OBSERVATIONS ON THE FLOWERING OF DECIDUOUS TREES AND SHRUBS IN REGINA, SK

H.E. MANN, Biology Department, Sir Wilfred Grenfell College, Memorial University of Newfoundland, Corner Brook, NF, A2H 6P9 and
M.V.S. RAJU, George Ledingham Herbarium, Biology Department, University of Regina, Regina, SK, S4S 0A2

In the last thirty years, the composition of the flora of the prairie city of Regina, located in south central Saskatchewan (50° 27 'N, 104° 37 'W) has changed considerably due to the planting of many trees and shrubs, both native (indigenous) and introduced (nonindigenous).[2,5] Almost all woody plants in the city have been planted except a few native species that occur along shores of wetlands such as Wascana Creek. Many species would not be able to establish themselves as seedlings on the dry open prairie, but once planted, established, and cared for by irrigation and fertilization, are able to flourish and enhance the quality of urban life. Over the years, as new species were introduced, it seemed interesting to follow their growth and to compare them to the already existing species. This article describes some of these observations on deciduous trees and shrubs, specifically with reference to their flowering phenology.

Observations of flowering behaviour of deciduous trees and shrubs were made within the city limits of Regina and especially on the campus of the University of Regina. The area selected for the study was comprised of open, abandoned areas, and streets and parks, including Wascana Park where the campus of the University of Regina is situated. Deciduous trees and shrubs, including some wild species along the shores of Wascana creek, were identified using available floras and guides.[4,6,7] Bailey's publication was also consulted for more exotic introductions, such as Tamarisk, Mongolian Linden, etc.[1] Every year since 1970, trees and shrubs were periodically monitored throughout the growing season from mid-March to late-August and details of flowering were recorded.

Table 1 summarizes the observations made on the 71 species (belonging to 38 genera and 19 families) included in this study. The terms "trees" and "shrubs" are variously used in the published literature and in some species the definitions may overlap. In this article, trees are considered to have one or a few main stems and to grow in excess of 4.5 meters, whereas shrubs have a number of branching stems and usually do not attain a height of 4.5 meters at maturity. We define "native" plants as those that have naturally occurred in the Regina Plain, Landscape Area 17 of the Moist Mixed Grassland ecoregion of Saskatchewan.[5] With respect to time of flowering, many of the species in Table 1 have been observed and recorded since 1970, but the data

Table 1 List of tree and shrub species with in city limits of Regina showing whether they are native (NAT) or introduced (INT), time of flowering and other phenologial characters.

No.	Plant Family	Plant name (Latin)	Common name	Tree (T) or Shrub (S)	Introduced (INT) or Native (NAT)	Flower early	Flower later	Time of flowering*
1	Salicaceae	*Populus alba* L.	White Poplar	T	INT	+	-	Apr
2		*P. balsamifera* L.	Balsam Poplar	T	NAT	+	-	Apr-May
3		*P. grandidentata* Michx.	Large-toothed Aspen	T	INT	+	-	Apr-May
4		*P. tremuloides* Michx.	Aspen Poplar	T	NAT	+	-	Apr-May
5		*Salix alba* L.	White Willow	T	INT	+	-	Apr-May
6		*S. bebbiana* Sarg.	Beaked Willow	S	NAT	+	-	Apr-May
7		*S. brachycarpa* Nutt.	Short-capsuled Willow	S	NAT	+	-	Apr-May
8		*S. discolor* Muhl.	Pussy Willow or diamond willow	S	NAT	+	-	Mar-Apr
9		*S. fragilis* L.	Brittle Willow	T	INT	+	-	Apr-May
10		*S. interior* Rowlee	Sandbar Wiilow	S	NAT	+	-	Apr-May
11		*S. lucida* Muhl.	Shining Willow	T	NAT	+	-	Apr-May
12		*S. lutea* Nutt.	Yellow Willow	S	NAT	+	-	Apr-May
13		*S. pentandra* L.	Bay-leaved Willow	T	INT	+	-	Apr-May
14	Betulaceae	*Alnus incana* (L.) Moench	Speckled Alder	T	INT	+	-	Apr-May
15		*Betula papyrifera* Marsh.	White Birch	T	INT	+	-	Apr-May
16	Fagaceae	*Quercus macrocarpa* Michx.	Bur Oak	T	INT	+	-	May
17	Ulmaceae	*Celtis occidentalis* L.	Hackberry	T	INT	+	-	Apr-May
18		*Ulmus americana* L.	American Elm	T	INT	+	-	Apr
19		*U. chinensis*	Chinese Elm	T	INT	+	-	Apr-May
20	Saxifrag-aceae	*Philadelphus lewisii* Pursh.	Mock-Orange	S	INT	-	+	June
21		*Ribes americanum* Mill.	Black Currant	S	NAT	-	+	May
22		*R. aureum* Pursh	Golden Currant	S	NAT	-	+	May
23	Rosaceae	*Amelanchier alnifolia* Nutt.	Saskatoon-berry	S	NAT	-	+	May-Jun
24		*Cotoneaster acutifolia* Turcz.	Cotoneaster	S	INT	-	+	May-Jun
25		*Crataegus rotundifolia* Moench	Round-leaved Hawthorn	S	NAT	-	+	May-Jun
26		*Malus* sp.	Apple (Horticultural)	T	INT	+	-	May-Jun
27		*M. spectabilis* Borkh.	Crabapple	T	INT	-	+	Jun
28		*Physocarpus malvaceus* (Greene) Kuntze	Mallow-leaved Ninebark	S	INT	+	-	Jun
29		*Potentilla fruticosa* L.	Shrubby Cinquefoil	S	NAT	-	+	Jun-Aug
30		*Prunus pennsylvanica* L.	Pin Cherry	S	NAT	-	+	May-Jun
31		*P. tenella* Batsch	Russian Almond	S	INT	+	-	May-Jun
32		*P. virginiana* L.	Choke Cherry	S	NAT	-	+	May-Jun
33		*Rosa acicularis* Lindl.	Prickly Rose	S	NAT	-	+	Jun
34		*R. arkansana* Porter	Low prairie Rose	S	NAT	-	+	Jun
35		*R. woodsii* Lindl.	Wood's Rose	S	NAT	-	+	Jun
36		*Sorbus americana* Marsh.	Western Mountain-Ash	T	INT	-	+	May-Jun
37		*Spiraea alba* Du Roi	Meadowsweet	S	NAT	-	+	May
38		*S. japonica* L.	Japanese Spiraea	S	INT	-	+	Jun
39	Fabaceae	*Amorpha fruticosa* L.	False Indigo	S	INT	-	+	Jun-Jul

Table 1 continued

40		*Caragana arborescens* Lam.	Common Caragana	S	INT	-	+	May-Jun
41		*C. frutex* Koch	Globe Caragana	S	INT	-	+	Jun
42		*C. pygmea* DC.	Caragana	S	INT	-	+	Jun
43	Celastraceae	*Euonymus nanus* Bieb.	Spindle shrub	S	INT	-	+	Jun-Jul
44		*E. atropurpureus* Jacq.	Burning-bush	S	INT	-	+	Jun-Jul
45	Anacardiaceae	*Rhus radicans* L.	Poison-Ivy	S	NAT	-	+	Jun
46	Aceraceae	*Acer ginnala* Maxim.	Amur Maple	T	INT	+	-	Jun
47		*A. negundo* L.	Box Elder	T	NAT	+	-	Apr-May
48		*A. saccharinum* L.	Silver Maple	T	INT	+	-	Apr-May
49	Hippocastanaceae	*Aesculus carnea* Hayne	Red Horse-Chestnut	T	INT	-	+	May-Jun
50	Tamaricaceae	*Tamarix gallica* L.	Tamarisk	S	INT	-	+	Jun-Aug
51	Vitaceae	*Parthenocissus quinquefolia* (L.) Planch.	Virginia creeper	S	INT	-	+	Jun
52	Rhamnaceae	*Rhamnus alnifolia* L'Hér.	Alder-leaved Buckthorn	S	NAT	+	-	Apr-May
53	Tiliaceae	*Tilia americana* L.	Basswood	T	INT	-	+	Jun
54		*T. europaea* L.	European Linden	T	INT	-	+	Jun
55		*T. mongolica* Maxim.	Mongolian Linden	T	INT	-	+	Jun
56	Elaeagnaceae	*Elaeagnus angustifolia* L.	Russian Olive	T	INT	-	+	Jun
57		*E. commutata* Bernh.	Wolf Willow	S	NAT	-	+	May-Jun
58		*Shepherdia argentea* Nutt.	Buffaloberry	S	NAT	-	+	May-Jun
59	Cornaceae	*Cornus alba* L.	Red-Osier Dogwood	S	NAT	-	+	May-Jun
60	Oleaceae	*Forsythia ovata* Nakai.	Golden-bells	S	INT	+	-	May
61		*Fraxinus pennsylvanica* Marsh.	Green Ash	T	NAT	+	-	May
62		*Syringa amurensis* Rupr.	Japanese Lilac	T	INT	-	+	Jul
63		*S. vulgaris* L.	Lilac	S	INT	-	+	May-Jun
64	Caprifoliaceae	*Sambucus racemosa* L.	Red Elderberry	S	INT	+	-	May-Jun
65		*Lonicera tartarica* L.	Tartarian Honeysuckle	S	INT	-	+	May-Jun
66		*Symphoricarpos albus* (L.) Blake	Snowberry	S	NAT	-	+	Jun
67		*S. occidentalis Hook.*	Western Snowberry	S	NAT	-	+	Jun
68		*Viburnum acerifolium* L.	Dockmackie	S	INT	-	+	May-Jun
69		*V. lentago* L.	Nannyberry	S	INT	+	-	May-Jun
70		*V. opulus* L.	European bush-Cranberry or High bush-Cranberry	S	I NT	-	+	Jun
71		*V. trilobum* Marsh.	High Bush Cranberry	S	NAT	-	+	Jun

* Data presented are those recorded for the growing season of 1999.

presented in Table 1 refer only to the observations made during the growing season of 1999.

Of the 71 species identified in the study area, 27 (38%) were trees and 44 (62%) shrubs and there were more introduced species (62%) than native (38%) (Table 1). Among trees, there were more introduced (81%) than native (19%) species. By contrast, equal numbers of native and introduced shrub species were present.

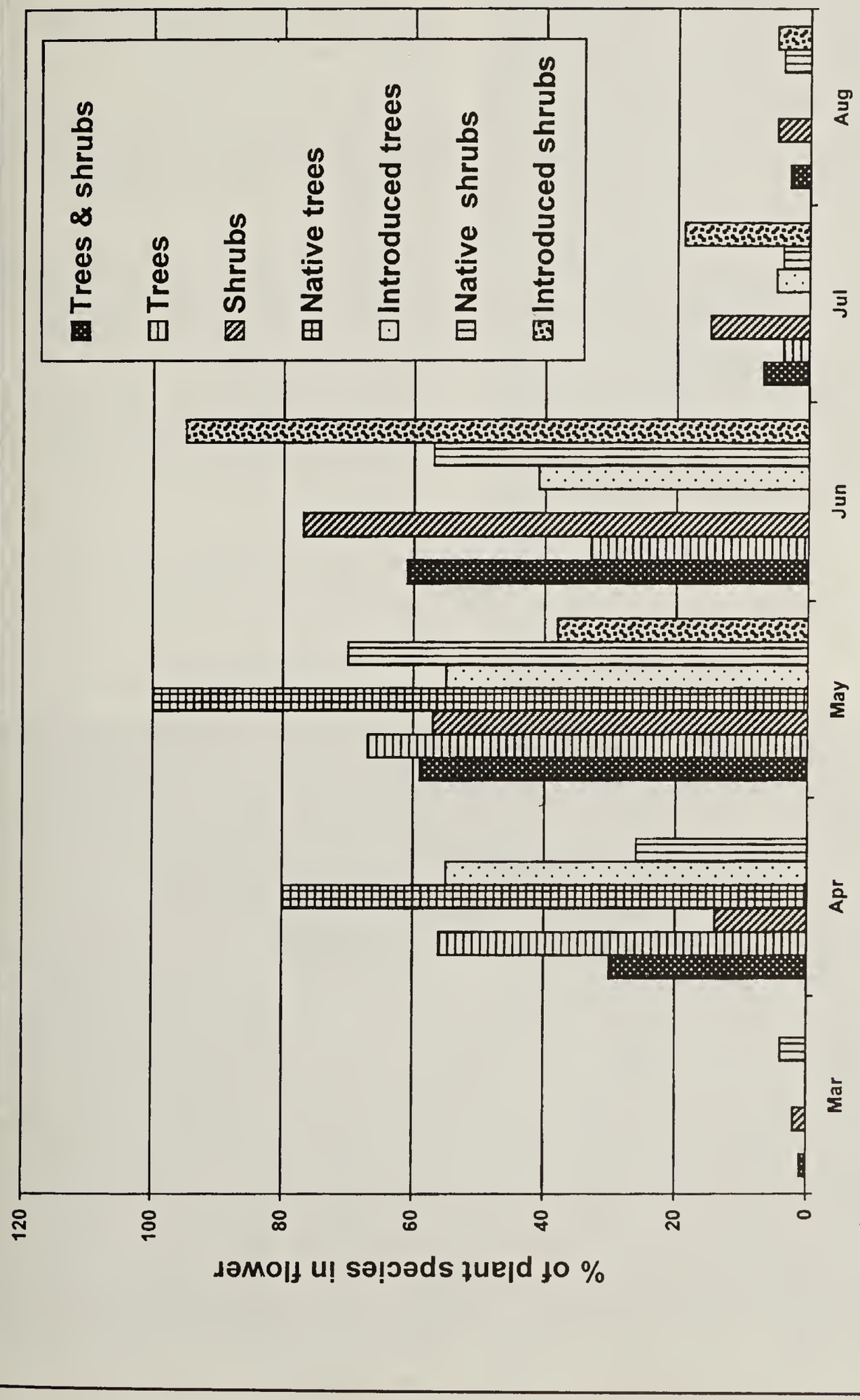
Some species flower very early, before the leaves are produced or, in some, while the leaves are still immature. Others blossom later, after the leaves are fully formed. Most trees, both introduced and native, showed a tendency to flower earlier (70%), before the leaves were formed, as compared to shrubs, 70% of which flowered after the leaves were formed. Most introduced (77%) and native (64%) shrubs leafed out well before the flowers appeared. The introduced shrubs bloomed late, extending the flowering period, and were probably selected for this aspect by horticulturists for aesthetic reasons.

Figure 1 summarizes in graphic format the seasonal flowering data for various combinations of trees and shrubs. In the study, the flowering time in deciduous trees and shrubs, despite fluctuations in their number, extended from late March to late August. Flowering in native trees began in April and remained dominant until about the middle of May. It abruptly declined in June. Flowering in introduced trees started in April and lasted until the end of July. The native shrubs, on the other hand, began to flower very early (mid- or late March) and extended until about the end of August, showing a peak in June. Flowering in the introduced shrubs lasted until the end of August.

Environmentalists and ecologists make a distinction between "native" and "introduced" plants and discuss their role in the ecosystem.[3] In the present study area, 62% of the woody plant species (trees and shrubs) were introduced. "Introductions of nonindigenous organisms can be both a boon and a bane to society".[3] World societies, especially in the temperate countries, depend heavily on introduced plants for their survival.[3] Good examples of aggressive opportunism by plants may be seen in agricultural endeavours where the disturbance of the habitat has allowed many undesirable weeds to move in. Changes in ecosystems due to deliberate introductions and/or invasions of plants have been going on since time immemorial. It is important, however, to minimize deliberate introductions and carry out appropriate testing and research before full-scale use of exotics is initiated. Continued monitoring also is necessary to identify species which may have a tendency to become over-aggressive in their new environment. Woody species, which must survive the ravages of our prairie winters both above and below ground are, however, less likely to become weedy than annuals or herbaceous perennials and only a few have done so. The shrubs and trees, both native and introduced, together maintain a long flowering period and most are welcome additions for beauty of the landscape, shelter and wildlife sustenance.

There was an interesting note recently in a local newspaper about planting trees in Regina.[8] The city of Regina has decided to introduce "a program to involve citizen volunteers in planting some 10,000 Bur Oak trees as a millennium project [which] is set to blossom, early in the New Year in Regina". This ambitious program is expensive, but it is, no doubt, welcome. The planting of Bur Oak trees in the

Figure 1. Graphic representation of the flowering pattern of various deciduous woody plant groups during the growing season of 1999.



Regina area adds to the aesthetic beauty more because of their arboreal quality than because of their flowers, which are rather small, inconspicuous and short lived.

Acknowledgements

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Box Elder (Manitoba Maple) flowers and young leaves. ***Anna Leighton***