

# **Supplemental Figure 1.** Seasonal shits in (a) LCC and (b) SPAD values and (c) rough rice yield expressed as 14% moisture content in our preliminary experiment conducted under microcosm conditions in 2017. Urea treatment received N as urea four times (40-40-40-40, total of 160 kg N ha−1), whereas Effluent treatment received N as cattle biogas effluent (the same effluent type as the current study) four times (the same timing and rate as Urea treatment). Vertical bar indicates the standard error (*n* = 3).



# **Supplemental Figure 2.** Seasonal shifts in daily mean air temperature (line, left y-axis) and daily solar radiation (bar, right y-axis) in the two experiments, a) I and b) II.

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# **Supplemental Figure 3.** Seasonal shift in rice plant height in the two experiments. Vertical bar indicates the standard error (*n* = 3).



# **Supplemental Figure 4.** Linear regression between LCC and SPAD values of the two experiments.

# **Supplemental Table 1.** Application rate of P element as cattle biogas effluent in the two experiments (kg P2O5 ha−1).

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment | Experiment I |  | Experiment II |
| TD 1 | TD 2 | TD 3 | Total |  | TD 1 | TD 2 | TD 3 | TD 4 | Total |
| Estd | 50 | 92 | 133 | 275 |  | 49 | 88 | 156 | ― | 293 |
| E2.75 | 50 | 111 | ― | 160 |  | 49 | 130 | ― | ― | 179 |
| E3.00 | 50 | 111 | ― | 160 |  | 49 | 126 | ― | ― | 175 |
| E3.25 | 50 | 111 | ― | 160 |  | 49 | 106 | ― | ― | 155 |
| E3.50 | 50 | 111 | 114 | 274 |  | 49 | 106 | 135 | ― | 290 |
| E3.75 | 50 | 111 | 114 | 274 |  | 49 | 106 | 133 | 141 | 429 |

TD, topdressing.

See Table 1 for the detailed application timing.

# **Supplemental Table 2.** Application rate of K element as cattle biogas effluent in the two experiments (kg K2O ha−1).

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment | Experiment I |  | Experiment II |
| TD 1 | TD 2 | TD 3 | Total |  | TD 1 | TD 2 | TD 3 | TD 4 | Total |
| Estd | 405 | 755 | 1088 | 2249 |  | 424 | 763 | 1350 | ― | 2537 |
| E2.75 | 405 | 906 | ― | 1312 |  | 424 | 1130 | ― | ― | 1554 |
| E3.00 | 405 | 906 | ― | 1312 |  | 424 | 1090 | ― | ― | 1514 |
| E3.25 | 405 | 906 | ― | 1312 |  | 424 | 916 | ― | ― | 1340 |
| E3.50 | 405 | 906 | 933 | 2244 |  | 424 | 915 | 1172 | ― | 2512 |
| E3.75 | 405 | 906 | 933 | 2244 |  | 424 | 915 | 1157 | 1227 | 3724 |

TD, topdressing.

See Table 1 for the detailed application timing.

# **Supplemental Table 3.** Plant nitrogen uptake as affected by experimental time and N treatment in the two experiments (g N m−2).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Grain |  | Leaf |  | Stem |  | Total |
| Exp. I | Exp. II |  | Exp. I | Exp. II |  | Exp. I | Exp. II |  | Exp. I | Exp. II |
| Zero | 5.03 d | 3.29 b |  | 3.39 d | 2.27 b |  | 1.42 b | 1.41 b |  | 9.84 d | 6.97 c |
| Estd | 7.59 bc | 6.62 a |  | 4.71 bcd | 4.02 ab |  | 2.02 ab | 2.30 ab |  | 14.33 bc | 12.94 ab |
| E2.75 | 8.12 abc | 5.21 ab |  | 3.93 cd | 3.03 ab |  | 1.76 b | 1.85 ab |  | 13.80 c | 10.10 bc |
| E3.00 | 6.73 cd | 5.41 ab |  | 4.38 bcd | 3.11 ab |  | 2.23 ab | 1.88 ab |  | 13.33 c | 10.39 b |
| E3.25 | 7.28 bc | 4.85 ab |  | 4.42 bcd | 3.50 ab |  | 2.03 ab | 1.85 ab |  | 13.72 c | 10.20 b |
| E3.50 | 8.16 abc | 5.83 a |  | 5.37 bc | 4.27 a |  | 2.13 ab | 2.47 ab |  | 15.66 bc | 12.56 ab |
| E3.75 | 8.85 ab | 6.95 a |  | 5.82 ab | 4.80 a |  | 2.39 ab | 2.76 a |  | 17.06 b | 14.51 a |
| U3.25 | 10.07 a | 5.86 a |  | 6.88 a | 3.37 ab |  | 2.98 a | 1.95 ab |  | 19.93 a | 11.19 b |
|  |
| *P value* |  |  |  |  |  |  |  |  |  |  |  |
| Time (I vs. II) | \*\*\* |  | \*\*\* |  | 0.61 |  | \*\*\* |
| N treatment | \*\*\* |  | \*\*\* |  | \*\*\* |  | \*\*\* |
| Time × N | \* |  | \* |  | 0.06 |  | \*\*\* |

\*\*\* and \* indicate significant difference at *P* < 0.001 and 0.05, respectively, by two-way ANOVA.

Different letters within the same column indicate the significant difference (*P* < 0.05) by Tukey–Kramer test.