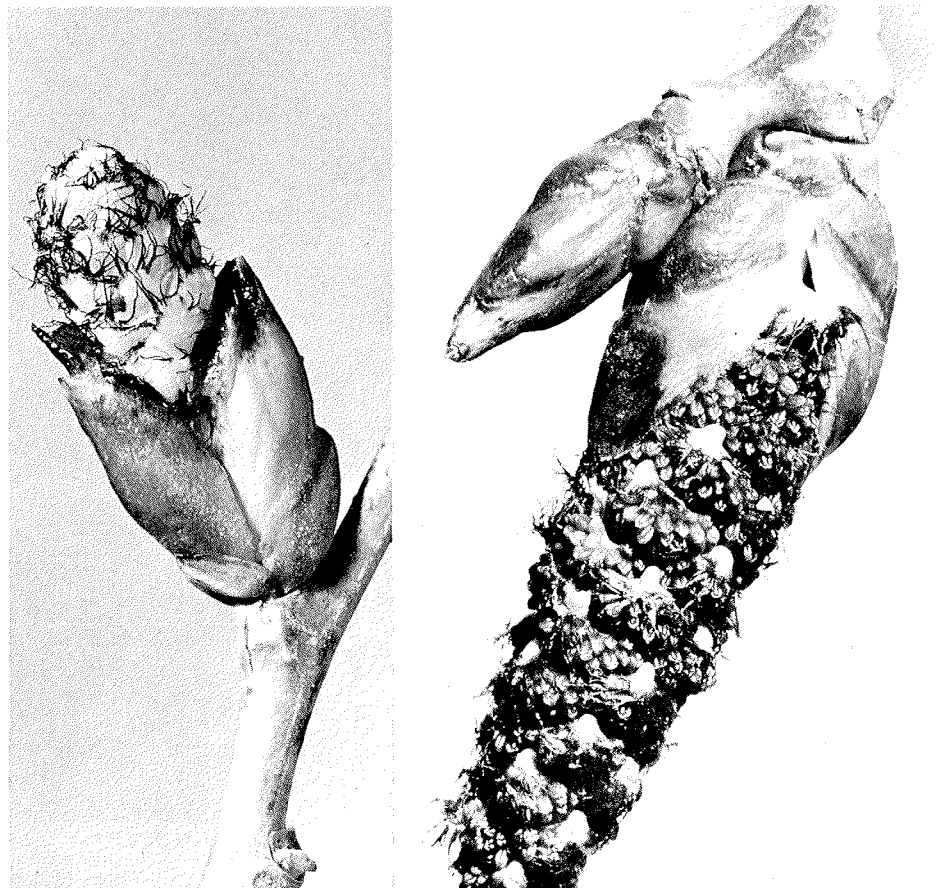


Figure 14

Fully developed eastern cottonwood female (X 2.2 on left) and Brooks #2 poplar male (X 1.2 on right) catkins.

- a *stigma*
- b *ovary*
- c *bract*
- d *anthers*

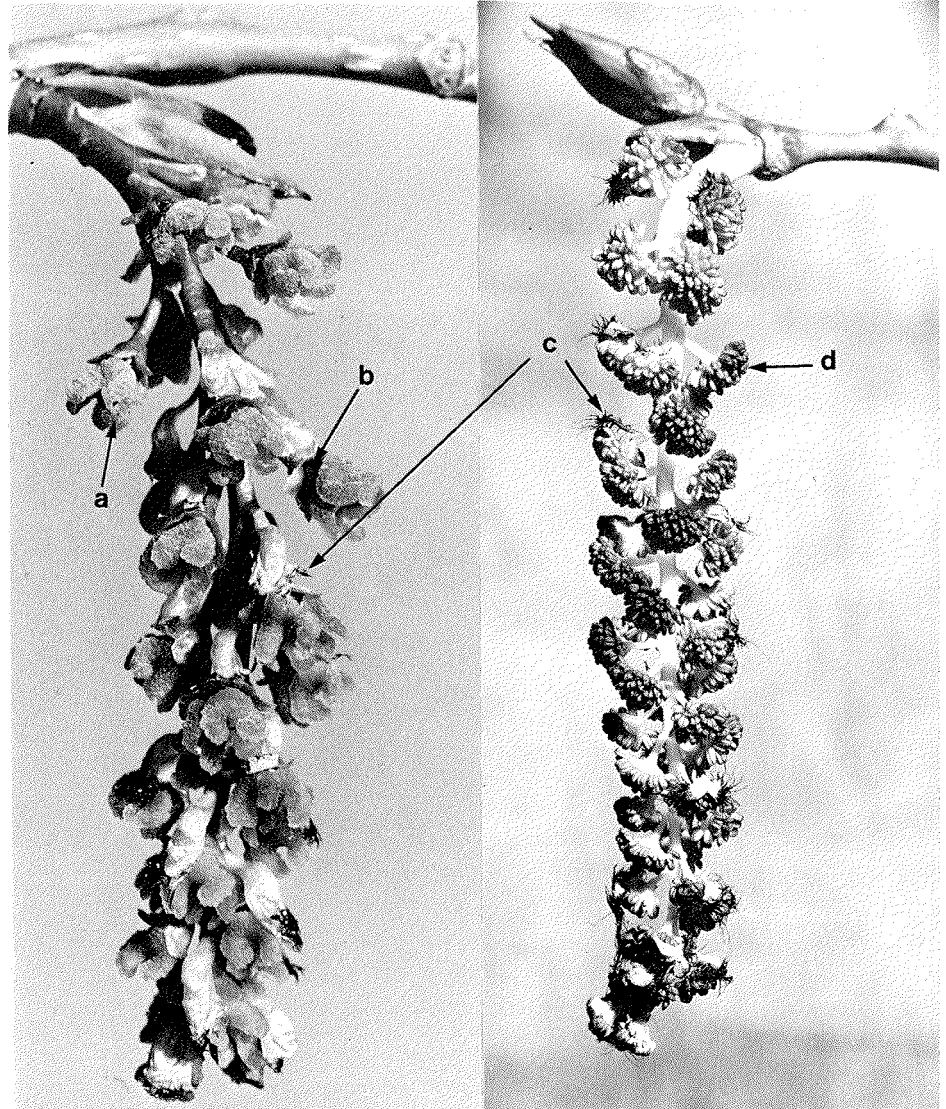


Figure 15

Pollen grains of trembling aspen.

- a *giant pollen grain*

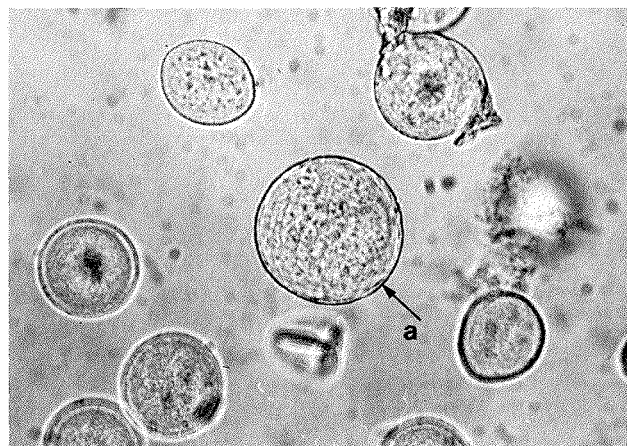


Figure 16

Mature female catkin
of 44-52 poplar (X 1.9).

- a *pedicel*
- b *capsule*
- c *peduncle*

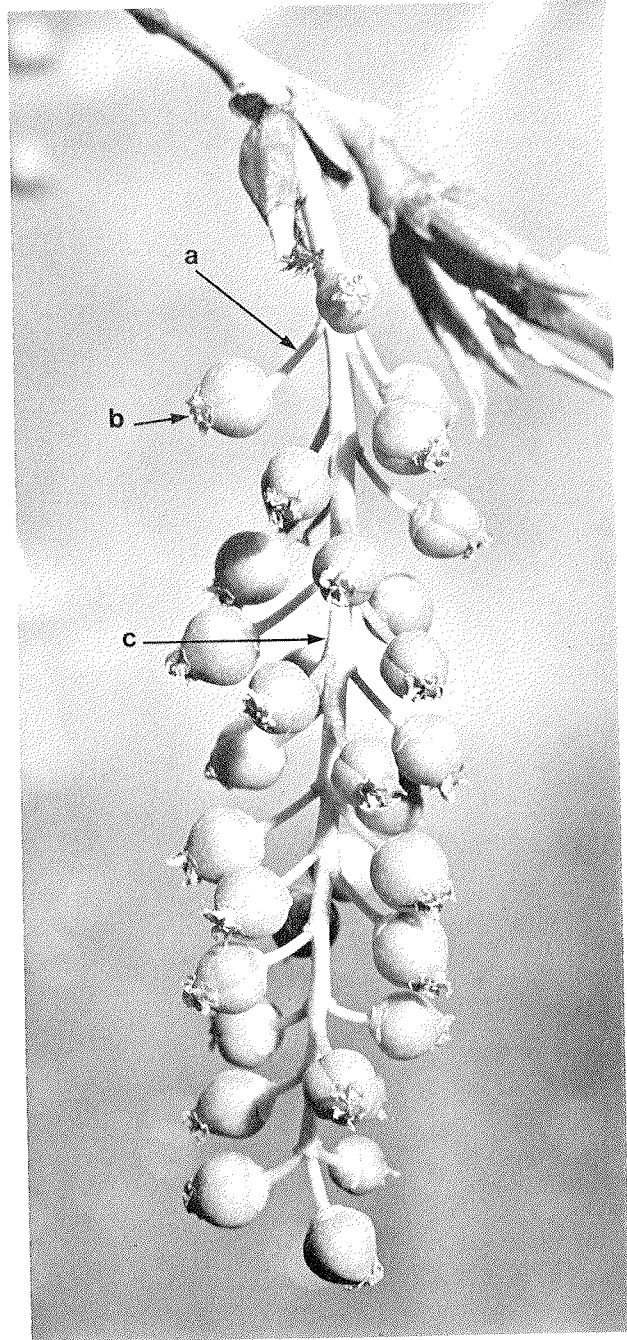


Figure 17

Comparative seed sizes (X 14)
and shapes of the three
native poplars.

- a *eastern cottonwood*
- b *balsam poplar*
- c *trembling aspen*

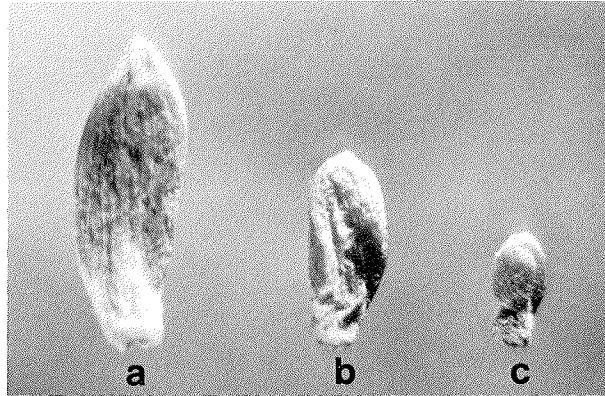
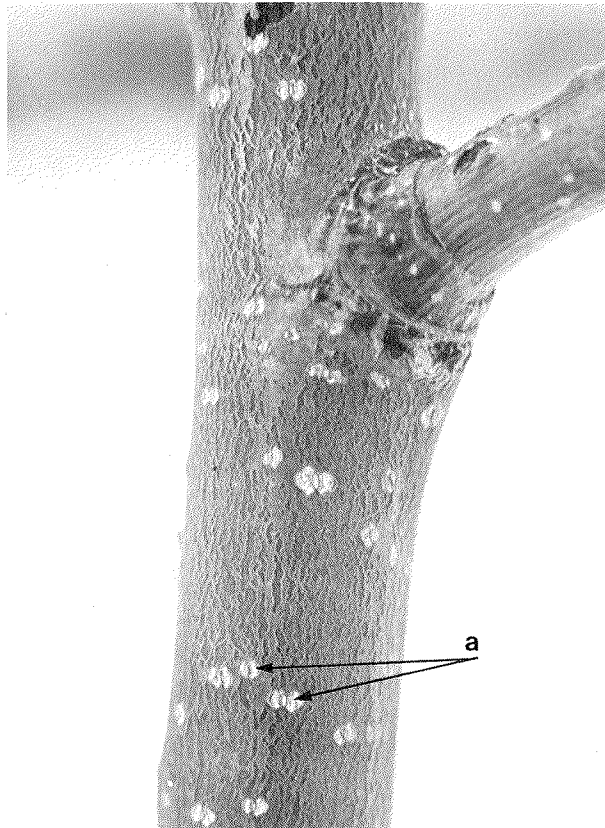


Figure 18

Lenticels on 2-year-old stem
of Northwest poplar (X 1.4).

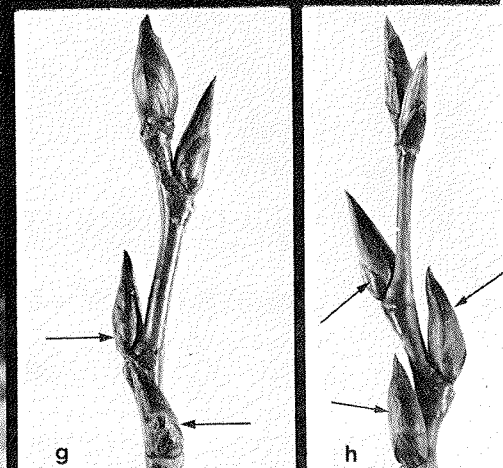
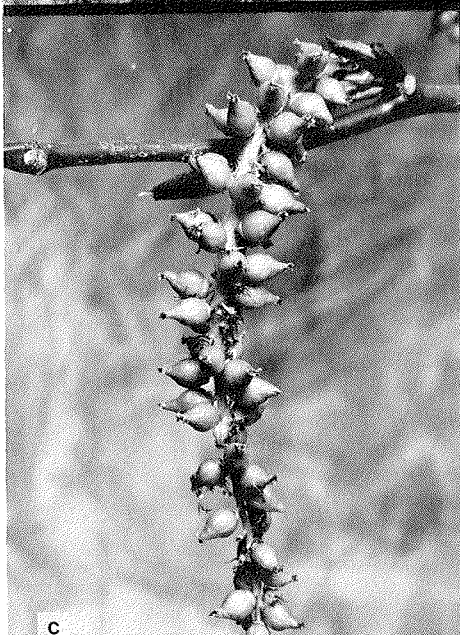
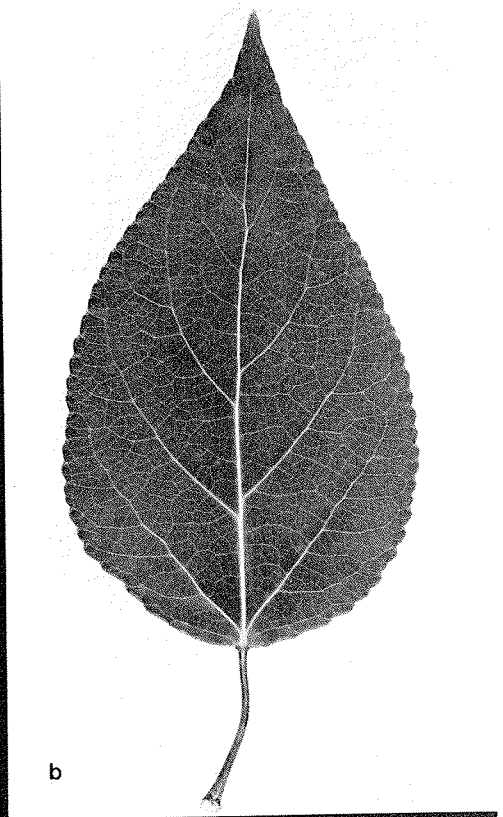
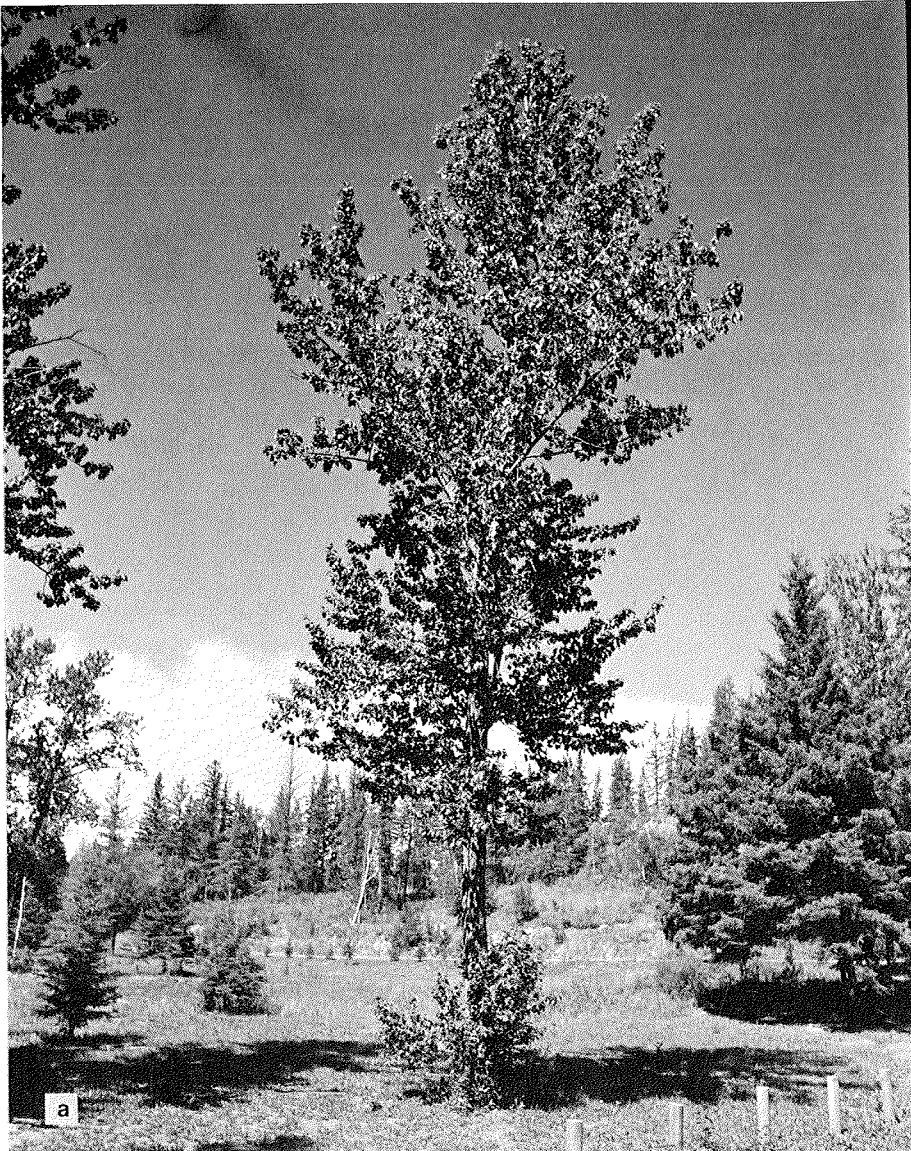
- a *lenticels*



Morphological Descriptions

17

Balsam poplar



Balsam Poplar

Populus balsamifera L.
(female and male)

- a mature tree
- b leaf (X 0.9)
- c fruit
- d mature bark
- e winter twig
- f 5-year-old stem
- g female buds (X 0.9)
- h male buds (X 0.9)

Trunk

Straight; curved and forked on poor and degraded soils.

Bark

Grayish or yellowish on upper trunk; in advanced age grayish-black, rough, fissured, and furrowed on lower trunk, furrows often extending up into crown.

Twig

Greenish-brown, cylindrical, finely pubescent; lenticels sparse, large, linear; buds outcurved, very gummy, acuminate, 5 times longer than wide, base scale pubescent; leaf scar small, triangular.

Leaf

Blade $1\frac{3}{4}$ times as long as wide and consisting of 2 disproportionate parts, ovate, upper surface shiny dark green, pale green with rusty-brown blotches below, tip acuminate, base narrowly rounded; margin finely serrate (or toothed only); petiole green, cylindrical, finely pubescent, shorter than length of blade; terminal glands absent.

Flower

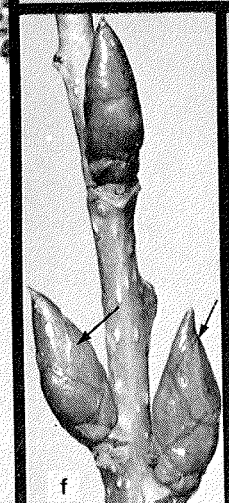
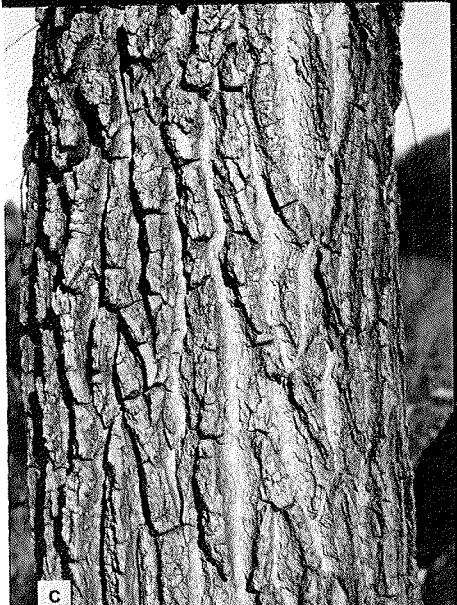
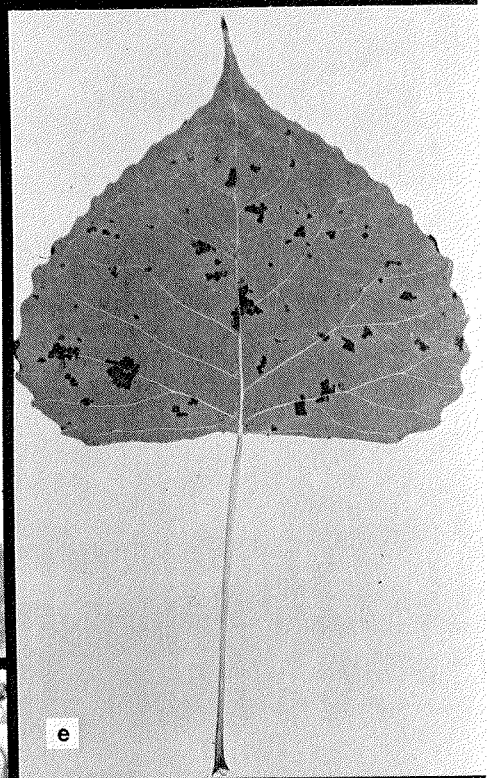
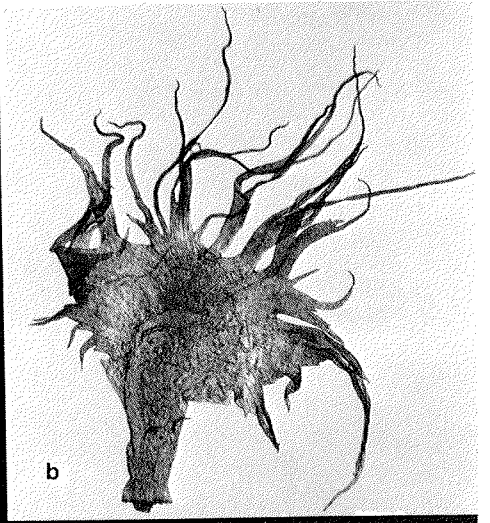
Two Y-shaped, yellowish-green stigmas; more than 50 filaments with bright purple anthers; bract slightly ciliate with 15 to 20 delicate, long digits, twice as long as wide; peduncle and pedicel downy.

Seed

Grayish-white, 2-mm long, 1-mm wide; 1,000-seed weight=0.4 to 0.7 g.

⁴A closely related species occurring in Alberta is *P. trichocarpa* Torr. and Gray (black cotton-

Eastern cottonwood



Eastern Cottonwood

Populus deltoides Bartr.
(female and male)

- a mature tree
- b bract (X 12.7)
- c mature bark
- d fruit
- e leaf (X 0.9)
- f female buds (X 1.7)
- g male buds (X 1.7)

Trunk

Straight.

Bark
Light, greenish-yellow on young stems; ash-gray, rough and furrowed on old trunks. "Old" means physiological age of tree and varies with ecologic conditions.

Twig
Angular with strong ribs, yellowish-brown, glabrous; lenticels sparse, conspicuously linear; buds outcurved, small, 3 times as long as wide, acute, brownish-green; leaf scar conspicuously large, 3-lobed; eyelash-like hairs at juncture of bud base and leaf scar.

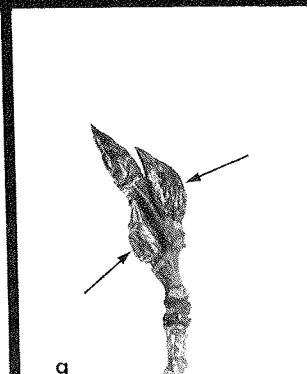
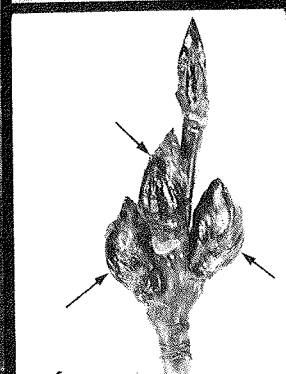
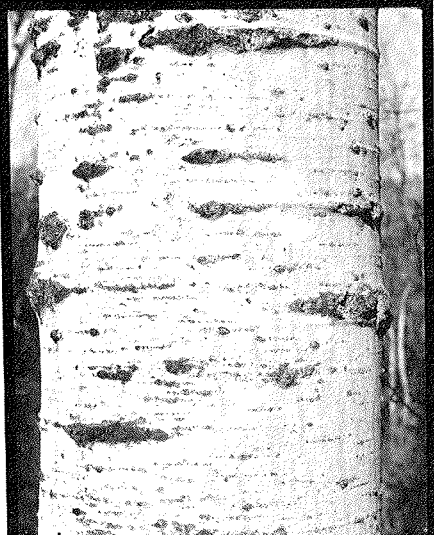
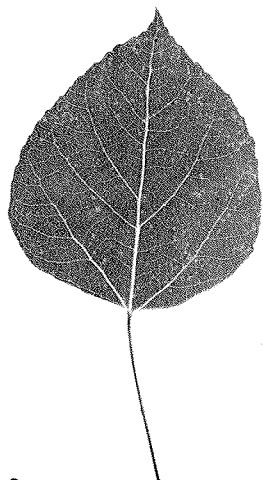
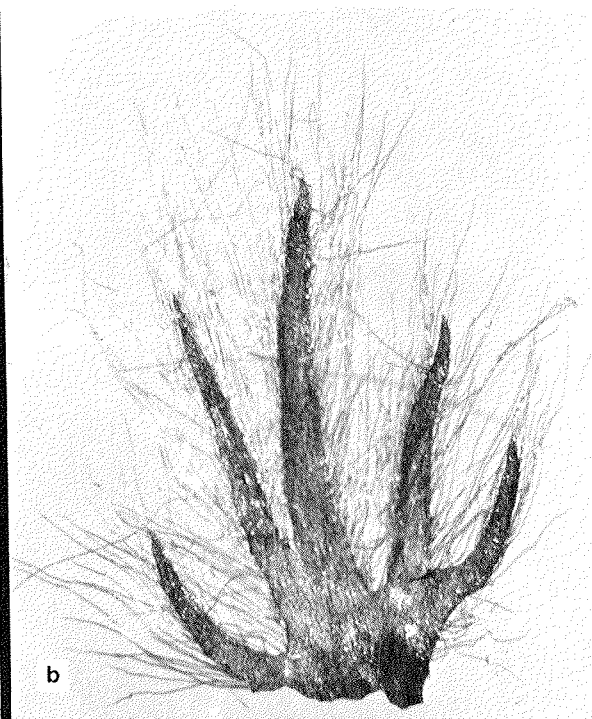
Leaf
Blade deltoid, with straight base and acuminate tip; margin coarsely serrate, finely pubescent; petiole yellowish-green, flattened, finely pubescent, as long as blade; 0 to 2 glands present below base of leaf blade.

Flower
3 to 4 green cap-like stigmas; 40 to 50 filaments with purple anthers; bract glabrous with 20 to 30 light brown digits, 4 times longer than wide; peduncle and pedicel glabrous.

Seed
Yellowish-white, 3-mm long, 1-mm wide; 1,000-seed weight = 0.9 to 1.1 g.

⁵A closely related variety is *P. deltoides* var. *occidentalis* Rydb. (plains cottonwood), whose distinguishing characteristics are leaves much broader than long, very coarsely serrated leaf margin, and pubescent buds. *P. deltoides*

Trembling aspen



TREMULOID ASPEN

Populus tremuloides Michx.
(female and male)

- a mature tree
- b bract (X 10.8)
- c leaf (X 0.9)
- d mature bark
- e 5-year-old stem
- f male buds (X 1.1)
- g female buds (X 1.1)

Trunk

Straight; curved and stunted on poor or degraded soils.

Bark

Smooth, greenish-white to cream, often marked with dark wart-like blotches; roughening of bole in advanced age (about 30 years).

Twig

Cylindrical, dark green, glabrous; lenticels oval, evenly distributed on young shoots; buds appressed, small, twice as long as wide, acute, slightly gummy; base scale brown, finely pubescent; leaf scar small, triangular.

Leaf

Blade broadly ovate or circular, $1\frac{1}{4}$ times as long as wide with pointed tip, dark green; margin finely serrate; petiole brownish-red, flattened, glabrous, as long as blade; terminal glands may be present.

Flower

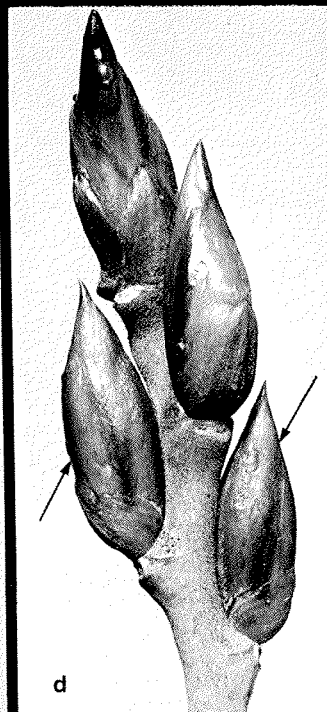
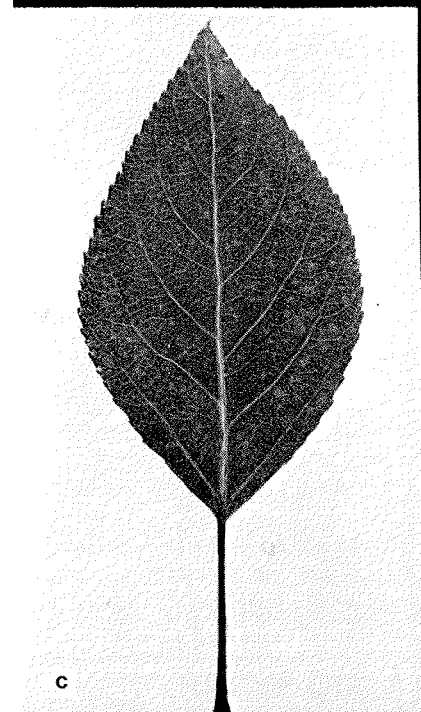
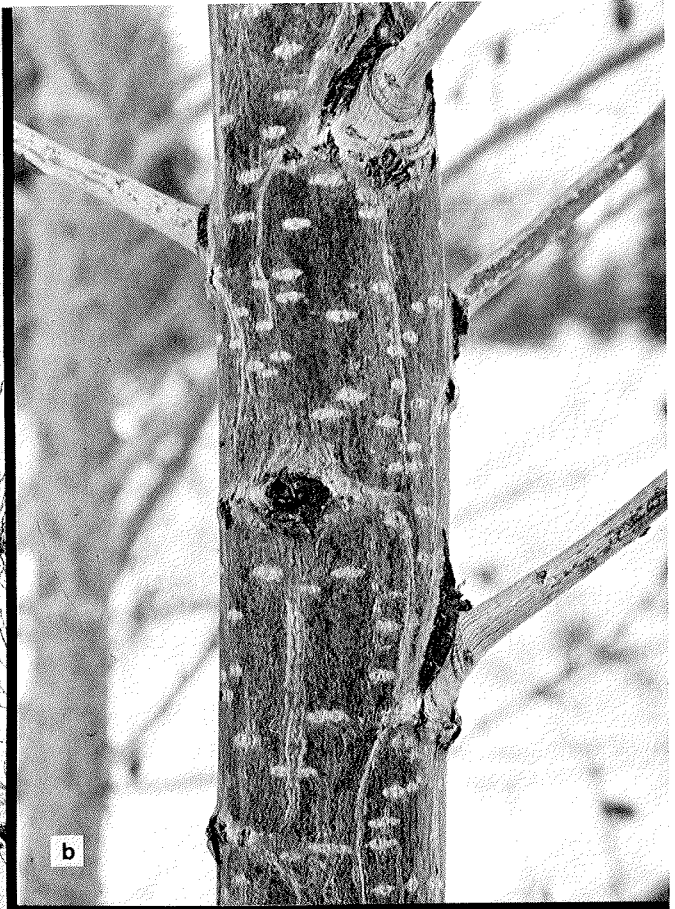
Two Y-shaped purple stigmas; 10 to 14 filaments with dark purple anthers; bract twice as long as wide, ciliate with 8 to 10 dark brown digits; peduncle and pedicel pubescent.

Seed

Yellow tinged to dark gray, 1-mm long, $\frac{1}{2}$ -mm wide; 1,000-seed weight=0.1 to 0.2 g.

⁶A closely related species, *P. grandidentata* Michx. (largetooth aspen) occurring in the northern Manitoba, differs with very

Berlin poplar



Berlin Poplar

Populus x berolinensis Dipp.

(male)

- a 6-year-old tree
- b 4-year-old stem
- c leaf (X 1.3)
- d male buds (X 1.9)
- e 6-year-old stem

Trunk

Straight, with nearly columnar crown.

Bark

Smooth, whitish or creamy-green, marked with black blotches.

Twig

Angular with developed ribs, light green, glabrous; lenticels linear, unevenly dispersed; buds elongated, 3 times longer than wide, glabrous, appressed, gummy, acute; leaf scar triangular, small.

Leaf

Ovate to oval with cuneate base and acuminate tip; blade nearly twice as long as wide, under surface glaucous; midrib glabrous; margin serrate, glabrous, appressed teeth; petiole reddish, one-third length of blade, cross section oval, occasionally some hairs present; terminal glands absent.

Flower

15 to 20 filaments with dark purple anthers; bract pubescent, longer than wide, 20 to 40 digits; peduncle and pedicel pubescent.

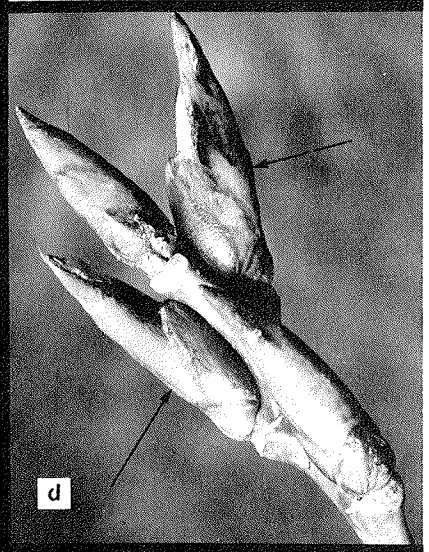
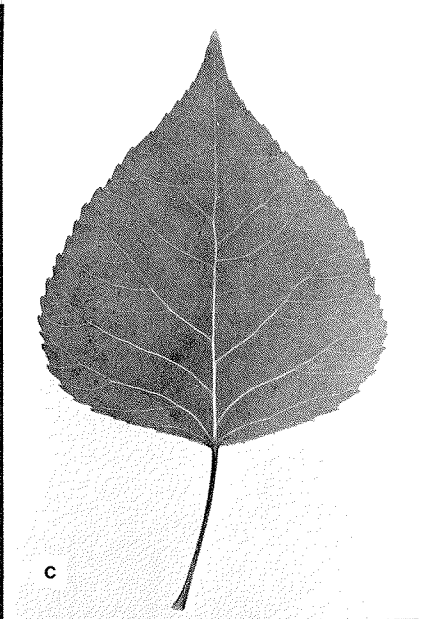
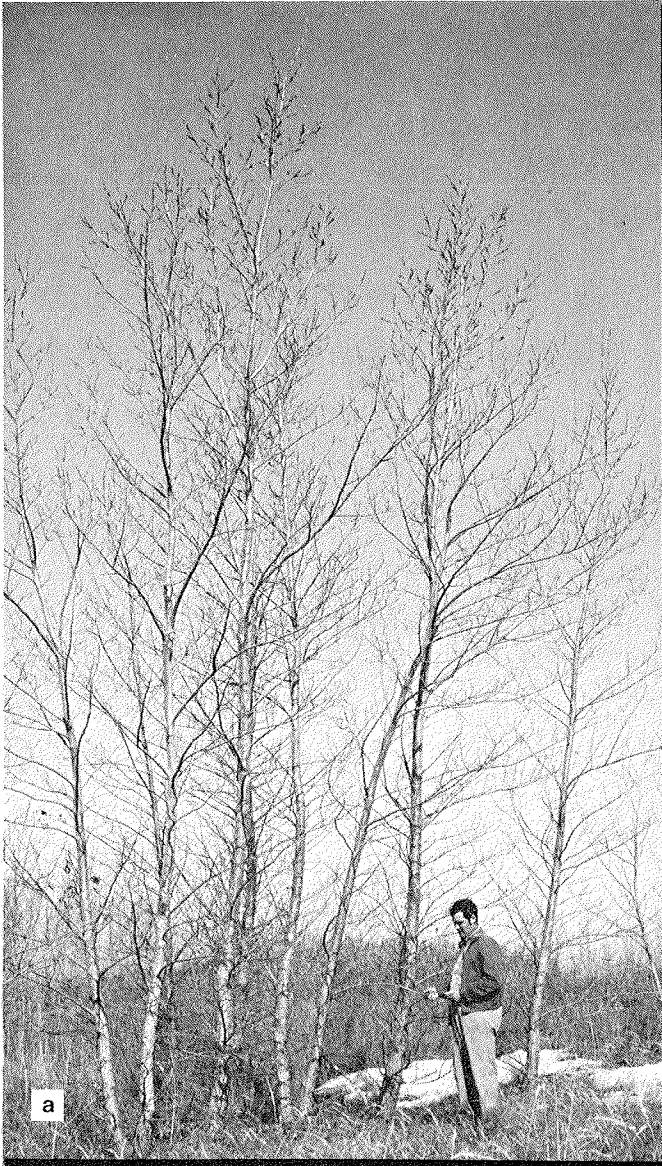
Notes:

Moderate growth; susceptible to canker, leaf rust and aphids; intolerant of early autumn and late spring frosts; early flushing and late defoliation.

Recommendations:

Suitable for amenity and farmstead plantations on good soils.

Brooks #2 poplar



BROOKS POPULAR CULTIVARS

Populus x deltoides Bartr. cv. 'Brooks' E. Griffin (male)

- a 12-year-old tree
- b 10-year-old stem
- c leaf (X 0.9)
- d male buds (X 1.5)
- e bract (X 10.4)
- f 20-year-old bark

Brooks #2

(illustrated)

Trunk
Straight.

Bark
Grayish-green when young with striped lenticels; in advanced age, smooth and light gray with fissures and warts that extend to crown.

Twig
Cylindrical, dark brown, glabrous, sometimes downy with oval, evenly distributed lenticels; buds ovoid, twice as long as wide, glabrous, appressed, very gummy, acute; leaf scar 3-lobed, very large.

Leaf
Deltoid with nearly straight to slightly rounded base and pointed tip; blade length and width equal; midrib pubescent; margin serrate, translucent border; petiole pink, finely pubescent, oval, half of blade length; 0 to 2 terminal glands present.

Flower
40 to 50 filaments with light purple anthers; bract much longer than wide, 25 to 30 dark brown, long and slender digits.

Notes:

Moderate growth; natural pruning at proper spacing; resistant to leaf rust and windthrow; highly susceptible to poplar bud-gall mite (*Aceria parapopuli* Keifer); intolerant of early autumn and late spring frosts.

Recommendations:

Suitable for amenity and farmstead plantations.

⁷The female parent (a plains cottonwood) of the Brooks poplars was taken as a seedling from a sandbar in the Red Deer River in Alberta near Steeveville in 1918 and established on the grounds of the Alberta Horticultural Research Centre, Brooks, Alberta. The male parent, a Russian poplar, grew adjacent to the plains cottonwood. E. Griffin made 28 selections from the first population of the offsprings. From these 28 selections, six male clones (Brooks #1-6) were chosen for further development by the Alberta Horticultural Research Centre (H. Oosterhuis, personal communication). The clone distributed by the PFRA

Brooks #1

(Griffin poplar)

Trunk

Forked and stunted with columnar-shaped crown and ascending branches.

Bark

Fissured, rough, gray.

Twig

Slightly angular; buds small, orange colored.

Leaf

Ovate with broadly cuneate base and pointed tip, dark green; margin serrate, glabrous; petiole less than half length of blade, yellowish, pubescent; 0 to 2 terminal glands present.

Flower

40 to 50 filaments with light purple anthers; bract much longer than wide, 25 to 30 dark brown, long and slender digits.

Notes:

At Brooks, Alberta, most of the Griffin poplars died back, which indicated intolerance of early autumn and late spring frosts and susceptibility to *Septoria* canker infection. Griffin poplars show very early flushing and early defoliation.

Recommendations:

Not suitable for prairie plantations.

Brooks #3

Trunk

Straight, with many lateral branches.

Bark

Smooth, yellowish, covered with scars caused by cankers.

Leaf

Ovate, dark green, with broadly cuneate base and acuminate tip; petiole as long as half of blade, reddish, glabrous; 0 to 2 terminal glands present.

Flower

40 to 50 filaments with light purple anthers; bract much longer than wide, 25 to 30 dark brown, long and slender digits.

Notes:

Poor growth; retains side branches; intolerant of early autumn and late spring frosts. Appears to be susceptible to canker, frost damage, and leaf pests.

Recommendations:

Not suitable for prairie plantings.

Brooks #4 and #6

Trunk

Straight, good height growth and clean bole.

Bark

Fissured and furrowed, dark gray.

Leaf

Broadly rhomboid with broadly cuneate base and acuminate tip, dark green; petiole almost as long as blade, yellowish, glabrous; terminal glands present.

Flower

40 to 50 filaments with light purple anthers; bract much longer than wide, 25 to 30 dark brown, long and slender digits.

Notes:

Fast growth; self-pruning at proper spacing; susceptible to canker, leaf rust and aphids; tolerant of early autumn and late spring frosts; early flushing and early defoliation.

Recommendations:

Industrial plantations on good alluvial soils; amenity and farmstead plantations in central and southern prairies.

Brooks #5

Trunk

Straight.

Bark

Smooth, light gray or yellowish with dispersed warts and fissures.

Leaf

Deltoid with straight base and pointed tip, yellowish-green; petiole white, glabrous, longer than half of blade; 0 to 2 terminal glands present.

Flower

40 to 50 filaments with light purple anthers; bract much longer than wide, 25 to 30 dark brown, long and slender digits.

Notes:

Moderate growth; susceptible to canker; intolerant of early autumn and late spring frosts; susceptible to poplar bud-gall mite and leaf rust; very early flushing and early defoliation.

Recommendations:

Amenity plantations on good soils.

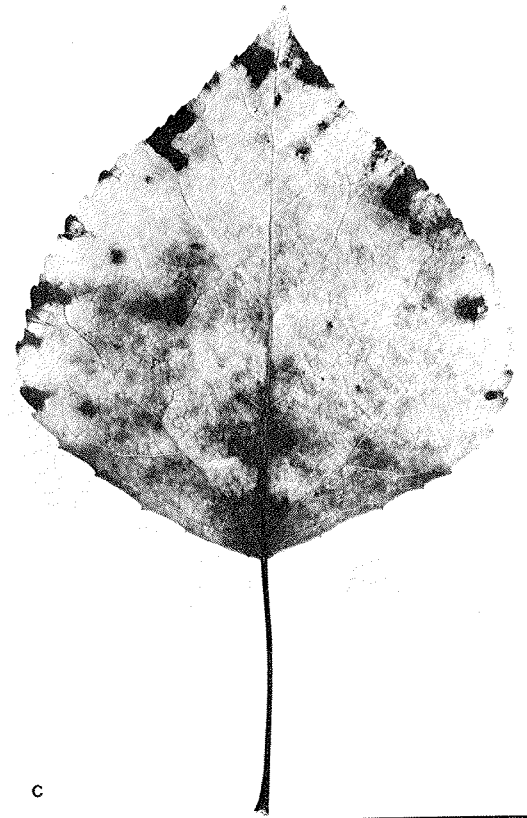
Cordeniensis poplar



a



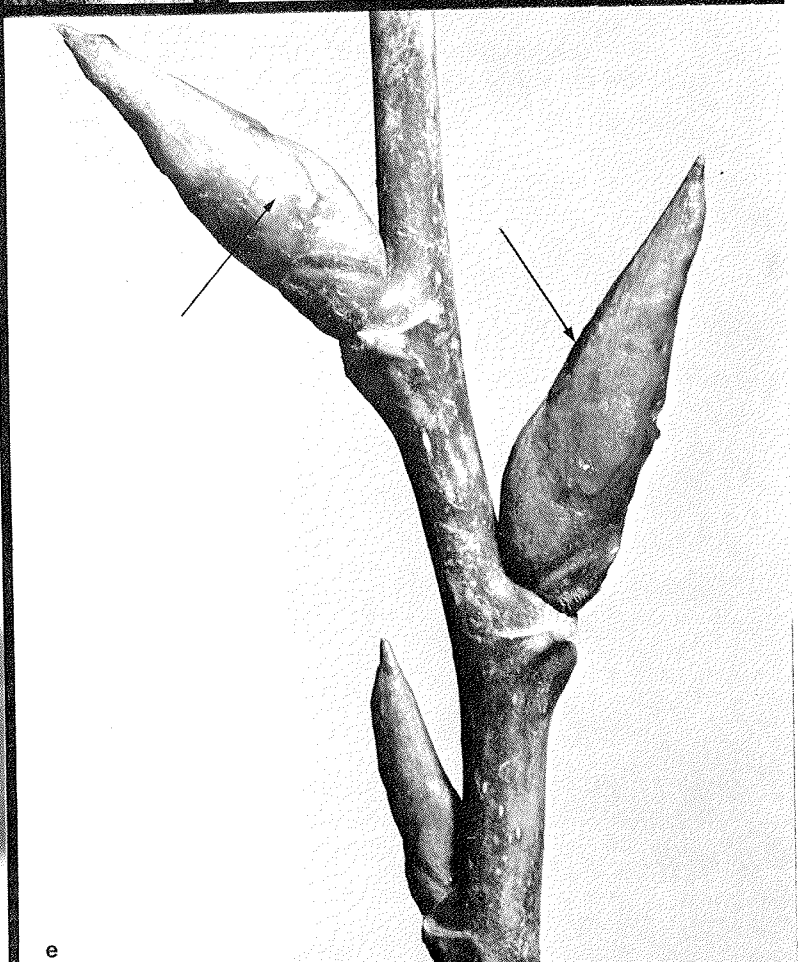
b



c



d



e

Populus x balsamifera L. cv.
'Cordeniensis' Cumming (male)

- a 6-year-old tree
- b cankers on 5-year-old stem
- c leaf (X 0.9)
- d 4-year-old stem
- e male buds (X 2.4)

Trunk

Nearly straight in first 2 years after planting; easily curved or bent.

Bark

Grayish-brown with striped lenticels in first 4 to 6 years; later marked with dark blotches caused by frost cracks and cankers.

Twig

Cylindrical (fine ribs may appear), dark brown with yellowish mottles, glabrous around buds; lenticels long oval and very dispersed; buds ovoid, very small, glabrous, appressed, very gummy, acute; leaf scar 3-lobed, large.

Leaf

Rhomboid or nearly so with broadly cuneate base and pointed tip; blade nearly twice as long as wide, lower surface grayish-green; midrib and margin glabrous, finely serrate; petiole pink, cross section flattened, half of blade length, glabrous; terminal glands absent.

Flower

More than 40 filaments with purple anthers; bract twice as long as wide, 20 to 25 digits, central portion of bract creamy or yellowish; peduncle and pedicel glabrous.

Notes:

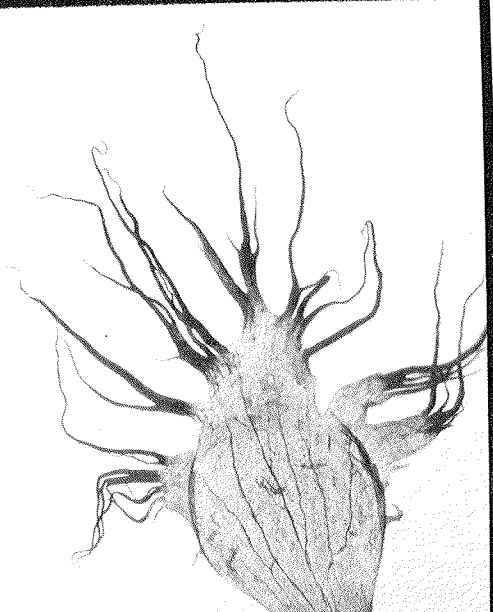
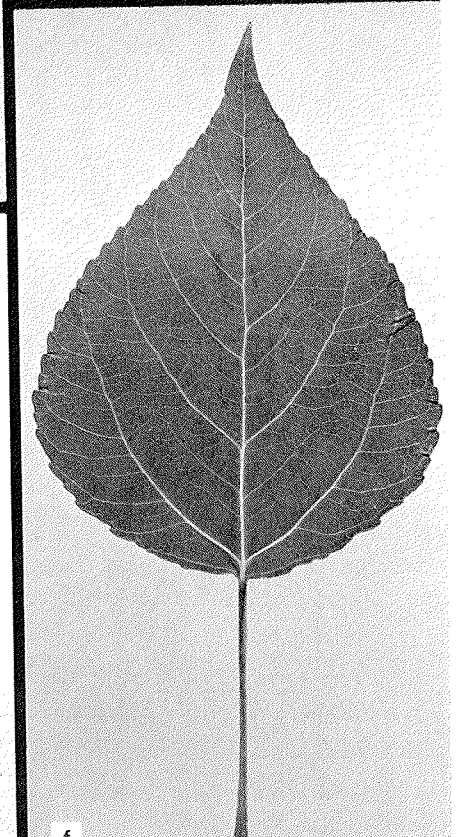
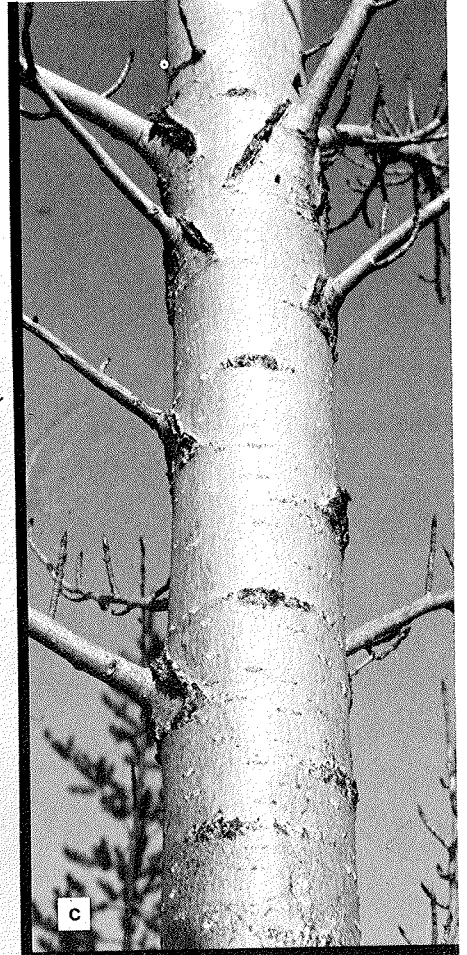
Fast growth; natural pruning possible at proper spacing; susceptible to canker, leaf rust and aphids; intolerant of early autumn and late spring frosts; subject to windthrow; very early flushing and early defoliation.

Recommendations:

Amenity plantations on good soils.

^aThis cultivar originated at Morden, Manitoba, where it was named *Populus cordeniensis* (W. A. Cumming, personal communication). The names used by other authors are misspelled, e.g., *cardiensis*, *cordeniensis*. A

Dunlop poplar



Dunlop Poplar

Populus x Petrowskyana Schneid. var.
'Dunlop' R. Dunlop (female and male)

- a 20-year-old tree
- b male buds (X 2.6)
- c 15-year-old stem
- d female bract (X 10.4)
- e male bract (X 6.6)
- f leaf (X 0.9)

Trunk

Straight; strong vertical growing lateral branches; crown columnar.

Bark

Smooth, whitish or creamy with dark rough blotches; furrowed at base when older (15 to 20 years).

Twig

Cylindrical, brownish-green, finely pubescent; lenticels unevenly dispersed, small, oval; buds elongated, nearly 3 times longer than wide, glabrous, appressed or slightly outcurved on older branches, very gummy, acuminate; leaf scar 3-lobed, small.

Leaf

Ovate with rounded base, sometimes slightly cordate, acuminate tip; blade slightly longer than wide, lower surface waxy; midrib downy on both surfaces; margin downy, appressed teeth, finely serrate, translucent border; petiole green, cylindrical, one-third of blade length, pubescent; 0 to 2 terminal glands present.

Flower

2 to 3 cap-shaped stigmas, tinged green; 40 to 50 filaments with dark brown anthers; bract longer than wide, 20 to 25 delicate digits, extended light central portion, glabrous; peduncle and pedicel glabrous.

Seed

2-mm long, 1-mm wide, grayish-yellow; 1,000-seed weight=0.6 to 0.8 g.

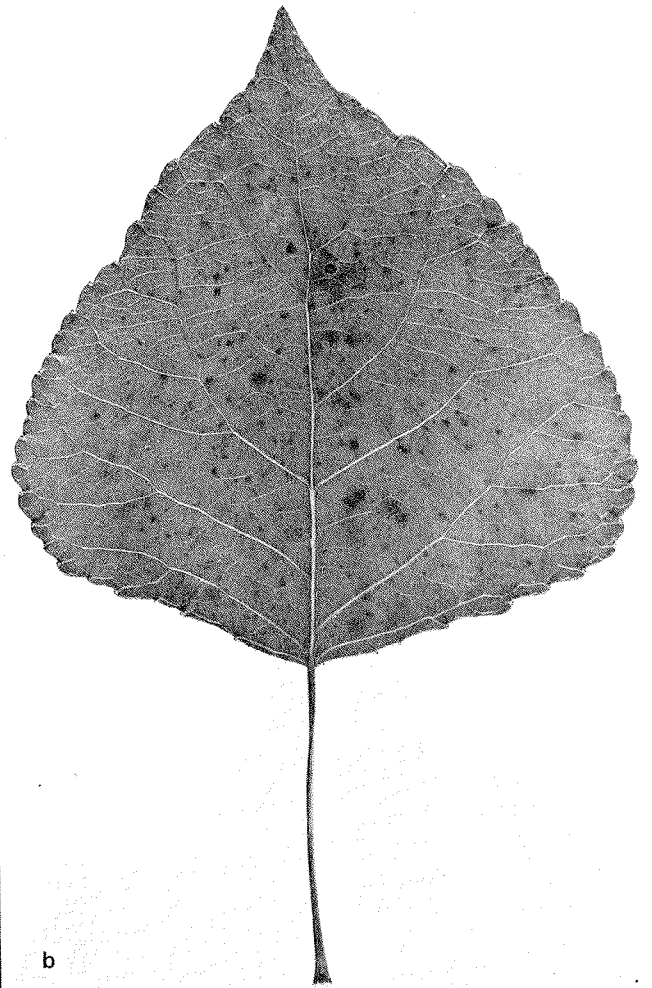
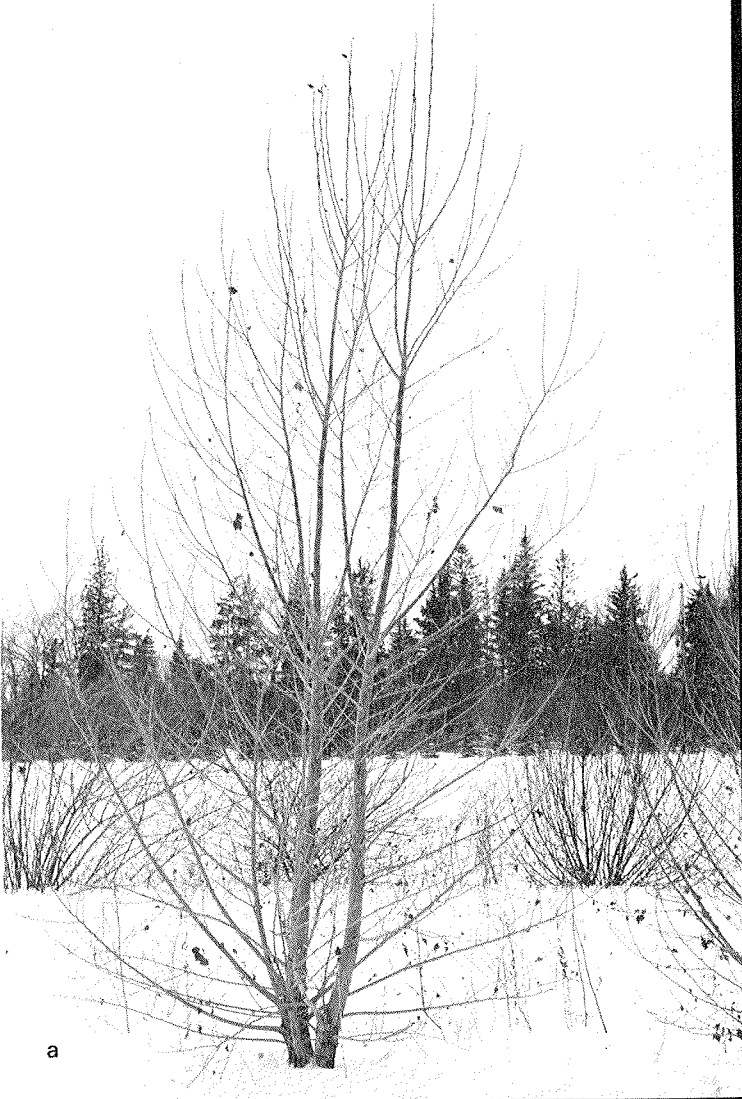
Notes:

Moderate growth; susceptible to canker, resistant to leaf rust and aphids; tolerant of early autumn and late spring frosts; early flushing and early defoliation.

Recommendations:

For amenity and farmstead plantations. Some trees in plantation at Mortlach, Saskatchewan, have columnar form particularly suitable for amenity plantings on prairies.

Dutch poplar



Dutch Poplar

Populus x euramericana (Dode)

Guinier cv. 'Gelrica' (male)

- a 6-year-old tree
- b leaf (X 1.7)
- c 6-year-old stem
- d 4-year-old stem

Trunk

Straight, with many side sprouts at base.

Bark

Smooth, white; gray and fissured at base when older.

Twig

Angular, strongly ribbed, greenish, downy; lenticels linear, dispersed mostly around leaf scars; buds elongated, nearly 3 times longer than wide, downy, appressed, gummy, acuminate; eye-lash-like hairs at juncture of bud base and leaf scar; leaf scar 3-lobed, large.

Leaf

Deltoid with broadly cuneate base and acuminate tip; blade equal in length and width, both surfaces equally yellowish-green; midrib glabrous on both surfaces; margin serrate, pubescent; petiole reddish, half of blade length, glabrous, flattened; terminal glands absent.

Flower

20 to 30 filaments with reddish-purple anthers; bract longer than wide, triangular, brownish-yellow digits that run into tinged purple short cilia; peduncle and pedicel glabrous.

Notes:

Fast growth; susceptible to canker, leaf rust and aphids; intolerant of early autumn and late spring frosts; subject to windthrow; late flushing and very late defoliation.

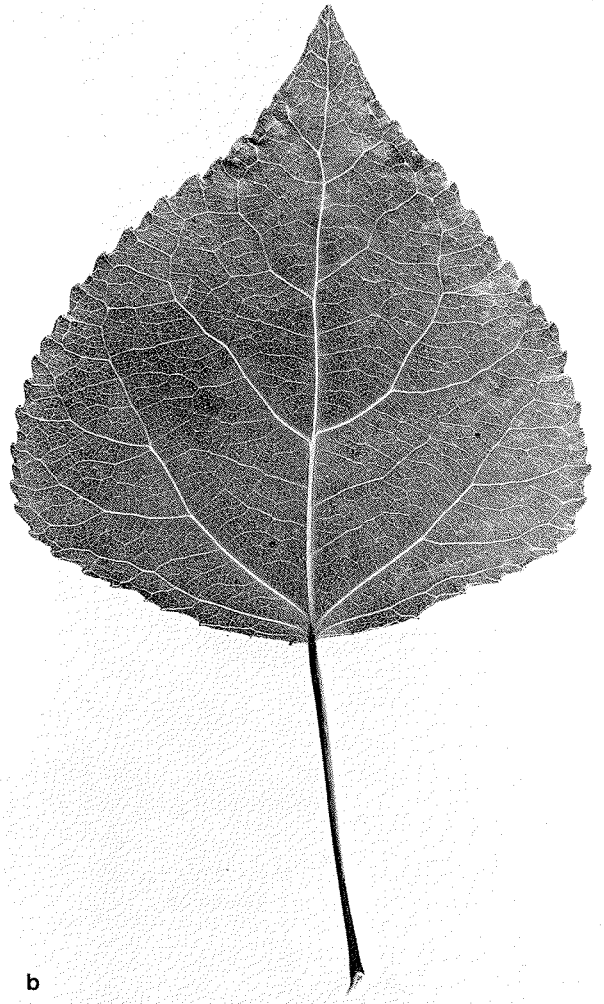
Recommendations:

Suitable for amenity and farmstead plantations on good soils.

Giant poplar



a



b



c



d

Giant Poplar

Populus x euramericana (Dode)

Guinier cv. 'Robusta vernirubens' (male)

- a 6-year-old tree
- b leaf (X 1.3)
- c 5-year-old stem
- d 3-year-old stem

Trunk

Straight, nearly columnar.

Bark

Grayish-green marked with dark blotches and frost cracks that sometimes become infected with canker; dark gray bark and furrows appear at early age.

Twig

Cylindrical, sometimes ribbed, yellowish to reddish-brown, glabrous; lenticels long oval, dispersed around leaf scars; numerous thin, delicate branchlets; buds ovoid, longer than wide, glabrous, outcurved, acute, not gummy; leaf scar triangular, large with tongue-like protrusion downward.

Leaf

Deltoid or nearly so with broadly cuneate base and pointed tip; blade length and width equal; midrib glabrous; margin finely serrate with fine hairs; petiole red, flattened, half of blade length, sparingly pubescent; 0 to 2 terminal glands present.

Flower

20 to 30 filaments with red anthers; bract longer than wide, numerous digits tinged light brown; peduncle and pedicel glabrous.

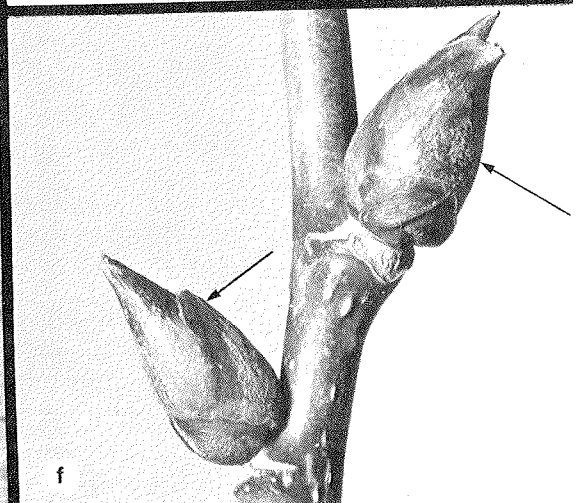
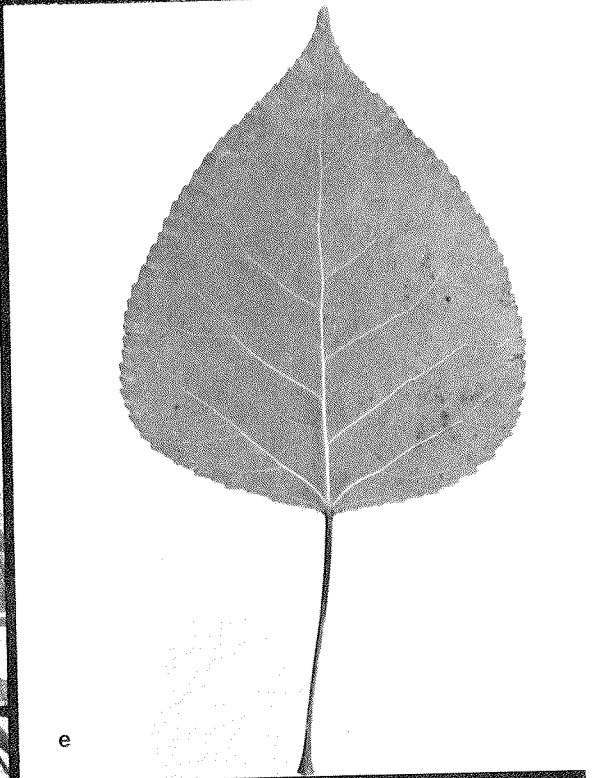
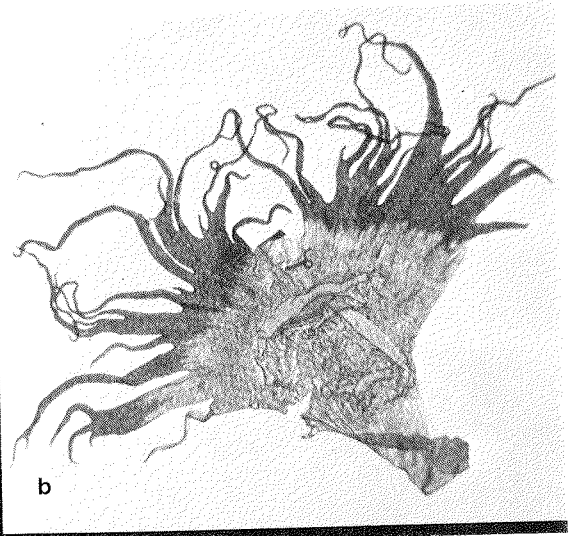
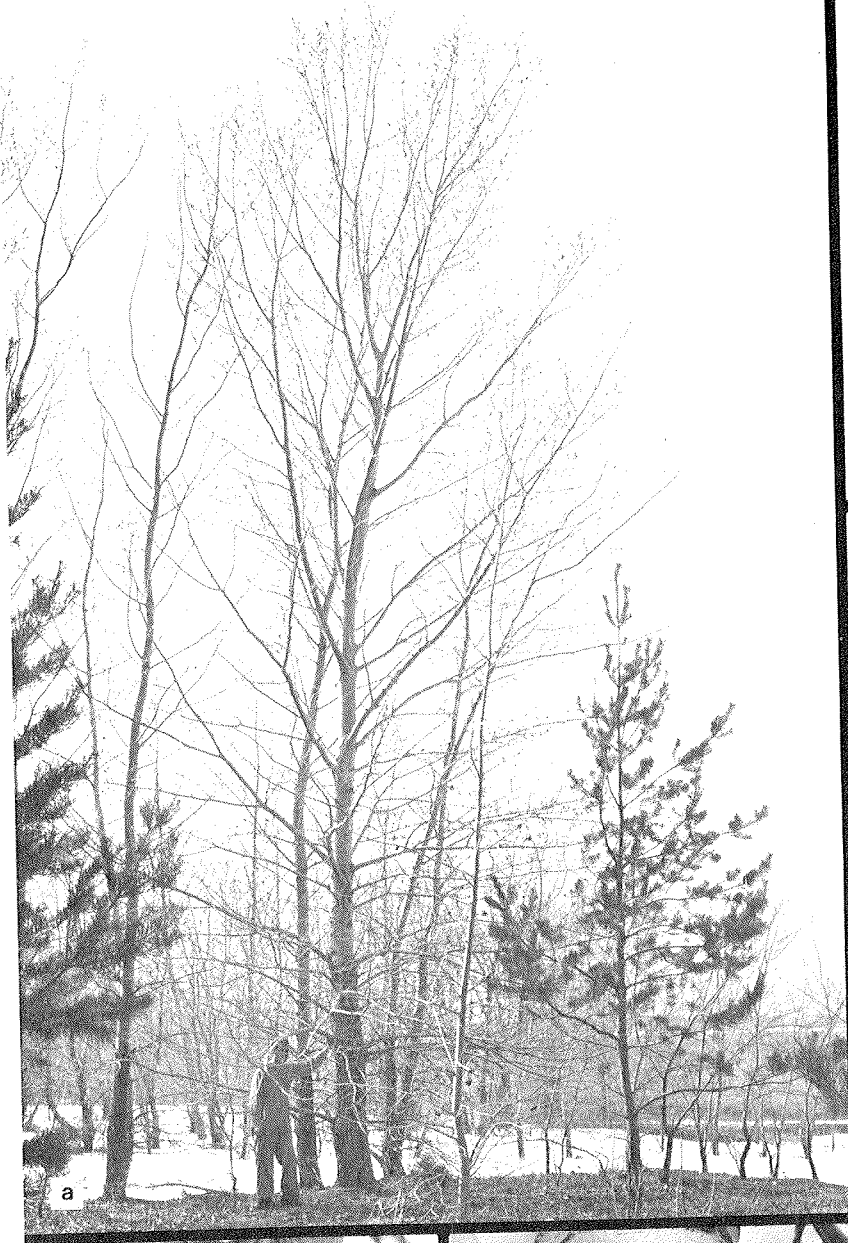
Notes:

Fast growth; susceptible to canker, resistant to leaf rust; intolerant of early autumn and late winter frosts; subject to windthrow; early flushing and late defoliation.

Recommendations:

Amenity and farmstead plantations on good soil.

Northwest poplar



Northwest Poplar

Populus x deltoides
Bartr. cv. 'Northwest' (male)

- a 20-year-old tree
- b bract (X 12.4)
- c 4-year-old stem
- d mature bark
- e leaf (X 0.9)
- f male buds (X 2.0)

Trunk

Moderately straight, with strong lateral branches.

Bark

Smooth, greenish-gray, or cream with striped lenticels; in advanced age, bole is rough and furrowed.

Twig

Cylindrical, dark green to brown, finely pubescent; lenticels dispersed, oval, small; buds elongated, 3 times longer than wide, acute, outcurved, gummy, pubescent; eyelash-like hairs at junction of leaf scar and bud base; leaf scar triangular, large.

Leaf

Broadly ovate with rounded or straight base and pointed tip; blade nearly as wide as long; finely serrate with hairs; midrib sparingly pubescent on both surfaces; petiole reddish, cross section oval, finely pubescent, equal to or shorter than blade; 0 to 2 terminal glands present.

Flower

60 to 80 filaments with purple anthers; bract one-half longer than wide with 25 to 35 glabrous, dark brown, delicate digits; peduncle and pedicel glabrous.

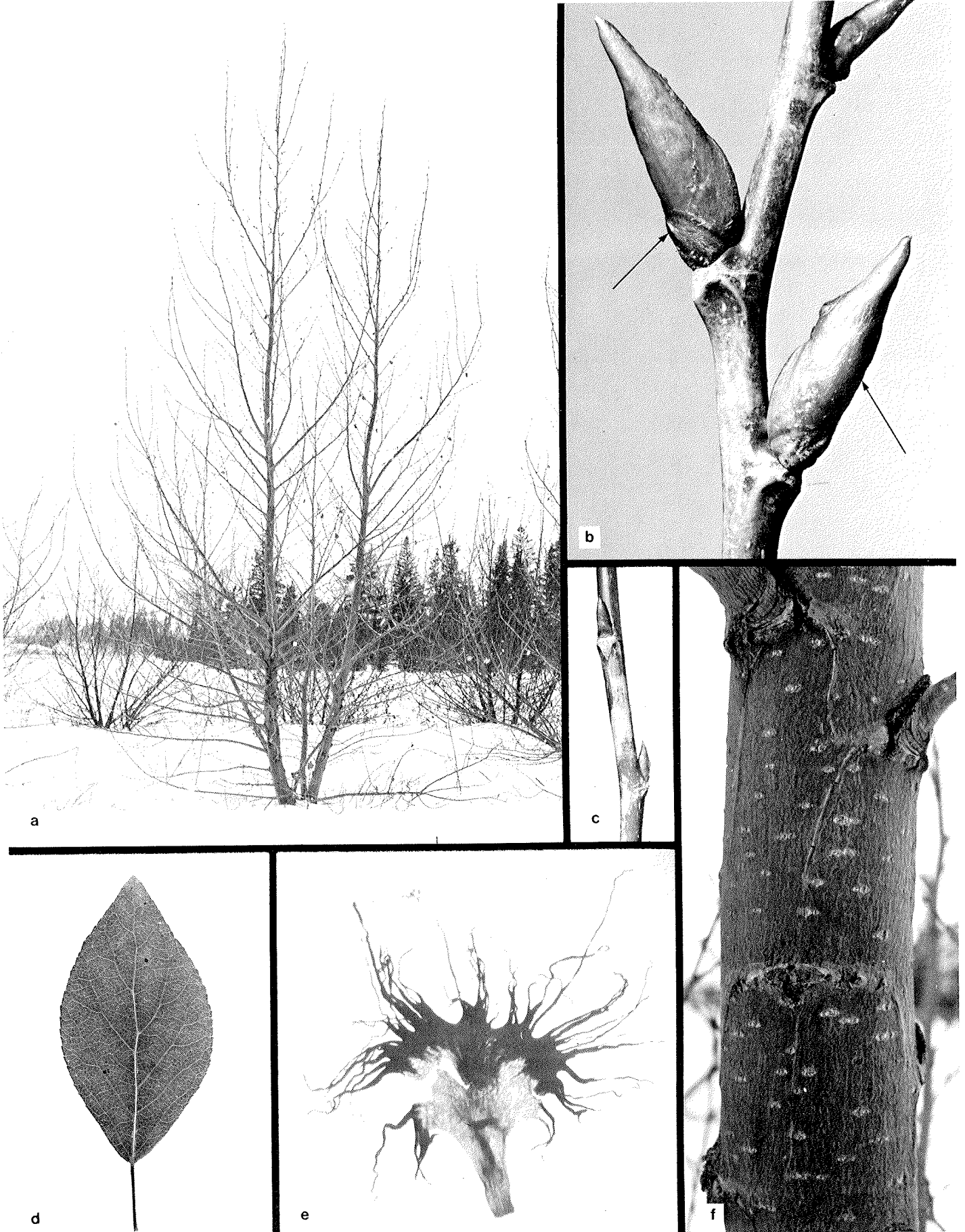
Notes:

Fast growth; good natural pruning at proper stand density; susceptible to canker, resistant to leaf rust and aphids; tolerant of early autumn and late spring frosts; very late flushing and very early defoliation and thus very short growing period.

Recommendations:

Suitable for industrial, amenity, and farmstead plantations.

Russian poplar



RUSSIAN POPLAR

Populus x Petrowskyana

Schneid. (male)

- a 6-year-old tree
- b male buds (X 2.2)
- c winter twig
- d leaf (X 0.9)
- e bract (X 8.6)
- f 4-year-old stem

Trunk

Spreading, with central trunk.

Bark

Grayish or creamy-green, frequently marked with dark blotches caused by frost cracks and cankers.

Twig

Cylindrical, greenish to dark brown, glabrous, covered with dispersed, oval lenticels; buds ovoid, nearly 3 times longer than wide, glabrous, appressed, very gummy, acute; leaf scar 3-lobed, very large.

Leaf

Oval with cuneate base and acuminate tip; blade $2\frac{1}{2}$ times longer than wide; midrib slightly pubescent; margin appressed, finely serrate, teeth sparsely pubescent, translucent border; petiole green, flattened, one-third length of blade, slightly pubescent; 0 to 2 terminal glands present.

Flower

40 filaments with dark red anthers; bract glabrous, nearly twice as long as wide, 28 to 32 delicate digits; peduncle and pedicel glabrous.

Notes:

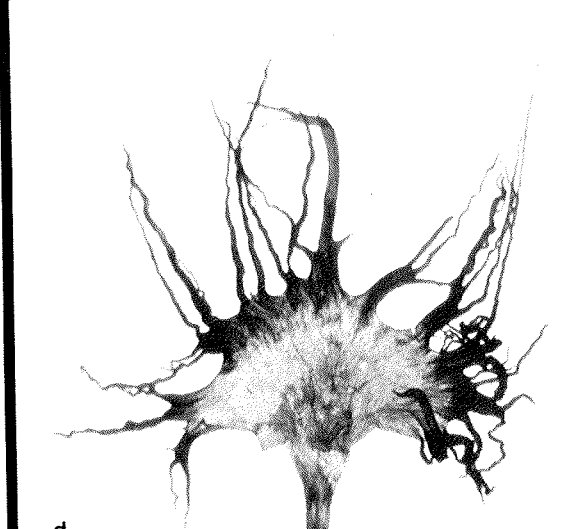
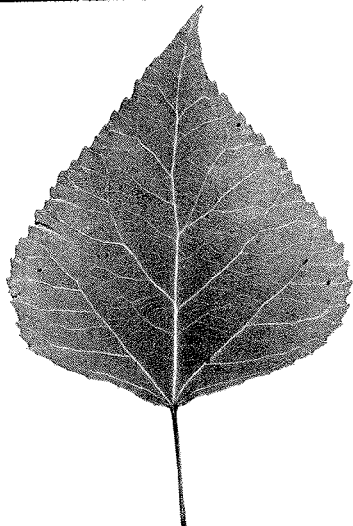
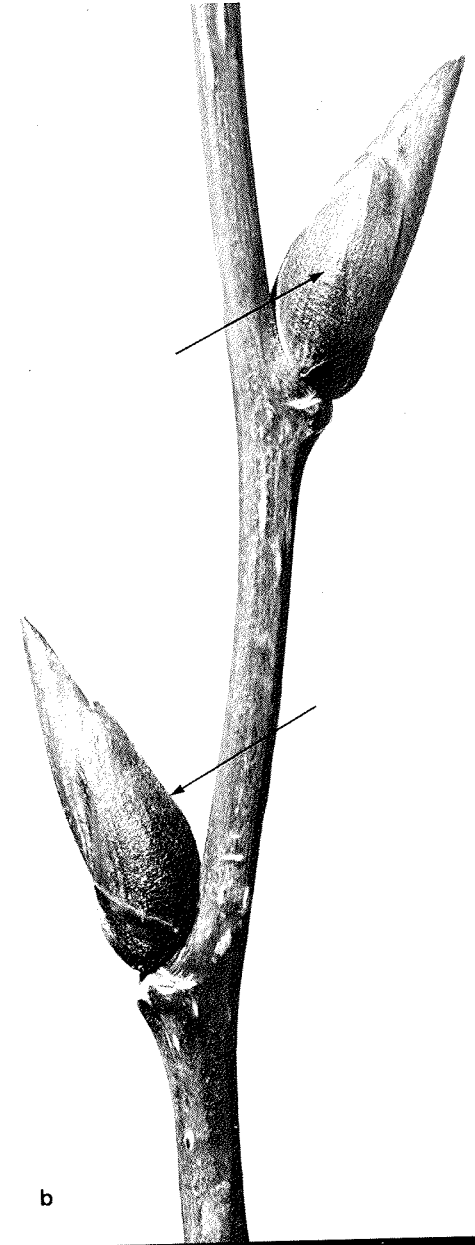
Fast growth; susceptible to canker and leaf rust; tolerant of early autumn and late spring frosts; very early flushing and early defoliation.

Recommendations:

Some selected clones suitable for amenity and farmstead plantations. Under name of Russian poplar several cultivars from unknown sources are in use but have proven very poor clones.

⁹According to Borsdorf (1965) *P. x Petrowskyana* is the female variation of *P. berlinensis*, both having originated from the same cross (*P. laurifolia* x *P. nigra* var. *italica*). The above description is based on a male

Saskatchewan poplar



Saskatchewan Poplar

Populus x deltoides

Bartr. cv. 'Saskatchewan' (male)

- a 12-year-old tree
- b male buds (X 2.2)
- c leaf (X 0.9)
- d bract (X 9.8)
- e 4-year-old stem

Trunk

Straight in first 10 years, then branchy.

Bark

Smooth, greenish or creamy-gray marked with frost cracks and long striped lenticels; after 10 to 15 years, rough and fissured at base.

Twig

Cylindrical, dark brown, downy; lenticels oval, evenly distributed; buds elongated, more than twice as long as wide, velvety, outcurved, acuminate; leaf scar triangular, small.

Leaf

Deltoid or nearly so with broadly cuneate base and acuminate tip; blade one-half longer than wide, whitish below and green above; midrib sparingly pubescent on both surfaces; margin finely serrate, occasionally pubescent; petiole pink, cylindrical, half of blade length, sparingly pubescent; 0 to 2 terminal glands present.

Flower

30 to 40 filaments with purple anthers; bract twice as long as wide, 25 to 35 delicate, glabrous, brown digits; peduncle and pedicel glabrous.

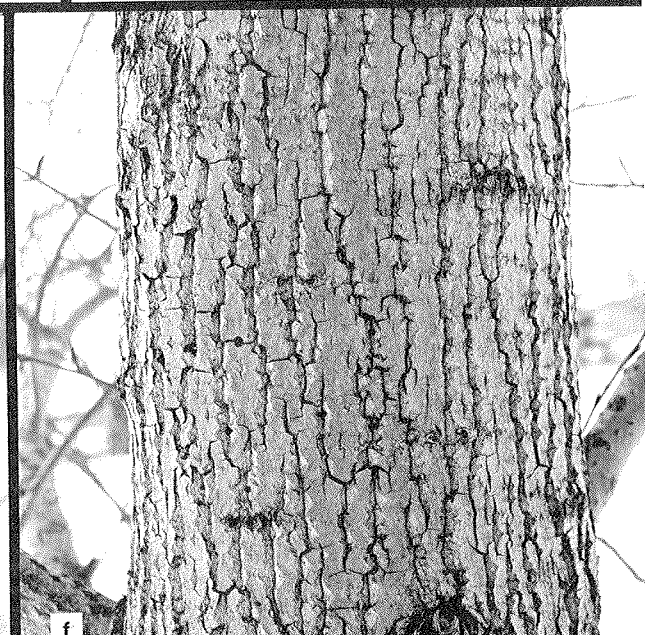
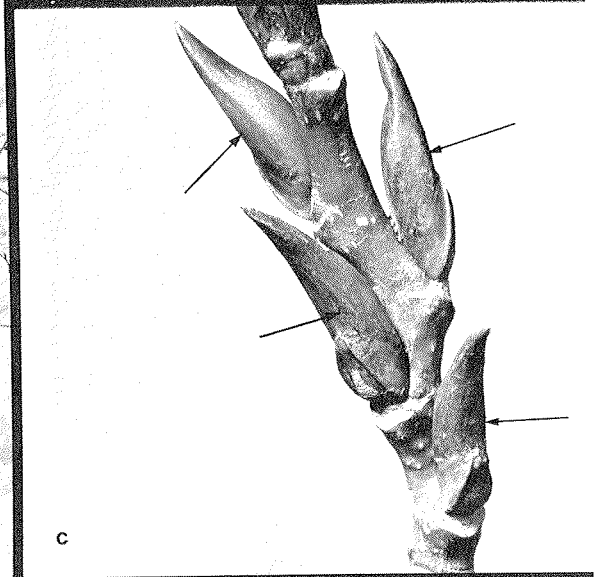
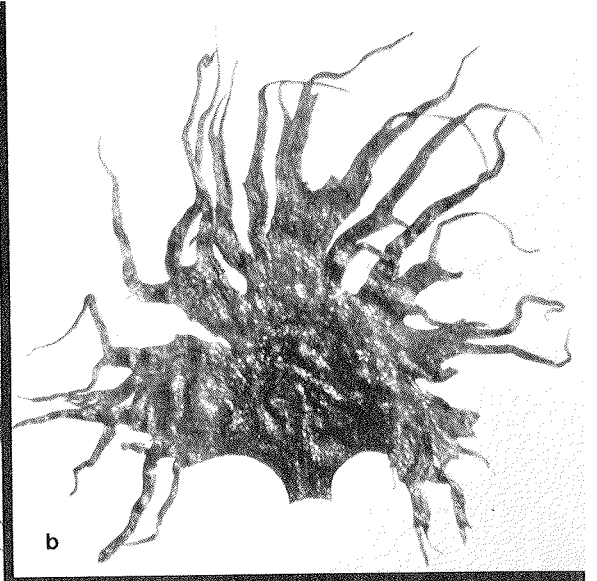
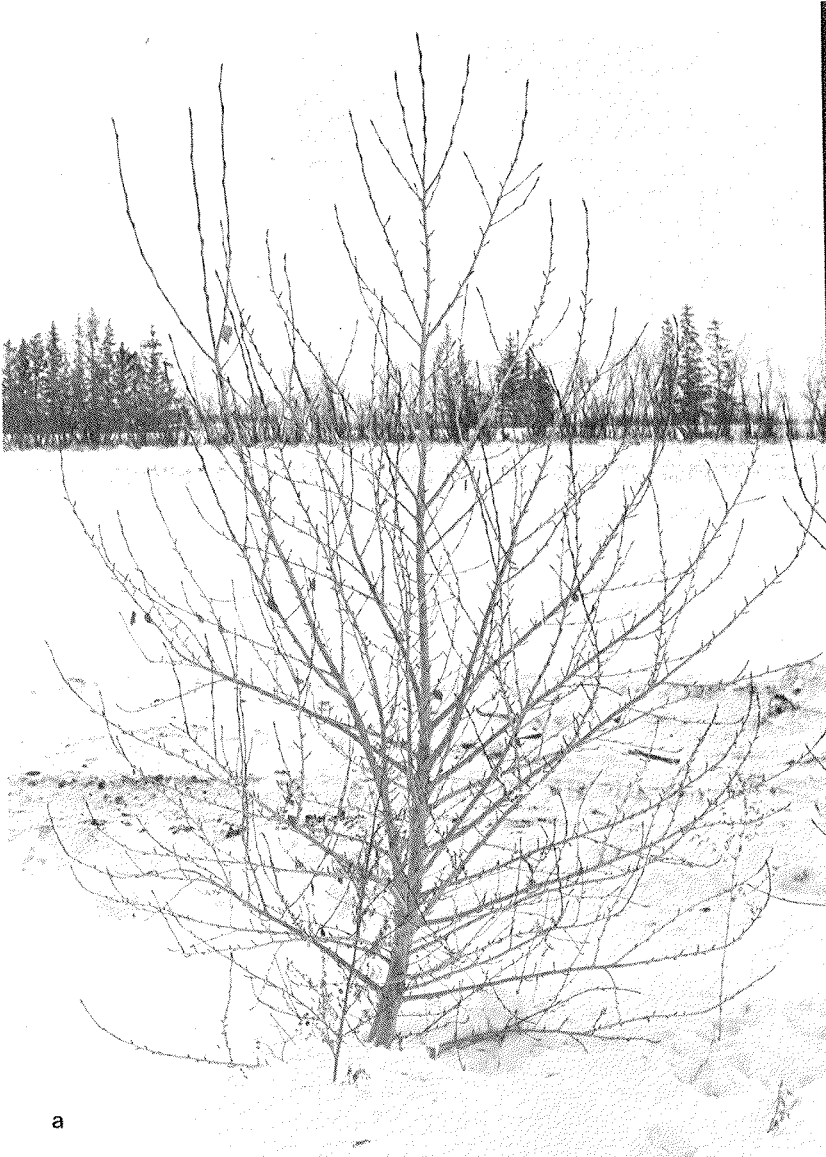
Notes:

Moderate growth; susceptible to canker and early infection common, susceptible to leaf rust and aphids, highly susceptible to poplar bud-gall mite; tolerant of early autumn and late spring frosts; late flushing and early defoliation.

Recommendations:

Suitable for amenity plantations.

Tristis poplar



Tristis Poplar

Populus tristis Fish.
(male)

- a 6-year-old tree
- b bract (X 12.6)
- c male buds (X 1.4)
- d leaf (X 0.9)
- e 4-year-old stem
- f 20-year-old bark

Trunk

Spreading, often forked.

Bark

Grayish-white to cream, marked with wart-like blotches.

Twig

Cylindrical, pubescent, yellowish-brown mottled; lenticels small, linear, grouped underneath leaf scar; buds outcurved, elongated, twice as long as wide, glabrous, gummy, acute; leaf scar 3-lobed, small.

Leaf

Deltoid or broadly ovate, with rounded base that is sometimes slightly cordate and pointed tip; blade one-half longer than wide, lower surface grayish-green; midrib pubescent on both surfaces; margin finely serrate; petiole red, cylindrical, shorter than half of blade, pubescent; 0 to 2 terminal glands present.

Flower

30 to 40 filaments with dark purple anthers; bract light brown central portion black, twice as long as wide, 15 to 20 digits; peduncle and pedicel glabrous.

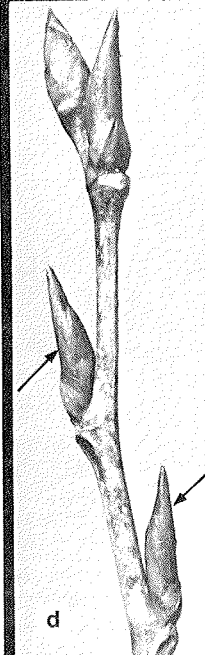
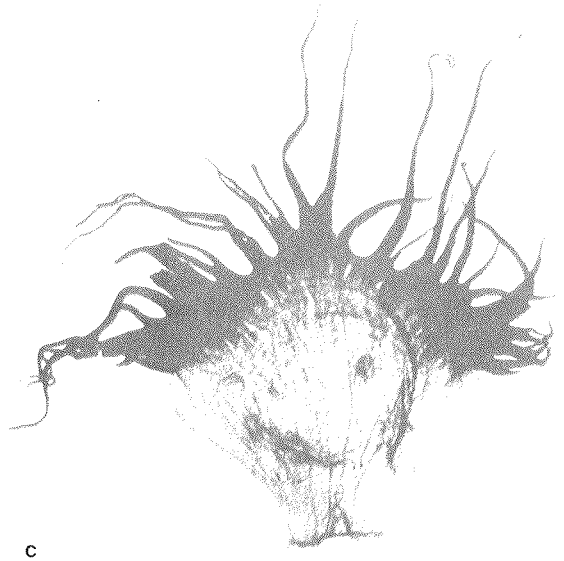
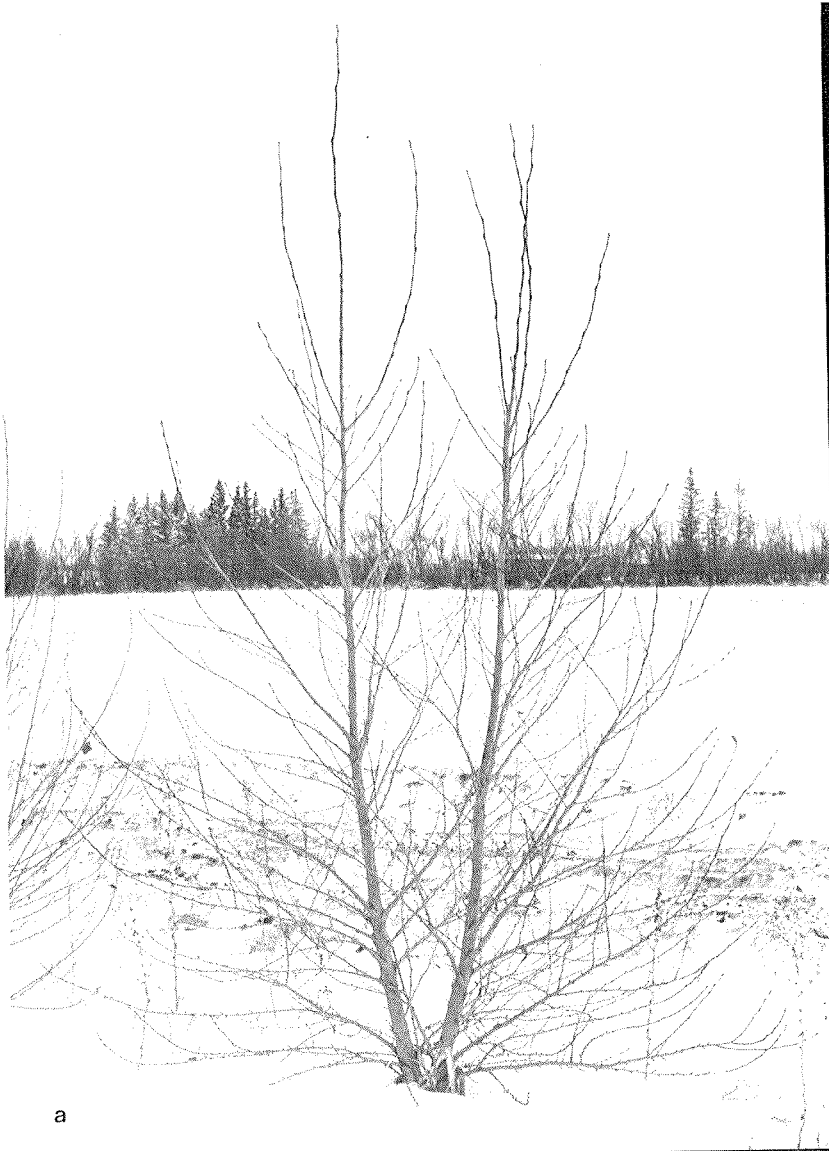
Notes:

Slow growth; side branches persist for long periods; highly susceptible to canker, leaf rust and aphids; tolerant of early autumn and late spring frosts, subject to windthrow; early flushing and early defoliation.

Recommendations:

Suitable for farmstead plantations.

Volunteer poplar



Volunteer Poplar

Populus x laurifolia

Ledeb. cv. 'Volunteer' Kerr. (female)

- a 6-year-old tree
- b leaf (X 1.3)
- c bract (X 15.5)
- d female buds (X 1.2)
- e 4-year-old stem

Trunk

Has no definite main stem in first 4 to 5 years; tends to produce numerous branchlets and lateral shoots.

Bark

Creamy-green or grayish with dark blotches and frost cracks; fissured when older.

Twig

Cylindrical, dark brown with yellowish mottles, glabrous; lenticels linear, evenly dispersed; buds elongated, nearly 3 times longer than wide, glabrous, appressed, very gummy, acute; leaf scar triangular, large.

Leaf

Oval with cuneate base and long pointed tip; blade twice as long as wide, lower surface grayish-green; midrib pubescent on both surfaces; margin finely serrate; petiole pink, flattened, and shorter than one-third of blade, pubescent; terminal glands absent.

Flower

Two greenish, cap-shaped, lobed stigmas; bract longer than wide, 18 to 22 glabrous, dark brown digits, central portion of bract cream colored; peduncle and pedicel glabrous.

Seed

1.7-mm long, 1-mm wide, white; 1,000-seed weight=0.5 to 0.7 g.

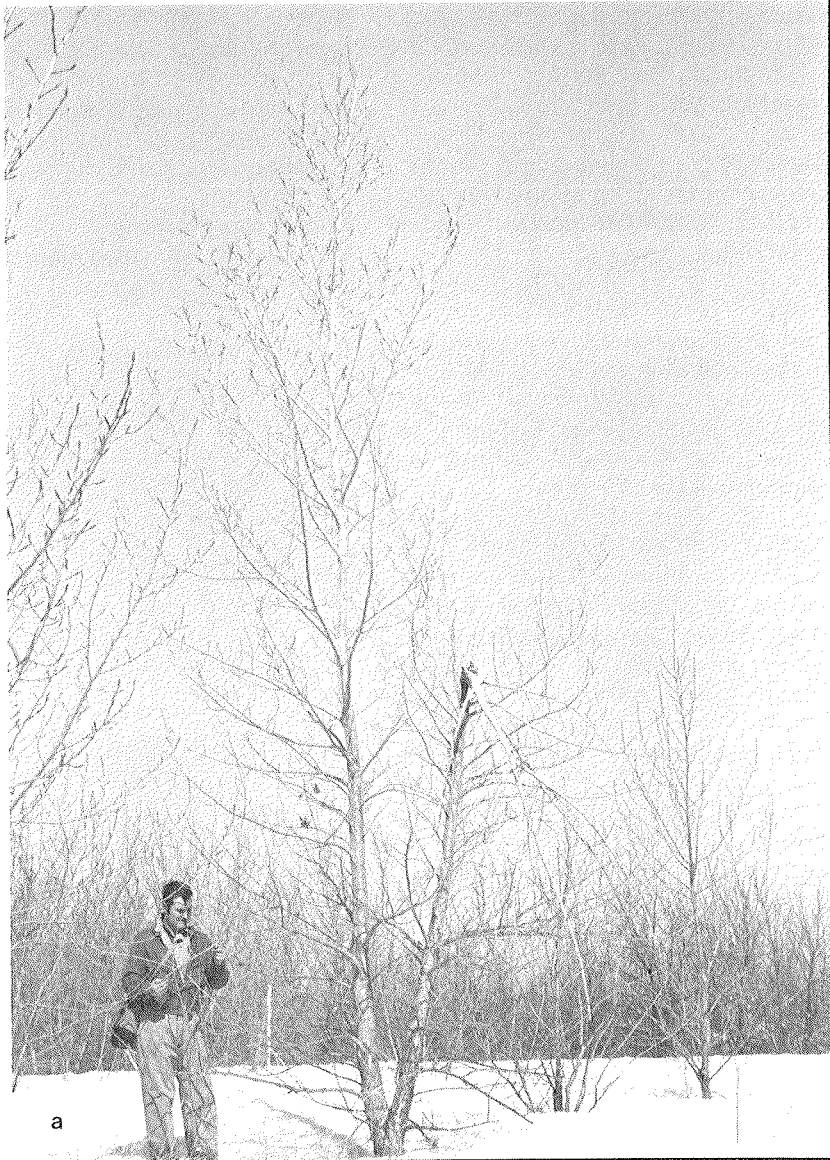
Notes:

Fast growth; resistant to canker and leaf rust; tolerant of early autumn and late spring frosts; subject to wind-throw; very early flushing and late defoliation.

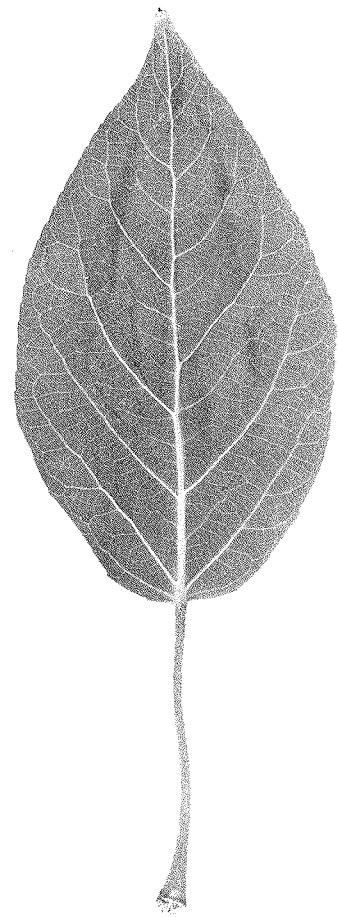
Recommendations:

Amenity and farmstead plantations.

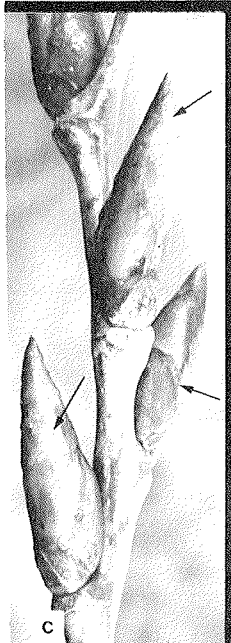
Wheeler poplar



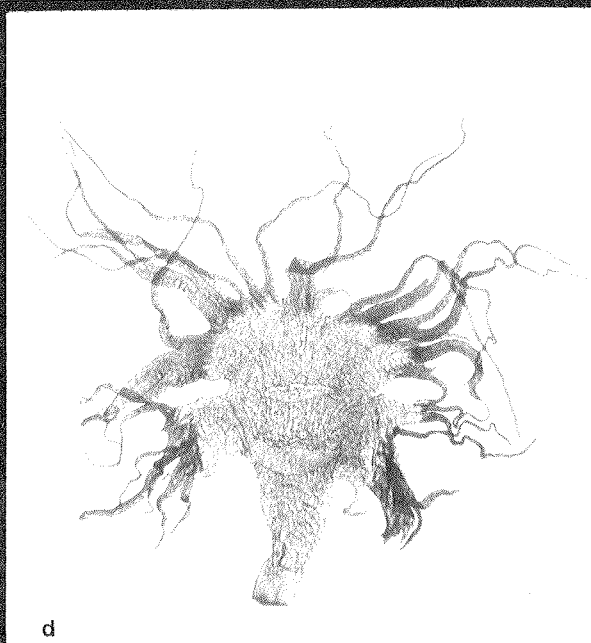
a



b



c



d



e

Wheeler Poplar

Populus x balsamifera L. cv.
'Wheeler' S. Wheeler (male)

- a 12-year-old tree
- b leaf (X 1.1)
- c male buds (X 1.4)
- d bract (X 9.5)
- e 15-year-old stem

Trunk

Spreading.

Bark

Creamy green or orange tinged, marked with dark blotches caused by frost cracks and warts.

Twig

Cylindrical, greenish-brown, glabrous, lenticels evenly dispersed, oval; buds ovoid, large, glabrous, appressed, gummy, acute; leaf scar 3-lobed, large.

Leaf

Blade oval, consisting of 2 disproportionate parts, with narrowly rounded base and pointed tip, twice as long as wide, lower surface waxy and rusty, upper surface dark green; midrib downy; margin delicately serrate, translucent border, teeth downy; petiole green, cylindrical, pubescent, less than half of length of blade; terminal glands absent.

Flower

40 to 50 filaments with dark purple anthers; bract longer than wide, 80 to 100 long delicate, dark brown digits; peduncle and pedicel glabrous.

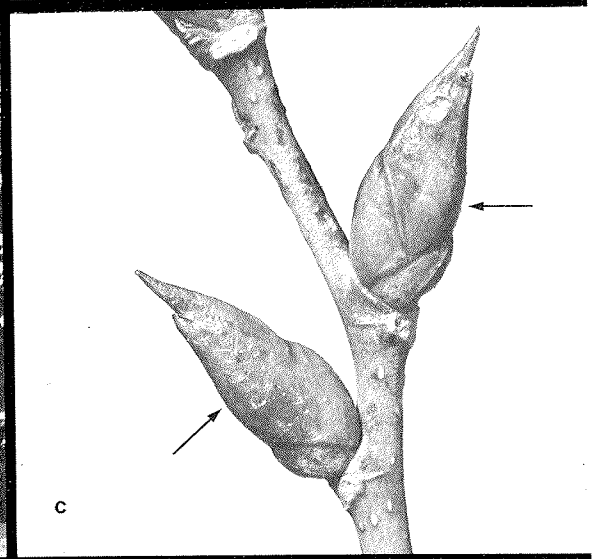
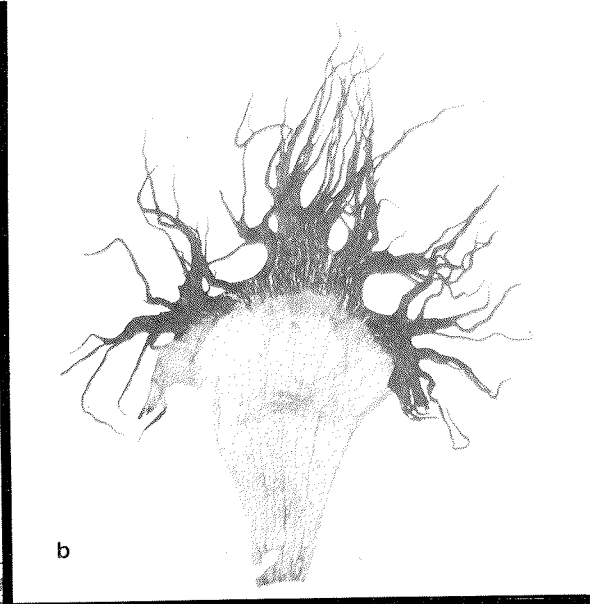
Notes:

Slow growth; retains branches on bole for long periods; highly susceptible to canker infections, which occur early, leaf rust and aphids; intolerant of early autumn and late spring frosts; very early flushing and early defoliation.

Recommendations:

Not suitable for prairie plantations.

44-52 poplar



Populus x deltoides Bartr.
cv. 'FNS #44-52' (female)

- a 25-year-old tree
- b bract (X 9.2)
- c female buds (X 2.2)
- d 4-year-old stem
- e mature bark
- f leaf (X 0.9)

Trunk

Straight, with strong side shoots from bole.

Bark

Smooth, greenish-gray with striped lenticels; rough, fissured and furrowed after about 8 to 10 years.

Twig

Angular with well-developed ribs, green, finely pubescent; lenticels long oval, usually grouped around leaf scars; buds elongated, 3 times longer than wide, acute, downy, appressed (outcurved when older), slightly gummy; eyelash-like hairs at juncture of leaf scar and bud base; leaf scar triangular, large.

Leaf

Rhomboid with broadly cuneate base and acuminate tip; blade length and width nearly equal; midrib glabrous on both surfaces; margin serrate and sparingly pubescent; petiole pink, slightly flattened, half of blade length, glabrous; terminal glands absent.

Flower

Three greenish, cap-shaped stigmas; bract twice as long as wide with 30 to 40 glabrous, dark brown to black digits, central portion of bract whitish-green; peduncle and pedicel glabrous.

Seed

White, 2.5-mm long, 1.0-mm wide; 1,000-seed weight = 0.8 to 1.0 g.

Notes:

Very fast growth; clear bole obtainable by pruning; susceptible to canker, resistant to leaf rust; intolerant of early autumn and late spring frosts; late flushing and very late defoliation.

Recommendations:

Suitable for industrial plantations on good alluvial soils on southern prairies, or for amenity and farmstead plantations.

¹⁰A suggested new name: Walker poplar. The clone was developed from a selection made by J. Walker at Indian Head about 1947. The

Glossary

Acute: Short-pointed as applied to buds.

Acuminate: Long-pointed as applied to leaf (Figure 3) and bud.

Anther: The pollen-bearing part of the stamen (Figures 12 and 14).

Appressed: Bud close or flat against the stem (Figure 9).

Bract: A modified leaf subtending the pedicel and belonging to the flower (Figure 14).

Bud scale: A modified protective leaf of a bud.

Bundle traces: The place on a leaf scar where the woody strands pass from the stem into the leaf (Figure 10).

Catkin: The flower cluster; usually crowded with bracts (Figures 13 and 14).

Capsule: The dry dehiscent fruit (Figure 16).

Cilia: Long, delicate, transparent hair.

Ciliate: Marginally fringed with hairs.

Clone: Trees reproduced asexually from a common ancestor and having identical genetic constitutions. Abbreviation: cl.

Cordate: Heart-shaped; refers to a leaf base with two rounded lobes.

Cultivar: Cultivated variety; clones and hybrids are included under this name. Abbreviation: cv.

Cuneate: Descriptive of leaf base; wedge-shaped (Figure 4).

Deltoid: Triangular; delta-like with equal sides (Figure 2).

Digit: Spreading finger-like, as applied to bracts (Figure 12).

Dioecious: Refers to a plant that has male and female flowers borne on different individuals.

Downy: Covered with fine, soft hairs.

Fissured: With narrow openings or cracks along the length of the bark.

Furrowed: With grooves along the length of the bark.

Glabrous: Not hairy; smooth.

Gland: Secreting organ of a leaf. Terminal glands are located below the base of the leaf blade at the juncture of the petiole. Minute glands are located above on the leaf teeth (Figure 5).

Glaucous: Covered with a bluish-gray bloom.

Gummy: Having a resinous exudation on the outer surface; said of buds.

Hybrid: Offspring of two different parental species.

Leaf scar: Scars on a twig from which leaves have fallen (Figures 7 and 11).

Lenticel: A wart-like prominence protruding through the bark of young twigs (Figure 18).

Linear: Elongated with nearly parallel sides.

Lobed : As applied to a stigma: divided into or bearing rounded segments.

Midrib : The prominent central vein of a leaf.

Outcurved : As applied to a bud: deviating outward from the stem (Figure 9).

Oval : As applied to a leaf: broad-elliptic, about $1\frac{1}{2}$ times as long as broad and round at the base (Figure 2).

Ovate : Having an outline like an egg, as applied to a leaf (Figure 2).

Ovary : The ovule-bearing part of the pistil (Figures 12 and 14).

Ovoid : Egg-shaped, as applied to the bud.

Pedicel : The supporting stalk of a single flower (Figure 16).

Peduncle : The main supporting stalk of the flower (Figure 16).

Petiole : The leaf stalk.

Pistil : The seed-bearing organ of the flower, consisting of ovary, style, and stigma.

Pollen : The dust-like grains or microspores borne by the anthers (Figure 15).

Pubescent : Covered with hairs (as opposed to glabrous) particularly if the hairs are short and soft.

Rhomboid : Quadrilateral with opposite sides and angles equal (Figure 2).

Serrate : Saw-toothed with the teeth pointing upward (Figure 5).

Species : A group of plants with identical genetic characteristics.

Stamen : The pollen-bearing male organ of a flower.

Stigma : The part of the pistil that receives the pollen (Figure 14).

Stipules : Leaf-like appendages at the base of the bud that subsequently fall off leaving stipule scars (Figure 8).

Terminal gland : Gland located at the juncture of the petiole and the leaf (Figure 5).

Translucent border : Said of the thin leaf-margin tissue that transmits light but is not transparent.

Variety : Individuals within a species with different morphologic and phenotypic characteristics.

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