



Effect of Organic Manure, Inorganic Fertilizers and Bio-Fertilizers on the Soil Health of Phalsa (*Grewia subinaequalis* D.C.)

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Abstract

A field experiment was conducted at main experiment station, Department of Horticulture, NDUAT Kumarganj, Faizabad (U.P.). to study the Effect of organic manure, inorganic fertilizers and bio-fertilizers on the soil health of phalsa (*Grewia subinaequalis* D.C.), results revealed that soil pH, EC, organic carbon, nitrogen, phosphorus, potassium FYM, NPK, *Azotobacter*, PSB, Zinc sulphate (0.4%) and Ferrous sulphate (0.4%) respectively.

Keywords

Soil pH, Organic Carbon, Nitrogen, Phosphorus and Potassium and Phalsa, Sharbati.

INTRODUCTION:

Use of chemical pesticides and fertilizers not only extensively damage the beneficial microbes in the soil but also cause ill effects on human health as well as environment hazards and reduce soil fertility (Macid *et al.*, 2007). The new approach to farming often referred to as sustainable agriculture, seeks to introduce agricultural practices that are ecofriendly and maintained the long-term ecological balance of the ecosystem. The judicious use of organic manure is

considered as the alternative source to meet the nutrient requirement of crop.

Phalsa (*Grewia subinaequalis* D.C.) belong to family Tiliaceae. Phalsa is subtropical fruit and has high nutrition value containing iron, vitamin A and C. Its fruits possess high medicinal properties. It is a crop of arid and semi-arid regions because of its hardy nature. It comes under minor fruit crops but it is a valuable fruit. Because of these, Phalsa produces often use very large amounts of synthetic mineral

nutrients which is not sustainable due to ill effects on soil and environment a *vis.*, much involvement of non-renewable energy in production input used, attempt to improve yield and quality of crop. Keeping in view the above facts, the present experiment was conducted to study the effect of organic manure, inorganic fertilizers and bio-fertilizers on the soil health of phalsa (*Grewia subinaequalis* D.C).

MATERIALS AND METHODS:

The experiment was carried out at main experiment station, Department of Horticulture, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) for two consecutive years. Cultivar Sharbati was used to evaluate the influence of eleven treatments comprising different combinations of nutrient resources the nutrients composition of was FYM with 1 per cent N₂, 0.5 per cent P₂O₅ and 1 per cent K₂O. The amount of respective nutrient resources was calibrated on basis of different doses *vis.*, 100 per cent NPK, 75 per cent NPK and 50 per cent NPK. The experiment was laid out in Randomized Block Design with three replications in the month of January. Two plants were taken as unit per plot. Fifteen-year-old uniform Phalsa plants, planted at 3X2 m apart were taken. The recommended dose of fertilizers (100g N, 125g P, 100g K per plant) and dose of FYM was 15 kg per plant.

For estimating the yield and quality character of the phalsa fruits was done just after the picking of the fruits in the second fortnight of May.

RESULTS AND DISCUSSION:

The maximum pH (8.52 and 8.50) during first year and second year, respectively was recorded in the T₆ (FYM +75% NPK + Azotobacter + PSB + ZnSO₄ (0.4%)) while it was minimum in T₄ (FYM +75% NPK + Azotobacter) (8.20 and 8.15 during both the years.) the study was partially supported with the findings of Magnusson (2000).

The maximum reduction in electrical conductivity was noticed in treatment T₃ (FYM +100% NPK + FeSO₄ (0.4%)) followed by T₆ (FYM +75% NPK + Azotobacter + PSB + ZnSO₄ (0.4%)) The study was supported with findings of Katyal (1993).

The maximum builds up of organic carbon was noticed in treatment T₆ (FYM +75% NPK + Azotobacter + PSB + ZnSO₄ (0.4%)) and FYM +50% NPK + Azotobacter + PSB. This tendency was observed in both the years. The result closely corroborates with the findings of Santhy *et al.* (1999).

The maximum available nitrogen (kg ha⁻¹) was recorded in T₂ (FYM +100% NPK + ZnSO₄ (0.4%)). While the minimum available nitrogen kg ha⁻¹ was recorded with the application of T₅ (FYM +75% NPK + Azotobacter + PSB). These results are in resemblance with the finding of Guarishankar *et al.* (2002).

The maximum availability of phosphorus (kg ha⁻¹) of soil was recorded in T₃ with application of FYM +100% NPK + FeSO₄ (0.4%) followed by T₁ FYM +100% NPK (Control). The minimum availability of phosphorus (kg ha⁻¹) of soil was recorded in T₁₁ FYM +50% NPK + Azotobacter + PSB + FeSO₄ (0.4%). These results are in conformity with the finding of Sharma (1999).

The maximum availability of potassium (kg ha⁻¹) of soil was recorded in T₁ (230.20 and 236.00 during both years respectively). These results are closely related to the finding Kumar and Yadav (1995).

The maximum number of fruits per node (15.93 and 16.23 during both years respectively) and the maximum number of fruiting node per shoot (25.12 and 24.76 during both years respectively) was found with T₆ FYM +75% NPK + Azotobacter + PSB + ZnSO₄ (0.4%) and T₇ FYM +75% NPK + Azotobacter + PSB + FeSO₄ (0.4%).

The maximum fruit yield kg per plant (5.06 and 5.23 both years respectively) was obtained with T₆ FYM +75% NPK + Azotobacter + PSB + ZnSO₄ (0.4%). Yadav *et al.* (2009).

Table 1: Effect of integrated nutrient management on Soil pH, EC(dsm⁻¹) and Organic carbon (%).

S. No.	Treatment	Soil pH		EC (dsm ⁻¹)		Organic carbon (%)	
		I st year	II nd year	I st year	II nd year	I st year	II nd year
T ₁	FYM +100% NPK(Control)	8.32	8.26	0.28	0.27	0.58	0.60
T ₂	FYM +100% NPK + ZnSO ₄ (0.4%)	8.50	8.46	0.26	0.25	0.56	0.58
T ₃	FYM +100% NPK + FeSO ₄ (0.4%)	8.28	8.23	0.25	0.21	0.56	0.58
T ₄	FYM +75% NPK + Azotobacter	8.20	8.15	0.30	0.29	0.54	0.56
T ₅	FYM +75% NPK + Azotobacter + PSB	8.36	8.32	0.30	0.29	0.55	0.57
T ₆	FYM +75% NPK + Azotobacter + PSB + ZnSO ₄ (0.4%)	8.52	8.50	0.25	0.24	0.59	0.61
T ₇	FYM +75% NPK + Azotobacter + PSB + FeSO ₄ (0.4%)	8.35	8.32	0.30	0.29	0.56	0.58
T ₈	FYM +50% NPK + Azotobacter	8.50	8.46	0.30	0.29	0.55	0.57
T ₉	FYM +50% NPK + Azotobacter + PSB	8.50	8.45	0.28	0.27	0.59	0.61
T ₁₀	FYM +50% NPK + Azotobacter + PSB + ZnSO ₄ (0.4%)	8.38	8.33	0.27	0.26	0.57	0.59
T ₁₁	FYM +50% NPK + Azotobacter + PSB + FeSO ₄ (0.4%)	8.25	8.21	0.25	0.24	0.55	0.57
SEm±		0.026	0.061	0.004	0.002	0.010	0.008
CD at 5%		0.077	0.181	0.011	0.006	0.029	0.024

Table 2: Effect of integrated nutrient management on available N, P₂O₅ and K₂O in soil

S. No.	Treatment	N (kg/ha)		P ₂ O ₅ (kg/ha)		K ₂ O(kg/ha)	
		I st year	II nd year	I st year	II nd year	I st year	II nd year
T ₁	FYM +100% NPK(Control)	212.30	217.00	18.80	19.60	230.20	236.00
T ₂	FYM +100% NPK + ZnSO ₄ (0.4%)	215.50	221.30	18.30	19.00	228.60	232.30
T ₃	FYM +100% NPK + FeSO ₄ (0.4%)	214.20	220.50	19.00	20.20	230.00	235.00
T ₄	FYM +75% NPK + Azotobacter	208.50	214.50	17.50	18.50	220.00	225.10
T ₅	FYM +75% NPK + Azotobacter + PSB	205.00	209.00	17.80	18.70	222.50	227.20
T ₆	FYM +75% NPK + Azotobacter + PSB + ZnSO ₄ (0.4%)	210.30	216.00	18.30	19.80	220.00	225.10
T ₇	FYM +75% NPK + Azotobacter + PSB + FeSO ₄ (0.4%)	212.20	218.00	18.00	18.60	218.50	223.50
T ₈	FYM +50% NPK + Azotobacter	208.40	215.00	17.20	17.90	213.00	217.20
T ₉	FYM +50% NPK + Azotobacter + PSB	206.20	211.20	18.00	18.60	215.00	219.00
T ₁₀	FYM +50% NPK + Azotobacter + PSB + ZnSO ₄ (0.4%)	206.80	212.20	17.50	18.50	216.80	220.30
T ₁₁	FYM +50% NPK + Azotobacter + PSB + FeSO ₄ (0.4%)	208.30	214.50	16.80	17.40	215.20	219.40
Sem±		2.473	2.578	0.219	0.229	4.380	4.677
CD at 5%		7.294	7.606	0.645	0.676	12.922	13.798

Table 3: Effect of integrated nutrient management on No. of fruit per node, No. of fruiting node per shoot and fruit yield kg per plant

S. No.	Treatment	No. of fruit / node		No. of fruiting node / shoot		Fruit yield kg / plant	
		I st year	II nd year	I st year	II nd year	I st year	II nd year
T ₁	FYM +100% NPK(Control)	12.85	12.86	11.97	12.21	3.52	3.57
T ₂	FYM +100% NPK + ZnSO ₄ (0.4%)	15.32	14.83	18.45	18.28	4.27	4.28
T ₃	FYM +100% NPK + FeSO ₄ (0.4%)	13.87	13.98	17.08	17.12	3.74	3.83
T ₄	FYM +75% NPK + Azotobacter	14.39	14.44	14.59	14.80	3.74	3.83
T ₅	FYM +75% NPK + Azotobacter + PSB	14.71	14.85	14.01	14.09	3.85	3.95
T ₆	FYM +75% NPK + Azotobacter + PSB + ZnSO ₄ (0.4%)	15.93	16.23	25.12	24.76	5.06	5.23
T ₇	FYM +75% NPK + Azotobacter + PSB + FeSO ₄ (0.4%)	15.48	15.60	23.22	22.82	4.39	4.48
T ₈	FYM +50% NPK + Azotobacter	14.76	14.78	17.37	17.38	3.69	3.72
T ₉	FYM +50% NPK + Azotobacter + PSB	15.06	15.09	17.60	17.62	3.83	3.87
T ₁₀	FYM +50% NPK + Azotobacter + PSB + ZnSO ₄ (0.4%)	15.14	15.22	21.90	21.68	3.93	4.03
T ₁₁	FYM +50% NPK + Azotobacter + PSB + FeSO ₄ (0.4%)	15.06	15.23	19.98	19.92	3.80	3.90
SEm±		0.295	0.301	0.121	0.176	0.039	0.058
CD at 5%		0.871	0.887	0.359	0.520	0.115	0.171

CONCLUSION:

The attributes of fruits with respect to soil fertility in terms of pH and was improved an organic carbon and available NPK status of the experiment field were maintained with the application of 100% FYM + 75% NPK + Azotobacter + PSB + ZnSO₄ (0.4%) (T₆). The maximum available nitrogen, phosphorus and potassium (kg ha⁻¹) was recorded in T₂ FYM +100% NPK + ZnSO₄ (0.4%), T₃ FYM +100% NPK + FeSO₄ (0.4%) and T₁ FYM +100% NPK (Control) respectively. This treatment also gave maximum net return per hectare.

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