

Supplementary Materials

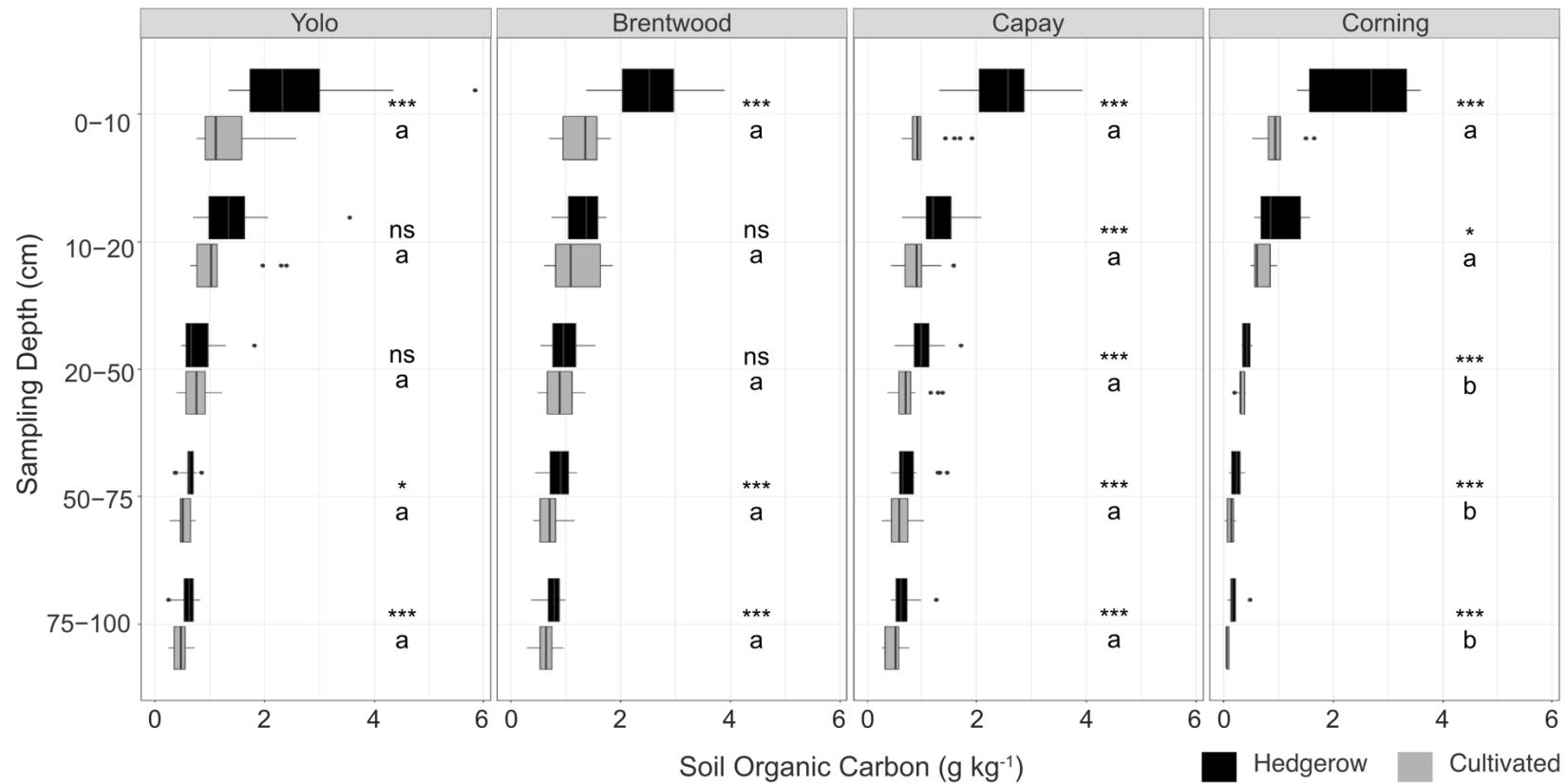


Figure S1. Box plots of soil organic carbon concentration in hedgerows and cultivated fields by depth and soil type. Letters indicate significant differences between soil types (n=6, except Corning n=3) and asterisks indicate significant differences between hedgerows (n=21) and cultivated fields (n=21) in Tukey means comparisons at $P < 0.05$. Vertical line in each box represents the mean and the left and right sides of the boxes represent the first and third quartiles, respectively. The whiskers extend to the highest and lowest values within 1.5 times the inter-quartile range and points outside of the “box and whiskers” represent outliers.

Table S1. Soil physical properties to a depth of 1 m according to soil type in hedgerows and cultivated fields for 21 sites in Yolo County, California. Cultivated fields were sampled 50 m away from hedgerows, which were located along field margins.

| Soil Type | Texture Class | Sand Content (g 100 g ⁻¹ soil) | | | | | Clay Content (g 100 g ⁻¹ soil) | | | | | Bulk Density (g cm ⁻³) | | | | | |
|-----------------|---------------|---|--------|------------|--------|----|---|------|------------|------|--------|------------------------------------|----|------------|--------|------|--------|
| | | Hedgerow | | Cultivated | | | Hedgerow | | Cultivated | | | Hedgerow | | Cultivated | | | |
| | | 0–10 cm depth | | | | | | | | | | 10–20 cm depth | | | | | |
| Yolo | SiCL | 17.4 | (1.08) | 18.3 | (1.29) | ns | c | 26.8 | (0.65) | 27.6 | (0.68) | ns | b | 1.29 | (0.06) | 1.29 | (0.03) |
| Brentwood | Cl | 25.6 | (1.03) | 25.2 | (0.90) | ns | b | 30.9 | (0.50) | 31.8 | (0.63) | ns | b | 1.32 | (0.05) | 1.23 | (0.05) |
| Capay | Clay | 16.0 | (1.22) | 15.2 | (1.06) | ns | c | 49.6 | (1.07) | 49.6 | (1.15) | ns | a | 1.46 | (0.06) | 1.40 | (0.05) |
| Corning | Loam | 36.0 | (2.71) | 38.3 | (1.44) | ns | a | 17.2 | (1.58) | 16.5 | (1.64) | ns | c | 1.24 | (0.09) | 1.46 | (0.07) |
| 10–20 cm depth | | | | | | | | | | | | | | | | | |
| Yolo | SiCL | 17.0 | (0.98) | 18.0 | (1.34) | ns | c | 26.9 | (0.63) | 27.9 | (0.89) | ns | b | 1.49 | (0.06) | 1.44 | (0.03) |
| Brentwood | Cl | 24.2 | (1.06) | 23.3 | (1.05) | ns | b | 31.4 | (0.78) | 32.1 | (0.84) | ns | b | 1.40 | (0.06) | 1.39 | (0.05) |
| Capay | Clay | 16.7 | (0.85) | 14.6 | (0.94) | ns | c | 50.8 | (1.04) | 50.9 | (1.20) | ns | a | 1.69 | (0.04) | 1.61 | (0.05) |
| Corning | Loam | 36.6 | (1.71) | 36.3 | (2.14) | ns | a | 17.6 | (1.35) | 16.1 | (1.70) | ns | c | 1.49 | (0.09) | 1.47 | (0.08) |
| 20–50 cm depth | | | | | | | | | | | | | | | | | |
| Yolo | SiCL | 17.3 | (0.73) | 17.8 | (1.60) | ns | c | 26.8 | (0.81) | 26.5 | (1.27) | ns | c | 1.48 | (0.08) | 1.52 | (0.05) |
| Brentwood | Cl | 23.2 | (1.11) | 21.5 | (0.97) | ns | b | 35.2 | (1.06) | 36.0 | (0.86) | ns | b | 1.53 | (0.04) | 1.56 | (0.04) |
| Capay | Clay | 16.8 | (1.15) | 15.3 | (0.62) | ns | c | 48.9 | (0.97) | 49.9 | (0.81) | ns | a | 1.72 | (0.03) | 1.75 | (0.05) |
| Corning | Loam | 43.3 | (1.30) | 39.1 | (2.32) | ns | a | 24.1 | (1.11) | 22.9 | (0.84) | ns | c | 1.67 | (0.09) | 1.59 | (0.08) |
| 50–75 cm depth | | | | | | | | | | | | | | | | | |
| Yolo | SiL | 19.5 | (0.77) | 17.5 | (1.76) | ns | c | 25.1 | (0.80) | 25.0 | (1.50) | ns | c | 1.47 | (0.02) | 1.49 | (0.03) |
| Brentwood | CL | 23.5 | (1.36) | 23.3 | (1.01) | ns | b | 31.6 | (0.90) | 31.5 | (0.80) | ns | b | 1.50 | (0.06) | 1.43 | (0.05) |
| Capay | Clay | 16.1 | (1.38) | 15.0 | (0.95) | ns | c | 50.5 | (1.13) | 50.8 | (1.06) | ns | a | 1.78 | (0.02) | 1.80 | (0.04) |
| Corning | CL | 45.3 | (0.94) | 43.3 | (1.16) | ns | a | 30.3 | (1.68) | 32.3 | (1.52) | ns | bc | 1.67 | (0.06) | 1.68 | (0.09) |
| 75–100 cm depth | | | | | | | | | | | | | | | | | |
| Yolo | SiL | 25.6 | (1.10) | 26.0 | (1.26) | ns | b | 21.7 | (1.05) | 22.6 | (1.00) | ns | b | 1.39 | (0.06) | 1.48 | (0.06) |
| Brentwood | Loam | 28.3 | (1.43) | 27.9 | (1.14) | ns | b | 23.8 | (1.10) | 23.1 | (1.01) | ns | b | 1.40 | (0.05) | 1.42 | (0.05) |
| Capay | Clay | 18.1 | (1.78) | 17.9 | (1.05) | ns | c | 49.4 | (1.32) | 49.7 | (1.43) | ns | a | 1.76 | (0.03) | 1.77 | (0.01) |
| Corning | SL | 51.2 | (1.60) | 49.0 | (0.32) | ns | a | 25.5 | (0.60) | 27.5 | (1.23) | ns | b | 1.6 | (0.07) | 1.57 | (0.12) |

Within a column, for each depth, values for soil type followed by the same letter are not significantly different at P<0.05. Soil properties were not significantly different by management (P<0.05) at any soil depth, except Bulk Density on Corning soils at 0–10 cm. Numbers in parentheses indicate standard error (n = 18); for Corning (n=9). SiCL = Silty clay loam; CL = Clay loam; SiL = Silt Loam; SL = Sandy Loam

Table S2. Total soil nitrogen concentrations, carbon-to-nitrogen ratios, and pH to a depth of 1 meter by soil type in hedgerows and cultivated fields for 21 sites in Yolo County, California.

| Soil Type | Total Soil Nitrogen (g kg ⁻¹) | | | | Soil C:N Ratio | | | | pH | | | | | | | | | |
|-----------------|---|------------|----------|------------|----------------|------------|----------|------------|----------|------------|----------|------------|-----|--------|-----|--------|----|----|
| | Hedgerow | Cultivated | Hedgerow | Cultivated | Hedgerow | Cultivated | Hedgerow | Cultivated | Hedgerow | Cultivated | Hedgerow | Cultivated | | | | | | |
| 0–10 cm depth | | | | | | | | | | | | | | | | | | |
| Yolo | 0.26 | (0.03) | 0.15 | (0.01) | *** | a | 10.09 | (0.28) | 9.06 | (0.46) | * | a | 6.8 | (0.07) | 6.8 | (0.05) | ns | a |
| Brentwood | 0.22 | (0.01) | 0.13 | (0.01) | *** | ab | 11.42 | (0.30) | 9.67 | (0.24) | *** | b | 6.5 | (0.05) | 6.5 | (0.04) | ns | b |
| Capay | 0.22 | (0.01) | 0.11 | (0.01) | *** | b | 11.46 | (0.30) | 9.52 | (0.26) | *** | b | 6.6 | (0.10) | 6.6 | (0.10) | ns | bc |
| Corning | 0.21 | (0.02) | 0.09 | (0.01) | *** | b | 11.83 | (0.22) | 10.58 | (0.33) | ** | b | 5.5 | (0.04) | 5.2 | (0.07) | ns | c |
| 10–20 cm depth | | | | | | | | | | | | | | | | | | |
| Yolo | 0.16 | (0.01) | 0.14 | (0.01) | ns | a | 9.01 | (0.40) | 8.48 | (0.38) | ns | a | 6.8 | (0.07) | 6.7 | (0.06) | ns | a |
| Brentwood | 0.12 | (0.01) | 0.12 | (0.01) | ns | ab | 10.94 | (0.27) | 9.78 | (0.3) | *** | b | 6.5 | (0.04) | 6.6 | (0.03) | ns | b |
| Capay | 0.13 | (0.01) | 0.10 | (0.01) | *** | bc | 10.17 | (0.23) | 9.25 | (0.24) | ** | ab | 6.6 | (0.10) | 6.6 | (0.10) | ns | ab |
| Corning | 0.09 | (0.01) | 0.08 | (0.01) | ns | c | 10.69 | (0.49) | 9.29 | (0.49) | ** | ab | 5.4 | (0.04) | 5.3 | (0.07) | ns | c |
| 20–50 cm depth | | | | | | | | | | | | | | | | | | |
| Yolo | 0.09 | (0.01) | 0.09 | (0.01) | ns | a | 9.22 | (0.22) | 8.60 | (0.33) | ns | a | 6.6 | (0.07) | 6.5 | (0.04) | ns | b |
| Brentwood | 0.09 | (0.01) | 0.09 | (0.01) | ns | a | 10.61 | (0.26) | 10.30 | (0.34) | ns | b | 6.3 | (0.05) | 6.3 | (0.03) | ns | b |
| Capay | 0.10 | (0.01) | 0.09 | (0.01) | * | a | 10.03 | (0.37) | 8.59 | (0.32) | ** | c | 7.1 | (0.07) | 7.0 | (0.05) | ns | a |
| Corning | 0.05 | (0.01) | 0.04 | (0.01) | * | b | 9.42 | (0.72) | 8.42 | (0.54) | ns | ac | 5.5 | (0.07) | 5.2 | (0.10) | * | c |
| 50–75 cm depth | | | | | | | | | | | | | | | | | | |
| Yolo | 0.09 | (0.01) | 0.08 | (0.01) | ** | a | 7.50 | (0.47) | 7.52 | (0.42) | ns | a | 6.6 | (0.07) | 6.6 | (0.04) | ns | b |
| Brentwood | 0.08 | (0.00) | 0.07 | (0.00) | ** | a | 10.70 | (0.30) | 10.06 | (0.30) | ns | b | 6.3 | (0.05) | 6.4 | (0.04) | ns | b |
| Capay | 0.08 | (0.01) | 0.07 | (0.01) | ** | a | 9.36 | (0.56) | 8.89 | (0.49) | ns | b | 7.1 | (0.06) | 7.0 | (0.05) | ns | a |
| Corning | 0.03 | (0.00) | 0.02 | (0.00) | *** | b | 7.41 | (0.80) | 10.33 | (1.04) | * | b | 5.5 | (0.10) | 5.2 | (0.06) | * | c |
| 75–100 cm depth | | | | | | | | | | | | | | | | | | |
| Yolo | 0.08 | (0.01) | 0.06 | (0.00) | ** | a | 7.82 | (0.64) | 7.66 | (0.58) | ns | a | 6.6 | (0.06) | 6.6 | (0.06) | ns | b |
| Brentwood | 0.08 | (0.00) | 0.06 | (0.00) | ** | a | 10.05 | (0.32) | 9.74 | (0.36) | ns | b | 6.4 | (0.04) | 6.4 | (0.03) | ns | b |
| Capay | 0.08 | (0.01) | 0.06 | (0.01) | ** | a | 9.22 | (0.60) | 8.36 | (0.62) | ns | ab | 7.1 | (0.06) | 7.1 | (0.06) | ns | a |
| Corning | 0.02 | (0.01) | 0.01 | (0.00) | * | b | 8.94 | (0.36) | 9.20 | (0.45) | ns | ab | 5.6 | (0.13) | 5.1 | (0.04) | ns | c |

Within a column, for each depth, values for soil type followed by the same letter are not significantly different at P<0.05. Soil properties were not significantly different by management (P < 0.05) at any soil depth, except pH from 20–75 cm in Corning soils. Numbers in parentheses indicate standard error (n = 18); for Corning (n=9). SiCL = Silty clay loam; CL = Clay loam; SiL = Silt Loam; SL = Sandy Loam

Table S3. Mean values and standard error for input data used in Principal Component Analysis (PCA).

| | Hedgerow | | Cultivated | |
|---|----------|------|------------|------|
| | mean | se | mean | se |
| Soil carbon (g kg ⁻¹ at 0–20 cm) | | | | |
| Yolo | 2.15 | 0.56 | 1.27 | 0.25 |
| Brentwood | 1.85 | 0.18 | 1.27 | 0.17 |
| Capay | 1.87 | 0.19 | 0.96 | 0.15 |
| Corning | 1.87 | 0.32 | 0.76 | 0.05 |
| Soil carbon (g kg ⁻¹ at 20–100 cm) | | | | |
| Yolo | 0.71 | 0.11 | 0.57 | 0.05 |
| Brentwood | 0.91 | 0.09 | 0.73 | 0.09 |
| Capay | 0.87 | 0.09 | 0.61 | 0.10 |
| Corning | 0.24 | 0.05 | 0.16 | 0.06 |
| Root intensity (0–20 cm) | | | | |
| Yolo | 1.16 | 0.35 | 0.54 | 0.06 |
| Brentwood | 1.34 | 0.16 | 0.52 | 0.09 |
| Capay | 0.98 | 0.12 | 0.55 | 0.11 |
| Corning | 1.03 | 0.18 | 0.97 | 0.16 |
| Root intensity (20–100 cm) | | | | |
| Yolo | 3.15 | 0.70 | 0.29 | 0.03 |
| Brentwood | 1.72 | 0.41 | 0.52 | 0.05 |
| Capay | 3.01 | 0.64 | 0.23 | 0.05 |
| Corning | 0.79 | 0.03 | 0.18 | 0.06 |
| Root depth (cm) | | | | |
| Yolo | 59.67 | 7.54 | 28.17 | 3.10 |
| Brentwood | 63.50 | 2.55 | 32.67 | 8.58 |
| Capay | 57.50 | 2.08 | 36.33 | 3.03 |
| Corning | 55.00 | 5.57 | 34.67 | 5.46 |
| Vegetative cover (months) | | | | |
| Yolo | 12.00 | 0.00 | 6.42 | 0.82 |
| Brentwood | 12.00 | 0.00 | 8.50 | 0.71 |
| Capay | 12.00 | 0.00 | 8.00 | 0.32 |
| Corning | 12.00 | 0.00 | 9.67 | 1.20 |
| Topsoil depth (cm) | | | | |
| Yolo | 11.67 | 1.69 | 13.33 | 2.06 |
| Brentwood | 12.17 | 1.30 | 11.83 | 0.75 |
| Capay | 11.00 | 0.73 | 11.33 | 0.92 |
| Corning | 10.00 | 2.08 | 11.67 | 2.33 |
| Earthworm index | | | | |
| Yolo | 3.33 | 0.33 | 2.17 | 0.48 |
| Brentwood | 2.50 | 0.43 | 2.50 | 0.43 |
| Capay | 3.17 | 0.31 | 2.33 | 0.33 |
| Corning | 2.00 | 0.58 | 2.00 | 0.58 |

Table S4. Summary results from the first three principal components of a PCA of soil physicochemical properties and biological indicators collected from soil pit descriptions (n=42). Weighted averages were calculated for 0–20 cm and 20–100 cm depths. Analysis was conducted on all sites without separation by soil type. Units provided in Table S3.

| | 0–20 cm depth | | | 20–100 cm depth | | | |
|-----------------------|---------------|--------|--------|-----------------------|--------|--------|--------|
| | PC1 | PC2 | PC3 | | PC1 | PC2 | PC3 |
| Eigenvalues | 1.68 | 1.45 | 1.23 | Eigenvalues | 1.64 | 1.36 | 1.19 |
| % Variance | 31.52 | 23.21 | 16.82 | % Variance | 38.52 | 26.61 | 20.14 |
| Cumulative % Variance | 31.52 | 54.73 | 71.55 | Cumulative % Variance | 38.52 | 65.13 | 85.27 |
| Factor Loading | | | | Factor Loading | | | |
| Rooting Depth | 0.513 | 0.051 | -0.177 | Root Intensity | 0.533 | 0.131 | 0.014 |
| Vegetative Cover | 0.478 | -0.077 | -0.216 | Rooting Depth | 0.495 | 0.210 | -0.224 |
| Root Intensity | 0.433 | -0.034 | -0.351 | Soil Carbon | 0.447 | -0.112 | 0.455 |
| Soil Carbon | 0.427 | -0.062 | 0.401 | Vegetative Cover | 0.425 | 0.249 | -0.388 |
| Earthworms | 0.325 | 0.248 | 0.223 | Clay | 0.194 | -0.621 | -0.224 |
| Topsoil Depth | 0.179 | -0.114 | 0.558 | Bulk Density | 0.001 | -0.502 | -0.560 |
| Bulk Density | 0.003 | 0.485 | -0.411 | Sand | -0.228 | 0.477 | -0.477 |
| Clay | -0.033 | 0.588 | 0.043 | Topsoil Depth | NA | NA | NA |
| Sand | -0.016 | -0.575 | -0.326 | Earthworms | NA | NA | NA |

Table S5. Spatial Information on extent of 21 hedgerows and adjacent cultivated fields, including the percent total of each field occupied by hedgerows. Hedgerows varied in height but were a minimum of 1.5 m tall.

| Site | Field Size (hectares) | Hedgerow Area (hectares) | % of Total Field |
|---------|--------------------------|-----------------------------|---------------------|
| 1 | 32.2 | 0.26 | 0.9 |
| 2 | 35.7 | 0.32 | 1.0 |
| 3 | 32.3 | 0.40 | 1.4 |
| 4 | 2.50 | 0.22 | 9.4 |
| 5 | 22.4 | 1.09 | 5.3 |
| 6 | 13.5 | 0.17 | 1.4 |
| 7 | 5.50 | 0.12 | 2.3 |
| 8 | 29.0 | 0.09 | 0.3 |
| 9 | 30.9 | 0.38 | 1.4 |
| 10 | 30.6 | 0.18 | 0.7 |
| 11 | 23.4 | 0.14 | 0.7 |
| 12 | 35.7 | 0.26 | 0.8 |
| 13 | 30.9 | 0.19 | 0.7 |
| 14 | 28.7 | 0.16 | 0.6 |
| 15 | 24.2 | 0.47 | 2.1 |
| 16 | 22.7 | 0.41 | 2.0 |
| 17 | 21.9 | 0.43 | 2.2 |
| 18 | 99.6 | 1.12 | 1.2 |
| 19 | 4.20 | 0.15 | 3.9 |
| 20 | 6.60 | 0.04 | 0.7 |
| 21 | 13.3 | 0.13 | 1.0 |
| Average | 26.0 | 0.32 | 1.9 |