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Research Article

The Impact of the use of Sludge in Agriculture on the Vegetative Growth of Cereal Crops

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Abstract

The present study was conducted to investigate the effect use the sewage sludge on two cereal crops Barley (Hordeum vulgare L.,), Wheat (Triticum astivum) characteristics(plant height (cm) , number of tillers, fresh weight (g) dry weight (g), test weight (g), grain yield (qha-).the soil treated with different levels of sewage sludge (0Kg, 4 Kg, 8 Kg, 12 Kg) Duration of the investigation lasted for two seasons. All plant parameter as plant height, number of tillers, dry &fresh weight, test weight and grain yield were significantly effected with increasing levels of sewage sludge on both experiments years 2012- 13&2013-14 on crops wheat and barley. The treatment T_3, T_7 were found the maximum vegetative growth effected because it's the high level of sewage sludge.

Keywords: *Sewage sludge, plant height, number of tillers, Barley, Wheat*

Introduction

There is an increasing interest in the agricultural application of sludge obtained in wastewater treatment plants, due to the possibility of recycling valuable components; organic matter, nitrogen, phosphorus and other plant nutrients (Suss, 1979). the application of sewage in soil not only solves the problem of its disposal, but will help improving the physical chemical and biological properties of soil, crop productivity and maintain a health and cleaner environment (paresh *et al* 2009, Saruhan *et.al* 2010) Application of untreated sewage and sewage sludge as manure or conditioner for soil had been practiced in many countries, Applying sewage sludge to agricultural soils improves soil physical and biological properties because it contains organic matter and plant nutrients (Chaudri, *et al*., 2001) Sewage sludge is a valuable organic manure and soil conditioner and has been used successfully as a fertilizer for many decades. However sludge's contain variable amounts of potentially toxic elements and concern about their impact (McGrath *et* al., 1994) Over the last two decades, sewage sludge have been established as viable alternatives to commercial fertilizers with respect to plant nutrition. A number of researchers have reported increased yields with various agronomic crops due to sludge application (Coker, 1966; Kelling *et al.,* 1977; Watson *et al.,* 1985). Urban sludge application on land increased the dry matter yield of maize over control (Santaram, 1996). The high nutrients and organic matter contents of sewage sludge make it an excellent fertilizer to enhance soil fertility and crop production. It can significantly increase crops yield over control (Chattopadhyay *et al*., 1992).The expansion of soil management practices that restore and/or improve crop production through lessening negative environment impacts has been studied by several authors (Attia, 2003). sludge application helps to reduce soil erosion and improves the soil quality as a plant growth medium (Petersen *et al.* 2003) In many investigations with different climatic and soils conditions have reported a substantial increase in plant growth, crop yield and biomass production upon sewage sludge application(Jamil *et al.* 2006). The aim of the present study is to investigate the effect of use the sewage sludge on the morphology characteristics of crops.

Material and method

The two experiments were conducted during Rabi season 2012-2013 to study the "to investigate the effect of the sewage sludge on vegetative growth of cereal crops". The field experiments were laid out at the Research Farm of Department of Environmental Science, School of Forestry and Environment, Sam Higginbottom Institute of Agriculture, Technology & Sciences (Deemed to -be- University), Allahabad. The area is situated on the right bank adjacent to Yamuna river in south of Allahabad city, which is located that 25̊24̍ 46.14'' N latitude, 81̊ 50̍ 49.95̎ E Longitude and

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98 m above the sea level. All the facilities required for experimentation were provided by the department.

Climate and Weather condition

The area of Allahabad District comes under subtropical and semiarid climate. Due to subtropical climate prevailing in the south east part of U.P with the extremes in temperature dropping to 4 – 6^{o}C in December to January and very hot in summer with temperature ranging between 46-48 ^{o}C in the month of May to June. The average rainfall is around 1013.4mm with maximum concentration during July to September and occasional frost in winter and hot wind (Loo) in summer. The climatic condition of the investigation area is most suitable for the cultivation of cereal crops. The metrological data during entire growth period of the crops for the two season, comprises maximum and minimum temperature, rainfall and relative humidity were recorded at Agro metrological adversely service, Department of Environmental Science, SOFE, SHIATS, Allahabad.

Treatment Combination

Barley crop	**Wheat crop**
T_1 = 00.00 Tonnes Sewage sludge	T_5 = 00.00 Tonnes Sewage sludge
T_2 = 04.00 Tonnes Sewage sludge	T_6 = 04.00 Tonnes Sewage sludge
T_3 = 08.00 Tonnes Sewage sludge	T_7 = 08.00 Tonnes Sewage sludge,
T_4 = 12.00 Tonnes Sewage sludge	T_8 = 12.00 Tonnes Sewage sludge

Plant sampling

Plant samples of Wheat and Barley crops were collected from field. Shoot samples of Wheat and Barley crops were collected at 40,80, and 120 days after sowing with stainless steel cutter. Plant samples were washed successively with tap water; acidified water, distilled water and double distilled water. These samples were then have dried first at room air temperature for several days and then in hot air oven at (60$\pm$5^{0}C) for 48 hours to constant dry weight.

Statistical Analysis

The field experiment was layout in a randomized block design with 12 treatment combination, each treatment replicated three times.

Result and Discussion

1- Effect of different levels of sewage sludge on plant height (cm) at 40, 80 and 120 days after sowing (DAS)

Table 1: Effect of different levels of sewage sludge on plant height (cm) at 40, 80 and 120 DAS

Treatments		40 DAS			80 DAS			120 DAS		
		2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
W	T_0	37.00	37.67	37.34	64.83	65.66	65.25	90.66	91.60	91.13
	T_1	40.67	40.67	40.67	66.33	67.33	66.83	96.00	96.83	96.42
	T_2	46.00	45.33	45.67	67.50	67.86	67.68	99.00	100.00	99.50
	T_3	48.50	47.33	47.20	68.16	69.86	69.01	101.33	101.83	101.5
B	T_4	27.90	33.00	30.50	38.60	40.33	39.47	75.50	78.13	76.2
	T_5	32.50	35.17	33.4	39.66	41.23	40.44	78.33	79.16	78.75
	T_6	33.60	35.23	34.42	42.33	43.00	42.67	80.16	81.13	80.65
	T_7	33.90	35.40	34.65	43.16	44.20	43.68	84.50	85.46	84.98
F-test		S	S	S	NS	S	S	S	S	S
S.Ed. (±)		4.575	3.342	3.563	-	4.601	6.991	7.514	7.615	7.540
C.D. at (P=0.05)		9.440	6.898	7.355	-	9.496	14.429	15.509	15.716	15.562

The results depicted in table and fig. (1) Shows the significant effect of sewage sludge on plant height of wheat and barley crop at 40, 80 and 120 DAS in 2012 and 2013.

The maximum plant height of wheat crop at 40, 80 and 120 DAS in 2012 and 2013 were recorded in T_3 (12.00 Tonnes Sewage Sludge + wheat Crop)48.50 & 47.33; 68.16 & 69.86 and 101.33 &101.83 cm similarly, the pooled values were also recorded as 47.20, 69.01 and 101.50 cm followed by T_2(8.00 Tonnes Sewage Sludge + wheat Crop) 46.00 & 45.33; 67.50&67.86 and 99.00&100.00 cm and minimum plant height was recorded in T_0(00.00 Tonnes Sewage Sludge + wheat Crop) 37.00&37.67; 64.83 & 65.66 and 90.67 &91.60 cm and pooled were 37.34, 65.25 and 91.13 cm.

The maximum plant height of barley crop was recorded in T_7 (12.00 Tonnes Sewage Sludge + Barley Crop) 33.90 & 35.40; 43.17 &44.20 and 84.50 &85.47 cm similarly, the pooled were recorded as 34.65, 43.68 and 84.98 cm followed by T_6 (08.00 Tonnes Sewage Sludge + Barley Crop) 33.60 & 35.23; 42.33 & 43.00 and 80.17 &81.13 cm and pooled were 34.42, 42.67 and 80.65 cm and minimum plant height were recorded in T_4(00.00 Tonnes Sewage Sludge + Barley Crop) 27.90 &33.00; 38.60 & 40.33 and 80.17 &81.13 cm and pooled were found as 30.45, 39.47 and 76.82cm.

It may be due to increased dose of sewage sludge that contains higher amount of N, P, K and other nutrients; As Nitrogen promotes vegetative growth through cell elongation apart from cell division and expansion.

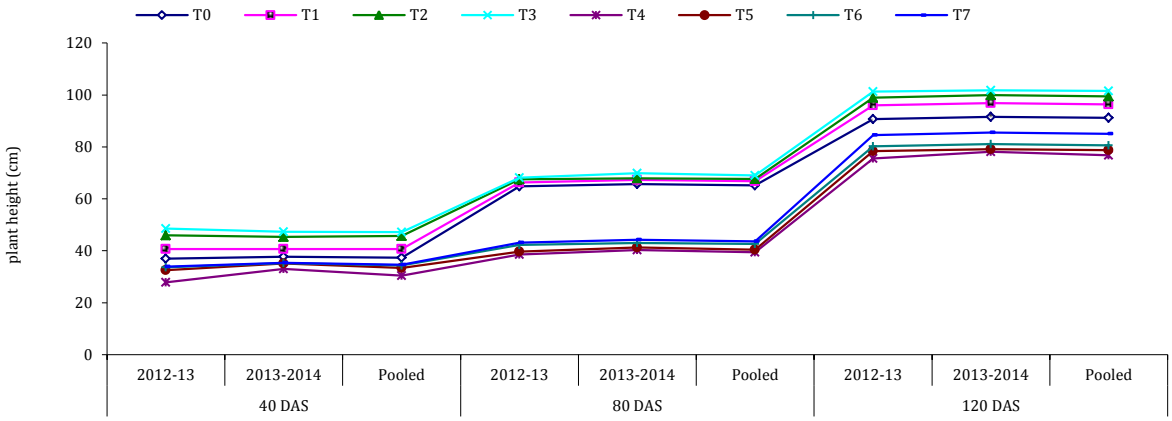

Fig.4.1: Effect of different levels of sewage sludge on plant height (cm) at 40, 80 and 120 DAS after sowing

Table 2 Effect of different levels of Sewage sludge on number of tillers at 40, 80 and 120 days after sowing (DAS)

Treatments		40 days			80 days			120 days		
		2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
Wheat	T_0	2.3	2.9	2.6	2.6	2.9	2.7	3	3.4	3.2
	T_1	3	3.7	3.3	3.6	4.0	3.8	3.9	4.1	4
	T_2	3.9	4.2	4.05	4.1	4.6	4.35	4.5	5	4.75
	T_3	4.5	5.1	4.7	4.9	5.3	5.1	5.1	5.6	5.35
Barely	T_4	2	2.3	2.15	2.2	2.4	2.3	2.5	3	2.8
	T_5	2.5	2.7	2.5	2.9	3.1	3	3.3	3.9	3.6
	T_6	3.1	3.6	2.35	3.4	3.9	3.65	4	4.2	4.1
	T_7	4	4.25	4.12	4.21	4.3	4.2	4.6	4.9	4.7
F- test		S	S	S	S	S	S	S	S	S
S. Ed. (±)		0.0397	0.0254	0.0324	0.4076	0.6860	0.5393	0.3439	0.4642	0.4038
C. D. (P = 0.05)		0.0820	0.0525	0.0669	0.8413	1.4158	1.1131	0.7099	0.9580	0.8335

Phosphorus is an important element for various metabolic activities and plant growth, K is involved in meristematic growth, regulates translocation of photosynthesis and action of several enzymes and Sulphur is involved in activation enzyme, which aid in biochemical reaction within plant and It brings significant increase in plant height. Similar finding were also reported by Prasad (2007), and Reddy et al. (1998); Yadav *et al.* (1997) and Thomaz *et al* (2009) Khosravi *et al* (2010).

2. Effect of different levels of Sewage Sludge on number of tillers at 40, 80 and 120 DAS

The results depicted in table and fig. 2 shows the significant effect of sewage sludge on number of tillers of wheat and barley crop at 40, 80 and 120 DAS in 2012 and 2013.

The maximum number of tillers of wheat crop at 40, 80 and 120 DAS in 2012 and 2013 were recorded in T_3 (12.00 Tones Sewage Sludge + Wheat Crop) 4.5 & 5.1; 4.9 & 5.3 and 5.1 &5.6 similarly, the pooled were recorded as 4.9, 5.1 and 5.35 followed by T_2 (08.00 Tones Sewage Sludge + Wheat Crop) 3.9 & 4.2; 4.1 & 4.6 and 4.4 & 5 and minimum number of tillers of wheat was recorded in T_0 (0.00 Tones Sewage Sludge + Wheat Crop) 2.3 & 2.9; 2.6 & 2.9 and 3 & 3.4 and pooled were 2.6, 3 and 8.3.2.

The maximum number of tillers of wheat crop was recorded in T_7 (12.00 Tonnes Sewage sludge + wheat crop) 4 & 4.25; 4.21 &4.3 and 4.6 & 4.9 similarly, the pooled were recorded as 4.12, 4.2 and 4.7 followed by T_6 (08.00 Tonnes Sewage sludge + wheat crop) 3.1 & 3.6; 3.4 & 3.9 and 4 & 4.2 and pooled were 3.35, 3.65 and 4.1 and minimum number of tillersof wheat were recorded in T_4(00.00 Tonnes Sewage sludge + wheat crop) 2 &2.3; 2.2 & 2.4 and 2.6 & 3 and pooled were found as 2.15, 2.3 and 2.8.

The results are shows significant effect of sewage sludge on the number of tillers. The number of tillers increase with increase of sewage sludge it may due to the sewage contains higher amount of N, P, K, and other nutrients and these nutrients are important for the vegetative growth and photosynthesis and promotes several enzymes that's bring significant increase in number of tillers. These findings are in close conformity with the finding of Singh and Kumar (1993) Khosravi*et al.* (2010).

3. Effect of different levels of Sewage sludge on fresh weight of plant (g) at 40, 80 and 120 DAS after sowing

The results depicted in table and fig. (3) shows the significant effect of application of sewage sludge on fresh weight of plant (g) of wheat and barley crop at 40, 80 and 120 DAS in 2012 and 2013.

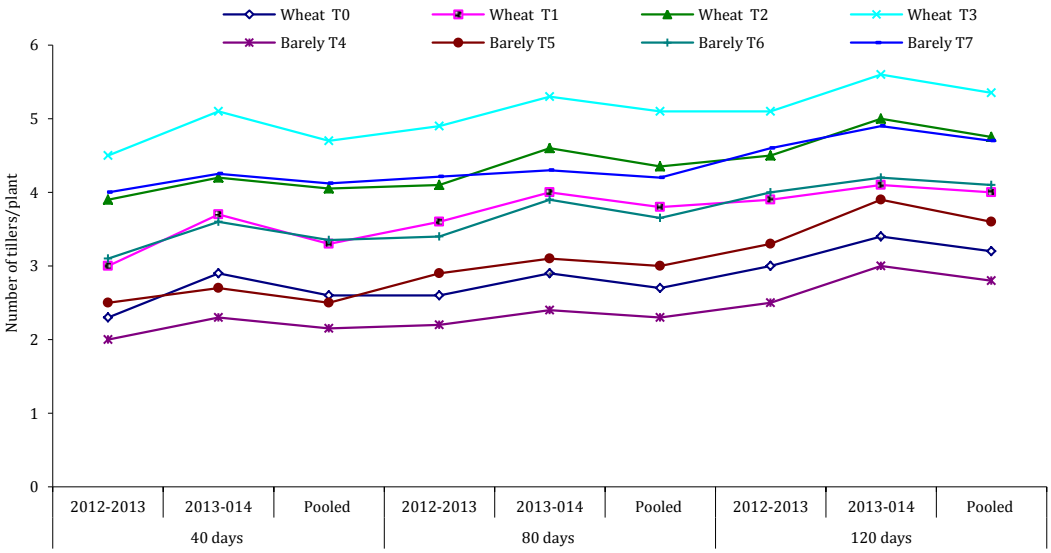

Fig.2: Effect of different levels of sewage sludge on number of tillers at 40, 80 and 120 DAS after sowing

Table 3 Effect of different levels of Sewage sludge on fresh weight of plant (g) at 40, 80 and 120 DAS after sowing

Treatments		40days			80days			120days		
		2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
Wheat	T_0	0.921	0.932	0.927	2.511	2.561	2.536	15.110	15.120	15.115
	T_1	0.943	0.944	0.944	3.210	3.220	3.215	16.120	16.110	16.115
	T_2	1.211	1.213	1.212	4.120	4.210	4.165	16.910	16.930	16.920
	T_3	1.611	1.611	1.611	4.910	4.920	4.915	17.110	17.120	17.115
Barely	T_4	0.911	0.910	0.911	2.911	2.912	2.912	16.120	16.140	16.130
	T_5	0.961	0.962	0.962	3.612	3.620	3.616	16.910	16.920	16.915
	T_6	1.361	1.401	1.381	4.110	4.130	4.120	17.510	17.520	17.515
	T_7	1.710	1.730	1.720	4.710	4.720	4.715	18.010	18.020	18.015
F- test		S	S	S	S	S	S	S	S	S
S. Ed. (±)		0.0216	0.0229	0.0211	0.0383	0.2912	0.1635	0.5768	0.6006	0.5885
C. D. (P = 0.05)		0.0446	0.0472	0.0435	0.0791	0.6010	0.3375	1.1906	1.2396	1.2147

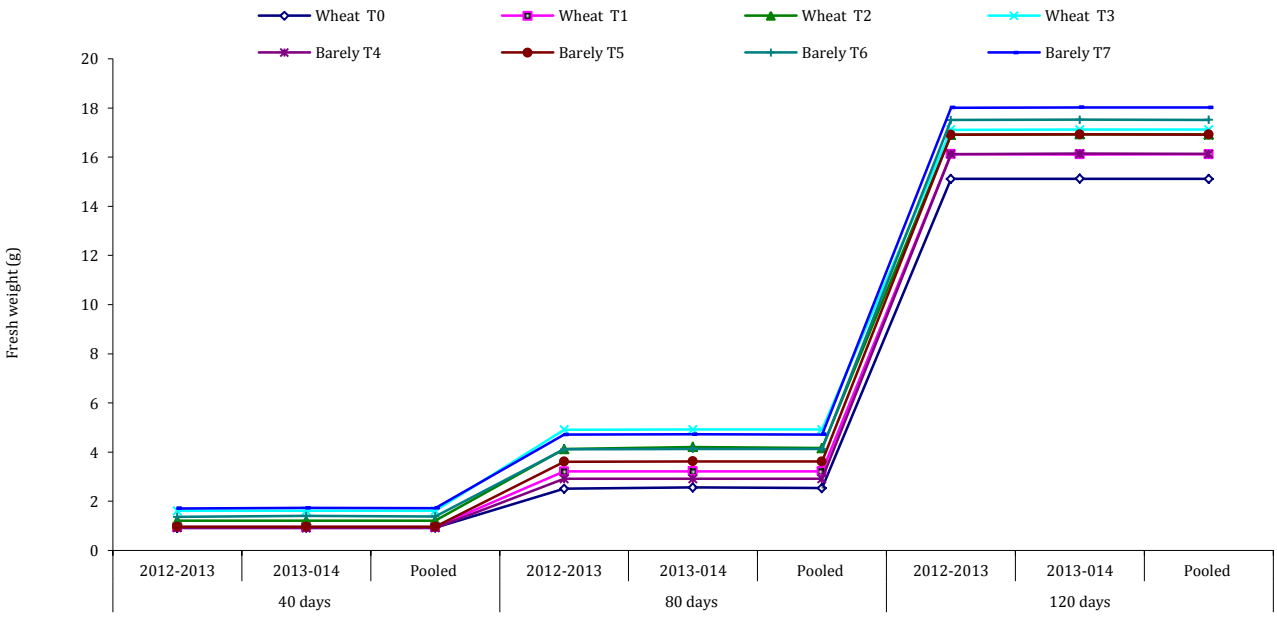

Fig.3 Effect of different level of sewage sludge on fresh weight of plant (g) at 40, 80 and 120 DAS

Table 4 Effect of different levels of sewage sludge on dry weight of plant (g/plant) at 40, 80 and 120 DAS

Treatments	40 day			80 day			120 day		
	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
T_0	0.283	0.290	0.287	1.28	1.29	1.28	7.76	7.80	7.73
T_1	0.323	0.343	0.333	1.32	1.35	1.35	8.00	8.20	8.10
T_2	0.330	0.357	0.343	1.34	1.37	1.35	8.33	8.53	8.43
T_3	0.353	0.370	0.363	1.35	1.39	1.37	8.50	8.90	8.70
T_4	0.257	0.270	0.265	1.23	1.26	1.25	7.10	7.30	7.20
T_5	0.290	0.301	0.298	1.26	1.31	1.29	7.40	7.60	7.50
T_6	0.327	0.373	0.363	1.29	1.32	1.31	7.97	8.23	8.10
T_7	0.357	0.370	0.363	1.32	1.35	1.33	8.37	8.43	8.40
F- test	S	S	S	S	S	S	S	S	S
S. Ed. (±)	0.010	0.012	0.008	0.007	0.007	0.004	0.104	0.065	0.037
C. D. (P = 0.05)	0.020	0.024	0.016	0.014	0.014	0.004	0.214	0.135	0.077

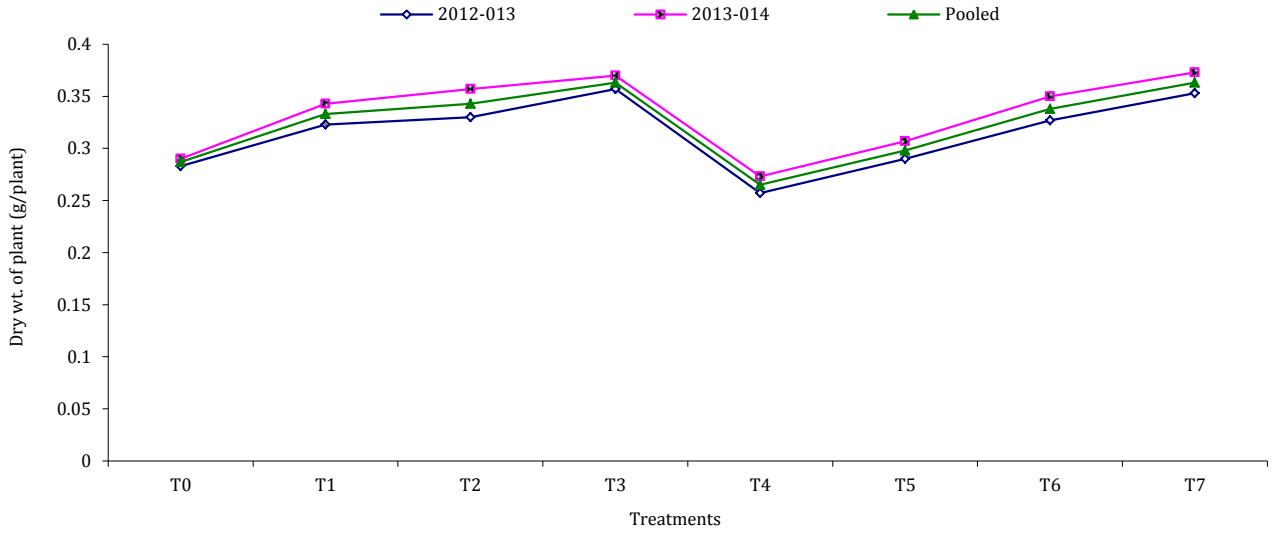

Fig. 4.a Effect of different levels of sewage sludge on dry weight of plant (g/plant) at 40 DAS

The maximum fresh weight of plant (g)of wheat crop at 40, 80 and 120 DAS in 2012 and 2013 were recorded in T_3 (12.00 Tonnes Sewage Sludge + wheat Crop)48.50 & 47.33; 68.16 & 67.00 and 101.33 & 101.83g similarly, the pooled were recorded as 47.20, 68.58 and 101.50 g followed by T_2(08.00 Tonnes Sewage sludge + wheat crop) 46.00 & 45.33; 67.50&67.86 and 99.00&100.00 gm and minimum fresh weight was recorded in T_0(00.00 Tonnes Sewage sludge + wheat crop) 37.00&37.67; 64.83 & 65.67 and 90.67 & 91.60 g and pooled were 37.34, 65.25 and 91.13 gm.

The maximum fresh weight of plant g of barley crop was recorded in T7 (12.00 Tones Sewage sludge + barley crop) 33.90 & 35.40; 43.17 &44.20 and 84.50 &85.47 g similarly, the pooled were recorded as 34.65, 43.68 and 84.98 gm followed by T6 (08.00 Tones Sewage sludge + barley crop) 33.60 & 35.23; 42.33 & 43.00 and 80.17 &81.13 cm and pooled were 34.42, 42.67 and 80.65g and minimum fresh weight of plant (gm)were recorded in T4(00.00 Tones Sewage sludge + barley crop) 27.90 &33.00; 38.60 & 40.33 and 80.17 & 81.13 gm and pooled were found as 30.45, 39.47 and 76.82 gm.

The fresh weight of plant was increased with increase level of sewage sludge it may due to it contains higher amount of N, P, K, and other nutrients and these nutrients important for vegetative growth and for photosynthesis and promotes several enzymes that's bring significant increase in fresh weight of plants. Similar findings were also reported by Khalid *et al.* (2012), Sutapa *et al.* (2012) and Yanchan *et al.*(2013).

4. Effect of different level of sewage sludge on dry weight of plant (g) at 40, 80 and 120 DAS

The results depicted in table and fig. (4) shows the significant effect of sewage sludge on dry weight of plant (g)of wheat and barley crop at 40, 80 and 120 DAS in 2012 and 2013.

The maximum dry weight of wheat crop at 40, 80 and 120 DAS was recorded in T_3(12.00 Tones Sewage sludge + wheat crop) 0.353&0.370; 1.35&1.39 and 8.50& 8.90 g/plant similarly, the pooled were recorded as 0.363&1.37and 8.70 g/plant followed by T_2(08.00 Tones Sewage sludge + wheat crop) 0.330&0.357;1.43&1.37 and 8.33&8.53 g/plant and pooled were found as 0.343, 1.35 and 8.43 g/plant.

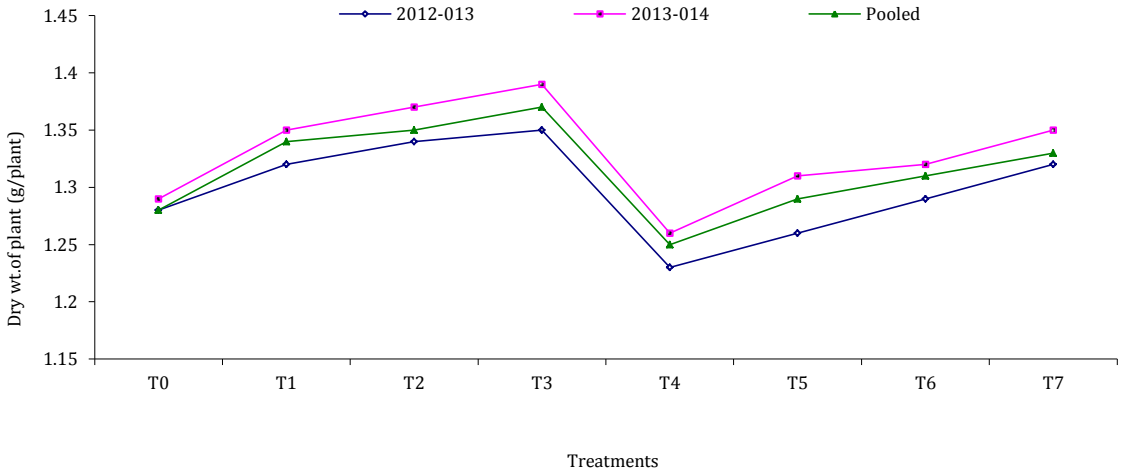

Fig .4. b: Effect of different levels of sewage sludge on dry weight of plant (g/plant)at 80 DAS

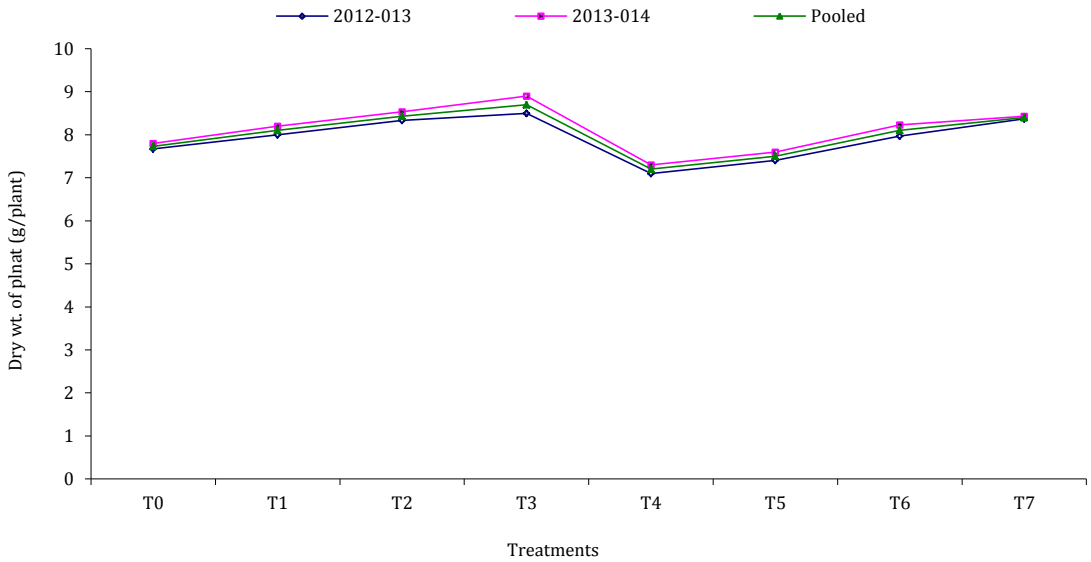

Fig. 4. c: Effect of different levels of sewage sludge on dry weight of plant (g/plant) at 120 DAS

The minimum dry weight of wheat crop were recorded in T_0(0.00 Tones Sewage sludge + wheat crop) 0.283&0.290; 1.28 &1.29 and 7.76&7.80 g/plant and pooled were found as 0.287 &1.28 and 7.73.

The maximum dry weight of Barley plant at 40 ,80 and 120 DAS in 2012 & 2013 were recorded in T7 (12.00 Tonnes Sewage sludge + Barley Crop) 0.357& 0.370;1.32&1.35 and 8.37& 8.43 g/plant similarly, the pooled were recorded as 0.363 , 1.33 and 8.40 g/plant followed by T6(08.00 Tonnes Sewage sludge + Barley Crop) 0.327&0.373; 1.29 &1.32 and 7.97&8.23 g/plant and minimum dry weight of Barley plant was recorded in T4(00.00 Tonnes Sewage sludge + Barley Crop) 0.257 & 0.270 ;1.23&1.26 and 7.10&7.30 g/plant and pooled were 0.265,1.25 and 7.20 g/plant.

The sewage sludge increased the grain yield and straw production of crops. It is mentioned that maximum yields in both grain and straw were obtained of sewage sludge application. Highest increase in the grain and straw yield of crops treated with sewage sludge. Similar findings had also reported by Hernandez *et al.* (1991), Jamil *et al.* (2004), and Tamrab *et al*. (2009),Khalid *et al*. (2012), Sutapa *et al.*(2012), Yanchan *et al*.(2013).

5. Effect of different levels of sewage sludge on grain yield (qha-)

The results depicted in table and figure.(5) shows the significant effect of sewage sludge on grain yield of wheat and barley crop qha^{-1}after crop harvest in 2012 and 2013.

The maximum grain yield$qha^{-1}$of wheat after crop harvest in 2012 and 2013 were recorded in T_3 (12.00 Tones Sewage sludge + wheat crop) 46.21 and 49.15 qha^{-1}similarly, the pooled were recorded as 47.68 qha^{-1}followed by T_2(08.00 Tones Sewage sludge + wheat crop) 42.31 and 46.12 qha^{-1} and minimum grains yield$qha^{-1}$was recorded in T_0(00.00 Tones Sewage sludge + wheat crop) 38.19 and 41.11qha^{-1} and pooled were found40.1qha^{-1}.

Table 5 Effect of different levels of sewage sludge on grains yield qha^{-1}

Treatments	2012-013	2013-014	Pooled
T_0	38.91	41.11	40.1
T_1	40.11	43.21	41.66
T_2	42.31	46.12	44.21
T_3	46.21	49.15	47.68
T_4	34.11	37.12	36.61
T_5	36.26	38.31	37.28
T_6	39.31	40.31	39.81
T_7	41.61	42.11	41.86
F- test	S	S	S
S. Ed. (±)	0.103	0.005	0.052
C. D. (P = 0.05)	0.212	0.010	0.107

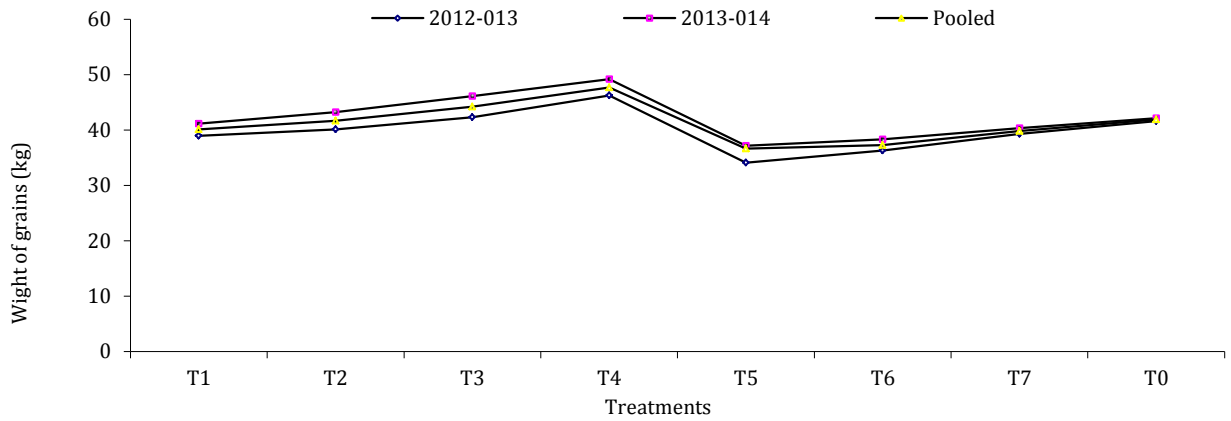

Fig.5 Effect of different levels of sewage sludge on grains yield qha^{-1}

Table 6 Effect of different levels of sewage sludge on test weight of grain (g)

Treatments						
	2012-13	2013-2014	Pooled	2012-13	2013-2014	Pooled
T_0	35.12	35.31	35.21	35.972	35.127	38.05
T_1	36.90	39.41	38.16	39.670	41.077	40.37
T_2	39.44	40.51	39.97	39.810	42.143	40.98
T_3	40.41	41.61	40.01	40.100	45.133	42.62
T_4	36.11	36.31	36.21	37.710	38.907	35.81
T_5	36.90	36,61	36.75	37.970	37.803	37.89
T_6	39.01	39.11	39.06	39.810	39.140	38.98
T_7	40.21	40.31	40.25	40.127	40.247	40.19
F-test	S	S	S	S	S	S
S.Ed. (±)	0.103	0.005	0.052	0.033	0.020	0.0190
C.D at (P=0.05)	0.212	0.010	0.107	0.068	0.041	0.040

The maximum grains yieldqha^{-1}of barley after crop harvest was recorded in T_7 (12.00 Tones Sewage sludge + barley crop) 41.61 and 42.11qha^{-1} similarly, the pooled were recorded as 41.86 qha^{-1}, followed by T_6 (08.00 Tones Sewage sludge + barley crop) 39.31 and 40.31qha^{-1}and pooled were 39.81qha^{-1}and minimum grain yieldqha^{-1}were recorded in T_4 (00.00 Tones Sewage sludge + barley crop) 34.11 and 37.12qha^{-1}and pooled were found as 36.61qha^{-1}.

It may due to the sewage sludge increased the grain yield crops. the maximum yields in grain were obtained of sewage sludge application that contain high amount of important nutrient such as N P K and it may due to the suitable condition of weather as humidity enhance plant to increase grain yield . Similar findings had also reported by Hernandez *et al.* (1991), Jamil *et al.* (2004), and Tamrabet *et al.* (2009) , Carmen (2005), Singh *et al.*, (2012), Hussein *et al.*(2010), El-Ghany, *et al.* (2013).

6. Effect of different levels of Sewage sludge on test weight (g)

The results depicted in table and fig. (6) shows the significant effect of sewage sludge on test weight (g) of wheat and barley at crop harvest in 2012 and 2013.

The maximum test weight (g) of wheat crop at crop harvest in 2012 and 2013 were recorded in T_3 (12.00

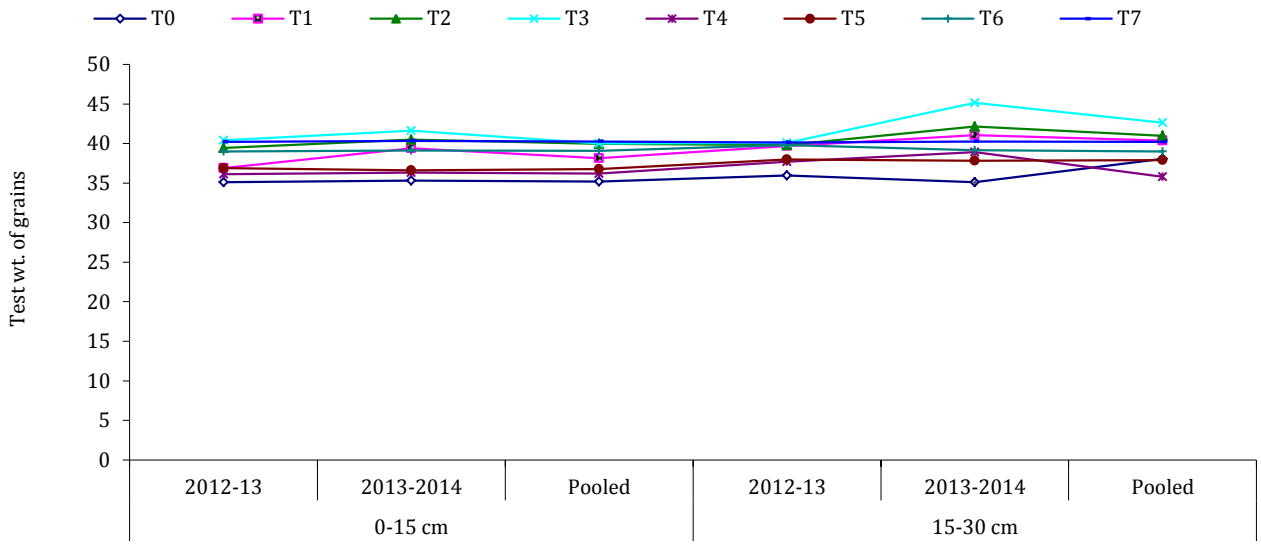

Fig.6 Effect of different levels of sewage sludge on test weight of grain (g)

Tonnes Sewage sludge + wheat crop) 40.41 & 41.61g similarly, the pooled were recorded as 40.01g followed by T_2(08.00 Tonnes Sewage sludge + wheat crop) 39.44 & 40.51gm and minimum test weightwas recorded in T_0(00.00 Tonnes Sewage sludge + wheat crop) 35.12 & 35.31gm and pooled were found35.21gm.

The maximum test weight (g) of barley crop was recorded in T_7 (12.00 Tones Sewage sludge + barley crop) 40.21 and 40.31g similarly, the pooled were recorded as 40.25g followed by T_6 (08.00 Tones Sewage sludge + barley crop) 39.01 and39.11 g and pooled were 39.06gand minimum test weight were recorded in T_4(00.00 Tones Sewage sludge + barley crop) 36.11 and 36.31g and pooled were found as 36.21g.

The result show The significant effect of sewage sludge on test weight of crops was found due to increase in nutrients content through sewage sludge and make it available to plant due to decreased in pH was probably caused by the production of organic acids during decomposition of sewage sludge and or by nitrification, similar results have been reported by Arif (2013), Singh *et al.* (2012), El-Ghany*et al.* (2013).

Summary & Conclusion

All plant parameter as plant height, number of tillers, dry & fresh weight, and 1000 seeds weight were increase with increasing level of sewage sludge on both experiments years 2012- 13&2013-14 on crops wheat and barley. The treatment T_3, T_7 were found the maximum vegetative growth.

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