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INFLUENCE OF CHEMICAL FERTILIZATION ON SILO MAIZE PRODUCTION

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Chemical fertilization is an agrotechnical measure essential in cropping systems and it guarantees yield boosts. At present, when setting up a cropping system, the main criterion to take into account is the influence of a certain technological part, in this case fertilization, of on the agricultural production; however the concept of sustainable development also requires the assessment of the impact on the primary consumer, along with complying with other requirements of environment protection and biodiversity conservation. In order to improve the influence of nitrogen and phosphorus chemical fertilizers inputs on biomass production in silo maize, when grown on the phaeoziom from Belciugatele Didactic Station, a monofactorial experiment was carried out, the fertilization having different doses of nitrogen and phosphorus. In the course of the experiment the Vultur hybrid especially designed for biomass production was used. Following the research carried out between 2002 and 2005, it was observed that the dry biomass production levels were between 6.27 and 8.13 t/ha; the increase of the chemical fertilizer doses applied led to yield boosts compared to the unfertilized treatments. Significant yield boosts were obtained in all three experimenting years when applying $N_{100}P_{50}$ and $N_{150}P_{100}$ formulas; between these two there were no significant differences. The increase of dosage over $N_{150}P_{100}$ results in lower yields

INTRODUCTION

Cropping systems, especially for forage crops, are assessed and improved according to some performance criteria, among which production, forage quality, environment protection and the influence on the primary consumer (the animal) play important roles.

Provided the imperative implementation of sustainable development, the improvement of the forage quality for silo maize is a major objective, which is assessed regarding input optimization and that's why the research approaches both the genetic potential of the used hybrids and the technological parts.

Among the technological parts impacting on the quantity and quality of silo maize production, the objective of the research carried out in this paper is to determine the influence of fertilization on the elements of biomass production and quality.

MATERIAL AND METHODS

Research was carried out in the period 2002-2005, in Belciugatele Didactic Station, in UASVM Bucharest.

The experiment was monofactorial, with 5 treatments: V_1-N_0P_0; V_2-$N_{50}P_{50}$; V_3-$N_{100}P_{50}$; V_4-$N_{150}P_{100}$; V_5-$N_{200}P_{100,}$ using the tiered seating system, in 4 replications. The active substance for phosphorus is expressed in P_2O_5.The surface of the experimental field was of 30 square metres.

In the course of research, the Vultur maize hybrid was sown at a density of 70,000 plants/ha.

The natural conditions where the experiment was carried out:

The temperature during sowing was over 8 ^{0}C (10.7 ^{0}C). During the growing season the mean temperature didn't go upper than 25 ^{0}C.

The rainfall pattern recorded in the course of the experiment shows that the year 2002 had high precipitations (838.5 mm); the year 2004 was dry (591.0 mm), with the precipitation amount lower than the multiannual average of 10 years (609.7 mm) and the average of the three studied years (777.7 mm); the year 2005 had the highest precipitations, mounting to 1120.6 mm, higher than the known multiannual figures.

The soil is cambic chernozem (phaeozem) with the following features: loamy-clayey texture, deeply humified (3% at the surface and 1% at 1 m depth); pH of 6.3-6.8, very high content in P, 72 ppm P_{AL}, very high content in K, 310 ppm K_{AL}, the C/N ratio of 11.4.

RESULTS AND DISCUSSION

The influence of chemical fertilization on production (entire plant), 2002-2005 average. According to the data presented in Table 1 there can be estimated that on the average of the three experimenting years, the increase in the applied rates of chemical fertilizers led to statistically assured production only in some for some treatments.

In comparison with the unfertilized treatment, the treatments with applied rates of $N_{50}P_{50}$ and $N_{200}P_{100}$ had no statistically assured production differences. The highest production was of the $N_{100}P_{50}$ treatment, with 16.85 t d.m./ha, 26.6% higher than the witness treatment and a production boost of 3.54 t d.m./ha, statistically assured as significant.

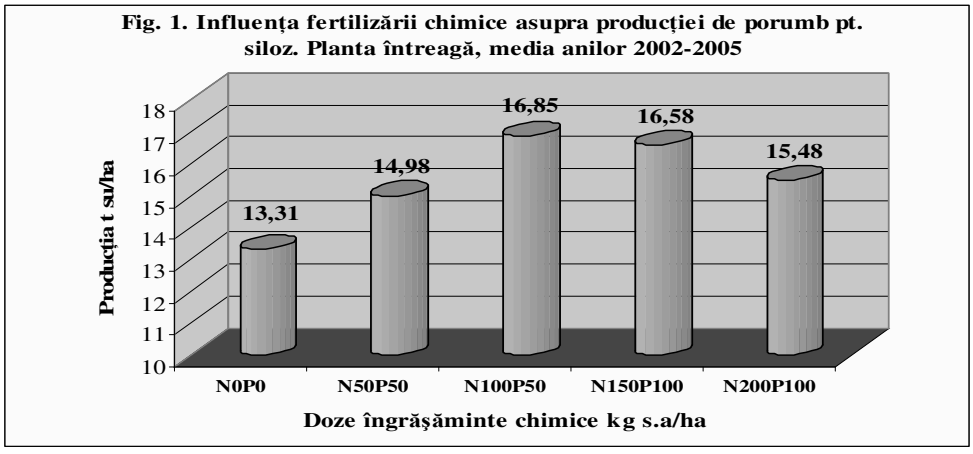
With an insignificant difference compared to the previous treatment, there was the $N_{150}P_{100}$ treatment where the production boost was 3.27 t d.m./ha higher than that of the unfertilized treatment.

Table 1

Chemical fertiliser influence on silage maize yield. Entire plant, the average of 2002-2005

Variants		Prod.		Dif.		Signif.
		t dm/ha	%	t dm/ha	%	
V1	N_0P_0	13.31	100	Mt	Mt	Mt
V2	$N_{50}P_{50}$	14.98	112.6	1.67	12.6	-
V3	$N_{100}P_{50}$	16.85	126.6	3.54	26.6	*
V4	$N_{150}P_{100}$	16.58	124.6	3.27	24.6	*
V5	$N_{200}P_{100}$	15.48	116.3	2.17	16.3	-

Dl 5%=2.54 t dm/ha; Dl 1%=3.70 t dm/ha; Dl 0.1%=5.54 t dm/ha



In conclusion, the treatments fertilized with $N_{100}P_{50}$ and $N_{150}P_{100}$ led to the highest productions. The highest production boost was recorded in the treatment fertilized with doses of 100 kg N and 50 kg P (Figure 1).

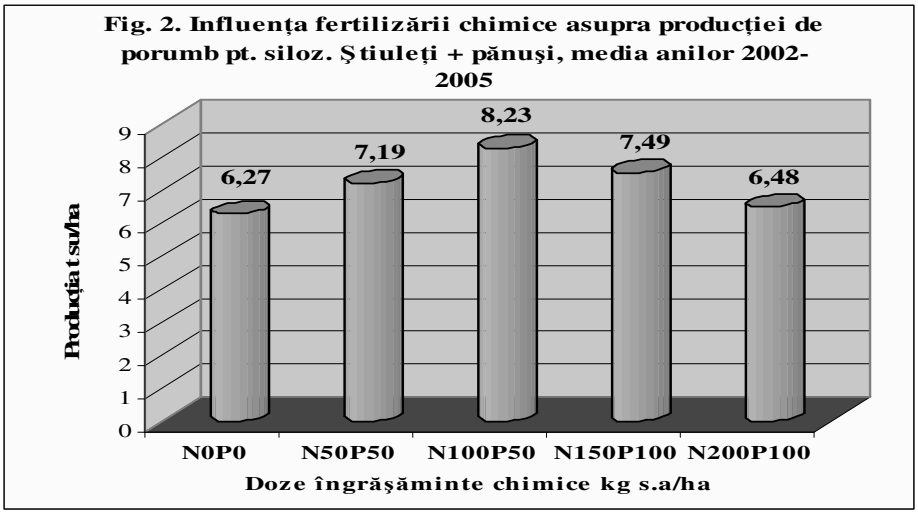
The influence of chemical fertilizers on production (cobs and husks), the 2002-2005 average. Analysing the data in Table 2 and Figure 2, the cob and husk production had significant production boosts (0.92 t d.m./ha), in the treatment fertilized with rates of $N_{50}P_{50}$.

Table 2

Chemical fertiliser influence on silage maize yield. Maize cob and maize husks, the average of 2002-2005

Variants		Prod.		Dif.		Signif.
		t dm/ha	%	t dm/ha	%	
V1	N_0P_0	6.27	100	-	Mt	Mt
V2	$N_{50}P_{50}$	7.19	114.7	0.92	14.7	*
V3	$N_{100}P_{50}$	8.23	131.3	1.96	31.3	***
V4	$N_{150}P_{100}$	7.49	119.5	1.22	19.5	**
V5	$N_{200}P_{100}$	6.48	103.4	0.21	3.4	-

Dl 5%=0.82 t dm/ha; Dl 1%=1.20 t dm/ha; Dl 0.1%=1.79 t dm/ha



Applying a rate of $N_{100}P_{50}$ V_3 led to a production of 8.23 t d.m./ha with a very significant boost of 1.96 t d.m./ha, higher than the unfertilized treatments. The increase of doses to $N_{150}P_{100}$ led to a distinctly significant production boost (1.22 t d.m./ha).

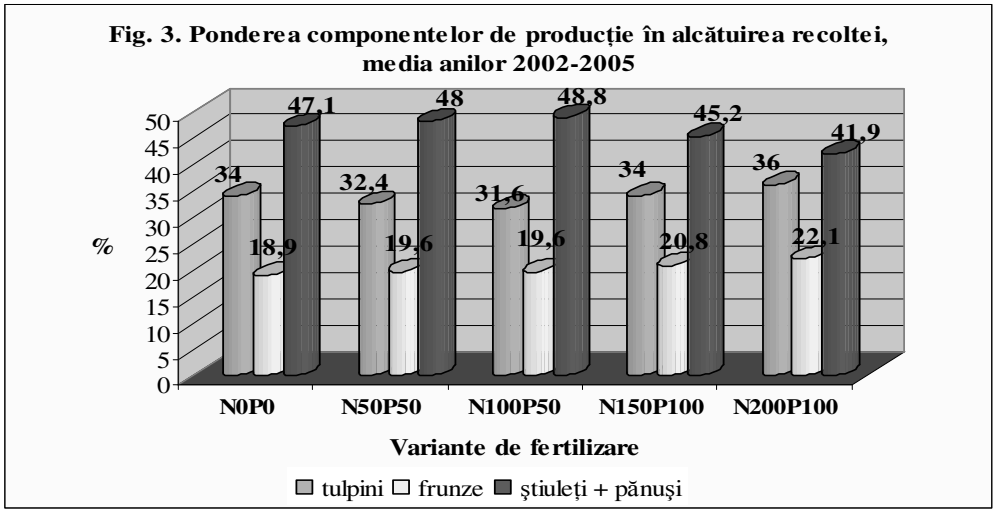
The treatment fertilized with 200 kg N and 100 kg P gave a yield boost of 0.21 t d.m./ha, with no statistical assurance, insignificantly higher than the unfertilized treatment.

The influence of chemical fertilizers on production (cobs and husks), the 2002-2005 average.

Table 3

Percentage of yields components, average of 2002-2005

Variants	Entire plant	Maize stalks		Maize leaves		Maize cob and husks	
	t dm/ha	t dm/ha	%	t dm/ha	%	t dm/ha	%
N_0P_0	13.31	4.53	34.0	2.51	18.9	6.27	47.1
$N_{50}P_{50}$	14.98	4.85	32.4	2.94	19.6	7.19	48.0
$N_{100}P_{50}$	16.85	5.34	31.6	3.30	19.6	8.23	48.8
$N_{150}P_{100}$	16.58	5.65	34.0	3.45	20.8	7.49	45.2
$N_{200}P_{100}$	15.48	5.57	36.0	3.43	22.1	6.48	41.9



Following the data in Table 3, there can be seen that the percentage of the stalks in the plant output was an average between 31 and 36%, slightly decreasing up to the rate of 150 kg d.s. N, where the output percentage increases. Regarding leaves, the increase in the applied rates of chemical fertilizers led to a slight increase, the output percentage being of 18-22%. The cobs and the husks make for 41-48% of biomass output, the increase of fertilizer doses leading to an increase of cob and husk percentage up to rates of 150 kg d.s. N, where it decreases (Figure 3).

CONCLUSIONS

1. Analysing the experimental data in the period 2002-2005, in the climatic conditions of the phaeozem zone, under no irrigation, the Vultur hybrid can

give biomass production of 16.85 t d.s./ha (26.6% higher than the production of the unfertilized treatment) when fertilizing with rates of $N_{100}P_{50}$.

2. In years with precipitation higher than the multiannual average, the crop uses more efficiently the applied nitrogen and less efficiently when there is scarce moisture.
3. Nitrogen leads to important biomass increases.
4. It is recommended to apply small doses of nitrogen when there are low precipitations or there is no irrigation.

REFERENCES

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