

1 **Supplementary material**

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4 **Table S1**

5 Concentration ($\mu\text{mol L}^{-1}$) of the principal elements recorded in acid rain from the Fuzhou Plain.

| Na^+ | K^+ | Mg^{2+} | Ca^{2+} | NH_4^+ | Cl^- | NO_3^- | SO_4^{2-} |
|---------------|--------------|------------------|------------------|-----------------|---------------|-----------------|--------------------|
| 147.96 | 13.40 | 24.08 | 72.97 | 47.35 | 159.44 | 119.19 | 76.35 |

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51 Table S2. Results of the general mixed models (GLM) in the “*nlme*” package in R, with
 52 the “*lme*” function with acid rain, season and growth stage as independent fixed
 53 categorical variables and plot as independent random factors with all soil studied
 54 variables as continuous dependent variables. Bold type highlight statistical significant
 55 differences ($P < 0.05$) of fixed factors and interactions in the statistical model and
 56 statistical significant differences ($P < 0.05$) among the values under distinct acid rain
 57 treatments.
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| Soil variables | model<-lme(Soil variables~treatment + season + period + treatment:season, data=da des, random=~1 plot) | | | | | |
|------------------|---|---|--|--|---|---|
| | Statistics model | | | treatments | | |
| pH | F-value (Intercept) treatment season period treatment:season | p-value 33123.02 15.82 15.39 35.79 3.80 | | treatment 2.5 3.5 4.5 Control | emmmean 5.99 6.03 6.03 6.31 | SE 0.02b 0.02b 0.02b 0.02a |
| | R ² _m =0.77 R ² _c =0.77 | | | | | |
| Fe | F-value (Intercept) treatment season period R ² _m =0.16 R ² _c =0.16 | p-value 563.1783 0.1590 0.1483 3.1558 0.0494 | | treatment 2.5 3.5 4.5 Control | emmmean 11.9 11.8 12.7 12.8 | SE 0.364 0.364 0.364 0.364 |
| Fe ²⁺ | F-value (Intercept) treatment season period R ² _m =0.59 R ² _c =0.59 | p-value 44.99773 0.87281 20.83871 38.72668 <.0001 | | Treatment 2.5 3.5 4.5 Control | emmmean 2.83 2.56 2.56 2.92 | SE 0.201 0.201 0.201 0.201 |
| Fe ³⁺ | F-value (Intercept) treatment season period R ² _m =0.17 R ² _c =0.17 | p-value 487.1499 2.0741 1.3332 3.4316 0.0385 | | treatment 2.5 3.5 4.5 Control | emmmean 9.10 9.28 10.11 9.84 | SE 0.331 0.331 0.331 0.331 |
| Salinity | F-value (Intercept) treatment season period season:period R ² _m =0.73 R ² _c =0.73 | p-value 277.64229 3.20627 0.0292 2.64569 13.76078 15.88181 <.0001 | | treatment 2.5 3.5 4.5 Control | emmmean 0.651 0.631 0.594 0.546 | SE 0.02a6 0.026a 0.027ab 0.026b |
| SWC | F-value (Intercept) treatment season period R ² _m =0.88 R ² _c =0.89 | p-value 3530.850 16.444 41.959 229.337 <.0001 | | Treatment 2.5 3.5 4.5 Control | emmmean 69.3 65.3 63.3 62.9 | SE 0.912a 0.912b 0.912bc 0.912c |
| SOC | F-value (Intercept) | p-value 1735.9084 <.0001 | | treatment 2.5 | emmmean 19.3 | SE 0.3a |

Con formato: Fuente: Negrita

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|-----------------|-----------------------------------|----------------|------------------|---------|-------------|--------------|
| | treatment | 9.0089 | 0.0001 | 3.5 | 19.7 | 0.3a |
| | season | 3.1270 | 0.0820 | 4.5 | 20.1 | 0.3a |
| | period | 22.5048 | <.0001 | Control | 18.2 | 0.3b |
| | season:period | 6.5590 | 0.0026 | | | |
| | R ² _m =0.48 | | | | | |
| | R ² _c =0.54 | | | | | |
| DOC | F-value | p-value | Treatment | emmmean | SE | |
| | (Intercept) | 347.7230 | <.0001 | 2.5 | 54.2 | 1.32 |
| | treatment | 2.2445 | 0.0940 | 3.5 | 56.1 | 1.32 |
| | season | 0.1100 | 0.7414 | 4.5 | 58.4 | 1.32 |
| | period | 19.1568 | <.0001 | Control | 57.8 | 1.32 |
| | treatment:season | 3.8884 | 0.0139 | | | |
| | treatment:period | 7.6466 | <.0001 | | | |
| | season:period | 13.4118 | <.0001 | | | |
| | R ² _m =0.78 | | | | | |
| | R ² _c =0.79 | | | | | |
| MBC | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 81.39774 | <.0001 | 2.5 | 107 | 5 |
| | treatment | 1.84256 | 0.1509 | 3.5 | 118 | 5 |
| | season | 0.99146 | 0.3240 | 4.5 | 114 | 5 |
| | period | 5.90203 | 0.0049 | Control | 109 | 5 |
| | treatment:season | 0.59144 | 0.6234 | | | |
| | treatment:period | 2.71529 | 0.0227 | | | |
| | season:period | 7.54589 | 0.0013 | | | |
| | R ² _m =0.58 | | | | | |
| | R ² _c =0.59 | | | | | |
| Temperature | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 90739.08 | <.0001 | 2.5 | 26.08 | 0.06 |
| | treatment | 0.67 | 0.5745 | 3.5 | 26.03 | 0.06 |
| | season | 770.54 | <.0001 | 4.5 | 26.06 | 0.06 |
| | period | 1340.28 | <.0001 | Control | 26.15 | 0.06 |
| | season:period | 4427.31 | <.0001 | | | |
| | R ² _m =0.99 | | | | | |
| | R ² _c =0.99 | | | | | |
| LOC:SOC | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 355.0384 | <.0001 | 2.5 | 30.1 | 1.2ab |
| | treatment | 3.2276 | 0.0283 | 3.5 | 27.0 | 1.2b |
| | season | 0.0028 | 0.9581 | 4.5 | 27.1 | 1.2b |
| | period | 1.3253 | 0.2730 | Control | 31.4 | 1.2a |
| | R ² _m =0.15 | | | | | |
| | R ² _c =0.15 | | | | | |
| TN | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 1660.5085 | <.0001 | 2.5 | 2.11 | 0.03a |
| | treatment | 14.1873 | <.0001 | 3.5 | 2.14 | 0.03a |
| | season | 4.1486 | 0.046 | 4.5 | 2.17 | 0.03a |
| | period | 60.6801 | <.0001 | Control | 1.93 | 0.03b |
| | season:period | 11.8122 | <.0001 | | | |
| | R ² _m =0.78 | | | | | |
| | R ² _c =0.78 | | | | | |
| N-availability | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 408.6116 | <.0001 | 2.5 | 55.0 | 1.4bc |
| | treatment | 13.7066 | <.0001 | 3.5 | 57.9 | 1.4b |
| | season | 18.4223 | 0.0001 | 4.5 | 62.6 | 1.4a |
| | period | 73.1508 | <.0001 | Control | 52.0 | 1.4c |
| | treatment:season | 5.4446 | 0.0025 | | | |
| | treatment:period | 11.9770 | <.0001 | | | |
| | season:period | 39.3415 | <.0001 | | | |
| | R ² _m =0.95 | | | | | |
| | R ² _c =0.96 | | | | | |
| NO _x | F-value | p-value | Treatment | emmmean | SE | |

Con formato: Subíndice

Con formato: Superíndice

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|------------------------------|-----------------------------------|-----------------|------------------|------------|-------------|---------------|
| | (Intercept) | 1.05548 | 0.3087 | 2.5 | 10.6 | 1.1a |
| | treatment | 13.77003 | <.0001 | 3.5 | 9.7 | 1.1a |
| | season | 3.97258 | 0.0512 | 4.5 | 10.5 | 1.1a |
| | period | 32.54137 | <.0001 | Control | 4.8 | 1.1b |
| | treatment:period | 5.86705 | 0.0001 | | | |
| | season:period | 28.29417 | <.0001 | | | |
| | R ² _m =0.75 | | | | | |
| | R ² _c =0.75 | | | | | |
| NH ₄ ⁺ | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 237.03930 | <.0001 | 2.5 | 44.4 | 1.6b |
| | treatment | 6.55398 | 0.0008 | 3.5 | 48.2 | 1.6ab |
| | season | 16.84292 | 0.0001 | 4.5 | 52.1 | 1.6a |
| | period | 54.55873 | <.0001 | Control | 47.1 | 1.6ab |
| | treatment:season | 3.09479 | 0.0347 | | | |
| | treatment:period | 13.79313 | <.0001 | | | |
| | season:period | 20.84761 | <.0001 | | | |
| | R ² _m =0.91 | | | | | |
| | R ² _c =0.91 | | | | | |
| Bacteria otus | F-value | P-value | Treatment | emmmean | SE | |
| | (Intercept) | 46.62601 | <.0001 | 2.5 | 24.9 | 2.4ab |
| | treatment | 4.28001 | 0.0090 | 3.5 | 20.4 | 2.4b |
| | season | 4.88988 | 0.0314 | 4.5 | 28.4 | 2.4a |
| | period | 0.67225 | 0.5149 | Control | 26.7 | 2.4a |
| | treatment:season | 4.06974 | 0.0114 | | | |
| | treatment:period | 7.44645 | <.0001 | | | |
| | season:period | 3.36096 | 0.0424 | | | |
| | R ² _m =0.59 | | | | | |
| | R ² _c =0.59 | | | | | |
| TP | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 2273.9659 | <.0001 | 2.5 | 2.08 | 0.03b |
| | treatment | 13.4515 | <.0001 | 3.5 | 2.17 | 0.03ab |
| | season | 0.0066 | 0.9357 | 4.5 | 2.20 | 0.03a |
| | period | 23.3164 | <.0001 | Control | 1.92 | 0.03c |
| | R ² _m =0.55 | | | | | |
| | R ² _c =0.56 | | | | | |
| P-availability | F-value | p-value | Treatment | emmmean | SE | |
| | (Intercept) | 662.8440 | <.0001 | 2.5 | 85.3 | 2.5 |
| | treatment | 2.0308 | 0.1186 | 3.5 | 78.3 | 2.5 |
| | season | 5.8490 | 0.0185 | 4.5 | 85.9 | 2.5 |
| | period | 0.8469 | 0.4336 | Control | 81.0 | 2.5 |
| | R ² _m =0.16 | | | | | |
| | R ² _c =0.16 | | | | | |
| C:N | F-value | p-value | Treatment | emmmean | SE | |
| | (Intercept) | 5335.396 | <.0001 | 2.5 | 9.26 | 0.06b |
| | treatment | 7.394 | 0.0003 | 3.5 | 9.29 | 0.06b |
| | season | 3.072 | 0.0856 | 4.5 | 9.34 | 0.0ab6 |
| | period | 105.013 | <.0001 | Control | 9.48 | 0.06a |
| | treatment:season | 8.603 | 0.0001 | | | |
| | treatment:period | 2.486 | 0.0344 | | | |
| | season:period | 3.741 | 0.0304 | | | |
| | R ² _m =0.93 | | | | | |
| | R ² _c =0.93 | | | | | |
| C:P | F-value | p-value | treatment | emmmean | SE | |
| | (Intercept) | 2088.0628 | <.0001 | 2.5 | 9.30 | 0.18 |
| | treatment | 1.3847 | 0.2557 | 3.5 | 9.11 | 0.14 |
| | season | 0.1277 | 0.7220 | 4.5 | 9.21 | 0.14 |
| | period | 6.1009 | 0.0038 | Control | 9.52 | 0.14 |
| | R ² _m =0.19 | | | | | |
| | R ² _c =0.19 | | | | | |
| N:P | F-value | P-value | treatment | emmmean | SE | |

| | | |
|-----------------------------------|---|--|
| | (Intercept) 46.62601 <.0001 treatment 1.28001 0.2787 season 4.88988 0.0314 period 0.67225 0.5149 treatment:season 4.06974 0.0114 treatment:period 7.44645 <.0001 season:period 3.36096 0.0424 $R^2_m=0.78$ $R^2_e=0.78$ | 2.5 1.023 0.016 3.5 0.993 0.016 4.5 0.997 0.016 Control 1.018 0.016 |
| LOC:N-availability | F-value p-value (Intercept) 200.65671 <.0001 treatment 2.17202 0.1001 season 48.72981 <.0001 period 43.58113 <.0001 $R^2_m=0.67$ $R^2_e=0.67$ | treatment emmean SE 2.5 115 6.36ab 3.5 109 6.36ab 4.5 103 6.36b Control 125 6.36a |
| LOC:P-availability | F-value p-value (Intercept) 353.7223 <.0001 treatment 1.1238 0.3462 season 2.9668 0.0899 period 4.5617 0.0141 $R^2_m=0.18$ $R^2_e=0.18$ | Treatment emmean SE 2.5 68.9 2.91 3.5 67.6 2.91 4.5 64.0 2.91 Control 71.4 2.91 |
| N-availability: P-availability | F-value p-value (Intercept) 146.03055 <.0001 treatment 4.82525 0.0049 season 11.63300 0.2070 period 13.12405 <.0001 treatment:season 9.35091 <.0001 treatment:period 9.43510 <.0001 season:period 13.02159 <.0001 $R^2_m=0.88$ $R^2_e=0.88$ | Treatment emmean SE 2.5 0.636 0.024a 3.5 0.741 0.024b 4.5 0.749 0.024b Control 0.644 0.024a |
| MBC:MBN | F-value p-value (Intercept) 1.324961 0.2545 treatment 4.602306 0.0059 season 9.110180 0.0038 period 3.790151 0.0285 treatment:period 4.070393 0.0018 $R^2_m=0.42$ $R^2_e=0.42$ | Treatment emmean SE 2.5 7.11 1.26ab 3.5 6.79 1.26ab 4.5 7.31 1.26a Control 6.01 1.26b |
| DOC:SOC | F-value p-value (Intercept) 140.83127 <.0001 treatment 2.74158 0.0425 season 0.18425 0.6695 period 18.97371 <.0001 treatment:season 2.54766 0.0658 treatment:period 2.49346 0.0340 season:period 17.04457 <.0001 $R^2_m=0.64$ $R^2_e=0.69$ | Treatment emmean SE 2.5 0.282 0.0117b 3.5 0.285 0.0117b 4.5 0.292 0.0117b Control 0.319 0.0117a |
| MBC:SOC | F-value p-value (Intercept) 138.82678 <.0001 treatment 0.56866 0.6378 season 0.37165 0.5444 period 19.69524 <.0001 season:period 5.40500 0.0069 $R^2_m=0.47$ $R^2_e=0.47$ | Treatment emmean SE 2.5 0.555 0.0343 3.5 0.611 0.0343 4.5 0.570 0.0343 Control 0.600 0.0343 |

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93 **Table S2**

94 Mixed models analyses of soil traits (dependent variables), acid rain treatments (categorical
 95 independent fixed variables), and season and crop period (categorical independent random
 96 variables) and plot as random.

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| Soil variable (Y) | | ANOVA (fixed factor) (intercept df = 1, treatment df = 63) | | model variance (%) R^2_m (fixed model) R^2_e (best model) |
|-------------------|-----------|--|---------|---|
| | | F | P | |
| Total Fe | Intercept | 929 | <0.0001 | $R^2_m=0.065$ |
| | treatment | 1.82 | 0.15 | $R^2_e=0.16$ |
| Fe ²⁺ | Intercept | 29.4 | <0.0001 | $R^2_m=0.014$ |
| | treatment | 2.2 | 0.096 | $R^2_e=0.85$ |
| Fe ³⁺ | Intercept | 528 | <0.0001 | $R^2_m=0.073$ |
| | treatment | 2.5 | 0.067 | $R^2_e=0.31$ |
| Temperature | Intercept | 325 | <0.0001 | $R^2_m=0.00016$ |
| | treatment | 0.67 | 0.57 | $R^2_e=0.99$ |
| pH | Intercept | 18202 | <0.0001 | $R^2_m=0.47$ |
| | treatment | 44.1 | <0.0001 | $R^2_e=0.75$ |
| SWC | Intercept | 289 | <0.0001 | $R^2_m=0.069$ |
| | treatment | 15.2 | <0.0001 | $R^2_e=0.89$ |
| Salinity | Intercept | 45.8 | <0.0001 | $R^2_m=0.033$ |
| | treatment | 3.21 | 0.029 | $R^2_e=0.75$ |
| SOC | Intercept | 1277 | <0.0001 | $R^2_m=0.18$ |
| | treatment | 8.27 | <0.0001 | $R^2_e=0.50$ |
| DOC | Intercept | 233 | <0.0001 | $R^2_m=0.024$ |
| | treatment | 2.57 | 0.20 | $R^2_e=0.64$ |
| MBC | Intercept | 47.1 | <0.0001 | $R^2_m=0.014$ |
| | treatment | 0.761 | 0.52 | $R^2_e=0.55$ |
| LOC/SOC | Intercept | 654 | <0.0001 | $R^2_m=0.12$ |
| | treatment | 3.234 | 0.028 | $R^2_e=0.12$ |
| DOC/SOC | Intercept | 222 | <0.0001 | $R^2_m=0.049$ |
| | treatment | 2.85 | 0.045 | $R^2_e=0.59$ |
| MBC/SOC | Intercept | 55.1 | <0.0001 | $R^2_m=0.012$ |
| | treatment | 0.59 | 0.64 | $R^2_e=0.52$ |
| Total N | Intercept | 433 | <0.0001 | $R^2_m=0.12$ |

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|-----------------------------------|------------------------|---------------|--------------------|--|
| | | | | |
| Available-N | Intercept treatment | 18.9 5.68 | <0.0001 0.0017 | R ² m=0.022 R ² e=0.91 |
| Soil NO ₃ ⁻ | Intercept treatment | 1.61 4.66 | 0.21 0.0053 | R ² m=0.064 R ² e=0.67 |
| Soil NH ₄ ⁺ | Intercept treatment | 24.4 1.69 | <0.0001 0.18 | R ² m=0.013 R ² e=0.82 |
| Microbial-N | Intercept treatment | 36.43 1.15 | <0.0001 0.34 | R ² m=0.036 R ² e=0.26 |
| Total P | Intercept treatment | 947 13.9 | <0.0001 <0.0001 | R ² m=0.25 R ² e=0.58 |
| Available P | Intercept treatment | 467 2.06 | <0.0001 0.11 | R ² m=0.071 R ² e=0.19 |
| C:N | Intercept treatment | 448 1.38 | <0.0001 0.26 | R ² m=0.0056 R ² e=0.90 |
| C:P | Intercept treatment | 2706 1.42 | <0.0001 0.25 | R ² m=0.048 R ² e=0.20 |
| N:P | Intercept treatment | 298 0.88 | <0.0001 0.46 | R ² m=0.0071 R ² e=0.81 |
| LOC/Available-N | Intercept treatment | 30.4 2.21 | <0.001 0.096 | R ² m=0.026 R ² e=0.73 |
| LOC/Available-P | Intercept treatment | 404 1.13 | <0.0001 0.34 | R ² m=0.040 R ² e=0.17 |
| Available N/Available P | Intercept treatment | 26.8 2.77 | <0.0001 0.049 | R ² m=0.027 R ² e=0.77 |
| MBC/MBN | Intercept treatment | 7.04 0.16 | 0.010 0.92 | R ² m=0.0051 R ² e=0.26 |

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107 **Table S3** Results of the general mixed models (GLM) in the “*nlme*” package in R, with the “*lme*” function with acid rain and growth stage as
 108 independent fixed categorical variables and plot as independent random factors with all soil studied variables as continuous dependent variables
 109 in early and late paddy seasons. Bold type highlight statistical significant differences ($P<0.05$) of fixed factors and interactions in the statistical
 110 model and statistical significant differences ($P<0.05$) among the values under distinct acid rain treatments.

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| Soil Variable | model<-lme(Soil variable~(treatment + timing)^2, data=dades, random=list(~1 plot)) | | | | | | | | | | | | | | | | |
|-----------------|--|----------|-----------|---------------|---------------|---------|-------|----------|------------------|----------|-----------|-------------|------------------|---------|------|--------|---|
| | Early paddy | | | | | | | | Late paddy | | | | | | | | |
| | Statistics | | | | Treatments | | | | Statistics | | | | Treatments | | | | |
| pH | DF | DF | F-value | p-value | treatment | emmmean | SE | | DF | denDF | F-value | p-value | treatment | emmmean | SE | | |
| | (Intercept) | 1 | 22 | 17414.405 | <.0001 | 2.5 | 6.07 | 0.02875b | (Intercept) | 1 | 22 | 15473 | <.0001 | 2.5 | 5.90 | 0.028b | Con formato: Fuente: Negrita |
| | treatment | 3 | 22 | 4.867 | 0.0096 | 3.5 | 6.05 | 0.02875b | treatment | 3 | 22 | 20.5 | <.0001 | 3.5 | 6.02 | 0.028b | Con formato: Fuente: Negrita |
| | timing | 2 | 22 | 8.486 | 0.0019 | 4.5 | 6.06 | 0.02875b | period | 2 | 22 | 11.9 | 0.0003 | 4.5 | 6.00 | 0.028b | Con formato: HTML con formato previo, Interlineado: Mínimo 10,25 pto, Diseño: Claro (Blanco) |
| | treatment:timing | 6 | 22 | 2.152 | 0.0877 | Control | 6.29 | 0.02875a | treatment:period | 6 | 22 | 1.97 | 0.1138 | Control | 6.32 | 0.028a | |
| | $R^2_m=0.79$ | | | | | | | | $R^2_m=0.83$ | | | | | | | | |
| | $R^2_e=0.80$ | | | | | | | | $R^2_e=0.84$ | | | | | | | | |
| Fe | DF | DF | F-value | p-value | Treatment | emmmean | SE | | DF | denDF | F-value | p-value | Treatment | emmmean | SE | | |
| | (Intercept) | 1 | 22 | 276.25609 | <.0001 | 2.5 | 11.3 | 0.399 | (Intercept) | 1 | 22 | 150 | <.0001 | 2.5 | 12.6 | 0.563 | Con formato: Subíndice |
| | treatment | 3 | 22 | 0.29933 | 0.8255 | 3.5 | 11.9 | 0.399 | treatment | 3 | 22 | 0.39264 | 0.7595 | 3.5 | 11.7 | 0.563 | Con formato: Superíndice |
| | timing | 2 | 22 | 0.12941 | 0.8793 | 4.5 | 12.7 | 0.399 | period | 2 | 22 | 2.94532 | 0.0736 | 4.5 | 12.7 | 0.563 | Con formato: Fuente: Negrita |
| | treatment:timing | 6 | 22 | 0.74277 | 0.6212 | Control | 12.3 | 0.399 | treatment:period | 6 | 22 | 1.79295 | 0.1471 | Control | 13.2 | 0.563 | Con formato: HTML con formato previo, Interlineado: Mínimo 10,25 pto, Diseño: Claro (Blanco) |
| | $R^2_m=0.30$ | | | | | | | | $R^2_m=0.37$ | | | | | | | | |
| | $R^2_e=0.30$ | | | | | | | | $R^2_e=0.37$ | | | | | | | | |
| Fe_2^+ | DF | DF | F-value | p-value | Treatment | emmmean | SE | | DF | denDF | F-value | p-value | treatment | emmmean | SE | | |
| | (Intercept) | 1 | 22 | 511.4578 | <.0001 | 2.5 | 2.33 | 0.0582 | (Intercept) | 1 | 22 | 23.3 | 0.0001 | 2.5 | 3.33 | 0.225 | Con formato: Izquierda, Interlineado: Mínimo 10,25 pto, Control de líneas vueltas y huérfanas, Dividir palabras, Diseño: Claro (Blanco), Punto de tabulación: 1,62 cm, Izquierda + 3,23 cm, Izquierda + 4,85 cm, Izquierda + 6,46 cm, Izquierda + 8,08 cm, Izquierda + 9,69 cm, Izquierda + 11,31 cm, Izquierda + 12,92 cm, Izquierda + 14,54 cm, Izquierda + 16,16 cm, Izquierda + 17,77 cm, Izquierda + 19,39 cm, Izquierda + 21 cm, Izquierda + 22,62 cm, Izquierda + 24,23 cm, Izquierda + 25,85 cm, Izquierda |
| | treatment | 3 | 22 | 1.0075 | 0.4082 | 3.5 | 2.28 | 0.0582 | treatment | 3 | 22 | 0.327 | 0.8060 | 3.5 | 2.83 | 0.225 | |
| | timing | 2 | 22 | 6.2862 | 0.0069 | 4.5 | 2.25 | 0.0582 | period | 2 | 22 | 37.5 | <.0001 | 4.5 | 2.87 | 0.225 | |
| | treatment:timing | 6 | 22 | 1.5909 | 0.1969 | Control | 2.17 | 0.0582 | treatment:period | 6 | 22 | 1.32 | 0.2887 | Control | 3.67 | 0.225 | |
| | $R^2_m=0.72$ | | | | | | | | $R^2_m=0.85$ | | | | | | | | |
| | $R^2_e=0.72$ | | | | | | | | $R^2_e=0.85$ | | | | | | | | |
| Fe_3^+ | DF | DF | F-value | p-value | treatment | emmmean | SE | | DF | denDF | F-value | p-value | treatment | emmmean | SE | | |
| | (Intercept) | 1 | 22 | 168.91145 | <.0001 | 2.5 | 8.92 | 0.409 | (Intercept) | 1 | 22 | 225 | <.0001 | 2.5 | 9.28 | 0.388 | Con formato: Subíndice |
| | treatment | 3 | 22 | 0.30117 | 0.8242 | 3.5 | 9.65 | 0.409 | treatment | 3 | 22 | 0.355 | 0.7861 | 3.5 | 8.90 | 0.388 | Con formato: Superíndice |
| | timing | 2 | 22 | 0.41925 | 0.6627 | 4.5 | 10.40 | 0.409 | period | 2 | 22 | 1.52 | 0.2417 | 4.5 | 9.83 | 0.388 | |

| | | | | | | | | | | | | | | | | | |
|-------------|------------------------------------|-------|---------|-----------|-----------|-----------|---------|----------|-----------------------------------|------------------|---------|-----------|-----------|---------|---------|--------|-------|
| | treatment:timing | 6 | 22 | 0.57911 | 0.7430 | Control | 10.13 | 0.409 | treatment:period | 6 | 22 | 3.07 | 0.0244 | Control | 9.56 | 0.388 | |
| | R ² _m =0.27 | | | | | | | | R ² _m =0.27 | | | | | | | | |
| | R ² _c =0.27 | | | | | | | | R ² _c =0.27 | | | | | | | | |
| Salinity | DF | - | DF | F-value | p-value | Treatment | emmmean | SE | DF | denDF | F-value | p-value | treatment | emmmean | SE | | |
| | (Intercept) | 1 | - | 22 | 328.6957 | <.0001 | 2.5 | 0.652 | 0.0223a | (Intercept) | 1 | 22 | 57.5 | <.0001 | 2.5 | 0.650 | 0.044 |
| | treatment | 3 | - | 22 | 8.0665 | 0.0008 | 3.5 | 0.580 | 0.0223b | treatment | 3 | 22 | 0.959 | 0.4296 | 3.5 | 0.681 | 0.044 |
| | timing | 2 | - | 22 | 10.0199 | 0.0008 | 4.5 | 0.542 | 0.0223c | period | 2 | 22 | 7.55 | 0.0032 | 4.5 | 0.646 | 0.044 |
| | treatment:timing | 6 | - | 22 | 3.6099 | 0.0121 | Control | 0.542 | 0.0223c | treatment:period | 6 | 22 | 0.710 | 0.6449 | Control | 0.550 | 0.044 |
| | R ² _m =0.76 | | | | | | | | R ² _m =0.76 | | | | | | | | |
| | R ² _c =0.76 | | | | | | | | R ² _c =0.76 | | | | | | | | |
| SWC | DF | DF | F-value | p-value | Treatment | emmmean | SE | DF | denDF | F-value | p-value | treatment | emmmean | SE | | | |
| | (Intercept) | 1 | 22 | 1884.8361 | <.0001 | 2.5 | 66.0 | 0.9659a | (Intercept) | 1 | 22 | 1198 | <.0001 | 2.5 | 72.6 | 1.19 | |
| | treatment | 3 | 22 | 5.0666 | 0.0081 | 3.5 | 63.8 | 0.9659ab | treatment | 3 | 22 | 1.14 | 0.355 | 3.5 | 66.8 | 1.19 | |
| | timing | 2 | 22 | 51.4042 | <.0001 | 4.5 | 60.4 | 0.9659b | period | 2 | 22 | 40.9 | <.0001 | 4.5 | 66.1 | 1.19 | |
| | treatment:timing | 6 | 22 | 1.0747 | 0.4073 | Control | 61.1 | 0.9659b | treatment:period | 6 | 22 | 1.80 | 0.146 | Control | 64.6 | 1.19 | |
| | R ² _m =0.91 | | | | | | | | R ² _m =0.86 | | | | | | | | |
| | R ² _c =0.92 | | | | | | | | R ² _c =0.86 | | | | | | | | |
| Temperature | DF | DF | F-value | p-value | Treatment | emmmean | SE | DF | denDF | F-value | p-value | treatment | emmmean | SE | | | |
| | (Intercept) | 1 | 22 | 83561.65 | <.0001 | 2.5 | 26.47 | 0.0569 | (Intercept) | 1 | 22 | 16365 | <.0001 | 2.5 | 25.7 | 0.115 | |
| | treatment | 3 | 22 | 1.42 | 0.2638 | 3.5 | 26.40 | 0.0569 | treatment | 3 | 22 | 0.007 | 0.999 | 3.5 | 25.7 | 0.115 | |
| | timing | 2 | 22 | 810.43 | <.0001 | 4.5 | 26.58 | 0.0569 | period | 2 | 22 | 615 | <.0001 | 4.5 | 25.5 | 0.115 | |
| | treatment:timing | 6 | 22 | 0.99 | 0.4571 | Control | 26.64 | 0.0569 | treatment:period | 6 | 22 | 0.713 | 0.643 | Control | 25.7 | 0.115 | |
| | R ² _m =0.99 | | | | | | | | R ² _m =0.99 | | | | | | | | |
| | R ² _c =0.995 | | | | | | | | R ² _c =0.99 | | | | | | | | |
| DOC | DF | denDF | F-value | p-value | treatment | emmmean | SE | DF | denDF | F-value | p-value | treatment | emmmean | SE | | | |
| | (Intercept) | 1 | 22 | 529.6062 | <.0001 | 2.5 | 57.3 | 1.23 | (Intercept) | 1 | 22 | 246 | <.0001 | 2.5 | 51.0 | 1.99b | |
| | treatment | 3 | 22 | 0.6965 | 0.5641 | 3.5 | 54.4 | 1.23 | treatment | 3 | 22 | 7.118 | 0.0016 | 3.5 | 57.8 | 1.99a | |
| | timing | 2 | 22 | 12.1288 | 0.0003 | 4.5 | 60.5 | 1.23 | period | 2 | 22 | 4.42 | 0.0243 | 4.5 | 56.3 | 1.99ab | |
| | treatment:timing | 6 | 22 | 4.5771 | 0.0037 | Control | 60.5 | 1.23 | treatment:period | 6 | 22 | 9.36 | <.0001 | Control | 55.2 | 1.99ab | |
| | R ² _m =0.87 | | | | | | | | R ² _m =0.78 | | | | | | | | |
| | R ² _c =0.87 | | | | | | | | R ² _c =0.83 | | | | | | | | |
| SOC | DF | denDF | F-value | p-value | Treatment | emmmean | SE | DF | denDF | F-value | p-value | treatment | emmmean | SE | | | |
| | (Intercept) | 1 | 22 | 557.5333 | <.0001 | 2.5 | 19.1 | 0.5875ab | (Intercept) | 1 | 22 | 3165 | <.0001 | 2.5 | 19.6 | 0.12a | |
| | treatment | 3 | 22 | 4.3581 | 0.0149 | 3.5 | 19.9 | 0.5875ab | treatment | 3 | 22 | 3.13 | 0.0461 | 3.5 | 19.6 | 0.12a | |
| | timing | 2 | 22 | 3.5901 | 0.0447 | 4.5 | 20.2 | 0.5875a | period | 2 | 22 | 0.843 | 0.4440 | 4.5 | 20.1 | 0.12a | |
| | treatment:timing | 6 | 22 | 1.9450 | 0.1181 | Control | 18.3 | 0.5875b | treatment:period | 6 | 22 | 7.51 | 0.0002 | Control | 18.0 | 0.12b | |
| | R ² _m =0.58 | | | | | | | | R ² _m =0.76 | | | | | | | | |
| | R ² _c =0.66 | | | | | | | | R ² _c =0.76 | | | | | | | | |
| MBC | DF | denDF | F-value | p-value | treatment | emmmean | SE | DF | denDF | F-value | p-value | treatment | emmmean | SE | | | |

| | | | | | |
|---------|--|--|--|---|--|
| | (Intercept) 1 22 150.89 <.0001 treatment 3 22 18.30 <.0001 timing 2 22 12.0 3e-04 treatment:timing 6 22 2.655 <.0001 $R^2_m=0.88$ $R^2_c=0.88$ | 2.5 86.2 4.27 b 3.5 108.3 4.27 a 4.5 97.7 4.27 ab | Control 95.5 4.27 ab | (Intercept) 1 22 152 <.0001 treatment 3 22 5.26 0.0069 period 2 22 1.35 0.29 treatment:period 6 22 6.91 0.0003 $R^2_m=0.55$ $R^2_c=0.59$ | 2.5 127 1.14 a 3.5 129 1.14a 4.5 130 1.14a |
| LOC:SOC | DF denDF F-value p-value (Intercept) 1 22 142.35028 <.0001 treatment 3 22 0.93644 0.4398 timing 2 22 0.15085 0.8609 treatment:timing 6 22 0.81584 0.5692 $R^2_m=0.20$ $R^2_c=0.20$ | Treatment emmean SE 2.5 29.3 1.47 3.5 28.1 1.47 4.5 27.4 1.47 Control 30.5 1.47 | DF denDF F-value p-value (Intercept) 1 22 94.7 <.0001 treatment 3 22 5.73 0.0038 period 2 22 1.15 0.3348 treatment:period 6 22 1.39 0.2609 $R^2_m=0.35$ $R^2_c=0.35$ | treatment emmean SE 2.5 29.8 0.96b 3.5 25.8 0.96c 4.5 26.7 0.96c Control 32.3 0.96a | |
| DOC:SOC | DF denDF F-value p-value (Intercept) 1 22 109.63705 <.0001 treatment 3 22 1.27838 0.3064 timing 2 22 6.81053 0.0050 treatment:timing 6 22 1.69929 0.1684 $R^2_m=0.69$ $R^2_c=0.73$ | Treatment emmean SE 2.5 0.305 0.0151 3.5 0.278 0.0151 4.5 0.309 0.0151 Control 0.331 0.0151 | DF denDF F-value p-value (Intercept) 1 22 160 <.0001 treatment 3 22 6.08 0.0036 period 2 22 3.55 0.0461 treatment:period 6 22 4.14 0.0062 $R^2_m=0.66$ $R^2_c=0.73$ | treatment emmean SE 2.5 0.262 0.012b 3.5 0.296 0.012ab 4.5 0.278 0.012b Control 0.307 0.012a | |
| MBC:SOC | DF denDF F-value p-value (Intercept) 1 22 86.41548 <.0001 treatment 3 22 17.13267 <.0001 timing 2 22 13.38925 2e-04 treatment:timing 6 22 11.13177 <.0001 $R^2_m=0.84$ $R^2_c=0.86$ | Treatment emmean SE 2.5 0.462 0.03106b 3.5 0.562 0.03106a 4.5 0.488 0.03106ab Control 0.522 0.03106b | DF denDF F-value p-value (Intercept) 1 22 145 <.0001 treatment 3 22 4.69 0.0111 period 2 22 0.96 0.3978 treatment:period 6 22 7.67 0.0002 $R^2_m=0.60$ $R^2_c=0.61$ | treatment emmean SE 2.5 0.648 0.011b 3.5 0.659 0.011ab 4.5 0.651 0.011ab Control 0.677 0.011a | |
| MBC:MBN | DF denDF F-value p-value (Intercept) 1 22 3.454 0.0765 treatment 3 22 7.95 0.0009 timing 2 22 0.411 0.668 treatment:timing 6 22 3.07 0.0245 $R^2_m=0.62$ $R^2_c=0.67$ | Treatment emmean SE 2.5 2.95 -1.02b 3.5 6.85 -1.02a 4.5 5.34 1.02ab Control 4.47 1.02ab | DF denDF F-value p-value (Intercept) 1 22 2.91 0.1022 treatment 3 22 3.28 0.0400 period 2 22 6.74 0.0052 treatment:period 6 22 3.84 0.0090 $R^2_m=0.50$ $R^2_c=0.51$ | treatment emmean SE 2.5 11.28 2.11a 3.5 6.73 2.11b 4.5 9.28 2.11ab Control 7.55 2.11ab | |
| TN | DF denDF F-value p-value (Intercept) 1 22 4621.8550 <.0001 treatment 3 22 5.0483 0.0082 timing 2 22 14.5847 0.0001 treatment:timing 6 22 1.8291 0.1396 | treatment emmean SE 2.5 2.15 0.05659a 3.5 2.19 0.05659a 4.5 2.25 0.05659a Control 1.93 0.05659b | DF denDF F-value p-value (Intercept) 1 22 356 <.0001 treatment 3 22 4.25 0.016 period 2 22 49.3 <.0001 treatment:period 6 22 1.75 0.1555 | treatment emmean SE 2.5 2.08 0.0204a 3.5 2.10 0.0204a 4.5 2.08 0.0204a Control 1.94 0.0204b | |

| | R ² _m =0.75 R ² _c =0.79 | | | | | R ² _m =0.92 R ² _c =0.94 | | | | | | | | | | | | | | |
|------------------------------|--|--|--|--|--|---|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| TP | DF denDF F-value p-value (Intercept) 1 22 516.9931 <.0001 treatment 3 22 4.1918 0.0173 timing 2 22 3.4909 0.0482 treatment:timing 6 22 1.1548 0.3651 R ² _m =0.63 R ² _c =0.67 | | | | | Treatment emmean SE 2.5 2.05 0.063a 3.5 2.21 0.063a 4.5 2.22 0.063a Control 1.88 0.063b | | | | | (Intercept) 1 22 2.91 0.1022 treatment 3 22 3.28 0.040 period 2 22 6.74 0.0052 treatment:period 6 22 3.84 0.0090 R ² _m =0.50 R ² _c =0.51 | | | | | treatment emmean SE 2.5 11.28 2.11a 3.5 6.73 2.11b 4.5 9.28 2.11ab Control 7.55 2.11ab | | | | |
| NO ₃ | DF denDF F-value p-value (Intercept) 1 22 0.656477 0.4265 treatment 3 22 0.186390 0.9045 timing 2 22 29.512296 <.0001 treatment:timing 6 22 14.765958 <.0001 R ² _m =0.86 R ² _c =0.88 | | | | | Treatment emmean SE 2.5 14.51 1.58 3.5 13.66 1.58 4.5 14.11 1.58 Control 7.99 1.58 | | | | | (Intercept) 1 22 37.8 <.0001 treatment 3 22 13.6 <.0001 period 2 22 7.94 .0025 treatment:period 6 22 3.51 .0138 R ² _m =0.74 R ² _c =0.74 | | | | | treatment emmean SE 2.5 6.77 0.553a 3.5 5.77 0.553a 4.5 6.82 0.553a Control 1.69 0.553b | | | | |
| NH ₄ ⁺ | numDF DF denDF F-value p-value (Intercept) 1 22 1122.6898 <.0001 treatment 3 22 76.2323 <.0001 timing 2 22 270.4769 <.0001 treatment:timing 6 22 105.7015 <.0001 R ² _m =0.99 R ² _c =0.99 | | | | | Treatment emmean SE 2.5 51.8 0.91b 3.5 54.8 0.91ab 4.5 64.5 0.91a Control 53.4 0.91ab | | | | | (Intercept) 1 22 306 <.0001 treatment 3 22 7.61 .0001 period 2 22 13.5 .0002 treatment:period 6 22 15.9 <.0001 R ² _m =0.95 R ² _c =0.95 | | | | | Treatment emmean SE 2.5 36.9 1.23b 3.5 41.5 1.23a 4.5 39.7 1.23ab Control 40.9 1.23a | | | | |
| Microbial number otus | numDF DF denDF F-value p-value (Intercept) 1 22 -317.07415 <.0001 treatment 3 22 3.10427 0.047 4 timing 2 22 0.02804 0.9724 treatment:timing 6 22 5.43921 0.0014 R ² _m =0.62 R ² _c =0.62 | | | | | treatment emmean SE 2.5 30.7 2.99ab 3.5 20.4 2.99ab 4.5 34.5 2.99a Control 22.7 2.99b | | | | | (Intercept) 1 22 28.9 <.0001 treatment 3 22 2.96 0.0401 period 2 22 3.82 0.0376 treatment:period 6 22 10.4 <.0001 R ² _m =0.77 R ² _c =0.77 | | | | | treatment emmean SE 2.5 19.0 2.1b 3.5 20.4 2.1b 4.5 22.3 2.1b Control 30.7 2.1a | | | | |
| N-availability | numDF DF denDF F-value p-value (Intercept) 1 22 288.36729 <.0001 treatment 3 22 17.18730 <.0001 period 2 22 55.46138 <.0001 treatment:period 6 22 8.41223 1e-04 R ² _m =0.95 R ² _c =0.96 | | | | | Treatment emmean SE dflower CL+upper CL- 2.5 66.3 1.98ab 2 48.8 3.5 83.9 3.5 68.5 1.98ab 2 50.9 86. 4.5 78.6 1.98a 2 61.1 96. | | | | | (Intercept) 1 22 517 <.0001 treatment 3 22 4.19 0.0173 timing 2 22 3.49 0.0482 treatment:timing 6 22 1.15 0.3651 R ² _m =0.63 R ² _c =0.67 | | | | | treatment emmean SE 2.5 2.085 0.063a 3.5 2.21 0.063a 4.5 2.22 0.063a Control 1.88 0.063b | | | | |

| | | | | |
|--------------------|--|---|--|---|
| | | Control 61.4 1.98 b | | |
| P-availability | num DF denDF F-value p-value (Intercept) 1 22 384.3059 <.0001 treatment 3 22 8.0223 9e-04 period 2 22 11.4253 4e-04 treatment:period 6 22 13.2363 <.0001 R ² _m =0.66 R ² _c =0.74 | treatment emmean SE df lower CL upper CL 2.5 87.9 2.99a 2 61.4 114 3.5 81.7 2.99b 2 55.1 10 8 4.5 85.5 2.99ab 2 58.9 1 12 Control 87.7 2.99a | DF denDF F-value p-value (Intercept) 1 22 927 <.0001 treatment 3 22 2.24 0.1123 period 2 22 0.954 0.4007 treatment:period 6 22 4.0 <.0001 R ² _m =0.79 R ² _c =0.83 | Treatment emmean SE 2.5 82.6 1.75 3.5 75.0 1.75 4.5 86.4 1.75 Control 74.4 1.75 |
| C:N | DF denDF F-value p-value (Intercept) 1 22 6202 <.0001 treatment 3 22 3.546 0.0312 timing 2 22 124.422 <.0001 treatment:timing 6 22 2.695 0.0408 R ² _m =0.96 R ² _c =0.96 | Treatment emmean SE 2.5 9.01 0.0855b 3.5 9.17 0.0855b 4.5 9.00 0.0855b Control 9.60 0.0855a | DF denDF F-value p-value (Intercept) 1 22 7619 <.0001 treatment 3 22 1.366 0.2793 period 2 22 81.4 <.0001 treatment:period 6 22 9.30 <.0001 R ² _m =0.95 R ² _c =0.95 | Treatment emmean SE 2.5 9.50 0.0714 3.5 9.41 0.0714 4.5 9.68 0.0714 Control 9.36 0.0714 |
| C:P | DF denDF F-value p-value (Intercept) 1 22 719.0037 <.0001 treatment 3 22 0.0656 0.9775 timing 2 22 2.2996 0.1239 treatment:timing 6 22 1.6506 0.1806 R ² _m =0.47 R ² _c =0.47 | treatment emmean SE 2.5 9.33 0.193 3.5 8.99 0.193 4.5 9.13 0.193 Control 9.80 0.193 | DF denDF F-value p-value (Intercept) 1 22 1168 <.0001 treatment 3 22 0.340 0.797 period 2 22 1.35 0.280 treatment:period 6 22 5.66 0.0011 R ² _m =0.55 R ² _c =0.58 | Treatment emmean SE 2.5 9.27 0.161 3.5 9.24 0.161 4.5 9.28 0.161 Control 9.25 0.161 |
| N:P | DF denDF F-value p-value (Intercept) 1 22 431.0646 <.0001 treatment 3 22 0.1086 0.9542 timing 2 22 26.1269 <.0001 treatment:timing 6 22 2.0460 0.1021 R ² _m =0.82 R ² _c =0.82 | Treatment emmean SE 2.5 1.06 0.0235 3.5 0.99 0.0235 4.5 1.03 0.0235 Control 1.04 0.0235 | DF denDF F-value p-value (Intercept) 1 22 784 <.0001 treatment 3 22 0.0887 0.9655 period 2 22 23.6 <.0001 treatment:period 6 22 2.11 0.0936 R ² _m =0.84 R ² _c =0.86 | Treatment emmean SE 2.5 0.988 0.0187 3.5 0.996 0.0187 4.5 0.964 0.0187 Control 0.998 0.0187 |
| LOC:N-availability | DF denDF F-value p-value (Intercept) 1 22 119.43570 <.0001 treatment 3 22 6.85377 0.0020 timing 2 22 7.09854 0.0042 treatment:timing 6 22 2.40137 0.0615 R ² _m =0.73 R ² _c =0.73 | treatment emmean SE 2.5 90.8 5.988 a 3.5 97.7 5.988a 4.5 77.0 5.988b Control 99.3 5.988a | DF denDF F-value p-value (Intercept) 1 22 97.1 <.0001 treatment 3 22 0.644 0.595 period 2 22 0.904 0.420 treatment:period 6 22 2.76 0.037 R ² _m =0.69 R ² _c =0.70 | Treatment emmean SE 2.5 140 9.64 3.5 121 9.64 4.5 129 9.64 Control 151 9.64 |
| LOC:P- | num DF denDF F-value p-value | Treatment emmean SE | DF denDF F-value p-value | treatment emmean SE |

| | | | | |
|--------------|--|--|---|--|
| availability | (Intercept) 1 22 239 <.0001 treatment 3 22 2.580 0.0794 timing 2 22 3.59 0.0447 treatment:timing 6 22 3.44 0.0150 $R^2_m=0.42$ $R^2_c=0.42$ | 2.5 64.5 2.7 3.5 67.5 2.7 4.5 65.3 2.7 Control 64.6 2.7 | (Intercept) 1 22 89.8 <.0001 treatment 3 22 0.753 0.532 period 2 22 1.48 0.250 treatment:period 6 22 0.388 0.879 $R^2_m=0.30$ $R^2_c=0.30$ | 2.5 73.3 4.97 3.5 67.7 4.97 4.5 62.7 4.97 Control 78.2 4.97 |
|--------------|--|--|---|--|

| N-availability:P-availability | DF denDF F-value p-value | Treatment emmean SE | DF denDF F-value p-value | treatment emmean SE |
|--|--------------------------|-----------------------------------|--------------------------|---------------------|
| (Intercept) 1 22 285.18750 <.0001 | 2.5 0.743 0.022c | (Intercept) 1 22 329 <.0001 | 2.5 0.529 0.020 | |
| treatment 3 22 6.38188 0.0028 | 3.5 0.853 0.022b | treatment 3 22 0.913 0.4506 | 3.5 0.628 0.020 | |
| timing 2 22 14.13000 0.0001 | 4.5 0.971 0.022a | period 2 22 6.52 0.0060 | 4.5 0.528 0.020 | |
| treatment:timing 6 22 30.60646 <.0001 | Control 0.684 0.022d | treatment:period 6 22 17.7 <.0001 | Control 0.604 0.020 | |
| $R^2_m=0.96$ | | $R^2_m=0.93$ | | |
| $R^2_c=0.96$ | | $R^2_c=0.95$ | | |

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Con formato: Fuente: Negrita**Con formato:** Fuente: Negrita**Con formato:** Fuente: Times New Roman, Negrita**Con formato:** Fuente: Times New Roman, Negrita**Con formato:** Fuente: Negrita**Con formato:** HTML con formato previo, Interlineado: Mínimo 10,25 pto, Diseño: Claro (Blanco)**Con formato:** Izquierda, Interlineado: Mínimo 10,25 pto, Control de líneas vueltas y huérfanas, Dividir palabras, Diseño: Claro (Blanco), Punto de tabulación: 1,62 cm, Izquierda + 3,23 cm, Izquierda + 4,85 cm, Izquierda + 6,46 cm, Izquierda + 8,08 cm, Izquierda + 9,69 cm, Izquierda + 11,31 cm, Izquierda + 12,92 cm, Izquierda + 14,54 cm, Izquierda + 16,16 cm, Izquierda + 17,77 cm, Izquierda + 19,39 cm, Izquierda + 21 cm, Izquierda + 22,62 cm, Izquierda + 24,23 cm, Izquierda + 25,85 cm, Izquierda

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Table S4

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Effects of pH on mean (\pm SE) soil physicochemical properties.

| Index | Early paddy | | | Late paddy | | | | |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | CK | pH 4.5 | pH 3.5 | pH 2.5 | CK | pH 4.5 | pH 3.5 | pH 2.5 |
| SOC (g kg ⁻¹) | 18.30±0.16b | 20.18±0.76a | 19.92±0.72ab | 19.07±0.37ab | 18.02±0.25b | 20.07±0.11a | 19.57±0.33ab | 19.58±0.35ab |
| DOC (mg kg ⁻¹) | 60.51±1.51a | 60.52±2.08a | 54.39±2.62b | 57.32±1.79ab | 55.16±3.25 | 56.26±2.24 | 57.82±2.23 | 50.99±3.01 |
| MBC (mg kg ⁻¹) | 95.5±5.32 | 97.66±7.89 | 108.31±8.58 | 86.25±6.08 | 121.96±10.43 | 129.87±13.02 | 128.58±12.12 | 126.97±7.61 |
| LOC (g kg ⁻¹) | 5.59±0.49 | 5.45±0.20 | 5.50±0.33 | 5.60±0.30 | 5.82±0.65 | 5.34±0.69 | 5.05±0.37 | 6.02±0.57 |
| LOC/SOC ratio | 30.51±2.60 | 27.42±1.40 | 28.14±2.85 | 29.32±1.22 | 32.27±3.91 | 26.73±3.45 | 25.80±1.93 | 30.84±3.23 |
| DOC/SOC ratio | 0.33±0.01a | 0.31±0.02ab | 0.28±0.02b | 0.30±0.02ab | 0.31±0.02 | 0.28±0.01 | 0.30±0.01 | 0.26±0.02 |
| MBC/SOC ratio | 0.52±0.03 | 0.49±0.04 | 0.56±0.06 | 0.46±0.04 | 0.68±0.05 | 0.65±0.06 | 0.66±0.07 | 0.65±0.04 |
| Total N (g kg ⁻¹) | 1.93±0.02b | 2.25±0.08a | 2.19±0.07a | 2.15±0.06a | 1.94±0.04b | 2.08±0.03a | 2.10±0.01a | 2.08±0.03a |
| Available N (mg kg ⁻¹) | 54.05±0.93b | 78.64±3.47a | 68.50±2.51ab | 66.33±1.87ab | 42.56±1.23b | 46.51±1.89ab | 47.32±0.94a | 43.66±1.93ab |
| NO ₃ ⁻ (mg kg ⁻¹) | 7.99±1.54b | 14.11±1.49a | 13.65±2.06a | 14.51±1.19a | 1.69±0.21b | 6.82±0.94a | 5.78±0.91a | 6.77±0.83a |
| NH ₄ ⁺ (mg kg ⁻¹) | 51.58±1.68a | 26.12±2.62b | 23.28±2.01b | 25.46±2.40b | 29.94±1.58a | 28.78±2.46a | 26.96±2.49a | 29.10±1.82a |
| MBN (mg kg ⁻¹) | 22.67±4.08ab | 34.49±5.87a | 20.41±3.28b | 30.70±5.72ab | 30.75±5.05a | 22.33±3.51b | 20.36±2.70b | 19.00±4.83b |
| Total P (g kg ⁻¹) | 1.88±0.04b | 2.22±0.13a | 2.21±0.09a | 2.05±0.07ab | 1.96±0.04b | 2.17±0.07a | 2.12±0.02a | 2.12±0.05ab |
| Available P (mg kg ⁻¹) | 87.73±1.88a | 85.47±4.68ab | 81.66±2.84b | 87.92±4.54a | 74.35±2.57b | 86.41±2.73a | 74.99±2.30ab | 82.59±1.82a |
| C:N ratio | 9.60±0.10a | 8.99±0.06b | 9.17±0.12b | 9.01±0.13b | 9.36±0.09b | 9.68±0.11a | 9.41±0.14ab | 9.50±0.09ab |
| C:P ratio | 9.80±0.28a | 9.14±0.25ab | 8.99±0.37b | 9.33±0.25ab | 9.25±0.20 | 9.28±0.33 | 9.24±0.17 | 9.27±0.18 |
| N:P ratio | 1.04±0.28 | 1.03±0.03 | 0.99±0.03 | 1.06±0.04 | 1.00±0.02 | 0.96±0.04 | 0.99±0.01 | 0.99±0.02 |
| LOC:available N | 99.33±9.43 | 77.03±5.81 | 97.67±10.71 | 90.83±5.90 | 150.96±12.25 | 129.50±20.91 | 121.13±6.86 | 139.61±16.04 |

| | | | | | | | | |
|---|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|--------------------|
| LOC:available P | 64.61±5.73 | 65.28±4.33 | 67.48±4.39 | 64.45±1.75 | 78.17±10.37 | 62.68±7.62 | 67.71±6.12 | 73.35±7.90 |
| Available N:available P | 0.68±0.02e | 0.97±0.03a | 0.85±0.05b | 0.75±0.04ab | 0.61±0.03ab | 0.53±0.03b | 0.63±0.02a | 0.53±0.02b |
| MBC:MBN | 4.47±0.96ab | 5.34±1.34ab | 6.84±1.68a | 2.95±0.37b | 7.55±1.69ab | 9.28±1.92ab | 6.73±0.65b | 11.27±4.47a |
| Salinity(mS cm⁻¹) | 0.54±0.02a | 0.54±0.03a | 0.58±0.04ab | 0.65±0.04b | 0.55±0.06a | 0.65±0.06b | 0.68±0.08b | 0.65±0.04b |
| Water content (%) | 61.09±1.40b | 60.41±1.69b | 63.80±0.75ab | 66.03±1.29a | 64.64±1.87b | 66.14±1.80ab | 66.78±1.69ab | 72.58±1.20a |
| Temperature (°C) | 26.64±0.11a | 26.58±0.10ab | 26.40±0.04b | 26.47±0.06ab | 25.66±0.22 | 25.54±0.12 | 25.66±0.05 | 25.69±0.06 |
| pH | 6.29±0.03a | 6.06±0.04b | 6.05±0.04b | 6.07±0.04b | 6.32±0.04a | 6.00±0.04b | 6.02±0.04b | 5.90±0.04b |
| Total Fe (g kg⁻¹) | 12.30±0.43 | 12.66±0.97 | 11.93±0.61 | 11.25±0.45 | 13.24±0.49 | 12.69±0.47 | 11.74±1.32 | 12.61±0.48 |
| Fe²⁺(g kg⁻¹) | 2.17±0.05 | 2.26±0.09 | 2.28±0.11 | 2.34±0.09 | 3.67±0.13 | 2.87±0.04 | 2.83±0.46 | 3.33±0.11 |
| Fe³⁺(g kg⁻¹) | 10.13±0.43 | 10.40±0.97 | 9.65±0.66 | 8.92±0.45 | 9.56±0.49 | 9.83±0.44 | 8.90±0.87 | 9.28±0.46 |

Lowerease letters within a row indicate treatment differences at $P < 0.05$.

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Table S5

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Repeated measures ANOVA of effects of acid rain and rice growth stage on soil physicochemical properties in early and late paddy.

| Variable | Factor | Early paddy | | | | Late paddy | | | |
|------------------------------|-------------------------------|-------------|----------|----------|-------|------------|----------|---------|-------|
| | | df | MS | F | P | df | MS | F | P |
| Total N | Acid rain | 3, 8 | 0.181 | 7.840 | <0.01 | 3, 8 | 0.047 | 12.417 | <0.01 |
| | Rice growth stage | 2, 16 | 0.863 | 36.673 | <0.01 | 2, 16 | 0.525 | 219.938 | <0.01 |
| | Acid rain × rice growth stage | 6, 16 | 0.038 | 1.633 | 0.202 | 6, 16 | 0.004 | 1.774 | 0.168 |
| Available N | Acid rain | 3, 8 | 473.740 | 18.871 | <0.01 | 3, 8 | 46.289 | 4.53 | 0.039 |
| | Rice growth stage | 2, 16 | 9827.080 | 287.706 | <0.01 | 2, 16 | 2771.982 | 261 | <0.01 |
| | Acid rain × rice growth stage | 6, 16 | 244.348 | 7.154 | <0.01 | 6, 16 | 190.693 | 18.0 | <0.01 |
| NO ₃ ⁻ | Acid rain | 3, 8 | 84.977 | 4.508 | 0.039 | 3, 8 | 53.204 | 29.938 | <0.01 |
| | Rice growth stage | 2, 16 | 1074.167 | 65.625 | <0.01 | 2, 16 | 27.049 | 8.332 | <0.01 |
| | Acid rain × rice growth stage | 6, 16 | 215.737 | 13.176 | <0.01 | 6, 16 | 9.663 | 2.976 | 0.038 |
| NH ₄ ⁺ | Acid rain | 3, 8 | 294.541 | 66.677 | <0.01 | 3, 8 | 37.970 | 2.72 | 0.115 |
| | Rice growth stage | 2, 16 | 9764.504 | 1090.651 | <0.01 | 2, 16 | 3346 | 255 | <0.01 |
| | Acid rain × rice growth stage | 6, 16 | 786.533 | 87.852 | <0.01 | 6, 16 | 212 | 16.2 | <0.01 |
| Microbial N | Acid rain | 3, 8 | 396.239 | 5.661 | 0.022 | 3, 8 | 250 | 4.42 | 0.041 |
| | Rice growth stage | 2, 16 | 424.611 | 4.933 | 0.021 | 2, 16 | 1559 | 21.2 | <0.01 |
| | Acid rain × rice growth stage | 6, 16 | 439.038 | 5.101 | <0.01 | 6, 16 | 710 | 9.63 | <0.01 |
| Total P | Acid rain | 3, 8 | 0.238 | 6.143 | 0.018 | 3, 8 | 0.078 | 9.10 | <0.01 |
| | Rice growth stage | 2, 16 | 0.430 | 17.625 | <0.01 | 2, 16 | 0.114 | 12.4 | <0.01 |
| | Acid rain × rice growth stage | 6, 16 | 0.030 | 1.229 | 0.343 | 6, 16 | 0.017 | 1.80 | 0.162 |

| | | | | | | | | | |
|-------------------------|-------------------------------|------|-----------|---------|-------|------|-------|-------|-------|
| | Acid rain | 3,8 | 76.265 | 0.900 | 0.482 | 3,8 | 312 | 17.1 | <0.01 |
| Available P | Rice growth stage | 2,16 | 73.408 | 1.809 | 0.196 | 2,16 | 19 | 8.76 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 564.236 | 13.901 | <0.01 | 6,16 | 242 | 11.0 | <0.01 |
| | Acid rain | 3,8 | 0.708 | 8.390 | <0.01 | 3,8 | 0.182 | 5.52 | 0.024 |
| C:N | Rice growth stage | 2,16 | 19.729 | 503.101 | <0.01 | 2,16 | 14.6 | 281 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.130 | 3.327 | 0.025 | 6,16 | 0.423 | 8.133 | <0.01 |
| | Acid rain | 3,8 | 1.109 | 2.878 | 0.103 | 3,8 | 0.004 | 0.020 | 0.996 |
| C:P | Rice growth stage | 2,16 | 1.926 | 6.199 | 0.010 | 2,16 | 1.168 | 5.32 | 0.017 |
| | Acid rain × rice growth stage | 6,16 | 0.552 | 1.777 | 0.168 | 6,16 | 1.070 | 4.870 | <0.01 |
| | Acid rain | 3,8 | 0.007 | 1.327 | 0.332 | 3,8 | 0.002 | 0.762 | 0.546 |
| N:P | Rice growth stage | 2,16 | 0.343 | 72.953 | <0.01 | 2,16 | 0.229 | 98.8 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.010 | 2.145 | 0.104 | 6,16 | 0.005 | 2.137 | 0.105 |
| | Acid rain | 3,8 | 926.385 | 6.808 | 0.014 | 3,8 | 149 | 1.817 | 0.222 |
| LOC:available N | Rice growth stage | 2,16 | 11552.165 | 28.938 | <0.01 | 2,16 | 20844 | 28.9 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 748.005 | 1.874 | 0.148 | 6,16 | 1976 | 2.739 | 0.050 |
| | Acid rain | 3,8 | 17.596 | 0.697 | 0.579 | 3,8 | 408 | 2.57 | 0.128 |
| LOC:available P | Rice growth stage | 2,16 | 109.853 | 1.275 | 0.306 | 2,16 | 777 | 3.060 | 0.075 |
| | Acid rain × rice growth stage | 6,16 | 226.713 | 2.632 | 0.057 | 6,16 | 86.3 | 0.340 | 0.906 |
| | Acid rain | 3,8 | 0.144 | 61.357 | <0.01 | 3,8 | 0.024 | 6.69 | 0.014 |
| Available N:available P | Rice growth stage | 2,16 | 1.362 | 248.011 | <0.01 | 2,16 | 0.464 | 221 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.136 | 24.764 | <0.01 | 6,16 | 0.036 | 17.3 | <0.01 |
| MBC:MBN | Acid rain | 3,8 | 23.858 | 2.579 | 0.126 | 3,8 | 36.5 | 1.010 | 0.437 |

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|--------------------|-------------------------------|------|----------|----------|-------|------|--------|--------|-------|
| | Rice growth stage | 2,16 | 111.453 | 17.609 | <0.01 | 2,16 | 181 | 4.47 | 0.029 |
| | Acid rain × rice growth stage | 6,16 | 19.234 | 3.039 | 0.035 | 6,16 | 148 | 3.646 | 0.018 |
| Fe | Acid rain | 3,8 | 3.236 | 3.230 | 0.082 | 3,8 | 3.454 | 1.516 | 0.283 |
| | Rice growth stage | 2,16 | 2.729 | 1.653 | 0.223 | 2,16 | 8.753 | 2.787 | 0.092 |
| | Acid rain × rice growth stage | 6,16 | 1.066 | 0.654 | 0.693 | 6,16 | 5.117 | 1.629 | 0.203 |
| Fe ²⁺ | Acid rain | 3,8 | 0.041 | 2.015 | 0.190 | 3,8 | 1.450 | 3.430 | 0.073 |
| | Rice growth stage | 2,16 | 1.154 | 32.483 | <0.01 | 2,16 | 41.463 | 88.296 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.049 | 1.366 | 0.287 | 6,16 | 0.601 | 1.279 | 0.321 |
| Fe ³⁺ | Acid rain | 3,8 | 3.796 | 4.437 | 0.041 | 3,8 | 1.407 | 1.342 | 0.328 |
| | Rice growth stage | 2,16 | 1.472 | 0.803 | 0.465 | 2,16 | 18.052 | 11.969 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.873 | 0.476 | 0.816 | 6,16 | 4.162 | 2.759 | 0.049 |
| Salinity | Acid rain | 3,8 | 0.024 | 6.786 | 0.014 | 3,8 | 0.029 | 3.255 | 0.081 |
| | Rice growth stage | 2,16 | 0.164 | 33.306 | <0.01 | 2,16 | 0.893 | 40.2 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.016 | 3.278 | 0.027 | 6,16 | 0.013 | 0.568 | 0.750 |
| Soil water content | Acid rain | 3,8 | 60.254 | 6.873 | 0.013 | 3,8 | 109 | 8.645 | <0.01 |
| | Rice growth stage | 2,16 | 1175.691 | 199.575 | <0.01 | 2,16 | 1007 | 88.9 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 6.598 | 1.120 | 0.394 | 6,16 | 20.3 | 1.792 | 0.164 |
| Temperature | Acid rain | 3,8 | 0.108 | 4.375 | 0.042 | 3,8 | | | 0.786 |
| | Rice growth stage | 2,16 | 96.027 | 3100.422 | <0.01 | 2,16 | 275 | 2428 | <0.01 |
| | Acid rain × rice growth stage | 6,16 | 0.028 | 0.918 | 0.508 | 6,16 | 0.085 | 0.748 | 0.619 |
| pH | Acid rain | 3,8 | 0.127 | 21.345 | <0.01 | 3,8 | 0.297 | 45.2 | <0.01 |
| | Rice growth stage | 2,16 | 0.199 | 30.685 | <0.01 | 2,16 | 0.102 | 14.8 | <0.01 |

Acid rain × rice growth stage 6,16 0.013 2.009 0.124 6,16 0.013 1.897 0.143

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150 **Table S4**

151 Relationship among carbon fractions.

| Variable | Early paddy | | | | Late paddy | | | |
|----------|-------------|----------|----------|--------|------------|----------|----------|--------|
| | SOC | DOC | MBC | LOC | SOC | DOC | MBC | LOC |
| SOC | | -0.164 | -0.036 | 0.284 | 1 | 0.236 | 0.037 | -0.074 |
| DOC | -0.164 | 1 | -0.758** | -0.136 | 0.236 | 1 | -0.436** | -0.150 |
| MBC | -0.036 | -0.758** | 1 | -0.148 | 0.037 | -0.436** | 1 | 0.136 |
| LOC | 0.284 | -0.136 | -0.148 | 1 | -0.074 | -0.150 | 0.136 | 1 |

152 *P < 0.05; **P < 0.01.

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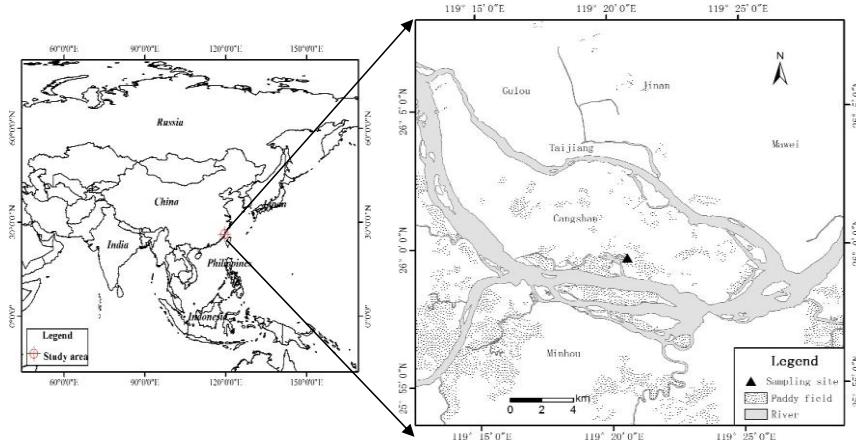
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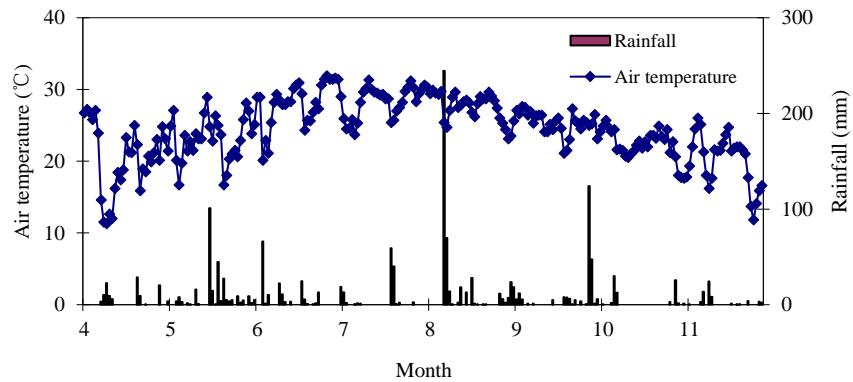
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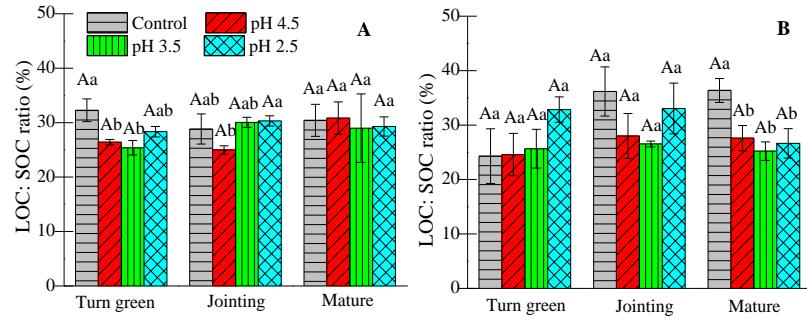
185 **Fig. S1.** Location of the study area and sampling sites (▲) in Fujian Province,
186 southeastern China.

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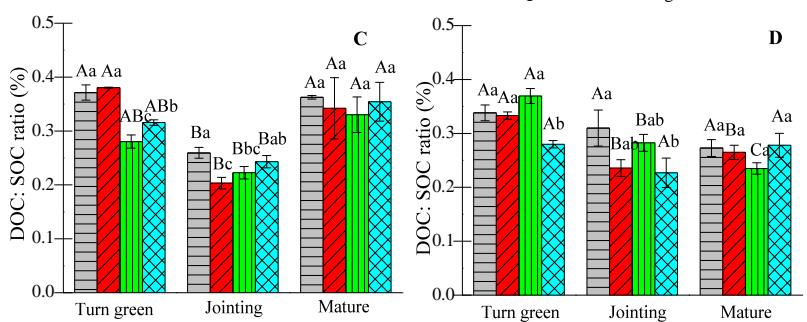


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203 **Fig. S2.** Temporal variation in air temperature (A) and rainfall (B).
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Fig. S3. Treatment effects on LOC:SOC, DOC:SOC, and MBC: SOC ratios in the early (A, C, and E, respectively) and late (B, D, and F, respectively) paddies. Data are means \pm SE; and different uppercase letters indicate treatment differences among rice growth stages, and different lowercase letters indicate treatment differences among the treatments within a rice growth stage at $P<0.05$.

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