THE INFLUENCE OF CHEMICAL FERTILISERS AND SOIL UPON THE CROP FORMATIONTO GROUNDNUTS AND THE CORRELATION WITH THE PHENOMENON OF WITHERING

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ABSTRACT

During the years 2012-2013 it have been carried out observations and measurements on plants growth and seed filling of groundnuts under the influence of chemical fertilizers application on the sandy soils from Tamburesti Research Station.

Plants accumulation of dry substance is occuring to maturity and seed weight also. Through the application of treatments with N and NP the increase is higher compared to control. Also, seed sizes and the weight of 1000 seeds are larger when N and NP fertilizer was applied compared to control. The formation of the yield is done faster and in greater quantities in the case referred to the treatment comparative with control. Seed are withered in a smaller number compared to control, when N and NP is applied. For Tamburesti variety the formation of the crop has been faster comparative with Venus variety, where the phenomenon of withering is more emphasized.

The accumulation of protein and fat substances takes place until the maturity of the seeds.

INTRODUCTION

Fertilizer research on groundnut in Romania was made in the eighties. The little work carried out has been summarized in a few research papers. Some authors considered that the physiological processes are well correlated with pod yield values and emphasized the effect of small doses of N (N50) or higher doses, but applied fractioned (N50P50) on a basis of P50 and 125000 plants/ha (4).

Being a leguminous crop, groundnut would normally be expected to meet its N requirement through symbiotic fixation. However, there have been some suggestions that the crop may require a low dose of starter N fertilizer in order to tie over the period preceding effective nodulation (3).

As concerns phosphate fertilizer not much work has been done, but the little that has been done shown conclusively that superphosphate offers the best promise (2).

Fertilizers and variety represents important ways through it can action with the view to increase yield and quality to groundnut crop.

Other authors, sustains that the durable agricultural technologies can be effective only as part of an integrated plan for use, seen in terms of systemic ecology, which aims at maximizing material and energetic flows in parallel with environmental care. The current biotechnological revolution is based on scientific knowledge, which is closely related to the current economic development (1).

MATERIALS AND METHODS

The experience took place on the sandy soils from Tamburesti Research Station in conditions of irrigation and was set up after randomized blocks method, ensuring 100000plants/ha. The soil has low fertility and contains 90-96% silicon, poor nitrogen (0.04-0.06%), middle stocked in phosphorus and very rich in potassium, with a pH of 5.8-6.2 and less humus (0.2-0.7%). Fertilizers were administrated in spring at soil preparation which consisted in plough in autumn and two soils leveling in spring. Sow saw made at the end of April in 2012 and first days of May in 2013.During vegetation period it was made observations and determinations.

RESULTS AND DISCUTIONS

The accumulation of biomass is intense in groundnut plants, especially in July and August, which is corresponding to the formation and maturation of pods. Higher values were obtained by Tamburesti variety. Venus variety also accumulated a quantity of dry substance which is growing evidently to N50P50, comparative with control and in N50P25 the increases are lower (table 1).It can appreciate that the optimum dose of fertilizer is N50P50. The obtained metabolic rates are correlated with yield values.

Pod yield varies from 2050 Kg/ha (Ct.) to 2460 Kg/ha (N50P50) to Tamburesti variety and from 1970 Kg/ha (Ct.) to 2140 Kg/ha (N50P50) to Venus variety in 2012. Those from 2013 were a little higher.

The structure of biomass is not very different between the two experimented varieties and very little influenced by the doses of fertilizer. Generally, on a plant, leaves biomass is higher, with values between 65-75% from the total weight of a plant. After fructification it increases the biomass of stems to approximate 40% and in the moment of harvest, the highest quantity of dry substance accumulates in the pods, approximate to 70%.It was establish that the leaves rate on a plant is smaller, especially in the first stages of vegetation, both in control and fertilized variants. At harvest, pods rate is higher, especially to N50P50 application dose (tables2 and 3).

Seed weight is also growing to the maturity. At the treatment with N and NP in different doses, seed weight is higher comparative with control, in all determinations. Higher doses of N ensure higher increase of seed weight. Tamburesti variety realizes higher yield comparative with Venus variety.

Seed sizes (table 4) were influenced by N treatments, especially to those where was applied along with P. Among the sizes of groundnut seed, length and thickness were much more influenced. In each variety seed sizes are variable depending on the pods which are becoming (one, two, three or four seed in a pod in Tamburesti and one or two seed in a pod in Venus). The seeds of Tamburesti variety are a little length and a higher thickness and the seeds of Venus variety are longer in length and smaller in thickness.

Table 1

Variation of biomass accumulation in plants and groundnut seed yield (g dried substance/plant)

Treatment	Variety	Year 2012						Dried pod yield (Kg/ha)	Year 2013						Dried pod yield (Kg/ha)
		05.06	15.06	30.06	10.07	25.07	25.08		05.06	15.06	30.06	10.07	25.07	25.08	
Ct.	Tamb.	1.8	4.6	8.8	9.6	24.2	32.8	2050	1.8	3.6	9.1	14.8	22.4	38.4	2090
	Venus	1.7	4.4	7.8	8.4	23.8	30.6	1970	1.6	5.1	8.3	15.4	22.0	42.0	1840
N50	Tamb.	2.2	5.1	9.6	12.4	28.8	38.4	2210	1.9	3.8	11.5	17.5	23.6	42.2	2300
	Venus	1.9	4.8	8.6	18.7	24.2	39.3	1990	1.5	3.0	8.0	10.6	21.4	40.7	1900
N100	Tamb.	1.4	3.8	4.2	8.2	18.4	24.5	2120	1.7	3.4	13.6	18.9	25.6	40.8	2200
	Venus	1.6	4.3	9.5	10.2	18.6	29.1	2000	1.6	3.2	9.2	14.6	21.0	36.2	1920
N150	Tamb.	1.4	4.0	7.2	9.1	26.3	42.3	2030	1.7	3.5	8.8	12.8	20.0	36.9	2100
	Venus	2.0	6.0	10.3	16.5	30.3	37.1	1990	1.6	3.3	10.0	15.5	21.4	37.0	1900
N50P25	Tamb.	2.8	4.5	7.4	14.5	21.4	62.6	2310	2.1	6.8	12.6	17.2	32.0	44.4	2400
	Venus	2.4	6.2	12.8	18.4	35.6	51.8	2050	2.0	4.8	10.0	17.6	23.5	39.5	2040
N50P50	Tamb.	1.6	4.5	10.0	12.6	22.8	48.8	2460	2.7	8.0	13.0	24.7	34.5	46.8	2550
	Venus	2.8	4.4	7.5	18.8	41.2	53.3	2140	2.2	5.0	12.0	17.0	22.8	42.2	2160

Table 2

Variation of dry substance rate to Tamburestigroundnut variety (g/plant)

Treatment	Year 2012				Year 2013			
	1 (05-25.VI)	2 (26.V-26.VII)	3 (27.VII-27.VIII)	4 (05.VI-27.VIII)	1 (05-25.VI)	2 (26.V-26.VII)	3 (27.VII-27.VIII)	4 (05.VI-27.VIII)
Ct.	0.44	0.50	0.40	1.34	0.28	0.34	0.40	1.02
N50	0.60	0.78	0.86	2.24	0.30	0.64	0.58	1.52
N100	0.34	0.48	0.40	1.22	0.24	0.18	0.42	0.84
N150	0.30	0.51	0.59	1.4	0.20	0.37	0.44	1.01
N50P25	0.70	0.90	1.2	2.8	0.32	0.48	0.94	1.74
N50P50	0.80	0.90	1.24	2.94	0.40	0.80	1.28	2.48

Table 3

Variation of dry substance rate to Venus groundnut variety (g/plant)

Treatment	Year 2012				Year 2013			
	1 (05-25.VI)	2 (26.V-26.VII)	3 (27.VII-27.VIII)	4 (05.VI-27.VIII)	1 (05-25.VI)	2 (26.V-26.VII)	3 (27.VII-27.VIII)	4 (05.VI-27.VIII)
Ct.	0.36	0.42	0.40	1.18	0.22	0.28	0.26	0.76
N50	0.64	0.78	1.04	2.46	0.50	0.54	0.40	1.44
N100	0.22	0.44	0.40	1.06	0.20	0.46	0.41	1.07
N150	0.20	0.40	0.42	1.02	0.18	0.40	0.35	0.93
N50P25	0.40	0.58	0.60	1.58	0.28	0.52	0.48	1.28
N50P50	0.60	0.76	0.84	2.2	0.36	0.44	0.58	1.38

Table 4

Average variation of seed characters

Treatment	2012		2013		2012		2013	
	Tamburesti		Venus		Tamburesti		Venus	
	Length	Thickness	Length	Thickness	Length	Thickness	Length	Thickness
Ct.	3.20	1.35	3.55	1.35	3.40	1.46	3.50	1.32
N50	3.71	1.26	3.74	1.55	3.45	1.21	3.60	1.47
N100	3.47	1.25	3.68	1.38	3.42	1.22	3.50	1.35
N150	3.64	1.32	3.76	1.44	3.40	1.44	3.52	1.36
N50P25	3.74	1.43	3.96	1.48	3.63	1.86	3.80	1.60
N50P50	3.86	1.48	4.06	1.42	3.92	2.06	3.85	1.52

One thousand seed mass was higher in the treatment with N and NP, comparative with control. This character it is also variable, depending on the category of seed. As an average of all kind of seeds one thousand seed mass varies from 450g (N150) to 580g (N50P50) at Tamburesti variety and from 700g (N150) to 880g (N50P25) in 2011 (fig. 1 and 2).In 2012 the vales of this character is higher in some variants and smaller in other variants.

Regardful of the two elements (seeds size and one thousand seed mass) results that the seeds in the treatments with N and NP were well formed, plumper, comparative with control. Although the seeds withered must be appreciated not only after the exterior aspect and even after their degree of the filling from where comes out that the phenomenon is accentuated in control comparative with fertilizers.

Table 5

Variation of one seeds weight

Treatment	2012	2013	2012	2013
	Tamburesti	Venus	Tamburesti	Venus
	One seed weight			
Ct.	0.45	0.60	0.60	0.79
N50	0.54	0.73	0.69	0.86
N100	0.50	0.70	0.54	0.73
N150	0.46	0.60	0.45	0.70
N50P25	0.64	0.82	0.81	0.88
N50P50	0.70	0.90	0.86	0.93

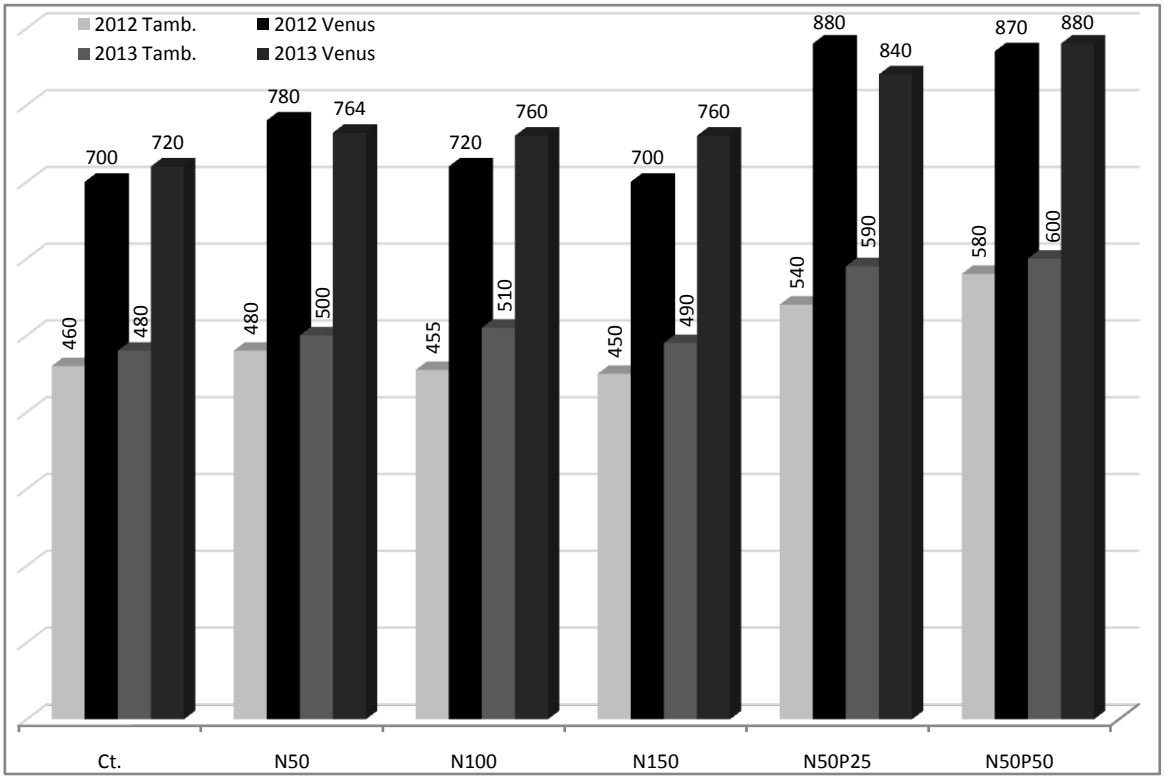

Fig. 1. Variation of one thousand seed mass (2012-2013)

Probably, the better values obtained in almost all fertilized variants, are due to the combined effect of those applied doses, because the experience was set up in the both years on the same plot.

The accumulation of the protein and fats evolved as results from the figures 3 and 4. After peg formation, the accumulation of protein substances and fats took place continuously, until harvest. The important quantities of protein and fats realized by the experimented varieties are due to the treatments with fertilizers, especially in the cease of treatments with NP comparative both to the variants fertilized with single nitrogen and control.

It can appreciate that there is a strong relationship between the treatments, seed increase and the accumulation of substances. Groundnut seed are increasing much more, are more filled and well formed in the treatments with NP both comparative with control and with single nitrogen application. It can conclude that the appreciation of withering must be made after many criteria to can reach more to the reality.

CONCLUSIONS

The research from this experience leads to the next conclusions:

- The highest yield of groundnuts pod it is obtained in the variants with NP fertilizers, both in N50P25 and N50P50;
- Single nitrogen fertilizer application to groundnuts appears not to confer much appreciable benefit in terms of yield formation. Groundnut plant is capable of fixing its own N;
- However, nitrogen fertilizer appears to enhance pod yield and the desirability of using such fertilizer may be viewed;

- Groundnut plants responses positively to phosphorus application along to nitrogen. The rate of accumulation of the substances in the seed is higher in the variants with these combinations of fertilizers, comparative with control and to Venus variety are even higher because it has a longer vegetation period;
- In the appreciation of seed withering to groundnuts it is necessary to determine all the issues as concern there dimensions;
- Both varieties had a good behavior in the matter of chemical fertilizer application from this experience.

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