

RESEARCH REGARDING THE INFLUENCE OF VINASSA FERTILIZATION ON *GOMPHRENA GLOBOSA* SPECIE

CERCETĂRI PRIVIND INFLUENȚA FERTILIZĂRILOR CU VINASSA ASUPRA SPECIEI *GOMPHRENA GLOBOSA*

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Abstract: *The paper presents the results of the experiments done at Gomphrena globosa specie, at which were applied fertilization with vinassa product (sub-product obtained after the evaporation of the residual waters from bakery yeast factories) in three doses as follows: 3 t/ha, 5 t/ha, 7 t/ha. Were made observations on morphologic and morph-anatomic behaviours of plants and on other side was made a study regarding biotic and enzymatic potential of soil. The height increase and flowering capacity were stimulated by application of vinassa no matter which was the utilised dose. Stem anatomic structure recorded modifications, mainly, at application of maximum doses, in the way of a better representation of the tissues from quantitative and quality point of view. At soil level, fertilization with vinassa leads to an increase of soil reaction to moderate alkaline domain.*

Key words: *Gomphreana globosa, vinassa, fertilization*

Rezumat: *Lucrarea prezintă rezultatele experiențelor efectuate la cultura de Gomphrena globosa, la care s-au aplicat fertilizări cu produsul vinassa (subprodus obținut în urma procesului de evaporare a apelor reziduale de la fabricile de producere a drojdiei de panificație) în trei doze și anume: 3 t/ha, 5 t/ha, 7 t/ha. S-au făcut determinări pe de o parte asupra însușirilor morfologice și morfo-anatomice ale plantelor, iar pe de altă parte, un studiu al potențialului biotic și enzimatic al solului. Creșterea în înălțime și capacitatea de înflorire au fost stimulate prin aplicarea vinassei indiferent de doza utilizată. Structura anatomică a tulpinii înregistrează modificări, îndeosebi, la aplicarea dozelor maxime, în sensul unei mai bune reprezentări a țesuturilor atât din punct de vedere cantitativ, cât și calitativ. La nivelul solului, fertilizarea cu vinasa a determinat o creștere a reacției solului spre domeniul moderat alcalin.*

Cuvinte cheie: *Gomphreana globosa, vinassa, fertilizare*

INTRODUCTION

Vinassa is a sub-product obtained from the residual waters resulted during obtaining of beer yeast. In Romania the product is processed at Yeast factory from Pașcani and was homologated as fertilizer in 2003. In other European countries vinassa results after the distillation process of sugar beet molasses, but in Central and South America is used molasses from sugar cane.

Vinassa product determined increases of production phytomass statistical assured (Ionel A. et al., 2000; Chelariu Elena-Liliana and Ionel A., 2005; Chelariu Elena-

Liliana, 2007) and influenced the chemical composition of the fodder obtained from the pastures by increasing content of crude protein, potassium, calcium and the decrease in crude cellulose content, phosphorus and magnesium (Vintu V. et al., 2003).

MATERIAL AND METHODS

Experience was set up at University of Agricultural Sciences and Veterinary Medicine, in the didactic field of Floriculture discipline, being organized in randomized blocks, with three repetitions. Researches were made regarding the influence of radical fertilizations with vinassa on *Gomphrena globosa* L specie.

Vinassa product is presented as a dark-brown liquid, with a quite low viscosity, with caramel smell (unpleasant due to the presence of phenols) and with a sour-sweet taste. It have a complex chemical composition, being rich in total nitrogen (3.0-3.2%), very rich in potassium (5.0-7.0%) and poor in phosphorous (0.3-0.5%). Also it has quite great amounts of calcium, sodium, magnesium, iron, copper, zinc.

Fertilization with vinassa was made in three different doses, respectively 3 t/ha, 5 t/ha and 7 t/ha, so that were obtained the following experimental variants: Control – unfertilized; V₁ – fertilized with vinassa 3 t/ha; V₂ – fertilized with vinassa 5 t/ha; V₃ – fertilized with vinassa 7 t/ha.

Biometric determinations: evaluation of height growth, ramification degree and plants' flowering capacity. Recorded dates were statistical analysed and are presented in synthesis graphs and tables.

Morph-anatomical analyses were made observations which put in light some modifications appeared at the tissues and organs level, function of applied treatment and used concentrations. To observe structure details of the studied material (stem) were made microscopical samples (Toma C. and Gostin Irina, 2000).

Pedo-ecologic and bio-pedology researches were made during vegetation period on soil resources. The studies were achieved also in field, through stationary method, and also in laboratory on soil samples gathered form experimental variants placed on a hortoc antrosol.

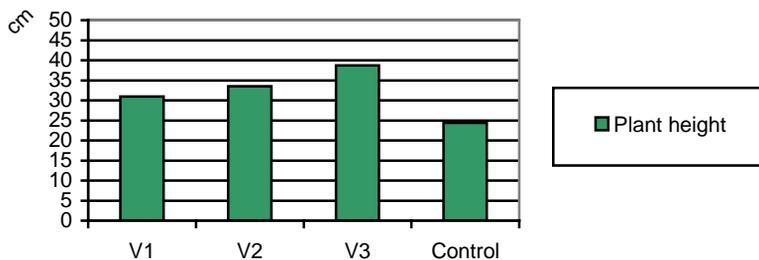
Were analysed the main features of the bio-type, regarding ecologic, areal and local context, by *studying the soil quality features* and by using the *form of specific ecologic of the eco-pedo-top*.

RESULTS AND DISCUSSIONS

Biometric determinations

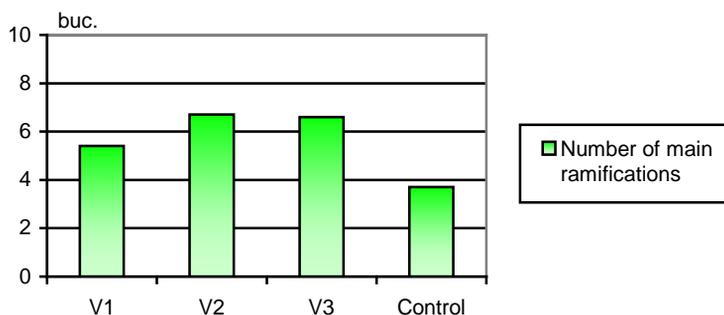
The height growth differences of plants record values from 58.6% (V₃) and 27.0% (V₁) face to control, with very positive significations (fig. 1).

Number of stem ramifications at fertilized variants overpass control with 45.9% at V₁, with 81.0% at V₂ and with 78.4% at variant V₃, at all of them the differences being very significant (fig. 2).



DL 5% = 2.5 cm; DL 1% = 3.7 cm; DL 0.1% = 6.0 cm

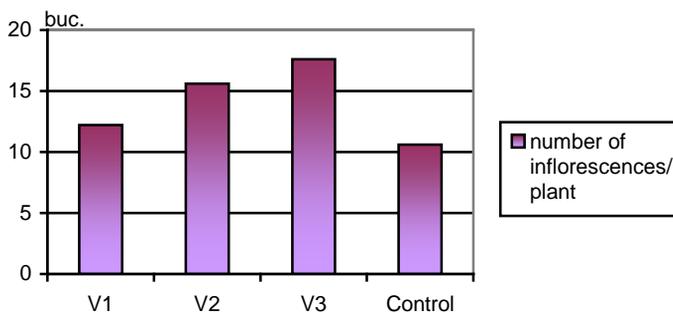
Fig. 1. Average height of *Gomphrena globosa* plants



DL 5% = 0.3 buc; DL 1% = 0.4 buc; DL 0.1% = 0.6 buc

Fig. 2. Average number of main ramifications/plant at *Gomphrena globosa*

The number of inflorescences per plant (fig. 3) is determined also by the applied fertilization. Variants V_2 and V_3 recorded very significant differences, and variant V_1 record significant differences.

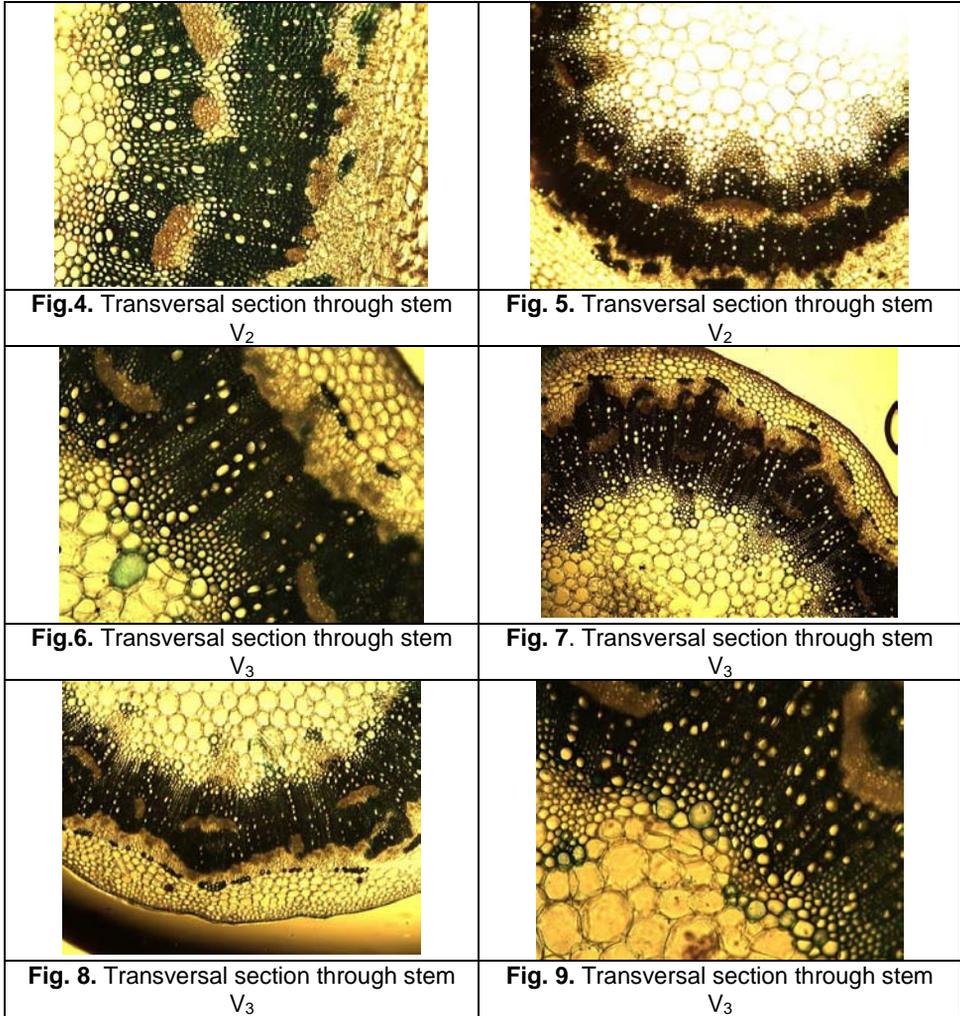


DL 5% = 1.6 buc; DL 1% = 2.4 buc; DL 0.1% = 3.8 buc.

Fig. 3. Average number of inflorescences/plant at *Gomphrena globosa*

Morph-anatomic studies

Stem structure at variants V_2 and V_3 is remarkable due to the fact that at variant V_2 (fig. 4, 5) the tissues are less quality and quantitative represented that at variant V_3 (fig. 6, 7). To the external part of marrow, from place to place, could be observed groups of well contoured cells with strong lignified walls, with an additional role in stem sustaining (fig. 8, 9).



Pedo-ecologic and bio-pedology studies

From the main 20 factors and ecologic determinants (5 climatic and 14 eco-pedological and 1 synthetic pedo-biologic indicator), the majority are from quantitative point of view in medium classes of size, and from quality point of view in medium classes of ecological favourability (table 1).

Table 1

Form of specific ecologic of eco-pedo-top (Experimental field – SDE UŞAMV İaşı)

Factors and ecologic determinants	Classes of ecological size							Classes of ecological favourability						
	0...m	I	II	III	IV	V	E ₁	E ₂	N...m	FS	S	M	R	FR
GROWTH FACTORS														
Content of total nitrogen (Nt)					x						x			
Content of mobile phosphorous (P ₂ O ₅)						x								x
Content of assimilable potassium (K ₂ O)						x								x
ECOLOGICAL CLIMATIC FACTORS														
Yearly average temperature (T)						x								x
Yearly average precipitations (P)				x									x	
Wind regime (V)				x									x	
Summer rains (Pe)			x							x				
Relative humidity of summer air (U _{er})			x							x				
SPACE TIME ECOLOGIC FACTORS														
Edaphic volume(Ve)						x								x
Length of bioactive period (LPB)						x								x
NEGATIVE ECOLOGIC FACTORS														
Hydrolytic alkalinity/acidity (Alc)						x					x			
Soil consistency (Con)							x				x			
ECOLOGIC DETERMINANTS														
Humus content (Hum)				x								x		
Soil texture (Tx)				x								x		
Aeration porosity (PA)			x								x			
Soil reaction (pH)				x							x			
Saturation degree with base (V)						x							x	
SYNTETIC BIOLOGIC INDICATORS														
Biologic activity (Bio)				x								x		
SYNTETIC PEDOLOGIC INDICATORS														
Potential trophicity (Tp)				x								x		
Effective trophicity (Te)				x								x		

X-experiments fertilization to soil with Vinassa

8 classes of ecological size (0 ... m, I, II, III, IV, V, E₁-extremely weak to moderate, E₂-extremely strong)

6 classes of ecological favourability (N ... m-negative to minimum, FS-very low, S-low, M-medium, R-high and FR-very high)

In small size class and very low and low favourability class are placed: aeration porosity, summer rains and relative humidity of summer air.

In excessive size class is placed hard consistency of soil in dry aggregation during summer (table 1).

Main physical and chemical properties of the soil from the experimental field (at a depth of 0-20 cm) are presented on experimental variations in table 2. Fertilization to soil with vinassa, especially in high doses, causes an increase of soil pH to moderately alkaline, increase of mobile phosphorous content, accessible potassium, the degree of saturation with base.

Table 2

Main physical and chemical features of horticultural soil from the experimental field

Variant	Deep (cm)	% coloid. clay	Text. class	PA %	pH H ₂ O	Hum %	Nt %	P _{AL} ppm	K _{AL} ppm	SB me	T me	V %
Control	0-20	34.8	T	10	7.28	3.312	0.202	55	218	31.5	33.7	91
V ₁ Vinassa 3t/ha	0-20	34.4	T	9	7.62	3.321	0.212	58	221	32.1	33.8	93
V ₂ Vinassa 5t/ha	0-20	36.1	T	7	7.96	3.352	0.224	57	234	32.8	34.2	95
V ₃ Vinassa 7t/ha	0-20	35.7	T	6	8.52	3.371	0.231	60	235	33.4	34.6	97

CONCLUSIONS

Experiments were focused on morphological and morph-anatomic features of plants, and on other side, was a study of biotic and enzymatic potential of soil.

Vinassa determined a stimulation of growth in height and flowering capacity no matter what was the used dose.

Stem anatomic structure record modifications, especially, at applying maximal doses, in the way that it is a better representation of the tissues both from quality and quantitative point of view.

At soil level, fertilization with vinassa leads to an increase of soil reaction to moderate alkaline domain.

REFERENCES

1. Chelariu Elena-Liliana, Ionel A., 2005 - *Results regarding the influence of fertilization with Vinassa Rompak upon the crop yield at Sante potato specie*. 4th International Symposium, Buletinul U.S.A.M.V. Cluj-Napoca, vol. 61, seria Agricultură.
2. Chelariu Elena-Liliana 2007 - *Studiul agropductiv al pajiștilor permanente din bazinul superior al râului Slănic - Buzău*, Teză de doctorat, U.Ș.A.M.V. Iași.
3. Ionel A., Vintu V., Halga P., Iacob T., Samuil C., 2000 – *Vinassa, fertilizant și aditiv furajer*. Lucrări științifice USAMV Iași, seria Zootehnie vol 43.
4. Toma C., Gostin Irina, 2000 - *Histologie vegetală*. Ed. Junimea, Iași.
5. Vintu V. et al., 2003 - *Posibilități de îmbunătățire a pajiștilor permanente prin folosirea ca fertilizant a subprodusului vinassa*. Lucrări științifice USAMV Iași, seria Agronomie.