EXPERIMENTAL RESULTS CONCERNING THE INFLUENCE OF FERTILIZERS AND X RAYS UPON QUANTITY AND QUALITY OF GROUNDNUTS YIELD, IN IRIGATED CONDITIONS, ON SANDS

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ABSTRACT

Groundnut variety Tamburesti experimentation by applying irrigation to 70% of the IUA took place at Tamburesti, R.S. in the years 2010, 2011 and 2012, on sand, poorly stocked with nitrogen and phosphorus and potassium medium.

Chemical fertilizers and irrigation have ensured high production yields ranging between 114 and 604Kg/ha, both in variants where were applied N, P, K, and especially from those irradiated with high doses of radiation.

They received superior and productions in terms of quantitative and qualitative N60P30K40 and irradiation by application of 6000 R, followed by N60P30K40 and irradiation of 9000 R.

INTRODUCTION

Expansion of irrigation in the region of Oltenia would make possible the rational exploitation of the soil less fertile, such as sands, creating the possibility to hold on the area of culture has as many valuable plants, which in terms of non-irrigation give smaller productions, among which and groundnuts.

Application of chemical fertilizers on the sands at other legumes (Feher Ecaterina, 1992) and cereals (Matei, I., 1997), has achieved significant increases, which demonstrates the effectiveness of such type of soil (1970). In this sense, a culture more groundnuts, were less studied from this point of view.

Research undertaken in our country regarding the influence of fertilization on the productive potential of the sand land irrigated were carried out after many years (1971-1990), and some results have been published by Matei, I. and al., 1991, from corn and wheat species. In other countries, large groundnut-growing it looks like groundnuts are a species from the grateful especially at fertilizers and irrigation (Agritex, 1982).

In connection with this issue, for the sand and irrigation conditions, special importance shows the optimum ratio of setting main macro-elements N, P, K and some doses of radiation. Studies and research undertaken in recent times have demonstrated the favorable influence of gamma radiation X over the quantity and quality of peanut production (Iancu Paula, 2008, 2011). In this paper is part of the results obtained on the influence of radiation X and fertilizers, the quantity and quality of peanut production in the irrigated scheme, on the sands.

MATERIALS AND METHODS

The experiences have been performed in the period 2010-2012 at Tamburesti R.S. It has experienced ten variant with the fertilizer N, P, K and two doses of irradiation (table 2). Groundnut variety Tamburesti was experienced at a density of 100000 plants/ha. The irradiation was carried out prior to planting, in doses ranging from 5000-10000 r. Irrigation was performed through sprinkler at 70% of IUA, the depth of 30 cm, with irrigation norm 300mc/ha. Sowing was done in the three years of experimentation, in late April-early May.

The following experiments were made measurements and observations of morphology and fenology variety, the productivity, the chemical composition of the seeds,

the attack of diseases, growth dynamics, etc. Observations and measurements were carried out at 25 plants in four repetitions, and the calculation and interpretation of the results was made through the variant and hydrologic analysis.

Pedo-climatic experimentation

The soil on which was placed the experience is sand, poorly stocked with phosphorus and nitrogen and potassium medium.

Climate data are presented in table 1. In terms of temperature and air, % U elements particularly important for groundnuts, 2010 was the less favorable, favorable, for 2011 and 2012 very favorable (table 1).

In 2010, U% air has very low individual values in June (40%), a fact which has adversely action plant meetings, to which were added and higher daily temperatures in this month, as well as the rains falling in early may, which have delayed the growth.

Table 1

Temperature, rainfalls and humidity of the ir from the vegetation period

Year/month	IV	V	VI	VII	VIII	IX	Yearly
T (°C)							
Average/sixty years	11.3	16.6	20.4	22.7	21.0	19.6	10.8
2010	12.9	18.3	22.2	24.2	24.4	18.5	10.4
2011	12.2	16.8	21.7	23.5	22.9	20.6	10.9
2012	14.4	17.2	22.6	22.6	23.7	21.1	-
P (mm)							
Average/sixty years							523.2
2010	36.5	79.0	183.0	33.5	42.5	11.5	470.7
2011	32.2	63.0	40.5	124.5	10.0	0.0	-
2012	22.7	30.9	30.3	109.0	38.3	0.0	573.5
U (%)							
2010	-	69	61	58	-	-	-
2011	-	62	62	64	-	-	-
2012	-	82	78	79	-	-	-
Second decade June 2010	42	40	48	43	51	-	-
Third decade June 2010	46	43	59	55	70	-	-

RESULTS AND DISCUTIONS

The results of research concerning the morphology of the variety Tamburesti, sands in conditions of irrigation, highlight the following (table 2):

- height plants shows differences between small variations, with the growing trend with higher doses of nitrogen (N60) and where it is applied and the higher dose of radiation;
- number of branches grows slightly under the influence of irradiation doses, most balanced results obtaining in variants with N, P, K and radiation;
- pod's plant number varies from one year to another, standing out with a total number of pods, appreciably the same variants with N, P, K and irradiation.

Table 2

Morphological data of Tamburesti variety in the experimentation period (2010-2012)

Crt. no.	Experimental variant	Plant height (cm)		Ramification no./plant			Pods no./plant	
		x±sx	s%	x±sx	s%		x±sx	s%
2010								
1	Ct.	23.0±0.9	21.3	5.4±0.12	15.3	13.9±0.3		43.5
2	N30+6000 R	25.8±0.9	17.0	5.2±0.1	26.0	13.6±0.4		61.0
3	P30+6000 R	21.0±0.9	21.4	5.5±0.2	44.0	14.6±0.2		21.7

4	N30P30+6000 R	28.3±0.7	13.4	5.7±0.2	40.6	13.7±0.2	26.3
5	N30K40+6000 R	26.2±1.0	20.2	5.7±0.1	33.3	16.5±0.1	12.2
6	P30K40+6000 R	26.1±1.0	11.5	6.0±0.1	26.6	14.3±0.3	37.2
7	N30P30K30+6000 R	28.0±0.1	2.5	5.4±0.1	14.9	15.6±0.2	23.2
8	N60P30K40+6000 R	27.2±0.7	13.8	5.9±0.2	25.5	17.0±0.3	11.7
9	N60P30K40+9000 R	33.2±0.1	2.7	5.8±0.2	29.1	18.2±0.6	38.7
10	N60P30K40	35.4±0.6	8.7	5.9±0.1	18.0	17.1±0.1	32.7
2011							
1	Ct.	29.2±0.7	12.5	5.2±0.14	31.8	17.2±0.2	13.8
2	N30+6000 R	30.4±0.7	12.7	5.7±0.04	7.3	15.7±0.5	33.3
3	P30+6000 R	33.2±0.2	3.6	6.0±0.02	3.3	16.3±0.3	26.9
4	N30P30+6000 R	31.5±0.9	14.6	5.5±0.40	8.0	16.4±0.5	42.1
5	N30K40+6000 R	34.6±0.7	10.6	5.7±0.06	11.1	16.9±0.4	30.4
6	P30K40+6000 R	24.5±0.8	12.3	6.0±0.20	33.3	16.5±0.4	33.3
7	N30P30K30+6000 R	28.9±0.6	11.4	7.0±0.20	25.0	19.1±0.5	30.7
8	N60P30K40+6000 R	31.4±0.5	8.5	5.8±0.04	7.1	17.1±0.5	23.4
9	N60P30K40+9000 R	33.0±0.8	12.1	5.9±0.06	10.1	17.2±0.4	29.1
10	N60P30K40	26.5±0.5	9.8	6.5±0.20	28.5	17.3±0.3	25.3
2012							
1	Ct.	33.6±0.1	12.8	7.2±0.16	15.8	26.3±0.8	13.3
2	N30+6000 R	35.2±0.7	14.2	7.1±0.12	14.6	27.3±0.6	13.6
3	P30+6000 R	30.7±0.5	12.5	8.7±0.08	16.9	25.3±0.4	13.1
4	N30P30+6000 R	35.8±0.5	14.2	6.9±0.40	14.8	26.3±0.1	13.6
5	N30K40+6000 R	37.2±0.6	10.5	7.4±0.20	17.9	25.3±0.7	13.1
6	P30K40+6000 R	41.5±0.8	7.3	7.7±0.10	20.9	30.4±0.5	14.5
7	N30P30K30+6000 R	41.8±0.4	6.4	8.5±0.60	18.9	27.3±0.1	13.4
8	N60P30K40+6000 R	42.4±0.3	7.7	8.6±0.04	14.4	28.2±0.3	12.7
9	N60P30K40+9000 R	43.3±0.2	5.9	8.8±0.05	12.6	29.6±0.4	12.5
10	N60P30K40	42.7±0.1	3.7	8.9±0.01	11.4	32.5±0.2	10.5

Elements of productivity (table 3) change much under the influence of treatment, obtaining the best results with the N60P30K40 version with or without irradiation, followed by the version with N30P30K40 and irradiated with 6000 and 9000R, and favorable to the N30 P30. Phosphorus applied alone or together with potassium, although the register values greater than the witness, is still behind other variants.

The mass of 1000 seeds has been treated by the variants, larger than the witness in all the years of experimentation. In terms of hectolitrical mass, the experience has been ranging between 74-78 Kilograms.

Seed productions obtained (table 4) are highlighting the effectiveness of fertilizers in the tested variants and irrigation. These are cheering if we consider that the only irrigation, in 2012, has increased seed production with 475 Kg/ha in irrigated conditions comparative with non-irrigated control variant, where the production of seed was only of 1550Kg/ha in 2010, when the non-irrigated culture almost was compromised.

Table 3

Productivity elements of Tamburesti groundnut variety (average 2010-2012)

Variant no.	Seed no/plant	Gram seed/plant (g)	Seed no/pod	Gram seed/pod (g)	Seed mass (g)	HM (Kg)
1	32.0	2.4	2.6	0.55	484	74
2	44.4	3.4	2.4	0.69	460	76
3	38.8	3.4	2.0	0.69	488	78
4	44.0	4.0	2.6	0.77	482	78
5	57.0	4.0	2.3	0.62	430	76
6	49.9	3.1	2.3	0.66	460	76
7	47.6	4.2	2.5	0.66	450	78
8	60.9	4.6	2.5	0.69	464	78
9	64.0	4.7	2.8	0.70	480	78
10	56.1	5.2	2.8	0.66	472	78

Table 4

Seed yield (average 2010-1012)

Variant no.	2010	2011	2012	Average (2010-2012)			
				Kg/ha	%	Diff. (Kg/ha)	Significance
1	1550	1939	2025	1838	Ct.	Ct.	Ct.
2	1700	2000	2475	2058	112	+220	-
3	1625	1930	2300	1952	106	+114	-
4	1900	2224	2975	2366	129	+528	**
5	1750	2074	2700	2175	118	+337	*
6	1685	2250	2525	2153	117	+315	*
7	1675	2170	2650	2165	118	+327	*
8	1800	2300	2700	2267	123	429	**
9	1775	2075	2700	2183	118	+345	*
10	1850	2400	3075	2442	133	+604	***

DL 5% = 360; 420; 380 DL 5% = 270
DL 1% = 510; 570; 520 DL 1% = 410
DL 0.1% = 680; 750; 690 DL 0.1% = 580

Analyzing average yield obtained in the three years, stands out the variants with N60P30K40 with 2442 Kg/ha, followed by N30P30 and irradiation with 6000 R with 2366 Kg/ha, followed by variant with N60P30K40 and irradiation with 6000 R with 2267Kg/ha, comparative with 1838 Kg/ha, the control variant.

In general, groundnuts are strongly reacting to irrigation bringing increases ranging between 114 and 604 Kg/ha. Combining irrigation with fertilization, the results are remarkable.

The amount of irradiation contribution appears slightly blocked due to large production which is registered in the variant without irradiation.

The average content of protein from the seed (table 5) is between 28.04% (2010) – 29.00% (2011) (control group) and 28% (N60P30K40 and 6000 R).

Nitrogen and phosphorus applied separately increase the percentage of protein with almost 0.14% (2011) – 0.49% (2012) compared to the average of the control and applied together with 0.9% (2012) – 0.94% (2011) compared to control.

The highest values are registered in the variants with complete treatment N, P, K, and especially in the irradiated ones, where the content of the protein is 30.58% (N60P30K40 and 6000 R) (2012) and 30.60% (N60P30K40 and 9000 R) (2012) compared to control (28.04%).

Table 5

Protein seed content

Variant no.	Protein (%)			
	2010	2011	2012	Average
1	28.04	29.00	28.60	28.54
2	28.87	28.40	29.03	28.76
3	28.25	28.86	28.60	28.57
4	28.75	29.48	29.44	29.22
5	27.65	29.67	30.30	29.20
6	28.33	29.05	30.00	29.12
7	28.00	28.74	29.60	28.78
8	28.26	29.31	30.58	29.38
9	28.46	29.43	30.60	29.49
10	28.94	29.94	29.68	29.52

The average percentage of protein varies from 28.54% to control up to 29.52% (N60P30K40), which demonstrates that groundnuts are proving a valuable culture on sandy soils, which would contribute to expanding vegetable protein deficit.

CONCLUSIONS

As concerns these researches, there are the following conclusions:

- groundnut is growing on the sandy soils from Tamburesti R.S. and respond particularly favorable to irrigation and fertilization.
- chemical fertilizers along with irrigation ensure high yield increases, ranging between 1550 Kg/ha (control variant 2010) and 3075Kg/ha (variants with N, P, K and without irradiation).
- biggest productions are obtained also in the N60P30K40 and irradiation of 6000 R and N30P30 and irradiation of 6000 R.
- moderate doses of nitrogen increases the number of pods/plant and the percentage of seed protein and phosphorus, potassium and especially irrigation, have contributed in making a larger number of seed/plant and normal development of the seed in the variants with irradiation doses of 6000 and 9000R, recording the highest values and more steadily.
- quality of yield is appreciable in terms of protein content, obtaining best results in the variants with N, P, K and especially with irradiation.

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