

**ЗЕМЛЕДЕЛИЕ, АГРОХИМИЯ, КОРМОПРОИЗВОДСТВО, АГРОЭКОЛОГИЯ,  
ЛЕСНОЕ ХОЗЯЙСТВО И ВОДНЫЕ РЕСУРСЫ**

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**REGULARITIES OF FRUITING SCOTCH PINE AND FACTORS  
AFFECTING SEED YIELD VALUE**

**Abstract**

The most important prerequisite for successful natural regeneration of tree species is the presence of seeds as under forest canopy and in clearings. The law of the maximum increase in the number of species in wild plants is carried out in the conventional natural environment, not modified by man, and addressed to the prosperity and progressive development of species. Natural selection under conditions of free interbreeding and interrelated influence of natural factors promotes the emergence of many varieties and forms of species in heterogeneous environments which are important factors in determining specific characteristics in the manifestation of the basic law of life in wild plants.

**Keywords:** the formation of cones, pine, seed ripening.

**Introduction**

In the development of the generative organs of all woody plants two major periods as embryonic (time of planting and the formation of germs in the kidney) and post-embryonic can be distinguished, which starts with flowering and ends with maturation of the seeds.

**Materials and methods of research**

The formation of pine cones takes place during three vegetation seasons. In order to facilitate further exposition, let us assume the symbol of years for pine trees during which the bumps are formed, according to T. P. Nekrasova:  $n$  – year bookmarks of generative organs and flowering;  $n+1$  is the year of the end of the embryonal development of generative organs and flowering;  $n+2$  – year fertilization, growth and development of seeds in cones;  $n+3$  – year of the seeds departure [1].

**Research results and discussion**

Pine embryonal period lasts about 12 months – from June of  $n$  year till June  $n+1$  year; post-embryonic period spans two growing seasons in  $n+1$  and  $n+2$  years and the winter between them. In total, from laying the rudiments of the female cones before the seeds ripen. Period for pine in Western Siberia is about 27 months, from flowering to seed maturation for about 16 months. Bookmark male generative rudiments takes place in June. During the summer, the main elements of the future of the male inflorescence are formed with the exception of the pollen, and in this condition the male bud winters. In May in  $n+1$  year the male buds begin to grow very rapidly in length and thickness. At the end of May epithelial scales fall away from them, and the pollen matures. By the end of May the male cones lose their juiciness, become yellow, all the male inflorescence becomes loose, and the moment of departure of the pollen comes. Tab

rudimentary female cones occur somewhat later than male. The actual laying of the primary meristem of the female generative rudiments happens in the second half of July. The germ of the upper bumps occur on the upper end of the embryonic growth of the same escape on the side of the cone buildup. At this time a bump meristematic tissue covers with scales. It has several increases in size before winter and begins to differentiate at the base it lays bumps – the lower ranks of future covering scales. In this state, the shoot with the female bud winters, it has form of kidneys. In May, female's shoots begin to grow later than male's, acquire a cylindrical shape with a thickening at the top, which makes it very good to distinguish them from shoots with male cones. By the middle of May the seed scales are formed and in the following days the ovules appear in the form of bubbles. The female cones are completely freed from the outer scales over the next few warm days, grow until 4-5 mm, seed scales develop into opaque. Color of cones becomes bright crimson. Seed scales at this time are widely separated, which enables access of the pollen. In the forest-steppe and South Taiga regions, the pollen of pine fly occurs in late May and at the beginning of June, and in cool spring it is delayed until mid-June. The date of flowering is determined by the degree of formation of generative organs and mainly depend on the weather in May. Particular importance in this period is heat.

Successful preparation for the blooming of pine takes place at a high temperature of May not below than 10°C. On this basis time of flight of pollen is verified in different areas.

Pollinated female cones soon after flowering closes the scales and change bright color to the brown. Their length at this time is about 0.05 cm, the shape is almost round.

During the summer  $n+1$  the germination of pollen grains occurs inside of pollinated female knobs but it is suspended in winter period as the pollen and ovule are at rest in winter. The second growth period begins with the warm spring days of the year  $n+2$ ; where fertilization, growth and development of seeds in the cone take place. Thus, from pollination to fertilization in pine is about 13 months.

The natural flight of seeds or the year of flight of seeds ( $n+3$ ) steppe forests of the Western Siberia in drought years begins in late April and ends usually by the end of May and the beginning of June.

N.N. Egorov, who conducted observations of the seed-bearing pines in the middle of pine forests indicates that the start date of disclosure cones and fly of the first seed is determined by the sum of positive air temperatures, which for this region in 1931 was 67.8, in 1932 - 62.6 and in 1933 – 63.2 [2].

According to the observations of L. N. Griбанова in the steppe forests of the sum of positive air temperatures were equal in 1954 (the middle year); in Arakaragai Bor was 100, in Munchakinsk bor- 75, in Naurzumbor- 60. Very dry period in 1955 was Arakaragai Bor 70, Munchinsky Bor 66 and nowadays the Naurzum pine forest 66 [3].

Thus, with increasing dryness of the climate for opening pine cones you need lower the sum of positive air temperatures.

As rule, maximum seed falls to the ground from cones in pine bor within 2-3 for five days from the beginning of fly from the cones of the first seeds. Moreover, in the first period from the beginning of the opening of cones on the soil fall heavier and with the best germination of pine seeds. Subsequently weight of them at the end of the period on the soil fall empty and small seeds, mostly not viable [3].

According to K. T. Abaeva, the best germination of pine seeds was observed at a temperature of 16-20°C the soil surface. The germination shoot occurs in the shortest possible time – within 8 to 11 days [4].

### Conclusion

Thus, self-seeding forest of natural origin arise, in the conventional natural condition, distinguished by their hereditary properties from forest artificial plantations. Crop plants can increase their numbers only in environments artificially created by man. The life and breeding of crop plants without human assistance is impossible.

While forests remain pristine, they normally grow and are renewed on a huge territory with a wide variety of soils and climatic conditions. All of the properties and characteristics of wild plants suitable for the species, ensure its resilience and mass reproduction in the conventional natural environment. To maintain high viability and selfrenewability of wild plants – that's the biological basis for the regulation of conditions of growth and reproduction of trees.

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### ҚАРАҒАЙ ЖЕМІС САЛУ ЗАҢДЫЛЫҚТАРЫМЕН ФАКТОРЛАР, АСТЫҚ ТҰҚЫМШАМАСЫН ӨСІРУ СЕБЕПШІСІ

#### Андатпа

Маңызды алғышарты табиғи жаңаруды ойдағыдайдамуы, орман астарында, сондай-ақ ағашы кесілген жерлерінде тұқым болуы болып табылады. Заң бойынша түрі-жабайы өсімдіктерді санының ұлғайту әдеттегі табиғи жағдайға жүзеге асырылады, адам өзгерпеген, өсіп-өркендеуі мен қарқынды дамыту бағытталған. Табиғи іріктеу жағдайында еркін шағылыстыру және өзара ықпал табиғи факторлардың пайда болуына ықпал етеді көптеген сорттары мен нысандарын түрдегі біртекті емес жағдайында сыртқы ортаның маңызды факторлар, спецификалық ерекшеліктері анықтайды, бұл жабайы өсімдіктің заңды көрсеткіші.

**Кілт сөздер:** түршік қалыптастыру, кәдімгі қарағай, тұқымжетілу.

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### ЗАКОНОМЕРНОСТИ ПЛОДОНОШЕНИЯ СОСНЫ ОБЫКНОВЕННОЙ И ФАКТОРЫ, ОБУСЛАВЛИВАЮЩИЕ ВЕЛИЧИНУ УРОЖАЯ СЕМЯН

#### Аннотация

Важнейшей предпосылкой успешного естественного возобновления древесных пород, как под пологом леса, так и на вырубках является наличие семян. Закон

максимального увеличения численности вида у диких растений осуществляется в обычной природной обстановке, не измененной человеком, и направлен на процветание и прогрессивное развитие вида. Естественный отбор в условиях свободного скрещивания и взаимосвязанного влияния природных факторов, способствует появлению многих разновидностей и форм вида в неоднородных условиях внешней среды – важнейшие факторы, определяющие специфические особенности в проявлении основного закона жизни у диких растений.

**Ключевые слова:** формирование шишек, сосна обыкновенная, созревание семян.

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#### INFLUENCE OF RESOURCE-SAVING TECHNOLOGY METHODS ON PRODUCTIVITY OF RAPE AGROECOSYSTEMS

##### **Abstract**

This article is aimed at studying the ecophytosanitary state and the productivity of the agroecosystem, depending on the effect of resource-saving technologies, such as minimizing soil cultivation, placing rapeseed in a short rotation crop tillage, timing and seeding rates. It is proved that minimization of soil cultivation and optimal location of rapeseed in short rotation crop tillage are the most important biological factors for increasing the ecophytosanitary state of the agroecosystem. Depending on the correct location of the rapeseed crop for the best predecessors and the scientifically-based selection of the time and the seed rate, the eco-phytosanitary condition stabilizes and yields significantly increase.

**Keywords:** rapeseed, agroecosystem, technology, techniques, agrophytocenosis, weeds, resource-saving technology, productivity.

##### **Introduction**

The consequences of rapid technical improvement and technological development of national economy under the modern civilization exacerbate the problems of ecological balance. The consumer attitude of mankind to the environment leads to multiple negative consequences, which dictate the need for rationalization of using natural resources, which shall balance human existence with unharmed natural resources [1, 2]. Agriculture is among the first to undergo these negative anthropogenic changes. Agroecosystem, which is essentially a mechanism for sustainable cultivation of natural resources, is fundamentally different from natural ecosystems and takes a key part in fluctuating ecological equilibrium of this ecosystem [3, 4].

Modern agroecosystem has biological productivity or biological capacity. The population size of certain species included in them fluctuates because of constant changes in abiotic and biotic factors. Factors affecting the density of species' population include competition among species in relation to food and space. Interspecific competition arises in case of different types of identical or similar requirements to environmental conditions. The competition intensifies with increasing shortage of means of subsistence between the components of agrophytocenosis. As a rule, the density of population of various groups of organisms in the agroecosystem is maintained at the optimal level by means of effective techniques of crop cultivation technology