

Supplementary material for

Importance of sugarcane straw maintenance to prevent soil organic matter depletion in a Nitisol in the central-southern region of Brazil

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Material and methods

Equations to calculate the carbon management index (CMI) as described in Blair *et al.* (1995):

$$CMI(\%) = CPI \times LI \times 100$$

Where, CPI is the carbon pool index (equation S1) and LI is the lability index (equation S2)

$$CPI = \left(\frac{C_{treat}}{C_{ref}} \right) \quad (S1)$$

Where, C_{treat} is the soil C stocks under treatments (MR, HR and TR) and C_{ref} is the soil C stocks under reference area (NR)

$$LI = \left(\frac{L_{treat}}{L_{ref}} \right) \quad (S2)$$

Where, L_{treat} is the C lability (equation S3) under treatments (MR, HR and TR) and L_{ref} is the C lability under reference area (NV)

$$L = \left(\frac{C_L}{C - C_L} \right) \quad (S3)$$

Where, C_L is the labile-C fraction (g m^{-2}) and C is the soil C stocks (g m^{-2})

Results

Table S1. Statistical analyses responses for variables studied in an Eutric Nitisol in Igarapé do Tietê, São Paulo state – Brazil

| Analyses responses | [†] C | N | C _L | MBC | MBN | C:N | MBC:MBN | MBC:C | MBN:N | C _L :C | MBC:C _L | CMI |
|----------------------------|---------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|----------------------|
| First year [§] | | | | | | | | | | | | |
| <i>F</i> -value blocks | 1.451 ^{ns} | 1.046 ^{ns} | 1.579 ^{ns} | 1.701 ^{ns} | 2.530 ^{ns} | 1.504 ^{ns} | 1.534 ^{ns} | 0.137 ^{ns} | 2.554 ^{ns} | 0.326 ^{ns} | 3.678 ^{ns} | 0.4330 ^{ns} |
| <i>F</i> -value treatments | 0.958 ^{ns} | 0.901 ^{ns} | 3.712 ^{ns} | 2.314 ^{ns} | 2.554 ^{ns} | 1.262 ^{ns} | 2.087 ^{ns} | 1.918 ^{ns} | 1.615 ^{ns} | 2.051 ^{ns} | 1.125 ^{ns} | 27.531 ^{**} |
| SMD | 3.51 | 0.55 | 9.26 | 10.25 | 1.07 | 2.55 | 4.91 | 0.52 | 0.57 | 0.65 | 6.09 | 5.09 |
| C.V.(%) | 5.93 | 10.82 | 4.74 | 9.35 | 15.41 | 9.79 | 13.62 | 12.70 | 19.05 | 8.91 | 4.90 | 2.48 |
| Second year | | | | | | | | | | | | |
| <i>F</i> -value blocks | 1.437 ^{ns} | 0.984 ^{ns} | 1.803 ^{ns} | 1.683 ^{ns} | 2.315 ^{ns} | 1.527 ^{ns} | 1.643 ^{ns} | 0.135 ^{ns} | 2.057 ^{ns} | 0.323 ^{ns} | 3.795 ^{ns} | 0.935 ^{ns} |
| <i>F</i> -value treatments | 15.938 [*] | 0.131 ^{ns} | 20.134 ^{**} | 49.957 ^{**} | 12.147 ^{**} | 1.172 ^{ns} | 15.912 ^{**} | 3.679 ^{ns} | 8.082 [*] | 3.974 [*] | 3.565 ^{ns} | 34.651 ^{**} |
| SMD | 1.01 | 0.17 | 11.28 | 17.05 | 2.03 | 2.73 | 2.62 | 0.98 | 0.26 | 0.52 | 7.52 | 4.36 |
| C.V.(%) | 5.88 | 11.44 | 9.85 | 15.01 | 13.49 | 8.99 | 13.81 | 12.51 | 9.70 | 8.82 | 4.87 | 2.32 |

[†] Variables: C = C stock; N = N stock; C_L = labile-C; MBC = microbial biomass carbon; MBN = microbial biomass nitrogen; CMI = carbon management index. [§]First year: October 2015 to November 2016, Second year: November 2016 to October 2017. SMD = significant minimum difference; C.V. = coefficient of variation. ** significance level at 1%; * significance level at 5%; ns = no significant.

Table S2. Soil temperature and moisture to different rates of straw removal in an Eutric Nitisol in Igaracú do Tietê, São Paulo state – Brazil. NR: no removal; MR: medium removal; HR: high removal; TR: Total removal.

| Sampled days | First year [§] | | | | | Second year | | | | |
|---|-------------------------|------|-------|-------|-------|-------------|------|-------|-------|-------|
| | 30 d | 60 d | 120 d | 180 d | 360 d | 30 d | 60 d | 120 d | 180 d | 360 d |
| Soil temperature (°C) [†] | | | | | | | | | | |
| NR | 25.4 | 25.6 | 23.4 | 19.2 | 22.0 | 24.6 | 26.6 | 26.6 | 19.3 | 22.7 |
| MR | 26.3 | 26.2 | 23.6 | 19.3 | 22.7 | 25.1 | 27.3 | 26.4 | 19.8 | 22.6 |
| HR | 26.9 | 27.9 | 24.7 | 19.8 | 23.1 | 25.9 | 28.0 | 22.7 | 19.8 | 22.9 |
| TR | 27.1 | 28.7 | 24.8 | 19.6 | 23.2 | 26.1 | 28.2 | 22.7 | 20.1 | 22.8 |
| Soil moisture (g g ⁻¹ soil) [‡] | | | | | | | | | | |
| NR | 0.15 | 0.16 | 0.13 | 0.12 | 0.16 | 0.14 | 0.17 | 0.14 | 0.11 | 0.15 |
| MR | 0.12 | 0.14 | 0.13 | 0.12 | 0.16 | 0.13 | 0.15 | 0.15 | 0.11 | 0.15 |
| HR | 0.11 | 0.13 | 0.13 | 0.12 | 0.15 | 0.11 | 0.13 | 0.12 | 0.11 | 0.14 |
| TR | 0.11 | 0.12 | 0.13 | 0.12 | 0.15 | 0.10 | 0.13 | 0.10 | 0.09 | 0.14 |

[§] First year: October 2015 to November 2016, Second year: November 2016 to October 2017. [†] Soil temperature (°C) was recorded at three points using an automated system that performs one measurement per hour and is equipped with copper–constantan thermopile sensors installed at the 5 cm soil depths. [‡] Soil moisture (g g⁻¹ soil) was determined on disturbed samples collected from three points at the 5 cm soil depths. Soil water content was determined by oven-drying (105°C) the samples until constant mass was reached.