Селекционная работа с кукурузой ведется по направлению создания простых и сложных межлинейных и сортолинейных гибридов. Ведется семеноводческая работа по размножению родительских форм гибридов. Созданы новые высокопродуктивные ремонтантные гибриды кукурузы.

Выводы

Селекция зерновых культур в Кыргызском НИИ земледелия ведется по направлению создания высокоадаптированных сортов и гибридов пшеницы, ячменя и кукурузы. Агробиологический принцип размещения сельскохозяйственных культур позволяет найти экологическую нишу для них. Экологическое испытание сортов при этом играет решающую роль. На основе экологического испытания можно говорить о целесообразности возделывания той или иной культуры, сорта в конкретном регионе.

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МОНИТОРИНГ ГРИБКОВЫХ ПОРАЖЕНИЙ ОСИНЫ МЕТОДОМ АНАЛИЗА ДРЕВЕСНЫХ КЕРНОВ

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ЖЫГАЧ ӨЗӨГҮН АНАЛИЗДӨӨ МЕТОДУ МЕНЕН АСПЕНДИН ГРИБОКТУК ТААСИРИНЕ МОНИТОРИНГ ЖҮРГҮЗҮҮ

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MONITORING OF FUNGAL INFESTATION OF ASPEN USING INCREMENT CORES

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Аннотация: осина (Populus spp.) играет весьма значительную роль в формировании лесных массивов в восточноевропейских регионах. Такие осиновые древостои очень часто поражаются грибковыми заболеваниями, в первую очередь сердцевинной гнилью. В рамках нашего проекта было проанализировано непрямое влияние рубок прореживания на фитосанитарное состояние осинников посредством ускорения роста деревьев. Для оценки роста и степени поражения древесной гнилью у отобранных для исследования экземпляров деревьев были взяты керны.

Ключевые слова: Populus tremula (L.), сердцевинная гниль, сплошная рубка, эффекты рубок прореживания.

Аннотация: Көктерек (Populus spp.) Чыгыш Европа аймактарында токойлордун пайда болушунда абдан чоң роль ойнойт. Мындай көктеректер көп учурда козу карындардан, биринчи кезекте өзөк чиригинен, жабыркайт. Долбоорубуздун алкагында биз бак-даректардын өсүүсүн тездетүү аркылуу кыюуларды суюлтуунун көктерек токойлорунун фитосанитардык абалына кыйыр таасирин талдоого алдык. Өзөк чиригинин өсүшүн жана жабыркоо даражасын баалоо үчүн тандалган дарак үлгүлөрүнөн өзөктөр алынды.

Негизги сөздөр: Populus tremula (L.), өзөк чириги, ачык кыюу, кыюунун суюлтуучу эффекттери.

Abstract: Aspen (Populus spp.) has a very important function in the formation of forests in Eastern Europe and Asia. However, such aspen stands are very often infected by fungal diseases, most notably heart rot. During our study, the indirect influences of thinning on the phytosanitary health of aspen trees through promotion of tree growth were analysed. Increment cores were collected from selected trees for measurements to evaluate annual growth and degree of wood rot infestation.

Keywords: Populus tremula (L.), heart rot, clear cutting, thinning effects

European aspen (Populus tremula L.) is a fast-growing broadleaved tree species which is native to the colder temperate and boreal areas of both Europe and Asia [1] and is a very important element of forest formation, amongst others in the Republic of Tatarstan. There, aspen is one of the most rapidly developing tree species, with stands growing 2-2.5 times faster than oak or coniferous tree species. Aspen wood is in great demand as a building and decorative timber as well as a resource for furniture, pulpwood and matches [2]. But often these stands are seriously affected by fungal diseases (Phellinus tremulae (Bond.) Bond. et. Boriss), primarily causing heart rot, which has negative economic effects.

The potential of proactive management to overcome the negative effects of Ph. tremulae has been evaluated in many studies, e.g., the selection of aspens for morphological characteristics as the colour of the bark [2]–[4], the identification of better resistant female trees [5], the breeding of triploid aspen [6] or the identification of its most appropriate felling age [4], [5], [7], [8].

One aspect that has been little studied is the indirect influence of thinning on the phytosanitary health of aspen by supporting tree growth. For a closer look at this problem, a scientific team from the All-Russian Research Institute of Silviculture and Mechanisation of Forestry (ARRISMF), led by Barantchugov, created field trials in the Republic of Tatarstan, where different thinning types were conducted to evaluate the effects on the quality and tree health of aspen [9]. We used these field trials in our research to conduct an analysis of the impacts of thinning on wood quality and wood decay.

MATERIALS AND METHODS

Study area

The survey was conducted in the physical-geographical region «Predkamje» in Tatarstan in two locations in Kama and Mamadysh forest districts, designated as site A and B in the following (Fig. 1).

The region is characterized by temperate continental climatic conditions with both warm summers and cold temperate winters. July is the warmest month with an approximate maximum temperature of 25°C, while the coldest month is January with an average minimum temperature of –7°C. The annual total rainfall is 460-540 mm. The soils of the two sites could be typed as phaeozem.

Fig. 1 Map of the Republic of Tatarstan with the study sites Kama (A) and Mamadysh (B) indicated.

These two study sites are under the dominance of P. tremula (> 95 % of the basal area), mixed with individual trees of Acer platanoides (L.), Betula pendula (ROTH), Tilia cordata (Mill.) and Ulmus glabra (Huds.). The area is managed by the clear-cutting method using a rotation period of 40 years. Following clear-cutting, the stands are naturally rejuvenated, mainly by root suckering. The research plots were not managed since the last clear-cuts in 1982 (site A) and 1979 (site B) until 1997. In that year, Baranchugov performed a thinning experiment including a control and two types of thinning treatments: (a) thinning from below, where 30-50% of the basal area of P. tremula was removed (treatment «tfbelow»), and (b) mechanical thinning, where 70% of all trees in the plot area were eliminated with a three-metre-wide roller chopper (treatment «tmechanic»).

Tree-ring analysis

In August 2021, all living trees with a diameter at breast height (DBH) of >7 cm were calipered. Per plot, increment cores of ten dominant aspens were sampled. More exactly, two 5.2 mm increment cores per tree were extracted at breast height using a Haglöf increment borer, resulting in a total number of 182 cores. Following sampling, the cores were air-dried and glued on wooden holders. After that, the top surface of the cores was prepared with a WSL core microtome [10] to highlight the annual rings. An ATRICS system [11] was then used to digitise the cores. Tree-ring width measurements were made directly on the resulting digital images and visually and statistically crossdated with the software CooRecorder/CDendro (Version 9.6.3, Cybis Elektronik & Data AB, Sweden).

Wood rot analysis

Samples of wood cores from a tree trunk may be analysed for discolouration or rot along the cross-section of the sample [12]. This discolouration of the increment cores in this study was measured visually using CooRecorder (Fig. 2). The border of fungal damage (last ring of decay) was determined for all 182 cores and included in the statistical wood rot analyses of the surveyed stands.

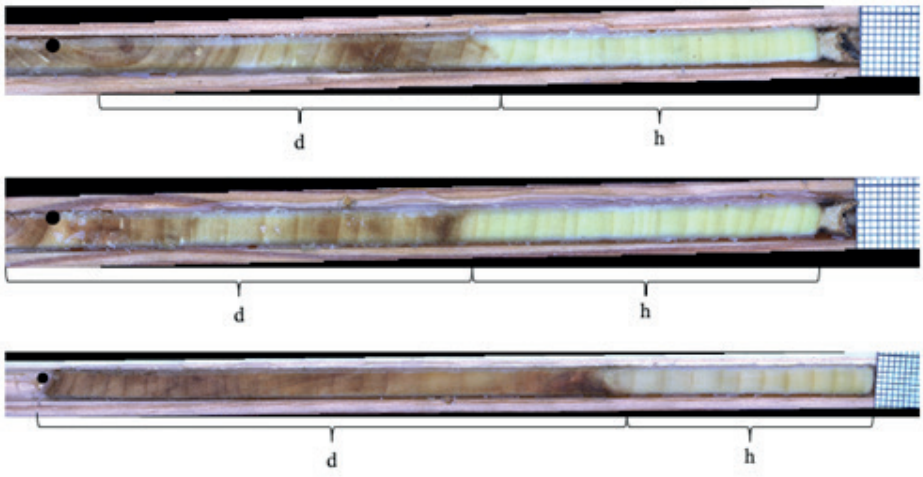

Fig. 2 Digital image of some increment cores with fungal damage towards the pith. Damaged (d) and healthy (h) wood is indicated.

The additional fungal identification of damaged wood was carried out by the independent biological testing laboratory of the Institut für Holztechnologie Dresden GmbH.

Statistical analysis

For the three treatment variants, we calculated and analysed the diameters (cm), the area (cm^2) and the percentage of area (%) with rot in the cross-section in relation to DBH. We used linear mixed modelling (LMM) to test the hypothesis that decay damage depends on the type of thinning. We applied the LMM based on the Restricted Maximum Likelihood (REML) approach, whereby the type of thinning (tfbelow, tmechanic or control) and the DBH are fixed effects.

RESULTS AND DISCUSSIONS

Average tree diameter in 2021 were 24.0, 22.8 and 25.2 cm for the control, the tfbelow variant and the tmechanic variant, respectively. Measured trees in all variants had diameters ranging from 18 to 30 cm, and the mean diameters of the trees studied did not significantly differ between the variants. The rotting grade in the core samples ranged from 10 to 53 %.

From the PCR amplification and NCBI results, the DNA of various basidiomycota was identified in all 30 wood samples analysed. The DNA of Ph. tremulae, which was identified in the tree slices in the preliminary assessment, was not verified in the PCR analysis of the core samples, probably related to the specific localisation of the pathogen and the non-targeted PCR analysis. A number of literature sources identify Ph. tremulae as the only source of core wood rot in aspens in Eastern European forests [2], [8], [13]. In this regard, the laboratory analyses of our cores show even more species of fungi. So, damages of aspen are not only caused by the white rot Ph. tremulae, the most common disease in this geographical zone [2], [14], and also by other basidiomycetes that are secondary infections or saprobionts on the aspen.

The differences in the grade of decay between trees in plots with different thinning-variants was easily recognisable in the core samples, confirming that the analysis of increment cores provides a quick and easy investigation of the various wood compounds [15] as well as a visual quality evaluation of rot damage [12].

In addition, the most significant finding was that the thicker the aspens in the plots with mechanical thinning (DBH ⩾ 28 cm), the lower their rotting rate. However, this effect was not significant in the variant with manual thinning, where the annual growth did not increase as much as in the plots with mechanical thinning. Similarly, the data gathered verify the theory of Vihrov et al. (1966), that the rate of core rot spread in stems from growing aspens depends, besides other factors, on the age and the growth rate.

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ОЦЕНКА ВЛИЯНИЯ АВТОМОБИЛЬНЫХ ВЫБРОСОВ НА МИКРОФЛОРУ ПОЧВ Г. БИШКЕКА

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Аннотация. В результате рассеивания выхлопных газов в сероземной почве транспортной зоны города Бишкека интенсивно накапливаются тяжелые металлы Pb, Ni, Zn, Cu и др. Приоритетными загрязнителями являются Pb и Ni, содержание которых превышают ПДК 2,8 – 4,6 и 10 - 12,5 раза. Экологические особенности загрязненных почв как среды обитания микроорганизмов транспортных зон г. Бишкека до настоящего времени не исследовались. Таким образом, исследования показали, что микроорганизмы, обитающие в урбоноземах, активно реагируют на загрязнение: в микробном комплексе уменьшается относительная доля актиномицетов и микромицетов. Бактерии рода Azotobacter заметно адаптируются к загрязнению, накапливая пигмент меланин.

Ключевые слова: загрязнения, тяжелые металлы, урбаноземы, почвенные микроорганизмы.

АВТОУНААЛАРДАН ЧЫККАН ЗЫЯНДУУ ЗАТТАРДЫН БИШКЕК Ш. ТОПУРАК МИКРОФЛОРАСЫНА ТИЙГИЗГЕН ТААСИРИН БААЛОО

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Аннотация. Бишкек шаарынын транспорттук аймактарынын боз топурактарында бөлүнүп чыккан газдардын таралышынын натыйжасында оор металлдар Pb, Ni, Zn, Cu ж.б. интенсивдүү топтолууда. Приоритеттик булгандыруучулар болуп Pb жана Ni аныкталды, алардын кармалышы ЧКдан 2,8-4,6 жана 10-12,5 эсе ашат. Бишкек шаарынын транспорттук зоналарында микроорганизмдердин жашоо чөйрөсү катары булганган топурактардын экологиялык өзгөчөлүктөрү ушул күнгө чейин изилдене элек. Ошентип, изилдөөлөр шаар кыртышында жашаган микроорганизмдер булганууга активдүү таасир этерин көрсөттү: микроб комплексинде актиномицеттердин жана микромицеттердин салыштырмалуу үлүшү азайган. Azotobacter тукумундагы бактериялар меланин пигментин топтоо менен булганууга байкаларлык ыңгайлануусу белгиленди.

Негизги сөздөр: булганууу, оор металлдар, урбанозем, топурак микроорганизмдери.

ASSESSMENT OF THE IMPACT OF VEHICLE EMISSIONS ON SOIL MICROFLORA IN BISHKEK

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Annotation. As a result of the dispersion of exhaust gases in the gray earth soil of the transport zone of Bishkek, heavy metals Pb, Ni, Zn, Cu etc. are intensively accumulated. The priority pollutants are Pb and Ni, the content of which exceeds the MPC 2.8-4.6 and 10-12.5 times. The ecological features of contaminated soils as a habitat for microorganisms in the transport zones of Bishkek have not yet been studied. Thus, studies have shown that microorganisms living in urban soils actively respond to pollution: in the microbial complex, the relative proportion of actinomycetes and micromycetes