

WILLOW (SALIX Spp.) PROPAGATION—NEW TECHNIQUE*by***MAHMOOD IQBAL SHEIKH.****Summary.**

Methods employed for willow cultivation in the country are rather medieval and have remained confined to planting of cutting insitu. Also the tree has been grown with little regard to the origin of the stock and its quality. An attempt has been made to collect willow material from different sources and to propagate the same by growing at close (3' X 3') and wide spacing (3' X 3') and planting out the latter when one year old. The results at the nursery stage as well those of field planting are quite encouraging.

Introduction.

Sporadic efforts have been made in the past to cultivate willows in Pakistan to meet a variety of requirements. The tree has usually been planted along water courses in the irrigated plantations and the banks of canals, rivers and streams. Willows have also been planted around agricultural field specially in the valleys of Mardan, Peshawar and Swat. Since essential cultural methods required for proper growth of the tree have not been adopted either due to lack of sufficient information or due to inherent capabilities of cuttings of the tree to take root easily, the resultant trees are crooked, malformed and forked providing a very small portion of clear and utilizable bole. If it had been properly planted and tended, the tree would have attained dimensions required by the sports goods industry in a reasonable short period of time, ranging from 10 to 12 years.

In Pakistan so far planting of willows has been done entirely from branch cuttings which are planted directly at the site. It has to be realised that techniques of willow wood production for different end uses is a specialised practice, quite distinct from routing afforestation techniques. Without meeting the due requirements of planting and tending it is difficult to get defect-free proper sized timber specially for the manufacture of cricket bats. Raising of willows for other uses such as basket manufacture, pulp and artificial limbs although does not require sophisticated cultivation practices but as compared to the present methods in vogue if the tree is given requisite care and attention, definite increase in quantity and quality can be expected. A part from defective planting techniques, poor quality of the produce is due also to use of stock regardless of the source, planting in unfavourable sites and insufficient tending in subsequent management operations.

Past Work on Propagation.

Methods of propagation and cultivation of willows have been a matter of gradual development in different parts of the world. While in the under developed countries, the centuries old method of willow propagation by branch cuttings is considered to be ideal, research workers have remained busy in developing suitable nursery and field plantation techniques with a view to improving the quality of wood for specific purposes with an eye on the end product.

Gorrie (2) has advocated use of cuttings with $\frac{3}{4}$ inch diameter at the thick end, 28 to 30 inches in length, putting $\frac{3}{4}$ of the total length into the soil. He has also suggested development of a suitable local strain between indigenous *Salix tetrasperma* with introduced varieties of *Salix alba*, or *Salix babylonica*.

British Forestry Commission (1) has recommended planting with poles from pollards, as sets from low stools and, as rooted plants. When planted these poles or sets are about 10 to 15 feet in length. The main idea behind this practice is to obtain the planting stock easily and without much cost with the added qualifications of being faultless, straight, free from side scares, sufficiently stout, to stand erect without a stake and that which would ultimately give a clear bole of 7 to 8 feet.

In Britain, the country, which is quite famous for production of quality cricket bats, the rooted plants are raised from 7 to 9 inches long and half to one inch thick cuttings. These are planted level with the ground at a distance of 6 to 9 inches in 2 feet apart lines. Only one shoot is allowed to grow out of a number of sprouts. The plants are lifted after one year, graded and replanted in lines at the spacing of $1\frac{1}{2}$ to 2 ft. X 3 ft. Out of these, larger plants are planted out when two year old; the rest are left to grow for another year or so. It has further been suggested by the Forestry Commission that planting of rooted plants should be favoured as these have greater prospects of success and are less exposed to root decay when planted out. Field planting at 30 ft. X 30 ft. has been recommended to get the best results.

Malhotara (3) while commenting on the planting of *Salix alba* var. *Caerulea* has advised that cuttings/stumps/ stubs should be wrist thick and $4\frac{1}{2}$ ft. long at the time of planting. He has further suggested that out of total length, 2 ft. should go into the ground. As regards rotation, he has recommended that such plantations should be worked on 12 to 14 years rotation.

Work in the Institute.

Taking a clue from the work done in Britain and significant results obtained from the experimental work on poplars in the country, it was decided to raise willow stock for field planting with the same techniques as employed for poplars, vis-a-vis raising of planting stock from first and second stage nurseries. Willow cuttings were collected from not only different sources within the country but also from outside.

Willow Propagation

Methods of propagation and cultivation of willows have been a matter of gradual development in different parts of the world. While in the under developed countries, the traditional method of willow propagation by branch cutting is still in vogue, the research workers have remained busy in developing suitable nurseries and field plantation techniques with a view to improving the quality of wood for



Photo 1. One year old, second stage nursery (3' x 3') of willows in the research garden of Pakistan Forest Institute Peshawar.

Work in the Institute

Taking a cue from the work done in Britain and significant results obtained from the experimental work on poplars in the country, it was decided to start willow stock for field planting with the same techniques as employed for poplars. A willow nursery was established in the research garden of the Pakistan Forest Institute, Peshawar. The nursery was established in a 3' x 3' plot. The willow cuttings were collected from not only different sources within the country but also from outside.

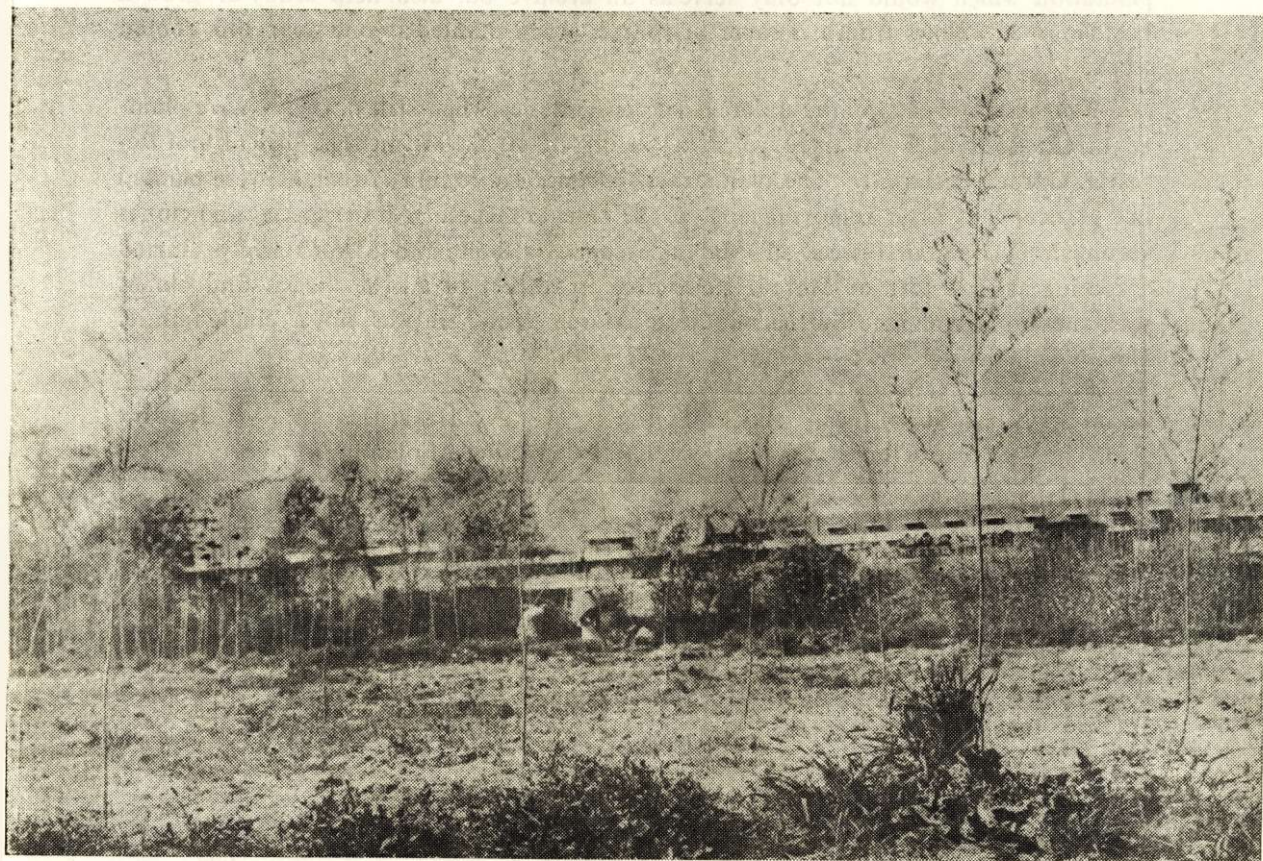


Photo 2. One year old plants from 2nd stage nursery, planted in February, 1973 in the Pakistan Forest Institute research garden, Peshawar.

The sources included Mardan, Jallo, Peshawar, Quetta, Argentina and Italy. First and 2nd stage nurseries were raised from cuttings. In the first stage cuttings were planted at the spacing of 3' X 3' and in the second stage cutting to cutting and line to line distance was kept as 3 ft. Planting was done in well worked soil, which was of first and 2nd stage nursery. Since the number of cutting available for raising planting stock was small, a statistically designed study could not be started in 1973. The stock available from 2nd stage nursery was however planted in the form of a small plantation which would not only serve as an archive but also help study of growth behaviour of willows from a number of sources when planted as one year old rooted stock.

Ten plants of each of the different species/varieties when still dormant were planted on the 15th of February, 1973 at a spacing of 10 X 10 ft. in the Silvicultural Research Garden, Peshawar. The plants ranged from 3 ft. to 11 ft. in height were planted in 1 ft. deep pits after removing most of the side branches. All the species and clones sprouted by the first week of March except S1-10-63 and S1-5-63 which started sprouting around 15th of March. Sprouting in respect of all the species and clones was, therefore, complete by the middle of March and there was not a single failure. Details are given below:—

Serial No.	Name/No. of the Species/Clone	Source	Av. Ht. at the time of planting		Remark
			(ft.)		
			Max.	Min.	
1.	<i>Salix viminalis</i> ? (Quetta willow).	Quetta	6.2	9.0	
2.	<i>Salix tetrasperma</i> ..	Charsadda Mardan Road.	6.0	8.1	
3.	<i>S. argentinensis</i> CL. 6899.	Argentina/Italy.	7.1	9.0	
4.	<i>Salix babylonica</i> ..	Peshawar.	7.0	9.0	
5.	<i>Salix alba</i> Var "Calva" "Sauce" alamo.	Italy.	6.1	9.1	
6.	<i>Salix alba</i> var. "Calva" Clone S1-10-63.	Italy.	6.0	8.0	Sprouting late (15-3-73).
7.	<i>S. alba</i> I-6/59 ..	Italy.	5.2	8.3	
8.	<i>S. argentinensis</i> 'Cv. mes-tizoamos SE. 38-62.	Italy.	3.1	7.2	
9.	<i>S. tetrasperma</i> ..	Peshawar	4.2	8.1	
10.	<i>S. argentinensis</i> CL. 6899.	Argentina/Italy.	4.0	11.2	Raised from root-shoot cuttings.
11.	<i>S. alba</i> var. "Calva" S1-5-63.	Italy.	7.3	11.2	Sprouting late (15-3-73)

Salix argentinensis C1-6899 has been repeated; in one case the entire plants were raised from branch cuttings and in the other from root-shoot cuttings.

Recommendations.

Cultivation of willows is not difficult. Only close attention to various details is necessary specially during its early life. It is time that the foresters and private growers of willow appreciate the requirements of the tree and get fully acquainted with its methods of cultivation. In order to bring the propagation practices at par with other countries, it is suggested that the willows may be propagated on the lines suggested above. If suitable soils and sites are selected and stout and healthy one year old planting stock from second stage nursery is planted, there is no reason as to why the requirements of sports goods industry and other industries based on the wood from this tree can not be met. The tree can be put to multifarious uses, has a fast rate of growth, can be planted easily under a variety of climatic condition and has a lesser number of known fungal and insect enemies. Grown with proper care, the tree can play a very important role in meeting the acute shortage of timber in the country over a short period of time.

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References.

1. British Forestry Commission. 1958 Bulletin No. 17 2nd edition Cultivation of Cricket bat willow.
2. Gorrie Maclagan .. 1960 Willow cultivation in West Pakistan., Pakistan Journal of Forestry Vol. X No. 4 Pages 295-298.
3. Malhotara M. K. C. .. 1952 Indian Forester Vol. 78 No. 2 page 92.
4. Nawaz, Mohammad .. 1959 Economics of growing Willow. Pakistan Jour. of Forestry Vol. IX No. 2 Pages 132-34.