ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Effect of Fertilization Systems on the Dynamics of Ca^{2+} In Crops of Winter Wheat

Alexander Nikolaevich Esaulko*, Timur Soltanovich Aysanov, Maksim Sergeevich Sigida, Elena Alexandrovna Salenko, and Alexander Vladimirovich Voskoboynikov

Stavropol State Agrarian University, Faculty of Agrobiology and land resources, Zootekhnicheskiy lane 12, Stavropol 355017, Russia.

ABSTRACT

Science and practice of agriculture proved that the unilateral use of high doses of physiologically acidic fertilizers, without combining them with organic contributes to the deterioration of soil basic indicators - increase in acidity and reduce the amount of absorbed alkaline and degree of soil saturation imi. Soil acidification is due to anthropogenic factors. One of the reasons - it's calcium loss due to make high doses of mineral fertilizers, especially physiologically acidic; another reason - it is an intensive treatment of the soil with heavy guns, destroying its structure to deteriorate water-physical properties, leading to waterlogging and flooding and as a result, leaching of calcium in the deeper layers of the soil. These degradation processes are responsible for reducing the amount of absorbed alkaline.

Keywords: winter wheat, leached chernozem, manure systems, productivity, foregoing crops.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Calcium is present in all plant cells. Its deficiency particularly affects the growth and development of root systems - stops the development of root hairs. Signs of a lack of calcium and reflected on the ground part of the plant - apical bud dies, stops the growth of the stem [2, 5, 9, 10].

In the context of the South of Russia is not marked lack of calcium. However, at the present time on the chestnut soils and chernozems even found a lack of Ca^{2+} due to the antagonistic activity of H^+ and NH_4^+, which promotes the systematic use of physiologically acid addition salts, processes of ammonification, nitrification, dentrification [1, 3, 8, 11].

MATERIALS AND METHODS

The studies were conducted in the period 2012-2014 years, In long-term stationary experiment departments agrochemicals and plant physiology and general agriculture and reclamation of the Stavropol State Agrarian University. The hospital is registered in the register of certificates of long experience GeoNetwork VNIIA Russian Federation. Crop rotation is the hospital with the following crop rotation: peas and oats mixture (cropped fallow) - winter wheat - winter barley - silage corn - winter wheat - pea - winter wheat – sunflower [4, 6, 7].

Repeated experience of 3-fold, total plot area of 108 m^2, width - 7.2 m, length - 15 m, the discount - 50 m^2. The experimental setup is based on a method of splitting plots. Experience two-factor: A factor - the system of winter wheat fertilizer; B - foregoing crops (engaged couples, corn for silage, peas).

Table 1: Systems fertilizer for winter wheat depending on foregoing crops

Foregoing crop	Fertilizer system	The method of fertilizer application		
		preplant	at sowing	additional fertilizing
1. Cropped fallow	recommended	$N_{30}P_{30}$	$N_{10}P_{10}$	N_{30}
	biologizing	–	$N_{10}P_{10}$	N_{30}
	calculation	$N_{85}P_{74}K_{32}$	$N_{10}P_{10}$	N_{50}
2. Corn for silage	recommended	$N_{30}P_{30}$	$N_{10}P_{10}$	N_{30}
	biologizing	–	$N_{10}P_{10}$	N_{30}
	calculation	$N_{42}P_{59}K_{22}$	$N_{10}P_{10}$	N_{50}
3. Peas	recommended	$N_{30}P_{30}$	$N_{10}P_{10}$	N_{30}
	biologizing	straw 2,4t/he +N_{20}	$N_{10}P_{10}$	N_{30}
	calculation	$N_{60}P_{65}K_{24}$	$N_{10}P_{10}$	N_{50}

With the use of soil recline plough cultivation method to a depth of 20-22 cm, with respect to the control (without fertilizer) in the experiment studied the effect of the following systems of winter wheat fertilizer, cultivated on various foregoing crops.

In the experiment, released varieties "Zustrich" winter wheat.

As a fertilizer experiment were used: ammonium nitrate, ammophos, nitroammophos, potassium chloride, as well as straw and half rotten manure cattle.

ISSN: 0975-8585

Sampling of soil and plant samples, as well as biometric observations were confined to the main phases of the development of winter wheat: preplant, tillering, booting, heading, full ripeness.

RESULTS AND DISCUSSION

On crops winter wheat (after a cropped fallow) dynamics of exchangeable calcium content in the 0-20 cm layer of chernozem leached during the growing season of winter wheat at all backgrounds food showed general orientation - a steady decline from the seed to full ripeness, due to absorption by plants Ca^{2+} ions with increasing increase in plant biomass in the process of ontogenesis.

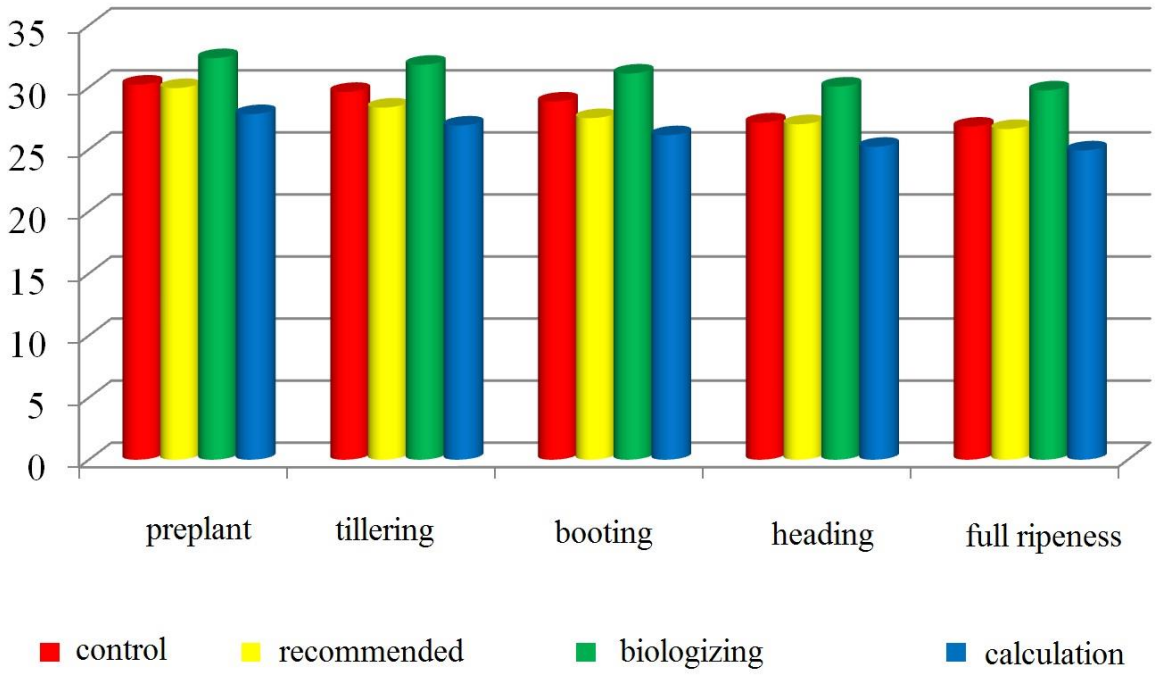

Figure: Dynamics of exchangeable calcium content (mg-eq / 100 g soil) in the 0-20 cm layer of leached chernozem under winter wheat depending on fertilization systems, (foregoing crop is cropped fallow) 2012-2014

According to the data presented in Figure 1, the average experience there was a significant reduction from sowing to tillering phase to 2.57 mg-eq / 100 g of soil, then there was a slight decrease in the interphase period of tillering - booting - 1.84 mg-eq / 100 g soil, booting - heading - 1.74 mg-eq / 100 g of soil, earing - full ripeness - 1.14 mg-eq / 100 g of soil.

Analysis of the results showed that crops winter wheat after a cropped fallow the use of biologize system fertilizer (characterized by the use of large amounts of organic fertilizer, contributes to the saturation of soil-absorbing complex ions Ca^{2+}, and an increase in the degree of buffering it), the average experience favored a significant increase in content exchangeable calcium in the topsoil for the control by 0.93 mg-eq / 100 g of soil. The use of the recommended fertilizer and settlement systems contributed to a significant decrease in the concentration of exchangeable calcium in the soil relative to control at 1.00 and 1.60 mg-eq / 100 g of soil. The advantage of biologize system fertilizer with respect to the recommended and settlement systems in the average experience was 1.93 and 2.53 mg-eq / 100 g soil, respectively.

The observed maximum content of exchangeable calcium in the plowing layer of leached chernozem during the growing season of winter wheat in the background of the system biologizing fertilizer plants. The advantage of biologize fertilizer system for the control and power the rest of backgrounds for winter wheat growing season was 0,46-1,44 mg-eq / 100 g of soil and 0,98-3,74 mg-eq / 100 g soil.

ISSN: 0975-8585

CONCLUSION

The test in the experience of the recommended fertilizer and settlement system significantly reduces the concentration of calcium with respect to the exchange control. Biologizing fertilizer system, characterized by the use of large quantities of organic fertilizers, favored an increase in the concentration of exchange form calcium with respect to the of all the studied variants of the experiment.

REFERENCES

[1] Podkolzin A.I., Korostelev S.A., Aysanov T.S. Influence of long application of fertilizers in the stationary experiment on the acid-base properties of leached chernozem / In: Modern resource-saving innovative technologies of cultivation of crops in the North Caucasus Federal District, 2012 p. 68-70.

[2] Aysanov T.S. The dynamics of agrochemical indicators leached chernozem and productivity of a winter wheat depending on predecessors / multidisciplinary network electronic scientific journal of the Kuban State Agrarian University. 2015. № 105. p 648-658.

[3] Influence of long application of fertilizers on the systems performance ph leached chernozem / A.N. Esaulko, T.S. Aysanov, A.Y. Fursova, M.Y. Kuzmenko // In: Agricultural science, creativity, growth in collection of scientific works based on the II International Scientific and Practical Conference. 2012. p. 7-9.

[4] The impact of techniques for determining the amount of absorbed bases leached chernozem of the Stavropol Upland on the reliability of this indicator /T.S. Aysanov, V.V. Ageev, A.N. Esaulko, A.K. Sheudzhen // In: Modern pecursosberegayuschie innovative technologies of cultivation of crops in the North Caucasus Federal District, 78th scientific conference. 2014. pp 18-20.

[5] Esaulko, A.N., Gorbatko, L.S. The biologizatoin of fertilizer is the way of development of sustainable agriculture // Sustainable agriculture and rural development in terms of the republic of Serbia strategic coals realization within the Danube region – preservation of rural values, 2012, P. 180-196.

[6] Agrochemical Principles of Targetting Winter Wheat Yield on Leached Chernozem of the Stavropol Elevation / A. N. Esaulko, M/S/ Sigida, E.A. Salenko, S.A. Korostylev, E.V. Golosnoy // Biosciences Biotechnology Researhc Asia, April, 2015, Vol.12(1), P. 301-309.

[7] Effect of Growth Factors on the Metabolism of Cucumber Crops Grown in a Greenhouse / M.V. Selivanova, O. Yu. Lobankova, E.S. Romanenko, N.A. Esaulko, E.A. Sosyura // Biosciences Biotechnology Researhc Asia, 2015, Vol.12(2), P. 1397-1404.

[8] Change in Microbiological Activity Under the Effect of Biological Factors of Soil Fertility in the Central Fore-Caucasus Chernozems / O.I. Vlasova, V.M. Perederieva, I.A. Volters, A.I. Tivikov, L.V. Trubacheva // Biol Med (Aligarh), 2015, 7(5), BM-146-15, P.6

[9] Comprehensive approach for evaluating the potential of the Stavropol agricultural territory / E.V. Pismennaya, A.V. Loshakov , D.A. Shevchenko, S.V. Odintsov, L.V. Kipa // International Journal of economics and financial issues (ISSN21464138-Turkey-Scopus). 2015.

[10] Pospelova O.A., Mandra Y.A., Stepanenko E.E., Okrut S.V., Zelenskaya T.G. Identification of technogenic disturbances of urban ecosystems using the methods of bioindication and biotesting // Biosciences Biotechnology Research Asia. Volume 12, Issue 3, December 2015, Pages 2241–2251.

[11] Natal'ja Jur'evna Sarbatova, Vladimir Jur'evich Frolov, Olga Vladimirovna Sycheva and Ruslan Saferbegovich Omarov. Res J Pharm Biol Chem Sci 2016;7(2):534-538.