

Supplementary Table S1 - Chemical, physical and mineralogical properties evaluated in samples from the protected cultivation environment (CP) from the 25 sampled sites and extractor/methodology used.

| Variable ⁽¹⁾ | Extractor (methodology) ⁽²⁾ |
|--------------------------------------|---|
| pH (water) | Soil/water relation 1:1 |
| Total Acidity (H+Al) | SMP Index |
| Available P | Mehlich-1 |
| Available K | Mehlich-1 |
| Exchangeable Na | Mehlich-1 |
| Exchangeable Ca | KCl 1 mol L ⁻¹ |
| Exchangeable Mg | KCl 1 mol L ⁻¹ |
| Exchangeable Al | KCl 1 mol L ⁻¹ |
| CEC _{effective} | Ca + Mg + K + Al |
| CEC _{pH 7,0} | Ca + Mg + K + Na + (H+Al) |
| Exchangeable aluminum saturation (m) | (Al/CTC _{efetiva})*100 |
| Base saturation (V) | ((Ca + Mg + K) / CTC _{pH 7,0})*100 |
| Available Cu | Mehlich-1/EAA-ICP |
| Available Zn | Mehlich-1/EAA-ICP |
| Extractable S | Ca (H ₂ PO ₄) (500 mg L ⁻¹ P) |
| Available B | Hot Water |
| Organic Matter | Sulfocromic oxidation /colorimetry |
| Clay content | Densimetry |

¹ According to the procedures described by Tedesco et al., 1995. ² Source: SBCS-NRS, 2016.

Supplementary Table S2 - Identification, municipalities, chemical, physical and mineralogical properties evaluated at 25 sample sites of the protected cultivation environment (CP).

| Id ¹ . | Municipalities | pH water 1:1 | Ca | Mg | Al | H+Al | CEC ^{effective} _e | Saturation (%) | | SMP index | %OM | % Clay | Texture | S | P ³ Mehlich | K | CEC _{pH7} | K | Cu | Zn | B |
|-------------------|-----------------|--------------------|-----------------------|-----|-----|------|---------------------------------------|----------------|------|--------------|-------|--------|---------|---------------------|------------------------|-----------------------|--------------------|---------------------|-------------|------|-----|
| | | | cmol dm ⁻³ | | | | | | Al | | Bases | m/v | | mg dm ⁻³ | | cmol dm ⁻³ | | mg dm ⁻³ | | | |
| 1R3 | Santa Maria | 6.2 | 7.6 | 2.3 | 0.0 | 2.2 | 10.7 | 0.0 | 83.0 | 6.6 | 3.5 | 14.0 | 4 | 18.9 | 449.8 | 0.8 | 12.9 | 332 | 9.3 | 9.3 | 0.8 |
| 2R3 | Santa Maria | 6.5 | 11.1 | 2.6 | 0.0 | 2.2 | 15.1 | 0.0 | 87.4 | 6.6 | 3.1 | 14.0 | 4 | 16.9 | 449.8 | 1.4 | 17.3 | 540 | 3.4 | 15.1 | 0.7 |
| 3R1 | Cruz Alta | 5.3 | 5.4 | 2.8 | 0.1 | 13.7 | 9.0 | 1.1 | 39.6 | 5.0 | 3.0 | 47.0 | 2 | 13.3 | 304.0 | 0.8 | 22.6 | 304 | 13.9 | 3.2 | 0.8 |
| 4R4 ² | Cruz Alta | 7.1 | 10.1 | 3.6 | 0.0 | 0.4 | 14.4 | 0.0 | 97.3 | 8.0 | 3.3 | 19.0 | 4 | 14.4 | 449.8 | 0.7 | 14.8 | 260 | 3.8 | 7.0 | 0.7 |
| 5R2 | Caçapava do Sul | 6.3 | 8.9 | 2.5 | 0.0 | 1.0 | 12.0 | 0.0 | 92.1 | 7.3 | 3.2 | 17.0 | 4 | 12.5 | 449.8 | 0.6 | 13.0 | 248 | 7.1 | 16.5 | 0.8 |
| 6R4 | Caçapava do Sul | 6.6 | 15.4 | 7.2 | 0.0 | 2.2 | 23.0 | 0.0 | 91.2 | 6.6 | 3.4 | 24.0 | 3 | 13.4 | 147.7 | 0.4 | 25.2 | 140 | 1.0 | 5.0 | 0.7 |
| 7R5 | Turuçu | 4.8 | 2.1 | 0.7 | 0.5 | 1.7 | 3.5 | 14.3 | 63.9 | 6.8 | 2.8 | 16.0 | 4 | 10.0 | 202.4 | 0.1 | 4.7 | 56 | 1.0 | 2.6 | 0.7 |
| 8R3 | São Vic. do Sul | 6.6 | 7.9 | 2.9 | 0.0 | 5.5 | 11.3 | 0.0 | 67.0 | 5.8 | 3.3 | 14.0 | 4 | 14.8 | 101.8 | 0.5 | 16.8 | 180 | 0.2 | 0.9 | 0.7 |
| 9R1 | Feliz | 7.4 | 6.3 | 3.2 | 0.0 | 2.0 | 10.9 | 0.0 | 84.9 | 6.7 | 2.8 | 14.0 | 4 | 21.4 | 449.8 | 1.4 | 12.9 | 552 | 12.5 | 17.7 | 0.8 |
| 10R4 | Cacequi | 5.4 | 6.8 | 3.9 | 0.1 | 0.8 | 12.2 | 0.8 | 93.5 | 7.5 | 4.0 | 9.0 | 4 | 22.0 | 449.8 | 1.4 | 12.9 | 548 | 1.3 | 13.7 | 0.8 |
| 11R1 | Bom Princípio | 5.9 | 3.0 | 1.1 | 0.0 | 3.9 | 4.5 | 0.0 | 53.2 | 6.1 | 2.9 | 9.0 | 4 | 11.3 | 449.8 | 0.3 | 8.4 | 128 | 10.0 | 12.2 | 0.6 |

| | | | | | | | | | | | | | | | | | | | | | |
|------|-----------------|-----|------|-----|-----|-----|------|-----|------|-----|-----|------|---|------|-------|-----|------|-----|-------------|------|-----|
| 12R1 | Cruzeiro do Sul | 7.2 | 12.9 | 2.7 | 0.0 | 2.0 | 16.9 | 0.0 | 89.6 | 6.7 | 2.9 | 36.0 | 3 | 8.4 | 326.4 | 1.3 | 18.9 | 520 | 6.5 | 7.8 | 0.7 |
| 13R1 | Venâncio Aires | 6.7 | 14.8 | 6.0 | 0.0 | 1.4 | 22.9 | 0.0 | 94.1 | 7.0 | 4.0 | 32.0 | 3 | 13.6 | 500.0 | 2.0 | 24.3 | 800 | 7.7 | 16.8 | 0.8 |
| 14R3 | S. Cruz do Sul | 6.7 | 11.7 | 2.1 | 0.0 | 2.2 | 14.4 | 0.0 | 86.5 | 6.6 | 3.4 | 14.0 | 4 | 10.5 | 500.0 | 0.6 | 16.6 | 228 | 1.4 | 5.2 | 1.9 |
| 15R2 | São Sepé | 5.5 | 4.3 | 1.7 | 0.0 | 1.6 | 6.9 | 0.0 | 81.2 | 6.9 | 3.1 | 16.0 | 4 | 10.7 | 326.4 | 1.0 | 8.5 | 404 | 3.3 | 12.1 | 1.3 |
| 16R3 | São Gabriel | 5.9 | 7.5 | 2.5 | 0.0 | 4.4 | 10.6 | 0.0 | 70.8 | 6.0 | 3.4 | 18.0 | 4 | 16.8 | 370.3 | 0.6 | 15.0 | 240 | 2.8 | 15.9 | 0.8 |
| 17R1 | Erechim | 6.4 | 14.7 | 5.8 | 0.0 | 2.5 | 22.6 | 0.0 | 89.9 | 6.5 | 3.7 | 29.0 | 3 | 17.7 | 500.0 | 2.0 | 25.1 | 800 | 8.5 | 43.1 | 0.7 |
| 18R1 | Caxias do Sul | 4.9 | 9.3 | 3.2 | 0.3 | 2.2 | 14.6 | 2.1 | 86.7 | 6.6 | 3.9 | 14.0 | 4 | 15.1 | 359.2 | 1.9 | 16.5 | 728 | 8.2 | 30.6 | 0.8 |
| 19R2 | Canguçu | 5.9 | 6.4 | 2.5 | 0.0 | 8.7 | 10.0 | 0.0 | 53.4 | 5.4 | 3.4 | 24.0 | 3 | 18.4 | 420.5 | 1.1 | 18.7 | 424 | 1.1 | 7.1 | 0.7 |
| 20R5 | Camaquã | 4.8 | 5.1 | 0.9 | 0.2 | 2.2 | 6.6 | 3.0 | 74.1 | 6.6 | 2.9 | 19.0 | 4 | 15.5 | 449.8 | 0.4 | 8.6 | 160 | 2.6 | 9.5 | 0.8 |
| 21R1 | Passo Fundo | 6.0 | 11.5 | 3.9 | 0.0 | 6.2 | 16.2 | 0.0 | 72.2 | 5.7 | 3.4 | 30.0 | 3 | 12.5 | 500.0 | 0.7 | 22.4 | 284 | 8.2 | 41.8 | 0.7 |
| 22R4 | Tabaí | 6.1 | 10.4 | 3.7 | 0.0 | 2.5 | 16.0 | 0.0 | 86.3 | 6.5 | 3.7 | 9.0 | 4 | 8.8 | 500.0 | 1.9 | 18.5 | 732 | 3.3 | 51.4 | 0.7 |
| 23R1 | Santa Rosa | 5.3 | 7.9 | 1.7 | 0.2 | 6.2 | 11.0 | 1.8 | 63.7 | 5.7 | 3.1 | 47.0 | 2 | 9.3 | 309.0 | 1.2 | 17.0 | 488 | 60.0 | 32.6 | 0.8 |
| 24R1 | Itaqui | 6.1 | 8.8 | 3.6 | 0.0 | 2.0 | 13.6 | 0.0 | 87.0 | 6.7 | 3.6 | 14.0 | 4 | 12.8 | 500.0 | 1.2 | 15.6 | 460 | 2.1 | 31.3 | 0.8 |
| 25R1 | J. de Castilhos | 5.6 | 8.3 | 2.3 | 0.0 | 4.9 | 12.1 | 0.0 | 71.0 | 5.9 | 2.9 | 29.0 | 3 | 14.0 | 449.8 | 1.4 | 17.0 | 560 | 6.4 | 33.1 | 0.8 |

¹Id.= Identification (sequential number followed by its respective region R1, R2, R3, R4, R5); ²Property with organic certification by audit; ³ At the discretion of laboratory, P levels determination generally terminated when 450 mg dm⁻³