Taxonomical Study of *Populus euphratica* and *Populus nigra* Leaves

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**ABSTRACT**

This study was carried out to study the taxonomy (morphology and chemical analysis) leaves differences between *Populus euphratica* and *Populus nigra*. A total of 20 leave samples were collected from the Rashidiya area for both species. The phenotypic characters were studied included leaf shape, leaf blade length, leaf blade width, leaf apex, leaf base, petiole length, and chemical analysis through electrophorsis pattern leave protein.

The results indicated that there are major differences between *Populus euphratica* and *Populus nigra* in the phenotypic characteristics of the leaves and also in protein separation on gel electrophorsis according to the molecular weight of protein, so that electrophorsis pattern can be adopted as new technique for plant taxonomy especially for the similar morphological plant.

**INTRODUCTION**

*Populus* is a genus of deciduous trees in the the angiosperms [1], which belongs to Salicaceae family [2]. The *Populus* (Poplar, Haur, Qauwagh) species includes between 25 and 35 species in six sections (Abaso, Aigeiros, Leucoides, Populus, Tacamahaca, Turanga). These sections are considered to be natural depending on the taxonomic scheme. The species of the genus *Populus* is one of the most commercially exploited groups of forest trees [3]. Trees with monopodial branching, buds with several scales, often viscid and blasmike. Leaves usually broad, commonly deltoid-ovate or rhombic-ovate, petioles long, often strongly compressed laterally, stipules generally inconspicuous and caduceus [4]

*Populus euphratica*: commn name euphrates poplar, firat poplar, salt poplar. Its a light-demanding species ecologically characterized as a pioneer, that grows during the summertime in shelter belts along riversides. [5]
Populus euphratica Olivier is known to exist in saline and arid environments [6].

*Populus euphratica* (Gharab) is a poplar species growing in arid regions of central Asia [5], where its distribution remains nevertheless restricted to river-banks or to areas with an access to deep water tables[7].

*Populus nigra* L.: common name black poplar is a tree of ecological and economic interest. It is a medium-sized to large deciduous tree, reaching 20-30 m (rarely 40 m) tall, with a trunk up to 1.5 m diameter leaves are diamond-shaped to triangular, 5-8 cm long and 6-8 cm broad [8] green on both surfaces.

The aim of this study is to investigate the different traits in the leaves between the two species: *Populus euphratica* and *Populus nigra*.

**MATERIAL AND METHODS**

**Leaves samples:** leaves of *Populus euphratica* and *Populus nigra* were collected for this study during September to November 2009 from the Rashidiya area taken from the top and bottom of the tree. (The plants grow in similar environmental conditions).

We studied the phenotypic and chemical analysis for the leaves of both species for the purpose of comparison between them, we studied the form of leaves and compare them with the form leaves for [9]. Measurements are taken for each of the leaf blade length, leaf blade width, leaf apex, leaf base, petiole length according to [8], then the proteins were separated in a gel electrophoresis way.

**Gel electrophoresis:** gel containing 3 per cent (stacking gel), 8.0 per cent or 10 per cent acrylamide were prepared from a stock solution of 30 per cent by weight of acrylamide and 0.8 per cent by weight of N,N-bis-methyl acrylamide. The gels were polymerized chemically by the addition of 0.025 per cent by volume of tetramethyl ethylenediamine (TEMED) and ammonium persulphate. Ten cm gels were prepared in glass tubes of a total length of 15 cm and with an inside diameter of 6 mm. The stacking gels of 3 per cent acrylamide and a length of 1 cm containing 0.125 M Tris-HCL (PH 6.8) and 0.1 per cent SDS and were polymerized chemically in the same way as for the separating gel. The electrode buffer (PH 8.3) contained 0.025 M Tris and 0.192 M glycine and 0.1 per cent SDS. The samples (0.2-0.3 ml.) contained the final concentration (final sample buffer) 0.0625 M Tris-HCL (PH 6.8) 2 per cent SDS, 10 per cent glycerol, 5 per cent 2-mercaptoethanol and 0.001 per cent bromophenol blue as the dye. The proteins were completely dissociated by immersing the samples for 1.5 min in boiling water. Electrophores was carried out with a current of 3 mA per gel.
until the bromophenol blue marker reached the bottom of the gel (about 7 h). The protein were fixed in the gel with 50 per cent trichloroacetic acid (TCA) overnight, stained at 37 C with a 0.1 per cent Commassie brilliant blue solution made up freshly in 50 per cent TCA. The gels were diffusion-destained by repeated washing in 7 per cent acetic acid according to [10]

RESULTS AND DISCUSSION

The leaves of the *Populus euphratica* are polymorphic [11]. That is different leaves on the same tree or even the same branch may have strikingly different shapes. The form of leaves are narrowly lanceolate or linear-lanceolate and willow-like (fig. 1 a and b). This results were in the same description figured by [12], But in *Populus nigra* leaves are dark green, more or less uniformly rhomboid-ovate or deltoid (fig. 2) this similar to results showed by [8]. According to table-1 we see clear differences in the Leaf blade length which were from 6-14cm in *Populus euphratica* while in *Populus nigra* were from 5-10cm, leaf blade width were 0.5-1cm in *Populus euphratica* but in *Populus nigra* were 3-10cm, apex of the leaves in *Populus euphratica* were Acute or rounded while in *Populus nigra* Acute or acuminate, The base of the leaves in *Populus euphratica* were Cuneate or cordate but in *Populus nigra* were Cuneate or subtruncate, Petiole length in *Populus euphratica* were 2.5-5mm while in *Populus nigra* 5-6mm, Stipules length in *Populus euphratica* were 2.5-3mm but in *Populus nigra* were 5-7mm, Stipules width in *Populus euphratica* were 0.5-1mm while in *Populus nigra* were 3.5-5.5mm these values were in the same ranges Recorded by [4] [8].

Table -1 Phenotypic of *Populus euphratica* and *Populus nigra* analysis

<table>
<thead>
<tr>
<th>description</th>
<th><em>Populus euphratica</em></th>
<th><em>Populus nigra</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>form</td>
<td>narrowly- lanceolate or linear- lanceolate</td>
<td>rhombic-ovate or deltoid</td>
</tr>
<tr>
<td>Leaf blade length(cm)</td>
<td>10*</td>
<td>8*</td>
</tr>
<tr>
<td></td>
<td>3.30**</td>
<td>2.06**</td>
</tr>
<tr>
<td>leaf blade width(cm)</td>
<td>1*</td>
<td>7*</td>
</tr>
<tr>
<td></td>
<td>0.21**</td>
<td>2.91**</td>
</tr>
<tr>
<td>Apex</td>
<td>Acute or rounded</td>
<td>Acute or acuminate</td>
</tr>
<tr>
<td>base</td>
<td>Cuneate or cordate</td>
<td>Cuneate or subtruncate</td>
</tr>
<tr>
<td>Petiole length(cm)</td>
<td>4*</td>
<td>6*</td>
</tr>
<tr>
<td></td>
<td>1.04**</td>
<td>0.47**</td>
</tr>
<tr>
<td>Stipules length(mm)</td>
<td>3*</td>
<td>6*</td>
</tr>
<tr>
<td></td>
<td>0.24**</td>
<td>0.82**</td>
</tr>
<tr>
<td>Stipules width(mm)</td>
<td>1*</td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>0.20**</td>
<td>0.85**</td>
</tr>
</tbody>
</table>

●each value are the average of 20 samples
*Average
**SD
In the last few years botanists have shown interest in using molecular techniques to address questions about populus biology, such as identification and relationships among populus trees. The study of genetic variation in plant species was greatly facilitated by the development of protein markers over three decades ago. [13]

There are some bands in common between all species. The phylogenetic analysis based on protein pattern, Furthermore, protein markers should be used to show the genetic structures and variations within the populations of each species.

The results showed that the separation protein by gel electrophoresis one of different Protein packages for both species in number and intensity according to the molecular weight of protein so this method could be used in the taxonomy of plants this similar to results of [14]
Based on the result of this study it can be said that gel electrophoresis is an effective way for plant taxonomy especially for the similar morphological plant.

REFERENCES


