International Journal of Agriculture and Environmental Research

ISSN: 2455-6939

Volume:03, Issue:01

INFLUENCE OF HERBAGREEN APPLICATION ON YIELD AND GLUTEN INDICATORS IN WHEAT PLANT

[1]DOLOREZA PRIFTI, [2]ARDIAN MAÇI

[1]PhD candidate, University "Fan. S. Noli", Korçë,

[2]Department of Agro-environment & Ecology, Agricultural University of Tirana.

ABSTRACT

Herbagreen is a Bio fertilizer, used successfully in agriculture in different countries of the world. This research study aims to demonstrate to the Albanian farmer the positive effects of this ecological fertilizer.

Herbagreen is composed of Calcium oxide (CaO) 35,9%, magnesium oxide (MgO) 1,9%, Silicium dioxide (SiO2) 18,1%, Phosphorus (P2O5) 0,28%, potassium oxide (K2O) 0,1%, Sulfur (S) 0,52% and some others microelements in 1 μm granules. Herbagreen main component is calcite - a sediment limestone - which is a natural product composed of the main components calcium, silicon, magnesium and iron.

It has clear visible effects of an improved photosynthesis process of a healthier plant in just a few days after its application on the plants leafs. The success of this product is due to effects of patented nanotechnology applied in production process of calcite through Tribo Mechanic Activation. This process grinds the calcite particles into nano dimensions (to 0.005 - 0.025 mm). The result is an energetic activation (ionization) of the particles as well as an increase of the nano particles contact surface. Our experiment demonstrates the effects of this natural fertilizer in wheat on yield and biochemical parameters. The evidence is that the yield and gluten were in a higher values in treated plants with Herbagreen compared to the control samples as well as to the chemical fertilizers treated plants.

Keywords: Bio-fertilizer, Herbagreen, nano-particles, yield, gluten

1. INTRODUCTION

Nanotechnology provides a wide opportunity of application in different fields of biotechnology and agricultural industries, because micro and nano particles have unique physicochemical

ISSN: 2455-6939

Volume:03, Issue:01

properties, as increased contact surface and high reactivity. (Brahic, C., 2005), (Shanahan, M., 2005). Moreover nano science contributes with new ideas leading to better understand the suitable mode of action of nano particles in plants. The appropriate elucidation of physiological, biochemical, and molecular mechanism of nano particles in plant leads to better plant growth and healthier development. Nanotechnology as a new emerging and fascinating field of science, permits advanced research in many areas, and nanotechnology discoveries could open up new applications in the field of biotechnology and agriculture. (Jones, P., 2006), (Mehta, M.D., 2004) In the field of electronics, energy, medicine, and life sciences, nanotechnology offers an expanding research, such as reproductive science and technology, conversion of agricultural and food wastes to into energy nanocides. (Nair, U. et al. 2010). Although fertilizers are very important for plant growth and development, most of the applied fertilizers are rendered unavailable to plants due to many factors and natural processes such as leaching, degradation by photolysis, hydrolysis, and decomposition. Hence, it is necessary to minimize nutrient losses in fertilization, and to increase the crop yield through the exploitation of new applications with the help of nanotechnology. One of the relevant discovers in agriculture is Herbagreen fertilizer, produced through Tribo-mechanic process. (Lelas. T., 1998), (acting-herbagreen, 2008). The Tribomechanical treatment has a determining effect on the textural characteristics because the total specific surface has doubled and the total porous volume has tripled after the treatment. (Dumancic, D., 2010). Herbagreen released Ca as carbonate calcium dissociation; so the plant is supplied continuously. (acting-herbagreen 2008), (SMART 2016), (NGTech 2014). From an agronomic point of view, Ca has many important functions; as it favours the healing, improves the fruit and vegetables preserving, and increases the resistance to the biotic and abiotic stresses. (Sacala. E., 2009) A calcium gradient allows the control and the polarized growth of the apical cells. (Bush. D.S. 1995). This zone is called vegetative point or apical zone.

Calcium is an essential element in the nitrogen metabolism because it stimulates the ammonium absorption. It is also, responsible for the stomata opening. That process is essential for the photosynthetic activity.

Calcium is also important for inter cellular communication. The functionality of the cadherins (link proteins) depends on the presence of the calcium. (Bush. D.S., 1995).

Moreover, calcium is important for the natural defence reactions. Many kinase proteins have a catalytic activity dependant on the calcium. Those proteins have an important role in the transmission of the defence signal when the plants detects a pathogen agent. (Burstrom, H.G., 1968)

We know that photosynthesis is a key process for plants on earth that changes light energy to chemical energy. Plants convert only 2-4% of the available energy in radiation into new plant

ISSN: 2455-6939

Volume:03, Issue:01

growth (Kirschbaum, M., 2011). For speed-up of plant photosynthesis and turbocharged crops, scientists are working with Rubisco, an important enzyme for photosynthesis process to catalyze the incorporation of carbon dioxide into biological compounds. By using Herbagreen we stimulate this important process and we generate the calcium concentration of the plants (Dumancic, D., 2010).

2. MATERIALS AND METHODS

The experiment was set up with five variants with four repetitions per each variant. The research is performed in the fields of the experimental station (EDE) of the Agricultural University of Tirana, Albania. In order to guarantee the safety and reliability of the results, the experiment is repeated for two consecutive years according to randomization block. The name of cultivar in experiment was Progress 2000 (an autochthon cultivar that EDE uses widely). The scheme of experiment was the following:

1. First variant is (control with natural fertilization of soil).
2. Second variant is with the optimal doses of fertilization that use (EDE) which corresponds with 3 KV/ HA DAP (Di-ammonium phosphate), 4 KV/ HA Urea and 2 KV/ HA K_2SO4 (potassium sulfate).
3. Third variant is with 30% less of optimal fertilization scheme of EDE.
4. The fourth variant is with 30 % less of optimal fertilization scheme, and one foliar treatment with Herbagreen nutrient.
5. The fifth variant is with 30 % less of optimal fertilization scheme of EDE and two foliar treatments with Herbagreen nutrient.

Wet gluten: Wet gluten in wheat flour is a viscos-elastic substance made of gliadin and glutein, which is obtained by means of the specified method contained in this international standard. The gluten index is a measure of the gluten characteristics, which indicates whether the gluten is weak, normal or strong.

2.1 Procedure

In the porcelain scale 12.5 grams of wheat flour grinded in a milling mill with a 1 mm sieve was weighed. 7.5 ml of distilled water is added. The flour was mixed with the water using the glass rod in the beginning and then the left hand fingers. The dough is homogenized and made into spherical shape. The capsule was covered with crystal and left for 20-30 minutes, enough for the proteins to expand (dough to rise). Following this time the dough was washed with running water. In this process the starch left as a white liquid and wheat bran. This process lasts for 15-20 minutes. The dough was dried in hands until it starts to stick. At this point it was weighed immediately in a crystal. Then the gluten content was calculated using the following formula: $G(\%) = g * 100 \div p$ where: G- % of glutein content, g -glutein weight in grams, p -flour weight in grams

The results of the experiments of gluten on wheat plant are shown in the graphs below. The data belong to one consecutive (2014) year of experiment on wheat plant.

These graphs represent the average of the replications per each one of the variants 1,2,3,4 and 5. Each variant had 4 replications. Based on the above mentioned methodology the parameters of each replication were analysed and measured. Than it was done the average of the data. The statistical elaboration of the data was done by using the ANOVA method and LTS –d test.

3. ANALYSIS RESULTS AND DISCUSSION

Mathematical elaboration												
Variants	**Replications**				Σ	Σ	**Squaring**				Σ	**Average yield**
	I	II	III	IV			PI	PII	PIII	PIV		
1	16.5	14	22.5	21.5	74.5	5550.25	272.25	196	506.2	462.25	1436.75	18.62
2	26	22	22.5	22	92.5	8556.25	676	484	506.2	484	2150.25	23.12
3	30	24	28	23	105	11025	900	576	784	529	2789	26.25
4	30.65	25.5	27	28	110.55	122221.3	903	650.25	729	784	3066.25	27.63
5	35.5	34	35	34	138.5	19182.25	1260.25	1156	1225	1156	4797.25	34.65
Σ	138.65	119.5	135	128.5	521.05		4011.5	3062.25	3750.5	3415.2	14239.5	
p^2	19057.8	14280.25	18225	16512.2	271493.1	56535.0						
Σp^2	68075.3											

$$Fk = \frac{(SV^2)}{n \times p} = \frac{(521.05)^2}{5 \times 4} = \frac{2171493.1}{20} = 13574.6$$

SKT=$(V1^2 + V2^2 + \cdots V5^2) - Fk = 14239.50 - 13574.60 = 664.9$

SKV=$\frac{\Sigma^2 V}{P} - Fk = \frac{56535.05}{4} - 13574.6 = 559.16$

SKP=$\frac{\Sigma^2 V}{n} - Fk = \frac{68075.3}{5} - 13754.6 = 40.46$

SKE=SKT-$(SKV + SKP) = 664.9 - (559.16 + 40.46) = 65.28$

Ed=$\frac{\sqrt{VarE \times 2}}{p} = \frac{\sqrt{5.44 \times 2.}}{4} = 1.64$

ISSN: 2455-6939

Volume:03, Issue:01

Table 1. Results of the yield of wheat crop

Source of change	**Freedom scale**	**The Amount quadratic**	**Variation**	**Fn Vales**		
				Factual	**Theoretical**	
					0.05	0.01
Repetition P	3	40.46	13.48	2.47	3.49	5.95
Variant V	4	559.16	139.79	25.69	3.26	5.41
Error	12	65.28	5.44			
Amount	19	664.9				

Table 2. Analysis of variance

Dmv 0.05=1.64 x2.178=3.57 kv/ha
Dmv 0.01=1.64 x3.054=5.00 kv/ha

Note. Variant 5 has the best values, verified on both levels.

As it can be deducted from the above **Table 1** detailing the productivity in kv/ha per each variant, the best performance in these terms is the one of the 5th variant respectively with 34.65 kv/ha. Second is listed the 4th variant with 27.63 kv/ha. The statistical data processing demonstrates that there are statistically proved differences for the probability levels of to =95 and to =99 between 5th Variant and the others (Table 2).

Also between 4th Variant and the others, there are statistically proved differences with Variants 1, 2 and 3.

The average yield of the experimental field results x average 26 kv/ha, this value is below the average yield of the Variant 3, 4 and 5 and above the Variant 1 and 2.

Regarding the two statistical parameters DMV = 0,95 and DMV = 0,99 only the 5th Variant is above the experiments average values.

ISSN: 2455-6939

Volume:03, Issue:01

V1Pmes	22%
V2Pmes	26.8%
V3Pmes	32%
V4Pmes	31.8%
V5Pmes	33%

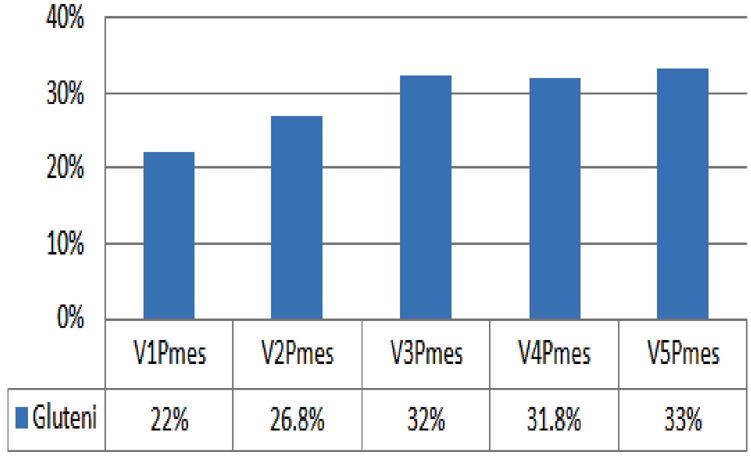

Figure 1. Results of wet gluten

Concerning to the % of gluten per each variant, the data showed that variant 5 (the one on which were used 30 % less of chemical fertilizers plus two Herbagreen bio fertilizer foliar treatments) had the highest values (M=33,SD=.102) followed by variant 3 (M=32,SD=.294), variant 4 (M=31.8,SD=.535), variant 2 (M=26.8,SD=.070), variant 1 represented the lowest values (M=22, SD =.102)

CONCLUSIONS

Herbagreen bio-fertilizer, is considered an innovation input in agriculture provided proof of increased average yield values in wheat plants without harming the ecosystem and without contaminating the soil.

The 5th Variant has the highest yield rate with 34,65kv/ha providing statistically proved differences for the two probability levels when compared to all the other variants considered in this experimental study.

The 4th Variant has statistically proved differences for the two probability levels when compared to Variant 1 and 2, and unverified statistically differences compared to 3rdVariant.

The average yields of the experimental field of 26 kv/ha is higher than the production rates of Variants 1 and 2 for both probability levels.

Referred to the value of gluten we have evidence that the highest value is in 5th variant.(Figure 1) Possibly it has a relation with yield and gluten. Using Herbagreen we increase the yield and the

ISSN: 2455-6939

Volume:03, Issue:01

percentage of gluten and the quality of bread wheat. Of course it may require further evidence with other experiments in the future.

In addition this Bio treatment does not pollute the soil and environment. It is the best alternative solution in developing and supporting sustainable agriculture.

REFERENCES

1. Artyszak, A., Gozdowski, D., and Kucinska (2015). The effect of calcium and silicon foliar fertilization in sugar beet.
2. Artyszak, A., Gozdowski, D., and Kucinska (2014). The effect of foliar fertilization with calcite marine in sugar beet. Plant Soil Environ. 60:413-417.
3. Burstrom, H. G., (1968) Calcium and plant growth Biological Reviews; 43-287-316
4. Bush, D. S., (1995) Calcium Regulation in Plant Cells and its Role in Signalling. In Annual Review of Plant Physiology and Plant Molecular Biology 46-95-122
5. Brahic, C. and Shanahan, M., (2005) What is Nanotechnology and what can it do?
6. Doran, J.W., Sarrantonio, M., Liebig, M. A., (2011) Soil health and sustainability. Advances in Agronomy In *Integrated Watershed Management in Rainfed Agriculture* 56:1-54; CRC Press.
7. Dumancic, D., (2010) Herbagreen (practical information), http://5k.web.tr/dokuman/Prof_Dr_Dumancic_Herbagreen_Article.doc
8. Epstein, E., (1999) Silicon Annu. Rev Plant Physiol..Plant Mol. Biol. 50: p 641-664.
9. Fauteux, F., Remus-Borel, W., Menzies, J. G., and Belanger, R. R., (2005), "Silicon and plant disease resistance against pathogenic fungi. FEMS Microbiology Letters, 249:1-6.
10. Jones, P., (2006) A nanotech revolution in agriculture and the food industry. Information Systems for Biotechnology. http://www.isb.vt.edu/articles/jun0605.htm
11. Kara, Z, and Sabir, A., (2010), Effects of Herbagreen application on vegetative developments of some grapevine rootstocks durig nursey propagation in glasshouse. In 2nd International Symposium on Sustainable Development, PP 127-132
12. Lelas, T., (1998) Vorrichtung zum Micronisierenvom Materialien und neuartige Verwendung smoglich keitenderartig mikronisierter Materialien, Patent PCT/ 1B99/00757, Geneve, Switzerland.
13. Mehta, M. D., (2004) From Biotechnology to Nanotechnology: What can we learn from earlier Technologies? 2004 *Bulletin of Science*, Technology & Society February 1, 24: 34-39

ISSN: 2455-6939

Volume:03, Issue:01

14. Nair, U., (2010) Roles of the lipid-binding motifs of Atg18 and Atg21 in the cytoplasm to vacuole targeting pathway and autophagy. J Biol Chem 285(15):11476-88
15. Kirschbaum, M., (2011) Temperature and soil organic matter decomposition rates–synthesis of current knowledge and a way forward, in *Global Change Biology,* Volume 17, Issue 11, PP. 3392-3404
16. Prifti, D., Maçi, A., (2015) The impact of Herbagreen nanotechnology on crops yield (wheat, corn) through leaf fertilization. *International Conference on Soil Proceedings: "Soil sustains life: too slow to form, too quick to lose". Agricultural University of Tirana*, 143-144.
17. Prifti, D., Maçi, A., (2015), The Effect of Herbagreen Fertilizer Nanoparticles in Wheat Productivity Through Leaf Pulverization; pp. 350 – 354. Publ. Date: 30 December 2015
18. Prifti, D., Maçi, A., (2014) Studimi i ndikimit të plehut Herbagreen në parametrat agronomikë dhe morfofizike tek kultura e misrit, nëpërmjet plehërimit gjethor. *Buletini Shkencor Nr 28. Universitetit F.S. Noli. Korçë ISSN2078-7111*, 47-57.
19. Sacala, E., (2005). Role of silicon in plant resistance to water stress. J. Elem. 14:619-630

    Silicon in agriculture conference, Uberlandia/MG-Brazil, Abstract Book,
20. Trawczynski, C., (2013). The effect of foliar fertilization of preparation Herbagreen on potato yield. Ziemniak Polski, 2:29-33.
21. Ugrinovi, M., Oljanca, S., Bradar-Jokanovic, M., Zdravkovic, J., Girek, Z. and Zdrvkovic, M. (2011). The effect of liquid and soluble fertilizer on lettuce yield. Contemporary Agriculture-The Serbian Journal of Agricultural Sciences. 60:110-115.
22. www.acting-herbagreen.com/HerbaGreen_Presentation_English.pdf
23. http://www.smart-fertilizer.com/articles/calcium-in-plants
24. http://ngtech.com.au/herbagreen-2/
25. https://statistics.laerd.com/statistical-guides/one-way-anova-statistical-guide.php

