

## Supplementary File 1: Additional information about field experiments

**Crop season:** 2015-2016.

**Location:** Tamil Nadu Agricultural University at Coimbatore (India), wetland field No.: D5 during the rabi season of 2015-2016.

**Crop:** Rice

**Variety:** CO(R)51

**Date of sowing:** 26<sup>th</sup> August 2015

**Design:** Split plot

**Replications:** Three (n = 3)

**Treatment details:**

**Main plot:** Method of cultivation

1. Conventional method
2. System of Rice intensification (SRI)

**Sub plot:** Nitrogen source

1. Urea
2. Ammonium sulphate
3. Urea + Vermicompost
4. Ammonium sulphate + Vermicompost

**Observations:**

1. Plant biometric observations including plant growth and yield components,
2. Greenhouse gas sampling (GHG) and analysis.

**Table 1S: Layout of the experimental plots.**

RI		RII		RIII	
M <sub>1</sub>	M <sub>2</sub>	M <sub>2</sub>	M <sub>1</sub>	M <sub>1</sub>	M <sub>2</sub>
S <sub>4</sub>	S <sub>1</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
S <sub>3</sub>	S <sub>4</sub>	S <sub>4</sub>	S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>
S <sub>1</sub>	S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>4</sub>	S <sub>2</sub>
S <sub>2</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>1</sub>	S <sub>3</sub>

Key:

M<sub>1</sub>: Conventional method of cultivation

M<sub>2</sub>: Sustainable rise intensification (SRI) method of cultivation

S<sub>1</sub>: Urea alone

S<sub>2</sub>: Ammonium sulphate alone

S<sub>3</sub>: Urea + Vermicompost

S<sub>4</sub>: Ammonium sulphate + Vermicompost

Recommended fertilizer as per standard (local) agronomic practice: 150:50:50 NPK kg ha<sup>-1</sup> and vermicompost at 5 Mg ha<sup>-1</sup>.



**Figure 1S: Overview of the experimental field during the 2015-2016 crop season.**



**Figure 2S: Overview of the manual gas chambers installed at the experimental field during the 2015-2016 cropping season.**

**Table 2S: Description of field operations conducted at the experimental site.**

Operation	Date
Transplanting + fertilizer application (25% N, 100% P and K).	19.09.2015
Gap filling	07.10.2015
Cono weeding (first)	15.10.2015
Gas sample collection	16.10.2015
Cono weeding (second) and gas sample collection	20.10.2015
First topdressing of fertilizer (25% N)	20.10.2015
Gas sample collection	29.10.2015
Second topdressing (25% N)	02.11.2015
Gas sample collection	19.11.2015
Third topdressing (25% N)	20.11.2015
Gas sample collection	21.11.2015
Gas sample collection	12.12.2015
Harvesting	22.01.2016



**Figure 3S: Collection of gas samples from static chambers after Cono weeding at the experimental field during the 2015-2016 cropping season.**



**Crop season:** 2016-2017.

As per previous season, the experiment was conducted at Tamil Nadu Agricultural University at Coimbatore (India), but at wetland field No.: B6 during the Kharif season of 2016. Treatment details are as follows:

**Crop:** Rice

**Variety:** CO(R)51

**Sowing date:** 13.07.2016

**Design:** Split plot with three replications ( $n = 3$ ).

**Treatments:** As outlined for the 2015-2016 cropping season.

Fertilizer application: 150:50:50 NPK,  $\text{kg ha}^{-1}$ .

Compost: Vermicompost applied at  $5 \text{ Mg ha}^{-1}$ .



**Figure 4S: Overview of the experimental field during the 2016-2017 cropping season.**



**Figure 5S: Collection of gas samples from static chambers established at the experimental field during the 2016-2017 cropping season.**

**Table 3S: Description of field operations conducted at the experimental site.**

Operation	Date
Transplanting and fertilizer application (25% N, 100% P and K)	08.08.2016
Gap filling	16.08.2016
Cono weeding (First)	01.09.2016
Gas sample collection	01.09.2016
Cono weeding (Second)	08.09.2016
Gas sample collection	08.09.2016
First top dressing (25% N)	08.09.2016
Second top dressing (25% N)	06.10.2016
Gas sample collection	07.10.2016
Gas sample collection	23.10.2016
Third top dressing (25% N)	25.11.2016
Gas sample collection	27.11.2016
Harvesting	22.12.2016

Soil characteristics:

Clay loam

Soil pH<sub>1:5</sub>: 8.54 and EC<sub>1:5</sub>: 0.13 dS m<sup>-1</sup>.

Depth interval, cm	Sand, %	Silt, %	Clay, %	Soil bulk density, g cm <sup>-3</sup>	Saturated hydraulic conductivity, cm h <sup>-1</sup>	*Field capacity (θ <sub>100</sub> , % v/v)	*Permanent wilting point (θ <sub>15</sub> , % v/v)
0-25	30.5	33.6	32.3	1.12	0.57	47.12	23.20
25-50	34.0	32.8	30.4	1.14	0.47	50.6	25.23
50-75	32.8	30.6	34.0	1.11	0.43	50.78	25.40
75-100	32.3	28.6	36.6	1.16	0.41	50.54	25.50
100-125	30.0	31.0	35.2	1.18	0.39	51.02	25.50

\*Volumetric soil water content at field capacity (100 cm suction) and permanent wilting point (15 bar), respectively.