

SELECTION OF *POPULUS CILIATA* CLONES

By

MAHMOOD IQBAL SHEIKH.

Director,
Forestry Research Division,
Pakistan Forest Institute,
Peshawar.

S U M M A R Y .

Research workers have hitherto ignored the inherent good qualities of Populus ciliata. The tree can become a potential source of raw material to feed multifarious woodbased industries. Initial selections from seedlings have indicated that seed from the same source gives progeny of a wide range, varying from very poor to excellent stock. This has helped selection of good clonal material over a period of 3 to 4 years.

T E X T .

1. **Introduction:** *Populus ciliata* is a species of great promise for the wet mountainous regions of West Pakistan. It thrives at high altitudes, and has a fast rate of growth even on moderately fertile soils. It is a fairly straight growing tree. The timber is of low density, and can be used for veneer, pulp and paper, fibreboard, matches and packing cases. For these reasons and the relative ease with which it can be propagated from cuttings, it was decided to select suitable clones of this species.

2. **Literature:** *Populus ciliata* has not been given any importance in the past. No serious attempts were made to raise the plants from seed and to select clonal material. Artificial fertilization has also not been reported in the literature. There are some indications that efforts were made in undivided India to sow seeds in pots for growing trees of this species. These were not very successful as either the seed did not germinate at all or the seedlings did not survive after germination.

3. **Selection of Plus Trees:** Fine specimens of *Populus ciliata* trees are available in the forests around Murree, Doonga gali, Kala Bagh and Nathiagali, ranging from 6,500 to 8,000 ft. above sea level. In this tract the trees of this species grow naturally or have been planted either in pure patches or mixed with conifers. Plus trees were

selected in December-March, 1967-68 in this area. The trees were leafless at that time of the year. Following criteria were used for selection of plus trees:—

- (i) Straight and cylindrical bole.
- (ii) Maximum branch-free bole length.
- (iii) Only one leader and branches in uniform whorls.
- (iv) Absence of insect and fungal damage.

4. **Trial Sowings:** In July, 1967 a small nursery was raised in compartment No. 1 of Murree Municipal Forests. The seed was collected from four "plus" trees growing around Murree and Bhurban. The trial sowing was done with a view to finding out viability and germination of the seed and survival percentage of seedlings. There was not only profuse germination but also the survival was excellent.

Encouraged with this success, seed was again collected from 6 "plus" trees selected in 1968 and sowing was done in well prepared beds in Compartment No. 9 (ii) of Sehr Bagla Range of Murree Forest Division.

5. **Collection and Preparation of Seed:**—Depending on the climatic conditions, *Populus ciliata* seed matures by the end of June which may be extended to the middle of July. Catkins assume yellow colour when the seed is mature and ready for collection. When pressed between fingers, capsules rupture along their natural lines of dehiscence, and not transversely. It is also possible to see some flossy material flying around which is a reliable indication of opening of the fruit.

The collected catkins were kept under shade to allow the capsules to dry and open. It is also advisable to turn the catkins over once or twice so that the lower and inner layers of capsules get sufficient air circulation for complete drying. When capsules open, a wire gauze tray (100 meshes in one square inch) of 3' × 2' with a depth of three inches was used for separation of the seed from cotton. Floss was rubbed on wire mesh for separating the seed which was collected down below on a sheet of paper. The seed so collected had some dried portion of the capsules which were removed by passing the seed through a fine sieve.

6. **Preparation of Seedling Nursery:**—A suitable piece of land was selected for raising the nursery. After thorough weeding and hoeing, farmyard manure was added to the soil at the rate of 800 kilos per acre. Later on, seed beds and lines for sowing seed were marked out on 2-foot wide beds. Adequate drainage of the beds was ensured with the help of trenches in between the beds.

7. **Sowing Operations:**—*Populus ciliata* seed has very low viability and loses it within a week after collection. The seed was, therefore, sown immediately after collection. Since the seed is very small, to facilitate an even and uniform spreading it



Fig.—1. 6 month old transplants of *Populus ciliata*.



Fig. 2 One year old stock of *p. ciliata*. Plants from the same seed source show lot of variation.

was mixed with dry sand in the ratio of 1:3. The seed was covered with a very thin layer of a mixture of leaf mould and ordinary nursery soil. Hand watering was done by very fine spray and the sown area covered with mats which were spread $1\frac{1}{2}$ ft. above the seed beds on wire ropes fixed on pegs. These mats also allowed about 25 percent light to reach the seed bed.

Watering was given twice a day with a fine spray till complete germination which took 7-10 days. Later, it was reduced to one irrigation a day throughout the growing season *i. e.*, summer season. Shading of nursery beds was gradually discontinued after germination of seed.

8. **Weeding:**—Hoeing around the seedlings with pointed ends of sickles was found very useful. This helped removal of the weeds which appeared quite profusely in the seed beds.

9. **Pricking:**—In 1969, that is in second year, pricking of the seedlings was done to remove congestion in the seed beds. Pricking was carried out in March-April. The selected seedlings were planted at a spacing of 1' x 6". Transplanting was followed by irrigation. Hoeing and weeding was done as and when necessary. The seedlings attained an average height of 4 ft. by the month of July and showed exceptionally fast rate of growth and vigour. However, attack of *Cuscuta reflexa* was noticed on some seedlings which were taken out with roots and destroyed in order to prevent the spreading of attack on rest of the stock.

10. **Selection Method:**—In the beginning of third year, *i. e.* 1970, when the transplanted seedlings were about one year old, the selection work was started. Again this had to be done in the dormant season in the months of March and early April.

The selection was made on the basis of rate of growth, habit of the seedlings and their resistance to fungal and insect diseases in a quantitative manner. Keeping these criteria in view, 132 seedlings were selected from a total of 3300. Each sapling so chosen was given progressive numbers. The tree No. 11/67 gave the highest number of good stock. Details are given below:—

Serial No.	Tree No.	Number selected
1.	11/67	1—6
2.	2/68	7—12
	11/67	13—71
3.	1/68	72—85
4.	4/68	86—105
5.	3/68	106—111
	2/68	112—117
6.	3/67	118—132

The above selection was made on 2nd April, 1970. The numbered seedlings were lifted from the beds and transplanted in the nursery while rest of the seedlings were rejected.

11. **Nursery from the selected stock:**—A new nursery with root-shoot cuttings and stem cuttings from the selected stock was established in the first week of April, 1970. 9-inch long root-shoot cuttings were planted 3 ft. apart in lines. At a distance of about 1½ ft. from these lines, three stem cuttings, four inches apart, were planted in such a way that each rooted cutting was facing its own three stem cuttings.

12. **Second Selection:**—The second selection of *Populus ciliata* was again done in a quantitative manner. For evaluation, habit, form of stem, rooting ability, disease resistance, rate of growth and reaction to environments were kept in view. Each plant was graded for these criteria collectively according to the internationally recognised procedure. Out of the first selection of 132, only 29 could stand this rigorous test.

13. **Fresh Selection:**—First selection of seedlings from 1969 sowing was carried out in 1971. The seed was collected from four trees. Number of plants selected from each seed source is given below:—

Tree No.	Plants selected
1. × (1) 69	1—7
2. × (2) 69	8—22
3. × (3) 69	23—28
4. × (4) 69	29—57

57 plants were selected out of total of a 2,550. The same criteria for selection were kept in view and planting was done in the same manner as given in paragraph 11 above.

14. **Interim Results:** After a few years' selection trials, it will be possible to select suitable clones of *Populus ciliata* for large scale plantation programme. Temporary clone numbers given now will ultimately become permanent. For instance from selection of 1968 sowings only 5 clones out of 29 may ultimately give the best results. These will thus be numbered as 1/70, 8/70, 20/70, and 28/70. Similarly, after final selection from 1969 sowings, 3 clones may give outstanding results. These will be labelled as 7/71, 21/71 or 40/71. While 1, 8, 20, 25, 28, 7, 21 and 40 will be clone numbers 70 and 71 indicate the years in which first selection was made.

The results so far are highly indicative. There is a clear evidence that if the suggested methods are adopted, *Populus ciliata* trees with exquisite qualities like fast rate of growth, cylindrical stem form, disease resistance, etc. can be developed and propagated. This will partly fulfil the much needed softwood requirements of the country.