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БАЯНДАМАЛАРЫ

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РЕСПУБЛИКИ КАЗАХСТАН

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PESTS AND DISEASES OF SEMYONOV FIRS IN KYRGYZSTAN

Abstract. Today the forestry of the Kyrgyz Republic is facing the needs to solve interrelated social, economic and environmental problems. Current and future forests state is alarming. A number of forest ranges in Kyrgyzstan are distressed and have lost their biological stability. In general, the presence of entomological and phytopathological pests in the forest is also part of the entire forest biodiversity created by nature itself. The sanitary condition of fir forests can currently be assessed relatively positive. Nevertheless, hazardous organisms are found in them. In the process of vital activity of these hazardous organisms, healthy trees dry out, plantings lose their role and ability to natural regeneration. The most common pests of fir forests are pine Dioryctria abietella Schiff., Megastigmus (Megastigmus Sp.), Adelges (Aphrastasia pectinatae Chol.) Among the diseases of Semyonov fir, the most widespread in the nursery is fusarium lesion of seedlings, and in natural stands – rust (Melampsorella cerastii Wint.), and cenangium cancer (Cenangium abietis (Pers.) Reh. Duby, 1896). Another most common disease is Alternaria blight caused by an imperfect fungus Alternaria alternate (Fr.) Keissler. The most dangerous disease of Semyonov fir is root rot, caused by the pine fungus Fomitopsis annosa (Fr.) Karst. 1881. Also pathogens of dangerous fungal diseases were found on Semyonov fir (Trichothecium roseum (Pers.) Link 1809 and Myxotrichum chartarum Kunze, 1823).

Key words: fir, fir forests, fungi, pathogens, pests, fungicides**.**

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ҚЫРҒЫЗСТАНДАҒЫ СЕМЕНОВ САМЫРСЫНЫНЫҢ ЗИЯНКЕСТЕРІ МЕН АУРУЛАРЫ

Аннотация. Бүгінде Қырғыз Республикасының орман шаруашылығында өзара байланысты әлеуметтік, экономикалық және экологиялық мәселелерді шешу қажеттілігі туындап отыр. Халықты ормандардың қазіргі және болашақ жағдайы алаңдатады. Қырғызстандағы бірқатар орман алқаптары қиын жағдайда және биологиялық тұрақтылығын жоғалтуда.

Орманда энтомологиялық және фитопатологиялық микроорганизмдердің болуы табиғаттың өзі жасаған бүкіл орман биоәртүрлілігінің бөлігі болып табылады. Қазіргі уақытта шырша ормандарының санитарлық жағдайын салыстырмалы түрде оң бағалауға болады. Алайда оларда қауіпті организмдер табылды. Осы қауіпті организмдердің тіршілік ету процесінде сау ағаштарға әсер етеді, екпелер өздерінің рөлі мен табиғи жаңару қабілетін жоғалтады. Шырша ормандарының ең көп таралған зиянкестеріне Dioryctria abietella Schiff., Megastigmus (Megastigmus Sp.), Adelges (Aphrastasia pectinatae Chol.) Семенов майқарағайы ауруларының арасында көшеттерге фузариозды зақымдану, ал табиғи екпелерде тат (Melampsorella cerastii Wint.) кең таралған және қатерлі ісік ценангия (Cenangium

abietis (pers.) Reh. Дуби, 1896. Тағы бір кең таралған ауру-Alternaria alternate (FR) жетілмеген саңырауқұлақтарынан туындаған альтернариоз.) Кейслера. Семенов шыршасының ең қауіпті ауруы-қарағай саңырауқұлақтарынан туындаған тамыр шірігі Fomitopsis annosa (Fr.) Karst. 1881. Семенов шыршасынан (Trichothecium roseum (Pers.) Link 1809 және Myxotrichum chartarum Kunze, 1823) қауіпті саңырауқұлақ ауруларының қоздырғыштары табылды.

Түйін сөздер: самырсын, самырсынды орман, саңырауқұлақтар, ауру қоздырғыштар, зиянкестер, фунгицидтер.

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ВРЕДИТЕЛИ И БОЛЕЗНИ ПИХТЫ СЕМЕНОВА В КЫРГЫЗСТАНЕ

Аннотация. Сегодня лесное хозяйство Кыргызской Республики сталкивается с необходимостью решения взаимосвязанных социальных, экономических и экологических проблем. Нынешнее и будущее состояние лесов вызывает тревогу. Ряд лесных массивов в Кыргызстане находятся в бедственном положении и потеряли свою биологическую стабильность.

Присутствие энтомологических и фитопатологических вредителей в лесу является частью всего лесного биоразнообразия, созданного самой природой. Санитарное состояние еловых лесов в настоящее время можно оценить относительно положительно. Тем не менее, в них обнаружены опасные организмы. В процессе жизнедеятельности этих опасных организмов здоровые деревья высыхают, насаждения теряют свою роль и способность к естественному возобновлению. Наиболее распространенными вредителями еловых лесов являются сосновые Dioryctria abietella Schiff., Megastigmus (Megastigmus Sp.), Adelges (Aphrastasia pectinatae Chol.). Среди болезней пихты Семенова наиболее распространенным в питомнике является фузариозное поражение сеянцев, а в естественных насаждениях – ржавчина (Melampsorella cerastii Wint.) и рак ценангия (Cenangium abietis (pers.) Reh. Дуби, 1896). Другим наиболее распространенным заболеванием является альтернариоз, вызываемый несовершенным грибком Alternaria alternate (фр.) Кейсслера. Наиболее опасным заболеванием пихты Семенова является корневая гниль, вызываемая сосновым грибком Fomitopsis annosa (FR) Karst. 1881. Также возбудители опасных грибковых заболеваний были обнаружены на пихте Семенова (Trichothecium roseum (Pers.) Link 1809 и Myxotrichum chartarum Kunze, 1823. Myxotrichum chartarum Kunze, 1823).

Ключевые слова: пихта, пихтовые леса, грибы, возбудители болезней, вредители, фунгициды.

Introduction. Semyonov fir or Turkestani (A. Semonovii Fedtsch) was first described by Professor B.A. Fedchenko in 1898 on the territory of Kyrgyzstan in the gorges of Besh-Tash of the Talas ridge. Fir trees grow in conditions of highly intersected terrain of high and medium mountains. These forests were formed on the basis of elements of tertiary complex of coniferous and coniferous-deciduous forests. They were separated from the Altai coniferous forests as a result of the Tien-Shan break. Their range is confined to the Western Tien Shan, Chatkal, Talas, At-Oynok, Uzun-Akhmat, Susamyr ranges and the Kokirim-Too Mountains. Plantings of the III-IY classes of bonitet with completeness from 0,4-0,8 predominate. They are confined mainly to the slopes of the northern exposure and occupy slopes from 1700-2700 m above sea level, where mountain-forest dark-brown soils of different thickness are common.

Semyonov fir in the past, had a common area with such species as Siberian fir, Himalayan fir and Gembila, and they may have descended from a common ancestor. Among them, only Siberian fir has the greatest geographical distribution. The main differences between it and the Tien Shan fir are the shorter needles and the absence of mechanical cells in it. Quite close to the Semyonov fir are also Central Asian firs – Himalayan and Gembila, which are distinguished by longer needles and cones.

The flora of fir forests is very diverse and is associated with the fact that this area is located at the junction between the North and South of Kyrgyzstan, and therefore you can find plants from both regions here. More

than 700 species of higher flowering plants have been recorded in this area, including about 150 tree and shrub species. Dark coniferous forests on the northern slopes alternate with meadow-steppes and meadows, and light coniferous forests on the southern slopes-steppes and meadow-steppes. Below the coniferous forests grow juniper forests from juniper hemispherical and Zeravshan. Even lower, the slopes are covered with shrubs, here you can also find pistachios and almonds. In the Chatkal range, together with fir, there are Tien Shan spruce, Sivers and Kyrgyz apple trees, walnut, Turkestan and Semyonov maple, karkas, Tien Shan and Persian mountain ash, and hawthorn species (Turkestan, Dzungarian, Pontic and Altai). Along the floodplains of the rivers there are various types of willows and poplars, Turkestan birch, curve, maples, Sogdian ash and magalebka cherry. From the bushes there are various types of rosehips: loose, broad-thorned, Albert, Fedchenko, exochord Tien Shan, spirea joey leaf, Altman's and Karelin's honeysuckle, barberry oblong and variegated, Sogdian and Ferghana plum, aflatunia elm leaf, Meyer's currant, blue blackberry, cherries: Tien Shan, red-fruited, Alai and abelia [Bikirov Sh.B., 2011].

Great damage to these forests was caused by mining felling, in which only the most valuable, the best specimens of fir were selected. This led to a decrease in the genetic potential of the species, a decrease in the protective, sanitary-hygienic and aesthetic properties of the forest. In this regard, the Semyonov fir was listed in the Red Book of Kyrgyzstan as a rare endemic species.

Research materials and methods. The research work was carried out in two stages, in the field and in the laboratory. The first stage is the allocation of permanent and temporary sample areas, and the collection of samples for mycological studies. As a result, according to the method [Zhukov A.M. 2001; Zhuravlev I.I. 1954], the selected samples were stored in specially sterilized bags. Growing trees were evaluated according to the four growth categories proposed by [Sinadsky Yu.V. 1977]. The degree of damage to the substrates was determined by the destruction scale [Gordienko P.V. 1985]. At the second stage of the research, the species composition of the fungi was determined. For this purpose, preparations were used [Zhuravlev I.I. 1954] in accordance with the wet chamber method. Tinder fungi are defined according to the scheme [Komarova E.P. 1964]. Simple microscopic preparations were prepared for fungal spores [Kirai Z. 1974; Komarova E.P. 1964]. Phenological and microclimatic observations in the nursery were carried out by generally accepted methods.

Research result. Semyonov fir in the Kyrgyz Republic currently occupies 3714 hectares of forests. As a result of the survey in the remote gorges of the mountains, we have identified the most valuable natural populations (genetic reserves) of the Semyonov fir, which are of great scientific, historical and economic importance. They are located in the Toktogul forestry: in the tracts of Karo-Karagay, Bugulu-Tor, Kan-Jailoo, Usta-Sai, Kuraryk, Itagar; in the Avletim forestry in the tracts of Batrakhan. The plantings here consist mainly of well-developed, healthy, multi-aged fir trees. Completeness is from 0.5 to 1.0. The optimum growth of Semyonov fir is confined to altitudes-2000-2500 m above sea level, the height of individual specimens reaches more than 30 m with a diameter of more than 1 m. The Semyonov fir tree lives up to 300 years.

Studies have found that the greatest harm to fir is caused by pests of cones, berries and seeds. As a result of the research, it was revealed that fir cones and seeds are damaged by the fir cone firefly (Dioryctria abietella Schiff.) and seed beetles of the genus (Megastigmus Dalm.).

In the years of good harvests, the spruce cone firefly of the Lepidoptera order damages a single number of fir cones up to 2.2%, and in a low-yielding year, the activity of the firefly increases, and it damages up to 17% of the cones [Bikirov Sh.B., 1984]. This pest [Ashimov K S., Kachibekova E.N., 1998.] damages up to 90% of cones. Infected bumps are twisted. The caterpillars feed on scales, seeds, strongly wear out the cones, gnaw the rod. The biology of the pest has not been sufficiently studied. The larvae feed in cones until the end of September, then they overwinter in cocoons, which are white, soft, translucent covers with which the caterpillar covers its body, attaching to the scales of the cone.

A characteristic feature of the cones and seeds pests is a hidden lifestyle during the feeding period. The main harm they cause in the larval stage. Pests of cones and fir seeds negatively affect the volume and quality of the annual crop, destroying most of it or the entire crop. All this worsens the sanitary condition of forests and their natural renewal, and also leads to an undesirable replacement of valuable forest-forming species by less valuable in economical means. Damaged seeds, collected together with undamaged ones, reduce the grade of the harvested seeds. The most dangerous, among all above-listed pests of fir seeds is the fir seed eater. In fact, fir forests in some cases are infection foci of seed eaters of Megastigmus Dalm. Usually, the infestation of fir seeds with seed eaters annually amounts to 25-30%, in some years it reaches 90%. In production conditions, large areas occupied by fir forests, the protection of fir cones from fir seed eaters is not carried out, except for special chemical control measures, in the form of various experimental developments carried out during scientific research on a limited area of the forest, i.e. on groups of trees.

Another pest particularly seen on fir is spruce-fir brown hermes (Aphrastasia pectinatae Chol.) - coniferous plants pest, affecting fir, larch, spruce, various types of pines. Brown spruce-fir hermes develops on spruce and fir. During the feeding process of the brown spruce-fir hermes, the larvae concentrate on the underside of the fir needles. With mass population, the trees are covered with abundant secretions, on which soot fungi develop. During the season, 3-4 generations of hermes can develop. Aphids feed on the lower side of the needles, and yellow spots appear on the upper side in the places of sucking. With a large number of hermes, the needles turn yellow and crumble, weakened trees die within a few years. Mature trees under normal soil conditions, optimal humidity and light are more stable, and hermes develops sporadically. The pest feeds and develops normally only on fir trees.

Control measures are preventive spraying of plants in the spring, repeatedly - during the regrowth of young shoots and with a large number of pests in the summer with one of the following chemicals: fufanon, aktellik, decis Profi, kemifos, molniya, komandor, iskra, inta-vir.

In addition to the above mentioned, pests and diseases of other tree species growing here are found on the fir forest enterprise territories of the Western Tien Shan. The main ones are leaf beetles and stem pests (barbels, bark beetles) that affect poplar, willow and elm tree species. Ringed silkworm-shrubs (mountain cherry, rosehip, etc.), Dutch disease – elm and others.

Leaf beetles and barbels cause significant damage to forestry. In some years, leaf beetles in nurseries destroy up to 100% of transplant sections with rooted cuttings of poplar and willow. Measures to control leaf beetles in nurseries, due to poor-quality chemicals obtained in plant protection services, do not give positive results. Over the past 10-15 years, the large Ferghana barbel has become widespread, which has increased its number from the valley zone and settled in the mountain zone. It damages almost all types of trees. The main reason for the rapid spread of the barbel is the large trees untimely cutting and tree surgery. In most cases, the time of carrying out these works coincides with the time of laying eggs by the barbel. As a result, on moistened fresh sections of trees, larvae emerge from the laid clutches of the barbel, which, feeding on wood, develop and completely damage the trunk part of the tree. As a result, the tree completely dies or breaks. There are no effective measures to control the barbel today [Toktoraliev B.A., et al., 2006].

Among the diseases of the Semyonov fir, the most widespread in the nursery is fusarium damage to seedlings, and in natural plantings – rust and cenangial cancer.

Planting material diseases grown in forest nurseries cause great harm to forestry, as in some cases they lead to the death of a significant part of fir seedlings, up to 30-70%. A special danger for seedlings is fusarium, which causes lodging of plants when they are grown in a nursery. This disease causes rotting of seeds and seedlings, wilting of seedlings and seedlings. The disease is focal in nature, and the plants die in clump. The main method of fir seedlings protection from fusariosis is considered to be the active method, i.e. suppression of the causative agent of the disease at the activation time by chemicals in combination with high agricultural technics. Except available control measures against this disease, usually it is practiced only fir seeds, sprouts and seedlings treatment by a solution of potassium permanganate, which give a relatively high effect.

The fungus Cenangium abietis (Pers.) Rehm. it was identified in the South of Kyrgyzstan as the causative agent of the dangerous fir disease “cenangial cancer”, which leads dry out of the shoots in the affected areas, as well as yellowing and falling of needles. In the end, the disease leads to the death of the entire plant, the undergrowth especially suffers. It should be noted that this disease appeared relatively recently in the areas where Semyonov fir grows and has already caused significant damage in the Sary-Chelek State Biosphere Reserve [Totubaeva N.E., et al., 2003]. As one of the methods of biological control of coenangial cancer of fir, it is recommended to control harmful insects (goldfish, sawfly, bark beetle) that damage both young and old trees and thereby contribute to the penetration of infection into plants. Also, as an additional control measure, it is recommended to select or introduce tree forms that are resistant to the most dangerous diseases [Ashimov K.S., 2004; Bilder I.V., 1999].

In natural forest stands, Semyonov fir is most strongly affected by rust fungi, they affect the branchwoods of fir trees. A characteristic sign of the affection is the thickening and cracking of the branchwoods in the affected area. In the spring, spore clumps appear on the affected branches in the form of a gelatinous yellow-brownish mass. Spores develop in the summer on an intermediate host (hawthorn, juneberry, etc.), falling on the fir branches, germinate and give a long-term mycelium, which causes thickening and curvature of the branches. Usually rust begins to affect the lower branches of all ages fir at different heights and exposures, but most often in the lower and middle mountains on the northern slopes. The damage caused by rust is significant, as the disease weakens the plants, and infected branches wither. The rust (Melampsorella cerastii Wint.) found on the fir forms witch-brooms and tumors on the branchewoods [Mosolova S.N., Prikhodko S.L., 2006].

Discussion. In addition, rust-weakened trees are subject to colonization by stem pest species, such as bark beetles, barbels, and goldfinches. Rust control measures are not carried out in fir forests, due to the high cost of work.

Another most dangerous disease of Semyonov fir can be called root rot, caused by the pine fungus Fomitopsis annosa (Fr.) Karst. The pine fungus is able to spread through the roots to nearby growing trees, causing a lesion focus. Infection of trees occurs with spores or mycelium, in places where the roots or lenticells of healthy roots are injured. Then the mycelium penetrates the trunk, thereby causing central rot. The bioecology of this disease was thoroughly studied by A.M. Soloviev [Soloviev A.M., 1964]. The author found that the main and permanent reservation of fungus spores is the forest litter, where more than 60% of spores are retained. Infestation of trees most often occurs by spores penetrating into the cracks of the bark and on the surface roots, or by mycelium of the forest litter. Pine fungus affects plants older than 2-3 years of age. The infestation increases with the trees age. The thickest trees are affected more strongly and reach 35-45%, all affected trees have destructive wood or die on the root. Infection of Semyonov fir with pine fungus at the age of 60-100 years reaches from 25 to 40%, and at the age of 100-120 years up to 50% of stands [Soloviev A.M., 1964]. As control measures, the following measures are recommended: cleaning, cutting, pruning and burning of dead-wood, chat wood, affected trees or individual branchewoods of needles. Decontaminate fresh wounds or other injuries with creosote oil, 5% solution of copper sulfate, 3% solution of sodium fluoride, or during the growing season 3-4 times with 1% solution of Bordeaux liquid.

Another most common disease – is alternaria blight, caused by an imperfecti fungi of Alternaria species, in terms of its biology, ecology and the nature of the damage caused by this fungi, is close to the representatives of Fusarium species, often codominant them. The Alternaria alternate (Fr.) Keissler species has been recorded on the Semyonov fir. It mainly affects young needles on 1-3 year-old sprouts, on trees of different ages [Sagitov A.O., et al., 2008]. The initial stage of the disease is needles yellowing, then the tip of the sprouts dies, and a black plaque forms on the dead needles, which is a septic (multi-layered, compacted) thick-walled fungi mycelium. Disease signs on the seedlings are noticeable in the spring, in autumn they turn yellow, and die by the spring of the next year.

In addition, on the seed skin of the Semyonov fir, pathogens of hazardous fungal diseases (Trichothecium roseum and Myxotrichum chartarum) were found, which destroy from 20 to 40% of the seeds within 7 days with sufficient humidity. [Kalykova G.N., 2009].

Conclusion. In general, the existance of entomological and phytopathological pests in the forest is also a part of the entire forest biodiversity created by nature itself. The sanitary condition of fir forests can be assumed relatively positive. However, hazardous organisms exist there. In the process of vital activity of these hazardous organisms, healthy trees dry out, plantings lose their role and ability to natural renewal.

In order to prevent the focus of the disease and localization, it is necessary to carry out the following measures:

Organize continuous monitoring of fir forests. Conduct comprehensive research activities aimed at preventing the disease, selection of the persistent forms and propagation;

Prohibit temporary and permanent cattle camp and grazing of livestock in the forest, especially in the floodplain part of it;

Clean the forest and cutting areas from felling residues, windthrows and windbreaks and dry-topped dead fir trees. Trim and remove the lower wilted or shriveled branches of the affected mature tree. Clean up the affected young stands (up to 20 cm in diameter at stump height) and the dead fir undergrowth, collect it in a specially designated place and eliminate it by burning;

Strengthen the fir stands protection, conduct regular monitoring, consider quarantine declaring in the focus of diseases.

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СОДЕРЖАНИЕ

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ФИЗИКА

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