THE SPREAD OF DISEASES IN VOLYN REGION FORESTS

Introduction. Sanitary and sanitary events are the part of preventative measures that take place by the forest users in order to preserve stability of plants, prevent the development of pathological processes in the forest, decrease of damage that is caused by the pests, diseases, natural phenomena and technogenic effects (Manion, 1991; Cherubini et al., 2002). 539.7 ha of disease concentrations faded under the influence of natural factors. 2716.8 ha of new ones arose during the year (Turko et al., 2016).

Health-improving measures are established in order to protect and save forests. Health-improving measures are part of preventive treatment which is to keep the rigidity of forest crops, to prevent the development of pathological processes in the forest, to lower the harmfulness caused by insect pests, diseases, natural calamities and anthropogenic influence (Lonsdale et al., 2008).

Materials and Methods. The research was held on the basis of the standardized document in force and recommendations based on usage of sanitary investigation, the results of forest health monitoring and statistical data of forestry enterprises (Vorontsov, 1978; Sanitarni pravyla u lisakh (Ukr.) 1980; 369 ha; alder fungus (Heterobasidion annosum) – 216 ha; much smaller (Armillariella mellea) P. Kumm. 1871) – 183 hа. In order to protect and preserve forests when forestry proceedings, a complex of sanitary and recreational events and sanitary requirements are taking place.

Keywords: sanitary cuts; wood decay; sanitary condition of the forests; dynamics of diseases and pests; plantings affected by pathogens.

Results and Discussions. While analyzing the sanitary state of Volyn forests we can see that the dynamics of area, affected by forest pests, diseases and damages by abiotic factors is negative in forest pathological meaning. By the end of 2016 the land areas with the concentration of forest diseases have increased with 957 hа (3.9 %) as compared to the last year and constitutes 25.234 hа. The dynamics of sanitary selective fellings continues decreasing after 2010 (Fig. 1). According to the reported data the biggest amount of cubic meters of selective sanitary fellings was in 2010 and constituted 193.751 m³. In 2015 this number changed to 46.528 m³, which is four times less. The plan of sanitary fellings for 2016 was about 75.000 m³ of wood.
Their amounts have significantly declined compared to the plan and constitutes 74 % (cubic measure). While sanitary selective fellings were conducted it was revealed that the selection of cubic measures from 1 hectare has increased with 0.7 m$^3$/ha in comparison with the previous year. Since 2005 and up to 2010 the amount of selective sanitary fellings has been continuing to grow. And since 2011 it has been constantly decreasing. By the end of the accounting period the smallest amount of fellings has been registered for the last 10 years. The amount of cubic meters that have been obtained from 1 ha in 2015 has also been the lowest for the last 10 years.

The dynamics of selective sanitary fellings is also characterized by the smallest amount of such ones conducted in the current year for the last 10 years (Fig. 2). And compared to 2009 it has become three times lower and equals 4286 ha. The delivery of this plan accounts for 64 %.

The amount of solid sanitary fellings in 2015 is 1821 ha, which has reached the maximum point for the last 10 years (Fig. 3). Volyn region climate conditions are characterized by moderate continental climate with warm summers and mild winters, which is generally beneficial to the growth and development of the forests. The major factor of the deterioration in the condition of the forests and the decrease in forest expansion are weather changes. They became the cause of extreme climate conditions (drought or lowering of ground water level) which are frequent. The average precipitation level has decreased with 2.5 %, and the annual amount of effective temperatures with 1.7 % for the last 20 years (Vyshnevsky, 2014).

Insect pests are not taken into account because their amount is low and doesn't influence the research. The largest land area of fellings was held because of the fire reasons in the current year. Also the major factor is that the present year is characterized by the drought season. The increase of disease concentrations in the forest occurred mainly because of the root fungus nucleus (Heterobasidion annosum). The biggest disease area is a root fungus (Heterobasidion annosum). Its square area in comparison with the previous year has increased to 4.5 % and now it occupies 13.961 ha. In the current year 1590 ha of root fungus nucleus emerged (Heterobasidion annosum), and only 708 were eliminated by sanitary cuts.

This disease is in progression in pure plantations on barren soil. An important factor of the spread of this disease is...
the creation of pine single-crop cultures on previously cultivated land and the critical age of this kind of disease. The crucial negative factor is the lack of attention of forest service to forestry enterprise in project management and sanitary examinations in the places of the low degree of damage. As a result, the massive attack of weakened trees (III – IV category of sanitary state) is being observed by hyperparasites which cause negative influence on destabilization of forest pathological situation, especially the forest crops weakened by the root fungus (*Heterobasidion annosum*).

According to the sanitary examination reported data the biggest locations of root fungus (*Heterobasidion annosum*) were revealed in State Establishment "Starozhytske Forestry Enterprise" – 1665 ha, State establishment "Maynetske forestry enterprise" – 2341 ha, State establishment "Liubeshivske Forestry and Hunting Enterprise" – 970 ha, State establishment "Kamin-Kharsynske forestry enterprise" – 810 ha, State establishment "Liubomolske Forestry Enterprise" – 1223 ha, State establishment "Ratmivske Forestry and Hunting Enterprise" – 882 ha, State establishment "Ratnagorilis" – 799 etc.

As well as in previous years, diseases that provoke stem rot – Aspen fungus (*Phellinus tremulae*) (Bondartsev) (Bondartsev & Borisov, 1953), Birch polyporus (*Piptoporus betulinus*) (Bull.) P. Karst., 1881, Red rot of pine and larch (*Phellinus pini* (Brot.) Bondartsev & Singer, 1941), Alder fungus (*Phellinus igniarius* (L.) Quél., 1886), Oak fungus (*Daedalea quercina* (L.) Pers. 1801 etc.) have become widely spread. As to the data about Oak fungus (*Daedalea quercina* (L.) Pers. 1801), Birch polyporus (*Piptoporus betulinus* (Bull.) P. Karst., 1881), Alder fungus (*Phellinus igniarius* (L.) Quél. 1886), they defeat extraneous substance of main forest breeds where the age of technical ripeness was reached (in some cases it over ripped) and such trees as aspen, birch and alder degenerate.

Concerning the Red rot of pine and larch (*Phellinus pinii*) and Oak fungus (*Daedalea quercina* (L.) Pers., 1801) the diseases are mainly spread in overriped wood. The age of main usage was prolonged because these forest crops were unexploited.

Aspen fungus (*Phellinus tremulae*) (Bondartsev & Borisov, 1953) nucleus occupies 993 ha by the end of 2016, where 18 ha need some control measures. Red rot of pine and larch (*Phellinus pinii*) nucleus occupies 562 ha by the end of 2016, where 248 ha need some control measures.

Oak fungus (*Daedalea quercina* (L.) Pers., 1801) nucleus occupies 676 ha by the end of 2016, where 230 ha need some control measures. Birch polyporus (*Piptoporus betulinus* (Bull.) P. Karst., 1881) nucleus occupies 657 ha by the end of 2016, where 283 ha need some control measures.

Stem rot (*Fomes fomentarius* (L.) Fr. 1849) nucleus occupies 2363 ha by the end of 2016, where 892 ha need some control measures. Diametrical Oak cancer (*Pseudomonas nas Schern.*) nucleus occupies 922 ha by the end of 2016, where 328 ha need some control measures.

Alder fungus (*Phellinus igniarius* (L.) Quél., 1886) nucleus occupies 313 ha by the end of 2016, where 137 ha need some control measures. Pitch streak (*Cronartium flaccidum* (Alb. & Schwein.) G. Winter, 1880) nucleus occupies 369 ha by the end of 2016, where 92 ha need some control measures.

Bacterial ash cancer (*Pseudomonas savastanoi* (Janse, 1982) Gardan, et al., 1992) nucleus occupies 216 ha by the end of 2015, where 114 ha need some control measures. Much smaller land area occupy such diseases as honey mushroom (*Armillaria mellea* (Vahl) P. Kumm., 1871) – 183 ha, birch fungus (*Lenzites betulina* (L.) Fr., 1838) – 84 ha etc.

**Conclusions.** After conducting our research, we can make the following conclusions:

1. The most influential factor on sanitary condition of Volyn forest ranges in 2016 was a long drought season which lead to the decrease of ground water level. The land area of weakened and drying plants has increased. Besides, a major harm was made to the forest plantations by heavy winds that were noted in the middle of the summer during the current year that happened on the territory of north-western forestry enterprises. Also, forest fires and their record square surface was noted and registered in the current year as well.

2. The lack of humidity can be noticed because of the long lasting period of the drought season proportionally on the whole territory of the region. The drought is revealed on small surfaces which is, probably, the result of the land form and the micro-climate where the drought takes place. During the year 2016, 321 ha of forest crops that have perished as a result of the ground water level lowering and the ground water level fluctuation were examined.

3. The drought of tertiary fir forest crops that have reached maximum age is also a global problem which characterizes Volyn forests sanitary state. This problem is mostly visible in southern forest regional enterprises. The drought is caused by the damage to the crops that arose as a result of root rot and massive invasion of pests. One of the drought reasons might be the fact that the territory of western Polissia isn’t a natural habitat for pure pine tree plantations.

4. Root fungus (*Heterobasidion annosum* (Fr.) Brek.) has developed rapidly because of the long lasting drought season and the ground water level decrease. During 2016 Volyn RFHIA enterprises tried to solve the problem by solid sanitary fellings in the areas of 332 ha with disease concentration. This is 2.4% from the general land area of these nucleuses.

Перелік використаних джерел

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Рассмотрены особенности распространения и динамика развития очагов болезней в лесах Волынской области. Отмечено, что динамика очагов болезней леса является отрицательной в лесопатологическом отношении, а площадь очагов наиболее опасных болезней леса за 2016 г. увеличилась на 954,8 га (3,8 %). Освещены основные проблемы и тенденции санитарного состояния лесов и дана характеристика очагов болезней леса в разрезе Волынского ОУЛМГ. Показана динамика выбо- рочных санитарных рубок и сплошных за последние 10 лет и распределение СРС по причинам расстройства в разрезе Во- лынского ОУЛМГ. Проанализировано санитарное состояние лесов Волыни, установлено, что в общем ликвидировано мерами борьбы и списано в течение отчетного года 1220,5 га очагов болезней, затухли под действием естественных факторов 539,7 га очагов болезней, возникло в течение года 2716,8 га новых очагов. Выявлено, что наиболее распространенным заболеванием является корневая губка (Heterobasidion annosum (Fr.) Bref. 1889). Ее площадь, по сравнению с предыдущими годами, увеличилась на 4,5 % и составляет 13961 га. В 2016 г. возникло 1590 га очагов корневой губки, а ликвидировано за счет борьбы 708 га. Установлено, что наиболее распространенными болезнями по площади в лесах области также являются стволовая гниль (Fomes fomentarius (L.) Fr. 1849) – 2363 га; осиновый трутовик (Phellinus tremulae (Bondartsev & Borisov, 1953) – 993 га; поперечный рак дуба (Pseudomonas quercus Schern.) – 922 га; ложный дубовый трутовик (Daedalea quercina (L.) Pers.1801) – 676 га; березовая губка (Piptoporus betulinus (Bull.) – 657 га.

Ключевые слова: санитарно-оздоровительные мероприятия; санитарные рубки; санитарное состояние; пораженные патогенами насаждения.