**Supplementary Table 1. Effect of tree-based land-use systems on SOC (Mg ha-1) at different soil depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tree-based land-use system** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| *Lagerstroemia parviflora* | 40.88±0.91 | 39.99±0.96 | 32.90±0.81 | **37.92b** |
| *Michelia champaca* | 40.12±1.01 | 36.95±1.07 | 31.66±1.02 | **36.24cd** |
| *Tectona grandis* | 39.52±0.59 | 35.74±0.76 | 30.25±0.65 | **35.17de** |
| *Shorea robusta* | 41.17±1.15 | 40.18±0.48 | 29.48±0.61 | **36.94bc** |
| Mixed | 47.06±1.14 | 47.13±1.90 | 32.48±1.33 | **42.22a** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 23.55±0.40 | 21.58±1.36 | 19.45±0.95 | **21.53gh** |
| *Anthocephalus cadamba* | 23.78±0.38 | 20.49±0.55 | 19.37±0.29 | **21.21ghi** |
| *Gmelina arborea* | 22.95±0.64 | 19.06±1.29 | 17.99±0.74 | **20.00hijkl** |
| *Shorea borneensis* | 23.01±0.94 | 19.66±0.44 | 17.36±0.39 | **20.01hijkl** |
| *Tectona grandis* | 23.33±1.86 | 19.55±0.53 | 18.62±0.73 | **20.50ghijkl** |
| *Lagerstroemia indica* | 23.47±1.35 | 19.96±0.30 | 17.03±0.60 | **20.16hijkl** |
| *Tectona grandis + Milvus migrans* | 23.45±1.21 | 18.96±0.32 | 17.58±1.02 | **20.00hijkl** |
| A c + S m | 23.05±1.51 | 19.71±0.64 | 17.32±0.62 | **20.03hijkl** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 24.56±0.95 | 20.63±0.47 | 16.66±0.71 | **20.62ghijkl** |
| *Swietenia macrophylla* based | 25.77±0.69 | 19.35±0.38 | 17.37±0.58 | **20.83ghijk** |
| *Terminalia arjuna* based | 24.56±0.65 | 19.48±0.32 | 16.54±0.39 | **20.19hijkl** |
| *Gmelina arborea* based | 25.23±1.50 | 19.77±0.45 | 16.91±0.67 | **20.64ghijkl** |
| *Millettia pinnata* based | 23.26±1.11 | 19.45±0.24 | 18.31±0.10 | **20.34ghijkl** |
| *Lagerstroemia indica* based | 25.83±0.95 | 20.69±0.19 | 18.92±0.29 | **20.81g** |
| *Anthocephalus cadamba* based | 24.02±1.30 | 19.26±0.96 | 18.66±0.70 | **20.65hijkl** |
| *Mangifera indica* based | 24.22±1.25 | 19.63±0.39 | 17.06±0.71 | **20.30ghijkl** |
| Homegarden | 34.98±1.18 | 28.23±1.44 | 27.13±0.71 | **30.11f** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 24.27±1.45 | 19.27±0.86 | 16.51±0.88 | **20.02hijkl** |
| *Cocos nucifera* | 24.67±0.37 | 18.82±0.56 | 17.32±0.63 | **20.27hijkl** |
| *Areca catechu* | 25.54±0.67 | 19.73±0.38 | 18.32±0.50 | **21.20ghi** |
| *Machilus bombycina* | 24.53±1.16 | 19.95±0.25 | 18.77±0.15 | **21.08ghij** |
| Tea plantations | 39.93±1.26 | 33.57±0.92 | 29.69±0.44 | **34.40e** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 24.28±0.58 | 18.81±1.07 | 16.32±0.58 | **19.80ijkl** |
| *Manilkara zapota* | 24.02±0.85 | 18.28±0.68 | 17.74±1.21 | **20.01hijkl** |
| *Litchi chinensis* | 23.82±0.61 | 18.31±0.63 | 15.33±0.53 | **19.15l** |
| *Anacardium occidentale* | 23.61±0.55 | 18.45±0.51 | 16.65±0.45 | **19.57jkl** |
| *Citrus lemon* | 22.55±1.13 | 18.90±0.87 | 16.18±1.17 | **19.2ll** |
| *Mangifera indica* | 23.56±0.55 | 18.15±0.73 | 16.60±0.59 | **19.44kl** |
| **Mean** | **27.53a** | **23.26b** | **20.26c** |  |

**A c + S m- *Anthocephalus cadamba + Swietenia macrophylla***

**Supplementary Table 2. Effect of tree-based land-use systems on biomass accumulation and partitioning (Mg ha-1)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TBL** | **Biomass** | | | | **TSB** | **AGB** | **BGB** | **LB** | **TB** |
| **Tree** | | **Shrub** | **Herb** |
| **Forest** | | | | | | | | | |
| L p | 130.36  \*(2.12)c | | 11.39  (1.1)c | 3.22  (0.62)c | 144.97  (2.16)c | 126.06  (2.10)c | 18.91  (1.30)c | 14.10  (1.17)a | 159.07  (2.21)c |
| M c | 139.68  (2.15)c | | 10.54  (1.1)c | 4.13  (0.71)b | 154.36  (2.19)c | 134.23  (2.13)c | 20.13  (1.33)c | 9.35  (1.01)b | 168.84  (2.22)c |
| T g | 140.70  (2.15)c | | 10.19  (1.1)c | 3.39  (0.64)c | 154.29  (2.19)c | 134.16  (2.13)c | 20.12  (1.33)c | 14.48  (1.19)a | 163.64  (2.23)c |
| S r | 256.02  (2.41)b | | 7.44  (0.9)d | 2.81  (0.6)cd | 266.26  (2.43)b | 231.53  (2.37)b | 34.73  (1.55)b | 12.43  (1.13)a | 278.69  (2.45)b |
| Mixed | 743.19  (2.87)a | | 17.80  (1.3)b | 6.62  (0.88)a | 767.61  (2.88)a | 667.49  (2.82)a | 100.12  (2.00)a | 13.60  (1.16)a | 781.21  (2.89)a |
| **Forest Tree Plantation** | | | | | | | | | |
| S m | | 39.13  (1.60)h | 2.06  (0.5)g | 0.93  (0.3)gh | 42.12  (1.64)h | 36.63  (1.58)h | 5.49  (0.82)g | 3.58  (0.66)d | 45.70  (1.68)i |
| A c | | 58.28  (1.77)f | 0.90  (0.5)jkl | 1.16  (0.33)g | 60.34  (1.79)g | 52.47  (1.73)g | 7.87  (0.95)f | 3.51  (0.65)a | 63.85  (1.8)gh |
| G a | | 27.36  (1.45)ij | 1.54  (0.3)hi | 0.91  (0.3)gh | 29.82  (1.49)i | 25.93  (1.43)i | 3.89  (0.69)h | 2.32  (0.52)e | 32.14  (1.52)j |
| S b | | 27.60  (1.45)ij | 1.97  (0.5)gh | 0.86  (0.3)gh | 30.44  (1.49)i | 26.47  (1.44)i | 3.97  (0.69)h | 1.73  (0.43)f | 32.17  (1.52)j |
| T g | | 22.65  (1.4)jkl | 1.89  (0.3)gh | 0.91  (0.3)gh | 25.44  (1.42)ij | 22.12  (1.36)ij | 3.32  (0.6)hij | 0.97  (0.1)gh | 26.41  (1.4)jkl |
| L i | | 39.04  (1.60)h | 1.55  (0.4)hi | 2.35  (0.3)de | 42.95  (1.63)h | 37.34  (1.57)h | 5.60  (0.81)g | 4.53  (0.44)c | 47.47  (1.67)i |
| Tg+Mm | | 82.21  (1.92)e | 1.18  (0.34)ij | 0.84  (0.26)h | 84.23  (1.9)ef | 73.25  (1.87)ef | 10.99  (1.08)e | 1.74  (0.44)f | 85.97  (1.9)ef |
| Ac+Sm | | 103.36  (2.02)d | 5.54  (0.81)e | 2.11  (0.49)e | 111.56  (2.05)d | 97.01  (1.99)d | 14.55  (1.19)d | 0.30  (0.11)i | 111.86  (2.05)d |
| **Agroforestry** | | | | | | | | | |
| A l b | 17.66  (1.3)mn | | 0.80  (0.25)kl | 0.04  (0.02)k | 18.49  (1.29)l | 16.08  (1.23)l | 2.41  (0.53)kl | 0.06  (0.03)jk | 18.56  (1.29)h |
| S m b | 79.44  (1.90)e | | 1.31  (0.47)i | 0.06  (0.27)k | 80.81  (1.9)ef | 70.27  (1.85)ef | 10.54  (1.06)e | 3.01  (0.60)d | 83.82  (1.9)ef |
| T a b | 25.52  (1.4)ijk | | 0.50  (0.2)mn | 0.12  (0.05)k | 26.14  (1.43)ij | 22.73  (1.37)ij | 3.41  (0.64)hi | 0.02  (0.01)k | 26.15  (1.4)kl |
| G a b | 28.30  (1.47)i | | 1.95  (0.36)gh | 0.50  (0.11)i | 30.75  (1.50)i | 26.74  (1.44)i | 4.01  (0.70 )h | 0.03  (0.01)k | 30.78  (1.5)jk |
| M p b | 13.54  (1.2)op | | 0.33  (0.12)no | 0.06  (0.03)k | 13.93  (1.2)m | 12.11  (1.12)m | 1.82  (0.5)mn | 0.08  (0.03)jk | 14.01  (1.17)o |
| L i b | 15.86  (1.2)no | | 0.64  (0.17)lm | 0.88  (0.03)gh | 17.38  (1.26)l | 15.11  (1.20)l | 2.27  (0.5)lm | 0.04  (0.02)k | 17.42  (1.26)n |
| A c b | 49.21  (1.7)fg | | 1.34  (0.37)i | 0.31  (0.18)j | 50.86  (1.7)gh | 44.23  (1.7)gh | 6.63  (0.88)f | 1.04  (0.3)gh | 51.9  (1.72)i |
| M i b | 19.36  (1.3)lmn | | 0.94  (0.25)jk | 0.06  (0.05)k | 20.36  (1.3)kl | 17.71  (1.27)kl | 2.66  (0.56)kl | 0.07  (0.03)jk | 20.44  (1.3)mn |
| Hg | 90.16  (1.9)de | | 2.72  (0.57)f | 1.52  (0.40)f | 94.41  (1.9)de | 82.09  (1.9)de | 12.31  (1.12)e | 2.97  (0.60)d | 97.38  (1.9)de |
| **Commercial Plantation Crops** | | | | | | | | | |
| H b | 51.35  (1.72)fg | | 0.75  (0.24)ij | 0.75  (0.24)h | 53.36  (1.73)g | 46.40  (1.67)g | 6.96  (0.90)f | 1.25  (0.35)g | 54.60  (1.7)hi |
| C n | 20.71  (1.3)klm | | 0.07  (0.03)p | 0.05  (0.02)k | 20.83  (1.3)kl | 18.11  (1.28)kl | 2.72  (0.6)jkl | 0.04  (0.02)k | 20.87  (1.3)mn |
| A c | 17.85  (1.3)mn | | 0.06  (0.03)p | 0.08  (0.03)k | 17.99  (1.28)l | 15.64  (1.22)l | 2.35  (0.52)l | 0.02  (0.01)k | 18.01  (1.28)n |
| M b | 17.44  (1.3)mn | | 0.73  (0.2)klm | 1.61  (0.42)f | 19.78  (1.32)l | 17.20  (1.26)kl | 2.58  (0.6)kl | 1.06  (0.3)gh | 20.85  (1.3)mn |
| T P | 47.17  (1.7)gh | | 29.24  (1.48)a | 0.41  (0.15)ij | 76.82  (1.88)f | 65.30  (1.81)f | 11.52  (1.09)e | 0.25  (0.10)ij | 77.07  (1.9)fg |
| **Fruit Orchard** | | | | | | | | | |
| P g | 6.32  (0.9)qr | | 0.29  (0.11)o | 0.06  (0.02)k | 6.66  (0.9)no | 5.79  (0.8)no | 0.87  (0.27)o | 0.02  (0.01)k | 6.68  (0.9)pq |
| M z | 12.54  (1.13)p | | 0.17  (0.07)op | 0.08  (0.03)k | 12.79  (1.1)m | 11.12  (1.08)m | 1.67  (0.42)n | 0.11  (0.1)jk | 12.90  (1.14)o |
| L c | 7.82  (0.94)q | | 0.06  (0.03)p | 0.07  (0.03)k | 7.95  (0.95)n | 6.92  (0.90)n | 1.04  (0.31)o | 0.09(  0.04)jk | 8.05  (0.95)p |
| A o | 17.86  (1.3)mn | | 0.14  (0.06)op | 0.06  (0.03)k | 18.07  (1.28)l | 15.71  (1.22)l | 2.36  (0.53)l | 0.88  (0.27)h | 18.95  (1.30)n |
| C l | 6.15  (0.85)r | | 0.04  (0.02)p | 0.01  (0.00)k | 6.20  (0.86)o | 5.40  (0.81)o | 0.81  (0.26)o | 0.07  (0.03)jk | 6.27  (0.9)q |
| M i | 22.63  (1.4)jkl | | 0.19  (0.08)op | 0.07  (0.03)k | 22.89  (1.4)jk | 19.90  (1.32)jk | 2.99  (0.6)ijk | 0.81  (0.26)h | 23.70  (1.4)lm |
| **Sem** | **0.03** | | **0.02** | **0.02** | **0.03** | **0.03** | **0.02** | **0.02** | **0.03** |
| **CDp=0.05** | **0.08** | | **0.06** | **0.06** | **0.08** | **0.08** | **0.06** | **0.06** | **0.08** |

**\*figures in parenthesis are log transformed values; TBLS- Tree-based land-use system; *L p- Lagerstroemia parviflora; M c- Michelia champaca; T g- Tectona grandis; S r- Shorea robusta; S m- Swietenia macrophylla; A c- Anthocephalus cadamba; G a- Gmelina arborea; S b- Shorea borneensis; L i- Lagerstroemia indica; M m- Milvus migrans; A l* b- *Albizia lebbeck* based; *S m* b- *Swietenia macrophylla* based; *T a* b- *Terminalia arjuna* based; *G a* b- *Gmelina arborea* based; *M p* b- *Millettia pinnata* based; *L i* b- *Lagerstroemia indica* based; *A c* b- *Anthocephalus cadamba* based; *M i* b- *Mangifera indica* based; Hg- homegarden; *H b*- *Hevea brasiliensis*; *C n*- *Cocos nucifera*; *A c*- *Areca catechu*; *M b*- *Machilus bombycina*; T P- tea plantation; *P g*- *Psidium guajava*; *M z*- *Manilkara zapota*; *L c*- *Litchi chinensis*; *A o*- *Anacardium occidentale*; *C l*- *Citrus lemon*; *M i*- *Mangifera indica*; TSB- total standing biomass; AGB- above ground biomass; BGB- below ground biomass; L B- litter biomass; TB- total biomass**

**Supplementary Table 3. Effect of tree-based land-use systems on soil EC (dS m-1) at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tree-based land-use system** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| *Lagerstroemia parviflora* | 0.25±0.01 | 0.24±0.01 | 0.20±0.01 | **0.23cd** |
| *Michelia champaca* | 0.27±0.01 | 0.25±0.01 | 0.23±0.03 | **0.25bc** |
| *Tectona grandis* | 0.28±0.01 | 0.24±0.03 | 0.22±0.01 | **0.24bcd** |
| *Shorea robusta* | 0.27±0.01 | 0.26±0.01 | 0.24±0.03 | **0.26b** |
| Mixed | 0.30±0.02 | 0.28±0.02 | 0.26±0.03 | **0.28a** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 0.21±0.01 | 0.21±0.02 | 0.18±0.02 | **0.20fg** |
| *Anthocephalus cadamba* | 0.20±0.01 | 0.20±0.02 | 0.19±0.02 | **0.20fg** |
| *Gmelina arborea* | 0.24±0.02 | 0.21±0.03 | 0.17±0.03 | **0.21ef** |
| *Shorea borneensis* | 0.23±0.01 | 0.18±0.02 | 0.15±0.01 | **0.18fghijk** |
| *Tectona grandis* | 0.22±0.01 | 0.20±0.01 | 0.19±0.02 | **0.20ef** |
| *Lagerstroemia indica* | 0.20±0.01 | 0.19±0.02 | 0.17±0.02 | **0.19fghij** |
| *Tectona grandis + Milvus migrans* | 0.20±0.00 | 0.19±0.01 | 0.19±0.02 | **0.20fg** |
| A c + S m | 0.19±0.01 | 0.15±0.01 | 0.13±0.02 | **0.16lmn** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 0.20±0.01 | 0.16±0.02 | 0.15±0.01 | **0.17hijklm** |
| *Swietenia macrophylla* based | 0.18±0.01 | 0.16±0.02 | 0.16±0.02 | **0.16jklm** |
| *Terminalia arjuna* based | 0.20±0.01 | 0.19±0.01 | 0.18±0.02 | **0.19fgh** |
| *Gmelina arborea* based | 0.17±0.01 | 0.17±0.03 | 0.16±0.01 | **0.17de** |
| *Millettia pinnata* based | 0.22±0.01 | 0.19±0.01 | 0.18±0.02 | **0.20ijklm** |
| *Lagerstroemia indica* based | 0.19±0.01 | 0.19±0.01 | 0.13±0.01 | **0.17fg** |
| *Anthocephalus cadamba* based | 0.20±0.02 | 0.19±0.02 | 0.19±0.03 | **0.19hijklm** |
| *Mangifera indica* based | 0.21±0.01 | 0.19±0.02 | 0.16±0.01 | **0.19fgh** |
| Homegarden | 0.24±0.01 | 0.23±0.02 | 0.21±0.03 | **0.22fghij** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 0.19±0.01 | 0.16±0.03 | 0.13±0.02 | **0.16de** |
| *Cocos nucifera* | 0.20±0.03 | 0.18±0.02 | 0.15±0.02 | **0.18klm** |
| *Areca catechu* | 0.19±0.02 | 0.18±0.03 | 0.17±0.02 | **0.16ghijkl** |
| *Machilus bombycina* | 0.20±0.01 | 0.18±0.02 | 0.15±0.02 | **0.18ghijkl** |
| Tea plantations | 0.25±0.02 | 0.23±0.01 | 0.22±0.01 | **0.23cd** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 0.17±0.01 | 0.16±0.03 | 0.14±0.03 | **0.16lmn** |
| *Manilkara zapota* | 0.16±0.01 | 0.14±0.01 | 0.15±0.02 | **0.15mn** |
| *Litchi chinensis* | 0.16±0.01 | 0.13±0.03 | 0.13±0.02 | **0.14m** |
| *Anacardium occidentale* | 0.19±0.01 | 0.19±0.02 | 0.15±0.01 | **0.18ghijkl** |
| *Citrus lemon* | 0.20±0.01 | 0.19±0.02 | 0.17±0.01 | **0.19fghi** |
| *Mangifera indica* | 0.22±0.01 | 0.20±0.03 | 0.15±0.02 | **0.19fghij** |
| **Mean** | **0.21a** | **0.19b** | **0.18c** |  |

**A c + S m- *Anthocephalus cadamba + Swietenia macrophylla***

**Supplementary Table 4. Effect of tree-based land-use systems on soil pH at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tree-based land-use system** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| *Lagerstroemia parviflora* | 4.64±0.04 | 4.74±0.04 | 5.17±0.07 | **4.85pq** |
| *Michelia champaca* | 4.73±0.07 | 4.90±0.04 | 5.20±0.03 | **4.94p** |
| *Tectona grandis* | 4.72±0.09 | 4.74±0.07 | 5.11±0.02 | **4.86pq** |
| *Shorea robusta* | 5.69±0.11 | 5.82±0.05 | 5.79±0.09 | **5.77abc** |
| Mixed | 4.23±0.07 | 5.06±0.08 | 5.16±0.04 | **4.82q** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 5.45±0.04 | 5.73±0.08 | 5.55±0.05 | **5.58ghijk** |
| *Anthocephalus cadamba* | 5.11±0.02 | 5.23±0.05 | 5.38±0.05 | **5.24o** |
| *Gmelina arborea* | 5.19±0.11 | 5.41±0.08 | 5.54±0.12 | **5.38mn** |
| *Shorea borneensis* | 5.74±0.05 | 5.85±0.05 | 5.82±0.07 | **5.80a** |
| *Tectona grandis* | 5.73±0.05 | 5.86±0.05 | 5.83±0.05 | **5.81a** |
| *Lagerstroemia indica* | 5.68±0.10 | 5.77±0.09 | 5.73±0.06 | **5.73abcdef** |
| *Tectona grandis + Milvus migrans* | 5.45±0.09 | 5.61±0.10 | 5.83±0.06 | **5.63efghij** |
| A c + S m | 5.59±0.05 | 5.58±0.09 | 5.84±0.06 | **5.67bcdefgh** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 5.46±0.08 | 5.78±0.02 | 5.64±0.06 | **5.63efghij** |
| *Swietenia macrophylla* based | 5.47±0.11 | 5.66±0.03 | 5.48±0.05 | **5.54ijk** |
| *Terminalia arjuna* based | 5.43±0.06 | 5.67±0.05 | 5.73±0.06 | **5.61fghijk** |
| *Gmelina arborea* based | 5.34±0.08 | 5.58±0.03 | 5.68±0.05 | **5.53ijk** |
| *Millettia pinnata based* | 5.56±0.04 | 5.67±0.05 | 5.71±0.06 | **5.65cdefghij** |
| *Lagerstroemia indica* based | 5.45±0.09 | 5.75±0.04 | 5.74±0.04 | **5.64cdefghi** |
| Anthocephalus cadamba based | 5.65±0.08 | 5.8±0.07 | 5.76±0.09 | **5.74abcde** |
| *Mangifera indica* based | 5.22±0.08 | 5.4±0.04 | 5.62±0.06 | **5.41lmn** |
| Homegarden | 5.19±0.05 | 5.23±0.03 | 5.35±0.09 | **5.23o** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 5.74±0.10 | 5.74±0.06 | 5.79±0.10 | **5.76abcd** |
| *Cocos nucifera* | 5.56±0.11 | 5.65±0.03 | 5.77±0.04 | **5.52jkl** |
| *Areca catechu* | 5.44±0.10 | 5.51±0.04 | 5.62±0.02 | **5.52ijkl** |
| *Machilus bombycina* | 5.19±0.08 | 5.24±0.06 | 5.33±0.04 | **5.25o** |
| Tea plantations | 5.10±0.04 | 5.16±0.09 | 5.67±0.08 | **5.30no** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 5.14±0.08 | 5.23±0.05 | 5.35±0.06 | **5.24o** |
| *Manilkara zapota* | 5.67±0.05 | 5.84±0.05 | 5.84±0.04 | **5.78ab** |
| *Litchi chinensis* | 5.57±0.11 | 5.80±0.07 | 5.90±0.03 | **5.76abc** |
| *Anacardium occidentale* | 5.51±0.07 | 5.69±0.09 | 5.72±0.08 | **5.64defghij** |
| *Citrus lemon* | 5.64±0.09 | 5.65±0.05 | 5.80±0.09 | **5.70abcdefg** |
| *Mangifera indica* | 5.20±0.08 | 5.59±0.05 | 5.68±0.03 | **5.49klm** |
| **Mean** | **5.38c** | **5.51b** | **5.59a** |  |

**A c + S m- *Anthocephalus cadamba + Swietenia macrophylla***

**Supplementary Table 5. Effect of tree-based land-use systems on soil moisture (%) at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tree-based land-use system** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| *Lagerstroemia parviflora* | 27.33±0.22 | 28.70±0.38 | 30.73±0.71 | **28.92bcd** |
| *Michelia champaca* | 26.04±0.36 | 27.41±0.60 | 28.93±0.87 | **27.46defghij** |
| *Tectona grandis* | 26.98±0.51 | 28.14±0.69 | 29.91±0.93 | **28.34cdefgh** |
| *Shorea robusta* | 25.95±0.72 | 25.25±0.67 | 24.03±0.29 | **25.08lm** |
| Mixed | 30.10±0.53 | 32.46±0.69 | 33.18±0.38 | **31.92a** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 25.60±0.20 | 26.24±0.78 | 26.89±0.25 | **26.24ijkl** |
| *Anthocephalus cadamba* | 24.60±0.37 | 29.60±0.75 | 31.84±0.48 | **28.68cdef** |
| *Gmelina arborea* | 24.25±0.62 | 25.51±0.99 | 26.11±0.51 | **25.29klm** |
| *Shorea borneensis* | 21.25±0.63 | 28.82±0.64 | 28.89±0.55 | **26.32ijkl** |
| *Tectona grandis* | 24.60±0.61 | 27.94±0.42 | 28.53±0.09 | **27.02efghijk** |
| *Lagerstroemia indica* | 27.83±0.50 | 29.30±0.26 | 30.79±0.65 | **29.31bc** |
| *Tectona grandis + Milvus migrans* | 26.50±0.63 | 28.63±0.22 | 29.66±0.28 | **28.26cdefgh** |
| A c + S m | 22.91±0.44 | 25.31±0.35 | 25.26±0.18 | **24.49mn** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 25.49±0.47 | 26.44±0.57 | 28.84±0.27 | **26.92fghijk** |
| *Swietenia macrophylla* based | 26.78±0.92 | 28.61±0.66 | 29.89±0.15 | **28.43cdefg** |
| *Terminalia arjuna* based | 25.43±0.35 | 26.79±0.31 | 27.08±0.43 | **26.43ijkl** |
| *Gmelina arborea* based | 24.65±0.97 | 26.76±0.81 | 28.65±0.94 | **26.69ghijkl** |
| *Millettia pinnata based* | 25.02±0.47 | 25.32±0.61 | 27.11±0.91 | **26.48ijkl** |
| *Lagerstroemia indica* based | 25.32±0.85 | 26.52±0.90 | 27.40±2.36 | **26.41ijkl** |
| *Anthocephalus cadamba* based | 23.77±0.28 | 26.96±0.48 | 29.55±0.51 | **26.76ghijk** |
| *Mangifera indica* based | 25.02±0.88 | 25.32±0.64 | 27.11±4.71 | **25.82jklm** |
| Homegarden | 25.99±0.58 | 26.98±0.88 | 29.55±1.01 | **27.5defghij** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 25.94±0.81 | 28.18±0.49 | 30.01±0.54 | **28.04cdefghi** |
| *Cocos nucifera* | 25.26±0.60 | 27.12±0.63 | 28.97±0.59 | **27.12efghij** |
| *Areca catechu* | 25.19±0.33 | 30.66±0.95 | 30.33±0.11 | **28.73cde** |
| *Machilus bombycina* | 25.68±0.16 | 27.05±0.71 | 27.17±0.27 | **26.63hijkl** |
| Tea plantations | 29.50±0.66 | 30.70±0.60 | 31.16±0.43 | **30.45ab** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 24.26±0.92 | 25.84±1.00 | 31.10±0.67 | **27.07efghij** |
| *Manilkara zapota* | 23.13±0.90 | 24.62±0.29 | 25.70±3.74 | **24.48mn** |
| *Litchi chinensis* | 25.97±0.11 | 26.15±0.52 | 27.14±1.03 | **26.42ijkl** |
| *Anacardium occidentale* | 22.22±0.79 | 23.37±0.75 | 24.74±0.50 | **23.44m** |
| *Citrus lemon* | 24.77±0.74 | 25.65±0.44 | 26.93±0.69 | **25.78jklm** |
| *Mangifera indica* | 24.27±0.44 | 26.97±0.60 | 27.91±0.05 | **26.38ijkl** |
| **Mean** | **25.40c** | **26.89b** | **28.61a** |  |

**A c + S m- *Anthocephalus cadamba + Swietenia macrophylla***

**Supplementary Table 6. Effect of tree-based land-use systems on soil available nitrogen (kg ha-1) at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TBLS** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| L p | 250.72±7.32 | 217.80±11.26 | 190.92±3.24 | **219.82cd** |
| *Michelia champaca* | 261.20±6.39 | 207.47±11.42 | 187.36±2.61 | **218.67cd** |
| *Tectona grandis* | 243.06±3.08 | 208.76±6.64 | 181.76±1.99 | **211.19d** |
| *Shorea robusta* | 245.87±4.19 | 223.52±9.83 | 214.85±3.99 | **228.08bc** |
| Mixed | 291.29±3.87 | 246.05±3.83 | 234.40±7.81 | **257.25a** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 197.70±7.22 | 164.23±6.36 | 124.40±7.81 | **162.11ghi** |
| A c | 191.97±2.74 | 150.75±5.82 | 112.82±1.47 | **151.85ijklmn** |
| *Gmelina arborea* | 190.67±7.08 | 147.79±6.20 | 108.96±6.62 | **149.14klmn** |
| *Shorea borneensis* | 192.22±6.02 | 132.00±9.17 | 127.32±2.18 | **150.52jklmn** |
| *Tectona grandis* | 188.09±6.92 | 129.33±3.93 | 110.22±2.44 | **142.55n** |
| *Lagerstroemia indica* | 190.89±6.53 | 141.15±4.66 | 117.67±5.81 | **149.90jklm** |
| T g + M m | 198.78±5.96 | 157.00±5.01 | 125.67±5.70 | **160.48ghijk** |
| A c + S m | 192.83±6.87 | 134.71±3.83 | 113.33±2.60 | **146.96mn** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 202.53±3.93 | 156.77±3.72 | 126.59±3.25 | **161.96ghi** |
| S mbased | 204.65±4.18 | 141.12±4.47 | 137.67±1.45 | **161.14ghij** |
| T abased | 199.99±5.10 | 144.15±6.98 | 118.31±2.83 | **154.15hijklm** |
| *Gmelina arborea* based | 184.00±2.20 | 150.02±1.65 | 123.08±3.14 | **152.37ijklmn** |
| *Millettia pinnata* based | 206.57±8.84 | 143.00±8.50 | 131.16±2.31 | **160.24bghijk** |
| L ibased | 202.71±4.05 | 140.78±5.14 | 122.67±2.33 | **155.39ghijklm** |
| A cbased | 191.38±4.29 | 132.33±9.06 | 124.58±3.29 | **149.43klmn** |
| *Mangifera indica* based | 185.14±2.45 | 166.59±5.01 | 126.25±3.99 | **159.33ghijkl** |
| Homegarden | 250.92±8.29 | 220.53±5.32 | 217.68±8.54 | **230.76b** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 198.82±6.13 | 153.46±8.36 | 111.62±1.69 | **154.64hijklm** |
| *Cocos nucifera* | 190.37±7.32 | 143.95±8.05 | 112.74±1.67 | **149.02klmn** |
| *Areca catechu* | 210.12±2.57 | 132.29±8.90 | 105.88±1.45 | **149.43klmn** |
| *Machilus bombycina* | 186.16±11.19 | 153.40±5.26 | 105.51±0.91 | **148.36lmn** |
| Tea plantations | 261.41±9.84 | 172.80±1.75 | 108.44±6.64 | **180.89e** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 209.17±6.63 | 184.77±8.74 | 154.75±4.37 | **182.90e** |
| *Manilkara zapota* | 192.23±11.22 | 170.24±9.28 | 156.37±7.24 | **172.95ef** |
| *Litchi chinensis* | 209.88±0.96 | 177.13±4.90 | 145.45±3.46 | **177.49e** |
| A o | 193.72±6.94 | 160.41±7.30 | 144.46±4.06 | **166.20fg** |
| *Citrus lemon* | 190.84±9.76 | 169.40±1.72 | 157.00±1.48 | **172.75ef** |
| *Mangifera indica* | 196.77±6.28 | 157.62±4.67 | 141.23±4.60 | **165.21fgh** |
| **Mean** | **209.17a** | **164.71b** | **140.03c** |  |

**TBLS- tree-based land-use system; L p- *Lagerstroemia parviflora*; A c- *Anthocephalus cadamba*; T g + M m- *Tectona grandis + Milvus migrans*; S m- *Swietenia macrophylla*; T a- *Terminalia arjuna*; L i- *Lagerstroemia indica*; A o- *Anacardium occidentale***

**Supplementary Table 7. Effect of tree-based land-use systems on soil available phosphorus (kg ha-1) at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tree based land use system** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| *Lagerstroemia parviflora* | 25.77±0.72 | 19.39±0.88 | 18.14±0.87 | **21.10cd** |
| *Michelia champaca* | 25.08±0.91 | 18.91±0.92 | 17.49±0.72 | **20.49d** |
| *Tectona grandis* | 26.33±0.88 | 22.94±1.01 | 18.09±0.92 | **22.45b** |
| *Shorea robusta* | 26.48±0.52 | 21.06±0.93 | 18.45±0.91 | **22.00bc** |
| Mixed | 30.15±0.54 | 24.42±0.52 | 19.62±0.58 | **24.73a** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 19.33±1.20 | 18.33±0.88 | 15.58±0.89 | **17.75f** |
| *Anthocephalus cadamba* | 17.23±0.62 | 15.03±0.65 | 14.87±0.87 | **15.71hijk** |
| *Gmelina arborea* | 18.16±1.19 | 16.06±0.67 | 15.48±1.10 | **16.57fghi** |
| *Shorea borneensis* | 19.31±0.56 | 16.13±0.64 | 15.01±0.58 | **16.82fghi** |
| *Tectona grandis* | 18.02±0.81 | 16.20±0.74 | 15.96±1.01 | **16.73fghi** |
| *Lagerstroemia indica* | 17.33±1.20 | 17.37±0.69 | 15.23±0.87 | **16.64fghi** |
| T g + M m | 16.45±1.18 | 16.36±1.05 | 14.25±0.90 | **15.68hijk** |
| A c + S m | 18.21±0.85 | 17.12±0.47 | 15.87±1.02 | **17.07fgh** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 16.16±1.04 | 15.68±0.87 | 15.02±0.57 | **15.62ijk** |
| *Swietenia macrophylla* based | 17.34±1.20 | 16.30±0.58 | 15.22±0.91 | **16.29ghij** |
| *Terminalia arjuna* based | 18.03±0.89 | 18.09±0.58 | 16.43±0.97 | **17.52fg** |
| *Gmelina arborea* based | 17.35±1.20 | 15.21±0.41 | 15.16±0.70 | **15.90hij** |
| *Millettia pinnata* based | 16.05±0.80 | 14.89±0.87 | 14.22±0.40 | **15.05jk** |
| *Lagerstroemia indica* based | 17.11±1.06 | 15.57±0.65 | 14.05±0.53 | **15.58ijk** |
| A cbased | 16.18±0.24 | 14.67±0.89 | 14.09±0.48 | **14.98jk** |
| *Mangifera indica* based | 17.21±0.58 | 15.08±0.99 | 16.13±0.65 | **16.14ghij** |
| Homegarden | 23.37±0.35 | 19.82±1.02 | 14.20±0.93 | **19.13e** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 19.20±0.86 | 14.04±0.54 | 13.16±0.45 | **15.47ijk** |
| *Cocos nucifera* | 16.68±0.61 | 16.07±0.49 | 15.47±0.65 | **16.07hij** |
| *Areca catechu* | 17.33±0.88 | 16.16±0.43 | 13.34±0.41 | **15.61ijk** |
| *Machilus bombycina* | 18.60±0.74 | 14.34±0.34 | 11.91±0.35 | **14.95jk** |
| Tea plantations | 28.22±0.51 | 23.43±0.66 | 21.94±1.04 | **24.53a** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 16.16±0.60 | 15.03±0.58 | 13.70±0.45 | **14.96jk** |
| *Manilkara zapota* | 15.11±0.88 | 14.04±0.51 | 13.96±0.77 | **14.37k** |
| *Litchi chinensis* | 16.19±0.67 | 15.54±0.36 | 15.02±0.71 | **15.58ijk** |
| *Anacardium occidentale* | 14.05±0.76 | 13.09±0.58 | 11.62±0.30 | **12.92l** |
| *Citrus lemon* | 15.53±0.40 | 11.34±0.34 | 10.68±0.18 | **12.52l** |
| *Mangifera indica* | 14.25±0.61 | 12.17±0.58 | 10.43±0.49 | **12.28l** |
| **Mean** | **19.03a** | **16.68b** | **15.13c** |  |

**T g- *Tectona grandis*;M m- *Milvus migrans*; A c- *Anthocephalus cadamba*; S m- *Swietenia macrophylla***

**Supplementary Table 8. Effect of tree-based land-use systems on soil available potassium (Kg ha-1) at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TBLS** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| L p | 122.16±9.11 | 116.32±2.33 | 113.28±7.41 | **117.25d** |
| *Michelia champaca* | 124.74±5.26 | 103.25±6.63 | 90.26±6.00 | **106.08cd** |
| *Tectona grandis* | 118.48±1.04 | 110.66±5.81 | 101.40±7.02 | **110.18bc** |
| *Shorea robusta* | 129.49±0.84 | 124.92±2.89 | 90.26±6.00 | **114.89bc** |
| Mixed | 141.14±6.05 | 131.74±4.28 | 114.92±2.69 | **129.27a** |
| **Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 86.10±4.61 | 83.07±4.62 | 78.60±1.05 | **82.50ghi** |
| *Anthocephalus cadamba* | 88.17±1.57 | 73.69±4.82 | 64.38±3.96 | **75.41gklmn** |
| *Gmelina arborea* | 87.61±1.46 | 71.45±2.61 | 64.10±3.15 | **74.38ijklm** |
| *Shorea borneensis* | 91.01±2.77 | 75.18±3.46 | 63.97±7.27 | **76.72hijklm** |
| *Tectona grandis* | 89.23±2.32 | 59.25±5.31 | 54.74±2.90 | **67.74mn** |
| *Lagerstroemia indica* | 87.62±2.21 | 66.27±3.33 | 57.44±3.77 | **70.44jklmn** |
| T g + M m | 90.15±4.05 | 88.50±1.63 | 65.54±7.29 | **81.40ghij** |
| A c + S m | 112.60±7.28 | 103.03±2.45 | 76.80±4.11 | **97.48de** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 126.23±3.77 | 116.48±10.75 | 85.74±5.74 | **109.48bc** |
| *S m* based | 100.41±6.13 | 99.74±0.85 | 81.53±7.14 | **93.89ef** |
| *Terminalia arjuna* based | 94.24±2.65 | 86.62±2.15 | 71.07±6.72 | **83.98ghi** |
| *Gmelina arborea* based | 84.36±4.43 | 80.31±5.50 | 63.94±6.99 | **76.20hijklm** |
| *Millettia pinnata* based | 75.50±8.67 | 66.81±1.98 | 50.72±5.74 | **64.34n** |
| L ibased | 90.29±2.15 | 71.54±4.50 | 67.38±3.74 | **76.40hijklm** |
| A cbased | 109.09±5.84 | 83.43±2.10 | 54.60±7.91 | **82.37ghi** |
| *Mangifera indica* based | 91.35±2.85 | 82.53±7.58 | 79.85±0.88 | **84.58fghi** |
| Homegarden | 87.62±1.92 | 79.92±3.79 | 75.75±8.15 | **81.10ghij** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 107.91±1.10 | 81.53±7.14 | 69.47±5.32 | **86.30fgh** |
| *Cocos nucifera* | 93.27±5.64 | 83.82±7.87 | 71.44±8.32 | **82.84ghi** |
| *Areca catechu* | 106.40±4.03 | 82.72±3.68 | 78.17±9.22 | **89.10fg** |
| *Machilus bombycina* | 94.21±4.53 | 91.55±7.16 | 71.07±6.72 | **85.61fgh** |
| Tea plantations | 123.19±4.64 | 98.47±7.94 | 72.67±6.46 | **98.11de** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 107.76±3.68 | 99.40±2.43 | 84.94±4.94 | **97.37de** |
| *Manilkara zapota* | 99.57±2.40 | 78.46±8.01 | 61.23±9.19 | **79.75ghijk** |
| *Litchi chinensis* | 103.59±2.61 | 76.64±4.04 | 56.20±6.11 | **78.81hijkl** |
| *Anacardium occidentale* | 94.44±3.55 | 75.54±2.62 | 55.41±3.93 | **75.13ijklm** |
| *Citrus lemon* | 93.24±7.41 | 64.57±4.90 | 51.77±4.24 | **69.86klmn** |
| *Mangifera indica* | 94.59±2.32 | 61.79±6.05 | 51.03±5.60 | **69.14lmn** |
| **Mean** | **100.85a** | **86.95b** | **72.42c** |  |

**TBLS- Tree-based land-use system; L p- *Lagerstroemia parviflora*; T g- *Tectona grandis*; M m- *Milvus migrans*; A c- *Anthocephalus cadamba*; S m- *Swietenia macrophylla*; L i- *Lagerstroemia indica***

**Supplementary Table 9. Effect of tree-based land-use systems on C: N ratio of soil at different depths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TBLS** | **0-20 cm** | **20-40 cm** | **40-60 cm** | **Mean** |
| **Forest** |  |  |  |  |
| L p | 163.10±1.15 | 184.89±12.78 | 172.29±2.67 | **173.43b** |
| *Michelia champaca* | 153.90±6.66 | 178.64±5.61 | 168.95±4.01 | **167.16bc** |
| *Tectona grandis* | 162.58±1.42 | 171.40±4.24 | 166.40±1.82 | **166.79bc** |
| *Shorea robusta* | 167.39±2.51 | 180.28±6.30 | 137.31±4.13 | **161.66c** |
| Mixed | 161.58±3.93 | 191.50±3.87 | 138.77±6.33 | **163.95bc** |
| **Forest Tree Plantation** | |  |  |  |
| *Swietenia macrophylla* | 119.51±5.81 | 132.36±13.21 | 157.50±12.21 | **136.45efghi** |
| *Anthocephalus cadamba* | 123.91±2.02 | 136.05±1.83 | 171.66±1.45 | **143.87def** |
| *Gmelina arborea* | 120.83±6.81 | 129.36±10.37 | 165.51±3.94 | **138.57defgh** |
| *Shorea borneensis* | 119.68±2.05 | 150.62±12.43 | 136.45±3.83 | **135.58fghi** |
| *Tectona grandis* | 123.67±5.40 | 151.43±6.35 | 169.32±9.92 | **148.14de** |
| *Lagerstroemia indica* | 122.81±3.75 | 141.62±2.71 | 145.84±11.76 | **136.75defghi** |
| T g + M m | 117.91±4.28 | 120.91±2.47 | 139.82±3.49 | **126.22ijk** |
| A c + S m | 120.29±11.94 | 146.40±4.63 | 152.80±3.90 | **139.83defgh** |
| **Agroforestry** | |  |  |  |
| *Albizia lebbeck* based | 121.31±4.90 | 131.73±3.77 | 131.66±5.56 | **128.23hij** |
| *S m* based | 126.03±4.04 | 137.20±1.67 | 126.26±4.70 | **129.83ghi** |
| *Terminalia arjuna* based | 123.06±5.47 | 135.92±8.21 | 139.78±1.21 | **132.92gfhi** |
| *Gmelina arborea* based | 136.97±6.64 | 131.79±2.33 | 137.77±8.60 | **135.51fghi** |
| *Millettia pinnata* based | 113.41±9.74 | 137.09±9.10 | 139.68±2.93 | **130.06ghi** |
| L i based | 127.38±2.88 | 147.26±4.02 | 154.35±3.67 | **143.00def** |
| A c based | 125.54±6.39 | 145.98±4.08 | 150.30±9.81 | **140.61defg** |
| *Mangifera indica* based | 131.01±8.33 | 118.13±4.99 | 135.54±8.74 | **128.23hij** |
| Homegarden | 139.70±6.55 | 126.24±6.55 | 125.15±7.30 | **130.36ghi** |
| **Commercial Crop Plantation** | | |  |  |
| *Hevea brasiliensis* | 121.91±4.47 | 126.45±9.87 | 147.75±5.66 | **132.03fghi** |
| *Cocos nucifera* | 129.83±2.98 | 131.07±3.27 | 153.66±6.01 | **138.19defgh** |
| *Areca catechu* | 121.56±3.26 | 150.31±9.15 | 173.11±5.10 | **148.33d** |
| *Machilus bombycina* | 133.56±14.94 | 130.45±6.04 | 177.91±3.00 | **147.31de** |
| Tea plantations | 152.84±2.65 | 194.29±5.55 | 262.30±5.77 | **203.15a** |
| **Fruit Orchard** | |  |  |  |
| *Psidium guajava* | 116.12±0.92 | 101.75±2.77 | 105.39±1.10 | **107.75l** |
| *Manilkara zapota* | 126.26±11.54 | 107.66±3.52 | 113.71±7.80 | **115.88kl** |
| *Litchi chinensis* | 113.50±3.26 | 103.55±4.92 | 105.49±4.32 | **107.51l** |
| *Anacardium occidentale* | 122.37±6.80 | 115.28±3.49 | 115.60±6.12 | **117.75jkl** |
| *Citrus lemon* | 118.17±0.13 | 110.87±4.89 | 103.18±8.14 | **110.74l** |
| *Mangifera indica* | 119.93±4.07 | 115.64±7.94 | 117.80±5.72 | **117.79jkl** |
| **Mean** | **130.23c** | **139.82b** | **146.64a** |  |

**TBLS- Tree-based land-use system; L p- *Lagerstroemia parviflora*; T g- *Tectona grandis*; M m- *Milvus migrans*; A c- *Anthocephalus cadamba*; S m- *Swietenia macrophylla*; L i- *Lagerstroemia indica***

**Supplementary Table 10. Effect of tree-based land-use systems on biomass carbon stock and partitioning (Mg ha-1)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TBLS** | | **TC** | **SC** | **HC** | **TPC** | **AGC** | **BGC** | **LC** | **TBC** |
| **Forest** | | | | | | | | | |
| L p | | 65.18  \*(1.8)c | 5.70  (0.8)c | 1.61  (0.4)c | 72.49  (1.9)c | 63.03  (1.81)c | 9.45  (1.0)c | 7.05  (0.9)a | 79.54  (1.9)c |
| M c | | 70.35  (1.9)c | 5.10  (0.8)c | 1.70  (0.4)c | 77.15  (1.9)c | 67.08  (1.83)c | 10.06  (1.0)c | 4.68  (0.8)b | 81.82  (1.9)c |
| T g | | 69.84  (1.9)c | 5.27  (0.8)c | 2.07  (0.5)b | 77.18  (1.9)c | 67.11  (1.83)c | 10.07  (1.0)c | 7.24  (0.9)a | 84.42  (1.9)c |
| S r | | 128.0  (2.1)b | 3.72  (0.7)d | 1.40  (0.4)cd | 133.1  (2.1)b | 115.77  (2.07)b | 17.37  (1.3)b | 6.21  (0.9)a | 139.35  (2.15)b |
| Mixed | | 371.6  (2.6)a | 8.90  (0.9)b | 3.31  (0.6)a | 383.8  (2.6)a | 333.74  (2.52)a | 50.06  (1.7)a | 6.80  (0.9)a | 390.61  (2.59)a |
| **Forest Tree Plantation** | | | | | | | | | |
| S m | | 19.57  (1.3)h | 1.03  (0.3)g | 0.47  (0.2)gh | 21.06  (1.3)h | 18.31  (1.29)h | 2.75  (0.6)g | 1.79  (0.5)d | 22.85  (1.38)i |
| A c | | 29.14  (1.5)f | 0.45  (0.2)jkl | 0.58  (0.20)g | 30.17  (1.5)g | 26.23  (1.43)g | 3.94  (0.7)f | 1.75  (0.4)a | 31.92  (1.52)gh |
| G a | | 13.68  (1.2)ij | 0.77  (0.25)hi | 0.46  (0.2)gh | 14.91  (1.2)i | 12.96  (1.14)i | 1.94  (0.5)h | 1.16  (0.3)e | 16.07  (1.23)j |
| S b | | 13.80  (1.2)ij | 0.99  (0.3)gh | 0.43  (0.2)gh | 15.22  (1.2)i | 13.23  (1.15)i | 1.99  (0.5)h | 0.87  (0.3)f | 16.09  (1.23)j |
| T g | | 11.32  (1.1)kl | 0.95  (0.3)gh | 0.45  (0.2)gh | 12.72  (1.1)ij | 11.06  (1.08)ij | 1.66  (0.4)hij | 0.48  (0.2)gh | 13.21  (1.2)jkl |
| L i | | 19.52  (1.3)h | 0.78  (0.25)hi | 1.18  (0.3)de | 21.47  (1.4)h | 18.67  (1.29)h | 2.80  (0.58)g | 2.26  (0.51)c | 23.74  (1.39)i |
| T g+M m | | 41.11  (1.6)e | 0.59  (0.20)ij | 0.42  (0.15)h | 42.12  (1.6)ef | 36.62  (1.57)ef | 5.49  (0.81)e | 0.87  (0.27)f | 42.99  (1.64)ef |
| A c+ S m | | 51.95  (1.7)d | 2.77  (0.57)e | 1.06  (0.31)e | 55.78  (1.8)d | 48.50  (1.69)d | 7.28  (0.92)d | 0.15  (0.06)i | 55.93  (1.75)d |
| **Agroforestry** | | | | | | | | | |
| A l b | 8.83  (0.9)mn | | 0.40  (0.15)kl | 0.02  (0.01)k | 9.25  (1.0)l | 8.04  (0.95)l | 1.21  (0.34)kl | 0.03  (0.01)k | 9.28  (1.01)h |
| S m b | 39.72  (1.6)e | | 0.66  (0.22)i | 0.03  (0.01)k | 40.41  (1.6)ef | 35.13  (1.56)ef | 5.27  (0.80)e | 1.50  (0.40)d | 41.91  (1.63)ef |
| T a b | 12.76  (1.1)ijk | | 0.25  (0.1)mn | 0.06  (0.03)k | 13.07  (1.2)ij | 11.36  (1.09)ij | 1.70  (0.43)hi | 0.01  (0.00)k | 13.08  (1.15)kl |
| G a b | 14.15  (1.18)i | | 0.97  (0.3)gh | 0.25  (0.10)i | 15.38  (1.2)i | 13.37  (1.16)i | 2.01  (0.48)h | 0.01  (0.01)k | 15.39  (1.21)jk |
| M p b | 6.77  (0.9)op | | 0.16  (0.1)no | 0.03  (0.01)k | 6.97  (0.9)m | 6.06  (0.85)m | 0.91  (0.3)mn | 0.04  (0.02)jk | 7.00  (0.90)o |
| L i b | 7.93  (0.9)no | | 0.32  (0.1)lm | 0.44  (0.2)gh | 8.69  (0.9)l | 7.56  (0.93)l | 1.13  (0.3)lm | 0.02  (0.01)k | 8.71  (0.98)n |
| A c b | 24.61  (1.4)fg | | 0.67  (0.22)i | 0.15  (0.06)j | 25.43  (1.4)gh | 22.11  (1.4)gh | 3.32  (0.63)f | 0.52  (0.2)gh | 25.95  (1.43)i |
| M i b | 9.68  (1.0)mn | | 0.47  (0.17)jk | 0.03  (0.01)k | 10.18  (1.05)kl | 8.85  (0.99)kl | 1.33  (0.37)kl | 0.04  (0.02)jk | 10.22  (1.1)mn |
| Hg | 45.08  (1.7)de | | 1.36  (0.37)f | 0.76  (0.25)f | 47.20  (1.7)de | 41.05  (1.6)de | 6.16  (0.85)e | 1.49  (0.39)d | 48.69  (1.7)de |
| **Commercial Plantation Crops** | | | | | | | | | |
| H b | 25.68  (1.4)fg | | 0.37  (0.14)ij | 0.37  (0.14)h | 26.42  (1.44)g | 22.98  (1.38)g | 3.45  (0.65)f | 0.62  (0.21)g | 27.05  (1.45)hi |
| C n | 10.36  (1.1)klm | | 0.04  (0.02)p | 0.02  (0.01)k | 10.42  (1.06)kl | 9.06  (1.00)kl | 1.36  (0.4)jkl | 0.02  (0.01)k | 10.44  (1.1)mn |
| A c | 8.93  (1.0)mn | | 0.03  (0.01)p | 0.04  (0.02)k | 8.99  (1.00)l | 7.82  (0.95)l | 1.17  (0.34)l | 0.01  (0.00)k | 9.00  (1.00)n |
| M b | 8.72  (0.9)mn | | 0.37  (0.1)klm | 0.81  (0.26)f | 9.89  (1.04)l | 8.60  (0.98)kl | 1.29  (0.36)kl | 0.53  (0.2)gh | 10.42  (1.1)mn |
| T P | 23.58  (1.4)gh | | 14.62  (1.19)a | 0.21  (0.08)ij | 38.41  (1.59)f | 32.65  (1.52)f | 5.76  (0.82)e | 0.13  (0.05)ij | 38.54  (1.6)fg |
| **Fruit Orchard** | | | | | | | | | |
| P g | 3.16  (0.6)qr | | 0.14  (0.06)o | 0.03  (0.01)k | 3.33  (0.6)no | 2.90  (0.6)no | 0.43  (0.16)o | 0.01  (0.01)k | 3.34  (0.6)pq |
| M z | 6.27  (0.9)p | | 0.08  (0.03)op | 0.04  (0.02)k | 6.39  (0.86)m | 5.56  (0.81)m | 0.83  (0.26)n | 0.06  (0.02)jk | 6.45  (0.87)o |
| L c | 3.91  (0.7)q | | 0.03  (0.01)p | 0.03  (0.01)k | 3.98  (0.70)n | 3.46  (0.65)n | 0.52  (0.18)o | 0.05  (0.02)jk | 4.02  (0.70)p |
| A o | 8.93  (1.0)mn | | 0.07  (0.03)op | 0.03  (0.01)k | 9.03  (1.00)l | 7.85  (0.95)l | 1.18  (0.34)l | 0.44  (0.16)h | 9.47  (1.02)n |
| C l | 3.08  (0.6)r | | 0.02  (0.01)p | 0.01  (0.00)k | 3.10  (0.61)o | 2.70  (0.57)o | 0.40  (0.15)o | 0.04  (0.02)jk | 3.14  (0.62)q |
| M i | 11.31  (1.1)jkl | | 0.10  (0.04)op | 0.04  (0.02)k | 11.44  (1.09)k | 9.95  (1.04)k | 1.49  (0.4)ijk | 0.40  (0.15)h | 11.85  (1.1)lm |
| **Sem** | 0.03 | | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 |
| **CDp=0.05** | 0.08 | | 0.05 | 0.05 | 0.07 | 0.07 | 0.05 | 0.05 | 0.07 |

**\*figures in parenthesis are log transformed values; TBLS- Tree-based land-use system; *L p- Lagerstroemia parviflora; M c- Michelia champaca; T g- Tectona grandis; S r- Shorea robusta; S m- Swietenia macrophylla; A c- Anthocephalus cadamba; G a- Gmelina arborea; S b- Shorea borneensis; L i- Lagerstroemia indica; M m- Milvus migrans; A l* b- *Albizia lebbeck* based; *S m* b- *Swietenia macrophylla* based; *T a* b- *Terminalia arjuna* based; *G a* b- *Gmelina arborea* based; *M p* b- *Millettia pinnata* based; *L i* b- *Lagerstroemia indica* based; *A c* b- *Anthocephalus cadamba* based; *M i* b- *Mangifera indica* based; Hg- homegarden; *H b*- *Hevea brasiliensis*; *C n*- *Cocos nucifera*; *A c*- *Areca catechu*; *M b*- *Machilus bombycina*; T P- tea plantation; *P g*- *Psidium guajava*; *M z*- *Manilkara zapota*; *L c*- *Litchi chinensis*; *A o*- *Anacardium occidentale*; *C l*- *Citrus lemon*; *M i*- *Mangifera indica*; TC- tree carbon; SC- shrub carbon, HC- herb carbon; TPC- total plant carbon; AGC- above ground carbon; BGC- below ground carbon; L C- litter carbon; TBC- total biomass carbon**

**Supplementary Table 11. Effect of tree-based land-use system on ecosystem carbon (Mg ha-1)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TBLS** | **TPC** | **LtC** | **SOC** | **EmC** |
| **Forest** | | | | |
| L p | 72.49(1.87)\*c | 7.05(0.90)ab | 113.77(2.06)b | 193.31(2.29)c |
| M c | 77.15(1.89)c | 4.68(0.75)c | 108.73(2.04)bc | 190.55(2.28)c |
| T g | 77.18(1.89)c | 7.24(0.91)a | 105.51(2.03)bc | 189.93(2.28)c |
| S r | 133.13(2.13)b | 6.21(0.86)b | 110.82(2.05)bc | 250.16(2.40)b |
| Mixed | 383.81(2.58)a | 6.80(0.89)ab | 126.67(2.11)a | 517.27(2.71)a |
| **Forest Tree Plantation** | | | | |
| S m | 21.06(1.34)h | 1.79(0.45)e | 64.58(1.82)e | 87.44(1.95)fgh |
| A c | 30.17(1.49)g | 1.75(0.44)e | 63.64(1.81)ef | 95.55(1.98)fgh |
| G a | 14.91(1.20)i | 1.16(0.33)f | 60.00(1.8)efgh | 76.07(1.89)hijk |
| S b | 15.22(1.21)i | 0.87(0.27)g | 60.03(1.8)efgh | 76.12(1.88)ijk |
| T g | 12.72(1.14)ij | 0.48(0.17)hi | 61.50(1.8)efgh | 74.70(1.88)ijk |
| L i | 21.47(1.35)h | 2.26(0.51)d | 60.48(1.8)efgh | 84.21(1.93)fgh |
| T g + M m | 42.12(1.63)fg | 0.87(0.27)g | 60.00(1.8)efgh | 102.99(2.02)efg |
| A c + S m | 55.78(1.75)d | 0.15(0.06)j | 60.07(1.8)efgh | 116.02(2.07)e |
| **Agroforestry** | | | | |
| A l based | 9.25(1.01)l | 0.03(0.01)j | 61.85(1.8)efgh | 71.14(1.86)ijk |
| S mbased | 40.41(1.62)ef | 1.50(0.40)e | 62.49(1.8)efgh | 104.40(2.02)efg |
| T a based | 13.07(1.15)ij | 0.01(0.00)j | 60.58(1.8)efgh | 73.65(1.87)ijk |
| G abased | 15.38(1.21)i | 0.01(0.01)j | 61.91(1.8)efgh | 77.31(1.89)hijk |
| M p based | 6.97(0.90)m | 0.04(0.02)j | 61.01(1.8)efgh | 68.03(1.8)jklm |
| L I based | 8.69(0.98)l | 0.02(0.01)j | 62.44(1.82)e | 71.14(1.86)ijk |
| A cbased | 25.43(1.42)g | 0.52(0.18)hi | 61.94(1.80)efgh | 87.90(1.95)fgh |
| M ibased | 10.18(1.05)kl | 0.04(0.02)j | 60.9(1.79)efgh | 71.12(1.86)ijk |
| Hg | 47.20(1.68)d | 1.49(0.39)e | 90.34(1.96)d | 139.02(2.15)d |
| **Commercial Plantation Crops** | | | | |
| H b | 26.42(1.44)g | 0.62(0.21)h | 60.05(1.8)efgh | 87.10(1.94)fgh |
| C n | 10.42(1.06)kl | 0.02(0.01)j | 60.8(1.79)efgh | 71.24(1.86)ijk |
| A c | 8.99(1.00)l | 0.01(0.00)j | 63.59(1.81)efg | 72.60(1.87)ijk |
| M b | 9.89(1.04)kl | 0.53(0.19)hi | 63.24(1.81)efg | 73.66(1.87)ijk |
| T p | 38.41(1.59)f | 0.13(0.05)j | 103.19(2.02)c | 141.74(2.15)d |
| **Fruit Orchard** | | | | |
| P g | 3.33(0.64)no | 0.01(0.01)j | 59.40(1.8)efgh | 62.74(1.8)jklm |
| M z | 6.39(0.86)m | 0.06(0.02)j | 60.04(1.8)efgh | 66.48(1.83)jklm |
| L c | 3.98(0.70)n | 0.05(0.02)j | 57.45(1.77)h | 61.48(1.80)jklm |
| A o | 9.03(1.00)l | 0.44(0.16)hi | 58.72(1.78)fgh | 68.19(1.84)jklm |
| C l | 3.10(0.61)o | 0.04(0.02)j | 57.63(1.77)gh | 60.77(1.79)jklm |
| M i | 11.44(1.09)jk | 0.40(0.15)i | 58.31(1.77)fgh | 70.16(1.85)ijk |
| **Sem** | **0.03** | **0.02** | **0.01** | **0.02** |
| **CDp=0.05** | **0.07** | **0.05** | **0.04** | **0.06** |

**\*figures in parenthesis are log transformed values; TBLS- Tree-based land-use system; L p- *Lagerstroemia* *parviflora*; M c- *Michelia* *champaca*; T g- *Tectona* *grandis*; S r- *Shorea* *robusta*; S m- *Swietenia* *macrophylla*; A c- *Anthocephalus* *cadamba*; G a- *Gmelina* *arborea*; S b- *Shorea* *borneensis*; L i- *Lagerstroemia* *indica*; M m- *Milvus* *migrans*; A l- *Albizia lebbeck*; T a- *Terminalia* *arjuna*; M p- *Millettia*  *pinnata*;L i- *Lagerstroemia* *indica*; M i- *Mangifera* *indica*; Hg- homegarden; H b- *Hevea* *brasiliensis*; C n- *Cocos* *nucifera*; A c- *Areca* *catechu*; M b- *Machilus* *bombycina*; T p- tea plantations; P g- *Psidium* *guajava*; M z- *Manilkara* *zapota*; L c- *Litchi* *chinensis*; A o- *Anacardium* *occidentale*; C l- *Citrus* *lemon*; TPC- total plant carbon; Lt C- litter carbon; SOC- soil organic carbon (up to 60 cm soil depth); EC- ecosystem carbon**