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Effects of urea, potassium sulphate and super phosphate on the growth performance of wheat (*Triticum aestivum*) at Shahdol district (M.P.)

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Abstract
The study was carried out in Shahdol (M.P.). Soil samples were collected from six locations within Shahdol (M.P.) namely Burhar, Jaitpur, Shahdol, Gohparu, Jaisinghnagar and Beohari. The experiment it is clear that in experimental sets with 0.2% of urea, potassium sulphate and super phosphate the average height of plant species *Triticum aestivum* increased as compared to their control sets but in another sets with 0.4% to 0.6% urea the average height of the plants was found to have decreased. The potassium sulphate was not effective but super phosphate shows earlier good results.

Keywords: urea; potassium sulphate; super phosphate; wheat; soil; shahdol

1. Introduction
Soil is a habitat for plants. As such, the soil's physical, chemical, and biological properties affect plant growth. The physical properties of a soil largely determine the ways in which it can be used. The size, shape, and arrangement of the primary soil particles are known as the physical properties of soil. Other important physical properties center on these such as the size and shape of the spaces between the particle arrangements, called the pore space, which has a direct effect on the movement of air and water, the ability of the soil to supply nutrients to plants, and the amount of water available to the plant.
Wheat is one of the most important food-grains and has commodial position in the agricultural map of our country. It is the major stuff of life for millions all over the world. It is used for human food principally as other semolina products. The lower yields of this crop are of immediate concern to us in view of the fast-growing population.
Triticum aestivum L. (Poaceae) is one of the first cultivated grains which has been mainly used as human food. According to FAO statistics (2014) [1] the average production of the crop in Iran is about 13.5 million tons per year that produce 90% of the country requirements. In small grain crops, seed germination and early seedling growth are very vulnerable to environmental stresses. The success at these stages could enhance crop growth and development, so the plants survive under environmental stresses to better production (Aliloo and Shokati, 2011 and Aliloo *et al*., 2014) [2, 3]. Fertilizers are superior tools to enhance productivity however, they have disadvantages such as eutrophication (Withers, 2014) [4], increase soil acidity and impact on soil biology (Belay *et al*., 2002) [5]. When fertilizers are used at sowing time or immediately before or after planting the chance will increase to impact on seed germination. Various tests have been reported conflicting effects of fertilizer on seed germination. The decrease of water potential because of dissolved mineral could affect root protrusion and seedling growth. Bouaziz and Hicks (1990) [6], however, reported that relationship between water potential and seed germination of wheat seed was not significant. There are contradictory reports about fertilizers effects on early growth of crop plants. Therefore, the aim of this study was to determine effects of NPK fertilizer on germination and seedling growth of wheat.

2. Material and Methods
From the experiment it is clear that in experimental sets with 0.2% of urea, the average height of plant species *Triticum aestivum* increased as compared to their control sets but in another sets with 0.4% to 0.6% urea the average height of the plants was found to have decreased.
In case of 0.2% of potassium sulphate the average height of the plants increased as compared to their control sets. At 0.4% and 0.6% of potassium sulphate sets, the average height was found to have decreased the correlation value was also found to be negative.
In case of the super-phosphate sets plants showed promoting character. The average height of the plants of all the species had registered an increase. under the treatment of 0.2% treatment. The % of super-phosphate increased from 0.4% to 0.6% the average height of the plants have decreased as compared to their control sets. The correlation values were found negative.
The analysis of 10 days old plant of *Triticum aestivum* which were irrigated with 0.2% urea had revealed that the percentage of sugar, non-sugar, and protein had increased (i.e. as per 3.32 mg., 5.64 mg., and 4.50 mg.) when compared with that of the control sets of plants (i.e. as per 2.83mg., 4.5mg. and 4.40mg.) but with 0.6% of urea the percentage of sugar, non-sugar, and protein was found to have decreased. Likewise, the values of Chl a and Chl b was observed lesser when compared with control. During the treatment of 0.2%, urea the fats conserved 0.99 mg which is similar to control if the concentration of urea soln. was increased the values of fats was observed 1.11 mg & 1.02 mg respectively. Azimi *et al.* (2013 a & 2013b) [7, 8] has also reported previously.
In case of 0.2% and 0.4% of potassium sulphate of the ten - day old plants of *Triticum aestivum*, the percentage of non-sugar and protein increased up to 5.61 mg., 4.45mg. but

sugar remained the same when compared with that of the control sets which recorded 4.5 gm., 4.40mg. and 2.83 mg. whereas the above sets which were irrigated with 0.6% of potassium sulphate, showed decrease in sugar (2.67 mg.) the amount of non-sugar and protein remained the same in respect of their control sets. Likewise, fat, Chl a and Chl b are shows lesser value when compared with control sets. Cao *et al.* (2007) [9] also reported such type results.

3. Results and Discussion

The 10-days old plants of *Triticum aestivum* on treatment with 0.2 to 0.6% of super-phosphate showed increase in sugar, non-sugar & protein from 3.15 mg. to 3.00 mg., 4.51 mg. to 4.42 mg. and 4.70 mg. to 4.68/100 mg.).

In case of 20-days old plants of *Triticum aestivum* which were treated with 0.2% to 0.6% of urea, the percentage concentration of sugar, protein, and fats have increased (3.49 mg to 3.29 mg, 4.55 mg to 4.46 mg and 1.01 mg to 0.99 mg) with respect of control ones respectively. The percentage concentration of non-sugar, Chl a and Chl b decreased.

In case of potassium-sulphate from 0.2% to 0.6%. The valus sugar, nonsugar, protein, fat, Chl a and Chl b are observed in decreasing order. Sugar 3.00 mg to 2.87 mg, non-sugar 7.71 mg to 6.64 mg, protein 4.43 mg to 4.42 mg, fat 0.87 mg to 0.80 mg Chl a 360 mg to 352 mg and Chl b 160 mg to 157 mg respectively. With super-phosphate percentage from 0.2% to 0.6%, the sets exhibited increase in sugar, non-sugar and protein percentage from 3.25 mg. to 3.15 mg. 7.71 mg. to 9.02 mg. and 4.71 mg. to 4.70 mg./100 gm. respectively as compared to the control ones i.e., as per 3.00 mg. 7.80 mg. and 4.44 mg. But fat, Chl a and Chl b shows lesser amount in comparison of control.

An analysis of 30-day old plants *Triticum aestivum* which were treated with 0.2% and 0.4% of urea, showed increase in sugar and protein i.e., 3.65 mg. and 4.56 mg. as compared to that of the control ones (3.00 mg. and 4.48 mg.) but non-sugar, fat, chl a and chl b shows low values in comparision of control as the percentage of urea increased upto 0.6%, the percentage of sugar, non-sugar, protein, fat and chl a and chl b decreased. The potassium sulphate was not effective but super phosphate shows earlier good results.

Table 1: Analysis of 10-day old plants of *Triticum aestivum* (per 100 gm.)

Name % percentage of the fertilizer		Sugar	Non-sugar	Protein	Fat	Chl-a (mg)	Chl-b (mg)
Urea	0.2	3.32	5.64	4.50	0.99	486	140
	0.4	3.31	4.51	4.49	0.89	485	139
	0.6	3.01	4.49	4.45	0.70	466	132
	r	-0.87	-0.87	-0.94	0.24	-0.64	-0.21
	SD	±0.18	±0.66	±0.03	±0.06	±15.72	±4.73
Potassium sulphate	0.2	2.81	5.61	4.45	0.87	495	171
	0.4	2.80	5.59	4.42	0.79	411	168
	0.6	2.67	4.51	4.40	0.70	410	163
	r	-0.80	-0.87	-0.55	0.24	0.5	0.39
	SD	±0.09	±0.63	±0.05	±0.06	±8.00	±2.52
Super phosphate	0.2	3.15	4.51	4.70	1.01	513	148
	0.4	3.10	4.49	4.67	1.03	506	143
	0.6	3.00	4.42	4.68	0.99	506	141
	r	0.99	0.87	0.91	-0.5	-0.69	0.59
	SD	±0.18	±0.63	±0.04	±0.02	±3.61	±2.52
Control		2.83	4.5	4.40	0.99	513	173

Table 2: Analysis of 20-day old plants of *Triticum aestivum* (per 100 gm.)

Name % percentage of the fertilizer		Sugar	Non-sugar	Protein	Fat	Chl-a (mg)	Chl-b (mg)
Urea	0.2	3.49	6.64	4.55	1.01	340	141
	0.4	3.41	6.61	4.53	1.01	340	140
	0.6	3.29	6.59	4.46	0.99	338	140
	r	-0.82	-0.99	-0.95	-0.5	-0.12	-0.19
	SD	±0.12	±0.03	±0.05	±0.02	±8.72	±2.65
Potassium sulphate	0.2	3.00	7.71	4.43	0.87	360	160
	0.4	2.99	6.69	4.43	0.85	360	160
	0.6	2.87	6.64	4.42	0.80	352	157
	r	-0.92	-0.88	-0.72	0.24	-0.57	-0.43
	SD	±0.08	±0.60	±0.04	±0.06	±7.02	±3.51
Super phosphate	0.2	3.25	7.71	4.71	0.99	340	156
	0.4	3.20	7.70	4.70	0.74	338	152
	0.6	3.15	9.02	4.70	0.77	330	144
	r	0.88	0.89	1	-0.80	0.98	-0.66
	SD	±0.20	±0.73	±0.04	±0.14	±6.11	±9.17
Control		3.00	7.80	4.44	0.99	360	164

Table 3: Analysis of 30-day old plants of *Triticum aestivum* (per 100 gm.)

Name % percentage of the fertilizer		Sugar	Non-sugar	Protein	Fat	Chl-a (mg)	Chl-b (mg)
Urea	0.2	3.65	7.81	4.56	0.85	421	136
	0.4	3.64	6.72	4.55	0.80	420	134
	0.6	3.35	6.70	4.54	0.69	417	130
	r	-0.85	-0.87	-0.83	-0.53	0.35	0.5
	SD	±0.18	±0.64	±0.09	±0.15	±8.62	±4.00
Potassium sulphate	0.2	3.15	9.01	4.47	0.89	466	148
	0.4	3.15	7.79	4.15	1.01	457	136
	0.6	3.01	7.70	4.39	1.03	454	133
	r	-0.80	-0.85	-0.56	0.92	-0.21	-0.95
	SD	±0.09	±0.70	±0.07	±0.08	±4.73	±7.94
Super phosphate	0.2	3.58	11.21	4.74	0.86	434	132
	0.4	3.55	12.20	4.73	0.85	422	124
	0.6	3.54	12.15	4.58	0.80	420	134
	r	0.90	0.85	0.96	0.98	-0.5	0.19
	SD	±0.13	±0.67	±0.06	±0.10	±6.00	±5.29
Control		3.00	10.12	4.48	0.99	466	148

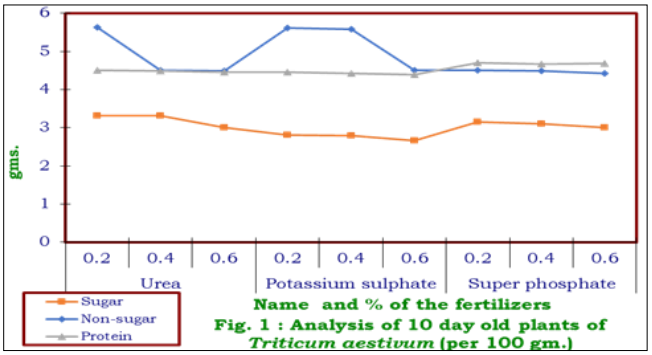

Fig 1: Analysis of 10-day old plant of *Triticum aestivum* (per 100 gm.)

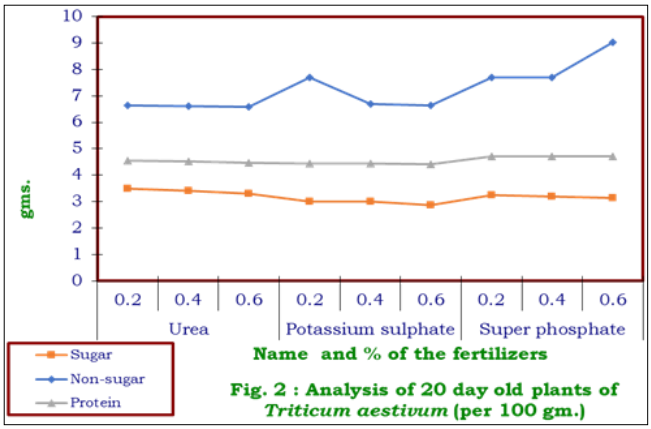

Fig 2: Analysis of 20-day old plant of *Triticum aestivum* (per 100 gm.)

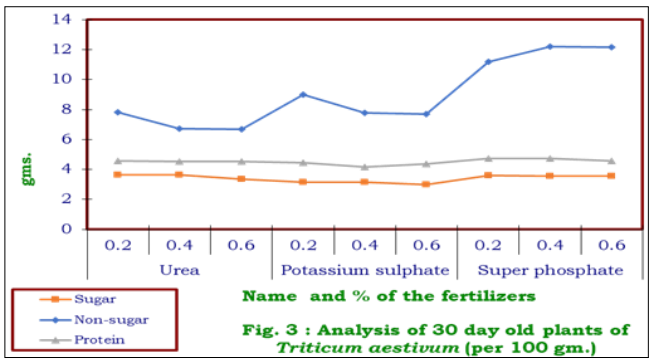

Fig 3: Analysis of 30-day old plant of *Triticum aestivum* (per 100 gm.)

It is possibly due to this factor only that osmotic effects develop resulting in decreased hydration of proteins including enzymes (Laties- 1954 and Honda *et al.* 1958) [10, 11] and there by produce changes in the rates of metabolic processes. Plant water stress is likely to reduce also the photo-synthetic surface and production of food material. Similar observation with regard to aquatic species have been made by Stocker and Hold Heild (1937) [12]; Greenfield (1942) [13], Ensgraber (1954) [14] and Boyer (1965) [15]. Another reason for plants growth reduction could be high concentrations of salts which tend to slow down or stop root elongation and hasten maturation Hayward and Blair 1942) [16]. White and Rose (1939) [17] also observed that root growth is seriously reduced due to excessively high concentration of salts.

4. Conclusion

In conclusion, we found different responses from wheat germination and seedling growth under fertilizer applications. Reduction in plant-growth may be due to a high salt content around the roots of the plants as it markedly reduces their power of absorbing water. Due to this factor plant water-stress occurs, whenever the loss of water in transpiration exceeds the rate of absorption. The high concentration of salt reduces the osmotic potential of the cell sap and due to it cell water potential is kept low.

5. References

1. Food and Agriculture Organization of the United Nations (FAO). FAO Statistics. faostat.fao.org/default.aspx, 2014.
2. Aliloo AA, Shokat B. Correlation between seed tests and seed performance of two maize hybrid (SC704 and SC500). Online Journal of Animal and Feed Research, 2011; 1:249-254.
3. Aliloo AA, Ezzati F, Mustafavi SH. Influence of seed moisture content and salicylic acid treatments on low and freezing temperature tolerance of fennel seeds. Agriculture and Forestry, 2014; 60:175-185.
4. Withers PJA, Neal C, Jarvie HP, Doody DG. Agriculture and eutrophication: where do we go from here? Sustainability, 2014; 6:5853-5875.
5. Belay A, Claassens A, Wehner FC. Effect of direct nitrogen and potassium and residual phosphorous fertilizers on soil chemical properties, microbial components and maize yield under long term crop rotation. Biol. Fert. Soils, 2002; 35:420-427.
6. Bouaziz A, Hicks DR. Consumption of wheat seed reserves during germination and early growth as affected by soil water potential. Plant and Soil, 1990; 128:161-165.
7. Azimi SM, Farnia A, Shaban M, Lak M. Effect of different biofertilizers on Seed yield of barley (Hurdeom vulgar L.), Bahman cultivar. International Journal of Advanced Biological and Biomedical Research. 2013a; 1(5):538-546.
8. Azimi SM, Nabati E, Shaban M, Lak M. Effect of N and P bio fertilizers on yield components of barley. International Journal of Advanced Biological and Biomedical Research. 2013b; 2(2):365-370.
9. Cao MJ, Yu HQ, Yan HK. Difference in Tolerance to Potassium Deficiency between Two Maize Inbred Lines. Plant Production Science, 2007; 10:42-46.
10. Laties GG. The osmotic inactivation in Situ of plant mitochondrial enzymes. J Exp. Bot, 1954; 5:49-70.
11. Honda SI, Robertson RN, Gregory JM. Studies in metabolism of plant cells XII. Ionic effects on oxidation of reduced diphosphopyridine nucleotide and cytochrome C by plant mitochondria. Aust. Biol. Sci, 1958; 111:1-55.
12. Stocker O, Holdheild W. Die assimilation Helgolander Gezeitenalgen Wahrend der Ebbzeit. Z. Bot, 1937; 32:1-59.
13. Greenfield SS. Inhibitory effects of inorganic Compounds on Photosynthesis in Chlorella Amer, J. Bot, 1942; 29:121-131.
14. Ensgraber A. Uber deneinfluse der antrocknugoul die, Assimilation and atmung von moosen and Flechten, Flora, 1954; 141:432-475.
15. Boyer MJ. Effect of seed soaking on the growth and development of Crop plants. Finger millet (Eleusine coracanna Gaertu) Ind. J of Plant Physiol. 1965; 8(1):52-56.
16. Hayward HE, Long EM, Uhoits R. Effect of chloride and sulphate on the growth and development of the Elberta peach on shalil and Lovell rootstocks. U.S. Dept. Agr. Tech. Bull, 1946, 922.
17. White LM, Ross WH. Effect of various grades of fertilizers on the salt contents of the soil solution. J Agr. Res, 1939; 59:81-100.