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ASSESS THE TOTAL MICROBIAL POPULATION BEFORE AMENDMENT AND AFTER AMENDING THE SOIL WITH DIFFERENT INORGANIC AMENDMENT

J.B. Khan, Charul Kanchan, Jitendra Kumar and Suresh Singh
Section of Rabi Cereal, C. S. A. Univ. of Agri. and Tech. Kanpur-208 002

ABSTRACT

The various inorganic amendments viz; ammonium sulphate (AS), sodium nitrate(SN), Urea (U), single super sulphate (SSP), murate of potash (MOP) and their different combination were used for the effected the population of microbial. The lowest fungal population was obtained farm soil amended with urea + single super phosphate + murate of potash (14.50x103/g soil) and maximum count of fungal population with single super phosphate(35.70x103/g soil). Maximum bacterial count 32.30x105 soil was found in single super phosphate + murate of potash combination. The highest population of was obtained from soil amended with urea + single super phosphate + murate actinomycetes (18.10x106/g soil) was obtained to soil amendment by sodium nitrate + murate of potash combination, which showed the 60.18 per cent increase in population over non-amended soil. Determination of total microbial population before amendment in soil collected from C.R.S., Nawabganj, Kanpur and Maraharpur, Kannauj. The soil of Nawabganj had total fungal population 17.30 x103/g soil, total bacterial population 14.30 x 105/g soil and total actinomycetes population 10.5 x 106/g soil. The soil of Maraharpur had 9.30 x103, 11.90 x 105 and 6.30 x 106/g soil, respectively, Fungi, Bacteria and actinomycetes. Thus Nawabganj soil has higher number of total fungi, Bacteria and actinomycetes respectively as compared to Maraharpur soil.

Key words : *Bacteria, fungi, actenomycetes, soil inorganic amendments.*

Soil is a complex ecosystem, delimited by physic-chemical parameters that hold enormous number of micro organisms. Several soil-organisms offer benefits to crop. Fungi and bacteria play a focal role in nutrient cycling by regulating soil biological activity. Organic and inorganic amendment of soil was one of the methods of bringing absent change in soil environment regulating the biological balance. The crop residue decompositron and its effects on plants roots rhizisphere, plant pathogens, disease incidence and soil micro-organisms had been reviewed from time to time. The total microbial population before amendment and after amending the soil with organic and inorganic amendment have been discussed in this paper.

MATERIALS AND METHODS

The population status of fungi, bacteria and actinomycete in the soil samples, isolations were made on specific media. Soil samples collected before amendment from C.R.S. Nawabganj and Maharapur, Kannauj.

Fungi : Peptene Dextose Rose Bengal Agar medium (Martin, 1950) was used for determining soil fungal populations. A soil detritions of 1:103 was prepared from 1g air dired soil in sterilized top water. One ml of soil suspension was transferred to sterilized petriplates with pipetle and 20ml of the sterilized but cooled medium was poured over it. The plates were incubated at 27+1°C for five days. Fungal colonies were counted with the help of a quebac dark field colony counter.

Bacteria : A soil solution of 1:105 on soil extract agar medium (Allen, 1957) was used for determining soil bacterial population. In sterilized petriplates one ml of soil suspension was transferred and 20mlof sterilized but cooled medicem was added. The peteriplates were incubated for seven days at 28+1°C. Bacterial colonies were counted using the colony matter.

Actinomycetes : The determining populations of actinomycetes was used starch ammeria agar medium. 1ml of 1:1°6 soil dilution was transferred asepically into the sterilized petriplates and about 20 ml sterilized but cooled medium was poured in the plates. The plates were incubated for eight days at 28+1°C and counting the number of colonies of actonomycetes with the help of colony counter.

Amendment of Soil by Inorganic Substance

Inorganic amendments : Differrent inorganic substance like ammonium sulphate (AS), Sodium nitrate (SN), Urea (U), Single super phosphate (SSP), murate of potash (MOP) and their different combination were used for amending the soil. The rates of

amendment were 120 kg N/ha in case off ammonium sulphate, sodium nitrate and urea, 60kg P_2O_5/ha for single super phosphate and 40 kg K_2O/ha for murate of potah, respectively. In case of combinations, the rates for each of the components remained the same as for it singly. These substances were incorporated into one kg soil at the above given rate for each amendment and mixed thoroughly. Amended soils were filled in 6" plastic plots and kept in glass house for 30-days. There were watered regularly to maintain soil moisture. Unamended soil served as control. Each treatment was replicated thrice.

The population of fungi, bacteria and actiomyctes were determine in the amended soils by following. The same procedure as describe earlier.

RESULTS AND DISCUSSION

Determination of total microbial population before amendment : The two soils were assessed for their total microbial population. The results of microbial population presented in Table-1. The soil of Nawabganj had total fungal population 17.30 x 103/g soil, total bacterial population 14.30 x 105/g soil and total actinomycetes population 10.5 x 106/g soil. The soil of Maraharpur had 9.30 x 103, 11.90 x 105 and 6.30 x 106/g soil, respectively, fungi, bacteria and actinomycetes. Thus Nawabganj soil had 86.02%, 20.17% and 66.67% higher number of total fungi, bacteria and actinomycetes, respectively as compared to the soil of Maraharpur, increased microbial population populations in C.R.F. Nawabganj, Kanpur soil appear basically due to inheatent properties of the soil. Physico-chemical properties of the soils to affect microbial population.

Determination of total Microbial population after amending the soil with inorganic amendment:

Effect of inorganic amendments on microbial population : In the Table-2 showed that the effect of inorganic amendments on fungi, Bacteria and actinomycetes.

Fungi : Different inorganic amendments reflected either inhibitory or stimulatory effect on the total fungal population of soils. The lowest fungal population was obtained from soil amended with urea + single super phosphate + murate of potash (14.50 x 103/g soil) which was significantly less than non-amended soil, where the fungal count was 19.70 x 103/g soil. The inhibition was 26.39 per cent. The fungal population obtained from soil amended with sodium nitrate + single super phosphate + murate of potash, single super phosphate alone and urea + murate of potash were statistically at par with non-amended soil. Although the amendments with sodium nitrate + murate of potash, urea + single super phosphate, ammonium sulphate + single super phosphate, sodium nitrate, ammonium sulphate + single super phosphate + murate of potash and sodium nitrate + single super phosphate gave higher counts of fungi as compared to non-amended soil. The result obtained were statistically at par with non-amended soil. All other amendments, viz; ammonium sulphate + murate of potash, ammonium sulphate, urea and murate of potash gave significantly higher fungal population with single super phosphate giving maximum count of 35.70x 103/g soil. The increase in fungal population due to these amendments were 29.44, 35.33, 38.587, 64.94 and 81.22 per cent, respectively, over the non amended soil.

Table-1: Determination of total microbial population before ammendment in soils collected from C.R.S., Nawabganj, Kanpur and Maraharpur, Kannauj.

Soil	Total microbial population		
	Fungi (103)	Bacteria (105)	Actinomycetes (106)
C.R.S. Nawabganj, Kanpur	17.30	14.30	10.50
Maraharpur, Kannauj	9.30	11.90	6.30
Average	13.30	13.10	8.40
C.D. at 1%	3.34	4.05	4.42
C.D. at 5%	2.42	2.96	3.10
C.V.	17.36		
Each figure is an average over 3 replications			

Table-2: Ddetermination of total microbial population in soil after amendment with various inorganic substances

Treatment		Total microbial population		
	kg/ha	Fungi (103)	Bacteria (105)	Actinomycetes (106)
Ammonium Sulphate (AS)	120 N	26.70	21.00	8.30
Sodium Nitrate (SN)	120 N	23.10	20.10	16.30
ustrightUrea (U)	120 N	27.30	16.30	17.00
Single Super Phosphate (SSP)	60 P_20_5	35.70	14.00	16.70
Murate of Potash (MOP)	40 K_20	32.10	26.10	14.70
AmoniumSulphate + Single Super Phosphate	*	23.00	23.50	16.10
Sodium Nitrate + Single Super Phosphate	*	24.30	25.50	15.50
Urea + Single Super Phosphate	*	22.70	23.10	15.30
AmoniumSulphate + Murate of Potash	*	25.50	20.50	17.50
tlparSodium Nitrate + Murate of Potash	*	22.70	20.50	18.10
Urea + Murate of Potash	*	19.10	22.70	15.00
AmoniumSulphate + Single Super Phosphate + Murate of Potash	*	24.10	25.10	13.70
Sodium Nitrate + Single Super Phosphate + Murate of Potash	*	16.50	27.70	14.50
Urea + Single Super Phosphate + Murate of Potash	*	14.50	29.00	13.10
Single Super Phosphate + Murate of Potash	*	18.20	32.30	13.10
Check (Non-amended soil)		19.70	13.10	11.30
C.D. at 1%	*	6.31	4.51	4.72
C.D. at 5%	*	4.24	3.01	3.21
C.V.	*	12.72	11.42	14.54
Each figure is an average over 3 replications Doses in the combinations remain same as for each inorganic amendment				

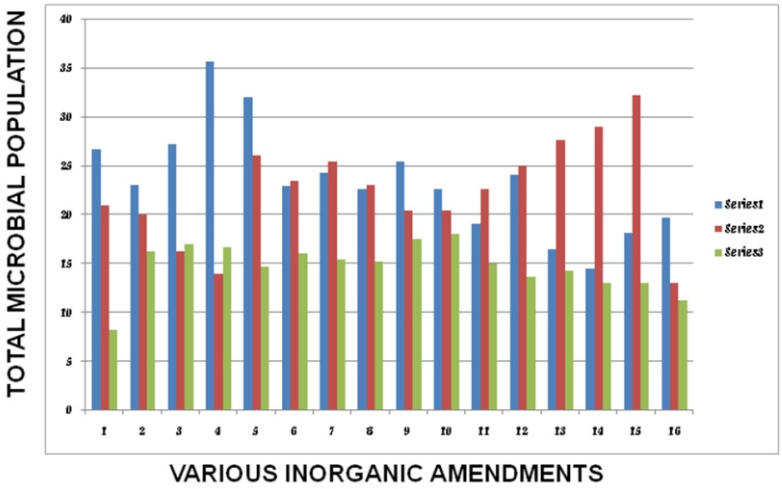

Fig.-1 : Determination of total microbial population in soil after amendment with various inorganic substances

1 = Ammonium Sulphate (AS) 2 = Sodium Nitrate (SN)
3 = Urea (U) 4 = Single Super Phosphate (SSP)
5 = Murate of Potash (MOP) 6 = AS + SSP
7 = SN + SSP 8 = U + SSP
9 = AS + MOP 10 = SN + MOP
11 = U + MOP 12 = AS + SSP + MOP
13 = SN + SSP + MOP 14 = U + SSP + MOP
15 = SSP + MOP

Bacteria : An increase in the population of bacteria in amended soil in comparison of non-amended soil. The lowest bacteria population was observed in non-amended soil (13.10 x 105/g soil) followed by amendments made with single super phosphate (14.00x105/g soil) and urea (16.30x105/g soil). All these treatments were statistically at par. The

remaining treatments increase in total bacterial population by 53.44, 56.49, 60.31, 73.28, 76.34, 79.39, 91.60, 94.66, 99.24, 111.45 and 121.37 per cent, respectively. Maximum bacterial count 32.30 x 105/g soil was found in single super phosphate + murate of potash combination, whereas the increase was 146.56 per cent over non-amended soil.

Actinomycetes : The lowest population count 8.30 x 106/g soil was obtained with ammonium sulphate which was statistically at par with the count 11.30x106/g soil in the non-amended soil. All the remaining amended increased the actinomycetes population. In the amendments with single super phosphate + murate of potash, sodium nitrate single super phosphate + murate of potash, murate of potash alone and urea + murate of potash, the actinomycetes population were at par with non-amended soil.

The amendments with urea + single super phosphate, sodium nitrate + single super phosphate, ammonium sulphate + single super sulphate, sodium nitrate, single super phosphate, urea and ammonium sulphate + murate of potash gave significantly higher actinomycetes count, the respective increase in population over non-amended soil were 35.39, 37.17, 42.48, 44.25, 47.79, 50.44 and 54.87 per cent. The highest population (18.10 x 106/g soil) was obtained to soil amendment by sodium nitrate + murate of potash combination, which showed the 60.18 per cent increase in population over non-amended soil. According to (2), and increase in fungal population when ammonium sulphate, single super phosphate and murate of potash were used.

(3) observed that there was reduction in bacterial count with correspondidng increase in the survival of Fusarium vasinfectum population to ammonium sulphate as well as sodium nitrate amendments. Similarly, addition of ammonium fertilizers was recorded to increase to population of fungi and diminished the bacteria and actinomycetes (4, 5). (6) reported that the total number of rhizosphere fungi and bacteria was highest in soil amended with nitrogen source whereas actinomycetes were highest in soil amended with phosphorus and potassium.

REFERENCES

1. Allen, O.N. (1957). Experiments in soil bacteriology. Ed. 3(Rev.) *Burgess Publ. Co.*, Minneapolis, Minn, 79 p.
2. Gupta, R.D.; K. K. Jha and S.P. Dev (1983). Effect of fertilizers and organic manures on the micro flora and microbiological process in soils. *Indian J Agric. Sci 53 :* 266-270.
3. Thakur Ji, (1974). Influence of N, P, K on stem rot incidence of capitularies Jute. *Indian J. Myco. Pl. Path. 4 :* 117-120.
4. Alexander, M. (1961). Introducing to soil microbiology Wiley and sons, New Year, pp-472.
5. Rangasawami, G.; Sandarao, W.V.B. and Singh, S. (1971). *Soil Biology, Reu. Soil Res.* India P.P. 49-50.
6. Sadasivum, T.S. (1965). Effect of mineral nutrients on soil micro-organisms and plant disease. In Baker K. F. and W.C., Synder (Eds.) ecology of soil Borne plant pathogens. *Univ. California press. Berkeley,* PP. 460-468.