

Osteoarthritis, Gout and Antidepressant Effects of *Platanus anatolius* versus *Platanus orientalis*

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Abstract: Plane is the name of *Platanus* genus from the family Platanaceae (Platanaceae) that is the tall, thick-scaled tree species. The Ottoman plane or eastern plane (*Platanus orientalis*) is the endemic plant of Anatolia, and the western plane (*Platanus occidentalis*) is the endemic plant of North America. Both species' hybrid is known as the London plane (*Platanus hispanica*). Eastern plane has been used for centuries in traditional Chinese medicine, Far Eastern countries and Iran for therapeutic purposes. Active compounds such as flavonoids [4], proanthocyanidin glycosides [8-10] penta-aromatic triterpenoids [11], tannin [12], phytol derivatives [13] and caffeic acid [14] which are found especially in plane leaf, are bioactive components that have a role in successful usage in traditional therapy. The ability of plane leaf to be effective in osteoarthritis and gout complaints directly depends on the bacterial population on it and harvest time.

Key words: *Platanus anatolius*, *Platanus orientalis*, Osteoarthritis, Gout and Antidepressant Effects

1. Introduction

Platanus (Platanaceae)'s seven species are allocated along the plant kingdom. The most common of them is named *P. orientalis* L. (plane-tree) has tall height of 55–60 m. [15] Incidental to platanaceae family, *P. orientalis* is wide-spreading from on South Europe to India containing Turkey. It's a longevous deciduous tree [16]. According to the literature survey, *Platanus orientalis* has many pharmacological activities cytotoxic, cytostatic, astringent, antimicrobial and antiseptic impact [17-18].

Ebn-e Sina (Avicenna) suggested usage of plane leaf as an anti-inflammatory for toothache [1], and as a pain reliever (analgesic) for knees. Plane leaf have been applied in traditional treatment methods for some dermatological, gastrointestinal and rheumatic complaints in Iran nowadays [2]. Dioscorides suggested plane leaf to treat the dysentery (dysentery) [3]. Anticancer efficacy has also been demonstrated with clinical trials [4]. Antiseptic and antimicrobial properties of plane are quite strong [4]. In this context, mouthwash prepared

from plane leaf is applied successfully both as antiseptic and for aphthous complaints. The leaves of *Platanus occidentalis* have been tested by Gross for cytotoxicity, concluded that they can be used safely [5].

2. Leaf Microbiological Flora

The plane leaf to be used for the treatment must be completely matured (when begun to turn yellow), and formic acid and formaldehyde present in the leaves must be destroyed with biodegradation by methylotrophic bacteria (methylobacterium). Methylobacterium has 52 known species at the time of article (<http://www.bacterio.net/methylobacterium.html>). Among this species were *Methylobacterium platani* and *Methylobacterium oryzae* which were isolated from *Platanus orientalis* and oryzae of rice, respectively [19, 20]. The microorganism which designated of *Methylobacterium platani*, refers to the *Platanus orientalis* tree due to its isolated from this tree species [20]. There are gram-negative bacteria (*Methylobacterium platani* sp.) that are specific to the plane leaf. These bacteria are found on leaf surfaces and gain energy by using formic acid, formaldehyde and methanol which are C1 group [6]. *Methylobacterium platani* sp. is a bacterial species belonging to the group Alphaproteobacteria that has the "sole carbon source" feature and takes the called as "*platani*" due to from the word "*platanus*".

When the leaves are fully mature (when begun to turn yellow), the toxic properties of the plane leaf are eliminated by *Methylobacterium platani* sp. bacteria. This bacterias were used C1 bodies as energy sources in the anabolism period that was controlled with some hormones. Otherwise, plane leaf has toxic and / or hypertensive effect and loses its efficiency largely against the anti-arthritis (osteoarthritis), anti-gout and antidepressant when it is early collected (green). This green plane leaf has headache and nausea effect due to chemical compounds such as formic acid and formaldehyde etc. When the plane leafs were collected in dry and color turn to closely yellow, tree withdraw some significant and efficient secondary metabolites from the leaf to body in catabolism period. With regard to Ebn-e Sina's (Avicenna) view, the plane leafs must be collected in right on time accordingly this negative effects.

3. Why *Platanus anatolius*?

Registration or patenting of plants and seeds is made according to their phenotype and genotype characteristics. However, these features are not enough. The ecological flora, biodiversity environment, allelopathic conditions, soil microbiological flora, especially mineral content of soil, climate and conditions, horizontal and vertical transitions directly affect the taxon chemistry of the plant (taxon marker). Each plant

has its own unique taxon marker, in other words chemical components, in its natural environment. Especially the mineral structure of the soil has a functional role in occurrence of specific secondary metabolites.

Taxonomic chemical components make the plant privileged. The most important group of these chemical compounds, which are separated into different classes, are "glycosides". Glycosides are excellent preventive, protective and therapeutic against various diseases (gout, osteoarthritis, antidepressant, antitryptogen, antidiabetic, etc.). They also form the basis of secondary metabolites found in plants.

The ability to acylation of glycosides (platanosides) found in the plane leaf makes the mechanism of action specific and selective, if it is used holistically. This makes plane leaf special in the treatment of certain diseases. Taxon chemistry of Anatolian plane trees (*Platanus orientalis*) growing in rich lands of boron, when compared with other plane tree species that can grow widespread all over the world, shows privileges about secondary metabolites (eg platanozide AT). Plane trees (see Figure 1) that grow in rich regions of boron deposits (Eskişehir, Seyitgazi, Bursa, Kestelek, Kütahya, Emet, Demirci, Bigadic, Manisa and Balıkesir) contain region-specific platanosides.

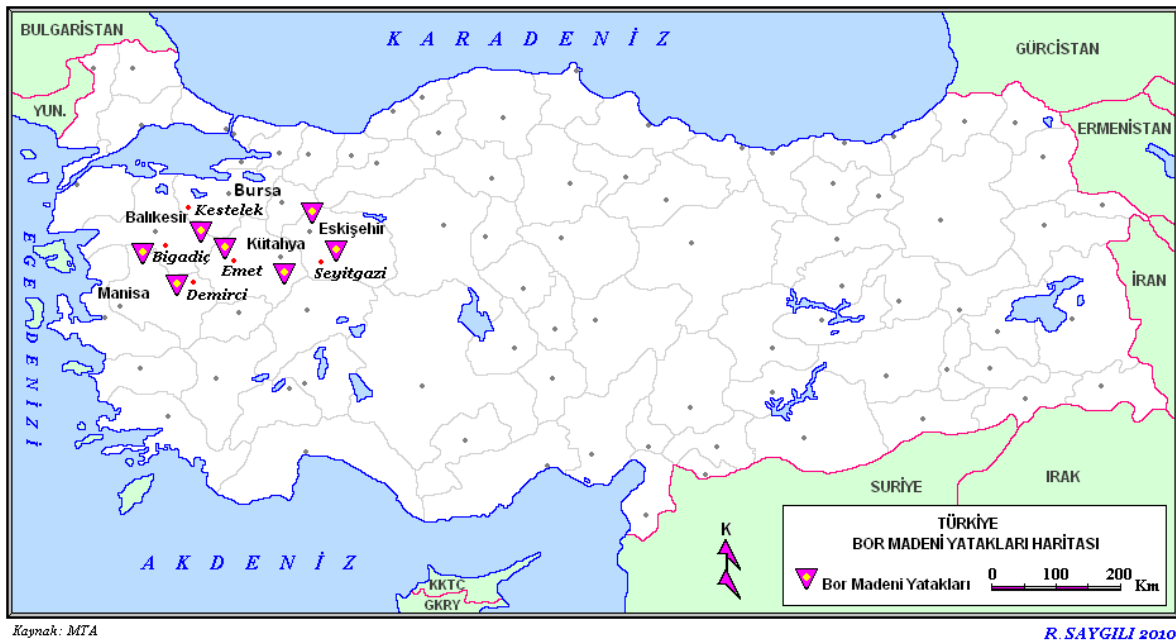


Figure 1. Places of *Platanus orientalis* grown in the regions that boron deposits are present in Turkey.

The plane trees that grow in the regions that boron deposits are present on the Anatolia, differ from “*orientalis*” in that it contains different glycosides in terms of taxon chemistry and entitle to take the name of “*anatolius*”. The glycosides of plane tree leaves of the above-mentioned regions (including boron deposits)

are analgesic in the specific and selective "osteoarthritic" complaints and are also effective against gout and general calcification complaints that develop in the body.

4. Usage of *Platanus Anatolius* against Calcification (Osteoarthritis) and Gout

The mineral composition of the soil which the plant grows is directly effective in the synthesis of the secondary metabolites. The proportional differences and variety of secondary metabolites synthesized in the leaf of *Platanus anatolius* grown in the soil that the boron mineral is present cause stronger indications. Some of these secondary metabolites are coumaryl rhamnopyranoside, platanoside, coumaroyl-glucopyranoside, nicotiflorin and kaempferol-3-rhamnopyranoside.

5. Antidepressant Effect of *Platanus Anatolius*

The antidepressant effect occurs due to the glycosides found in the leaves of both *Platanus orientalis* and *Platanus anatolius*. Isocarboxid, phenelzine, selegiline, and tranlycypromine may be listed as the major agents used in the class of powerful antidepressant drugs known as Monoamine Oxidase Inhibitors (MAOIs) and prescribed for the treatment of depression. These compounds interfere in the activity of the enzyme Monoamine Oxidase (MAO) that is responsible for the destruction of monoamines.

There may be interactions that cause hypertension between some foods and medicines, with MAO inhibitors. As an example, for these foods can give some cheese varieties, beer, wine, pickled fish, fermented products, sour yogurt and chocolate. Anti-asthmatic drugs interact with MAOI so that can cause to high blood pressure.

The acylated flavonol glycoside, kaemferol-3-O- β -D-[6-E-p-coumaroyl]-glucopiranozide and kaemferol-3-O- α -L-[2-E-p-coumaroyl]-rhamnopyranozide act directly as MAO inhibitors found in the plane leaf. Plane leaf does not have any side effects compared to synthetically used agents when used, and there is no restriction on its use in foods.

6. Analgesic Effect of *Platanus Anatolius*

Ebn-e Sina (Avicenna) proposes plane leaf as an analgesic (pain reliever) in the teeth, back and knee lid pain in his book "El-kanun fi't-tibb". American natives had used it in colds and persistent cough complaints [7].

7. Conclusion

Platanaceae (Platanaceae) family has been used for the treatment of some diseases in alternative medicine. The utilization of plane tree has been described in many research articles but osteoarthritis effect hasn't been referred. This editorial proposes that plane leaves can be used for the osteoarthritis if the leaves collect at the right time and region. Plane leaves include some toxic chemicals such as formic acid these chemicals made difficult to use for the treatment some disease in human metabolism.

Methlobacterium platani which is Methlobacterium species use the C1 groups molecules for the living in leaves of *Platanus orientalis* and this toxic effect of plane leaves was disappeared by *methlobacterium platani* for this reason this leaves should be collect when the plane's colour turn newly yellow. This yellow colour indicates that the degree of anabolism and catabolism of plant. If the plane leaves got dry and sheerly mature, pigments and secondary metabolites withdraw to the trunk for the keep a living by plant. As a result, while platanus leaves utilizing for treatment, ripening period of plant according to some toxic compounds must be follow with analytical techniques.

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