



ORIGINAL ARTICLE

Investigation of Ecological, Protective and Economic Status of Forest species *Buxus hyrcana*

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ABSTRACT

Forests are masterpiece of the nature and creation and one of the most precious and beautiful God-given resources, and have an unquestionable role in the welfare of human life, as one of the most important resuscitative systems in welfare and prosperity of human societies. Existing of many and varied economic and environmental values in these valuable resources, guarantees human societies life. *Buxus* is a member of *Buxaceae* family that is native and exclusive of the northern Iran forests. *Buxus hyrcanianis* among "Relik" or ancient pieces, and its attribute is one of biodiversity indices and in other words is the world heritage. This species is shadow-friendly and Shadow is such a friendly and unique maritime climate and in fact, it is in danger of becoming extinct in the near future. The best habitat of this species is in the north of Iran at the height of 20 to 400 meters from sea level. So, *buxus* forests are often very dense and humid. This dense forest is a suitable habitat for other known and unknown of plant and animal species life. This rich gene bank can provide a wide field of research. Moreover, the area of these forests is covered by much valuable humus which has played a very important and worthy role in survival of these forests over millions of years and creation of an ecosystem which has been remained since tertiary geological era. Therefore, it is expected that, all related organizations (forest organization, researches organization and universities) attempt to improve and develop these valuable resources.

Keywords: Endemic species, gene bank, *buxus* forests, extinction

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INTRODUCTION

The role of natural forests is clear in biodiversity, wood production, and oxygen, creation of beautiful views and by-products and soil [1]. Water preservation and vital importance of the forests in the current world is not anymore due to its economic values; but also, is because of its irreplaceable environmental values. *Buxus* is prohibited to be cut. In terms of ecological, this species has a great role in biodiversity of woody species. There are few studies about *buxus* [2]. Caspian *buxus*, forest *buxus* and Hyrcan *buxus* are evergreen and deciduous species of the northern forests and have dark green and shiny. These leaves are toxic so, they are not used by livestock, and there is no excuse for charging the farmers to destroy these amazing trees. This species is completely different with Japanese *buxus* (*Evonymus Japonica*) and (*Evonymus fortunei*) and earring *buxus* (*latifolia Evonymus*) which are among trimmed and decorative and are observed in Tehran or other cities in Iran in the parks or gardens. Hyrcan *Buxus* is among "Relik" or ancient species, and its attribute is one of biodiversity indices and in other words is the world heritage. On the other hand, it is native or endemic. Accordingly, it has a high protective importance. Currently, only a few forest parks exist in protective list including Namakabroud, Gerdab, Khibos, Jeisa, Cheshmehbolbol (Gorgan) and few other small areas which are only 1000 ha. Hyrcan *buxus* is placed in *Quercus Buxetum* community which is a specific plant community for Caspian plains. *Buxus* in these communities is along with Maple - Alder - Hackberry - Rush - Swinging platforms - *Diospyros lotus*. *Buxus* is a shadow-friendly tree and cannot tolerate intense sun. Therefore, *buxus* forest is often dense and moist. This dense forest is a suitable habitat for other known and unknown of plant and animal species life. This rich gene bank can provide a wide field of research. Moreover, the area of these forests is covered by much valuable humus which has played a very important and worthy role in survival of these

forests over millions of years and creation of an ecosystem which has been remained since tertiary geological era. Buxus growth is very slow and reaches 1 mm per year. Earth SentinelsCenter measured some buxuses which the perimeter of its tree was 60 cm and even 75 cm in a sample (equal to 85.23 cm diameter) which represents that, many centuries of their life have been gone on. Buxus wood is very expensive because of its hardness and other traits [3].

GENERALITIES ABOUT HEDGE

Buxus hyrcana pojark is a geographical breed of *buxus sempervirens* species [4]. *Buxus* is a member of Buxaceae family that is native and exclusive of the northern Iran forests. This tree has branches with erect angle, wide and almost curved, or a relatively high tree. The leaves are leathery, toothless with length of 24-35 m and width of 10-14 mm, wider in bottom half, narrow toward the end, with two dark green surfaces. It is bright on the upper surface, a single-stand plant with flowers which consist of terminal female flowers and male flowers in leaves axis. Male flowers have 4 sepals, 4 stamens and pistil remains, without petals. Female flowers have unknown perianth but, spiral bracteole, dicot stigma, ribbed budding fruit capsules (Image 1) [5].



Figure 1. Leaves are reciprocal, leathery with two dark green surfaces

DISTRIBUTION

The main origin of Caspian buxus is in India and Malaysia just like some other native trees of Caspian forests such as *Albizia julibrissin* and *Diospyros lotus* L., and their antiquity back to geology tertiary era and is considered as one of the remaining trees of pliocene period in the northern forests [6]. *Buxus* grows specifically in the northern forests of Iran including Gilan, Mazandaran and Golestan provinces. The peak of its growth is in Noshahr and Esalam. But, it is also seen in Turkmenistan [5]. It goes up to 1100 m height from sea level and extends from Astara to Miandarreh of Gorgan [7].

ECOLOGY

Buxus is among the elements of Euxino-hyrcanian and is considered as specific of marine weather, and in fact, is in danger of extinction and will probably destroyed in near future. The best habitat of this species is in the north of Iran at the height of -20 to 400 m from sea level but, it is observed up to 1200 m from sea level [8]. *Buxus* is a warmth-friendly and shadow friendly species which is very sensitive to the ecosystem variations [9]. This species is tolerant to shade and is distributed under epoch of northern forests which makes a dark environment in the forest by creating a dense canopy. Its leaves are leathery and it has small round capsules as fruit in which there are black grains. Reproduction is done by seed and its growth is very slow (Image 2) [10].



Image 2. Fruit in buxus trees

Hyrcana buxus characteristics

Flowering and fruiting time (phenology) of buxus is since March until May [11]. Caspian buxus is one of the numerated evergreen broad-leaved trees of Caspian forests which have 500 years longevity [12].

Geographical distribution in Iran

In the near past, numerous stands of this plant were observed in the forest areas of Gila, Mazandaran and Golestan provinces; but, nowadays due to the forests occupy on the pretext of towns and villages development and on the other hand, because of cutting and uncontrolled exploitation of this plant, the number of its stands has been decreased [11]. Sisangan region is a forest park or forest cache of buxus which is located 25 far from the north of Noshahr and height of -20 to 145 m from sea level (Image 3). There are old stands of oak, hornbeam, hackberry, maple, hazel and linden trees in upper floor of some points of this supported forest under which buxus continues its life [13].

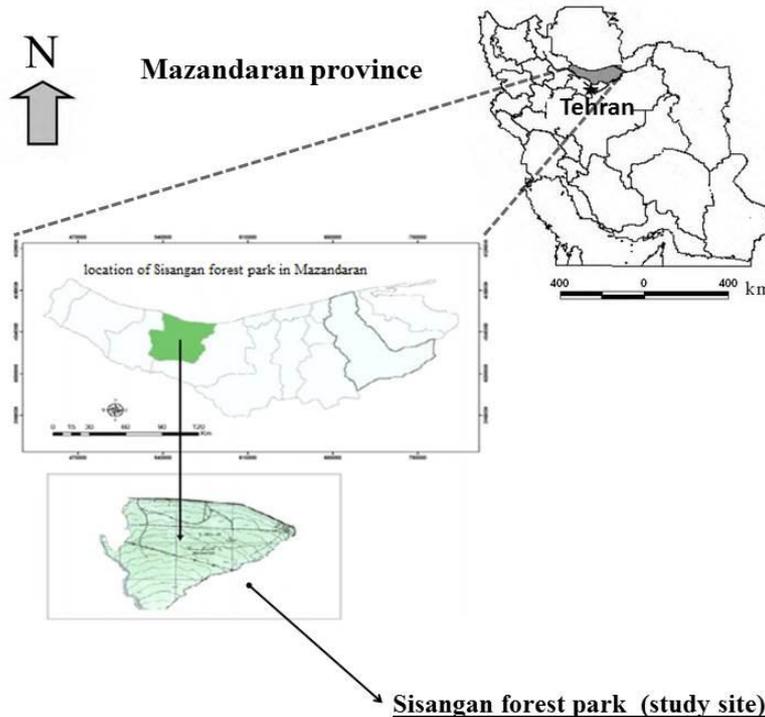


Image 3. Map of location of Sisangan forest park in Mazandaran province

Environment

This plant is used for various purposes including: subtilizing the air with oxygen and moisture, soil protection against water and wind erosion, creating a suitable environment for humans and other organisms and landscaping, creation of hedges in landscapes (Image 4).



Image 4. Buxus trees breeding in order to construct landscapes n the parks and towns

Handicrafts

Since, this plant has a very hard and resistant wood, so, it is considered by rural people and its wood is used as one of the most widely used materials in handicrafts of the northern province of Iran. Unfortunately, this matter has caused uncontrolled exploitation of the wood of this plant and consequently reduction of the number of its stands in Caspian forests.

Compounds

Leaf and root epidermal have resinous substances, pectic compounds and various alkaloids.

Therapeutic properties

Decoction of the leaves and bark of this plant is very bitter and its excessive consumption can cause toxicity but, its small amount is blood purifier and can dispel fever, bile, and is cathartic and suitable to treat agues. Also, use of the combs made from buxus results in skin and hair improvement [11].

CONCLUSION

Due to having valuable wood, the forest species buxus was severely harvested and currently, it has been remained as spots and cache. Therefore, it is expected that, all related organizations (forest organization, researches organization and universities) attempt to improve and develop these valuable resources. This worthy species can be used natural landscaping of towns and compatible with ecological conditions of buxus in terms of climatic because, having two unique features including being evergreen and slow growth, reduces maintenance cost which demonstrates economic value of this species.

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