

THE INFLUENCE OF LEAF AND ROOT FERTILIZATION ON SOME VALUABLE LARGE-PEPPER CROP PRODUCTION, CULTIVATED IN VEGETATION VESSELS SYSTEM

INFLUENȚA FERTILIZĂRII FOLIARE ȘI RADICULARE ASUPRA PRODUCȚIEI UNOR CULTIVARE VALOROASE DE ARDEI GRAS, EXPERIMENTATE ÎN SISTEMUL VASELOR DE VEGETAȚIE

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Abstract. *To satisfy the new quality exigencies which are a necessity for modern agriculture, specialists must to develop new cultivation systems, depending on natural mechanisms, which must guarantee the environment protection, but to also satisfy the humanity food supplies demands.*

For this reasons, this scientifically work is about the production variation of some new, valuable hybrids pepper cultivated in vegetation vessels system in the specifically conditions of Iasi area, using mineral fertilizers (15-15-15 C) and leaf fertilizers (Folisof 221, Kristalon Verde, Fertcomplex C., Biostar).

The results certify the fact that satisfactory productions are obtained using both fertilization systems, even if some important incensements are record only by using leaf fertilization.

Rezumat. *Pentru a satisface noile exigențe de calitate impuse agriculturii moderne, specialiștii trebuie să dezvolte noi sisteme de cultivare, bazate pe mecanisme naturale, care să asigure protecția mediului, dar să satisfacă totodată și cerințele de hrană ale omului.*

Din aceste considerente, lucrarea de față urmărește dinamica producției unor cultivare valoroase, noi de ardei gras, cultivate în sistemul vaselor de vegetație în condițiile specifice zonei Iași, folosind fertilizatori minerali (complex 15-15-15) și foliari (Folisof 221, Kristalon Verde, Fertcomplex C., Biostar).

Datele obținute certifică faptul că producții satisfăcătoare se obțin prin utilizarea ambelor tipuri de fertilizare, chiar dacă se înregistrează sporuri uneori semnificative și la aplicarea numai a fertilizării foliare.

Regarding the economical and feeding importance of pepper, the growth study of some new plants in some specials conditions, using different fertilization systems, is one of the main domain for specialists, to recommend the moast efficient practical solutions, for specifically area conditions.

MATERIALS AND MEANS OF RESEARCH

The experiment was carried out on the premises of the experimental field of the Agrochemical discipline of "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine, Iasi, in vegetation vessels, using mineral fertilizer (complex 15-15-15) and leaf fertilizers (F₂₂₁, Fertcomplex, Green Kristalon and Biostar) in the large-pepper crop and monitoring the effect these two combined have on the production.

The experiment organized in vegetation vessels in 2006 is bifactorial, following the randomized blocks method.

A factor (leaf fertilization, non-mineral fertilization)

- a1 - F₂₂₁
- a2 - Fertcomplex
- a3 - Green Kristalon
- a4 - Biostar
- B factor (leaf fertilization + mineral fertilization – complex 15-15-15):
- b1 - F₂₂₁ + N₈₀P₈₀K₈₀
- b2 - Fertcomplex + N₈₀P₈₀K₈₀
- b3 - Green Kristalon + N₈₀P₈₀K₈₀
- b4 - Biostar + N₈₀P₈₀K₈₀

The complex fertilizer 15-15-15 contains 50% ammoniacal nitrogen, 50% nitric nitrogen, phosphorus 98% soluble in citric acid, 60% soluble in water, potassium 45% total active agent, humidity 1%, granulation 1-4 mm 90%, free acidity maximum 3%. This is a chemical fertilizer with well balanced basic elements (N, P, K), used in ecological doses (minimum) recommended for large-pepper crop (N₈₀P₈₀K₈₀).

Table 1

Composition and Characteristics of used leaf fertilizers

Leaf fert.	CSA %	pH	N g/l	P g/l	K g/l	B G/l	S g/l	Mn g/l	Mg g/l	Zn g/l	Cu g/l	Fe g/l	Mo g/l
F221	16	6,5-7	70	70	48	0,2	9	0,2	0,5	0,1	0,05	0,2	-
Fert.	16	6.5	80	80	75	0,3	0,4	0,4	0,04	0,04	0,1	0,3	0,03
Kris.	16	6,6	180	180	180	0,025	-	0,04	-	0,025	0,01	0,07	0,004
Ecol. fert.	pH	Nt %	Norg %	Mat or %	Polizahar., polipept, prot.					Vitamins			
Bios	5,8	2	2	12	13,5					B1, B6, PP			

Recommended concentrations for organic leaf fertilizer are: 0,2-0,3% (Biostar) and between 0,5 -1% for the chemical ones, while recommended doses are 2-3 l/ha for leaf organic fertilizers and between 7-8 l/ha for the chemical ones.

The biological material used was represented by four hybrids of Capsicum annum: Albatros, Belladonna, Gypsy, Shy Beauty.

Albatros F1 is a very early indeterminate hybrid with extremely high yield potential. The plant is vigorous, with short internodes. Fruits are tapered, 3-4-lobed. The fruit color is white with yellow undertone, becoming bright red at biological ripeness. Fruits are 100-120 g in weight, 6-7 cm in diameter, 10-12 cm in length, with a wall thickness of 5-6 mm. This variety features an outstanding fruit-setting ability and intermediate heat resistance. Recommended for very early greenhouse and open-field production

Belladonna F1 is a very early-maturing hybrid. The plants are vigorous, with a compact, indeterminate plant habit allowing very easy harvest. Produces a high percentage of 4-lobed, thick-walled (6-7 mm) fruit. The blocky bell-shaped fruit average 9-10 x 8-9 cm in size and 160 - 200 g in weight and are very uniform. The fruit color varies from ivory at industrial ripeness to yellow at complete physiological ripeness. Resistant to tobacco mosaic virus (Tobamo virus P0). Particularly suited for early spring, summer and autumn production in glasshouses, as well as for cultivation in plastic film greenhouses, under plastic cover and in the open field for fresh market.

Gypsy F1 is a very early and extremely productive hybrid. Matures 60 days after transplanting. Plants have a compact growth habit and a height of 45-55 cm. Fruits measuring 10x6 cm, have a great flavor and are light-yellow at industrial ripeness and red at biological ripeness. Resistant to tobacco mosaic virus. Recommended for very early production in glass greenhouses, plastic film greenhouses and in the open field

Shy Beauty F1 is early-maturing hybrid with vigorous plants and excellent yield potential. Fruits are blocky, thick-walled. The fruit color is ivory at industrial ripeness and red at biological ripeness. Suitable for fresh market and processing. Resistant to tobacco mosaic virus (Tm2) and bacterial spot. Recommended for cultivation in glass greenhouses, plastic film greenhouses and in the open field.

Mineral fertilization with the complex fertilizer 15-15-15 was carried out on May 23, 2006, one week before plantation.

Leaf fertilization was accomplished in three steps: the first fertilization before blooming, on July 4, 2006; the second fertilization in the immediately following period, on July 12, 2006; and the last fertilization during blooming, on July 18, 2006.

RESULTS AND DISCUSSIONS

The results obtained after weighing the production of each plant (in grams) were transformed in t/ha, taking as cultivation density 60.000 plants/ha as presented in table 2.

Table 2

Large-pepper production (t/ha)

Variants/ Hybrids	Gypsy		Albatros		Belladonna		Shy Beauty	
	t/ha	Increase t/ha	t/ha	Increase t/ha	t/ha	Increase t/ha	t/ha	Increase t/ha
Unfert.	17,940	0	18,960	0	19,320	0	17,820	0
F1	21,420	3,480	22,920	3,960	23,940	4,620	22,140	4,320
F2	21,660	3,720	22,980	4,020	24,300	4,980	22,080	4,260
F3	21,900	3,960	23,940	4,980	25,020	5,700	22,560	4,740
F4	19,920	1,980	21,120	2,160	21,240	1,920	18,420	0,600
M+F1	30,480	12,540	34,380	15,420	35,460	16,140	33,780	15,960
M+F2	31,200	13,260	33,900	14,940	34,920	15,600	32,400	14,580
M+F3	31,800	13,860	35,400	16,440	35,640	16,320	35,160	17,340
M+F4	29,880	11,940	31,200	12,240	30,900	11,580	29,160	11,340

M = unfertilized; F1 = leaf fertilization with F₂₂₁; F2 = leaf fertilization with Fertcomplex; F3 = leaf fertilization with Green Kristalon ; F4 = leaf fertilization with Biostar; M+F1 = leaf fertilization with F₂₂₁ + N₈₀P₈₀K₈₀; M+F2 = leaf fertilization with Fertcomplex+ N₈₀P₈₀K₈₀; M+F3 = leaf fertilization with Green Kristalon + N₈₀P₈₀K₈₀ și M+F4 = leaf fertilization with Biostar + N₈₀P₈₀K₈₀

The agrochemical calculations on the soil pointed to the following indices: 6,8-7,2 ph, SB = 28,3 me/100 g soil, Ah = 0,4 me/100 g soil, V% = 95%, C organic = 2,01%, Nt = 0,197%, C/N = 12,01, P₂O₅ = 72 ppm, K₂O = 342 ppm, I.N. = 2,83.

Analyzing the production data from table 2, we can easily notice that the genetic production potential of the Belladonna hybrid is the highest, being followed by the Albatros hybrid, then Gypsy and Shy Beauty.

Using leaf fertilizers brings rather large production profits (from 0,600 t/ha to 5700 kg/ha) for each large-pepper hybrid, but without significant variations when compared to the applied leaf fertilizer. This demonstrates that each hybrid reacts well to the fertilizers, the difference in production being given by the genetic potential of the hybrids.

Significant benefits as compared to the unfertilized (the unfertilized variant) are registered by the variants fertilized in combination (mineral and leaf) keeping the same rule of the genetic potential of each hybrid.

Thus, Belladonna registers a maximum increase in production with the mineral fertilized variant (N₈₀P₈₀K₈₀), together with the foliar Green Kristalon (16320 kg/ha), the fertilizer with the highest content of NPK (180 g/l). This demonstrates the fact that the crop depends on the plants good provision of P and K.

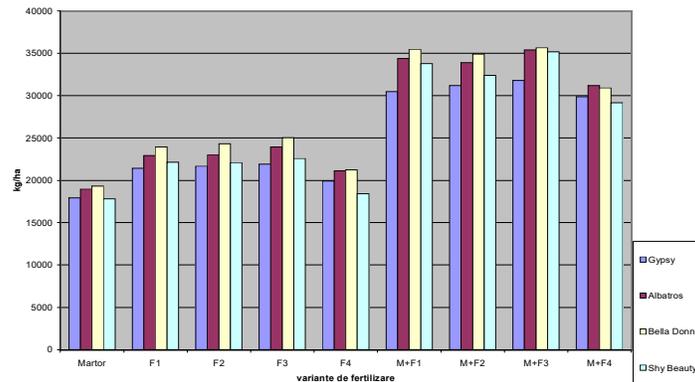


Figure 1 - The variation of the production according to fertilization

The first three leaf fertilizers bring production benefits superior to the Biostar fertilizer, an ecological fertilizer that brings a smaller amount of accessible nutritional elements to the plants. The only strong point of this fertilizer could be the vitamin content, but that hasn't brought crops to the same level as the chemical leaf fertilizers. This shows that mineral substances with small molecules are more easily absorbed at the leaf level, to the detriment of the organic ones.

When applying combined fertilization (mineral+leaf) the production benefits are considerable, varying from 11580 kg/ha to 35640 kg/ha as compared to the unfertilized variant.

CONCLUSIONS

A determining factor in calculating the large-pepper production is the genetic potential of the hybrid. Important production benefits may be obtained through unilateral fertilizing using leaf fertilizers. In this case, the best response comes from using chemical fertilizers rather than 'ecological' ones.

The hybrids employed in this study are highly productive, but the maximum may be obtained only by using fertilizers.

Combined fertilization (root + leaf) has proved to be the optimal variant, bringing considerable production increases.

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