

SEED PRODUCTIVITY OF ALFALFA DEPENDING ON THE METHODS OF CROP TENDING

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In solving the problem of increasing and stabilizing the production of feed protein in Ukraine, the yield enhancement in alfalfa as a leading forage legume culture is of great importance. Until recently, the level of seed yield (70-85% of the potential) of this crop has remained low and unstable [1, p. 32].

By fixing nitrogen from the air, alfalfa leaves, together with root and crop residues, up to 150-170 kg/ha of biological nitrogen in the soil. An increase in the planting acreage of alfalfa will enable to preserve the deficit-free balance of humus in soils and their fertility.

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All operations of the single technological process of cultivation of seed alfalfa create the preconditions for soil improvement in crop rotation, reducing populations of harmful insects, weeds, pathogens and accumulation of useful organisms [2, p. 236].

The loosening between rows improves the conditions of the growing season, temperature, air, water, nutrients and microbiological soil regime.

In the Forest-Steppe and Steppe, loosening prevents the formation of deep cracks, losing moisture, and reduces the soil overwarming. An increased gas exchange in the soil improves the activity of free-living nitrogen-fixing bacteria, beneficial microorganisms, nitrification processes, etc.

In the areas of sufficient moisture on light loam and sandy loam soils, the main objective of inter-row cultivation is the protection from weeds and the creation of optimum plant stand that increases the seed productivity of alfalfa [3, p. 112].

In the development of new improved technology of the production of alfalfa seed, a particular focus should be placed on wide-row spaced planting; measures to increase the number of wild pollinators; the protection of crops from pests and weeds; the modes of use of seed plant stand; reduction in loss of seeds at harvest due to the technological methods of crop tending [4, p. 15].

Phosphoric fertilizers significantly increase the seed productivity of alfalfa. They have a positive effect on the growth of the root system, the development of top, contribute to the formation of a greater number of generative stems, flowers, beans and increase winter hardiness [5, p. 130].

The goal of our research is to determine the effect of inter-row loosening on the seed productivity; to study the effect of the inter-row cultivation on the formation of vegetative mass of plants, the passage of the main phases of alfalfa development.

The experimental design: 1) alfalfa according to the conventional technology (check I); 2) $P_{90}K_{90}$ to the basic application (check II); 3) $P_{90}K_{90}$ + early cutting down + 2-time inter-row loosening to a depth of 5-6 and 10-12 cm; 4) $P_{90}K_{90}$ + 2-time inter-row loosening to a depth of 5-6 and 10-12 cm; 5) $P_{90}K_{90}$ + 3-time inter-row loosening to a depth of 5-6, 10-12 and 20 cm; 6) $P_{90}K_{90}$ + 2-time inter-row loosening to a depth of 10, 20 and 40 cm; 7) $P_{90}K_{90}$ + 2-time inter-row loosening to a depth of 5-6 and 10-12 cm + the hilling-up of plants in the budding stage.

The main attention during the tending of seed alfalfa crops is paid to the formation of healthy plants and the creation of favorable conditions for flowering and fruit formation.

The duration of the period from the beginning of spring aftergrowing to the beginning of flowering in the second year of life was stable in all variants of the experience and amounted to 85 days. The only exception was the option of 3–106 days. This figure exceeded the values in other variants by 24.7%.

The period from the beginning of spring aftergrowing to seed maturation of seed alfalfa of the second year of life in our experience lasted from 149 to 157 days. However, as with the previous indicator, all variants were the same, except for the third one – 157 days. This difference was 5.4%.

The number of stems at the time of spring aftergrowing, depending on the experiment variant, ranged from 130-144 pcs that significantly influenced the further productivity of crops. The difference between the experiment variants ranged from 1.5% to 10.8%. The greatest number of stems was generated in the variant 5 ($P_{90}K_{90}$ + 3-time inter-row loosening to a depth of 5-6, 10-12 and 20 cm) and, vice versa, the minimum was obtained in the variant 4 ($P_{90}K_{90}$ + 2-time inter-row loosening to a depth of 5-6 and 10-12 cm).

The analysis of the formation of the number of alfalfa stems after harvesting has revealed that the lowest value of the indicator is in the variant 3 – 190 pcs., and most of all – in the variant 7. The difference in the number of stems after harvesting is 17.8%.

Important in the seed production of alfalfa is the creation of an optimal feeding area for plants, in which fewer flowers would fall off, and a higher seed yield would be formed. The weight of 1000 seed alfalfa is an important element of the crop structure, which affects the sowing quality of seeds, germination energy, equalization of crops, seed viability, and adjusts the seeding rate. On average in the variants during the two years, the highest weight amounting to 1000 seeds was obtained in the variant 7 – 1.9 g. The minimum value of the indicator was 1.45 g – in the variant 3. Therefore, this indicator significantly depends on the methods of crop tending.

Improving the technology of production of alfalfa seeds enables to increase the yield of seeds of this crop. The main indicator of the efficiency of production as the yield of seeds in our experience significantly depends on the weather conditions of the year and methods of crop tending.

The average yield of seeds ranges from 1.08 c/ha to 1.65 c/ha. The greatest deviation is observed in the check option 1, and in check 2 – 0.48 c/ha or 41.0%.

The higher seed yields of alfalfa are possible with crop tending, which includes fertilizing $P_{90}K_{90}$ + early cutting down + 2-time inter-row loosening at a depth of 5-6 and 10-12 cm.

References:

1. Zharinov V. I. (1980). Main ways of the development of seed production of alfalfa [Osnovni shlyakhy rozvytku nasinnystva lyutserny]. *Bulletin of Agricultural Sciences*, no. 11, p. 30-34.
2. Bober A. F. (2001). Genetic and breeding research on the creation of competitive varieties of autogamous alfalfa [Henetyko-selektsiyni doslidzhennya po stvorenniyu konkurentnozdatnykh sortiv avtohamnoyi lyutserny]. *Breeding and genetics on the verge of millennia*. K.: Logos. Vol. 3. P. 236-243.
3. Zinchenko O. I. (1999). Forage production [Kormovyrobnytstvo]. K.: High School. 121 p.
4. Boiko O. V. (2004). Mechanized care of crops [Mekhanizovanyy dohlyad za posivamy]. *Mechanization of cultivation of crops*, no. 5, p. 14-17.
5. Kovalenko V. P. (2012). Improvement of the technology of cultivation of alfalfa and perennial legume-cereal grass mixture [Udoskonalennya tekhnolohiyi vyroshchuvannya lyutserny posivnoyi ta bahatorichnykh bobovo-zlakovykh travosumishok]. *Bulletin of Sumy National Agrarian University*, no. 9 (24), p. 129-132.