



Future of Poplars in India

Jagdish Kishwan¹ and Dinesh Kumar²

¹Inspector General of Forests, Ministry of Environment & Forests,
Govt. of India, INDIA

²Scientist D, Silviculture Division, Forest Research Institute,
Dehradun, INDIA



Species of Poplars in India

- Indigenous species:

- *P. ciliata*
- *P. alba*
- *P. euphratica*
- *P. gamblei*
- *P. jacquemontii* var. *glauca*
- *P. rotundifolia*

- Exotic species:

- *P. deltoides*
- *P. nigra*
- *P. x euramericana* (*P. deltoides* x *P. nigra*), etc.



Indigenous Species

Occur as scattered trees in depressions and along water courses in temperate area

Total extent: Not more than 300 ha equivalent area

- *P. ciliata:*

- The most extensive indigenous poplar
- Distributed throughout Himalayas at 1300-3000 m altitude
- Uses: Packing cases, match sticks, fuel, fodder; also suitable for plywood and hardboards



Indigenous Species (contd.)

- *P. alba:*

- Occurs in Western Himalayas (i.e. parts of Lahaul and Kinnaur) at 2500 - 3300 m altitude
- Severely lopped for fuel, small timber and fodder

- *P. euphratica:*

- Occurs in cold desert area in Western Himalayas (i.e. parts of Laddakh and Spiti) at 2500 - 3300 m altitude
- Severely lopped for fuel, small timber and fodder



Indigenous Species (contd.)

- *P. gamblei:*

- Southernmost species of indigenous poplar in India (27°-30°N latitude)
- Occurs in Eastern Himalaya (Arunachal Pradesh) at 600 –1100 m altitude
- Used for packing cases and match industries

- *P. jacquemontii var. glauca:*

- Distributed in Eastern Himalayas (Sikkim) at 2500 – 2900 m altitude
- Bears bi-sexual flowers



Indigenous Species (contd.)

- *P. rotundifolia:*
 - Occurs in Eastern Himalayas (close to Bhutan border) at 2300 – 3050 m altitude



Indigenous Poplars

Natural Regeneration/Plantation

- **Natural regeneration:**

- *P. euphratica* and *P. alba*: almost absent due to severe lopping for fuel, small timber and fodder
- Other species: satisfactory

- **Plantation:**

- *P. ciliata* and *P. gamblei* grow fast; others are relatively slow-growers
- *P. ciliata*: Planted by State Forest Departments around villages
- *P. gamblei*: Not much planted due to poor rooting of cuttings



Exotic Species of Poplar in Plantation Forestry in India

- Major plantation species: *P. deltoides*
- Other plantation species *P. nigra* and *P. x euramericana*

Populus deltoides:

- **Planted on a commercial scale in agroforestry**
- **Area:** 60,000 ha equivalent (at notional density of 500 trees/ha)
- **Trees standing:** 30 million
- **Current planting/replanting rate:** 10 million plants/year i.e. 20,000 ha/year (Chandra, 2001)
- **Major planting region:** Plains of North-West India (Punjab, Haryana and Western Uttar Pradesh)



Cultivation of Poplar (*P. deltoides*)

- **Planting sites:** Irrigated agricultural field of farmers
- **Planting method:** Planted with agricultural crops, rather than solo plantation
- **Spacing:** 5m x 4m or 4m x 4m as block plantation
3 m to 4m in linear rows as boundary plantation
- **Crops grown:** Grain crops (except rice), vegetables, pulses, medicinal plants, fruit trees
- **Rotation adopted:** 6-8 years
- **MAI:** 20-25 m³/ha/yr (yield upto 49m³ has been recorded in few plantations)
- **Yield at harvest:** 150-200 m³/ha in block plantation
12-20 m³/ha in boundary plantation



Promotion of Poplar Cultivation and Productivity



P. deltooides

- **Indian Council of Forestry Research and Education, Dehradun**
 - **A. Increasing area under poplar cultivation:**
 - **Introduction trials of poplar have been laid out outside the traditional poplar cultivation zone:** Eastern, Central and Western Indian States viz. Eastern Uttar Pradesh, Bihar, Orissa, West Bengal, Gujarat, Maharashtra, Chhattisgarh, etc. (Trials to conclude in 2006)
 - **Interspecific hybridisation:** *P. deltooides* x *P. euphratica* hybrid has been produced to combine high stress of *P. euphratica* and rapid growth of *P. deltooides*. This hybrid might suit sites too harsh for *P. deltooides*

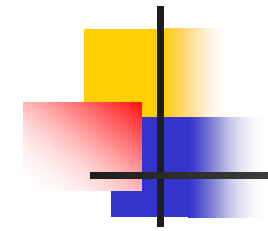


- B. Genetic improvement for development of higher yielding clones:

90% of agroforestry plantations are based on only 4 clones viz. G48, D121, G3 and S7C15

To widen the genetic base and improve productivity, the following steps are underway:

- Multilocation trials of best 60 clones out of over 400 presently available in India (Trials to conclude in 2006)
- Hybridisation among best 40 clones
- Introduction of fresh germplasm (seeds) from natural stands in South-Eastern part of the USA (collaboration: Mississippi State University, USA)
 - Field trials of above efforts are in different stages



- C. Developed approach for multi-step selection and concurrent multiplication of superior clones (for superior stem volume)*
 - This approach combines speed of selection at age 2 years and accuracy of 6 years age
 - This is the first time that an approach of concurrent selection and multiplication has been formulated and proved in any tree species in the world
 - **This will facilitate early deployment of new clones**

***Reference (proved in):**

Kumar D. and Singh N.B. 2001. Age-age correlation for early selection of clones of *Populus* in India. *Silvae Genetica*. 50 (3-4): 103-108



■ Other organisations

- WIMCO Seedlings Ltd. has produced 6 outstanding clones and got them registered with International Poplar Commission
- Uttaranchal Forest Department has produced about 20 clones which grow faster than the traditionally planted clones such as G48, D121, etc.



Other Species of Poplar

- Provenance and progeny trials of *P. ciliata* are underway
- Candidate plus trees of *P. ciliata*, *P. alba* and *P. euphratica* have been selected
- Hybridisation is underway for
 - *P. ciliata* x *P. ciliata* (intraspecific breeding)
 - *P. ciliata* x *P. maximowiczii* (inter-specific breeding)
 - *P. ciliata* x *P. yunnanensis* (inter-specific breeding)
 - *P. ciliata* x *P. deltoides* (inter-specific breeding)

Production and Consumption of Poplar Wood in India

- Poplar wood production : 1.125 million m³/yr
- Consumer industries of poplar wood:
 - Plywood and veneer (80% approx.)
 - Matchwood (20% approx.)
 - Paper

In plywood, poplar is used only as core and cross band veneer

Use as fuel is restricted to waste wood

Unlike Europe and North America, coppicing of poplar for biomass production (for paper and energy industries) is not done in India.



Consumption Pattern: A Case Study

- **Place:** Yamunanagar (Haryana)
- **What is important about it:**
The biggest consumer of poplar wood in India
- **Industries:**
 - 300 plywood units
 - 1 paper industry (Ballarpur Industry Ltd., Yamunanagar)
- **Demand for poplar:** 4299 m³/day
- **Supply of poplar :** 1901 m³/day
- **Deficit in poplar supply:** 2398 m³/day



Ballarpur Industry Ltd., Yamunanagar

- **Wood consumption potential:** 812.5 m³/day
- **Wood consumption at time of survey:** 701.25 to 770 m³/day
- Sources of raw material:
 - Poplar logs : 26.5 m³/day
 - Poplar waste from plywood industry : 315.8 m³/day
 - Eucalyptus : 219.8 m³/day
 - Bamboos : 132.3 m³/day
 - Hardwood scrap : 60.0 m³/day

Thus Ballarpur Industry Ltd., Yamunanagar meets 45% of its wood demand from poplar

But, out of the total wood supply of Yamunanagar market, only 18% goes into paper



Future of Poplar Cultivation

- **In the next 10 years:**
 - Area under poplar : 200,000 ha
 - In traditional zone : 150,000 ha
 - Outside traditional zone: 50,000 ha
- **In the next 15 years:**
 - Production of poplar wood: >4.00 million m³/yr



Future Projections

<u>Year</u>	<u>Area (ha)</u>	<u>Plantation (mM³)</u>
2000	60,000	1.13
2010	2,00,000	3.75
2015	2,50,000	4.70



Policy and Institutional Issues

- Although no restriction on cultivation and felling of exotic poplars, need to review and relax felling, transport and trade rules and regulations
- Need for regulatory mechanism for:
 - Quality control of planting stock — certification/registration
 - Stabilizing of market price — support price and market information
- Promoting poplar cultivation outside conventional zone
- Incentive for setting up of poplar-based industries in new areas
- Credit and insurance facility
- Need for conservation of indigenous poplars