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## RESEARCH ARTICLE

### TAXONOMIC REVISION OF THE FAMILY SALICACEAE OF PAKISTAN

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#### ABSTRACT

The present study of confined to the taxonomic revision of family salicaceae of Pakistan. In this family considerable hybridization between different taxa is involved and there is considerable morphological variation within each species. The extensive availability of frequently misidentified plant specimens. In different herbaria of Pakistan suggest that it is taxonomically a difficult family. Some species of the genus *Salix* Linn show nomenclatural problems. The present study was therefore under taken to clear up the taxonomic position of a number of taxa. Minute character have been considered for the delimitation of various taxa, e.g. pubescence, the length and position of the pedicle and peduncles, the length of catkin, the size and shape of leaves, the size and shape of capsule, etc.. Numerical analysis was carried out using following computer packages: SPSS & statistical cluster analysis was used and delineate and defined taxa. Result are presented in the form of keys and dendrogram

## INTRODUCTION

The family salicaceae comprise 3 genera and 620 species distributed in northern hemisphere. In Pakistan, family is represented by 2 genera, namely *Salix* L. and *populus* L. which are commonly called willows and poplars respectively (Ali, 2001). Willows are exceedingly difficult ones owing to the tendency of variation. The character of free and united stamens on which main subdivision is based by no means in variable and length of style and stipe of ovary and shape of stigma show considerable variation. There is difficulty in correlation to sex, which is by no means considerable in case of their species, which flower before coming into leafy. There is another problem of hybridization. Both members of family of willows and poplars have male and female catkin on different trees offers nectars to bees for fertilization their seeds carry no endosperm, and so have short life germinating condition must be right straight away which may be why willows and poplars tend to grow in moist soil. Stewart (1972) reported 7 species of genus *populus* L. and 33 species of *Salix* L. from Pakistan. He listed 9 species of *Salix* L. And 1 species of *populus* L. as of doubtful occurrence. He also misidentified some species of *Salix* Moreover, Stewart work was only a check list. He provided any taxonomical information. The absence of detailed taxonomic treatment of the genus of our area makes it necessary to revive this genus using whatever tools are available, and re-evaluation of past research found in the majority of world's flora. The present study was therefore, undertaken to clear up the taxonomic position of family salicaceae. The genus *Salix* (willows) consist of some 300 large

and small bushes from all northern temperate areas, the arctic and south temperate zones excluding Australia. The flowers in catkin appear on separate male and female trees and open before leaves. The Weeping Willow (*Salix babylonica* L.) Is one of the most loved of all willow. It grows besides lakes and ponds in parks and gardens on dry soils as well. Vigour is another family quality, but in this Poplar is more consistent than Willow. America, Europe and Asia share most of the tree species of Willow, except the most famous of all, the Weeping Willow, which grow wild only in west of China. Stories abound of introduction of *S. babylonica*, the original Weeping Willow. Before, it was established it came from China, it was thought it has been the tree by the waters of Babylon where the Jews in captivity sat down and wept. Its entry into western garden came early in 18<sup>th</sup> century, from Middle East, according to another story, as a withy used to the tie a parcel sent from Spain to Lady Suffolk in London. W.A. Bean recounts how the poet 'pope' noticing one of the twigs was alive, begged it and plants it at Twickenham when it grows into celebrated weeping willows of his villagarden. Weeping willow picked up the name of *S. babylonica* L. on its travel from China to Europe. Most weeping willows in garden today are hybrid between this and white willow. Genus *populus* Linn is a gums of thirty species of very fast growing, mainly large deciduous trees with resinous buds and flowers in catkin on separate male and females trees. They all come from northern temperate regions. The white poplar (*populus alba* L) indigenous to central and southern Europe and into central Asia, is a tree which can reach 18 meter (60 ft in height. It has furrow, black bark on hole, which becomes gray or even yellowish white lighter up and on numerous stout branches.

Plate-I. *S. acmophylla* Boiss.: Branch with fruiting catkins.Plate-II. *S. tetrasperma* Roxb.: Branch with male and fruiting catkins.Plate-XVIII. *P. nigra* L.: Branch with fruiting catkins.

The branch is also pitted with black, diamond shaped marks. The leaves are lobbed almost maple like and cover with dense white hairs on their underside and thinly spread on this upper surface. Easily mistaken for white poplar is gray poplars (*populus canescens*), although it is usually taller with a rounder crown and in every way bigger, with leaves which are rounded and duller white beneath and smooth on the upper surface. Neither tree is native to small organ requiring millimeter measurements (such as bracts, pedicel calyx etc.) were measured under microscope. Morphological characters (vegetative and reproductive) were examined under microscope.

**Numerical Taxonomy:** Numerical Taxonomy is the grouping by numerical methods of taxonomy units into taxa on the basis of their character states. Adanson (1763) gave concept of numerical taxonomy. Different taxa are separated by means of correlated features. Adanson (1763) Britain but both have become neutralized therefore the centuries. The black poplar (*populus Ingra* L.) comes from northern and western Europe and is big, spreading tree with huge lower branches arching out into wide crown after 30meter (100ft) in height The leaves are ear shaped, bright, glossy green above and pall green beneath, turning a soft yellow in the autum. But it is the cultivar "Italica" usually called the Lombardy poplar because of its Italian origin, which is best known of this spices if not of the whole genus. Planted throughout the temperate world as screens, avenues and as individual ornamentals, this tree is, to most people, the epitome of the word popular. It is sometime to 30 meters(100ft) tall and usually look even taller with its elegant spire-like form, it deserves its wide spread popularity.

## MATERIALS AND METHODS

Morphology plant specimens were studied from different Herbaria. The Herbarium of Quaid –e-Azam university, Islamabad (ISL).The National herbarium of Pakistan museum of national History Islamabad (PMNH), many collections have been make in cause of author' field studies. The voucher specimens were deposited in herbarium of Quaid-e-Azam university Islamabad. A microscope (Bausch and Lamb) was used for morphological studies which gives a magnification of 10 X0.7-3x, thus enlarging the image by 7-30 times. For each Taxon, the measurement of each character were usually taken from a sample of 20-30 specimens selected to cover the extremes of geographical, ecological and altitude range of the

Taxon. All measurement into centimeter (such as plant height) were taken to the nearest centimeter using a ruler.

## RESULTS AND DISCUSSION

Taxonomically the family salicaceaeis a natural taxon. There is a tending to refer the family to Amentiferae in view of perianthless flowers being aggregated into catkins. Engler (1964) regarding the family as one of the most primitive among the dicotyledonous due to simply perianth unisexual flowers. He included the family in his third order of the subclass Archichlanydeae. The family salicaceaeconsists of 3 genera and 620 species. They tend to occur in wet places, such as in bottom land and along streams, although confined to such habitat. Though the members of the family are cosmopolitan in distribution, they abound the four center of the temperate zone, such as the sea, central Europe and the Himalayas. However, they are absent in Australia. In Pakistan the family is represented by 2 genera and 34 species and 1 subspecies. The genus *Salix* Lin is probably the commonest woody genus in mountainous areas ascending into the alpine zone. *Salix* Lin is large and complicated genus in the family salicaceae. It shows a wide range of variations. Different author have tried to give different names to our Taxa. Many of our specials have been given half a dozen names. In the family salicaceae considerable hybridization between different Taxa, is also included and there is considerable morphological varied from within each species. The extensive availability of frequently misidentified plant specimen in different herbaria of Pakistan suggests that it is Taxonomy a difficult genus. Therefore a detailed study of the family salicaceae has been carried out. Minute charters have been considered for the delimitating of various Taxa, e.g. pubescence, the length of catkin, the length and position of the pedicels and peduncle, the size and shape of the leaf, the pubescence's and shape of the capsule. Ali (2001) did not report *S.triandra* L. and *S.australi* Anderson from Pakistan. Stewart (1972) placed the latter special as synonym under *S.excelsa* Gmel. In the present account *S.triandra* Linn and *S.australi* or Anderson have been reported from Pakistan for the first time and hence these species are new records. In the present account it has been concluded that 6 species of *populus* L. and 28 species of the genus *Salix* L. and one subspecies namely *S. denticulata* Andersonssp has *Arica* (parker) Ali occur in Pakistan.

Table. 1. Data Sheet for family Salicaceae

Name of plant Species	Habit*	Plant Height (cm)	Pubescent*	Texture*	Petiole length (cm)
<i>Salix acmophylla</i>	1	15-30	2	1	-0.6
<i>S. tetrasperma</i>	1	5-20	2	1	0.2-0.8
<i>S. Wilhelmsiansa</i>	1	6-7	1	3	0.1-0.2
<i>S. koweieana</i>	1	4-8	2	3	0-0.5
<i>S. capussii</i>	1	4-8	2	3	2-0.2
<i>S. pycnostachya</i>	1	10-10	2	3	0.2-0.6
<i>S. blakii</i>	1	6-7	1	3	0.1-0.6
<i>S. sericocarpa</i>	1	10-10	2	2	0.2-0.6
<i>S. denticulata</i>	2	5-8	2	3	0.2-0.6
<i>S. caesia</i>	2	1-5	3	3	0.2-0.6
<i>S. karelinii</i>	2	5-6	2	2	0.5-1
<i>S. alba</i>	1	35-35	2	1	1-0.8
<i>S. babylonica</i>	1	15-20	2	2	0.5-0.5
<i>S. excelsa</i>	1	30-30	2	3	0.3-0.4
<i>S. iliensis</i>	1	3-8	1	3	0.2-0.2
<i>S. dolichostachya</i>	1	7-15	2	1	0.2-0.6
<i>S. wallichiana</i>	1	6-7	1	3	0.6-1
<i>S. flabellaris</i>	3	1.5-1.5	2	3	1-0.6
<i>S. lindleayna</i>	2	1-5	1	3	0.6-0.6
<i>S. vinibalis</i>	1	5-6	4	3	0.2-1.5
<i>S. turanica</i>	1	5-6	3	1	0.2-0.5
<i>S. aegyptiaca</i>	1	2.5-10	4	3	0.2-1
<i>S. fedtschenkoi</i>	2	5-6	2	3	0.4-1
<i>S. schugnanica</i>	2	0.3-1.5	1	3	0.1-0.3
<i>S. sclerophylla</i>	2	2-2	1	3	0.2-0.2
<i>S. nurastanica</i>	2	1-1	1	3	0.1-0.1

Name of plant Species	Leaf length (cm)	Leaf breadth (cm)	Leaf base*	Leaf margin*	Leaf apex*	Leaf Texture*	Leaf Color*
<i>Salix acmophylla</i>	2.4-12.8	0.3-1.7	1	3	3	4	4
<i>S. tetrasperma</i>	2.2-4.3	1.2-2.4	1	2	2	1	2
<i>S. Wilhelmsiansa</i>	0.9-3.1	0.2-0.4	1	2	2	3	4
<i>S. koweieana</i>	2-4.5	0.3-0.7	2	4	1	1	2
<i>S. capussii</i>	2.5-4	0.3-0.5	3	1	1	1	1
<i>S. pycnostachya</i>	2.2-10	0.5-2.5	1	1	2	1	1
<i>S. blakii</i>	2.3-3.2	0.5-0.7	1	1	1	1	4
<i>S. sericocarpa</i>	1.6-9	1.5-3	3	3		1	2
<i>S. denticulata</i>	2-5.8	1-3	3	2	5	1	1
<i>S. caesia</i>	1-2.5	0.4-0.8	1	1	1	1	2
<i>S. karelinii</i>	2-5.5	1-3	2	2	1	1	1
<i>S. alba</i>	5-10	1-3	2	3	2	1	1
<i>S. babylonica</i>	0.5-5.3	0.4-1.6	1	1	1	1	1
<i>S. excelsa</i>	5-8.5	1.3-2	2	2	2	1	1
<i>S. iliensis</i>	2.5-4	0.3-0.5	3	1	1	1	1
<i>S. dolichostachya</i>	6-10	1.5-2.1	3	2	2	1	4
<i>S. wallichiana</i>	4-6.5	2-3.2	3	1	1	4	1
<i>S. flabellaris</i>	4-10	1.5-2.1	1	2	5	1	1
<i>S. lindleayna</i>	1.6-3.2	0.5-0.7	2	1	1	1	2
<i>S. vinibalis</i>	5-12	0.5-2	3	1	2	3	2
<i>S. turanica</i>	4.5-14	1-2.5	2	1	2	1	3
<i>S. aegyptiaca</i>	5-15	3-6	2	2	2	2	2
<i>S. fedtschenkoi</i>	2-5.5	1-3	1	2	4	1	1
<i>S. schugnanica</i>	3.5-6	0.7-3	2	1	1	1	3
<i>S. sclerophylla</i>	2-3.4	1-2	1	1	2	3	1
<i>S. nurastanica</i>	2-3	0.9-1.2	2	2	1	1	2

Habit\* : trees = 1; Pubescent\*; Hairy = 1 waxy patches = 3 Texture\*; Rough(1,2); Shrubs = 2; Glabrous = 2; Tomentose = 4 Smooth=3

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