RESEARCHES REGARDING THE INFLUENCE OF FERTILIZATION ON THE FLOWER YIELD OF TAGETES SP. (FRENCH MARYOLD)

CERCETĂRI PRIVIND INFLUENȚA FERTILIZĂRII ASUPRA RECOLTEI DE FLORI LA TAGETES SP (FRENCH MARYOLD)

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Rezumat: *În lucrare sunt prezentate rezultatele cercetărilor desfăşurate pe aluvisolul gleizat moderat din teritoriul Belinț, obținute la Tagetes tenuifolia, Tagetes erecta, Tagetes patula, tipurile galben, orange şi nana, prin fertilizare diferențiată.*
Cea mai mare recoltă, de 1700 kg/ha flori ligulate uscate, s-a înregistrat la Tagetes erecta.
Dublarea dozelor de fosfor, de la P_{40} la $P_{80,}$ a mărit recolta de flori ligulate uscate cu 8%. Îngrăşămintele cu azot în domeniul cercetat, $N_{34} – N_{128}$, au condus la sporuri de recoltă, în funcție de doză, cuprinse între 2% şi 17%.

Abstract: *In the paper are presented the results of the research done on the moderate gleic alluvial soil from Belinț area obtained by differentiated fertilization for Tagetes tenuifolia, Tagetes erecta, and Tagetes patula, the yellow, orange and nana types.The highest yield was that of 1700 kg/ha liguled dry flowers and was obtained for Tagetes erecta.The yield of liguled dry flowers was increased by 8% by doubling the doses of phosphorous from P_{40} to P_{8}. The nitrogen based fertilizers, $N_{34} – N_{128}$, led to increased yields in the studied areas. Depending on the doses used, the increase in yield was between 2% and 17%.*

Key words: *Tagetes sp: fertilization with NPK*
Cuvinte cheie:*Tagetes sp: fertilizare cu NPK.*

INTRODUCTION

The marigolds (French maryold) are cultivated for their flowers with no receptacle Tagetes flores sine receptaculis which contain volatile oil (0.5-1.5%), helenien (0.7%), flavonoids etc. The helenien produces an increase of the adaptation speed and ameliorates the visual sensibility of the normal eye, a favourable action in cases of myopia, in the undeveloped forms of pigmentaria retinitis and in the case of hemeralopy.

In the literature there are only few data related to the influence of fertilization upon the flowers' yield and their composition.

MATERIALS AND METHODS

The tests were trifactorial, organized according to the subdivided plots method, with three repetitions, the A factor being the phosphorus doses (P_{40} and P_{80}), the B factor was the nitrogen doses (N_0, N_{32}, N_{64}, N_{96} and N_{128}), and the C factor the studied species (Tagetes tenuifolia, Tagetes erecta, Tagetes with the following forms: yellow, orange and nana).

The precursory cultivated plant was the bean.

The seeding was done directly on the field, the distance between rows being of 50 cm, the depth of seeding of 1-2 cm and the density of 4 kg/ha. There have been obtained three yields annually. The liguled flowers were dried in the shadow until they reached a constant weight.

RESULTS AND DISCUSSIONS

The total yield of fresh liguled flowers after the three harvests is given in Table 1.

The production of dried liguled flowers was calculated based on the drying output and the results are to be found in Table 2

Table 1

Total yield of fresh liguled flowers

The A factor The phosphorus doses	The B factor The nitrogen doses	The C factor – The species of *Tagetes*					The averages of the A factor			
		T. tenuifolia	*T. erecta*	*T. patula galben*	*T. patula orange*	*T. patula nana*	Yield Kg/ha	%	Difference Kg/ha	Signification
P_{40}	N_0	4596	9710	6390	5706	5991	6727	100	-	
	N_{34}	4371	9810	6008	5691	6005				
	N_{68}	4703	10144	6192	5747	6132				
	N_{96}	5001	10398	5722	5773	7529				
	N_{128}	5387	10802	6500	6822	7040				
P_{80}	N_0	4842	10243	6380	6230	6246	7056	105	329	XXX
	N_{34}	4721	9961	6253	6021	6045				
	N_{68}	4897	10208	6354	5924	6146				
	N_{96}	5229	10520	6426	6440	6971				
	N_{128}	5661	11206	6767	9123	7585				

DL 5% = 36kg/ha, DL 1% = 66 kg/ha, DL 0.1% = 146 kg/ha

Specification	*T. tenuifolia*	*T. erecta*	*T. patula galben*	*T. patula orange*	*T. patula nana*
Yield kg/ha	4941	10300	6299	6346	6569
%	100	208	127	128	133
Difference		5359	1358	1405	1628
Signification		XXX	XXX	XXX	XXX

DL 5% = 99kg/ha, DL 1% = 183 kg/ha, DL 0.1% = 405 kg/ha

Specification	N_0	N_{34}	N_{68}	N_{96}	N_{128}
Yield kg/ha	6034	6488	6645	7001	7689
%	100	107	110	116	127
Difference		454	611	967	1655
Signification		XX	XX	XX	XXX

DL 5% = 222 kg/ha, DL 1% = 408 kg/ha DL 0.1% = 906 kg/ha

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By analyzing the influence of phosphorus fertilization, the obtained results show that for the analyzes species and on the nitrogen fertilization levels, by doubling the phosphorus doses from P_{40} to P_{80} the average yield was significantly increased with more than 300 kg/ha.

The nitrogen fertilizers increased the average yield as compared to the other factors with 7% for a N_{32} doses, with 10% for a N_{64} doses, with 16% for the variants fertilized with N_{96} and with over 27% for the variants fertilized with N_{128}.

As about the genotypes considered, the average results on the studied fertilizer levels show that the highest yield was obtained for the species *Tagetes erecta*, for which the increase in yield as compared to *Tagetes tenuifolia* was of 108%, that means a harvest difference of more than 5300 kg/ha, which is a very significant growth statistically seen.

The species *Tagetes patula* is the most valuable and the only species from which one collects nowadays flowers.

For the three types considered, that is with yellow, orange or nana flowers, the average yield was closed for each fertilization level, respectively it was between 3299 kg/ha (*T.p. galben*) and 6569 kg/ha (*T.p. nana*).

Table 2

The total yield of dried liguled flowers

The A factor The phosphorus doses	The B factor The nitrogen doses	The C factor – The species of *Tagetes*					The averages of the A factor			
		T. tenuifolia	*T. erecta*	*T. patula galben*	*T. patula orange*	*T. patula nana*	Yield Kg/ha	%	Difference Kg/ha	Signification
P_{40}	N_0	795	1708	1013	1022	1048	1155	100	-	
	N_{34}	812	1749	1085	1011	1082				
	N_{68}	831	1801	1092	1025	1096				
	N_{96}	872	1826	1127	1229	1281				
	N_{128}	884	1835	1151	1220	1264				
P_{80}	N_0	798	1708	1156	1041	1050	1252	108	97	XXX
	N_{34}	815	1787	1103	1049	1094				
	N_{68}	869	1808	1105	1052	1109				
	N_{96}	859	1869	1157	1562	1378				
	N_{128}	891	1883	1164	1567	1423				

DL 5% = 6kg/ha, DL 1% = 12 kg/ha, DL 0.1% = 29 kg/ha

Specification	*T. tenuifolia*	*T. erecta*	*T. patula galben*	*T. patula orange*	*T. patula nana*
ield kg/ha	843	1797	1115	1178	1176
%	100	213	132	140	139
Difference		954	272	335	333
Signification		XXX	XXX	XXX	XXX

DL 5% = 25 kg/ha, DL 1% = 45 kg/ha, DL 0.1% = 101 kg/ha

Specification	N_0	N_{34}	N_{68}	N_{96}	N_{128}
Yield kg/ha	1134	1159	1179	1309	1328
%	100	102	104	115	117
Difference		25	45	175	194
Signification			XX	XXX	XXX

DL 5% = 39 kg/ha, DL 1% = 72 kg/ha , DL 0.1% = 160 kg/ha

The highest yield was obtained for *Tagetes patula nana* where it surpassed 6500 kg/ha.

The results show that the total production of dried liguled flowers varied between 795 kg/ha for *Tagetes tenuifolia* fertilized with N_0P_{40} and 1883 for *Tagetes erecta* fertilized with $N_{28}P_{80}$.

The fertilizers containing phosphorus used in doses of P_{80} led to an increase of yield with 8% as compared to the variants fertilized with P_{40}.

The fertilizers containing nitrogen increased the yield with 2% for the variant fertilized with N_{32}, with 4% for a doses of N_{64}, with 15% for a doses of N_{96} and with 17% for a doses of N_{128} as compared to the average of the other experimental factors.

From all tested species, the highest yield, that is 1797 kg/ha dried liguled flowers, has been obtained for *Tagetes erecta.*

According to the cultivated species (yellow - orange - nana), *Tagetes patula* gave yields of 1115 – 1178 kg/ha dried liguled flowers.

CONCLUSIONS

1. Fertilization is an important technological element for these species.
2. From all tested species, *Tagetes erecta* has given the highest yield, that is 1700 kg/ha dried liguled flowers.
3. According to the cultivated species (yellow - orange - nana), *Tagetes patula* gave yields of 1100 – 1200 kg/ha dried liguled flowers.

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