



Identifying forest types associate with physiological factors in middle Zagros forests in Iran

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ABSTRACT

Physiological factors have effects on most forest parameters such as forest classification so that understanding knowledge about this subject is important to manage forests. The forests of Sorkhake-sanjahi village with area of 1645 ha located in Eslam Abad city, Kermanshah province, Iran were selected. 23 sample plots with rectangular shape (40m*50m) were selected and the species, origin of species and canopy percent were recorded. Broun Blankeh method based on percent of canopy area of dominant species was selected. Results showed that two main forest types identified were *Quercus-Daphne* and *Quercus-Prunus-Cratagus*. *Quercus-Daphne* is coppice and ranging from 1820-2322 and *Quercus-Prunus-Cratagus* ranging from 1890-2130 that *Cratagus aronica* and *Purunus tortuosa* are high forest and *Q. persica* is coppice.

Key words: Middle Zagros, Eslam Abad, Forest types, Braun-Blanquet method

INTRODUCTION

Zagros forests cover over one-fifth area of Iran and more than 170 tree and shrub species and also one-third of population are located in these forests (Koch pideh and kaikhosravi, 2007). Today, most areas of these forests have been destroyed and have formed coppice (marvie mohajer, 2005). The main factors that have caused to create this situation due to browsing, agroforestry, using wood to provide essential needs of rural people, extracting sand and rock supplies, harvesting none-wood productions, pets and illness (Jazireie and ebrahimi rastagi,2003). More than 90 percent of trees located in Zagros forests that due to repetition cutting for using essential needs have been changed to thick coppice with less than 5 m of height (Shariat nejad and Ebrahimi rastagi, 1997). Plant species have different ecological needs that live together in nature and create types and societies (Edward, 2000). Most area of Zagros forests have arid and semiarid climate and they have low precipitation (Fatahi, 2005). High evaporation specially in growing seasons, spring and summer, and disordering distribution of precipitation are major factors that

prevent improving ecological characteristics of these forests. The main plant genus in Zagros forests is *Quercus* that covers most area of these forests. Oaks with strong roots can resist when they face to sever winds and droughts. Nowadays, dust and aerosols cause to close oak stoma and create some problems to this plant but oaks can tolerate this situation by closing their stoma. Various studies were done in order to forest classification in Iran. Parma, 2002 showed that there were 5 main forest types of Zagros including pure *Q. persica*, dominant *Q. persica*, dominant *pistachio khinjuk*, dominant *Acer monspessulanum* and mixed *Acer monspessulanum*. In southern Zagros there are some forest types including: pure *Q. persica*, mixed *Q. persica*, *amygdalus- Quercus*, mixed *amygdalus orientalis* and pure *amygdalus orientalis* (Latifi and Adeli, 2006). A study was carried out in central Zagros and three main groups were determined. First group had positive correlation with soil acidity and main species of it were *Stipa capensis*, *Fibigia macrocarpa*, *Medicago rigidula*. Second group is located in high elevation with more nutrients and moisture of site than other groups. *Quercus persica*, *Amygdalus haussknechtii*, *Bromus tectorum*, *Galium verum* were determined as indicator species of second group. Third group with *Daphne mucronata* and *Euphorbia macroclada* located in low elevation and have less nutrients than second group (Haidari et al, 2008). Mohsennezhad et al.(2010) determined that soil characteristics and topography cover 30 percent of vegetation changes and also they expressed soil function was much than topography. The main goals of this study are identifying and determining forest types and their relevant to physiography in order to manage forest sources in middle Zagros.

MATERIAL AND METHODS

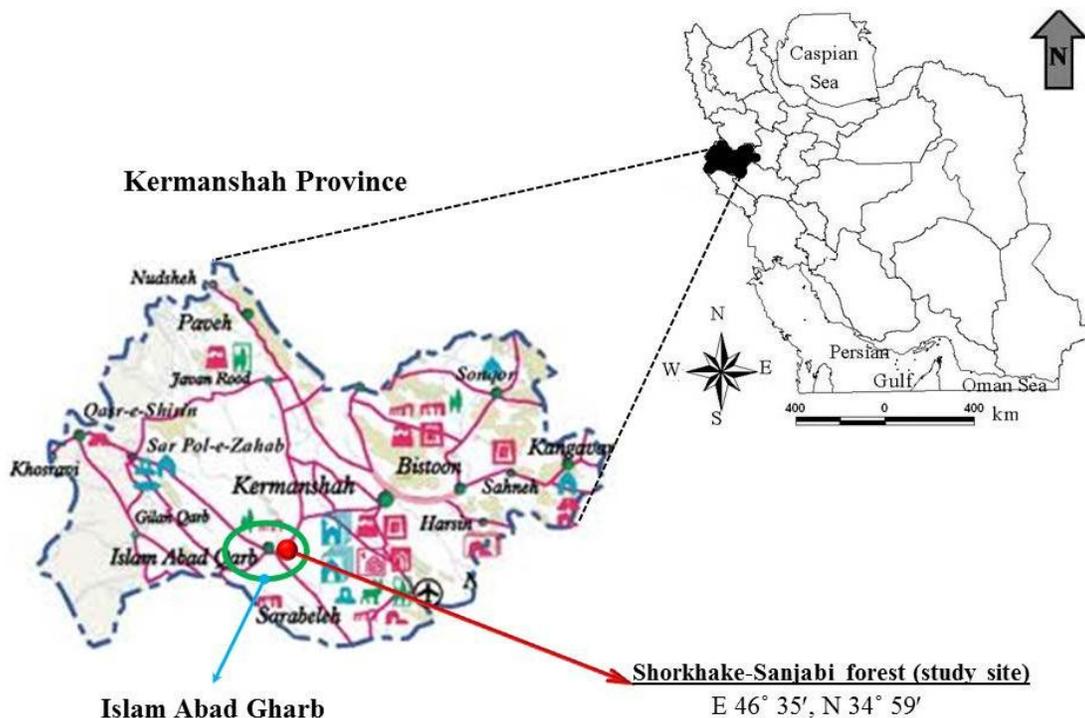


Fig1. Location of the Sorkhe-Sanjabi forests in Kermanshah, Iran

Describing case stud

The study occurred in middle Zagros forests. The forests of Sorkhake-sanjabi village with area of 1645 ha located in Eslam Abad city, Kermanshah province, Iran were selected (fig.1). The meteorological station nearest to the case study indicates that the mean annual precipitation is 275 mm. This area has been located at 1750-2311 m a. s. l.

Methods:

23 sample plots with rectangular shape (40m*50m) were selected for this study. The species, origin of species and canopy percent were recorded in each plot. Broun Blankeh method based on percent of canopy area of dominant species was used.

Main forest species in order of importance:

1. *Quercus persica*: tree species with an average height of 8 m. It generally grows at 1000-2300 m a. s. l. in Iran but it appears at 1600-1900 m a. s. l. in Sorkhake-sanjabi.
2. *Daphne mucronata*: shrub species with about 2 m in height and joins to Thymeleaceae family that appears at 1400- 2000m a. s. l. Presence of this species is an indicator of old sites.
3. *Prunus tortuosa*: shrub species with less than 3 m in height. It becomes at 1000-2100m a. s. l.
4. *Cratagus aronia*: shrub species with less than 8 m in height and appears at 1600-1900.
5. *Amygdalus lycioides*: shrub species with an average height of 2 m and it grows at 2000 m a. s. l.

Determining economic and environmental values of forests types:

Economical values of plant species usually determine and identify by non-wood products. Wood products in Zagros forest are not important for valuing economic subjects.

RESULTS AND DISCUSSION

The forest types that identified in this study were *Quercus-Daphne* and *Quercus-Prunus-Cratagus*. Studying the condition of presence and spatial distribution of forest types have shown that *Quercus-Daphne* appears at 1820-2322 m a. s. l. and this forest type becomes in south, southwest and west regions. The forest type of mixed oak, *Quercus-Prunus-Cratagus*, becomes at 1890-2130 m a. s. l. and appears in north and northwest.

Quercus-Prunus-Cratagus and *Quercus-Daphne* cover 293 and 476 ha, respectively.

Tree and shrub species that become with *Quercus-Prunus-Cratagus* are including:

Daphne mucronata, *Amygdalus lycioides*, *Ficus carica*, *Pyrus communis*, *Amygdalus oreintalis*, *Quercus infectoria*

Tree and shrub species that appear with *Quercus-Daphne* are including:

Prunus tortuosa, *Ficus carica*, *Amygdalus orientalis*, *Amygdalus lycioides*

Table1: economic and environmental values of plant species

Forest type	Species	Environmental	Economic
2	<i>Cratagus aronica</i>	*	*
2	<i>Purunus tortuosa</i>	*	*
2-1	<i>Daphne mucronata</i>	*	
2-1	<i>Hordeum bulbous</i>	*	*
2-1	<i>Bromus tomentellus</i>	*	*
2-1	<i>Festuca ovina</i>	*	*
2-1	<i>Agropyron intermedium</i>	*	*
2	<i>Amygdalus lycioides</i>	*	
2	<i>Poterum sangisorba</i>	*	*
2	<i>Amygdalus oreintalis</i>	*	*
2-1	<i>Sily sp</i>	*	*
2-1	<i>Gundellia tourenfortii</i>	*	*
2-1	<i>Achillea sp</i>	*	*
2	<i>Ficus carica</i>	*	
2	<i>Tymus sp</i>	*	*
2	<i>Platago sp</i>	*	*
2-1	<i>Carthamus sp</i>	*	*
2-1	<i>Quercus persica</i>	*	*

The effects of altitude on spatial distribution of forest types

Determining spatial distribution of forest types is very important because of ecological dependency of types on physiographic parameters. *Quercus-Daphne* ranges from 1820 to 2322 m a. s. l. This type has two layers that first one is 1-5 % and covers 70 ha and the second one is 6-25% with an area of 406.25 ha. *Quercus-Prunus-Cratagus* ranging from 1890 to 2130m a. s. l. and only has a layer with 6-25% that covers 293.5 ha. The reproduction of *Quercus-Daphne* was poorer than *Quercus-Prunus-Cratagus* and also *Q. persica* had poor reproduction with averagely 86 coppice seedlings and 46 high forest seedlings of *Daphne mucronata* as well as 5 coppice seedlings of *Purunus tortuosa* per hectare. *Quercus-Daphne* is coppice-high stand that *Daphne mucronata* is high forest and *Q. persica* is coppice and also *Quercus-Prunus-Cratagus* is coppice-high stand that *Cratagus aronica* and *Purunus tortuosa* are high forest and *Q. persica* is coppice.

Ecological features of dominant forest types

Quercus-Daphne: Generally, this light demanding type can be appear on the soils with medium to high in depth and gentle to steep slopes that have adequate humidity beginning at 1820 m a. s. l. The needed minimum rainfall is 500 mm per year. With regard to suitable condition of this forest type, different under-layer plants are present. Annual and perennial plants grow in this forest type and generally forest floor is not ricked by litter fall. Therefor litter fall can't change the forest soil easily and it has a little impact on reproduction.

Quercus- Prunus-Cratagus : This type are formed by tolerate and untolerate species and appear on the calcareous soils with medium to high in depth and this value cause to tolerate inverse conditions well such as steep slope. The needed rainfall is 500 mm per year for this type. The under story plants are invasive species and also litter fall is poor and then forest soil is not productive.

Forest type quality and forest site productivity

Quercus- Prunus-Crataegus is the best site among all forest types related to oak. The quality of this type is better than others and also it has better productivity than other forest types. *Quercus- Prunus-Crataegus* is face to some problems due to past and present pressures by human being and animals. *Q. persica*, *Crataegus aronica* and *Purunus tortuosa* sites are poor according to productivity and reproduction and these subjects should be attention in future.

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