UDC 631.84.633.35.631.582

THE IMPACT OF FERTILIZERS IN CROP ROTATION ON THE CONTENT OF THE NUTRITION IN THE SOIL, THE HARVEST OF CLOVER, HAY AND QUALITY OF IT.

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The influence of fertilizers in 10 - times crop rotation on the content of elements of nutrition in the soil, harvest and quality of clover and hay.
Clover, mobile elements of nutrition, harvest and quality.

Introduction. One of the major challenges facing the agro-industrial complex in the further intensification of fodder production is increasing of the production of fodder protein.

Reducing it to the diet of animals leads to a significant redistribution of fodder, shortage of livestock production, increase its cost. The solution of this problem depends largely on the actual implementation of the targets in the livestock industry [1].

Significant role in solving of the problem of fodder protein assigns to perennial grasses and especially legumes. In overcoming this problem important role plays clover as the most productive and most valuable crop. Clover - a valuable legume fodder crop that has gained recognition all over the world. Widespread of clover in agriculture contribute to its extremely useful biological and agronomic properties. Clover, like other legumes, absorbs nitrogen from the air and stores it in the soil by biological way, contributes to obtaining high harvests of other crops, thanks to biologically fixed nitrogen, which remains in the soil after harvesting clover. Long-term studies indicate that the amount of biologically fixed nitrogen can reach up to 250 kg / ha. Clover refers to the structure-making corps for soil. About 60 % of the total biomass of clover is its root system, after plowing a field where clover has grown the soil compaction is reduced, the soil aeration is improved, soil enriched with organic substance, humus and after mineralization of the last two enriched with macro- and microelements of nutrition [2]. Clover improves the phytosanitary state of soil, promotes beneficial microflora. After growing clover subsequent cereals less affected by diseases such as root rot Fusarium. As a result, in the soil after growth

clover the most favorable water- physical, nutritional and phytosanitary states appear [3].

Methods and conditions for research. The aim of research was to study the effect of fertilizers made in the rotation, the accumulation of nitrogen, phosphorus and potassium in the soil, the formation of clover's hay and its and quality. The research works were carried out in a stationary experiment at the Department of Agricultural Chemistry and quality of Plant named after

O. I. Dushechkina NUBiP of Ukraine. The following aspects are: ten time crop rotation, corn and beet alternated by crops: clover, winter wheat, sugar beet, maize, spring wheat, peas, winter wheat, sugar beet, corn for silage, barley with sowing of clover.

The experiment repeats three times on the area accounting 100 m2. The sort of clover is Agros -12. Agricultural technology is common for this area.

The following options were taken for research whichdiffer in the numberof fertilizersin crop rotationofmanure aftereffect background.

The variants ofthe investigation are: control (nofertilizer), manure aftereffect (intensity 12 t/ ha) + background, backgrounds + P (saturation P83,5 kg /ha),background+ PK (saturation P83, 5K87,5 kg /ha),von+ NPK (saturation N80P83, 5K87,5kh/ha), NPK (saturation N80P83, 5K87,5 kg/ ha).

The soil of area under research ismeadow-chernozemcarbonatecoarse-silty-loamy whichis characterized by following indicators: the humus content4.7%, pH 7.7soil solution, the capacity of absorbed basic elements mekv/10030.2g. of soil.The soilcontainsan average numberof nitrogen andphosphorus and islowin potassium. The clover has been growingunder aftereffect of fertilizers made duringcrop rotation, fertilizers were not used in the process of planting.

The studies have shownthat the usage offertilizers incrop rotationimprovessoil fertilityand createsfavorable conditionsfor plant growth, due to the accumulation ofnitrogen, phosphorus and potassium.Among themacro elementsrequired forplantduring the vegetation, one of the mainplaces is occupied bynitrogen.The value ofnitrogen forsoil fertilityisnot only its role as an element for plant's nutrition

but for the involvementin variousbiochemical processes, due to the fact that soilsthat containsignificant reserves ofnitrogenareusuallyhighlyfertile.

Alkali-hydrolyzed nitrogen characterizes the degree of soil cultivation and its provision of nitrogen. By studying the dynamics of alkali-hydrolyzed nitrogen was established (Table 1) that content of it in the plow layer of soil during spring growing was little dependent on the amount of fertilizers in crop rotation. The content of alkali-hydrolyzed nitrogen in the option of bringing in of phosphate fertilizers was 13.9 mg/100g soil. The aftereffect of some fertilizers helped to increase the alkali-hydrolyzed nitrogen on 7.2 mg, and was accounted for 14.5 mg per 100g of the soil. The aftereffect of phosphorus-potassium fertilizers was not useful to create alkali-hydrolyzed nitrogen for 5 mg/100g soil relative to control. The highest content alkali-hydrolyzed nitrogen was in the option with aftereffect of full mineral fertilizer on the background of aftereffect of manure, content was 16.3 mg per 100 g of soil is 5.9 mg more than in the control variant. In the phase of budding alkali-hydrolyzed nitrogen content increased significantly and reached, in embodiments where the aftereffect fertilizer was studied from 14.6 to 18.2 mg/100 g of soil in the reference version 11.2 mg. The highest content of alkali-hydrolyzed nitrogen was in the option of adding full mineral fertilizer in crop rotation on the background of aftereffect was 18.2 mg/100g soil. The aftereffect of fertilizers added in crop rotation had a positive effect on the content of mobile phosphorus and exchangeable potassium. The processes of converting phosphate into the soil are very complex, due to the usage of fertilizers, and related solubility and precipitation, adsorption and desorption, mineralization and other processes.

1. Content elements of plant nutrition in soil depends on fertilization background mg per 100 g of soil in the 0-25 cm layer

Variants of the experiment	Phases of growth and development clover					
	spring regrowth			budding blossoms		
	Alkaline-hydrolyzed nitrogen	Mobile phosphorus	Exchangeable potassium	Alkaline-hydrolyzed nitrogen	Mobile phosphorus	Exchangeable potassium

Control	9,4	2,9	5,9	11,2	2,4	5,3
Aftereffect manure (saturation of 12 t / ha) + background	12,9	5,6	7,7	14,6	4,9	7,4
background + $P_{83,5}$	13,9	5,83	8,4	14,2	5,2	8,2
background + $P_{83,5}K_{87,5}$	14,9	4,85	9,5	15,9	4,7	8,9
background + $N_{80}P_{83,5}K_{87,5}$	16,3	6,7	10,2	18,2	5,8	9,8
$N_{80}P_{83,5}K_{87,5}$	14,5	5,2	9,8	15,8	4,5	7,2

Studies have shown that regular application of fertilizers in crop rotation has a positive effect on the dynamics of mobile forms of phosphorus under clover . During the vegetation of clover content of mobile phosphorus changed. Its greatest number observed in the phase of spring growing and reduced to the phase of budding. This is due to the fact that previously to the phase of budding clover the plants intensively assimilate phosphorus soil. The results show that the fertilizers in crop rotation on the content of mobile phosphorus influenced by following way. The aftereffect of organic fertilizers and aftereffect bringing in some mineral elements has positive influence on mobile phosphates 5.6 and 5.2 mg per 100 g soil. Bringing in full mineral fertilizer on the background of manure contributed the greatest amount of phosphorus in the phase of spring growing was 6.7 mg per 100 g of soil in the control version 2.9 mg. In the phase of budding - flowering content of mobile phosphorus was in the fertilized variants from 4.9 to 5.8 mg per 100 g soil, in control of the content of 2,4 mg per 100 g soil. The main source of potassium for plants is the exchangeable potassium, this form describes the fertility of the soil with respect to potassium. Fertilizers in crop rotation help to increase mobile potassium in the plow soil layer. In embodiments where the fertilizers were introduced mobile potassium content in spring growing phase was higher compared with controlled variants, both in spring growing phase and in the phase of budding (Table 1). The aftereffect of phosphorus-potassium fertilizers on the background of manure and some mineral fertilizers helped to create identical amount of exchangeable potassium content in the plow layer, amounting to 9.5 and 9.8 mg per 100 g soil , control of 5.9 mg per 100 g soil. In the phase of budding - flowering mobile potassium content in soil ranged

from 7.4 - 9.8 mg per 100 g, in the control soil version 5.3 mg per 100 g soil. In the case aftereffect of a full mineral fertilizer on the background of manure the amount of exchangeable potassium content was 10.2 mg per 100 g soil. This is because potassium clover absorbed more rapidly up to phase of budding. It should be noted that the seasonal dynamics of exchangeable potassium plays a role not only using fertilizers in crop rotation but also meteorological conditions, length and intensity of soil drying.

Fertilizers in crop rotation had a positive effect on the value of the crop of clover's hay Table. 2. Highest harvest was obtained in the option where the aftereffect of complete fertilizer at the background of manure were studied and was 63.1 kg / ha / ha to control gain is 17.5 kg / ha. In the option of aftereffect of the phosphorus-potassium fertilizers on the background after-organic fertilizers, harvest totaled 61.2 c / ha , with the result in the control variant 45.6 t / ha. The lowest harvest obtained in the variant with after making of some phosphate fertilizers that are made to rotation on the background of aftereffect of manure it was 56.8 cwt / hectare.

Under the influence of fertilizers in crop rotation in the ground were changing the contents of the elements of nutrition, which is reflected not only in the hay harvest , but also on its quality. The widespread use of clover's hay makes a number of requirements for quality "crude" protein , fiber, and carotene content of NO3. These parameters determine the value of clover [4]. On the content of " raw" protein aftereffect of fertilizers affected the following way Table 2. In embodiments where the fertilizer contributed content of "raw" protein ranged from 13.9 % to 14.9%, in the control version 13.7. The fertilizers had the best effect on the content of "crude " protein where studied aftereffect of joint application of organic and mineral fertilizers, protein content was 14.9% gain to the control was 1.2%. the aftereffect of phosphate fertilizers on the background aftereffect of manure content provided "raw" protein of clover's hay 13.9% is 0.2% more than in the control.

2. Effect on after-fertilizers in crop rotation on yield and quality indicators clover hay

Option experiment	Vintage clover hay	To gain control, kg/ha	Content "raw" protein,%	To gain control, kg/ha	Fiber, %	The content of carotene, kg/ha
control (no fertilizer)	45,6	-	13,7	-	31,1	8,5
aftereffect manure (intensity 13 t / ha)+background	59,2	13,6	14,1	0,4	24,4	9,8
background+P (saturation P83,5 kg/ha)	56,2	9,6	13,9	0,2	23,9	12,6
Background+ PK (saturation P83,5K87,5 kg/ha)	61,2	15,6	14,7	1,0	24,5	14,9
background+ NPK (saturation N80P83,5K87,5 kg / ha)	63,1	17,5	14,9	1,2	24,7	15,6
NPK (saturation N80P83,5K87,5 kg/ha)	59,6	14,0	14,2	0,5	26,1	13,6
The least significant difference – 2,8 cwt/ha						

Fiber refers to a group polysaccharides. In the practice of feeding animals produce "crude" fiber. In clover hay fiber content varies depending on the age of the plant. Early growth of clover plants contain small amounts of fiber, as the aging plant fiber content increases. In embodiments where the fertilizer was studied aftereffect fiber content of clover hay ranged from 23.9% to 26.1% when the content control of 31.1%. This is due to the fact that the fertilized variants clover plants were physiologically younger. In fertilized variants carotene content ranged from 9.8 to 15.6 to 15.6 mg /%, when the content control of 8.5 mg /%.

An important indicator of quality hay is carotene content. Carotene is a pigment that in animals is converted to vitamin A. Vitamin A affects the passage of various physiological processes in animals. In clover hay, resulting in a variant where

fertilizers were introduced in the rotation, carotene content ranged from 9.8 mg /% to 15.6 mg /%, for control of the content of 8.5 mg /%. The content of nitrate nitrogen was within the RC (the threshold allowable concentration). Obtained in the experiment of clover hay for Quality refers to the first category.

References:

1. E.D. Akmanayev red clover t.pratense. Scientific Bulletin number 74. In 2002. P.243-258.
2. V.A. Vatsyk productivity of legumes and legume-cereal grass mixtures and varieties in use. / / Bulletin of Agricultural Science. - 2000 number 5. P.67-68..
3. V.P. Patyka etc. .. Biological nitrogen. Monograph. K. Light. 2003 - 424 p.
4. I.D. Shyyan Effect of fertilizers on the yield of alfalfa and its use of atmospheric nitrogen. Agriculture. - 2003. Number 3. P. 3-4.