



Assessment of Physicochemical and Microbiological Properties of Soil from Organic Vegetable Farms in Bangladesh

Md. Nazim Uddin^a, Md. Kamrul Hasan^b, M. A. Matin^b, Abdul Khaleque^d, Md. Latiful Bari^{c*}

Supplementary Information

Supplementary Table 1 | Per hectare use of input in producing tomato, potato and bottle gourd in the study areas.

| Items | Input used | | | | | | | | |
|-------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | Tomato | | | Potato | | | Bottle gourd | | |
| | Organic | Semi-organic | Chemical | Organic | Semi-organic | Chemical | Organic | Semi-organic | Chemical |
| Human labour (man-days) | 245± 0.22 | 256± 0.27 | 251± 0.25 | 282± 0.40 | 292± 0.45 | 289± 0.44 | 234± 0.16 | 239± 0.19 | 236± 0.17 |
| Mechanical power (Tk.) | 10702± 0.24 | 10790± 0.68 | 11683± 0.12 | 11596± 0.69 | 11634± 0.88 | 12114± 0.27 | 12088± 0.14 | 12408± 0.73 | 12353± 0.46 |
| Organic Fertilizer | Kg | | | | | | | | |
| Vermi compost | 613± 0.05 | | - | 539± 0.68 | - | - | 532± 0.65 | - | - |
| Pile compost | 590± 0.94 | | - | 398± 0.98 | - | - | 699± 0.48 | - | - |
| Cowdung | 15939± 0.30 | 12900± 0.18 | - | 15862± 0.92 | 12827.82 | - | 15696.09 | 12821± 0.79 | - |
| Fertilizers | Kg | | | | | | | | |
| Urea | | 270± 0.34 | 278± 0.38 | - | 363± 0.81 | 380± 0.89 | - | 396± 0.97 | 458± 0.28 |
| TSP | | 213± 0.06 | 239± 0.19 | - | 192± 0.96 | 188± 0.94 | - | 237± 0.18 | 269± 0.34 |
| MoP | | 152± 0.76 | 168± 0.84 | - | 193± 0.96 | 290± 0.445 | - | 206± 0.02 | 234± 0.16 |
| Seedling (no.) | 17824 | 17215 | 18716 | - | 14 | 13 | 2692 | 2741 | 2720 |
| Support cost (Tk) | 11362± 0.53 | 11633± 0.88 | 11150± 0.47 | 918± 0.57 | 1476± 0.34 | 1495± 0.44 | 25602± 0.37 | 26798± 0.32 | 26217± 0.43 |
| Irrigation (no.) | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| Weeding (no.) | 2 | 2 | 2 | - | - | - | - | - | - |
| Spray (no.) | - | 2 | 2 | - | 1 | 1 | - | 1 | 1 |
| Harvest (no.) | 13 | 15 | 15 | 1 | 1 | 1 | 14 | 15 | 16 |

Supplementary Table 2| Nutritional status of vermin compost and commercial organic fertilizer collected from farms and companies*

| Component | Recommended character | Test results of collected organic fertilizers sample | | | | | Compliances with govt. standard | | | | |
|--------------------|----------------------------|--|----------------|----------------|----------------|----------------|---------------------------------|----------------|----------------|----------------|----------------|
| | | S ₁ | S ₂ | S ₃ | S ₄ | S ₅ | S ₁ | S ₂ | S ₃ | S ₄ | S ₅ |
| Physical | | | | | | | | | | | |
| Color | Dark grey (DG) to black | DG | DG | DG | BL | BL | Y | Y | Y | Y | Y |
| Physical condition | Non granular (NG) form | NG | NG | NG | NG | NG | Y | Y | Y | Y | Y |
| Odor | Absence of foul odor (AFO) | AFO | AFO | AFO | AFO | AFO | Y | Y | Y | Y | Y |
| Moisture | Max. 10-20% | 15.4 | 18.3 | 15.9 | 16.5 | 16.9 | | | | | |
| Chemical | | | | | | | | | | | |
| pH | 6.0-8.5 | 7.9 ±0.11 | 8.03±0.09 | 7.8 ±0.66 | 8.1 ±0.35 | 8.0 ±0.38 | Y | Y | Y | Y | Y |
| Organic Carbon | 10-25 % | 16.5 ±5.3 | 18.5 ±6.2 | 17.34±5.6 | 18.11±4.7 | 18.54±4.2 | Y | Y | Y | Y | Y |
| Total N | 0.5-4.0% | 0.98±0.08 | 1.43±0.06 | 1.74±0.21 | 1.81±0.22 | 1.75±0.25 | Y | Y | Y | Y | Y |
| C:N ratio | Max. 20 | 15.04 | 13.60 | 10.34 | 11.22 | 11.36 | Y | Y | Y | Y | Y |
| P | 0.5-3.0% | 0.71±0.09 | 0.91±0.12 | 1.23±0.32 | 1.12±0.33 | 1.14±0.30 | Y | Y | Y | Y | Y |
| K | 0.5-3.0% | 0.53±0.10 | 1.03±0.41 | 0.85±0.22 | 1.05±0.45 | 0.89±0.31 | Y | Y | Y | Y | Y |
| S | 0.1-0.5% | 0.19±0.11 | 0.38±0.08 | 0.37±0.13 | 0.28±0.14 | 0.37±0.16 | Y | Y | Y | Y | Y |
| Zn | Max. 0.1% | 0.023±0.01 | 0.031±0.02 | 0.05±0.01 | 0.08±0.01 | 0.06±0.01 | Y | Y | Y | Y | Y |
| Cu | Max. 0.05% | 0.02±0.001 | 0.02±0.001 | 0.009±0.001 | 0.008±0.001 | 0.009±0.001 | Y | Y | Y | Y | Y |
| Ar | Max. 20 ppm | - | - | - | - | - | ND | ND | ND | ND | ND |
| Cr | Max. 50 ppm | BDL | BDL | 12.12±5.3 | 23.32±7.3 | 12.12±6.9 | Y | Y | Y | Y | Y |
| Cd | Max. 5 ppm | BDL | BDL | 2.12±0.53 | 2.02±0.51 | 2.19±0.57 | Y | Y | Y | Y | Y |
| Pb | Max. 30 ppm | BDL | BDL | 8.31±1.73 | 6.01±1.42 | 6.31±1.29 | Y | Y | Y | Y | Y |
| Hg | Max. 0.1 ppm | BDL | BDL | BDL | BDL | BDL | Y | Y | Y | Y | Y |
| Ni | Max. 30 ppm | BDL | BDL | 12.87±4.33 | 9.67±4.03 | 10.27±5.31 | Y | Y | Y | Y | Y |

Values ± SEM (n=3)

*S₁=Vermicompost sample collected from farmer Khallior Rahman, Rajbari, prepared only using cowdung as raw materials,S₂=Vermicompost sample collected from Balidanga, Rajbari, prepared with cowdung, neem leaves, mahogany fruits, banana leaves and ash.S₃= Commercial organic fertilizers sample collected from Mati organics (Bio-gen), prepared by using ingredients- bio slurry, cotton seeds, cowdung, poultry litter, ash.S₄= Commercial organic fertilizers sample collected from Mazim organics, prepared by using ingredients- sugarcane pressed mud , cotton seeds, cowdung, poultry litter, ash, Tricho- leachate.,S₅= Commercial organic fertilizers sample collected from Mazim organics, prepared for ACI company Pallijaibo shar as brand by using ingredients- sugarcane pressed mud, cotton seeds, cowdung, poultry litter, ash, Tricho- leachate.

DG= dark grey,

G= Grey,

NG= Non –Granular,

AFO=Absence of foul odor,

BDL=Below the detection level,

Y= compliance to government order

Supplementary Table 3 | Physicochemical status of the soil samples collected from organic, semi organic and conventional farming field (15 cm depth) located at Gazipur, Jhenaidah and Noagoan

| Soil Characters | CL | Gazipur | | | Jhenaidah | | | Noagoan | | |
|-----------------|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | F ₁ | F ₂ | F ₃ | F ₄ | F ₅ | F ₆ | F ₇ | F ₈ | F ₉ |
| pH | - | 7.00 ± 0.51 | 6.22 ± 0.67 | 6.86 ± 0.49 | 6.43 ± 0.62 | 6.75 ± 0.58 | 6.40 ± 0.55 | 6.30 ± 0.51 | 6.01 ± 0.53 | 6.61 ± 0.45 |
| OM (%) | - | 2.17 ± 0.11 | 1.86 ± 0.12 | 0.60 ± 0.09 | 1.88 ± 0.22 | 1.72 ± 0.13 | 0.34 ± 0.11 | 1.82 ± 0.22 | 1.60 ± 0.18 | 1.24 ± 0.10 |
| N (%) | 0.12 | 0.12 ± 0.003 | 0.10 ± 0.004 | 0.04 ± 0.001 | 0.10 ± 0.002 | 0.10 ± 0.001 | 0.02 ± 0.003 | 0.10 ± 0.002 | 0.09 ± 0.001 | 0.07 ± 0.001 |
| P µg/g | 7.0 | 72.29 ± 9.52 | 29.49 ± 5.51 | 64.54 ± 6.56 | 11.40 ± 2.33 | 16.51 ± 4.32 | 34.04 ± 8.59 | 31.07 ± 8.52 | 7.00 ± 1.56 | 32.09 ± 9.41 |
| K meq/100g | 0.12 | 0.27 ± 0.03 | 0.13 ± 0.02 | 0.41 ± 0.06 | 0.08 ± 0.01 | 0.13 ± 0.03 | 0.17 ± 0.0 | 0.08 ± 0.51 | 0.09 ± 0.51 | 0.08 ± 0.51 |
| S µg/g | 10.0 | 37.69 ± 6.51 | 18.49 ± 2.51 | 37.92 ± 5.58 | 24.03 ± 4.55 | 23.77 ± 3.53 | 29.00 ± 6.46 | 27.03 ± 5.16 | 27.81 ± 4.55 | 21.23 ± 3.36 |
| Ca meq/100g | 2.0 | 3.70 ± 0.89 | 3.90 ± 0.59 | 4.80 ± 1.18 | 10.20 ± 1.51 | 7.10 ± 0.88 | 4.40 ± 0.61 | 3.90 ± 0.64 | 3.60 ± 0.39 | 4.60 ± 0.52 |
| Mg meq/100g | 1.0 | 1.40 ± 0.24 | 1.70 ± 0.26 | 2.10 ± 0.11 | 2.50 ± 0.44 | 3.10 ± 0.51 | 2.00 ± 0.43 | 1.60 ± 0.51 | 1.50 ± 0.32 | 1.80 ± 0.31 |

F₁= Organic farmer soil converted the land 2010 at Jhenaidah,

F₂= Semi-Organic farmer soil at Jhenaidah,

F₃ = Conventional farmers soil at Jhenaidah

F₄ = Organic farmer soil converted the land 2013 at Gazipur,

F₅ = Semi-Organic farmer soil at Gazipur

F₆ = Conventional farmers soil at Gazipur

F₇ = Organic farmer soil converted the land 2014 at Noagoan

F₈= Semi Organic farmer soil Noagoan ,

F₉= Conventional farmers soil Noagoan,

CL= Critical limit (BARC 2012).