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RESEARCH REGARDING THE INFLUENCE OF CLIMATE CONDITIONS ON SOY CROPS

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Abstract: *Soy is known for its sensibility to pedologic and atmospheric drought, the negative effects on plant growth and fruition being stronger at very high temperatures. During 2016 and 2017, in Recas, we have observed the effect of seed bacterization on plant growth and development and on the production. 2016 was, from a climatic point of view, very favourable for soy beans, the precipitation regime being optimal for the plant. 2017 was a less favourable year, due to precipitation insufficiency associated with very high temperatures. In 2017, the production decreased with about 85%, as compared to the one obtained in 2016. The bacterization effect, though strong in 2016, was as good as non-existent in 2017.*

INTRODUCTION

The symbiosis soy plants enter into with nitrogen binding bacteria specific for them (Bradyrhizobium japonicum) is based on an advantageous exchange between the two partners. Soy feeds the bacteria photoassimilates, and bacteria offer the soy plant nitrogen they bind from the air. When vegetation conditions are favourable for soy, it can provide the bacteria with photoassimilates, while the bacteria, reproducing, carry out an intense nitrogen binding activity, providing large nitrogen quantities. [2]

Soy plants are sensitive to lack of water in the soil. Times of drought affect the plant growth and development profoundly and, indirectly, hinder the setting in and functioning of the symbiosis, determining the binding of small quantities of nitrogen [3, 4]

MATERIALS AND METHODS

In 2016 and 2017 we organised a monofactorial experiment on a soil in Recas [1] where we monitored plant growth and development in two variants: non-bacterized and bacterized with the biopreparation Nitogin.

We determined:

- plant height;
- number of pods/plant step;
- number of pods/plant;
- number of grains/plant;
- MMB;
- productions/ha.

Climatic conditions varied widely during the two experimental years.

Table 1.

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2015	2.1	2.9	7.1	11.6	17.7	21.2	24.9	24.5	19.0	10.9	6.7	3.s1
2016	-0.3	6.9	7.7	13.7	16.3	21.6	23.9	24.3				
Annual averages	-1.2	0.4	6	11.3	16.5	19.6	21.6	20.8	16.9	11.3	5.7	1.4

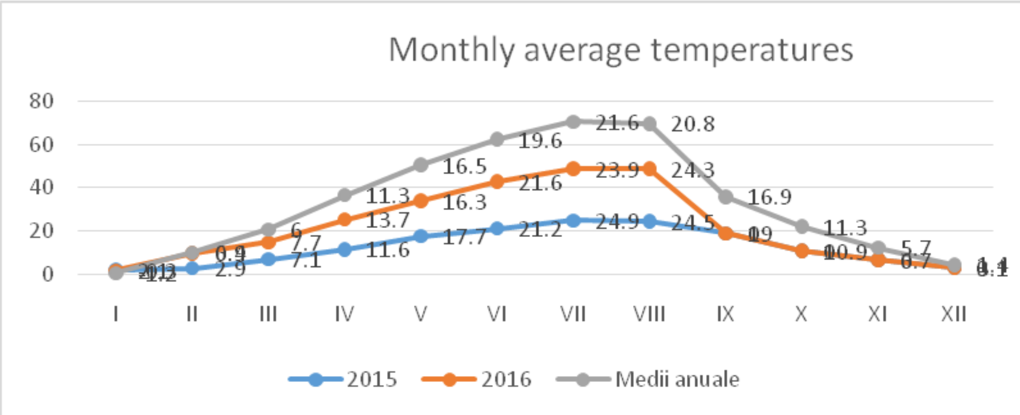

Fig. 1. Monthly average temperaturess

Table 2.

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2015	51.4	37.4	33.3	28.1	46.9	61.8	25	111.2	60.5	60.9	48.8	8.
2016	48	45	64	20	51	177	172					
Multiannual averages	40.9	40.2	41.6	50	66.7	81.1	59.9	52.2	46.1	54.8	40.6	47

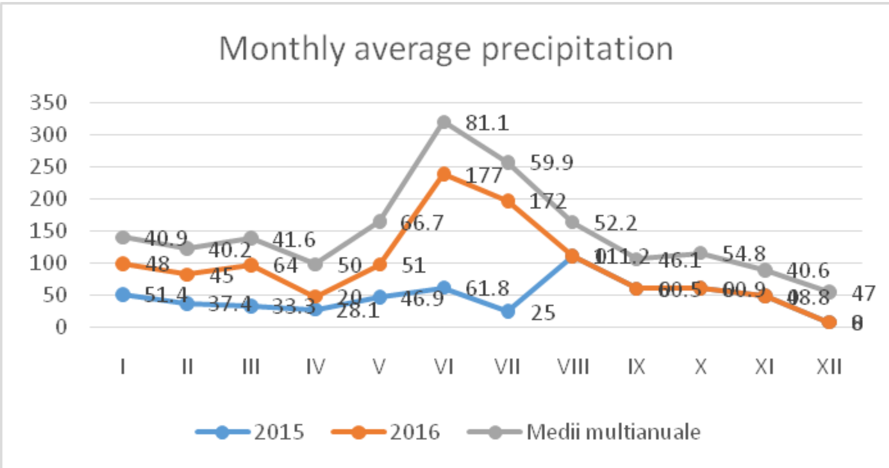

Fig. 2. Monthly average precipitations

2016 was a very favourable year for soy, considering the precipitation quantity during the vegetation period, as well as the precipitation period in accordance with the soy requirements.

2017 was not favourable for the soy crop, due to very small precipitation quantities during the plant growth and fruition periods associated with very high temperatures which increased the unfavourable effect at plant levels.

Taking all these into account, we analysed statistically the Influence of climatic favourability on the soy productions.

RESULTS AND DISCUSSIONS

Table 3.

	Year	Plant height (cm)
Bacterized	2016	138.6
	2017	45.6
Not bacterized	2016	115.3
	2017	44.8

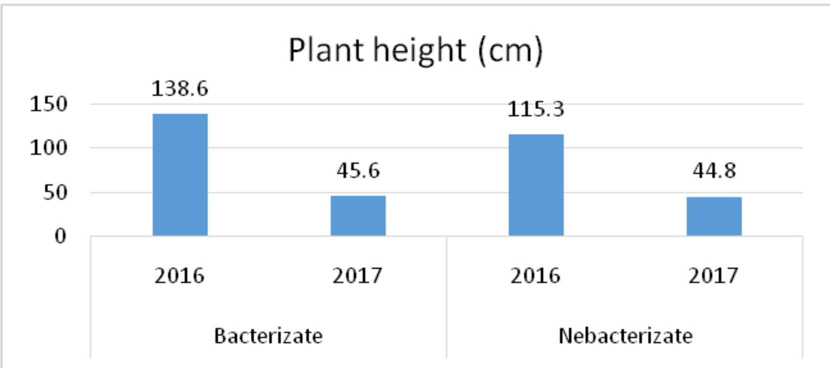

Fig. 3. Plant height

Figure 1 shows that the plant height has been strongly affected by unfavourable conditions during 2017.

Regarding the influence of bacterization in 2016, of year of good climatic favourability, we observed that the plant height had increased with 23.9 cm (20.7 %). In 2017, practically there was no height increase in the bacterized variant (0.8 cm- 1.7 %).

Table 4.

	Year	No. of pod steps
Bacterized	2016	20.3
	2017	8.3
Non-bacterized	2016	17.6
	2017	8

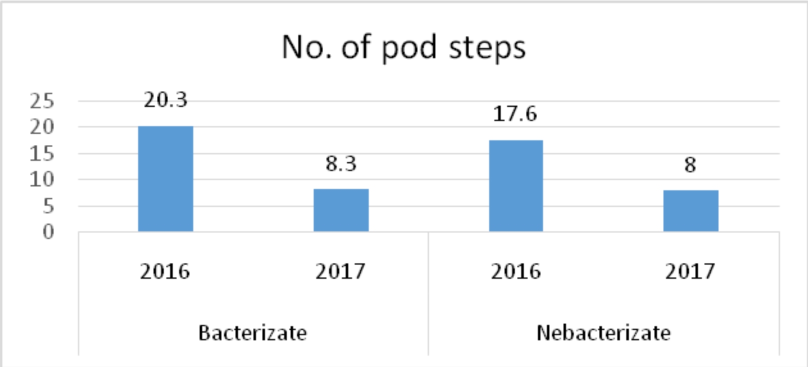

Fig. 4. Number of pod steps.

The number of pod steps was high during 2016. With the bacterized variant, the number of pod steps was by 2.7 (15.3 %) higher, as compared with the non-bacterized variant. In 2017, the number of pod steps was very low (8 respectively 8.3) in both variants.

Table 5.

	Year	Pod no.
Bacterized	2016	50.6
	2017	12
Non-bacterized	2016	42.4
	2017	12.6

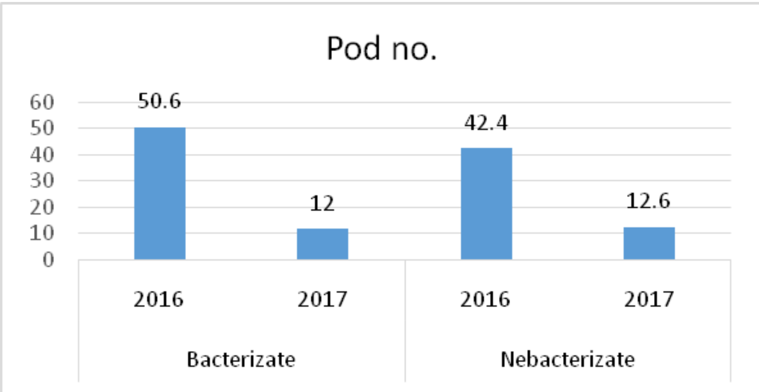

Fig. 5. Pod number

The number of pods per plant achieves a high number in 2017 in both variants, with an addition to the bacterized variant of 8.2 pods/ plant. In 2016, the number of pods/plant was about 75% more reduced than in 2017, no differences being discernible at the level of the two studied variants.

Table 6.

	Year	No. grains/plant
Bacterized	2016	125.3
	2017	106.1
Non-bacterized	2016	20.2
	2017	18.7

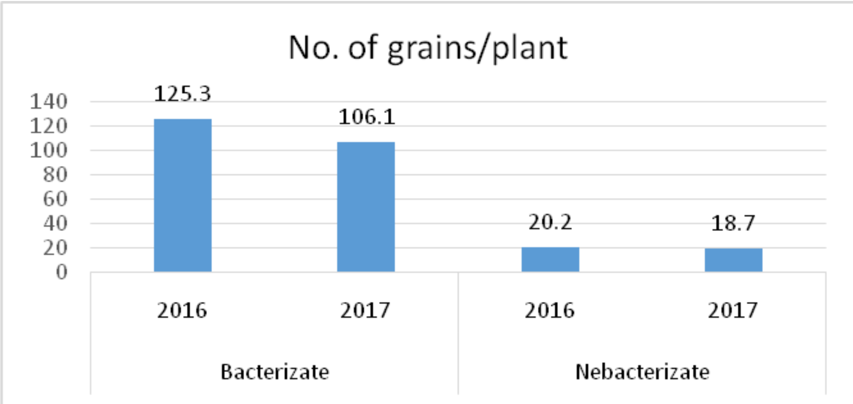

Fig. 6. Number of grains per plant

The number of grains per plant, an essential productibility element, shows that, in the climatic favourable year, it increased, due to bacterization, by 19.2 grains per plant, respectively by 18.01%. As natural consequence of the plant growth and development during 2017, the number of grain per plant was very low: 20.2 in the bacterized variant and 18.7 in the non-bacterized one.

Table 7.

	Year	MMB
Bacterized	2016	128.6
	2017	87.0
Non-bacterized	2016	128.1
	2017	87.7

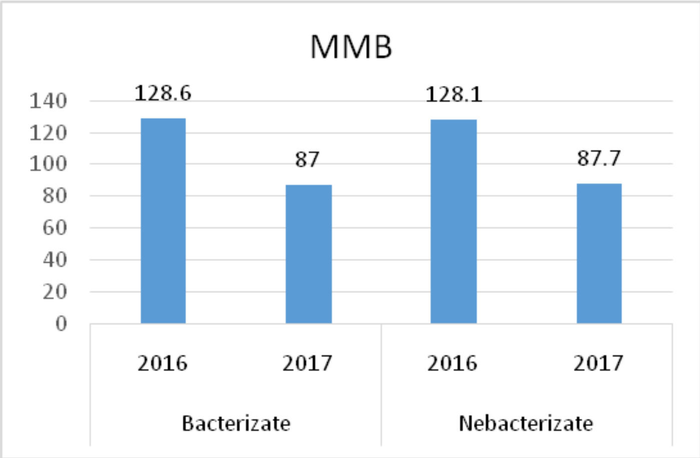

Fig. 7. MMB

Analysing MMB which represents a characteristic of high stability, we observe that, under the conditions of 2017, it was significantly affected, so that, in 2016, MMB was specific to the variety, ca. 130 g, while in 2017, it only reached 87 g.

When analysing the obtained productions, we find:

Production.

Experimental factor B / A	INOCULATION		Average production	%	Dif.	Signific.
	Non-bacterized	Bacterized				
2016	34076	4169 a	3788	100	Mt	
2017	409c	440 c	425	11	-3363	000

Factor B averages:

Production	1908	2304
%	100	121
Difference	Mt	396
Significance		XXX

DL	A	B	AXB
5%	183	117	137
1%	265	193	207
01%	307	258	232

We notice that the average production with both bacterization variants in 2017 decreased with 89% as compared to 2016. As an average, during the two study years, we obtained a production increase by 21% respectively 396 kg/ha through bacterization.

When analysing the factor interaction we observe that, in 2016, production of the bacterized variant is differentiated statistically from the non-bacterized one, and from both variants production in 2017. In 2017, the productions obtained in both bacterized and non-bacterized variants are not statistically differentiated.

CONCLUSIONS

1. In 217, unfavourable climatic conditions led to a decrease in production by 89% as compared to the one obtained in 2016, a very favourable year for soy.
2. Under favourable climatic conditions (2016), through bacterization we obtained a value increase of the determined elements by 15-20% which materialized in an increase in production from 407 kg/ha to 4169 kg/ha insured statistically.
3. Under unfavourable climatic conditions (2017), through bacterization, we did not obtain any increase in value for the determined elements.
4. The production level achieved under unfavourable conditions (2017) in the bacterized variant did not differ statistically from the non-bacterized variant.

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