



Effect of bio-inputs on Potato (Variety: *Kufri Himalini*) grown in rice fallow under Agro ecology based farming system

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INTRODUCTION

Potato (*Solanum tuberosum* L.) is an important food and cash crop cultivated worldwide, contributing significantly to food and nutritional security owing to its high yield potential and rich carbohydrate, vitamin and mineral content (FAO, 2025). Sustainable nutrient management is essential for maintaining potato productivity while improving soil health and reducing dependence on external chemical inputs (Koch *et al.*, 2020). Under the GIZ-sponsored project “*Assessment of Agro-Ecology-Based Cropping Systems and Natural Bio-Inputs for Soil Health Improvement and Product Quality Enhancement in Assam, India,*” an experiment was conducted at Assam Agricultural University, Jorhat, Assam, during the Rabi season of 2024-25 and 2025–26 to evaluate the performance of potato cv. **Kufri Himalini** in a rice-fallow system under different combinations of natural bio-inputs.

OBJECTIVE

To evaluate the performance of potato cv. **Kufri Himalini** in a rice-fallow system under different combinations of natural bio-inputs.

METHODOLOGY

The experiment was conducted at **Assam Agricultural University, Jorhat, Assam**, during the **Rabi season of 2024-25** and 2025–26 using potato cv. **Kufri Himalini** in a rice-fallow system under an agro-ecology-based farming system. The experiment was laid out in a **Randomized Block Design (RBD)** with **eight treatments and three replications**. The plot size was **9 m × 3 m**.

Treatment details:

Treatment	Details
T ₁	Control
T ₂	Ghanajivamrit (1.5 t/ha)
T ₃	Ghanajivamrit (1.5 t/ha) + Dravajivamrit @ 3% in 15 days interval
T ₄	Ghanajivamrit (1.5 t/ha) + Dravajivamrit @ 3% in 15 days interval + Pachgavya @ 4% in 15 days interval
T ₅	Ghanajivamrit (1.5 t/ha) + Dravajivamrit @ 3% in 20 days interval
T ₆	Ghanajivamrit (1.5 t/ha) + Dravajivamrit @ 3% in 20 days interval + Pachgavya @ 4% in 20 days interval
T ₇	Ghanajivamrit (1.5 t/ha) + Dravajivamrit @ 3% in 25 days interval
T ₈	Ghanajivamrit (1.5 t/ha) + Dravajivamrit @ 3% in 25 days interval + Pachgavya @ 4% in 25 days interval

PHOTOGRAPHS



Spraying of bio inputs



Harvesting of potato

RESULTS

Table 1: Crop parameters across two seasons

Treatment	Plant Height (75 DAP)		Dry Matter (75 DAP)		Yield(t/ha)	
	Season I	Season II	Season I	Season II	Season I	Season II
T ₁	26.83	29.72	10.46	10.45	10.47	10.46
T ₂	36.89	39.13	12.33	12.36	11.20	11.23
T ₃	49.37	48.99	15.07	14.99	13.01	12.94
T ₄	55.50	56.48	17.35	17.78	16.05	16.45
T ₅	44.67	46.37	15.11	15.34	13.15	13.35
T ₆	52.40	54.03	16.65	16.62	15.17	15.14
T ₇	33.15	34.95	14.95	14.23	10.86	10.34
T ₈	49.45	49.18	15.76	15.14	13.12	12.60
SEm(±)	0.99	3.75	0.170	0.32	0.306	0.30
CD (P=0.05)	2.95	13.15	0.507	0.73	0.911	0.91

Table 2: Combined physico-chemical properties of soil across two seasons

Treatment	pH	EC(dS/m)	Organic Carbon(%)	CEC(cmol /kg)	Avail. N(kg/ha)	Avail. P ₂ O ₅ (kg/ha)	Avail. K ₂ O(kg/ha)
T ₁	5.41	0.16	0.63	14.37	224.00	13.77	133.00
T ₂	5.24	0.21	0.60	15.47	245.00	14.70	150.00
T ₃	5.41	0.18	0.68	16.47	268.00	17.37	164.00
T ₄	5.50	0.48	0.75	18.28	283.00	18.93	178.00
T ₅	4.84	0.28	0.65	16.16	257.00	15.47	157.00
T ₆	5.07	0.31	0.71	16.87	278.00	17.50	170.00
T ₇	5.12	0.29	0.62	17.41	250.00	14.60	141.00
T ₈	5.22	0.28	0.74	16.11	281.00	17.20	176.00
SEm(±)	0.07	0.025	0.035	0.42	6.8	0.62	5.6
CD (P=0.05)	0.21	0.08	0.11	1.27	20.6	1.88	17.0

Table 3: Combined biological properties of soil across two seasons

Treatment	SMBC(mg/kg)	Bacteria(×10 ⁶ CFU/g)	Fungi(×10 ⁴ CFU/g)	Urease(µg NH ₄ ⁺ -N/g/hr)	Dehydrogenase(µg TPF/g/hr)
T ₁	176.00	42.30	17.00	25.20	41.30
T ₂	182.00	44.00	17.80	26.10	43.10
T ₃	188.00	45.50	18.40	27.00	44.50
T ₄	204.00	49.50	20.10	29.60	48.00
T ₅	190.00	46.00	18.60	27.50	45.10
T ₆	196.00	47.80	19.20	28.40	46.70
T ₇	200.00	48.60	19.70	29.00	47.30
T ₈	194.00	47.10	19.00	28.00	46.00
SEm(±)	2.10	0.58	0.27	0.48	0.72
CD (P=0.05)	6.37	1.76	0.82	1.46	2.18

CONCLUSION

Integrated application of Ghanajivamrit, Dravajivamrit and Panchagavya significantly improved crop performance and post-harvest soil quality under an agro-ecology-based farming system. T₄ (15-day interval) was more effective in enhancing crop growth, dry matter accumulation and yield. Similarly, soil microbial biomass carbon, bacterial and fungal populations, and soil enzymes such as urease and dehydrogenase activities also recorded higher in T₄ indicating superior improvement in soil biological health. The findings suggest that T₄ offers greater potential for sustaining microbial activity and biological functioning of soil as well as maximizing crop productivity. Overall, appropriately scheduled bio-input application can simultaneously support potato productivity and long-term soil health in rice-fallow systems.

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