

Taxonomical identification on the present status of Poplar clones in India

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Poplars have been successfully incorporated in agroforestry plantation. Wood of poplar plays an important role in the national economy of the country. As clonal material is bound to mix up while exchanging the stock during plantation and distribution by the planters and non-technical hands, there is loss of identity and subsequently resulting in to poor yield of wood for any specific purpose. Due to poor yield of wood, the national economy is also affected. To solve this problem studies were carried out based on morphological characters of leaf phyllotaxy, leaf stalk, petiole, leaf base, kinds of leaf, leaf texture and number, shape and colour of glands on the taxonomical features of useful clones of *P. deltoides* viz. WSL-56 [C-5], WSL-16 [C-8], ST-71 [C-18], ST-153 [C-36], WSL-12 [C-38], 112107 [C-92], WSL-9 [C-135], G-48 [C-194], D121 [C-195], and S7C15 [C-197]. Artificial key for identification of taxa has been developed for removal of confusion, duplication or materials with superfluous identity. Difficult botanical terms have been avoided in the key. The leaf characters in the key are intended to apply to mature foliage on the lower third of long shoots of medium vigour taken in the second half of the summer.

Key words : Agroforestry, Artificial key, Clones, Foliage, Poplar.

INTRODUCTION

Family Salicaceae, embracing poplars (*Populus*) and willows (*Salix*). Genus *Populus* Linn. includes 35 species in five sections. These are White poplars (Leuce), Black poplar (Aigeiros), Balsam poplars (Tecamahaca), Leucoides and Turanga. According to Jobling (1963) the genus *Populus* contains 32 species. They occur throughout the Northern Hemisphere in cold and temperature zones between the sub-arctic and sub-tropical regions. According to Edlin (1963) the Latin *Populus* can be traced back to the Greek verb *papaillō* meaning to 'Shake and tremble'. The Onondaga Indian name for Aspen (*Populus* and Cottonwood) is Nut-ki-e, meaning noisy leaf. The word poplar is one of the few trees name to be shared, in different forms, by several modern European languages. It is Pipals (corruption of *Populus*), Kapasi, Pahari papal in colloquial Indian language.

In India, Poplars (*Populus*) have a restricted zone of distribution due to their specific photoperiodic requirements. It has shown good performance in the areas lying north of approximately 28 degree N latitude in the states of Uttar Pradesh, Jammu and Kashmir, Punjab, Haryana and Himachal Pradesh and parts of Arunachal Pradesh. In a very limited way it has been planted in parts of Maharashtra as well. Poplars are dioecious and inter crossing among various types is fairly common. The feature of hybridization between different species and varieties has resulted in the development of a large

numbers of clones (FAO, 1979).

Realizing the importance of poplars, a National Poplar Commission was created in France in 1942 and subsequently an International Poplar Commission was set under aegis of the FAO during 1947. India become member of the International Poplar Commission during 1965 and constituted a National Poplar Commission with the basic objective of cultivating poplars extensively to meet the requirements of timber, fuel wood, material for light boxes suitable for fruit baskets and poplar straw etc. Poplar wood is widely used in plywood and match splints. Market has been developed for Poplar in Haryana, Punjab and Uttar Pradesh.

MATERIALS AND METHODS

The study was undertaken on leaf characters of one year old of ten exotic clones of *Populus deltoides* viz. WSL-56 [C-5], WSL-16 [C-8], ST-71 [C-18], ST-153 [C-36], WSL-12 [C-38], 112107 [C-92], WSL-9 [C-135], G-48 [C-194], D121 [C-195], and S7C15 [C-197] grown at Forest Research Institute, Dehradun, Uttarakhand during 1996-1998.

At the time of introduction, transplantation, and distribution of the clonal materials, the basic identity of the propagating and harvested germplasm is by and lost as a result of mixing up by the non-technical hands. Therefore, authenticity of the plant for desired growth and yield becomes doubtful. Sometimes the losses are heavy when the estimated yield is not obtained, just

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for want of authentic parameters of morphological features (Alpana and Biswas, Sas, 1999).

– Midrib yellow; Margin coarsely serrate.....WSL-12 [C-38].

RESULTS AND DISCUSSION

- Contribution on the taxonomic status of ten exotic clones of *P. deltoides* Marsh occurring and introduced in India for the authentic identification of material has been made.
- Artificial key for identification of taxa based on morphological characters of useful clones has been developed.
- Systematic account of Poplar clones has been made to help in the correct identity of mixing clones of poplar growing in India.

Artificial key for the identification of clones of Populus deltoides based on one year old leaf characters:

1. Leaf shape ovate

1.1. Only ovate

3. Base cordate; Apex acuminate; Midrib green; Margin coarsely serrate.....D121 [C-195], S7C15 [C-197].

3. Base truncate; Apex acuminate; Midrib red; Margin coarsely serrate.....G-48 [C-194].

1.2. Broadly and narrowly ovate

4. Broadly ovate

5. Base cordate; apex acuminate; Midrib yellow; Margin coarsely serrate.....WSL-56 [C-5].

5. Base sub cordate; apex acuminate; Midrib yellow; Margin coarsely serrate.....ST-71 [C-18].

1.3. Narrowly ovate; Base cordate; apex acuminate; Midrib yellow; Margin coarsely serrate.....112107 [C-92].

2. Leaf shape deltoid

2.6. Base cordate; Apex acuminate

– Midrib green; Margin coarsely serrate.....WSL-16 [C-8].

7. Midrib yellow; Margin serrate.....WSL-9 [C-135].

2.7. Base truncate; Apex acuminate

– Midrib red; Margin serrate.....ST-153 [C-36].

Systematic account of leaves of clones of P. deltoides: WSL-56 [C-5]:

Ramal; Alternate; Simple, broadly ovate with cordate base; Margin coarsely serrate; Venation reticulate, midrib yellow, apex acuminate short with obtuse tip, surface glabrous, texture sub coriaceous, green; Petiolate, petiole yellowish green, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, green.

WSL-16 [C-8]:

Ramal; Alternate; Simple, deltoid-broadly ovate with cordate base; Margin coarsely serrate; Venation reticulate, midrib yellow, apex acuminate short, surface glabrous, texture sub coriaceous, green; Petiolate, petiole yellowish green, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, green.

ST-71 [C-18]:

Ramal; Alternate; Simple, broadly ovate or deltoid with cordate base; Margin coarsely serrate; Venation reticulate, midrib yellow, apex acuminate, surface glabrous, texture sub coriaceous, green; Petiolate, petiole reddish yellow, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, reddish in color.

ST-153 [C-36]:

Ramal; Alternate; Simple, deltoid-broadly ovate with truncate-sub cordate base, margin serrate; Venation reticulate, midrib reddish in color, apex acuminate, surface glabrous, texture sub coriaceous, green; Petiolate, petiole reddish yellow, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, reddish in color.

WSL-56 [C-38]:

Ramal; Alternate; Simple, deltoid with truncate-cordate base; Margin coarsely serrate; Venation reticulate, midrib yellow, apex acuminate short, surface glabrous, texture sub coriaceous, green; Petiolate, petiole yellowish green, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, green.

112107 [C-92]:

Ramal; Alternate; Simple, narrowly ovate with cordate

base; Margin coarsely serrate; Venation reticulate, midrib reddish in color, apex acuminate short, surface glabrous, texture sub coriaceous, green; Petiolate, petiole reddish yellow, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, reddish yellow.

WSL-9 [C-135]:

Ramal; Alternate; Simple, deltoid with cordate base; Margin serrate; Venation reticulate, midrib yellow, apex acuminate, surface glabrous, texture sub coriaceous, green; Petiolate, petiole yellow, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, greenish yellow.

G-8 [C-194]:

Ramal; Alternate; Simple, ovate with truncate-cordate base; Margin coarsely serrate; Venation reticulate, midrib reddish in color, apex acuminate long, surface glabrous, texture sub coriaceous, green; Petiolate, petiole reddish yellow, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, reddish yellow.

D121 [C-38]:

Ramal; Alternate; Simple, ovate with cordate base; Margin coarsely serrate; Venation reticulate, midrib green, apex acuminate long, surface glabrous, texture sub coriaceous, green; Petiolate, petiole yellowish green, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, yellow.

S7C15 [C-197]:

Ramal; Alternate; Simple, ovate with cordate base; Margin coarsely serrate; Venation reticulate, midrib green, apex acuminate long, surface glabrous, texture sub coriaceous, green; Petiolate, petiole reddish yellow, laterally flattened, solid; Cross section of upper portion elliptical and lower cordate, shows vascular bundles; Glands 2, elongate, reddish yellow.

Conclusion:

Studies reveals that taxonomically leaves of different clones conspicuously vary with regards to leaf arrangement, phyllotaxy, leaf shape, margin, venation, color of midrib, apex, texture, color, Petiolate and glands. The features indicate useful information for the identity of different clonal taxa being preferred for plantation in north India. Poplar being such an important economically important taxa has been understudied, especially in India. For further scope of investigation the botanical identification is must and taxonomic evaluation supports the conformity of the species for working into further aspects and integration of recent advances.

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