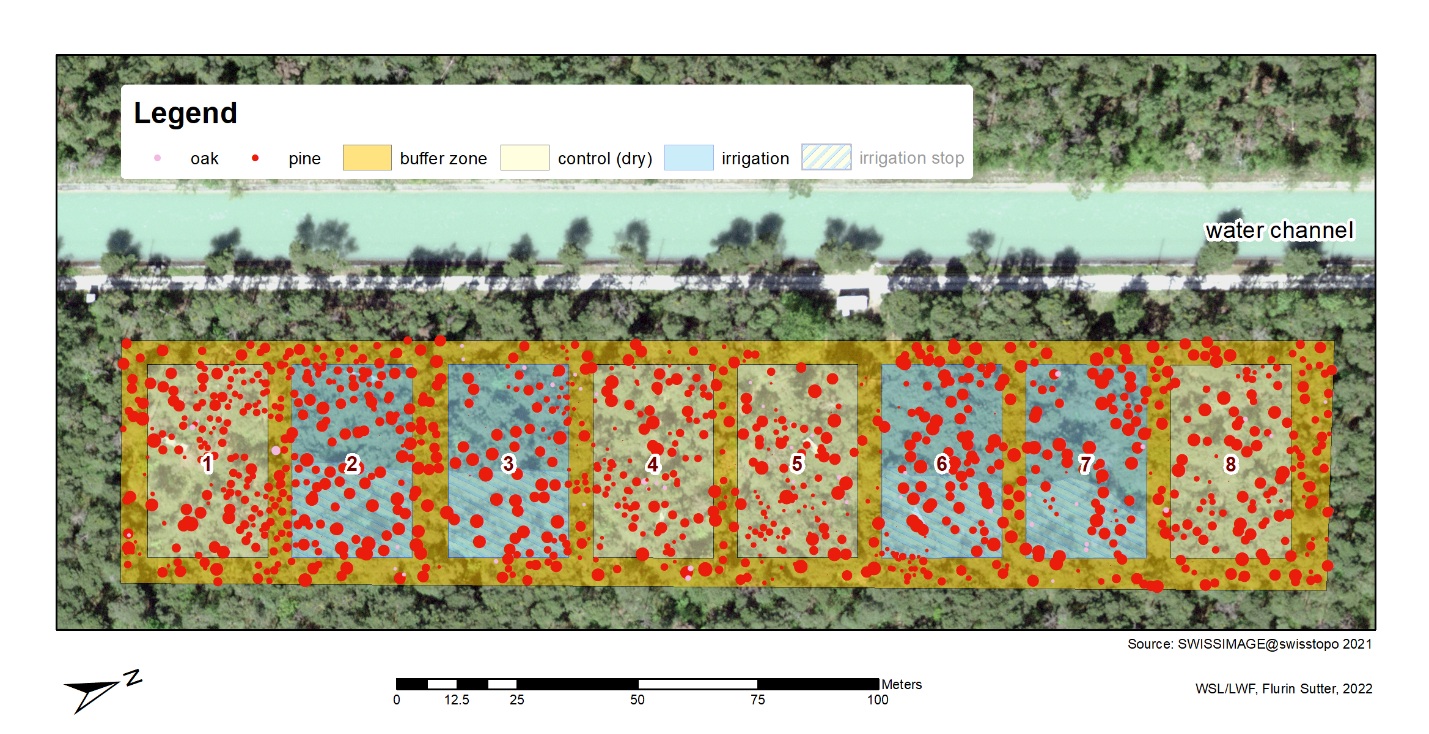
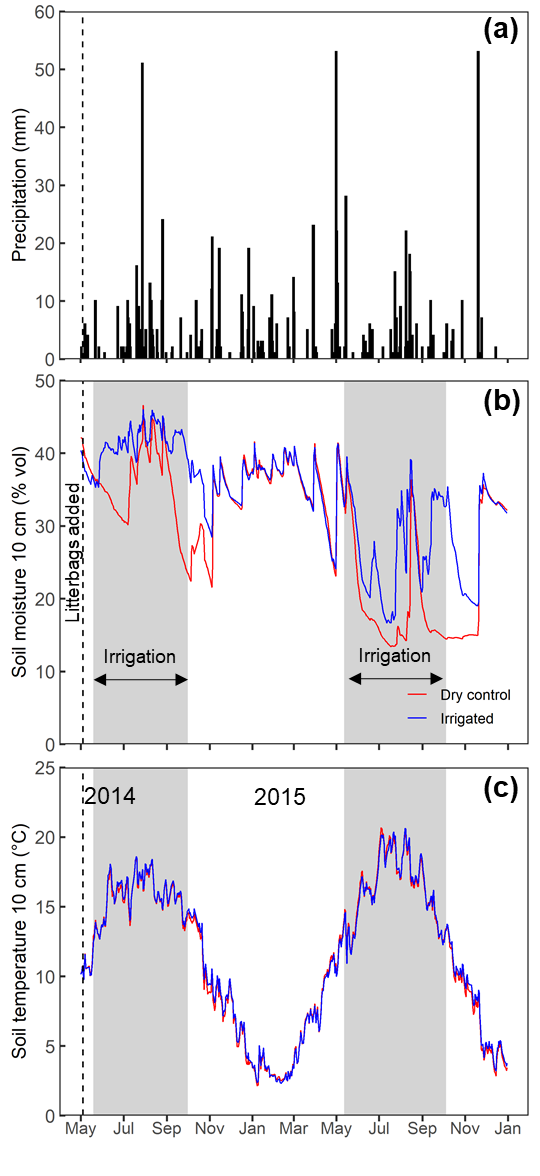
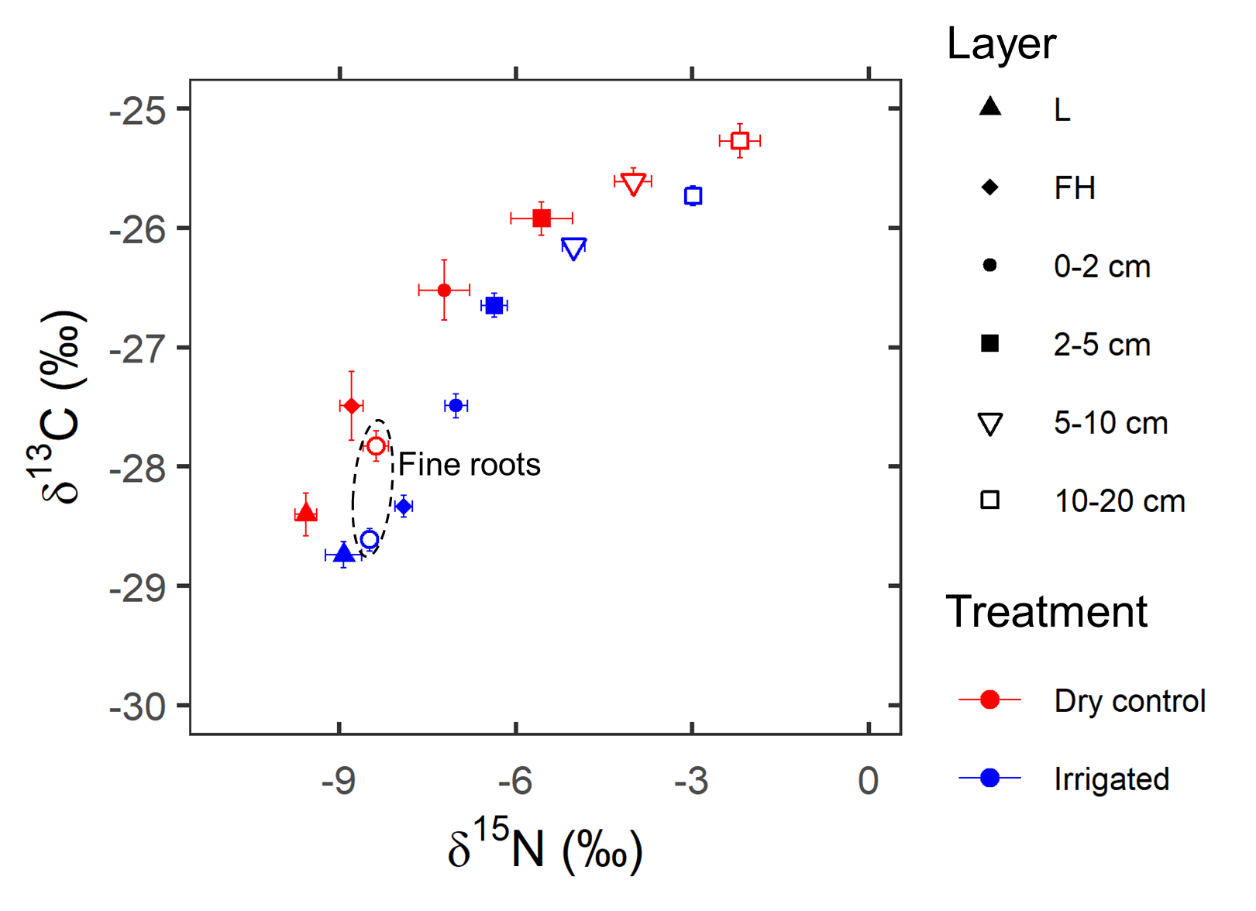
# Supporting information for “*Soil fauna drives vertical redistribution of soil organic carbon in a long-term irrigated dry pine forest*” (Guidi et al.)

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**Fig. S1.** Experimental setup of the irrigation experiment in Pfynwald (Valais, Switzerland), including four randomly selected irrigated plots (in blue) and four dry control plots (in light yellow), adjacent to the water channel used for irrigation. The plots are separated by a buffer zone (in orange). In four subplots within the irrigated plots, the irrigation was stopped at the end of 2013 (irrigation stop). These subplots were not investigated in the current study.



**Fig. S2.** Precipitation (a), soil volumetric water content (b), and soil temperature (c) during the litter decomposition experiment from May 2014 through December 2015. Daily amount of precipitations are from the adjacent meteorological station of Sion (data MeteoSchweiz). Mean volumetric water contents and soil temperatures were measured at 10 cm depth in three dry control and three irrigated plots at two different locations per plot. ****

**Fig. S3.** Relationship between δ13C and δ15N values of the organic layers (L litter, and FH fermentation and humified), mineral soil at different soil depths and fine roots in total soil (highlighted with a dotted ellipses) in dry control and irrigated plots sampled in 2019. The symbols represent the means of four replicates (±standard error).

**Table S1.** Effects of irrigation, depth, year and their interaction on SOC stocks tested with linear-mixed effect models: (a) full model, including all sampling years, using a first-order autocorrelation structure (*corAR1* function), and (b) by sampling year. The *varIdent* structure was used to account for variance inhomogeneity.

1. Full model (all sampling years)

|  | SOC stocks | | |
| --- | --- | --- | --- |
|  | DF | *F* | *P* |
| ***All depths*** |  |  |  |
| Irrig. | 1,6 | 0.1 | 0.72 |
| Depth | 5,66 | 66.9 | **<0.001** |
| Year | 1,66 | 11.9 | **0.001** |
| Irrig. x Depth | 5,66 | 11.9 | **<0.001** |
| Irrig. x Year | 1,66 | 0.4 | 0.55 |
| Depth x Year | 5,66 | 1.4 | 0.25 |
| Irrig. x Depth x Year | 5,66 | 0.9 | 0.51 |
|  |  |  |  |
| ***L*** |  |  |  |
| Irrig. | 1,6 | 7.0 | **0.038** |
| Year | 1,6 | 11.1 | **0.016** |
| Irrig. x Year | 1,6 | 0.6 | 0.46 |
| ***FH*** |  |  |  |
| Irrig. | 1,6 | 12.6 | **0.012** |
| Year | 1,6 | 0.0 | 0.94 |
| Irrig. x Year | 1,6 | 0.2 | 0.67 |
| ***0-2 cm*** |  |  |  |
| Irrig. | 1,6 | 3.3 | 0.12 |
| Year | 1,6 | 0.0 | 0.99 |
| Irrig. x Year | 1,6 | 1.2 | 0.32 |
| ***2-5 cm*** |  |  |  |
| Irrig. | 1,6 | 6.0 | **0.049** |
| Year | 1,6 | 4.5 | 0.08 |
| Irrig. x Year | 1,6 | 2.6 | 0.16 |
| ***5-10 cm*** |  |  |  |
| Irrig. | 1,6 | 11.1 | **0.016** |
| Year | 1,6 | 0.0 | 0.86 |
| Irrig. x Year | 1,6 | 0.2 | 0.64 |
| ***10-20 cm*** |  |  |  |
| Irrig. | 1,6 | 1.6 | 0.26 |
| Year | 1,6 | 1.5 | 0.27 |
| Irrig. x Year | 1,6 | 0.1 | 0.78 |
|  |  |  |  |
| ***Total soil (L+FH+0-20 cm)*** |  |  |  |
| Irrig. | 1,6 | 0.0 | 0.86 |
| Year | 1,6 | 4.5 | 0.08 |
| Irrig. x Year | 1,6 | 0.4 | 0.54 |
| ***Organic layers (L+FH)*** |  |  |  |
| Irrig. | 1,6 | 14.1 | **0.009** |
| Year | 1,6 | 2.5 | 0.17 |
| Irrig. x Year | 1,6 | 0.0 | 0.88 |
| ***Mineral soil (2-10 cm)*** |  |  |  |
| Irrig. | 1,6 | 7.7 | **0.032** |
| Year | 1,6 | 1.4 | 0.28 |
| Irrig. x Year | 1,6 | 1.5 | 0.26 |
| ***Mineral soil (0-20 cm)*** |  |  |  |
| Irrig. | 1,6 | 3.5 | 0.11 |
| Year | 1,6 | 1.4 | 0.29 |
| Irrig. x Year | 1,6 | 0.1 | 0.73 |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

1. By sampling year

|  |  | SOC stocks | | |
| --- | --- | --- | --- | --- |
| Year | Depth | DF | *F* | *P* |
| 2011 | ***All depths*** |  | | |
|  | Irrig. | 1,6 | 0.0 | 0.94 |
|  | Depth | 5,30 | 11.5 | **<0.001** |
|  | Irrig. x Depth | 5,30 | 8.2 | **<0.001** |
|  | ***By depth*** |  |  |  |
|  | L | 1,6 | 4.3 | 0.08 |
|  | FH | 1,6 | 10.2 | **0.019** |
|  | 0-2 cm | 1,6 | 4.2 | 0.09 |
|  | 2-5 cm | 1,6 | 8.0 | **0.030** |
|  | 5-10 cm | 1,6 | 7.8 | **0.032** |
|  | 10-20 cm | 1,6 | 0.6 | 0.46 |
|  | *Total soil (L+FH+0-20 cm)* | 1,6 | 0.0 | 1.00 |
|  | *Organic layers (L+FH)* | 1,6 | 13.3 | **0.011** |
|  | *Mineral soil (0-20 cm)* | 1,6 | 2.6 | 0.16 |
|  |  |  |  |  |
| 2019 | ***All depths*** |  |  |  |
|  | Irrig. | 1,6 | 0.3 | 0.58 |
|  | Depth | 5,30 | 33.8 | **<0.001** |
|  | Irrig. x Depth | 5,30 | 15.5 | **<0.001** |
|  | ***By depth*** |  |  |  |
|  | L | 1,6 | 2.6 | 0.16 |
|  | FH | 1,6 | 6.9 | **0.039** |
|  | 0-2 cm | 1,6 | 0.5 | 0.52 |
|  | 2-5 cm | 1,6 | 4.0 | 0.09 |
|  | 5-10 cm | 1,6 | 4.7 | 0.07 |
|  | 10-20 cm | 1,6 | 2.1 | 0.20 |
|  | *Total soil (L+FH+0-20 cm)* | 1,6 | 0.2 | 0.65 |
|  | *Organic layers (L+FH)* | 1,6 | 8.7 | **0.025** |
|  | *Mineral soil (0-20 cm)* | 1,6 | 2.7 | 0.15 |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

**Table S2.** Summary for different soil layers of: (i) measured irrigation effects on SOC stocks, with 95% confidence intervals and *P* values based on linear-mixed effect models including all sampling years, and (ii) absolute and relative minimum detectable difference (MDD) of SOC stocks, predicting the effect size detectable with α value of 0.05 and 60% power in linear-mixed effect models (power analysis by simulation with R package *simr*).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Layers | Measured irrigation effect | 95% confidence interval | *P* value of irrigation effect | MDD  absolute | MDD relative to dry control |
| (kg SOC m-2) | (kg SOC m-2) |  | (kg SOC m-2) | (%) |
| Mineral soil (2-10 cm) | 1.12 | 0.21, 2.03 | **0.032** | 1.10 | 62 |
| Mineral soil (0-20 cm) | 1.01 | -0.37, 2.39 | 0.11 | 1.35 | 33 |
| Total soil (L+FH+0-20 cm) | 0.05 | -1.33, 1.43 | 0.86 | 1.50 | 26 |

*P*-values < 0.05 are given in bold.

**Table S3.** Effect of irrigation, depth and their interaction on the natural abundance of the 13C and 15N isotope and C/N ratio in the soil tested with linear-mixed effect models. The *varIdent* structure was used to account for variance inhomogeneity. For δ15N, a spatial correlation structure (*corSpher*) with depth as spatial covariate was included in the model. Additionally, the effect of irrigation on the chemical properties of fine roots (total soil) is reported.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | δ13C | | |  | δ15N | | |  | C/N ratio | | |
| Year | Depth | DF | *F* | *P* |  | DF | *F* | *P* |  | DF | *F* | *P* |
| Soil | | | | | | | | | | | | |
| 2011 | ***All depths*** |  |  |  |  |  |  |  |  |  |  |  |
|  | Irrig. | 1,6 | 56.9 | **<0.001** |  | 1,6 | 0.4 | 0.57 |  | 1,6 | 1.6 | 0.25 |
|  | Depth | 5,29 | 251.4 | **<0.001** |  | 5,29 | 99.5 | **<0.001** |  | 5,29 | 81.8 | **<0.001** |
|  | Irrig. x Depth | 5,29 | 8.9 | **<0.001** |  | 5,29 | 4.6 | **0.003** |  | 5,29 | 4.8 | **0.003** |
|  | ***By depth*** |  |  |  |  |  |  |  |  |  |  |  |
|  | L | 1,6 | 48.7 | **<0.001** |  | 1,6 | 12.8 | **0.012** |  | 1,6 | 0.7 | 0.45 |
|  | FH | 1,5 | 82.7 | **<0.001** |  | 1,5 | 7.9 | **0.037** |  | 1,5 | 0.0 | 1.00 |
|  | 0-2 cm | 1,6 | 8.2 | **0.029** |  | 1,6 | 0.6 | 0.48 |  | 1,6 | 10.3 | **0.018** |
|  | 2-5 cm | 1,6 | 8.3 | **0.028** |  | 1,6 | 5.4 | 0.06 |  | 1,6 | 0.4 | 0.55 |
|  | 5-10 cm | 1,6 | 21.9 | **0.003** |  | 1,6 | 1.6 | 0.25 |  | 1,6 | 0.0 | 0.87 |
|  | 10-20 cm | 1,6 | 9.3 | **0.022** |  | 1,6 | 4.9 | 0.07 |  | 1,6 | 2.8 | 0.14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2019 | ***All depths*** |  |  |  |  |  |  |  |  |  |  |  |
|  | Irrig. | 1,6 | 13.3 | **0.011** |  | 1,6 | 1.5 | 0.26 |  | 1,6 | 0.3 | 0.61 |
|  | Depth | 5,30 | 324.6 | **<0.001** |  | 5,30 | 110.6 | **<0.001** |  | 5,30 | 87.2 | **<0.001** |
|  | Irrig. x Depth | 5,30 | 3.2 | **0.020** |  | 5,30 | 4.1 | **0.006** |  | 5,30 | 0.7 | 0.62 |
|  | ***By depth*** |  |  |  |  |  |  |  |  |  |  |  |
|  | L | 1,6 | 2.8 | 0.15 |  | 1,6 | 3.2 | 0.13 |  | 1,6 | 3.1 | 0.13 |
|  | FH | 1,6 | 7.9 | **0.031** |  | 1,6 | 12.8 | **0.012** |  | 1,6 | 0.0 | 0.83 |
|  | 0-2 cm | 1,6 | 13.0 | **0.011** |  | 1,6 | 0.2 | 0.69 |  | 1,6 | 0.2 | 0.71 |
|  | 2-5 cm | 1,6 | 17.3 | **0.006** |  | 1,6 | 2.0 | 0.21 |  | 1,6 | 0.1 | 0.76 |
|  | 5-10 cm | 1,6 | 18.0 | **0.005** |  | 1,6 | 7.5 | **0.034** |  | 1,6 | 0.1 | 0.78 |
|  | 10-20 cm | 1,6 | 8.4 | **0.027** |  | 1,6 | 4.6 | 0.08 |  | 1,6 | 0.3 | 0.63 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fine roots | | | | | | | | | | | | |
| 2019 | *Total soil (FH+0-20 cm)* | | | | | | | | | | | |
|  | Irrig. | 1,6 | 25.0 | **0.002** |  | 1,6 | 0.2 | 0.69 |  | 1,6 | 0.2 | 0.64 |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

**Table S4.** Mineral soil properties at different soil depths in dry control and irrigated plots sampled in 2019 tested with linear-mixed effect models. The values represent the means of four replicates (±standard error).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Clay (%) | | |  | pH | | |  | Inorganic C (%) | | |  | Stoniness (% volume) | | |  | Bulk density of fine soil (g cm-3) | | |
| Depth | Dry control | Irrigated | *P* |  | Dry control | Irrigated | *P* |  | Dry control | Irrigated | *P* |  | Dry control | Irrigated | *P* |  | Dry control | Irrigated | *P* |
| 0-2 cm | 11 (1) | 13 (1) | 0.12 |  | 5.6 (0.1) | 6.6 (0.1) | **0.001** |  | 0.3 (0.1) | 0.1 (0.0) | 0.38 |  | 3 (1) | 1 (0) | 0.07 |  | 0.44 (0.04) | 0.41 (0.04) | 0.62 |
| 2-5 cm | 11 (0) | 10 (1) | 0.44 |  | 6.4 (0.0) | 6.7 (0.1) | **0.026** |  | 0.1 (0.0) | 0.2 (0.1) | 0.39 |  | 20 (8) | 5 (2) | **0.033** |  | 0.55 (0.09) | 0.46 (0.04) | 0.42 |
| 5-10 cm | 10 (1) | 11 (0) | 0.19 |  | 6.9 (0.1) | 7.1 (0.1) | 0.09 |  | 0.5 (0.1) | 0.6 (0.1) | 0.46 |  | 26 (6) | 19 (3) | 0.52 |  | 0.50 (0.03) | 0.54 (0.05) | 0.54 |
| 10-20 cm | 10 (0) | 10 (0) | 0.37 |  | 7.2 (0.1) | 7.4 (0.0) | 0.05 |  | 1.4 (0.1) | 1.4 (0.2) | 0.94 |  | 28 (7) | 23 (3) | 0.65 |  | 0.42 (0.04) | 0.50 (0.05) | 0.28 |

*P*-values < 0.05 are given in bold

**Table S5.** Soil dry masses, C and N concentrations, N stocks at different soil depths in dry control and irrigated plots sampled in 2011 and 2019 tested with linear-mixed effect models. The values represent the means of four replicates (±standard error).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Soil Mass (Mg ha-1) | | |  | C concentration (%) | | |  | N concentration (%) | | |  | N stock (Mg ha-1) | | |
| Year | Depth | Dry  control | Irrigated | *P* |  | Dry control | Irrigated | *P* |  | Dry control | Irrigated | *P* |  | Dry control | Irrigated | *P* |
| 2011 | L | 15.2 (2.0) | 14.0 (0.9) | 0.71 |  | 44.8 (0.9) | 33.4 (2.8) | **0.013** |  | 1.09 (0.04) | 0.88 (0.04) | **0.012** |  | 0.16 (0.02) | 0.12 (0.01) | 0.07 |
|  | FH | 28.4 (6.1) | 18.3 (2.4) | 0.12 |  | 36.9 (1.2) | 21.6 (1.1) | **<0.001** |  | 1.18 (0.10) | 0.68 (0.03) | **0.005** |  | 0.34 (0.08) | 0.10 (0.04) | **0.036** |
|  | 0-2 cm | 77.2 (5.0) | 79.2 (4.1) | 0.75 |  | 16.5 (1.3) | 12.9 (1.7) | 0.14 |  | 0.65 (0.04) | 0.55 (0.06) | 0.22 |  | 0.50 (0.04) | 0.43 (0.03) | 0.18 |
|  | 2-5 cm | 153.2 (4.4) | 140.6 (10.6) | 0.31 |  | 6.4 (0.4) | 11.7 (2.6) | **0.048** |  | 0.28 (0.02) | 0.48 (0.07) | **0.026** |  | 0.43 (0.03) | 0.65 (0.05) | **0.010** |
|  | 5-10 cm | 190.7 (18.9) | 222.0 (15.3) | 0.21 |  | 4.3 (0.3) | 6.1 (1.3) | 0.20 |  | 0.19 (0.01) | 0.27 (0.04) | 0.07 |  | 0.36 (0.02) | 0.58 (0.05) | **0.004** |
|  | 10-20 cm | 414.5 (50.0) | 422.7 (42.7) | 0.88 |  | 2.9 (0.3) | 3.2 (0.1) | 0.25 |  | 0.16 (0.01) | 0.17 (0.01) | 0.43 |  | 0.65 (0.08) | 0.70 (0.05) | 0.57 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2019 | L | 9.4 (1.3) | 8.0 (1.2) | 0.45 |  | 45.1 (0.3) | 38.3 (1.7) | **0.009** |  | 1.05 (0.07) | 0.77 (0.02) | **0.006** |  | 0.10 (0.02) | 0.06 (0.01) | 0.09 |
|  | FH | 40.2 (13.4) | 12.9 (5.3) | 0.08 |  | 32.0 (2.0) | 22.0 (1.1) | **0.003** |  | 1.16 (0.04) | 0.79 (0.02) | **<0.001** |  | 0.46 (0.15) | 0.10 (0.04) | **0.041** |
|  | 0-2 cm | 83.3 (7.7) | 79.6 (7.3) | 0.74 |  | 14.5 (1.8) | 13.7 (0.3) | 0.82 |  | 0.58 (0.08) | 0.55 (0.02) | 0.89 |  | 0.47 (0.04) | 0.44 (0.04) | 0.63 |
|  | 2-5 cm | 121.0 (10.1) | 128.8 (9.6) | 0.60 |  | 7.8 (1.0) | 9.9 (0.8) | 0.19 |  | 0.32 (0.04) | 0.41 (0.03) | 0.13 |  | 0.38 (0.05) | 0.52 (0.03) | 0.06 |
|  | 5-10 cm | 180.1 (12.9) | 207.4 (15.6) | 0.23 |  | 4.6 (0.4) | 5.7 (0.3) | 0.08 |  | 0.21 (0.01) | 0.26 (0.02) | **0.044** |  | 0.38 (0.05) | 0.53 (0.03) | **0.038** |
|  | 10-20 cm | 317.6 (32.5) | 381.5 (39.2) | 0.25 |  | 3.3 (0.2) | 3.4 (0.4) | 0.85 |  | 0.17 (0.00) | 0.17 (0.02) | 0.75 |  | 0.53 (0.06) | 0.65 (0.04) | 0.17 |

*P*-values < 0.05 are given in bold

**Table S6.** Effects of irrigation (dry control *vs* irrigated), origin (dry control *vs* irrigated), size (0.1 mm *vs* 10 mm mesh size) and their interaction on chemical properties of the litter from the three dominant tree and shrub species tested with linear-mixed effect models: (a) full model, including all litter species, and (b) by litter species. The *varIdent* structure was used to account for variance inhomogeneity. Chemical properties were measured from a set of control litterbags collected 10 days after placement (before the start of irrigation) in May 2014. Due to the few replicates, effect of “size” was not investigated for lignin, lignin/N and phenol.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | C (%) | | | N (%) | | | δ13C (‰) | | | | δ15N (‰) | | | | C/N | | | | Ash (%) | | |
|  | DF | *F* | *P* | DF | *F* | *P* | DF | *F* | *P* | DF | | *F* | *P* | DF | | *F* | *P* | DF | | *F* | *P* |
| Irrig. | 1,6 | 15.2 | **0.008** | 1,6 | 1.4 | 0.28 | 1,6 | 3.3 | 0.12 | 1,6 | | 0.6 | 0.49 | 1,6 | | 0.6 | 0.47 | 1,6 | | 3.0 | 0.13 |
| Origin | 1,56 | 15.0 | **<0.001** | 1,51 | 2.5 | 0.12 | 1,56 | 438.9 | **<0.001** | 1,51 | | 65.3 | **<0.001** | 1,51 | | 1.4 | 0.25 | 1,36 | | 34.4 | **<0.001** |
| Size | 1,56 | 0.7 | 0.41 | 1,51 | 0.0 | 0.83 | 1,56 | 1.4 | 0.24 | 1,51 | | 0.7 | 0.40 | 1,51 | | 1.4 | 0.25 | 1,36 | | 4.4 | **0.042** |
| Species | 2,56 | 1267.2 | **<0.001** | 2,51 | 211.9 | **<0.001** | 2,56 | 1418.5 | **<0.001** | 2,51 | | 578.6 | **<0.001** | 2,51 | | 352.2 | **<0.001** | 2,36 | | 605.4 | **<0.001** |
| Irrig. x Origin | 1,56 | 0.1 | 0.80 | 1,51 | 0.2 | 0.68 | 1,56 | 3.9 | 0.05 | 1,51 | | 0.1 | 0.72 | 1,51 | | 0.1 | 0.72 | 1,36 | | 0.9 | 0.36 |
| Irrig. x Size | 1,56 | 0.1 | 0.80 | 1,51 | 0.0 | 0.84 | 1,56 | 1.5 | 0.23 | 1,51 | | 3.0 | 0.09 | 1,51 | | 0.6 | 0.45 | 1,36 | | 0.2 | 0.63 |
| Origin x Size | 1,56 | 0.1 | 0.74 | 1,51 | 0.2 | 0.64 | 1,56 | 0.1 | 0.72 | 1,51 | | 0.1 | 0.82 | 1,51 | | 0.2 | 0.66 | 1,36 | | 0.9 | 0.34 |
| Irrig. x Species | 2,56 | 2.8 | 0.07 | 2,51 | 0.8 | 0.47 | 2,56 | 0.2 | 0.82 | 2,51 | | 1.2 | 0.31 | 2,51 | | 0.9 | 0.42 | 2,36 | | 1.1 | 0.34 |
| Origin x Species | 2,56 | 1.3 | 0.27 | 2,51 | 1.9 | 0.16 | 2,56 | 7.6 | **0.001** | 2,51 | | 2.3 | 0.11 | 2,51 | | 4.0 | **0.025** | 2,36 | | 5.7 | **0.007** |
| Size x Species | 2,56 | 0.0 | 0.99 | 2,51 | 0.3 | 0.73 | 2,56 | 0.1 | 0.89 | 2,51 | | 4.7 | **0.014** | 2,51 | | 1.2 | 0.32 | 2,36 | | 1.8 | 0.18 |
| Irrig. x Origin x Size | 1,56 | 0.3 | 0.58 | 1,51 | 0.1 | 0.76 | 1,56 | 0.7 | 0.42 | 1,51 | | 0.4 | 0.56 | 1,51 | | 0.0 | 0.97 | 1,36 | | 0.0 | 0.88 |
| Irrig. x Origin x Species | 2,56 | 0.7 | 0.50 | 2,51 | 0.0 | 0.97 | 2,56 | 0.5 | 0.58 | 2,51 | | 3.7 | **0.032** | 2,51 | | 0.1 | 0.88 | 2,36 | | 0.3 | 0.76 |
| Irrig. x Size x Species | 2,56 | 0.8 | 0.45 | 2,51 | 0.8 | 0.44 | 2,56 | 0.4 | 0.69 | 2,51 | | 0.7 | 0.49 | 2,51 | | 0.5 | 0.59 | 2,36 | | 0.5 | 0.62 |
| Origin x Size x Species | 2,56 | 0.5 | 0.59 | 2,51 | 0.8 | 0.44 | 2,56 | 0.5 | 0.60 | 2,51 | | 0.4 | 0.65 | 2,51 | | 0.6 | 0.57 | 2,36 | | 3.3 | **0.047** |
| Irrig. x Origin x Size x Species | 2,56 | 1.6 | 0.21 | 2,51 | 0.1 | 0.91 | 2,56 | 0.1 | 0.95 | 2,51 | | 0.2 | 0.81 | 2,51 | | 0.0 | 0.96 | - | | - | - |

(a) Full model (all litter species)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Lignin (%) | | | Lignin/N | | | Phenol (%) | | |
|  | DF | *F* | *P* | DF | *F* | *P* | DF | *F* | *P* |
| Irrig. | 1,4 | 0.4 | 0.54 | 1,4 | 1.1 | 0.36 | 1,4 | 0.2 | 0.67 |
| Origin | 1,4 | 0.7 | 0.44 | 1,4 | 116.6 | **<0.001** | 1,4 | 4.6 | 0.10 |
| Species | 2,4 | 2.4 | 0.21 | 2,4 | 459.5 | **<0.001** | 2,4 | 631.2 | **<0.001** |
| Irrig. x Origin | 1,4 | 3.8 | 0.12 | 1,4 | 0.0 | 0.88 | 1,4 | 0.0 | 0.96 |
| Irrig. x Species | 2,4 | 0.6 | 0.59 | 2,4 | 6.7 | **0.053** | - | - | - |
| Origin x Species | 2,4 | 0.4 | 0.67 | 2,4 | 70.2 | **0.001** | - | - | - |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

(b) By litter species

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | C (%) | | | N (%) | | | δ13C (‰) | | | | δ15N (‰) | | | | C/N | | | | Ash (%) | | |
|  |  | DF | *F* | *P* | DF | *F* | *P* | DF | *F* | *P* | DF | | *F* | *P* | DF | | *F* | *P* | DF | | *F* | *P* |
| *Quercus* | Irrig. | 1,6 | 0.3 | 0.59 | 1,6 | 0.1 | 0.78 | 1,6 | 1.1 | 0.33 | 1,6 | | 0.7 | 0.44 | 1,6 | | 0.1 | 0.72 | 1,6 | | 1.4 | 0.28 |
|  | Origin | 1,9 | 11.8 | **0.007** | 1,9 | 0.2 | 0.64 | 1,9 | 30.5 | **<0.001** | 1,9 | | 17.5 | **0.002** | 1,9 | | 0.0 | 0.92 | 1,9 | | 57.3 | **<0.001** |
|  | Size | 1,9 | 1.1 | 0.32 | 1,9 | 0.8 | 0.41 | 1,9 | 0.0 | 1.00 | 1,9 | | 7.5 | **0.023** | 1,9 | | 1.0 | 0.35 | 1,9 | | 1.3 | 0.28 |
|  | Irrig. x Origin | 1,9 | 0.7 | 0.42 | 1,9 | 0.0 | 0.99 | 1,9 | 1.8 | 0.21 | 1,9 | | 0.6 | 0.48 | 1,9 | | 0.1 | 0.74 | 1,9 | | 0.2 | 0.69 |
|  | Irrig. x Size | 1,9 | 0.4 | 0.55 | 1,9 | 0.0 | 0.98 | 1,9 | 0.6 | 0.46 | 1,9 | | 1.7 | 0.23 | 1,9 | | 0.0 | 0.87 | 1,9 | | 0.6 | 0.45 |
|  | Origin x Size | 1,9 | 0.0 | 0.85 | 1,9 | 0.5 | 0.50 | 1,9 | 1.1 | 0.33 | 1,9 | | 0.2 | 0.70 | 1,9 | | 0.1 | 0.73 | 1,9 | | 0.8 | 0.40 |
|  | Irrig. x Origin x Size | 1,9 | 0.5 | 0.52 | 1,9 | 0.5 | 0.49 | 1,9 | 0.0 | 0.94 | 1,9 | | 0.0 | 0.89 | 1,9 | | 0.5 | 0.49 | 1,9 | | 0.0 | 0.98 |
|  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  | |  |  |  | |  |  |
| *Viburnum* | Irrig. | 1,6 | 5.1 | 0.06 | 1,6 | 1.2 | 0.31 | 1,6 | 0.2 | 0.71 | 1,6 | | 0.2 | 0.65 | 1,6 | | 0.4 | 0.53 | 1,6 | | 2.2 | 0.19 |
|  | Origin | 1,11 | 17.3 | **0.002** | 1,11 | 10.4 | **0.008** | 1,11 | 68.2 | **<0.001** | 1,11 | | 4.4 | 0.06 | 1,11 | | 6.3 | **0.029** | 1,11 | | 3.0 | 0.11 |
|  | Size | 1,11 | 2.6 | 0.14 | 1,11 | 0.5 | 0.48 | 1,11 | 0.8 | 0.40 | 1,11 | | 0.0 | 0.99 | 1,11 | | 1.4 | 0.25 | 1,11 | | 4.5 | 0.06 |
|  | Irrig. x Origin | 1,11 | 0.3 | 0.60 | 1,11 | 0.1 | 0.71 | 1,11 | 0.0 | 0.96 | 1,11 | | 3.8 | 0.08 | 1,11 | | 0.1 | 0.75 | 1,11 | | 0.9 | 0.35 |
|  | Irrig. x Size | 1,11 | 0.2 | 0.68 | 1,11 | 1.0 | 0.33 | 1,11 | 0.0 | 0.97 | 1,11 | | 0.0 | 0.99 | 1,11 | | 1.2 | 0.29 | 1,11 | | 0.0 | 0.84 |
|  | Origin x Size | 1,11 | 1.0 | 0.33 | 1,11 | 0.0 | 0.90 | 1,11 | 0.1 | 0.81 | 1,11 | | 0.8 | 0.38 | 1,11 | | 0.0 | 0.88 | 1,11 | | 3.8 | 0.08 |
|  | Irrig. x Origin x Size | 1,11 | 0.4 | 0.53 | 1,11 | 0.2 | 0.70 | 1,11 | 0.0 | 0.84 | 1,11 | | 0.7 | 0.43 | 1,11 | | 0.2 | 0.67 | 1,11 | | 0.2 | 0.68 |
|  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  | |  |  |  | |  |  |
| *Pinus* | Irrig. | 1,5 | 4.5 | 0.09 | 1,5 | 0.2 | 0.69 | 1,5 | 0.0 | 0.99 | 1,5 | | 1.0 | 0.36 | 1,5 | | 0.7 | 0.46 | 1,3 | | 0.0 | 0.92 |
|  | Origin | 1,10 | 19.3 | **0.001** | 1,5 | 17.8 | **0.008** | 1,10 | 326.5 | **<0.001** | 1,5 | | 14.5 | **0.013** | 1,5 | | 11.5 | **0.020** | 1,1 | | 2.1 | 0.39 |
|  | Size | 1,10 | 2.5 | 0.15 | 1,5 | 1.6 | 0.26 | 1,10 | 1.4 | 0.27 | 1,5 | | 1.1 | 0.34 | 1,5 | | 3.4 | 0.13 | - | | - | - |
|  | Irrig. x Origin | 1,10 | 0.4 | 0.56 | 1,5 | 0.2 | 0.70 | 1,10 | 3.1 | 0.11 | 1,5 | | 4.9 | 0.08 | 1,5 | | 0.1 | 0.79 | - | | - | - |
|  | Irrig. x Size | 1,10 | 0.4 | 0.54 | 1,5 | 0.0 | 0.99 | 1,10 | 1.7 | 0.22 | 1,5 | | 2.4 | 0.19 | 1,5 | | 0.0 | 0.96 | - | | - | - |
|  | Origin x Size | 1,10 | 1.5 | 0.25 | 1,5 | 1.4 | 0.28 | 1,10 | 0.0 | 0.96 | 1,5 | | 0.2 | 0.65 | 1,5 | | 1.0 | 0.37 | - | | - | - |
|  | Irrig. x Origin x Size | 1,10 | 1.5 | 0.24 | 1,5 | 0.5 | 0.50 | 1,10 | 0.6 | 0.46 | 1,5 | | 0.2 | 0.71 | 1,5 | | 0.1 | 0.82 | - | | - | - |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Lignin (%) | | | Lignin/N | | | Phenol (%) | | |
|  |  | DF | *F* | *P* | DF | *F* | *P* | DF | *F* | *P* |
| *Quercus* | Irrig. | 1,1 | 0.01 | 0.93 | 1,1 | 1.26 | 0.46 | 1,1 | 0.38 | 0.65 |
|  | Origin | 1,1 | 0.03 | 0.90 | 1,1 | 0.06 | 0.85 | 1,1 | 0.05 | 0.86 |
|  | Irrig. x Origin | 1,1 | 0.11 | 0.79 | 1,1 | 0.03 | 0.89 | 1,1 | 0.29 | 0.69 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Viburnum* | Irrig. | 1,2 | 3.4 | 0.21 | 1,2 | 0.2 | 0.71 | - | - | - |
|  | Origin | 1,2 | 3.3 | 0.21 | 1,2 | 2.8 | 0.24 | - | - | - |
|  | Irrig. x Origin | 1,2 | 26.6 | **0.036** | 1,2 | 0.2 | 0.71 | - | - | - |
|  |  |  |  |  |  |  |  |  |  |  |
| *Pinus* | Irrig. | 1,2 | 1.2 | 0.39 | 1,2 | 2.1 | 0.28 | 1,2 | 1.0 | 0.43 |
|  | Origin | 1,1 | 4.9 | 0.27 | 1,1 | 6.1 | 0.24 | - | - | - |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

**Table S7.** Effects of irrigation (dry control *vs* irrigated), species (*Quercus*, *Viburnum,* *Pinus*), origin (dry control *vs* irrigated), size (0.1 mm *vs* 10 mm mesh size), sampling time (6 dates) and their interaction on the mass loss (%) from litterbags during the litter decomposition experiment (2014-2015) tested with linear-mixed effect models: (a) full model, including all litter species, (b) by litter species, using a first-order autocorrelation structure (*corAR1* function), and (c) by litter species and sampling dates. The *varIdent* structure was used to account for variance inhomogeneity.

1. Full model (all litter species)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mass loss (% initial) | | |
|  | DF | *F* | *P* |
| Irrig. | 1,6 | 179.2 | **<0.001** |
| Species | 2,380 | 1.9 | 0.15 |
| Origin | 1,380 | 9.1 | **0.003** |
| Size | 1,380 | 161.7 | **<0.001** |
| Time | 5,380 | 875.3 | **<0.001** |
| Irrig. x Species | 2,380 | 2.3 | 0.10 |
| Species x Origin | 2,380 | 5.6 | **0.004** |
| Irrig. x Origin | 1,380 | 0.2 | 0.67 |
| Species x Size | 2,380 | 13.5 | **<0.001** |
| Irrig. x Size | 1,380 | 65.5 | **<0.001** |
| Origin x Size | 1,380 | 8.3 | **0.004** |
| Species x Time | 10,380 | 2.8 | **0.002** |
| Irrig. x Time | 5,380 | 12.2 | **<0.001** |
| Origin x Time | 5,380 | 0.7 | 0.61 |
| Size x Time | 5,380 | 7.1 | **<0.001** |
| Irrig. x Species x Origin | 2,380 | 0.6 | 0.54 |
| Irrig. x Species x Size | 2,380 | 0.9 | 0.41 |
| Species x Origin x Size | 2,380 | 3.6 | **0.029** |
| Irrig. x Origin x Size | 1,380 | 2.9 | 0.09 |
| Irrig. x Species x Time | 10,380 | 3.0 | **0.001** |
| Species x Origin x Time | 10,380 | 1.9 | 0.05 |
| Irrig. x Origin x Time | 5,380 | 0.5 | 0.80 |
| Species x Size x Time | 10,380 | 3.6 | **<0.001** |
| Irrig. x Size x Time | 5,380 | 7.6 | **<0.001** |
| Origin x Size x Time | 5,380 | 1.0 | 0.44 |
| Irrig. x Species x Origin x Size | 2,380 | 3.8 | **0.022** |
| Irrig. x Species x Origin x Time | 10,380 | 0.4 | 0.93 |
| Irrig. x Species x Size x Time | 10,380 | 1.6 | 0.11 |
| Species x Origin x Size x Time | 10,380 | 2.1 | **0.027** |
| Irrig. x Origin x Size x Time | 5,380 | 3.2 | **0.007** |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

1. By litter species

|  | Mass loss (% initial) | | |
| --- | --- | --- | --- |
|  | DF | *F* | *P* |
| *Quercus* | | | |
| Irrig. | 1,6 | 93.0 | **<0.001** |
| Origin | 1,112 | 11.8 | **<0.001** |
| Size | 1,112 | 238.5 | **<0.001** |
| Time | 5,112 | 361.0 | **<0.001** |
| Irrig. x Origin | 1,112 | 2.3 | 0.14 |
| Irrig. x Size | 1,112 | 42.4 | **<0.001** |
| Origin x Size | 1,112 | 2.4 | 0.12 |
| Irrig. x Time | 5,112 | 6.3 | **<0.001** |
| Origin x Time | 5,112 | 3.4 | **0.007** |
| Size x Time | 5,112 | 12.8 | **<0.001** |
| Irrig. x Origin x Size | 1,112 | 0.1 | 0.80 |
| Irrig. x Origin x Time | 5,112 | 0.2 | 0.98 |
| Irrig. x Size x Time | 5,112 | 8.1 | **<0.001** |
| Origin x Size x Time | 5,112 | 0.9 | 0.46 |
|  |  |  |  |
| *Viburnum* |  |  |  |
| Irrig. | 1,6 | 116.3 | **<0.001** |
| Origin | 1,114 | 10.0 | **0.002** |
| Size | 1,114 | 93.1 | **<0.001** |
| Time | 5,114 | 323.5 | **<0.001** |
| Irrig. x Origin | 1,114 | 0.6 | 0.46 |
| Irrig. x Size | 1,114 | 38.5 | **<0.001** |
| Origin x Size | 1,114 | 5.5 | **0.021** |
| Irrig. x Time | 5,114 | 8.0 | **<0.001** |
| Origin x Time | 5,114 | 0.4 | 0.83 |
| Size x Time | 5,114 | 3.3 | **0.008** |
| Irrig. x Origin x Size | 1,114 | 11.4 | **0.001** |
| Irrig. x Origin x Time | 5,114 | 0.1 | 0.99 |
| Irrig. x Size x Time | 5,114 | 3.2 | **0.009** |
| Origin x Size x Time | 5,114 | 2.7 | **0.023** |
|  |  |  |  |
| *Pinus* |  |  |  |
| Irrig. | 1,6 | 38.3 | **0.001** |
| Origin | 1,115 | 0.5 | 0.46 |
| Size | 1,115 | 3.9 | 0.05 |
| Time | 5,115 | 337.4 | **<0.001** |
| Irrig. x Origin | 1,115 | 0.6 | 0.43 |
| Irrig. x Size | 1,115 | 7.0 | **0.009** |
| Origin x Size | 1,115 | 6.3 | **0.013** |
| Irrig. x Time | 5,115 | 6.8 | **<0.001** |
| Origin x Time | 5,115 | 1.5 | 0.21 |
| Size x Time | 5,115 | 2.5 | **0.032** |
| Irrig. x Origin x Size | 1,115 | 0.0 | 0.99 |
| Irrig. x Origin x Time | 5,115 | 0.7 | 0.63 |
| Irrig. x Size x Time | 5,115 | 2.7 | **0.024** |
| Origin x Size x Time | 5,115 | 1.3 | 0.25 |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

1. By litter species and sampling dates (140 and 572 days after litterbags placement)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Mass loss (% initial) | | | | | | |
|  |  | 0.1 mm mesh bags | | |  | 10 mm mesh bags | | |
|  |  | DF | *F* | *P* |  | DF | *F* | *P* |
| **140 days** |  |  |  |  |  |  |  |  |
| *Quercus* | Irrig. | 1,6 | 10.6 | **0.017** |  | 1,5 | 16.9 | **0.009** |
|  | Origin | 1,2 | 1.1 | 0.40 |  | 1,4 | 0.9 | 0.41 |
|  | Irrig. x Origin | 1,4 | 0.0 | 0.87 |  | 1,5 | 1.1 | 0.35 |
|  |  |  |  |  |  |  |  |  |
| *Viburnum* | Irrig. | 1,4 | 51.7 | **0.002** |  | 1,5 | 14.2 | **0.013** |
|  | Origin | 1,4 | 3.5 | 0.14 |  | 1,1 | 0.4 | 0.64 |
|  | Irrig. x Origin | 1,4 | 0.3 | 0.62 |  | 1,1 | 0.3 | 0.67 |
|  |  |  |  |  |  |  |  |  |
| *Pinus* | Irrig. | 1,4 | 19.6 | **0.011** |  | 1,5 | 2.5 | 0.17 |
|  | Origin | 1,2 | 1.1 | 0.41 |  | 1,1 | 0.1 | 0.79 |
|  | Irrig. x Origin | 1,2 | 0.2 | 0.71 |  | 1,1 | 0.0 | 0.92 |
| **572 days** |  |  |  |  |  |  |  |  |
| *Quercus* | Irrig. | 1,3 | 20.0 | **0.021** |  | 1,4 | 8.8 | **0.041** |
|  | Origin | 1,2 | 2.2 | 0.28 |  | 1,1 | 0.5 | 0.62 |
|  | Irrig. x Origin | - | - | - |  | 1,1 | 0.1 | 0.85 |
|  |  |  |  |  |  |  |  |  |
| *Viburnum* | Irrig. | 1,4 | 0.2 | 0.65 |  | 1,3 | 0.0 | 0.92 |
|  | Origin | 1,1 | 0.5 | 0.61 |  | 1,2 | 0.3 | 0.62 |
|  | Irrig. x Origin | 1,1 | 0.1 | 0.81 |  | 1,2 | 1.4 | 0.36 |
|  |  |  |  |  |  |  |  |  |
| *Pinus* | Irrig. | 1,3 | 10.1 | **0.050** |  | 1,3 | 0.3 | 0.62 |
|  | Origin | 1,2 | 0.1 | 0.84 |  | 1,1 | 95.9 | 0.06 |
|  | Irrig. x Origin | 1,2 | 1.1 | 0.41 |  | - | - | - |

*P*-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF)

**Table S8.** Mean abundance of invertebrates (n. individuals m-2) grouped by body-size (meso- and macrofauna based on Nielsen, 2019) in the organic layers (L + FH) and mineral soil of the dry control and irrigated plots tested with linear-mixed effect models. Abundances represent the means of four replicates (±standard error).

| Sampling date | Body-width groups | Taxonomic groups | Organic layers (L + FH) | | | | |  | Mineral soil (0-10 cm) | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dry | Irrigated | Statistical significance | | |  | Dry | Irrigated | Statistical significance | | |
| ind. m-2 | ind. m-2 | DF | *F* | *P* |  | ind. m-2 | ind. m-2 | DF | *F* | *P* |
| May 2015 | mesofauna | Acari | 5916 (1636) | 6850 (2413) | 1,6 | 0.1 | 0.74 |  | 29635 (2776) | 37338 (7145) | 1,6 | 0.7 | 0.43 |
|  | Collembola | 884 (347) | 2031 (109) | 1,6 | 7.0 | **0.038** |  | 5730 (1122) | 7990 (1766) | 1,6 | 1.1 | 0.33 |
|  | Protura | 0 (0) | 6 (6) | 1,6 | 1.0 | 0.36 |  | 0 (0) | 64 (64) | 1,6 | 1.0 | 0.36 |
|  | Symphyla | 8 (5) | 63 (31) | 1,6 | 0.9 | 0.37 |  | 923 (420) | 1974 (729) | 1,6 | 1.6 | 0.26 |
|  | Pseudoscorpiones | 5 (3) | 2 (2) | 1,6 | 0.7 | 0.44 |  | 32 (32) | 64 (64) | 1,6 | 0.2 | 0.67 |
|  | Enchytraeidae | N.A. | N.A. | N.A. | N.A. | N.A. |  | 60 (14) | 54 (16) | 1,6 | 0.1 | 0.75 |
|  | macrofauna | Formicidae | 84 (20) | 56 (27) | 1,6 | 0.7 | 0.43 |  | 859 (362) | 95 (32) | 1,6 | 3.2 | 0.12 |
|  | Insecta (adults) | 75 (30) | 66 (27) | 1,6 | 0.1 | 0.82 |  | 0 (0) | 32 (32) | 1,6 | 1.0 | 0.36 |
|  | Insecta (larvae) | 48 (5) | 28 (12) | 1,6 | 1.5 | 0.26 |  | 286 (80) | 318 (152) | 1,6 | 0.1 | 0.79 |
|  | Diplopoda | 3 (2) | 0 (0) | 1,6 | 2.1 | 0.19 |  | 0 (0) | 0 (0) | - | - | - |
|  | Isopoda | 0 (0) | 6 (4) | 1,6 | 2.3 | 0.18 |  | 0 (0) | 159 (159) | 1,6 | 1.0 | 0.36 |
|  | Lumbricidae | 3 (2) | 3 (2) | 1,6 | 0.0 | 1.00 |  | 102 (44) | 116 (35) | 1,6 | 0.7 | 0.45 |
|  | Gastropoda | 11 (4) | 47 (5) | 1,6 | 12.5 | **0.012** |  | 0 (0) | 191 (82) | 1,6 | 5.0 | 0.07 |
|  | Chilopoda | 19 (11) | 11 (11) | 1,6 | 0.8 | 0.41 |  | 191 (152) | 127 (52) | 1,6 | 0.2 | 0.70 |
|  | Araneae | 3 (2) | 8 (6) | 1,6 | 0.6 | 0.48 |  | 32 (32) | 32 (32) | 1,6 | 0.0 | 1.00 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| July 2015 | mesofauna | Acari | 1269 (330) | 4898 (184) | 1,6 | 23.8 | **0.003** |  | 44341 (15532) | 38929 (11142) | 1,6 | 0.1 | 0.76 |
|  | Collembola | 327 (91) | 1089 (129) | 1,6 | 14.6 | **0.009** |  | 3119 (789) | 12191 (2215) | 1,6 | 16.1 | **0.007** |
|  | Protura | 0 (0) | 3 (3) | 1,6 | 1.0 | 0.36 |  | 64 (37) | 223 (183) | 1,6 | 0.3 | 0.62 |
|  | Symphyla | 2 (2) | 14 (5) | 1,6 | 7.5 | **0.034** |  | 414 (80) | 1846 (1126) | 1,6 | 3.9 | 0.10 |
|  | Pseudoscorpiones | 2 (2) | 6 (4) | 1,6 | 0.8 | 0.39 |  | 255 (116) | 0 (0) | 1,6 | 5.3 | 0.06 |
|  | Enchytraeidae | N.A. | N.A. | N.A. | N.A. | N.A. |  | 3 (2) | 38 (19) | 1,6 | 18.5 | **0.005** |
|  | macrofauna | Formicidae | 5 (3) | 172 (170) | 1,6 | 1.0 | 0.36 |  | 64 (64) | 732 (358) | 1,6 | 3.3 | 0.12 |
|  | Insecta (adults) | 102 (46) | 111 (20) | 1,6 | 0.1 | 0.75 |  | 509 (147) | 1210 (443) | 1,6 | 5.0 | 0.07 |
|  | Insecta (larvae) | 5 (3) | 122 (45) | 1,6 | 15.2 | **0.008** |  | 477 (210) | 605 (330) | 1,6 | 0.1 | 0.76 |
|  | Diplopoda | 2 (2) | 3 (3) | 1,6 | 0.2 | 0.67 |  | 0 (0) | 0 (0) | - | - | - |
|  | Isopoda | 2 (2) | 38 (12) | 1,6 | 11.9 | **0.014** |  | 0 (0) | 191 (152) | 1,6 | 2.3 | 0.18 |
|  | Lumbricidae | 0 (0) | 6 (4) | 1,6 | 2.3 | 0.18 |  | 7 (5) | 37 (16) | 1,6 | 6.6 | **0.042** |
|  | Gastropoda | 2 (2) | 128 (71) | 1,6 | 10.2 | **0.019** |  | 32 (32) | 159 (159) | 1,6 | 0.3 | 0.63 |
|  | Chilopoda | 0 (0) | 3 (2) | 1,6 | 2.1 | 0.19 |  | 0 (0) | 0 (0) | - | - | - |
|  | Araneae | 5 (3) | 16 (8) | 1,6 | 1.7 | 0.24 |  | 32 (32) | 95 (61) | 1,6 | 0.9 | 0.39 |

P-values < 0.05 are given in bold. DF, degrees of freedom (numerator DF, denominator DF). N.A., not assessed.

**Table S9.** Abundance (n. individuals m-2), α-diversity (species richness, Shannon index) and community dissimilarity based on Bray-Curtis of Acari and Collembola sampled in June 2017. The values represent the means of four replicates (±standard error).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Taxonomic groups | Litter | |  | Soil (0-10 cm) | |  | *P-*values\* | | |
| Dry | Irrigated |  | Dry | Irrigated |  | Irrig. | Layer | Irrig. x  Layer |
| **Abundance** |  |  |  |  |  |  |  |  |  |  |
| n.ind. m-2 | Acari | 220 (22) | 160 (45) |  | 51380 (6527) | 47239 (15149) |  | 0.26 | **<0.001** | 0.58 |
| Collembola | 21 (12) | 11 (2) |  | 2208 (907) | 3333 (707) |  | 0.58 | **<0.001** | 0.43 |
|  |  |  |  |  |  |  |  |  |  |  |
| **α-diversity** |  |  |  |  |  |  |  |  |  |  |
| Species richness | Acari | 21.3 (0.8) | 18.5 (2.0) |  | 21.5 (2.1) | 16.5 (0.6) |  | 0.05 | 0.55 | 0.55 |
|  | Collembola | 4.5 (1.2) | 3.5 (0.9) |  | 3.3 (0.8) | 3.8 (0.6) |  | 0.79 | 0.58 | 0.42 |
|  |  |  |  |  |  |  |  |  |  |  |
| Shannon index | Acari | 2.0 (0.2) | 2.0 (0.1) |  | 2.1 (0.1) | 1.9 (0.1) |  | 0.53 | 0.60 | 0.44 |
|  | Collembola | 0.7 (0.2) | 0.5 (0.2) |  | 0.8 (0.2) | 0.7 (0.2) |  | 0.35 | 0.43 | 0.82 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Bray–Curtis**  **dissimilarities** | Acari |  |  |  |  |  |  | **0.013** | **<0.001** | 0.52 |
| Collembola |  |  |  |  |  |  | **0.031** | **0.014** | 0.58 |

\*Effects of irrigation, layer and their interaction on abundance and α-diversity were assessed by linear mixed-effects models. Effects on Bray–Curtis dissimilarities were assessed by permutational multivariate analysis of variance (PERMANOVA). P-values < 0.05 are given in bold.

**Table S10.** Relative abundances of Acari taxonomic groups in litter and soil (0 - 10 cm depth) of dry and irrigated plots (sampling June 2017) and results of correlation-based indicator species analysis. Indicator species analysis was performed based on square-root transformed relative abundances using the multipatt function in R package indicspecies. Significant indicator species (P value < 0.05) based on indicator species analysis are given in bold.

See Excel file

**Table S11.** Relative abundances of Collembola taxonomic groups in litter and soil (0 - 10 cm depth) of dry and irrigated plots (sampling June 2017) and results of correlation-based indicator species analysis. Indicator species analysis was performed based on square-root transformed relative abundances using the multipatt function in R package indicspecies. Significant indicator species (P value < 0.05) based on indicator species analysis are given in bold. See Excel file

**Table S12.** List of Acari taxonomic groups including average counts and relative abundances in litter and soil (0 - 10 cm depth) of dry and irrigated plots (sampling June 2017).

See Excel file

**Table S13.** List of Collembola taxonomic groups including average counts and relative abundances in litter and soil (0 - 10 cm depth) of dry and irrigated plots (sampling June 2017).

See Excel file