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Physico-chemical study of River Ramganga and Its Effects on Growth Parameters of some Rabi Crops YIZ, Mustard, Soyabeans, Groundnut And Linseed

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ABSTRACT
The adverse effect of river Ramgnga on growth parameters of selected rabi crops viz Mustard (var-Pioneer 45546, Soyabean (var-JS 9566), Groundnut (var RG-559) and Linseed (var - Jawarhar - 23). found to be increased. The physico-chemical parameters such as pH, total hardness, BOD, COD, DO etc. of the river Ramganga found to be increased the man causes of water pollution in the river are the disposal of human sewage, animal wastes, increasing pollution and disposal of brass industries effluent. In this manuscript chemical content and the effect of river Ramganga on growth contributory attributes like NAR, LAR, RGR and CGR in same rabi & kharif crops were studied in pot culture experiments, a mark decline in various growth parameter was observed. However Linseed performed was well as compared to other crops.
Key words- *River Ramganga, NAR, LAR, RGR, CGR ete.*

I. INTRODUCTION

Beside biological field of the crops the nutritional importance of the primary concern from the health and hygiene point of view., water of river Ram ganga can become polluted by a number of sources, treatment plants, ranging from sewage and factories to mining activities, pored road and agriculture, run-off, accordingly in our country effluent from almost industries and sewage water one being discharged untreated either on land or into the river Ramganga. Even at the places where some treatment facilities exist, there are not being operated properly. Resultantly these washes' pollute the river and intimately agriculture land. [2, 3, 4]

Many brass industries in Moradabad discharge their effluent directly or indirectly into the river Ramganga. In the present study water of Ramganga river was analysed for various physical or Chemical Parameters like temperature, pH, acidity, alkalinity hardness, free CO_2, TDS, DO, N, P, K, BOD, COD, and heavy melats[5,6]. Similarly physico-chemical characteristics of soil was analysed[5,6]. and soil parameters were found. Comparatively higher in irrigated field with contaminated water of river Ramganga than that of irrigated field with uncontaminated water. Water of river Ramganga containing lots of pollutant leads to accumulation of heavy metals in soil[9,8] which has been reported to super germination of seeds.[9,10]

Growth of the crop plants to the net result of the intakes of minerals and then salts which on hydrology become ionised into cations and anions. Intake of cations and anions depends on the degree of permeability of plasma membrane. While thin accumulation in different vegetative or reproduction part empty inflorences then growth.

It has been established that deficiency of excessive availability of a particular element both become detrimental and bring about inhibition in growth.[10] On the other hand, degree of germination of major organic compound in the plant in the form of carbohydrates, proteins, lipids etc. Degradation of water quality brings about total imbalance in the mineral sources and such conditions coupled with disturbed edaphic Condition exert holistic effect on the vegetative growth, reproductive potential, productivity and quality of the chops.[11]

The important once are relative growth rate RGR, leaf area ratio. LAR and chlorophyll content with provides a basis after photosynthesis. These parameters are usually limited by the presence of the certain Chemicals/salts in soil which are present in the river Ramganga. In substantial quantities, so present investigation was carried out to study the effect of river Ramganga on some crops VIZ Mustard, Linseed, groundnut, and soyabean varieties - Pioneer 45546, JS9560, RG-559 and Jawaher-23, respectively .

II. EXPERIMENTAL

The seeds of all the four crops under study viz mustard, linseed, groundnut and soyabean were south in unglazed earthen pots (30x40 cms) filled with garden loam soil mixed with farm yard manure. After one week of seedling amergence, thinning was done to allow only one seed to grow in each pot. experiment was conducted in triplicate for each crop. The control and treatment sets were maintained separately for each crop under study. Physico-chemical composition of soil was the same as in energy estimation experiments [12, 13, 14]

In the Control sets the pot were irrigated with tap water where as in the treatment set with polluted water of river Ramganga was used for irrigation. The irrigationwere made at weekly intervals in both the sets. Physico-chemical composition of tap wale and river Ramganga was studied.[10,15] Plant were harvested at the time of fruit and seed ripening. Monoliths were taken out from the pot to avoid any damage to the roots. Different parts such as, root, stem, leaves and seeds were collected separately from the plants of control and treatment seb. six plants were eradicated from each pot at leafy and pre flowering stage. The leaf blades were exercised from the plants. Area of lin randomly selected, deaf blades was counted in an auto area meter for dry Weight the plant were washed throughly with the distilled waterand after drying in sun, were oven dried for 12 hrs at 80°c.

LAR, NAR, CGR were computed according to waston 1947, Chemical analysis of the plant samples was done in triplicate, sequence of %age decrease of different chemical constituents have been shown in tables Sequence of % are decrease of each constituents in different plant parts viz root, stem, leaf and seed is presented in Table 4.

III. Result and Discussion

Physico-chemical analyses of river Ramganga sample are depicted in Table 1. The higher value of BOD, COD and low value of D.O. indicated the presence of higher concentration of biodegradable organic matter (permissible limit as ISI standards for River Ramganga). It was Observed that the 1% age increase in weight of seeds of all the Crops were in range 41 – 42.5% as compared in that of control ranges (48 % – 47.5%). The observed slowgermination rate may be due to heavy load of organic matter.

Table- 1 **Physico chemical Parameters of River Ramganga**

S.No	Parameters	River Ramganga	Tap water
1	Colour	Brown-black	Colour less
2	Odour	Foul smelling	Odour less
3	Temp ^{o}c	18.9-30.28	19.56-32.5
4	Transparency(cm)	2.0-3.7	100
5	TDS Mg/L	325.1210	98-182
6	TSS Mg/L	172-189	18.0-28
7	DO	1.7-5.7	10-13.2
8	BOD Mg/L (5days 22 ^{0}	31.5-1265.15	2.5-3.0
9	PH	4.1-9:2	7.0-7.2
10	COD Mg/L	63.0-1660.40	40-45
11	Total Alkalinity Mg/L (Na CaCO3)	49.4-351.10	13-63
12	Total Nitrogen Mg/L	8.5-64.2	
13	Na	15.7-22.3	2.0-2.4
14	K	17.5-18.3	1.7-2.2
15	Ca	67.4-91.3	1.4-4.7
16	Mg	42.3-60.9	9.5-14.5
17	EC (ms cm $^{-1}$)	401-5.4	1.3-1.8
18	TOTAL HARDNESS mg/L	45.2-580.4	97-126
19	DISSOLVED SILICA mg/L	0.4-1.8	-
20	FREE CO_2mg/L	7.2-270	1.2-2.5
21	PO_4mg/L	1.3-4.8	0.2-0.4
22	SO_4mg/L	112-151	1.6-4.7
23	Cl mg/L	291-5030	14.2-23.6
24	OIL & GASES mg/L	16.67	-
25	HEAVY METALS		-
	Ccl	0.02-0.3	-
	Cr	0.3-0.5	-
	Cr	0.5-0.8	-
	Pb	0.2-0.3	0.09
	Ni	0.3-0.5	-
	Fe	2.5-2.8	0.3
	Zn	3.0-5.5	1.2
	Co	0.3-0.5	-
	Mn	0.7-0.8	0.5

Data reveal (Table 2) that **the** Sequence of percentage decrease in the inorganic and organic constituents in different crops viz. mustard, linseed, groundnut and Soyabean receiving the water of river Ramganga rained in different crops which may be attributed to vertical difference in the degree of intake relative participation in the molecules of lipids protein and carbohydrates, similarly sequence of % age degree in Ca , K ,P , total $–N_2$, crude proteins and ether extract and of age increase in Na, Re, so_4 el, total- Carbohydrates and total ash in vegetative part viz. root, stem and leaf area propagules like seed may be accounted to thin differential behaviour in respect of their Trend of % decrease in chemical constituents in the treated plants over their respective controls Table 2.

Po_4	1.1-4.8	.2-0.39
Oil & grease	16.8-7.5	-
Heavy metals		
Cd	0.02	-
Cr	0.3-0.4	-
Al	0.6-0.8	-
Pb	0.2-0.4	0.08
Ni	0.3-0.6	-
Fe	2.8-3.0	0.4
Zn	3.8-5.1	1.2
Co	0.3	-
Mn	0.6-0.8	0.5

Table 2: Sequence of percentage decrease in the inorganic and organic constituents in different crops viz. mustard, linseed, groundnut and Soyabean receiving the water of river Ramganga rained in different crops

Mustard (Var Pioneer 45546)	Root	K>EE >Ca>Cp>TN>P>TC>TA>CL>So_4>Na>Fe
	Stem	K>Ca>P>Cp>TN>EE>cl>TC>TA>So_4>Fe>Na
	Seed	K>Ca>P>Cp>TN>EE>cl>TC>TA>So_4>Fe>Na
	Leaf	K>Ca>P>EE>cp>TN>TC>TA>So_4>Fe>cl>Na
LINSEED (Van – Jawaher -23)	Root	EE>K>Ca>P>TN>CP>TC>TA>So>cl>Fe>Na
	Stem	Ca>EE>P>K>cp>TN>TC>TA>cl>So_4>Fe>Na
	Seed	Ca>K>EE>P>TN>cp>TC>TA>cl> So_4>Fe>Na
	Leaf	K>Ca>EE>P>TN>cp>TA>TC> So_4>Fe>Na
GROUND NUT (Van RG-559)	Root	K>Ca>EE>TN=CP>P> So_4>TC>TA>Fe>el>Na
	Stem	K>Ca>P>EE>TN>cp>TC>TA>So_4>cl>Fe>Na
	Seed	Ca>K>P>TN=CP>EE>TC>TA>So_4>Fe>cl>Na
	Leaf	Ca>K>P>TN=CP>EE>TC>TA>So_4>Fe>Na>cl
SOYABEAN (Van JS 9560)	Root	K>Ca>cp>TH>EE>P>TC>TA>So_4>Na>cl>Fe
	Stem	Ca>P>K>cp>TN>EE>TC>TA>So_4>Na>cl>Fe
	Seed	Ca>P>K>TN>EE>TA>TC>So_4>Na>Fe>cl
	Leaf	K>Ca>EE>P>cp>TN>TA>Na>Fe>SO_4>cl

Table.3: Sequence of % decrease in elemental bioaccumulation and concentration of organic constitutes in different part of crops under treatment with river Ramganga over their respective controls

	Mustard (var. Pioneer 45546	**Linseed (var. Jawaher-23)**	**Ground Nut (var. RG-559)**	**Soyabean (var. JS 9560)**
Ca	stem> leaf > seed > root	Seed > Leaf >stem> root	Stem>seed>leaf>root	Seed> Leaf >stem> root
Na	root > seed > lean > Leaf	Stem> Leaf > root > seed	Leaf>stem>seed>root	Seed > leaf > root>stem
K	seed > root >stem> Leaf	Seed > Leaf > root >stem	Leaf>root>seed>stem	Seed > root > leaf>Stem
P	Leaf > seed >stem> root	Stem> Leaf > seed > root	Seed>leaf>stem>root	Stem> Leaf >seed> root
Fe	seed >stem> Leaf > root	Seed >stem> Leaf > root	Root>leaf>stem>seed	Root >Leaf >stem> seed
So4	root > seed >stem> Leaf	Seed >stem> Leaf > root	Roots>stem>leaf>seed	Leaf >stem> root> seed
Cl	Leaf > root >stem> seed	Leaf >stem> root > seed	Leaf>stem>seed> root	Leaf >root > seed>stem
Tm	seed > Leaf > root >stem	Seed > Leaf >stem> root	Seed>stem>leaf>root	Seed >steam>leaf> root
CP	seed > Leaf > root >stem	Seed > leaf >stem>root	Seed>stem>leaf>root	Leaf >stem> seed> root
TE	leaf > root >stem> seed	Root > leaf >stem> seed	Stem>root>seed>leaf	Leaf>stem>seed> root
EE	root > seed > Leaf >stem	Root > Leaf >stem> seed	Seed>root>stem leaf	Seed >stem>Leaf > root
TA	stem> root > Leaf > seed	Stem> root > seed > Leaf	Root>stem>leaf>seed	Root> Leaf > seed >stem

Table 4 Effect River Ramganga on growth parameters of some crops VIZ. Mustard, Linseed, Ground nut, and Soyabean.

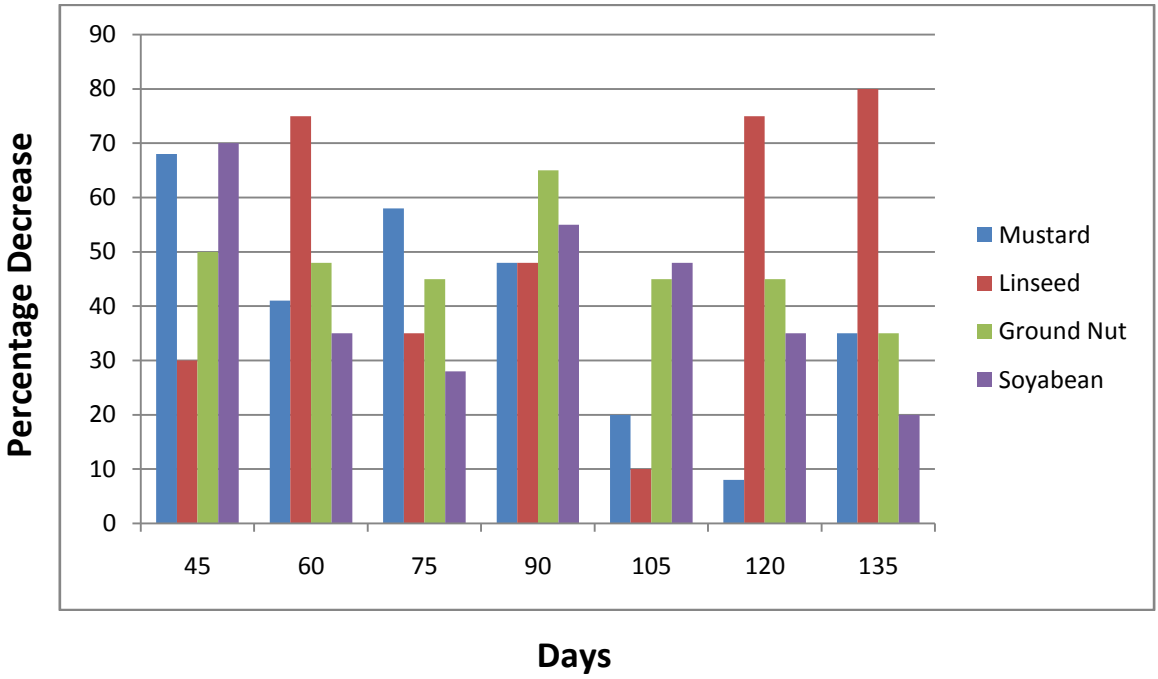
Crops	**NAR g/cm^2 day^{-1}**		**LAR cm^2/gm.**		**RGR mg.$^{-1}$ day^{-1}**		**CGR g/day**	
	Control	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
Mustard (Pioneer45546)	0.06232 (05209)	0.0527 (0.0318)	1.5164 (1.4025)	1.0484 (1.0102)	0.01637 (0.0180)	0.0063 (0.00526)	0.0704 (0.0598)	0.0607 (0.0428)
LINSEED (Jawaher -23)	0.835 (0.2398)	0.6727 (0.4028)	2.7861 (1.8010)	2.462 (1.102)	0.0497 (0.0189)	0.02432 (0.01023)	0.0451 (0.0302)	0.327 (0.0226)
GROUNDNUT (RG-559)	0.0812 (0.0701)	0.0623 (0.0390)	1.7102 (1.6893)	1.2532 (1.2134)	0.4496 (0.3592)	0.01492 (0.01203)	0.6024 (0.4002)	0.2767 (0.2431)
SOYABEAN (JS 9560)	0.0601 (0.0305)	0.0520 (0.3301)	0.5987 (0.5028)	0.0901 (0.0791)	0.03195 (0.02670)	0.0074 (0.00392)	0.05313 (0.04001)	0.0477 (0.0303)

**Values in parentheses show the data after 85 days

NAR - Net Assimilation Rate, LAR-Leaf Area Ratio, RGR - Relative Growth rate CGR- Crop Growth Rate

TABLE 5: % age Decrease in NEP in terms of Biomass under never Ramganga Treatment (Compared with respective controls)

	% Decrease						
	45	**60**	**75**	**90**	**105**	**120**	**135**
Mustard (Pioneer 45546)	57.04	40.01	58.02	44.06	21.40	0.46	32.04
LINSEED(Jawaher -23)	30.01	65.50	35.50	45.02	0.75	74.5	82.02
GROUNDNUT(RG-559)	48.12	45.60	62.01	62.01	40.5	43.02	30.00
SOYABEAN (JS 9560)	67.02	38.04	54.02	54.02	44.02	32.02	21.65



Performance in permitting the accumulation of nutrients, which in the event of deficiency or excessive availability effect Chlorophyll biosynthesis and synthesis of carbohydrates, lipids and proteins (Table 3) .

Table 4 reveals that polluted water of river Rāmgangā application brought about a reduction in growth contributory attributes of all crops studied. NAR was reduced significantly by river Ramganga applications in all the crops studies Ground nut showed maximum inhibition at first grow of 55 days, whereas soybean emery mass susceptible at round stage to river Ramganga water treatment. More over Linseed and mustard responded fairly well to this menace as Compared to other crops.

A drastic suppression due to river Ramganga treatment was also observed in RGR and LAR in all the crops. In general RGR was arrested more severely in comparison to otherparameters studied. Soybean exhibit a formidable deleterious effect of river in RGR, whereas groundnut better than the other crops. Decrease in leaf area due to effluent imposition in soil medium has resulted in a sharp decrease in LAR of plants especially in soybean. The data also indicate that crops growth ratio reduced due to the water of Ramganga river application without linear magnitude with exception of crops of linseed, where the reduction is significant."

It is obvious from the result that NAR, LAR, RGR and CGR were found to be limit under water of river Ramganga, in position throughout in LAR, RGR and MAR is probably due to lowering of leaf area the fluctuations in growth parameters may also be attributed to hastened flagging of leaves in all the four crops.

Data given in label 2 reveal that all the fore crops were adversely affected as evidenced by bio man production, elemental bioaccumulation and concentration of organic nutrients which is presented by bar diagram in Table 5/ Fig 1. The variations observed may be accounted to the varietal differences which may be genetic or partially environmentally). This is in conformity with the findings reported by Tripathi et al. (1990)[16].

IV. Conclusion

It has generally been considered that osmotic effect was the primarycause of growth and depression[10], in some cases nutritional imbalance on deficiency causes decreased growth and plant injury. It was assumed that pollutants of variable nature accumulate in rhizosphere zone of crop plants and disturb the isosmotic relation and nutritional status of cell. Beside this decomposition of only layer on the soil surface and soilparticles in the form of minute droplets, depletes the availability of soil oxygen required for respiration and other metabolic process. Adverse effect of oil and grease has also been reported in seedling growth P. Sativame[4]. The finding of

our experiments also indicated relatie tolerance to revere Ramganga neaten treatment are all the crops studied. The magnitude of inhibition due to river Ramganga imposition was in descending order Lensed>Ground suit> Mustard Soyabean.

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