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PERSPECTIVES OF USE OF NATURAL REGENERATION IN OAK FORESTS IN THE FOREST-STEPPE ZONE ON RIGHT BANK OF DNIEPER

V. Levchenko, candidate of agricultural sciences

The factors that affect the survival of the natural regeneration in common oak stands and on clearcuts in the Forest-Steppe zone on Right-bank of Dnieper are presented. The ways and the main tasks for oak regeneration management in natural oak stands are presented.

Natural regeneration, common oak, fruiting, clearcut, oak stands.

At the present stage of forestry development one of the most important task is to develop basics of forest management, which would contribute to the renewal and increasing of forest resources through maximum use of natural seed potential of forest plantations. This can significantly reduce the cost and time of creating long-lived, highly productive and biologically stable stands.

Natural seed regeneration is spontaneous in nature, but this spontaneity has its laws, which should be investigated, studied and used in the forestry.

The purpose of the research is to explore the factors that affect the quantity and quality of natural regeneration of common oak in stands and logging areas on the Right-Bank Forest-Steppe of Ukraine, suggest ways and identify the main tasks of caring for logging areas with natural regeneration of common oak.

Material and Methods. The measurement of natural seed regeneration of common oak under forest canopy and on logging areas were performed on temporary sample plots (1.0 ha) by placing on them 25 evenly located areas the size of 2.0×2.0 m [2]. Natural seed regeneration was divided into four groups by density: sparse - up

to 3.0, medium – 3.1-8.0, bushy – 8.1-13.0 very bushy - more than 13.0 thousand units per hectare [4].

Fruiting of wood species in forest plantations, seed germination and emergence of seedlings, the development of self-seeding and undergrowth are necessary steps of natural regeneration of forest that ends up by canopy closure of the young forest stand. To obtain a sufficient number of young generation of economically valuable species is required to carry out activities to promote natural regeneration at each stage.

Fruiting depends on the internal biological characteristics of tree species and external environmental conditions: climate, soil, stand density, class of age and so on. The ability of oak to the annual fruiting is not always realized due to unfavorable climatic conditions for the emergence of flowers, fertilization of ovaries and ripening of fruits[4]: presence of late spring frosts during flowering lead to icing of flowers and young shoots of oak; high summer temperatures, humidity deficit of air and soil, arid second part of summer lead to premature abscission of immature acorns of oak; winter with frequent thaws, hail, downpour, hurricanes, damage by pests and disease lesions.

These environmental factors negatively impact on oak fruiting, significantly reducing it. For oak fruiting also affects canopy density. It is known that well-lit trees on the open space and forest edges have a well-developed crown, so they fructify better than shaded trees with poorly developed crown.

High density of forest stands negatively affects for their growth, causes abnormal development of the crowns, fruiting of trees and reduces overall productivity of stands.

The results of research. In oak stands of the Right-Bank Forest-Steppe of Ukraine prevailing poor (2 points) and middle (3 points) fruiting of oak [1, 3].

In order to improve fruiting of oak from the age of thinning it is necessary to create optimal conditions of light and crowns development of evenly placed on the area oak trees. Such conditions can be created keeping canopy density of layer in which is oak at 0.6-0.7. This canopy density will ensure the best conditions for

pollination, formation of the optimal length of oak crowns from 1/3 to 1/4 of the trunk height, also will positively influence for the dying of withering branches, cleaning stems from knots, process of photosynthesis, etc.

Germination of acorns depends from their surviving after falling, from fauna injury and adverse environmental factors. After falling on the soil surface, oak acorns are becoming food for wild boars, whose number should be regulated to the optimal or areas that have natural regeneration of oak should be enclosed. During the good and abundant fruiting of oak there are enough acorns for eating boars, rodents, birds and for the appearance of a young generation of forest.

For germinating acorns require water, oxygen and heat that are sufficiently hosted under a canopy of oak stands. Therefore, acorns germinate good and become seedling.

Analyzing the distribution of natural seed regeneration under a canopy of premature, mature and over-mature oak plantations of varying canopy density in state enterprises of Kiev, Vinnitsa and Cherkassy oblast departments of forestry and hunting [1, 3], It may be noted that most of the renovation of oak (2.5 - 34.0 thousand units per ha) was observed in stands with middle canopy density (0.6 - 0.7), and the lowest - in high canopy density stands (0.8 - 1.0). Increasing of canopy density to 0.8 and above significantly reduces illumination under canopy of oak stands, which negatively effect on growth and development of oak regeneration (0.3 - 3.0 thousand units per ha). Reducing of canopy density in oak stands to 0.4 - 0.5 contributes to sod formation on soil with sedge-grass vegetation and proliferation of undergrowth that prevents germination of oak acorns and normal growth and development of its self-seeding and regrowth (4.3 - 14.3 thousand units per ha).

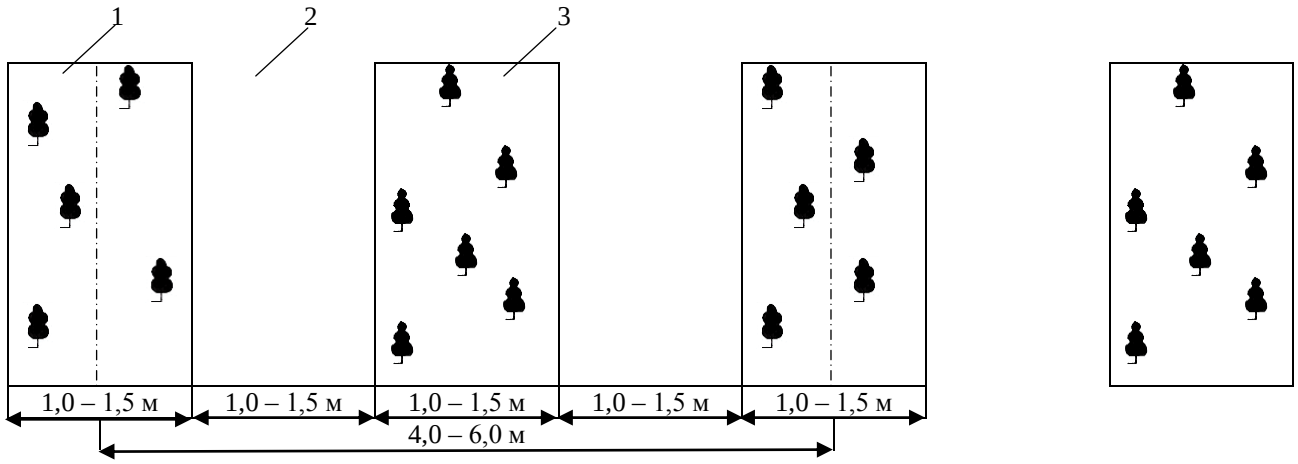
The largest part of doubtful 36.4 - 39.0% and dry 15.7 - 18.0% oak regeneration observed in the high canopy density oak stands (0.8 - 1.0). This is because oak is intolerant tree type and can not grow in terms of long-term shading. If the need of light with the age is not satisfied, then undergrowth of oak turns into the "storchky" or dies. Conservation of natural regeneration of oak under a canopy of parental stand can be achieved through reforming cutting, regeneration cutting or

complex methods of final felling with the use of technologies, which allow preserve the natural regeneration of the main species. This will promote uneven, long-lived, highly productive, bio-stable stands and will respond with the multifunctional forest management based on the principles of close to nature, taking into account social, environmental and economic requirements enhance biodiversity conservation based on natural processes.

The largest number of natural regeneration of oak observed after clear cuttings, where the major harvesting was carried out in autumn and winter after falling acorns and before germination. Poor preservation of natural regeneration of oak is observed on the logging areas, where major harvesting conducted in the spring summer periods after germination of acorns and oak seedling formation.

There are frequent occurrence of very dense natural oak seed regeneration (22 - 70 thousands of units per ha) on the logging areas after medium or good fruiting of oak. Such quantity of oak in 6-19 times greater than amount required for artificial oak regeneration.

On the logging areas with natural regeneration of oak at the beginning of the growing season the first maintenance can be carried out with the use of chemicals, and in further restrict the conduct of maintenance only in the left stripes with the presence of natural regeneration of oak, width of stripes need to be from 1.0 to 1.5 m (stripe 1, see picture).



Scheme of maintenance by stripe method on logging areas with dense natural seed regeneration of oak:

1 - stripe with the presence of natural regeneration of oak;

2 - stripe of complete removal of grass and woody vegetation;

3 - stripe with the presence of accompanying oak tree species.

The main objective of maintenance in oak young stands is to take oak to the top layer and the creation of complex for the shape forest stands with the second layer [4]. In order to prevent suppression of oak by herbaceous and woody vegetation it is necessary to conduct it continuous removal in stripes width from 1.0 to 1.5 m (stripe 2, see picture).

It should also be remembered that the oak is specie from mixed forests, so it grows better when on the sides it is surrounded by shade-tolerant tree species satellites - linden, maple, hornbeam, elm, which form a "guard", and thus increase the growth of oak in height, forming a slender trunk and protect it from adverse factors.

Therefore, during the thinning in oak stands, need to remember about the presence of the tree species satellites of oak, their share of participation in the young forest stand should be 2-3 units [4]. For this purpose on the area should be left stripe 1.0 - 1.5m width, where will be saved satellites species regenerated by seeds (stripe 3, see picture).

Conclusions

In the oak forests on the Right-Bank Forest-Steppe of Ukraine should be increasing the number of areas that renewed naturally, with the advantage in the composition of natural regeneration of common oak. In order to improve fruiting of oak needs to maintain optimal canopy density by the timely and efficient conduct of thinning. Clear cutting should be performed in autumn and winter after falling acorns and before the germination of oak. Chemical care in oak young stands of natural origin should be applied before bud burst on oak. On the logging areas with dense natural seed regeneration of oak, care should be carried out for oak on scheduled stripes 1.0 - 1.5 m width.