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THE COMBINED EFFECT OF PHOSPHORUS AND MOLYBDENUM ON BROAD BEAN PLANT GROWTH AND ITS CHEMICAL COMPOSITION

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ABSTRACT: *Field experiment was carried out at the Farm of Sers El-Lyian Agricultural Staion for two seasons (98/1999- and 1999/2000) to study the individual and combined effect of P and Mo at different rates (0, 100 and 200 kg/fed.) ordinary superphosphate and spraying with (0, 0.1 and 0.2 g /L (300L /fed.) Molybdic acid) on broad bean (Vicia faba L.) plant growth and its content of some nutrients.*

The obtained data show that, P and Mo application individually or together resulted in a significant increase of the all growth parameters under study. i.e. plant height (cm), number of branches / plant, number of pods/plant and number of seeds/plant. The highest Increase of those parameters was found when P and Mo added together at high application rates especially in the second season.

The obtained dry matter yield of straw (g/plant) and seeds (g/plant or ardab/fed.) increased significantly by increasing application rates of either P or Mo where the highest yield of straw and seeds of broad bean plant was found when P and Mo applied together at high application rates. Seeds index values (g/100 seed) takes the same trend of dry matter yield. The obtained values of dry matter yield and seeds index in the second growth season were higher than there found in the first season.

Phosphorus and molybdenum application individually or together increased N, P, K and Mo content (concentration and uptake) of straw and seeds of broad bean plant. The highest contents of the studied nutrients were found in the second growth season when the plants were fertilized by P and Mo together at high application rates. N, P, Mo content of seeds under different fertilization treatment were higher than those found with straw, while K was higher than seeds.

Key words: *Broad bean, Straw, Seeds, Phosphorus, Molybdenum, Growth parameter.*

INTRODUCTION

Broad bean (*Vicia faba L.*) is the world's fourth most important field crop after wheat, rice and maize. Broad bean is grown primarily for grain and secondary for fodder and raw material for industrial processes. The seeds are used for both human and animal consumption. The vegetative parts of the plant are made into compost or a good source of organic manure. Broad bean is one of the most important foods in Egypt.

Rosolem et al., (1999) and Abou Hussein et al., (2002) found an increase in macronutrients uptake by the P fertilized maize, wheat and broad bean. Komel Sharma *et al.*, (1999) and El-Fiki (2000) pointed out that, Mo concentration and uptake was enhanced significantly with application of P for pobinia pseudacacia in nursery beds.

The total Mo content of most agricultural soils lies between 0.6-3.5 ppm with an average of 2.0 ppm and an average available content about 0.2 ppm (Cheng and Oullette, 1973). Shehata (2001) reported that, Mo application at rate of 1 and 2 ppm increased the dry matter yield of pea and wheat and its content of nutrients. Also, who added that Mo application increased N-fixation by pea plants. Bayoumi *et al.*, (2002) noticed that, the grain yield of maize increased significantly by Mo fertilization. Similar increase was found in the protein content of maize grain.

This study was conducted to evaluate the individual and combined effect of both P and Mo on broad bean plants growth and its content of nutrients.

MATERIALS AND METHODS

The effect of different levels of phosphorus, molybdenum and their combination on broad bean was tested in field experiments during the two subsequent winter seasons of 1998/1999 and 1999/2000 in split plot design with four replicates at Sers El-Lyian Agric. Res. Station, Monefiya Governorate, Egypt. The levels of phosphorus rates were allocated for the main plots, while the molybdenum rates were allocated for the sub plots.

The physical and chemical properties of cultivated soil were determined and included in Table (1)

Table (1): The tested soil characteristics.

A- chemical properties									
pH (1:2.5)	EC dS/m	Soluble cations (meq/100g)				Soluble anions (meq/100g)			
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{-}	HCO_3^{-}	Cl^{-}	SO_4^{--}
7.7	0.94	1.00	1.60	1.85	0.24	--	0.80	2.50	1.39

b-mechanical analysis					
Coarse sand %	Fine sand %	Silt %	Clay %	$CaCO_3$ %	Textural class
1.65	55.35	30.0	13.0	2.90	Sandy loam

C- Available nutrients (ppm)							
Macronutrients			Micronutrients				
N	P	K	Fe	Zn	Mn	Cu	Mo
50	17	540	6.2	1.2	16.4	0.50	0.08

Phosphorus was applied at the rates of 0, 15.5 and 31 kg P_2O_5/ fed. as superphosphate (15.5% P_2O_5) before planting. Molybdic acid was applied as foliar spray at the rate of 0, 0.1 and 0.2 g/L after 45 days and 60 days from sowing(300L/fed.).

Plant samples at harvesting were taken from of each plot. Some growth parameters of broad bean plant were determined. Also dry matter yield of broad bean plants (straw and seeds) and seed index (g /100 seeds) were recorded.

Nitrogen content of the dried plants (straw and seeds) was determined by kjeldahl method according to Chapman and Pratt (1961). Phosphorus content of the dried plant parts was determined by colorimetric method as described by Troug and Mayer (1949). Potassium content by flamphotometer (Chapman and Pratt, 1961). Molybdenum content of the dried plant parts was estimated using the atomic absorption spectrophotometer.

Data were subjected to analysis of variance according to Sndecor and Cochran (1980)

RESULTS AND DISCUSSION

Growth parameters

The results in Table (2) show that, P, Mo and P + Mo applications significantly increased the plant height (cm), number of branches, number of pods per plant and number of seeds per plant. The present data show a gradual response in these parameters of broad bean plants owing to the increase in Mo levels. The greatest effect of P and Mo were recorded with highest doses of P (200 kg superphosphate/fed.) and Mo (2 g/L) compared with the control and low level. Also the effect of P is more clearly with Mo in two the seasons. The positive effect of P and Mo on previous parameters in the second season was more than that found in the first season. These results are in agreement with those obtained by El-Fiki (2000),Khalil(2001),Shehata (2001) and Bayoumi *et al.*, (2002).

Dry matter yield

The results in Table (3) show that, Mo application significantly increased dry matter yield (g/plant) of broad bean plants (straw and seeds) in the two seasons. It could be seen that, there was a gradual response in dry matter accumulation of broad bean plants owing to the increase in Mo levels. The greatest effect of Mo was recorded with the high dose of Mo (ppm) compared with control and low level of Mo treatments. This increasing effect was more with seeds compared with straw. It can be concluded from the aforementioned results that, Mo has positive effect on broad bean dry matter yield of straw and seeds which may be due to the stimulation of N by plants. Since Mo is an essential component of nitrate reduactase and nitrogenase which control the reduction of inorganic nitrate and helps in fixing N_2. Thus, Mo is the key to N fixation by legumes. Also Mo is required in the synthesis of ascorbic acid and is implicated in making Fe physiologically available within plant. All these factors increase dry matter accumulation. Similar results were obtained by Brar and

Table (2): Some growth parameters of broad plant as affected by P and Mo applications

Super phosphate added kg/fed	First season (1998-1999)				Second season (1999-2000)				Grand mean	L.S.D at 0.05
	Mo_0	Mo_1	Mo_2	Mean	Mo_0	Mo_1	Mo_2	Mean		
	Plant height (cm)									
0	79.27	82.13	84.13	81.84	99.3	106.0	84.13	105.43	93.64	P:3.658
100	85.60	87.60	88.33	87.178	102.1	87.60	88.33	106.76	96.97	Mo:3.13
200	89.46	91.00	95.73	92.07	109.3	91.00	95.73	111.07	101.57	P*Mo:n.s
Mean	84.77	86.91	89.40		103.6	86.91	89.40			
	Number of branches/plant									
0	2.57	2.87	3.00	2.81	2.75	2.95	3.40	3.03	2.92	P:0.623
100	2.93	3.53	3.27	3.24	2.97	3.23	3.90	3.33	3.29	Mo:0.44
200	3.34	3.60	3.83	3.59	3.47	3.71	4.11	3.76	3.68	P*Mo:n.s
Mean	2.95	3.33	3.37		3.06	3.29	3.80			
	Number of pods/plant									
0	8.50	8.85	9.25	8.86	8.97	11.57	12.10	10.88	9.87	P:0.62
100	10.05	10.65	10.95	10.55	10.30	12.33	13.47	12.03	11.29	Mo:0.44
200	12.11	13.30	14.45	13.28	11.97	12.97	14.68	13.21	13.25	P*Mo:n.s
Mean	10.22	10.93	11.55		10.41	12.29	13.42			
	Number of seeds/plant									
0	25.40	30.15	33.00	29.51	26.10	31.63	34.13	30.62	30.07	P:5.41
100	31.70	32.40	39.97	34.69	32.67	35.67	37.10	35.15	34.92	Mo:5.02
200	38.15	41.15	45.10	41.46	38.29	41.43	46.73	42.15	41.81	P*Mo:n.s
Mean	31.75	34.56	39.35		32.35	36.24	39.32			

Table (3): dry matter yield of broad bean plants (straw and seeds) and seeds index (gm/100seeds) as affected by P and Mo applications

Super phosphate added kg/fed	First season (1998-1999)				Second season (1999-2000)				Grand mean	L.S.D at 0.05
	Mo_0	Mo_1	Mo_2	Mean	Mo_0	Mo_1	Mo_2	Mean		
	Straw dry yield (gm/plant)									
0	23.50	25.20	28.90	25.87	25.31	27.76	29.71	27.59	26.73	P:3.859
100	26.65	29.80	32.50	29.62	28.88	31.13	32.35	30.79	30.20	Mo:2.834
200	28.50	31.25	33.80	31.18	30.85	34.15	37.10	34.03	32.61	P*Mo:n.s
Mean	26.18	28.75	31.73		28.35	31.01	33.05			
	Seeds dry yield (gm/plant)									
0	18.05	21.31	24.14	21.17	22.20	27.87	28.65	26.24	23.70	P:5.99
100	25.02	28.09	32.49	28.53	28.22	32.18	35.97	32.12	30.33	Mo:4.799
200	27.95	32.32	36.06	32.11	29.81	34.54	41.81	35.39	33.75	P*Mo:n.s
Mean	23.67	27.24	30.90		26.74	31.53	35.48			
	Seeds dry yield (Ardab/fed)									
0	5.14	5.90	6.71	5.92	6.17	7.18	7.98	7.11	6.51	P:0.965
100	7.33	8.48	8.95	8.25	8.35	9.95	9.33	8.84	8.55	Mo:1.042
200	7.91	8.72	9.60	8.74	8.89	9.12	9.56	9.19	8.97	P*Mo:n.s
Mean	6.79	7.70	8.42		7.80	8.38	8.95			
	Seeds index (gm/100seed)									
0	70.60	78.95	86.04	78.53	83.75	84.85	87.18	85.26	81.90	P:2.024
100	87.09	88.07	89.10	88.08	88.24	89.77	90.09	89.37	88.72	Mo:0.974
200	88.72	90.10	90.80	89.71	89.36	90.33	91.10	90.26	89.98	P*Mo:n.s
Mean	81.97	85.71	88.65		87.45	88.32	89.46			

Sadha (1992), Shehata (2001) and Bayoumi *et al.*, (2002) on phaseolus, pea and corn respectively.

Data in Table (3) shows that, significantly increases of straw and seeds yield of broad bean when fertilized by superphosphate especially at the application rate of 200 kg/fed. This may be due to the influence of phosphorus which is essential to plant growth. These results are in agreement with those obtained by Osaki *et al.*, (1993) and Abou Hussien *et al.*, (2002).

The combined effect of P and Mo on broad bean plants growth was positively where the dry matter yield of straw (g/plant) and grains (ardab/fed.) were increased significantly with the increase of added P and Mo. Molybdenum is an essential micronutrient, but the physiological requirement for this element is relatively low. Tiffen (1972) discussed the possibility of organic complexing, mainly of the Mo-S amino acid complex that was found in the xylm fluid; Mo is essential component of the nitrogenase and nitrate reductase is also present in other enzymes (oxidase) that catalyze diverse and unrelated reactions. Thus the requirement of plants for Mo appears to be related to the N supply. The obtained dry matter yield (straw and seeds) of broad bean plants in second season was more than that found in the first season under different studied treatments. Similar results were obtained by Shehata (2001). El-Fiki (2000), found relative increase (%) of grains yield of corn plants which were 2.07, 7.30 and 19.95% when the plants fertilized by 100 kg superphosphate/fed, 250 ppm $(NH_4)_6Mo_7O_{24}4H_2O$ and both P +Mo respectively.

The parameter of g/100 seeds as presented in Table (2) reveals that, the fertilization of broad bean plants by P and Mo resulted in an increase in the value of this parameter where these increases in the plants fertilized by P were more than those for the plants fertilized by Mo. The highest value of g/100 seeds were found in the plants fertilized by P and Mo together especially in the second season. Similar results were obtained by Khalil (2001). The positive effect of P and Mo on total yield could be attributed directly to increase in the number of branches and pods per plant. Also it is for Mo attributed to the improvement nitrogen fixation activity of root nodules. The obtained results are in agreement with those of Li and Gupta (1995) and Metwally *et al.*, (1995) with soybean and pea respectively.

Macronutrients content

The results in Table (4) show that, there was significant increase in N, P and K concentrations (%) and uptake (mg/plant) by P and Mo applications for straw and seeds. The greatest positive effect of P and Mo was found with highest doses of P (200kg/fed) and Mo (0.2 g/L) especially when these doses were added together. The positive effect of P and Mo on N, P and K content in seeds was more than that found with straw. Also, the data show, insignificant difference in the positive effect of P and Mo on N, P and K content in straw and seeds of broad bean plants in the two seasons.

The increments of N content of broad bean plants by Mo addition may be attributed to the role of Mo in normal assimilation of N by plants. It is important to nitrate reductase enzyme which is essential in the assimilation of nitrate since it catalyzes the first step of the reduction of NO_3 to NH_4. The other

Table (4): The combined effect of P and Mo applications on N, P and K concentration (%) and uptake (mg/plant) by straw and seeds of broad bean plant.

SP (kg/fed)	Mo g/L	First season															
		Straw								Seeds							
		0		0.1		0.2		Mean		0		0.1		0.2		Mean	
	Nutrients	Conc. %	uptake mg/p	Conc. %	uptake mg/p	Conc. %	uptake mg/p	Conc. %	uptake mg/p	Conc. %	uptake mg/p	Conc. %	uptake mg/p	Conc. %	uptake mg/p	Conc. %	uptake mg/p
0		1.815	426.5	1.984	499.9	2.090	604.0	1.963	510.1	2.617	555.5	2.854	731.4	3.024	860.6	2.831	715.8
100	N	1.926	551.7	2.153	792.3	2.252	844.5	2.110	729.5	2.806	751.7	2.970	835.7	3.123	1105.8	2.966	897.7
200		1.980	611.8	2.291	853.3	2.404	932.7	2.225	799.2	2.905	944.4	3.072	1144.0	3.170	1298.1	3.049	1128
Mean			530.0		715.1		793.7				750.5		903.7		1088.1		
0		0.187	43.9	0.205	51.6	0.215	62.1	0.202	52.5	0.250	53.0	0.265	67.9	0.270	76.8	0.261	65.9
100	P	0.201	57.5	0.224	82.1	0.240	90.0	0.221	76.6	0.280	75.0	0.295	83.0	0.305	108.0	0.293	88.6
200		0.210	64.8	0.235	87.5	0.252	97.7	0.232	83.3	0.297	96.5	0.310	115.4	0.317	129.8	0.308	113.9
Mean			55.4		73.8		83.2				74.8		88.7		104.8		
0		1.957	459.8	2.100	529.2	2.205	637.2	2.087	542.0	0.801	179.1	0.844	216.3	0.861	245.0	0.835	213.4
100	K	2.007	575.0	2.221	817.3	2.300	862.5	2.176	751.6	0.851	227.9	0.870	244.8	0.890	315.1	0.870	262.6
200		2.150	664.3	2.275	847.4	2.351	912.1	2.258	807.9	0.875	284.4	0.890	331.4	0.905	370.5	0.890	328.7
Mean			566.3		731.3		803.9				230.4		264.1		215.5		
		Second season															
0		1.822	428.1	1.983	499.7	2.008	580.3	1.937	502.7	2.671	572.1	2.941	726.4	3.105	870.0	2.905	722.8
100	N	1.951	558.9	2.204	811.0	2.307	865.1	2.154	745.0	2.870	768.8	3.032	1044.8	3.206	804.3	3.036	872.6
200		2.003	618.9	2.332	868.6	2.435	944.7	2.256	810.7	2.982	1011.4	3.151	1171.2	3.753	1538.7	3.295	1240.4
Mean			535.3		726.4		796.7				784.1		980.2		1071.0		
0		0.190	44.6	0.210	52.9	0.217	62.7	0.205	53.4	0.255	54.1	0.265	65.4	0.270	75.6	0.263	65.0
100	P	0.205	58.7	0.225	82.8	0.250	93.7	0.226	78.4	0.282	75.5	0.298	102.7	0.310	108.7	0.296	95.6
200		0.210	64.8	0.240	89.4	0.255	98.9	0.235	84.3	0.301	102.0	0.313	116.3	0.320	132.1	0.311	116.8
Mean			56.0		75.0		85.1				77.2		94.8		105.4		
0		1.957	459.8	2.100	529.2	2.200	635.8	2.085	541.6	0.800	171.3	0.850	209.9	0.854	239.2	0.834	206.8
100	K	2.110	604.5	2.215	815.1	2.315	868.1	2.213	762.5	0.855	223.6	0.875	301.5	0.890	312.3	0.866	279.1
200		2.152	664.9	2.270	845.5	2.350	911.8	2.257	807.4	0.875	296.8	0.890	330.8	0.915	377.8	0.893	335.1
Mean			570.4		729.4		805.2				230.5		280.7		309.7		

molybdoprotein in plants is the nitrogenase enzyme which fixes N_2 to NH_3 to be assimilated by the plants (Khoch *et al.*, 1967). Similar results were obtained by Shehata (2001) and Bayoumi *et al.*, (2002). Also the increments of P and K content of broad bean plants by Mo addition may be attributed to the improving of N fixing activity of the root nodules and hence increase the vegetative growth and consequently increase P, K and other nutrients uptake. The present results coincide with these reported by Khalil *et al.,* (1990), and El-Fiki (2000). El-Fiki (2000) found that P application at rates of 200 kg superphosphate/fed increased N uptake by corn plants by 29.7% compared with control. The positive effect of P addition on K uptake by plant taps can be discussed on the basis of the effect of P on the plant growth and its effective roles in different enzymatic function. These results are in harmony with these obtained by Khan *et al* (1994) and Dayeganlye (1996).

Data in Table (4) show that, N and P concentration and uptake of seeds of broad bean plants fertilized by different levels of P and Mo were more than that found with the plant straw and shoot, where the concentration and uptake of K by the roots were more than those found in the seeds under different studied treatments. This trend of the results was found in the two seasons. The obtained differences between the concentration and uptake of N, P and K by broad bean (straw and seeds) plants which found in the two seasons were insignificant and may be due to the migration of K to the straw. These results are in agreement with those obtained by Hanna and Eisa (1998), Shehata (2001) and Bayoumi *et al.*, (2002).

Mo-content

The effect of P, Mo and P + Mo application at different levels on Mo concentration and its uptake (mg/plant) by straw and seeds of broad bean plants were presented in Table (5). Data show that, the studied fertilization treatments resulted in an increase of Mo concentration and its uptake by straw and seeds of broad bean plants. These increases were low with P application compared with Mo application. Mo concentration and its uptake by seeds were more than those found with straw of broad bean plants. There are no significant differences between the obtained data which found in the two seasons. These results are in agreement with those obtained by Ibrahim *et al.,* (1986) and Kariman (1995) with pea and corn plants respectively. El-Fiki (2000) reported that, superphosphate application at rate of 200 kg/fed. resulted in a very little increase of Mo concentration and its uptake by corn plants. This effect may be attributed to an inhibition in Mo-uptake by the sulphate (SO_4^{2-}) component in superphosphate and thus decreasing Mo deficiency. An antagonistic effect SO_4^{-2} on the uptake of Mo has been observed in various crops such as pea (Revsenauer, 1983) and corn (Bayoumi *et al.,* 2002). These results are in agreement with those obtained by Rebalka *et al.,* (1993) and El-Fiki (2000).

The highest content of Mo of broad bean plants was found in the plants fertilized by P and Mo together. Shehata (2001), found a significant increase in Mo uptake by Mo addition for straw and seeds of pea plants.

Tasble (5): The combined effect of P and Mo applications on Mo concentration (ppm) and uptake (mg/plant) by straw and seeds of broad bean plant.

	Straw								Seeds							
Mo g/L	0		0.1		0.2		Mean		0		0.1		0.2		Mean	
SP (kg/fed)	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p	Conc. (ppm)	uptake mg/p
First season																
0	0.631	0.0140	0.765	0.0192	0.810	0.0234	0.735	0.0191	0.805	0.0187	0.910	0.0234	1.000	0.0287	0.905	0.0236
100	0.692	0.0198	0.850	0.0313	0.892	0.0334	0.811	0.0281	0.853	0.0246	0.982	0.0359	1.040	0.0336	0.958	0.0313
200	0.712	0.0220	0.903	0.0336	0.955	0.0370	0.856	0.030	0.875	0.0269	1.033	0.0383	1.075	0.0408	0.994	0.0353
Mean	0.678	0.0188	0.839	0.0280	0.885	0.0312			0.844	0.0234	0.975	0.0325	1.038	0.0340		
Second season																
0	0.651	0.0138	0.780	0.0199	0.805	0.0229	0.745	0.0188	0.805	0.0172	0.905	0.0223	1.010	0.028	0.906	0.0226
100	0.700	0.0187	0.903	0.0254	0.853	0.0302	0.818	0.0247	0.870	0.0233	1.003	0.0345	1.045	0.0366	0.972	0.0314
200	0.703	0.0228	0.910	0.0338	0.915	0.0374	0.842	0.0313	0.875	0.0296	1.035	0.0384	1.097	0.0453	1.002	0.0377
Mean	0.684	0.0184	0.864	0.0263	0.857	0.0301			0.850	0.2330	0.981	0.0317	1.050	0.0360		

The obtained results in this study concluded that, to maximizing the broad bean plants yield and it content of N, P, K and Mo, must be fertilized by P and Mo at high used application rates

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التأثير المشترك للفسفور و الموليبدنم علي نمو نبات الفول البلدي وتركيبه الكيميائي

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المخلص العربى

أجريت تجربة حقلية بمزرعة محطة البحوث الزراعية بسرس الليان لدراسة التأثير الفردي و المشترك للفسفور و الموليبدنم عند معدلات الإضافة المختلفة (صفر، ١٠٠، ٢٠٠ كيلوجرام سوبر فوسفات/ فدان ورش محلول ٣٠٠ لتر/فدان تركيزة صفر ،٠,١، ٠,٢ جم/لتر حامض موليبدنيك) على نمو نبات الفول البلدي و محتواه من بعض المغذيات.

أوضحت النتائج المتحصل عليها وجود زيادة معنوية في جميع معايير النمو تحت الدراسة (إرتفاع النبات بالسنتيمتر وعدد الأفرع بكل نبات و عدد القرون بكل نبات و عدد البذور بكل نبات) نتيجة لإضافة الفسفور أو الموليبدنم كل على حدة أو عند إضافتهما معا و كان أعلى زيادة أمكن الحصول عليها عند إضافة الفسفور و الموليبدنم سويا خاصة في الموسم الثاني.

ازداد محصول المادة الجافة للقش (جم/نبات) و البذور (جم/نبات و أردب/فدان) زيادة معنوية بزيادة المضاف من الفسفور و الموليبدنم حيث كان أعلى محصول مادة جافة نحصل عليه عند إضافة الفسفور و الموليبدنم معا خاصة عند معدلات الإضافة العالية. و قد أخذت قيم دليل البذور (جم/١٠٠بذرة) نفس إتجاه المادة الجافة و كانت القيم المتحصل عليها للمادة الجافة و دليل البذور في موسم النمو الثاني أعلى من تلك المتحصل عليها في الموسم الأول.

تسببت إضافة الفسفور و الموليبدنم منفردين أو معا إلى زيادة محتوى (التركيز والممتص) القش و البذور لنبات الفول البلدي من النيتروجين و الفوسفور و البوتاسيوم و الموليبدنم و كان أعلى محتوى من المغذيات المدروسة قد وجد في موسم النمو الثاني عند تسميد النباتات بالفوسفور و الموليبدنم معا عند معدلات الإضافة العالية وكان محتوى البذور من النيتروجين و الفوسفور و الموليبدنم مع جميع معاملات التسميد فى البذور أعلى منة فى القش بينما البوتاسيوم كان مخالفا حيث تركيزة والكمية الكلية منة فى النبات أعلى فى القش منة فى البذور.