

Figure S1.

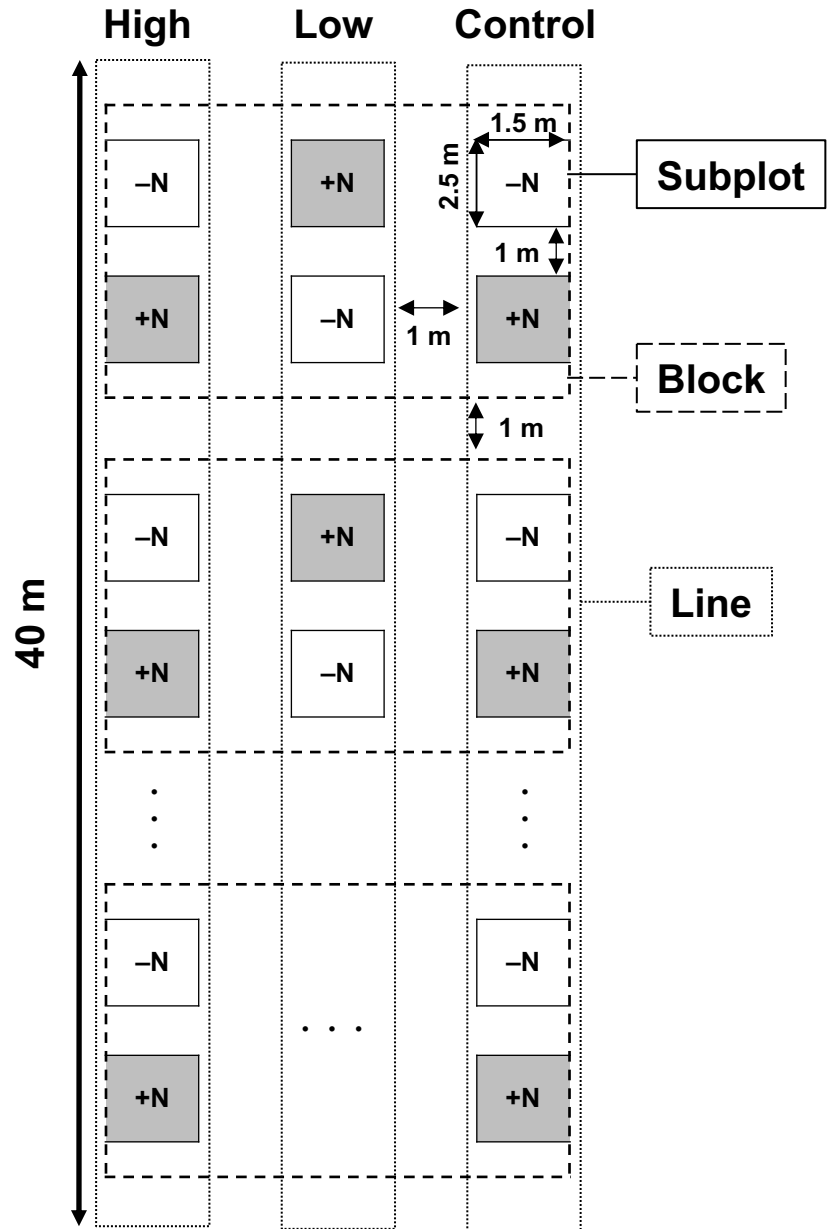


Table S1.

| | Control | | Low compaction | | High compaction | | C | ANOVA | | |
|--|-----------------------------------|--------------|----------------|--------------|-----------------|--------------|--------------|-------|-------|------|
| | -N | +N | -N | +N | -N | +N | | N | C × N | |
| Fraction (m ³ m ⁻³) | Air | 17.31 ± 4.84 | 15.18 ± 5.39 | 15.79 ± 5.84 | 16.09 ± 1.46 | 9.65 ± 1.92 | 10.25 ± 3.01 | * | N.S. | N.S. |
| | Liquid | 39.81 ± 2.49 | 54.05 ± 2.54 | 46.49 ± 8.63 | 46.54 ± 2.90 | 41.9 ± 1.21 | 50.02 ± 6.49 | N.S. | * | N.S. |
| | Solid | 42.86 ± 2.59 | 38.75 ± 3.53 | 37.71 ± 5.00 | 37.36 ± 3.42 | 48.44 ± 1.75 | 39.72 ± 7.76 | * | * | N.S. |
| Chemistry | pH | 5.89 ± 0.13 | 5.52 ± 0.08 | 5.82 ± 0.21 | 5.79 ± 0.17 | 5.96 ± 0.09 | 5.72 ± 0.06 | N.S. | ** | N.S. |
| | Inorganic N (µg g ⁻¹) | 63.19 ± 4.69 | 84.56 ± 7.68 | 69.02 ± 9.72 | 81.11 ± 7.29 | 66.27 ± 9.02 | 83.45 ± 8.14 | N.S. | *** | N.S. |
| Bulk density (g cm ⁻³) | June | 0.74 ± 0.03 | 0.73 ± 0.02 | 0.97 ± 0.03 | 0.97 ± 0.03 | 1.14 ± 0.04 | 1.11 ± 0.05 | *** | N.S. | N.S. |
| | July | 0.75 ± 0.02 | 0.75 ± 0.04 | 0.95 ± 0.08 | 0.91 ± 0.05 | 1.05 ± 0.04 | 1.06 ± 0.04 | *** | N.S. | N.S. |
| | Sept | 0.78 ± 0.01 | 0.78 ± 0.03 | 0.91 ± 0.05 | 1.00 ± 0.03 | 1.09 ± 0.04 | 1.11 ± 0.03 | *** | * | N.S. |
| | Oct | 0.74 ± 0.00 | 0.74 ± 0.02 | 0.93 ± 0.04 | 0.95 ± 0.02 | 1.08 ± 0.03 | 1.08 ± 0.02 | *** | N.S. | N.S. |
| Water contents (%) | June | 17.84 ± 2.68 | 18.34 ± 1.84 | 17.05 ± 2.48 | 17.81 ± 1.09 | 20.02 ± 1.60 | 20.42 ± 1.24 | N.S. | N.S. | N.S. |
| | July | 19.32 ± 2.14 | 19.55 ± 3.12 | 19.8 ± 1.28 | 20.39 ± 0.87 | 21.69 ± 1.41 | 21.23 ± 1.20 | N.S. | N.S. | N.S. |
| | Sept | 21.22 ± 2.01 | 21.96 ± 2.40 | 22.22 ± 1.08 | 22.42 ± 1.29 | 24.08 ± 1.27 | 23.98 ± 1.41 | N.S. | N.S. | N.S. |
| | Oct | 27.21 ± 0.84 | 27.42 ± 0.83 | 26.04 ± 1.09 | 26.88 ± 0.58 | 28.09 ± 0.92 | 27.97 ± 1.08 | * | N.S. | N.S. |

Table S2.

| | | Control | | High | | C | ANOVA | |
|------|----------|--------------|--------------|-------------|--------------|------|-------|-------|
| | | -N | +N | -N | +N | | N | C × N |
| 2018 | 0-10 cm | 0.00 ± 0.00 | 0.00 ± 0.00 | 1.5 ± 0.17 | 1.47 ± 0.23 | *** | N.S. | N.S. |
| | 10-20 cm | 0.12 ± 0.05 | 0.21 ± 0.11 | 0.88 ± 0.09 | 0.97 ± 0.18 | *** | N.S. | N.S. |
| | 20-30 cm | 0.40 ± 0.07 | 0.50 ± 0.05 | 0.67 ± 0.14 | 0.63 ± 0.09 | *** | N.S. | N.S. |
| | 30-40 cm | 0.35 ± 0.04 | 0.43 ± 0.08 | 0.51 ± 0.07 | 0.47 ± 0.08 | ** | N.S. | N.S. |
| 2019 | 0-10 cm | 0.10 ± 0.05 | 0.08 ± 0.04 | 0.43 ± 0.14 | 0.29 ± 0.07 | *** | N.S. | N.S. |
| | 10-20 cm | 0.19 ± 0.12 | 0.17 ± 0.09 | 0.55 ± 0.06 | 0.51 ± 0.09 | *** | N.S. | N.S. |
| | 20-30 cm | 0.29 ± 0.04 | 0.44 ± 0.05 | 0.52 ± 0.14 | 0.73 ± 0.06 | *** | ** | N.S. |
| | 30-40 cm | 0.48 ± 0.11 | 0.54 ± 0.15 | 0.44 ± 0.09 | 0.44 ± 0.10 | N.S. | N.S. | N.S. |
| HCI | 0-10 cm | -0.05 ± 0.01 | -0.03 ± 0.01 | 1.04 ± 0.19 | 1.17 ± 0.25 | *** | N.S. | N.S. |
| | 10-20 cm | 0.03 ± 0.02 | 0.12 ± 0.07 | 0.33 ± 0.08 | 0.46 ± 0.21 | *** | N.S. | N.S. |
| | 20-30 cm | 0.10 ± 0.03 | 0.03 ± 0.07 | 0.14 ± 0.18 | -0.10 ± 0.14 | N.S. | * | N.S. |
| | 30-40 cm | -0.19 ± 0.10 | -0.12 ± 0.12 | 0.07 ± 0.15 | 0.02 ± 0.09 | *** | N.S. | N.S. |

Table S3.

| Time | Control | | Low compation | | High compaction | | Two-way ANOVA | | |
|------|--------------|--------------|---------------|--------------|-----------------|--------------|---------------|-----------|-------------|
| | +W | +N | +W | +N | +W | +N | Compaction | N loading | Interaction |
| AM | -0.41 ± 0.04 | -0.49 ± 0.03 | -0.63 ± 0.01 | -0.51 ± 0.04 | -0.53 ± 0.03 | -0.63 ± 0.01 | *** | N.S | N.S |
| PM | -1.36 ± 0.06 | -1.45 ± 0.05 | -1.47 ± 0.06 | -1.52 ± 0.06 | -1.50 ± 0.10 | -1.80 ± 0.12 | N.S. | * | N.S |

Table S4.

| | | First condition | | | | Final condition | | | | HCI | | | |
|------------|--|-----------------|--------------|----------|----------|-----------------|-------------|----------|--------------|-------------|--------------|----------|----------|
| | | 0-10 cm | 10-20 cm | 20-30 cm | 30-40 cm | 0-10 cm | 10-20 cm | 20-30 cm | 30-40 cm | 0-10 cm | 10-20 cm | 20-30 cm | 30-40 cm |
| Control | Total root density (kg m ⁻³) | 0.00 | 0.35 | 0.15 | 0.20 | 0.36 | 0.34 | 0.15 | -0.09 | -0.04 | 0.58 | 0.14 | -0.19 |
| | Lateral root density (kg m ⁻³) | 0.00 | 0.23 | 0.10 | 0.17 | 0.46 | 0.53 | 0.03 | -0.20 | -0.09 | 0.36 | 0.20 | -0.24 |
| | Fine root density (kg m ⁻³) | 0.00 | -0.48 | -0.15 | -0.11 | 0.35 | 0.27 | -0.24 | -0.55 | -0.12 | -0.58 | -0.09 | 0.32 |
| | Lateral root proportion (%) | 0.00 | -0.07 | -0.03 | -0.01 | 0.36 | 0.48 | -0.18 | -0.22 | -0.17 | -0.16 | 0.21 | -0.23 |
| | Fine root proportion (%) | 0.00 | -0.49 | -0.14 | -0.15 | 0.01 | -0.06 | -0.16 | -0.28 | 0.00 | -0.65 | -0.23 | 0.40 |
| Compaction | Total root density (kg m ⁻³) | -0.33 | 0.03 | 0.02 | -0.16 | 0.16 | 0.03 | -0.02 | -0.16 | -0.41 | 0.01 | 0.02 | 0.01 |
| | Lateral root density (kg m ⁻³) | -0.05 | 0.21 | -0.04 | -0.21 | -0.06 | -0.09 | 0.07 | -0.19 | -0.07 | 0.22 | -0.07 | -0.01 |
| | Fine root density (kg m ⁻³) | 0.04 | 0.30 | -0.12 | -0.11 | -0.46 | 0.11 | 0.25 | -0.07 | 0.16 | 0.19 | -0.25 | -0.03 |
| | Lateral root proportion (%) | 0.46 | 0.29 | -0.11 | -0.18 | -0.34 | -0.20 | 0.13 | 0.00 | 0.54 | 0.34 | -0.16 | -0.12 |
| | Fine root proportion (%) | 0.52 | 0.37 | -0.21 | 0.00 | -0.67 | 0.13 | 0.36 | 0.10 | 0.70 | 0.24 | -0.38 | -0.07 |

Table S5.

| | Root (R) | | N loading (N) | | R × N | |
|--------------|----------|----------------|---------------|----------------|----------|----------------|
| | χ^2 | <i>p</i> value | χ^2 | <i>p</i> value | χ^2 | <i>p</i> value |
| Lateral root | 10.70 | ** | 0.70 | N.S. | 0.01 | N.S. |
| Fine root | 24.44 | *** | 0.08 | N.S. | 0.10 | N.S. |

Table S6.

| Fungal Taxon | Relative abundance (%) | Fungal Taxon | Relative abundance (%) |
|---------------------------|------------------------|-------------------------------|------------------------|
| Articulospora tetracladia | 1.8 | Saitozyma sp.A | 0.9 |
| Ascomycetes sp. | 1.7 | Saitozyma sp.B | 0.7 |
| Basidiomycetes sp. | 1.4 | Suillus clintonianus | 2.2 |
| Cryptococcus sp. | 0.6 | Suillus laricinus | 11.8 |
| Cystofilobasidium sp. | 1.0 | Suillus viscidus | 4.7 |
| Dotideomycetes sp.A | 1.3 | Suillus visidus | 0.2 |
| Dotideomycetes sp.B | 1.1 | Tetracladium sp.A | 0.9 |
| Epicoccum sp. | 1.4 | Tetracladium sp.B | 0.7 |
| Fungal sp. | 0.4 | Tetracladium sp.C | 0.6 |
| Hebeloma sp. | 0.4 | Tetracladium sp.D | 0.8 |
| Helicorhoidion sp.A | 0.5 | Tetracladium sp.E | 0.3 |
| Helicorhoidion sp.B | 0.8 | Tetracladium sp.F | 1.5 |
| Helotiales sp.A | 0.2 | Tetracladium sp.G | 0.5 |
| Helotiales sp.B | 0.1 | Tetracladium sp.H | 0.3 |
| Inocybe curvipes | 1.8 | Thelephoraceae sp. | 0.3 |
| Laccaria sp.A | 0.3 | Tomentella sp.A | 0.6 |
| Laccaria sp.B | 0.4 | Tomentella sp.B | 1.0 |
| Laccaria sp.C | 0.6 | Tomentella sp.C | 0.8 |
| Laccaria sp.D | 1.3 | Tomentella sp.D | 0.7 |
| Laccaria sp.E | 0.3 | Tomentella sp.E | 1.7 |
| Leotiomycetes sp. | 0.9 | Tricholoma auratum | 0.8 |
| Mortierella sp.A | 0.7 | Trichosporiella cerebriformis | 1.7 |
| Mortierella sp.B | 0.2 | Wilcoxina mikolae | 30.0 |
| Mortierella sp.C | 0.1 | Wilcoxina sp.A | 1.7 |
| Mortierellales sp. | 0.5 | Wilcoxina sp.B | 0.2 |
| Paraconiothyrium sp. | 0.1 | Wilcoxina sp.C | 0.5 |
| Pleurotus sp.A | 1.3 | Anonymous sp | 12.5 |
| Pleurotus sp.B | 0.2 | | |