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Effect of fertilizers on seed germination wheat (*Triticum aestivum*) at Shahdol district (M.P.)

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Abstract
The present paper deal the effect of fertilizers on seed germination at Shahdol district (M.P.). Fertilizer solutions had been prepared using a definite amount of fertilizer i.e. each of 0.2, 0.4 and 0.6 percent by weight dissolved in distilled water. The average length of seedlings was also observed higher under the treatment of low concentration of urea. But when concentration of urea was increased the length of seedlings decreased. The height of 10 days old plants were also observed, under low concentration normal height of plants was observed according to comparison of with control. The result indicated that high concentration of urea and potassium sulphate prevents the germination.

Keywords: Fertilizers, urea, potassium sulphate, super phosphate, Shahdol

1. Introduction
Reddy, *et al.* (1972) [1] and Farnia *et al.* (2015) [2] studies the best method of the sowing of the wheat-seed and placement of fertilizers. Kasimov (1982) [3] and Zaki *et al.* (2007) [4] studies the effects, as regards the sowing-dates, fertilizer application and grain-yield of wheat. Asana and Saini (1962) [5] and Ashutosh *et al.* (2006) [6] reported, that the showing of the seed, in some nutrient solution has also been found to be beneficial. Pathak *et al.* (1986) [7] and Gayathiri and Anburani (2008) [8] studied the performance of soyabean varieties under different levels of phosphorus application. Similarly during present investigation the study was carried out in order to find out the bio-chemical effects of different fertilizers on the seed germination, and the root and shoot - length of wheat (*Triticum aestivum*). Different percentages of fertilizers such as urea, potassium sulphate and single superphosphate have been carried out. The very same results were obtained with potassium sulphate and super phosphate. In this experiment the average root and shoot-length of seedlings were noted and compared with those of the control sets.
The co-efficient of correlation was calculated between the germination, the root and shoot-length of seedlings and the increasing concentrations of the fertilizer. The values of urea and potassium sulphate showed negative correlation whereas the super-phosphate had yielded positive value.

2. Material and Methods
Fertilizer solutions had been prepared using a definite amount of fertilizer i.e. each of 0.2, 0.4 and 0.6 percent by weight dissolved in distilled water. Healthy seeds of *Triticum aestivum*, selected and soaked separately in the fertilizer solutions i.e. each of 0.2, 0.4 and 0.6 percent of urea, potassium sulphate and super-phosphate with the control sets for 24 hours 20 ml of each solution mentioned above was used to soak the filter paper in each of the neat and clean petridish. Triplicate sets of petridish for each type were prepared. The seeds were spread at the rate of 20 per petridish, 60 seeds of each species were tested for each set. Control germination was also run simultaneously. From the second day of the sowing of seeds the process of germination was studied and carried out upto a further period of seven days. Results of the seed germination, average percentage of germination, total mean length of root and shoot of the seedlings were observed.

3. Results and Discussion
With the lowest percentage i.e. 0.2 of urea seeds of *Triticum aestivum* showed percent of germination as compared with the control sets. It has been observed throughout these experiments that along with the increase in the percentage of urea, the percentage of Germination decreases.

Cooks (1967) [9], Ashutosh *et al.* (2006) [6] and Farnia *et al.* (2015) [2] had observed similar effects when he applied urea in combination with cerales & pulses seeds resulting in a poor germination.

In case of 0.2% urea mean-length of the seedlings increased as compared with control sets, of seedlings. But it was found that with increase in the percentage of urea from 0.2 to 0.6 the average length of the seedlings decreased as compared with control ones. The root shoot-length of seedlings had also decreased with in the percentage of urea from 0.2 to 0.6 Maron *et al.* (1971) [20] happened to obtain nearly the same results when the lowest rated of urea drilled with wheat seeds reduced the number of plants emerging and surviving.

Likewise the average length of seedlings was also observed higher under the treatment of low concentration of urea. But when concentration of urea was increased the length of seedlings decreased. The height of 10 days old plants were also observed, under low concentration normal height of plants was observed according to comparison of with control. The correlation studies of germination and root and shoot-length of seedlings revealed the negative values. With increase in the percentage of the fertilizer solution from 0.2 to 0.6 in all sets exhibited poor percentage of germination as compared with the control sets.

With each percentage of the potassium sulphated the average length of the root and shoot were found to have decreased as compared with those of the control sets. The correlation was also calculated between the percentage and the root length, and the percentage and the shoot length which was found to be of negative value, for each type of the sets.

Treatment of seeds with the superphosphate solution also showed decreasing effects. With increase in the percentage from 0.2 to 0.6 the percentage of germination decreased. The mean length of the seedlings was not increased due to increasing in the percentage of the fertilizer except 0.2% of superphosphate solution. Mehrotra *et al.* (1968) [11] and Admasu and Tadesse (2016) [12] have also observed similar results when the wheat seed was treated with the phosphate solution. The average length of the root and shoot were found to be increasing in low percentage of solution of the super-phosphate from 0.2 to 0.6%.

The correlation was also calculated between the concentration and the root-length and again the concentration and the shoot length which was found to be of moderate value, in all sets of the super-phosphate (Tables No. 1-4).

Table 1: Percentage germination Wheat (*Triticum aestivum*) of seeds

Name and % of the fertilizers		**Wheat (*Triticum aestivum*)**				
Days →		**3**	**4**	**5**	**6**	**7**
Urea	0.2	35	55	70	85	95
	0.4	30	50	65	85	90
	0.6	25	40	60	70	80
r		-1	0.98	-1	-0.86	-0.98
SD		5	7.64	5	8.66	7.64
Potassium sulphate	0.2	35	50	70	80	95
	0.4	35	45	65	75	90
	0.6	30	45	65	75	85
r		-0.86	-0.86	-0.86	-0.86	-1
SD		2.89	2.89	2.89	2.89	5
Super phosphate	0.2	30	40	65	85	90
	0.4	25	40	60	70	85
	0.6	20	35	55	60	80
r		-1	-0.86	-1	-0.99	-1
SD		5	2.89	5	12.58	5
Control		30	40	70	85	90

Table 2: Average percentage germination of seedling and regression value of Wheat (*Triticum aestivum*)

% of the fetilizers	**Urea**	**Potassium sulphate**	**Super phosphate**
0.2	68	66	62
0.4	63	62	56
0.6	55	60	50
r	-0.991	-0.982	-0.998
SD	±6.56	±3.06	±6.00

Table 3: Average Wheat (*Triticum aestivum*) root and shoot length of seedling in cms

% of the fertilizers	**Urea**		**Potassium sulphate**		**Super phosphate**	
	Root	**Shoot**	**Root**	**Shoot**	**Root**	**Shoot**
0.2	2.00	2.35	1.90	2.15	1.55	2.65
0.4	1.15	1.30	1.60	2.10	1.35	2.35
0.6	0.85	1.00	1.25	1.80	1.20	2.10
r	-0.964	-0.952	-0.999	-0.924	-0.997	-0.999
SD	±0.60	±0.71	±0.33	±0.19	±0.18	±0.28

Table 4: Effect of fertilizers on average length of seedling in normal condition of Wheat (*Triticum aestivum*)

% of the fertilizers	Urea	Potassium sulphate	Super phosphate
0.2	4.35	4.05	4.20
0.4	2.45	3.70	3.70
0.6	1.85	3.05	3.30
r	-0.958	-0.985	-0.998
SD	±1.31	±0.51	±0.45

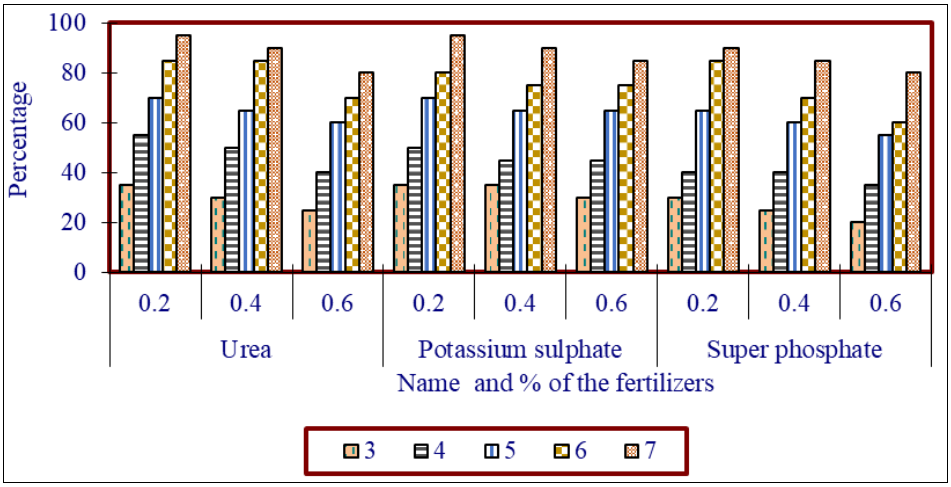

Fig 1: Percentage germination of seeds Wheat (*Triticum aestivum*)

4. Conclusion

The result indicated that high concentration of urea and potassium sulphate prevents the germination. This factor of inhibition of germination has due to the high osmotic pressure caused by high salt concentration (Bumble *et al.* 1968) [13] and excess quantity of micro-nutrients which effect the uptake of water and other metabolic activity. Kasten (1939) [14] also observed similar results by the addition of starch and $(NH_4)_2SO_4$ to the soil, such an increase in the soil organ was produced that all free oxygen disappeared the seedlings growing in the soil also dried up. Oxygen is vital and essential as it is required for root-growth. When carbon dioxide in the solution which replaces oxygen the due quota of oxygen supply declines. Due to this reasons germination decreased and even germinated seeds got whatever was left over to the end i.e., a low amount of oxygen poor aeration retards not only root growth and water absorption but also the absorption of minerals, water.

The reason for the deleterious effects of higher concentration may be attributed to the toxic effect of higher concentration of salts on physiological and biochemical processes within the cell, Paul *et al.* (1992) [15]. A high salt content around the roots of the plant markedly reduces their power of absorbing water White and Ross (1939) [16] observed that excessively high concentration of salts also occur occasionally in green house soils causing serious reduction in growth, presence of biuret in urea also affects germination.

Phosphate had a specific action in encouraging root development. (Watson and Russell 1943) [17] due to this reason seeds of *Triticum aestivum* with super phosphate had shown a normal increase in root and shoot length. Phosphorous also helps in the development of merits tissue, Russell and Martin (1949) [18] calcium appears to be essential for the proper growth and functioning of root tips. Kersting Munster Forsch Dienst (1948) [19].

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