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The role of starter solutions on growth and yield of lettuce transplants grown at southern of Iraq

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I. Abstract

The study was conducted at the agricultural research station affiliated with the college of Agriculturwe ,University of Basrah in the area of Garmat Ali, to study the effect of lettuce transplants treatment with two starter solutions urea (0,0.5,1,2)gm litter^{-1} NPK (0,0.5,1,2)gm litter^{-1} and their interaction on the vegetative growth and yield . The results showerd both of starter solutions treatments significantly affected in transplants weight ,hight,srem length, total leaves number ,leaf area ,total head weight and total yield.The interaction between starter solutions significantly affected in all traits of the study except the diameter stem

Keywords:*lettuce ,starter solution ,urea ,NPK,growth,yield*

II. Introduction

Lettuce *Lactuca sativa* L. is a winter vegetable crop that belongs to the asteraceae family.It grown all over the world in wild area.leaves are highly nutritious value in every 100 g of fresh leaves there are 4.7-7.6 % dry matter , 2.5 – 4% carbohydrates 0.8-1.8 % proteins , fats 0.3 % , fibers 0.5-1% ,1900 U vitamin A ,vitamin C 10-30 mg 100g fresh weight(Boras etal., 2011).

Lettuce is one of the vegetables which can transplanting (Matloob *etal*.,1989).Transplanting causes a transplant shock which occur after transplanting directly, and this shock stops the transplant growth to along period which causes late maturity because of the reduction in growth of plants which are tranplantedand transferred from nursery to field(Melton and Dufault 1991) . Supplying the transplants with water and nutrients before transferred to the field lead to produce strong transplants (Agro 1997) due to increase carbohydrates in transplants which enhance or improve roots growth after transplanting (Mckee,1981).The treatment with starter solutions which are considered as diluted fertilized solutions and composed as chemical fertilizers(Hussan 1992) Studies are clarified the importance of starter solutions in increase growth and yield for instant Patil *etal* (1979) found that treatment brassica transplants *Brassica oleracea* var capitata c.golden acre at age 25-30 day after transplantibng with urea at concentratiobns (0.5,1, 1.5 ,2) % about 5 minutes dipping roots causes highly yield results with 0.5 , 1 %. Kadam *etal* (1993) said that treatment of brassica transplants at age 25-30 day about 10 seconds with NPK 15-15-15 at concentrations1-5% that the highly yield resulted with 2%.Dufault (1986) found that the treatment of cucumis melo var reticulatus with N (10, 50, 250) mg litter $^{-1}$, P2O5

(5,25,125)) mg litter $^{-1}$ and 250) mg litter $^{-1}$ K lead to condition the transplants to toletrance transplanting shock and showed highly early yield than the control.Islam etal (1989)found that treatment of cabbage transplants Atlas cultivar with urea as starter solutiobn (0.5 ,1.1.5, 2)% by dipping transolants roots for 5 minutes and

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grow directly that both concentrations 1 ,1.5 % showed the high marketing yield whilke the treatment with 2% showed the high productivity .Masson etal (1990) found that lettuce fertilized transplants with 400 mg litter $^{-1}$ N causes increase the dry weight of shoot system and plant leaf area . Obed (2004) found that dipping cabbage transplants roots with urea at 1% conc. For 5 minutes significantly increased hight,leaves number ,leaf area ,stem diameter, fresh weight , early yield , marketing yield and productivity. Because of the reduction of studies about starter solutions on lettuce tranasplants local cultivar grown at southern of Iraq ,Basrah province this study aimed to know the effect of both starter solutions urea and NPK and their interaction on growth and yield of lettuce .

III. Materials and Methods

This study is conducted in the winter season 2018-2019 in the Agriculture station of researches-college of agriculture.The table (1) clarify some physical and chemical characteristics of the field soil.

The transplants production of lettuce local c.by ploughing the soil and dividing it into lines and adding thel mannure 10m3donom-1 .The lines 1*2m number of lines are 16.The seeds were grown at 4/10 in rows , the spaces between rows 20cm and all the agricultural processes were done such removing the weeds,irrigation,protection and transplants hardening .The treatments were with urea (0,0.5 ,1,2)g litter^{-1} .The treatment with starter solution NPK 15-15-15 (0,0.5 ,1,2)g litter^{-1} .The experiment conducted aas a factorial experiment with 16 treatment ,48 experimental unit contributed randomizedly on lines and treated with urea after 21 days from planting and with NPK after 28 days from planting date .

The transplants were transplanted or transferred to the field at 20/11 after plowing the soil and adding the manure at 10 m^3 donom^{-1} and divided into lines the space 70cm between line and an other .The transplants were grown in both sides of line ,the space between transplants was 40cm.The transplants number in the experimental unit was 40 transplants.The experiment was conducted as a factorial experiment by RCBD desigh with three replications .The experimental units 48.All agricultural service processes were done for all experimental units (Matloob etal.,1989).Data were taken before and after transplanting .The data were analysized by using genstate version 2010 and the means were compared acoording to LSD on significant level 0.05(Alrawi and Khalafallah 1980)

Table (1) some physical and chemical properties of soil .

Property value

Table (1): Some chemical and physical characteristics of the study soil

Attribute		Value	Unit
pH		7.2	
ECe		4.03	ds m-¹
Available Phosphorus		0.32	mg kg-¹
Total Nitrogen		0.51	g kg-¹
Ready Potassium		16.58	mg kg-¹
solube positive ions	Calcium	16.5	
	Magnesium	11	
	Sodium	21.3	

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	Bicarbonates	13.6	millimoles l^{-1}
	Sulfates	18.5	
	Chlorides	28.0	
Soil separators	Sand%	13.8	%
	Silt%	35.24	
	Clay%	50.88	
Soil texture		Clayey silty	

IV. Results and conclusion

Table (2) showed that both treatments with starter solutions significantly affected on study the indicators with all concentrations with urea compare with control in increase percent(10.59,14.83,23.72) % in transplant weight and increase percent(17.00,31.43,33.67) % in stem length and (23.27,28.72,30.18) % in stem diameter in sequence.The significant increase with urea treatment may be due to the important role of nitrogen in the structure of more the biological compounds in a plant such as proteins, organic acids , nuclic acids and clorophyll which are enhance the cell division and increase the vegetative grpwth or may be Nitrogins role in auxens formation in tryptophane which is the precursure of the auxin in apical meristems which have an important role in cells elongation (Mohammed and Alyounis 1991) or may be due to the increase in roots growth after transplanting (Lipty and Nicholls 1993) which causes increase in water and nutrients absorption and finally increase the growth . These results are agree with (Patil etal 1979 ,Masson etal 1990, Obed 2004)

Table (2) showed that the transplants treatment with all NPK concentrations as a starter saolution significantly increased all the traits compare to the control in increase percent (13.13 , 16.10 ,15.68)% in transplant weight , (4.68,8.66,6.87)% in plant hight , (8.71,10.87,6.11) % in stem length and (10.00,14.28,16.28) % in stem diameter in sequence.The significant increase with NPK may be due to an important physiological roles to the nutrients NPK and their role in the biological processes such as photosynthesis,respiration ,absorption and carbohydrates synthesis and fatty acids (Alsahaf 1989).Plants absorp more nutrients in an early stage of growth specially phosphorous which it had absorped in the early growth with highly level which increase roots grpwth and finally hold transplants on the soil (Hassan 1992) .These due to an increase in the vegetative growth .These results agree with (Argo 1997).

Table (2) effect of both Urea and NPK starter solutions on some vegetative indicators on lettuce plants .

Stem diameter(cm)	**Stem length(cm)**	**Plant hight (cm)**	**Transplant weight (gm)**		**treatments**	
2.75	**9.83**	**28.38**	**2.85**		**0**	**Urea concentration(gm litter-1**
3.39	**11.5**	**30.90**	**2.61**		**0.5**	
3.54	**12.92**	**32.93**	**2.71**		**1**	

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3.58	13.14	34.36	2.92	2		
0.21	0.46	1.05	0.17	LSD0.05		
3.01	11.13	30.12	2.36	0		NPK concentration(gm litter-1
3.31	11.81	31.53	2.66	0.5		
3.44	12.34	32.73	2.74	1		
3.5	12.1	32.19	2.73	2		
0.21	0.46	1.05	0.17			LSD 0.05
Ste)	Stem	Plant h				
2.32	8.21	25.10	2.33	0	0	Effect of Interaction between Urea and NPK
2.72	10.26	28.37	2.22	0.5		
3.01	10.33	29.27	2.23	1		
2.95	10.51	30.79	2.23	2		
3.08	10.6	30.34	2.23	0	0.5	
3.25	11.47	30.17	2.6	0.5		
3.41	12.02	32.20	2.77	1		
3.81	11.92	30.87	2.83	2		
3.29	12.65	32.6	2.37	0	1	
3.61	12.36	33.15	2.77	0.5		
3.68	13.52	33.5	2.73	1		
3.6	13.13	32.45	2.96	2		
3.35	13.07	32.43	2.5	0	2	
3.66	13.14	34.43	3.06	0.5		
3.66	13.51	35.93	3.23	1		
3.64	12.85	34.63	2.9	2		

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NS	**0.92**	**2.11**	**0.34**		**LSD0.05**	

The interaction between the two factors significantly affected on all indicators except stem diameter ,the treatment with urea 2g litter^{-1} and NPK 1 g litter^{-1} showed the highly transpklant weight 3.23 g , transplant hight 35.93 cm while the plants treated with urea 1g litter^{-1} and NPK 1g litter^{-1} showed the vhighly stem length 13 .52 cm while the untreated transplants with urea and treated with NPK with 0.5 g litter^{-1} showed the lowst transplant weight 2.22 gm .The untreated transplants showed the least hight and stem length (25.10,8.21) cm in consequence.

Table (3) showed that both treatments and their interaction significantly affected in all growth indicators .The urea treatment caused a significant increase in total leaves number in increase percent (7.96,16.53,19.48)%, leaf area (13.03,29.88,39.68)% and in yield (22.43, 58.93,57.29)% compared to control .This increase may be due to the nutrients in both starter solutions which improved or enhanced the roots absorptionand their role in photosynthesis to occur strong transplants (Argo 1997) .These results agree with patil etal.,1979,Dufault,1986, Islam etal 1989, Masson etal .,1990 and Obed 2004).The interaction showed significant effect to the urea treatment with 1g litter^{-1} and NPK 0.5g litter^{-1} the highly leaves number 48.07 leaves and treatment with urea 1g litter^{-1} and NPK 1g litter^{-1} the highly leaf area 708.35 dcm^2 plant^{-1} .plants treated with urea 2g litter^{-1} and NPK 2g litter^{-1} showed the highly head weight 503.7 gm and total yield 7.915 ton donom^{-1} while untreated plants showed the least means in leaves number 35.51 , leaf area 466.95 dcm^2 plant^{-1} ,total head weight 263.6gm and productivity 4.142 ton donom^{-1} .

Conclusion

We can conclose from this study that if we want to produce strong and healthy transplants without disieses on local lettuce we had better treat these transplantswith starter solutions Urea at conc.2g litter-1 after 21 days of planting date and after a week treat with NPK starter solution !5-15-15 2glitter-1 before transplanting.

\Table (3) Effect of startetr solutions Urea and NPK on some yield indicators of lettuce plants.

)total yield ton donom -1	**Head weight gm plant-1**	**Leaf area dcm2 plant-1**	**Leaves number leaf plant-1**		
4.702	**299.5**	**524.85**	**39.32**		
5.761	**366.7**	**593.25**	**42.45**		
7.480	**=476.0**	**681.66**	**45,82**		
7.403	**471.1**	**733.12**	**46.98**		
0.433	**27.6**	**38.95**	**0.99**		**LSD 0.05**

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5.787	368.3	575.39	42.2			
6.412	408.1	630.9	43.8			
6.524	415.2	6.73.37	45			
6.622	421.4	653.23	43.56			
0.433	27.6	38.95	0.99	LSD 0.05		
4.142	263.6	466.95	35.51	0	0	Effect of Interacti and NPK
4.716	300.1	518.09	39.30	0.5		
4.923	313.3	565.35	42.20	1		
5.028	320.0	549.00	40.27	2		
5.349	340.4	544.25	40.82	0	0.5	
5.987	381.0	563.59	41.34	0.5		
5.948	378.5	654.08	42.35	1		
5.762	366.7	611.09	42.29	2		
7.032	447.5	630.96	45.37	0	1	
7.398	470.8	700.71	48.07	0.5		
7.704	490.3	708.35	45.30	1		
7.786	495.5	686.65	44.53	2		
6.626	421.7	659.40	47.10	0	2	
7.550	480.5	741.25	46.50	0.5		
7.522	478.7	765.71	47.17	1		
7.915	503.7	766.18	47.17	2		
0.835	55.19	77.89	1.99		LSD0.05	

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V. Referances

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