

STATUS OF POPLAR IN UTTAR PRADESH*

B.S. BURFAL¹, K.L. MEENA², R.C. SHARMA³ AND C.B. CHHIMWAL⁴

Introduction

Throughout the world more than thirty species of Poplar have been recorded (Kedarnath, 1979; Anon., 1980). The genus is found interspersed throughout the forests in the Northern hemisphere. The approximate latitudinal range is 30° N to 45° N. Exceptional occurrences are reported beyond this range too. The area of natural forests is predominantly shared between Canada and United States of America (USA) (Dalal and Trigotra, 1983).

In India only six species of Poplar occur naturally in cold Himalayan region of India. They are known to occur in subtropical broadleaved hill forests, wet temperate, moist temperate deciduous forests and dry temperate forests. Almost all the North Indian States having Himalayan ranges possess Poplar. These are: *Populus ciliata*, *P. gamblei*, *P. balsamifera*, *P. euphratica*, *P. jaquemontiana* and *P. laurifolia* (Jha, 1999). Above mentioned species on account of their limited and scattered distribution could not get commercial importance (Mathur and Sharma, 1983). However, *P. ciliata*

and *P. gamblei* being comparatively faster growing and larger occurrence species could gain some importance. Other species are very slow growing.

Apart from the natural poplars there are other species of Poplar found in India which were introduced either long back or recently for different purposes. The earlier introductions were for ornamental purposes mainly in Kashmir valley while recent introductions were to meet the growing timber demand in the country. These introduced (exotic) species are *P. alba* (JK), *P. deltoides* (JK, UP, HR, AP, MH, SK), *P. nigra* (JK), *P. robusta* (UP, HP), *P. tremula* (JK), *P. euramericana* (JK, UP, HP) and *P. yunnanensis* (UP, HP) (Dalal and Trigotra, 1983; Fotedar, 1973; Lohani, 1976; Seth, 1979).

In Uttar Pradesh (UP) there is only one representative of indigenous genus *Populus*, i.e. *Populus ciliata*. However, a number of exotic species and their clones were tried in UP since almost 50 years ago and after a decade of rigorous trials both in hills and plains (mainly Tarai region) only *P. yunnanensis* and *P. deltoides* were found

* Includes Uttaranchal also

1. Conservator of Forests (Seed & Research), Lucknow (U.P.).

2. Silviculturist Sal Region, Haldwani (Uttaranchal).

3. Assistant Silviculturist, Sal Region, Haldwani (Uttaranchal).

4. Range Officer (Research), Haldwani (Uttaranchal).

most promising species respectively (Seth, 1969; Lohani, 1976; Chaturvedi and Rawat, 1984).

In UP, breeding of Poplar was also started successfully from 1982. By breeding, a number of new local clones of Poplar have been developed out of which 13 clones have been found promising in hills and 30 clones in Tarai region. These new clones have two to three times more productivity than the exotic clones.

In this paper, while giving an account of the status of Poplar in U.P., the distribution of natural Poplar and introduction of exotic Poplar both in hills and plains have been given. The details of research work carried out concerning Poplar introduction and mass scale plantation of Poplar in forest area and in agroforestry by the farmers have been also given. Development of new local clones by breeding has also been given with their comparative productivity with the promising exotic clones.

Indigenous Poplars in Uttar Pradesh

Out of the six Poplar species naturally occurring in India only one species known as *P. ciliata* occurs in UP between the elevation of 2000 to 3000 m usually in moist locations in the sub-tropical and temperate regions of Himalaya. In the Western Himalaya it is a common and conspicuous tree in mixed broadleaved Oak and coniferous forest. It is capable of growing on dry hill sides, where it sends up numerous suckers. In such places it does not attain large dimensions. In coniferous forests it is most frequently found with Deodar, Spruce and Silver fir, *P. ciliata* reaches its large dimensions in ravines with mixed broad leaved forests, associated

with *Aesculus indica*, *Prunus ceresoides*, *Cedrella ferrata*, *Ulnus wallichiana*, Maple and Oaks. In some places it is found in pure patches.

Populus ciliata is a light demander. It springs up chiefly on open ground and stands little shade even in youth. It pollard vigorously, but its coppicing power is poor except in case of young trees. It has an extraordinary capacity for producing root suckers. On hill sides where the soil is exposed or on rocky ground, suckers often appear in great profusion even from roots of large size. The tree stands drought well.

Poplars are known for their best growth, easy vegetative propagation and production of higher yields on short rotation of 8-10 years but *Populus ciliata* an indigenous one which has a widest distribution, is slow growing species in UP hills. Moreover, the demand of irrigation in early stages and requirement of deep fertile soil, limits the scope of *P. ciliata* cultivation in hills.

Introduction of Exotic Poplars in U.P.

The rapid growth rate and multifarious uses and ability to grow in association with farm crop of exotic poplars, encouraged the UP Forest Department almost 50 years ago to undertake trials for selecting Poplar planting material and devise techniques for their introduction in Uttar Pradesh. The progress made in introduction of exotic poplars in hills, Bhabar (foot hills) and plains (Tarai region) of UP has been described separately.

(a) *Trials in Hills* : The first attempt of introduction of exotic poplars in the hill region of UP was made in 1950 with the cuttings of *P. serotina*, *P. gelrica*, *P. robusta*

and *P. berolinensis* obtained from USA and UK. Except a few surviving specimens of *P. robusta* and *P. gelrica* the others failed completely. Twenty two clones were further imported from UK in 1959 out of which only *P. yunnanensis* showed promising growth. During 1965 several clones of Poplar were obtained from Europe and introduced for trials at various locations on the hills. However, the promising species found for hills are *P. yunnanensis* and *P. deltoides* (G3 and G48 clones).

In hills, trials on methods of planting of poplars were made at various places. Direct cuttings, barbatelles, polythene bag plants, branch cuttings and naked root entire transplants were tried. Trials were also made to find out the best time of planting. The results indicated that one year old Entire Trans-Plants (ETPs) with naked roots planted during winter months of January and February, give the best results. As irrigation facilities are limited, the plants do well only in deep soils with planting of moisture but the plants do not stand any water logging. Poplars do better on Northern rather than the hotter Southern aspect. Presently Poplar plantations in hills are limited to few sites, it has not been accepted for large scale plantations either by Forest Department or by the farmers.

(b) *Trials in Bhabar region* : The foot hills of Uttar Pradesh which are with low water table are known as Bhabar region. Trials of seven clones were taken up in 1963 by planting cutting of these clones along a water channel in Haldwani. I-488, *P. heidenis*, *P. eugenei* and *P. robusta* showed some promising results in early stage but finally all the seven clones tried, failed completely. No further trials are being done

in this tract mainly due to the poor moisture regime of the tract.

(c) *Trials in Tarai Belt* : Tarai belt is characterised by deep fertile soil and high water table. Maximum number of clones were tried in this tract. In Tarai area Poplar was introduced on trial in 1960. From 1960 to 1970 about 300 clones of 15 species of Poplar were put under trial. However, only one clone of *P. deltoides* (clone-IC) was found promising. In 1970-1971 more clones were imported for trial. This time three clones of *P. deltoides* viz G3 and G48 (both from Australia) and D121 (from USA) were found successful which were later planted on large scale by UP Forest Department. Uttar Pradesh Forest Department also started trial of Poplar with agriculture crop and seeing the encouraging results, in 1974, 200 ETPs were first time planted in a farm at Bajpur. From 1979-1980, UP Forest Department also started leasing out forest land for agriculture with Poplar plantations (i.e. in agroforestry). Since then about 250 to 300 ha area is annually planted with Poplar. At present there is about 3500 ha net area under Poplar plantations, however, the total planted area may be about 10,000 ha.

In the field of Farm/Agro-forestry, Poplar has been adopted by most of the farmers in Western UP. They are planting more than 10 million Poplar plants every year.

During 1982 some fresh seeds of *P. deltoides* were received from USA. Those clones were put under trial, out of which now only two clones EL-89 and EL-74 are under observation in the field.

In 1986, new clones received from USA *P. deltoides* - 121 clones, *P. trichocarpa* - 27

clones and *P. deltoides*, *P. trichocarpa* - 20 clones. The clones which are showing promising for Tarai region near Lalkuan are: ST-148, ST-66, ST-72, 113324, S7C20, S7C8, 82-42-5, 3324, 3167, 82-35-4 and 82-33-3.

Developing local clones

During the field trial of various clones a clear indication was given that the clones

lost vigour and resistance to pest and disease by successive multiplications and the clones once found good performed poorly by 10th generation of the clonal cuttings. The performance at that stage depended entirely on availability of new clones from USA and Australia. This was not a happy situation and it was realized that without a proper breeding programme of producing new clones, the large scale plantation programme based on Poplar may not remain

Table 1

Series promising Poplar clones of Tarai, U.P.

Year and name of selection	Clone
1982 Series	L-12/82, L-13/82, L-29/82, L-30/82, L-34/82, L-49/82, L-52/82, EL-74/82, EL-89/82
1984 Series	L-51/84, L-62/84, L-71/84, L-75/84, L-165/84, L-181/84, L-188/84, L-200/84, L-247/84, L-290/84, L-293/84
1985 Series	L-7/85, L-13/85, L-38/85, L-52/85, L-68/85, L-141/85, L-179/85, L-185/85, L-188/85, L-208/85
1986 Series	L-13/86, L-49/86, L-70/86, L-106/86, L-113/86, L-124/86, L-134/86, L-154/86, L-164/86, L-285/86
1987 Series	L-1/87, L-2/87, L-5/87, L-20/87, L-39/87, L-54/87, L-101/87, L-127/87, L-158/87, L-253/87
1988 Series	L-20/88, L-24/88, L-35/88, L-39/88, L-40/88, L-44/88, L-47/88, L-50/88, L-52/88, L-57/88, L-80/88, L-86/88, L-92/88, L-95/88, L-148/88, L-159/88, L-164/88, L-168/88, L-170/88, L-177/88
1989 Series	L-48/89, L-136/89, L-146/89, L-154/89, L-156/89, L-163/89, L-182/89, L-183/89, L-205/89, L-232/89
1990 Series	L-244/90, L-246/90, L-258/90, L-282/90, L-287/90
1991 Series	L-147/91, L-149/91, L-151/91, L-254/91, L-545/91.
1992 Series	L-13/92, L-14/92, L-16/92, L-17/92, L-18/92, L-19/92, L-29/92, L-34/92

Source : Anon. (1997)

viable. Old plantations were then screened to see if some clones produce flowers. In 1982, some trees of *P. deltoides* (clone G48) produced female flowers in Dhimari block of Central Tarai Forest Division. The seeds were sown immediately after the Capsula opening which germinated and produced seedlings. The female flowers were then open pollinated. The most likely male parent clone is G3 surrounding the plantation of clone G48 (female). About 600 seedlings obtained from open pollinated seeds of G48 were raised and planted in Lalkuan Forest Research Nursery. After screening for three years, sixty selected clones were planted in plot of nine ETPs in three replications. These were continuously screened for rate of growth, disease tolerance and the shape of the stem. After a trial of about 8 years, following seven clones have been identified as performing better than or equal to clone G3. As the trials were carried out at Lalkuan the series was named as 'L' series clones : LA-12/82, LA-29/82, LA-34/82, LA-39/82, LA-49/82 and LA-52/82.

Rest 53 clones did not perform well and were rejected in course of trials. There was no flowering in 1983. In 1984, open pollinated seeds from female clones G48 and D121 were again collected and 16,000 seedlings were planted in the nursery. After first screening, 113 clones were identified and planted in the field. After two years 25 clones were selected. These were planted in the field for trial and further study. The clones of 1984 selection that appeared promising are : LC-24/84, LC-39/84, LC-49/84, LC-51/84, LC-62/84, LC-71/84, LC-75/84, LC-142/84, LC-156/84, LC-162/84, LC-165/84, LC-181/84, LC-182/84, LC-188/84, LC-200/84, LC-247/84, LC-290/84 and LC-293/84.

Controlled cross pollination of *Populus* clones were also started from 1988 and a number of promising clones have been developed by controlled breeding as well.

More than 80 promising local clones have been developed by the Silviculturist,

Table 2

Productivity of some 'L' Poplar clones and other clones based on trials in Tarai Central Forest Division
(Year of Plantation - 1989,
Year of Measurement - 1997,
Spacing - 3 x 5 m)

Clone	MAI ha (OB) (m ³)	Top 10 clones
LA-34/82	36.56	IV
LA-49/82	33.74	
LC-51/84	35.74	V
LC-62/84	31.48	
LC-74/84	33.84	X
LC-75/84	30.54	
LC-116/84	35.53	VII
LC-169/84	39.84	I
LC-188/84	32.09	
LC-247/84	34.04	VIII
LD-13/85	33.96	IX
LD-17/85	35.70	VI
LD-51/85	36.67	III
LD-179/85	32.32	
LD-188/85	39.19	II
82-35-4	33.86	
11-33-24	26.72	
S7C8	32.47	
G3	21.74	
G48	23.85	
G121	<10.00	

Sal Region in about 15 years of breeding and selection (both by open and controlled pollination). They are recorded in Table 1. [Their details with initial performance can be had from Annual Research Report of the Silviculturist, Sal Region, U.P. (Anon., 1997)].

The productivity of some promising clones of 'L' series with other clones are given in Table 2.

Present Research Activities in Poplar

- (1) Cross breeding of Poplar both by open and closed pollination continues (financed by UPFC).
- (2) Field trial of new developed clones for survival, productivity, suitability (for varying locality/region), wood quality

and disease resistance continues (financed by UPFC).

- (3) Extension programme for new clones of Poplar (financed by UPFC).
- (4) Multilocal field trial of promising clones of *P. deltoides* in plains area of UP (financed by ICFRE and in technical collaboration with FRI, Dehra Dun).
- (5) Multilocal field trial of promising clones of *P. deltoides* in Tarai (Sal) region of UP (financed by ICFRE and in technical collaboration with FRI, Dehra Dun).
- (6) Tree improvement and multilocal trial of selected clones of Poplar in Hill Region (financed under UP Forestry Project).

SUMMARY

In Uttar Pradesh (UP) there is only one representative of indigenous genus *Populus*, i.e. *Populus ciliata*. However, a number of exotic species and their clones were tried in UP since almost 50 years ago and after a decade of rigorous trials both in hills and plains (mainly Tarai region) only *P. yunnanensis* and *P. deltoides* were found most promising species respectively. In UP breeding of Poplar was also started successfully from 1982. By breeding, a number of new clones of Poplar have been developed and more than 30 clones have been found promising which have 25% to 70% more productivity than the exotic clones. The work on breeding and selection of new clones continues.

उत्तर प्रदेश में पोपलर की स्थिति

बी०एस० ब्रुफल, के०एल० मीना, आर०सी० शर्मा व सी०बी० छिमवाल

सारांश

उत्तर प्रदेश में पोपलर की केवल एक स्थानीय प्रजाति जो पोपलर सीलिएटा के नाम से जाना जाता है पाया जाता है लेकिन पोपलर के अनेक विदेशी प्रजातियां तथा उसके क्लोन पर पिछले 50 वर्षों से उत्तर प्रदेश में अनुसंधान किया जा रहा है। लगभग एक दसक तक के गहन परीक्षण के उपरान्त पर्वतीय क्षेत्रों के लिए *पोपुरस यूनेनानसिस* तथा मैदानी (तराई) क्षेत्र के लिए *पोपुलस डेल्टायडिस* उपयुक्त पाये गये। उत्तर प्रदेश में वर्ष 1982 से पोपलर ब्रीडिंग का कार्य भी प्रारम्भ किया गया तथा ब्रीडिंग से कई नई क्लोन विकसित करने में सफलता मिली जिनमे से परीक्षण करने के उपरान्त 30 क्लोन उपयुक्त पाये गये जिनकी उत्पादकता विदेशी क्लोन की तुलना में 25 प्रतिशत से 70 प्रतिशत तक अधिक पायी गयी। पोपलर के ब्रीडिंग एवं उपयुक्त नये क्लोन के चयन का कार्य अभी भी निरन्तरता से चल रहा है।

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