

www.biodicon.com

ISSN 1308-8084 Online; ISSN 1308-5301 Print

Biological Diversity and Conservation

10/2 (S2) (2017) 26-27

Research article/Araştırma makalesi

Some reasons of degradation of Tugai Forests near Ili River in Kazakhstan

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Abstract

Tugai forests are intrazonal forests formations, which grow along bottomlands of rivers in arid regions. These forests are called intrazonal forests because they are not separate zones. They are like inclusions in an extensive arid zone but they are intra-area vegetation, which is different from the main background arid flora. Main tree species are *Populus diversifolia* Schrenk, *Populus pruinosa* Schrenk, *Fraxinus sogdiana* Bunge and *Elaeagnus angustifolia* L. Area of the tugai forests is decreasing because of many reasons. The aim of this study was to know some reasons of their degradation. There were used methods of forest pathology observation. We installed window traps for catching insects, which are pests. In addition, we collected samples of damaged parts of trees as herbarium to know diseases. According the results of this study, the main pests and disease of tugais were identified. Description of main pests was written. The most numbered species of pests was *Hylesinus varius* Fabricius for *Fraxinus sogdiana*. *Scolytus jaroschewskii* Schevyrew was often in *Elaeagnus angustifolia*. *Agrilus ganglbaueri* Semenov was identified for both species of *Populus*. The main disease of *Populus pruinosa* was *Melampsora tremulae* Tul. (*Melampsora populnea* (Pers.) P. Karst.) For *Fraxinus sogdiana* and *Elaeagnus angustifolia* dangerous diseases were not established. For conservation of the tugai forests, ecosystem method of study and forest pathology monitoring will be suggested.

Key words: Tugai forests, degradation, pests, diseases, forest pathology monitoring

1. Introduction

Tugai forests are intrazonal forests formations, which grow along bottomlands of rivers in arid regions. These forests are called intrazonal forests because they are not separate zones. They are like inclusions in an extensive arid zone but they are intra-area vegetation, which is different from the main background arid flora (Prohorov, 1982). The tugai forests of the present are tree, shrub and herb communities in flood plains of the Syr Darya, Chu, Ili, Karatal, Lepsy, Aksu and Charyn rivers with total area of about 400 thousand ha of which is covered by forest no more than 150 thousand ha (Baizakov, 2007).

The tugai forests have a large agricultural and economic significance: They protect against soil erosion, water evaporation and they firm the banks of the rivers. They often play an agricultural field-protection role against wind or snow, for example, and realize biodrenage in slumpy bottomland regions (Kolesnichenko, 2013). Main tree species of tugai forests near Ili River are *Populus diversifolia* Schrenk, *Populus pruinosa* Schrenk, *Fraxinus sogdiana* Bunge and *Elaeagnus angustifolia* L. Because of the specificity of the tugai forests, such as a peculiarity of the trees and shrubs, conditions of the climate, soil and hydrology, they have their own species of insect fauna. In spite of the harsh climatic conditions, low humidity and species limitations of trees and shrubs, the forest insect fauna is very diverse in the tugais (Sinadskii, 1963).

Both natural and anthropogenic factors are the causes of desertification in Kazakhstan. The main natural factor contributing to desertification processes in Kazakhstan is the intra continental state of the country, determining continental and arid climate, the scarcity and irregularity water resources distribution, causing widespread sand and saline lands (Sarsekova et. al., 2015). Similarly, area of the tugai forests is decreasing because of many reasons. In

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addition to frequent fires and illegal cuttings of the unique tugai forests, they constantly decrease because of the growth of pests and diseases loci and an unregulated year-round pasturage of livestock (Prohorov, 1982).

The aim of this study was to know pests and diseases as reasons of the tugai forests degradation. The tasks of the study were to conduct forest pathology observation of the tugai forests near Ili River; to collect samples of pests and diseases; to identify them and to propose methods for conservation of the tugai forests.

2. Materials and methods

There were used routing methods and visual forest pathology observation in the tugais. Collection of samples of pests and diseases carried out during vegetation period from spring to autumn. We walked along the forests and searched visible damaged parts of trees. For collecting insects, we installed window traps. The universal window trap is served for catching of insect, which migrate in the air, and this trap is effective for all the directions of the migration. The action of the window trap is following: migrant insects colliding with the guide surfaces fall down and get into the bag. For each tree were measured its parameters and the environmental parameters: habitat (canopy openness), amount of dead wood, tree composition, and density of shrubs, estimations of river or other objects from window traps. Also there were measured tree parameters: circumference of the tree, height of the tree, height to the first dead branch and height to the first green branch, sanitary condition of the tree, presence or absence of fungi, a number of holes in the stem, presence or absence wood without bark, a number of hanging branches. GPS coordinates were taken from each tree (Kolesnichenko and Nakladal, 2014). In addition, we collected samples of damaged parts of trees as herbarium to know diseases. There were 2 localities of Fraxinus sogdiana, 2 localities of Populus diversifolia, 2 localities of Elaeagnus angustifolia and 1 locality of Populus pruinosa. There were chosen 20 trees in each locality. Total number of trees and window traps was 140 pieces. Collection of insects from window traps was conducted from May to August 2013-2014 once in each 2 weeks. Each two weeks we went to localities and picked up insects from each window trap. Insects were put into plastic bags where they were fixed with alcohol. Plastic bags with insects were put into a freezer. The identification of insects to Order level was done in the Department of Forest Protection and Entomology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences in Prague. The specialists in Institute of Botany and Phytointroduction, Almaty, Kazakhstan made identification of fungi diseases.

3. Results

According the results of this study, the main pests and disease of tugais were identified. The most numbered species of pests was *Hylesinus varius* Fabricius for *Fraxinus sogdiana*. *Scolytus jaroschewskii* Schevyrew was often in *Elaeagnus angustifolia*. *Agrilus ganglbaueri* Semenov was identified for both species of *Populus*. The main disease of *Populus pruinosa* was *Melampsora tremulae* Tul. (*Melampsora populnea* (Pers.) P. Karst.) For *Fraxinus sogdiana* and *Elaeagnus angustifolia* dangerous diseases were not established.

In general, pests and diseases are only additional reasons of degradation of tugai forests near Ili River. The main reason is anthropogenic factors: illegal cuttings, cattle grazing, not systematic recreation. For conservation of the tugai forests, ecosystem method of study and forest pathology monitoring will be suggested.

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(Received for publication 25 May 2015; The date of publication 15 August 2017)