STUDIES REGARDING THE BEHAVOIUR OF *CALLISTEPHUS CHINENSIS* IN CONDITIONS OF UNCONVENTIONAL FERTILIZATION

STUDII PRIVIND COMPORTAREA SPECIEI *CALLISTEPHUS CHINENSIS* ÎN CONDIȚIILE FERTILIZĂRII NECONVENȚIONALE

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Abstract. *The paper presents the experimental results regarding the influence of unconventional fertilizers on Callistephus chinensis plants. Were made fertilizations in soil with vinassa (3 t/ha, 5 t/ha, 7 t/ha) and foliar fertilizations with Folisof F212 (0.2%; 0.4%; 0.6%). The obtained results show the fact that foliar fertilization and the ones with vinassa improve the development and flowering of Callistephus chinensis plants. Stem morph-anatomic structure prove the fact that treatments with Folisof F212 lead to an increase of stems' diameter proportional to concentration and fertilization with vinassa lead to an ample development of bark and marrow. At soil level application of foliar fertilizers indirectly leads, by stimulation of plants' metabolism, to an additional consumption from soil reserve.*

Key words: *Callistephus chinensis*, fertilization, Folisof F212, vinassa

Rezumat. *Lucrarea prezintă rezultatele experimentale privind influența fertilizanților neconvenționali asupra plantelor de Callistephus chinensis. Au fost făcute fertilizări la sol cu vinassa (3 t/ha, 5 t/ha, 7 t/ha) şi fertilizări foliare cu Folisof F212 (0,2%; 0,4%; 0,6%). Rezultatele obținute au demonstrat că fertilizările foliare şi cele cu vinassa favorizează creşterea şi înflorirea plantelor de Callistephus chinensis. Structura morfo-anatomică a tulpinii demonstrează faptul că tratamentele cu Folisof F212 determină o creştere a diametrului tulpinii proporțional cu concentrația, iar fertilizarea cu vinassa o dezvoltare mai amplă a scoarței şi măduvei. La nivelul solului aplicarea fertilizării foliare a determinat indirect, prin stimularea metabolismului plantelor, un consum suplimentar din rezerva solului.*

Cuvinte cheie: *Callistephus chinensis*, fertilizare, Folisof F212, vinassa

MATERIAL AND METHODS

The experimental crops were set up at the University of Agricultural Sciences and Veterinary Medicine Iaşi, in the didactic field of Floriculture discipline. Experiences were organized as randomized blocks with three repetitions. Were tested root fertilizers and also foliar fertilizers which were applied at *Callistephus chinensis* specie.

As root fertilizer was use *vinassa* (obtained at Yeast factory from Paşcani), with a complex chemical composition: total nitrogen (3.0-3.2%), potassium (5.0-7.0%), phosphorus (0.3-0.5%), appreciable quantities of calcium, sodium, magnesium, iron,

copper, zinc. Fertilization with vinassa was made with three different doses, respectively 3 t/ha, 5 t/ha and 7 t/ha.

For foliar fertilizations was used Folisof F212 which is a Romanian complex foliar fertilizer, with macro and micro-elements: N - 90 g/litre, K - 90 g/litre, P - 45 g/litre, Ca - 0.4 g/litre, Mg - 0.5 g/litre, B - 0.2 g/litre, Zn - 0.1 g/litre, Fe - 0.2 g/litre. Treatments, in a number of four, were applied at periods of 10 days, using three concentrations (0.2%, 0.4% and 0.6%), resulting seven experimental variants (including control): Control – unfertilized; V_1 – treated with vinassa 3 t/ha; V_2 – treated with vinassa 5 t/ha; V_3 – treated with vinassa 7 t/ha; V_4 – treated with Folisof F212 0.2%; V_5 – treated with Folisof F212 0.4%; V_6 – treated with Folisof F212 0.6%.

To count the impact of using the fertilizers was evaluate the rate of height growth, ramification degree and flowering capacity of plants. The recorded data were statistical analysed and are presented in synthesis graphs and tables.

These dates were completed with a series of morph-anatomical analyses which put in light some appeared changes at tissue level, function of the applied treatment and used dose. To be able to observe structural details of the studied material (stem) were made microscopic samples. Biological material was preserved in ethylic alcohol of 70%, then divided into sections with a razor at hand microtome; were made transversal sections through stem.

Pedo-ecological research was done during vegetation period on soil resources. Studies took place in field using the stationary method, and also in laboratory, on soil samples gathered from experimental variants. Were analysed the main characteristics of the bio-top, in ecological, areal and local context, by studying the quality features of soil.

RESULTS AND DISCUSSIONS

Bio-metric determinations. Treatments with Folisof F212 and vinassa at *Callistephus chinensis* stimulated the height growth with values from 8.3% (V_4) and 40,7% (V_2). Differences face to control, at all variants fertilized, were very significant (fig. 1).

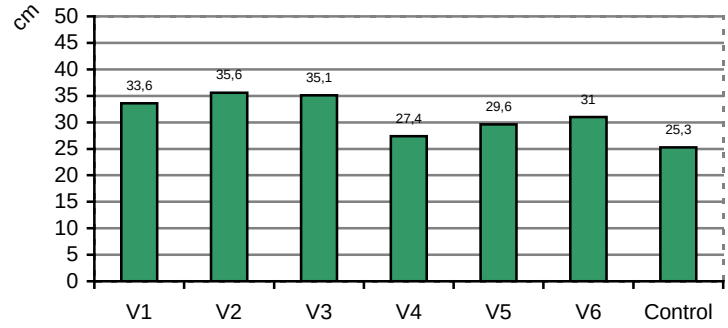

Fig. 1. Average height of plants

Also, ramification degree of stems from plants fertilized recorded positive differences face to control (distinct significant at V_1 and V_2 and very significant at V_3, V_4, V_5 and V_6 (fig. 2).

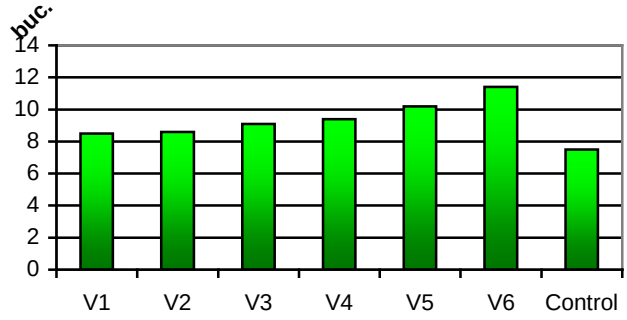

Fig. 2. Average number of ramification/plant

As regarding the flowering capacity, respectively average number of inflorescences/plant, all the variants overpass the control with very significant differences, but the highest values were recorded at variants treated with Folistof in 0.4 - 0.6 % (fig. 3).

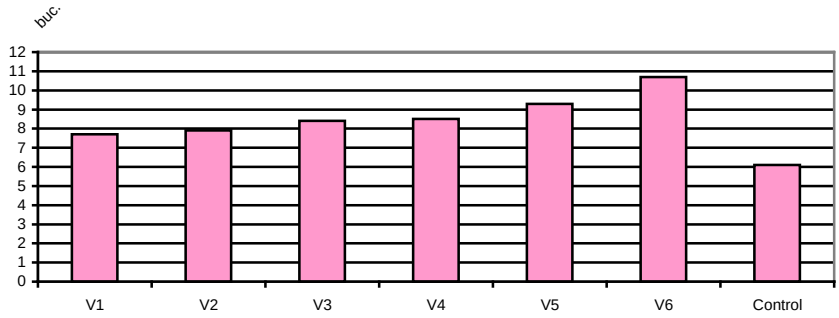

Fig. 3. Average number of inflorescences/plant at *Callistephus chinensis*

Morph-anatomical studies. At variant V_1 (fig. 4) bark is less represented. Tissue leader is a ring type one, due to a strong process of sclerifications and lignifications of the radius bone marrow (fig. 5). Marrow is thick, with a lignified perimedular area. The line of posts of mechanical fibres has very strong thickened walls (fig. 6). Variant V_2 is quite similar with variant V_1, differences of anatomical structure being insignificant (fig. 7). Plants from variant V_3 presents a large development of bark and marrow, in prejudice of mechanic tissue and leading tissue (fig. 8, 9).

Transversal section through stem of plants treated with Folisof F212 show an increasing of the diameter proportional with dose. Unlike variant V_4 (fig. 10),

where mechanic tissue is less represented, at variant V_6 (fig. 11) mechanic and wooden tissues are well developed.

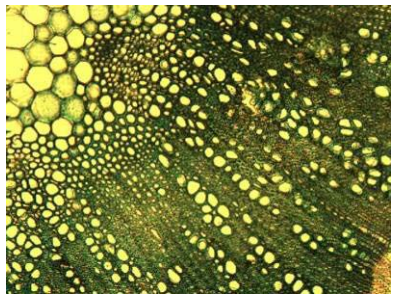

Fig. 4. Transversal section through stem V_1

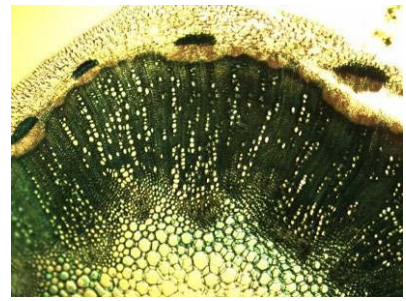

Fig. 5. Transversal section through stem V_1

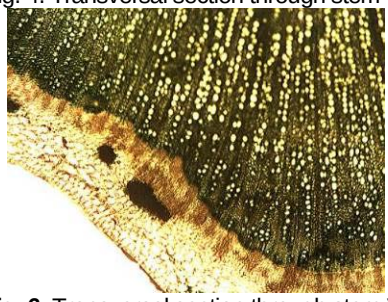

Fig. 6. Transversal section through stem V_1

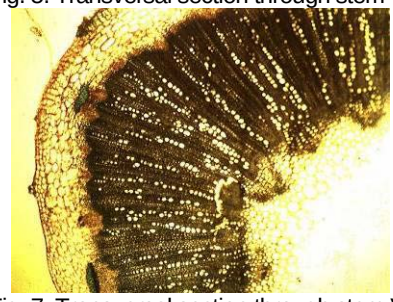

Fig. 7. Transversal section through stem V_2

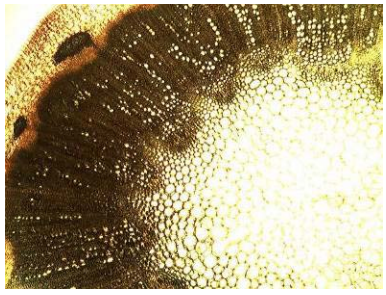

Fig. 8. Transversal section through stem V_3

Fig. 9. Transversal section through stem V_3

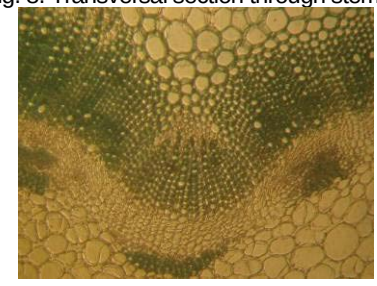

Fig. 10. Transversal section through stem V_4

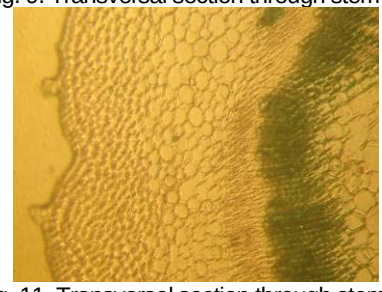

Fig. 11. Transversal section through stem V_6

Table 1

The main pedo-biological features of soil at fertilization with vinassa and Folisof

Enzymatic activity	Specification	Experimental variants						
		Control 0-20 cm	**Vinassa 3 t/ha 0-20 cm**	**Vinassa 5 t/ha 0-20 cm**	**Vinassa 7 t/ha 0-20 cm**	**Folisof 0.2% 0-20 cm**	**Folisof 0.4% 0-20 cm**	**Folisof 0.6% 0-20 cm**
Catalase DL 5% -8 mg O_2 DL 1% - 20 mg O_2 DL 0.1% - 28 mg O_2	mg O_2	343	318	302	281	377	413	425
	diff.	-	-25	-41	-62	34	70	82
	%	100	96.95	92.07	85.67	109.9	120.4	123.9
	signification	-	0	00	000	xx	xxx	xxx
Sucrase DL 5% - 111 mg DL 1% - 138 mg DL 0.1% - 371 mg	mg glucose	1321	1164	931	867	1521	1648	1737
	diff.	-	-157	-390	-454	200	327	416
	%	100	88.65	70.91	66.03	115.1	124.7	131.5
	signification	-	00	000	000	xx	xxx	xxx
Urea DL 5% - 3 mg NH_4 DL 1% - 5 mg NH_4 DL 0.1% - 7 mg NH_4	mg NH_4	15	10	8	6	17	18	19
	diff.	-	-5	-7	-9	2	3	4
	%	100	71.43	57.14	48.86	113.3	120.0	126.7
	signification	-	0	000	000	xx	xxx	xxx
Total phosphatase DL 5% - 0.8 mg P DL 1% - 1.6 mg P DL 0.1% - 2.1 mg P	mg P	5.5	3.3	2.1	1.7	6.7	7.0	7.6
	diff.	-	-2.2	-3.4	-3.8	1.2	1.5	2.1
	%	100	71.74	45.65	36.96	121.8	127.3	137.5
	signification	-	0	000	000	xx	xxx	xxx
IPAE DL 5% - 1.83% DL 1% - 2.31% DL 0.1% - 4.44%	%	17.67	14.79	12.28	11.15	20.10	21.67	22.77
	diff	-	-2.9	-5.4	-6.5	2.4	4.0	5.0
	%	100	87.20	72.40	65.74	113.7	122.6	128.8
	signification	-	0	000	000	xx	xxx	xxx

Studies and analysis included also the enzyme potential of soil from experimental field. In table 1 are presented the values of enzyme potential (catalase, sucrase, urease and phosphatase) recorded during the vegetation period, from soil samples gathered from depth of 0-20 cm. Soil samples from control variant record medium values of enzymatic activity, while fertilization with vinassa decreases enzymatic activity proportional to the dose of fertilizers and by application of foliar fertilization increased the values of enzyme potential at the same time with doses increasing.

CONCLUSIONS

Both Folisof F212 and vinassa stimulated the growth in height and ramification degree and flowering capacity of *Callistephus chinensis* plants, differentiated, function of used concentration.

The incentive effect of root and foliar fertilizer was highlighted by morph-anatomical analysis in the leaves and stems (changes indicating an increased activity and increased stem diameter).

Fertilization to soil with vinassa, especially in high doses causes an increase in response to field moderately alkaline soil, the content of mobile phosphorus, potassium assimilable, and degree of saturation in the base, but also a decrease of enzymatic activity.

Foliar fertilization with Folisof applied during the vegetation season in four rounds; provide nutrients, vitamins and growth stimulants that are totally soluble and rapidly falling in plant metabolism, stimulating plants to additional consumption of nutrients from the soil reserve.

REFERENCES

1. **Bireescu L., Bireescu Geanina, Teodorescu E., 2002** – *Cercetări ecopedologice asupra biotopurilor din sectorul mijlociu al culoarului Siretului.* Lucrări ştiinţifice UŞAMV, seria Horticultură, vol. 45, pg. 495-500.
2. **Bireescu L., Bireescu Geanina., Dorneanu Emilia, 2002** – *Rolul fertilizării foliare pentru echilibrarea nutriției minerale* – Simpozion Internațional CIEC, Braşov, Ed. Agris, pg. 301-306.
3. **Chelariu Elena-Liliana**, **Ionel A., 2005** – *Results regarding the influence of fertilization with Vinasa Rompak upon the crop yield at Sante potatoe specie*. 4th International Symposium, Buletinul U.Ş.A.M.V. Cluj-Napoca, vol. 61, seria Agricultură, pg. 408.
4. **Draghia Lucia, Chelariu Elena-Liliana, Delinschi Violeta, Grădinariu G., Bireescu L., 2008** - *Bio-fertilizer foliar application influences on growth and anatomical changes of Tagetes patula*. Proceedings of „43rd Croatian and 3rd International Symposium on Agriculture", University of Zagreb, Croatia, pg. 511.
5. **Nannipieri P., Ascher, J., Ceccherini M. T., Landi L., Pietramellara G., Renella G., 2003 –** *Microbial diversity and soil functions.* European Journal of Soil Science, vol. 54, p. 655.
6. **Ştefanic G., 1994 –** *Biological definition, quantifyng method and agricultural interpretation of soil fertility*. Romanian Agricultural Research, 2: p.107-116.