Package 'SoilFunctionality'

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Type Package

Title Soil Functionality Measurement

Version 0.1.0

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Description Generally, soil functionality is characterized by its capability to sustain microbial activity, nutritional element supply, structural stability and aid for crop production. Since soil functions can be linked to 80% of ecosystem services, conservation of degraded land should strive to restore not only the capacity of soil to sustain flora but also ecosystem provisions. The primary ecosystem services of soil are carbon sequestration, food or biomass production, provision of microbial habitat, nutrient recycling. However, the actual magnitude of soil functions provided by agricultural land uses has never been quantified. Nutrient supply capacity (NSC) is a measure of nutrient dynamics in restored land uses. Carbon accumulation proficiency (CAP) is a measure of ecosystem carbon sequestration. Biological activity index (BAI) is the average of responses of all enzyme activities in treated land over control/reference land. The CAP parameter investigates how land uses may affect carbon flows, retention, and sequestration. The CAP provides a signal for C cycles, flows, and the systems' relative operational supremacy.

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CarbonAccumulationProficiency

Carbon Accumulation Proficiency

Description

Carbon accumulation proficiency (CAP) is a measure of ecosystem carbon sequestration.The CAP parameter investigates how land uses may affect carbon flows, retention, and sequestration. The CAP provides a signal for C cycles, flows, and the systems relative operational supremacy.

Usage

```
CAP(TOC, BD, Control_Stock)
```

Arguments

TOC	a value or a vector of values containing Total Organic Carbon (TOC)
BD	a value or a vector of values of same length containing Bulk Density (BD)
Control_Stock	one reference or control value of stock

Value

Carbon Accumulation Proficiency

References

Ghosh, A., Kumar, R.V., Manna, M.C., Singh, A.K., Parihar, C.M., Kumar, S., Roy, A.K. and Koli, P., 2021. Eco-restoration of degraded lands through trees and grasses improves soil carbon sequestration and biological activity in tropical climates.Ecological Engineering, 162, p.106176.\ Patidar, P., Sannagoudar, M.S., Ghosh, A., Singh, A.K., Misra, S., Khandibagur, V., Ojha, D., Casini, R., Elansary, H.O. and Chandra, A., 2023. Tropical range grasses can sustain soil functions despite nutrient depletion in semiarid degraded land. Frontiers in Sustainable Food Systems, 7, p.1230156.

Examples

```
TOC = c(1.45,1.41)
BD = c(1.24, 1.26)
Control_Stock = 9.97
CAP(TOC, BD, Control_Stock)
```

NutrientSupplyCapacity

Nutrient Supply Capacity

Description

Nutrient supply capacity (NSC) is a measure of nutrient dynamics in restored land uses.

Usage

```
NSC(Nutrient, Control_Nutrient)
```

Arguments

Nutrient   a vector containing seven values of N (g/kg), P (kg/ha), Fe (ppm), Mn (ppm), Zn (ppm) and Cu (ppm)

Control_Nutrient

     a vector of same length containing control or reference values of N (g/kg), P (kg/ha), Fe (ppm), Mn (ppm), Zn (ppm) and Cu (ppm)

Value

Nutrient Supply Capacity

References

Ghosh, A., Kumar, R.V., Manna, M.C., Singh, A.K., Parihar, C.M., Kumar, S., Roy, A.K. and Koli, P., 2021. Eco-restoration of degraded lands through trees and grasses improves soil carbon sequestration and biological activity in tropical climates.Ecological Engineering, 162, p.106176.\ Patidar, P., Sannagoudar, M.S., Ghosh, A., Singh, A.K., Misra, S., Khandibagur, V., Ojha, D., Casini, R., Elansary, H.O. and Chandra, A., 2023. Tropical range grasses can sustain soil functions despite nutrient depletion in semiarid degraded land. Frontiers in Sustainable Food Systems, 7, p.1230156.

Examples

```
Nutrient=c(268.8,1.82,38.53,17.59,51.32,4.78,2.17)
Control_Nutrient=c(252,0.61,18.04,6.46,28.48,0.96,1.50)
NSC(Nutrient, Control_Nutrient)
```

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