Supplementary Information

Table S1: Location details of the studied sites

Sl. No.	Location name	Soil type (Soil Taxonomy)	District	Forest Beat and Circle
1.	Biharinath Hill	Haplustalfs	Bankura	Tiluri, Central Circle
2.	Rupganj	Haplustalfs	Paschim Barddhaman	Arrah, South East Circle
3.	Piariganj	Paleustalfs	Paschim Barddhaman	Basudha, South East Circle
4.	Latiabani	Haplustalfs	Bankura	Gangajalghati, Central Circle
5.	Ramchandrapur	Haplustalfs	Bankura	Baliatore, Central Circle
6.	Murakati	Haplustalfs	Bankura	Amdangra, Central Circle
7.	Lalgarh	Paleustalfs	Jhargram	Lalgarh, Western Circle
8.	Jorakusmi	Haplustalfs	Paschim Medinipur	Moupal, Western Circle
9.	Panisol	Paleustalfs	Jhargram	Dhabani, Western Circle
10.	Dhanghari	Haplustalfs	Paschim Medinipur	Narayangarh, Western Circle
11.	Tapoban	Ustifluvents	Jhargram	Chandabila – 1, Western Circle
12.	Sital Pura	Paleustalfs	Jhargram	Nayagram, Western Circle

Table S2: Methods of soil analysis

Parameters	References
Soil texture (%)	Soil Survey Staff - Soil Survey Manual, USDA Handbook No. 18, 1951
Bulk Density (g/cc)	Thin-walled core sampler; Piper, C.S. 1966
Visual Evaluation of Soil Structure (VESS)	Guimarães, 2011
Aggregate stability (%)	Liu et al., 2009
pH	Jackson 1967
Soil Organic Carbon (OC) (%)	Walkley and Black method; Jackson 1967
Organic Matter (OM) (%)	Walkley and Black method; Jackson 1967
Nitrogen (N) (kg/ha)	Tandon, HLS. 1993
P_2O_5 (kg/ha)	Bray and Kurtz method; Tandon, HLS. 1993
K_2O (kg/ha)	Systronics flame photometer 128; Jackson 1967
Electrical conductivity (EC) (ds/m)	Basak, R.K. 2000)
Calcium (Ca) (mg/kg)	Systronics flame photometer 128; Jackson 1967
Sodium (Na) (mg/kg)	Systronics flame photometer 128; Jackson 1967
Cation Exchange Capacity (CEC) (meq./100g)	Purnamasari et al., 2021; FAO, 2022
Magnesium (Mg) (mg/kg)	Systronics flame photometer 128; Jackson 1967

Mechanical composition: Different-sized particles were separated following the international pipette method after pretreatment of the samples, i.e., removing organic carbon using H_2O_2 (30%) and bicarbonate-dithionite-citrate was used to remove free iron oxide, 2% Na_2CO_3 (pH 9.5) was used for effective dispersion (Robinson, 1922).

Visual Evaluation of Soil Structure (VESS): Soil sampling involves taking an undisturbed slice of soil from a depth of about 25 cm using a spade, which is then manually broken along natural fracture planes. Two breaking methods were compared, i.e., breaking the soil slice by hand and also dropping it from a height of 1 m, both aimed at reducing operator influence. Aggregates were split by hand to evaluate internal porosity, assessing size, shape, and visible porosity. The soil structure quality (Sq) was scored based on the aggregate size, strength, porosity, roots, and color, with scores ranging from 1 (good) to 5 (poor) (Guimarães, 2011).

Aggregate stability (water-stability index computation): The water-stability of soil aggregates was assessed using the static water-measure method, which involved immersing the aggregates in water and recording the time until they collapsed (Liu et al., 2009).

Bulk density: The bulk density (BD) is measured in the field using a thin-walled core sampler, with the results further validated through Keen-Raczkowski Box measurements in the laboratory (Piper, 1966)

Soil pH: This was carried out in a soil to water ratio of 1:2 with the help of a Systronic pH meter (model Systronics µ pH meter 361) with a glass electrode (Jackson, 1967).

Electrical conductivity: Electrical conductivity was determined using a soil to distilled water ratio of 1:2 by a Systronics EC meter, (model Systronics µ Conductivity meter 306) (Basak, 2000)

Organic carbon: The organic carbon content in the sample was estimated by the wet oxidation method of Walkley and Black (1934) (as reported in Jackson, 1967).

Available calcium, magnesium, sodium and potassium: The available cations were determined by extracting the soil with 1N ammonium acetate (pH 7.0), calcium and magnesium content in the extract were determined by the versene titration method, while sodium and potassium amounts were determined with the flame photometer model (Systronics flame photometer 128) (Jackson, 1967).

Available nitrogen: For available nitrogen determination, the procedure involved distilling the soil with an alkaline potassium permanganate solution and determining the ammonia liberated. (Tandon, 1993).

Available phosphorus: For determining plant available phosphorus in the soil samplr, the Olsen's method was used for neutral-alkaline soils while the Bray and Kurtz method was used for acidic soils (Tandon, 1993).

Cation Exchange Capacity (CEC): 1N ammonium acetate solutions at different pH levels (4.8, 6.0, and 7.0) were used to extract exchangeable cations from the soil samples (Purnamasari et al., 2021; FAO, 2022).

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