

水稲の葉色に基づく施肥設計はメタン発酵消化液の肥料利用でも有効である

Variable-timing, fixed-rate application of cattle biogas effluent as fertilizer for rice using a leaf color chart

ベトナムのメコンデルタにおける水稲栽培において、バイオガスダイジェスターからの牛ふん由来のメタン発酵消化液を肥料利用する際に、安価な葉色板(LCC、図1)で測定・数値化できる葉色の変化から施用時期を決定する手法の有効性を検証する。LCC値がある閾値以下に低下する度に一定窒素量の牛糞由来の消化液を施用すると、設定する閾値が高いほど、施用回数および総施用量が増加する(表1)。播種後21~81日目の平均LCC値と籾収量との間には、異なる作期それぞれで正の直線関係がみられる(図2)。この手法を用いることで、化学肥料による慣行レベルと同等の子実収量を達成できる。

This study examined the performance of variable-timing, fixed-rate application of biogas effluent from cattle manure for rice production in the Mekong Delta, Vietnam, using a leaf color chart (LCC, Fig. 1). We set several LCC threshold values, and by each incremental raising of the threshold, the application timing and the resultant total amount were increased (Table 1). There were positive relationships between the mean LCC values during 21 to 81 days after sowing and rice yields in two seasons (Fig. 2). The proposed method can achieve yield levels comparable to those from inorganic fertilizers.

表1 8つの処理区における窒素施肥の方法と2回の実験での施用回数および総施用量(kg N ha⁻¹)

Table 1. The method and the total rate (kg N ha⁻¹) of N application for eight treatments in two experiments

Treatment	Application method	Experiment 1	Experiment 2
Zero	No nitrogen	0	0
Estd	Split-application, for three times at conventional timings	150 (30-50-70)	150 (30-50-70)
E2.75	60 kg N ha ⁻¹ as effluent whenever LCC value goes below 2.75	90 (30-60)	90 (30-60)
E3.00	60 kg N ha ⁻¹ as effluent whenever LCC value goes below 3.00	90 (30-60)	90 (30-60)
E3.25	60 kg N ha ⁻¹ as effluent whenever LCC value goes below 3.25	90 (30-60)	90 (30-60)
E3.50	60 kg N ha ⁻¹ as effluent whenever LCC value goes below 3.50	150 (30-60-60)	150 (30-60-60)
E3.75	60 kg N ha ⁻¹ as effluent whenever LCC value goes below 3.75	150 (30-60-60)	210 (30-60-60-60)
U3.25	60 kg N ha ⁻¹ as urea whenever LCC value goes below 3.25	150 (30-60-60)	90 (30-60)

Experiment 1 mainly in dry season and Experiment 2 mainly in wet season.

The first N application was conducted 10 or 11 days after sowing at 30 kg N ha⁻¹, except for Zero treatment.

P and K (only in Zero and U3.25 treatments) were split-applied as inorganic fertilizers at conventional timings.



図1 LCC値の測定の様子
Fig. 1. Measuring the LCC value
(Photo courtesy: Mr. Ariel Javellana, IRRI)

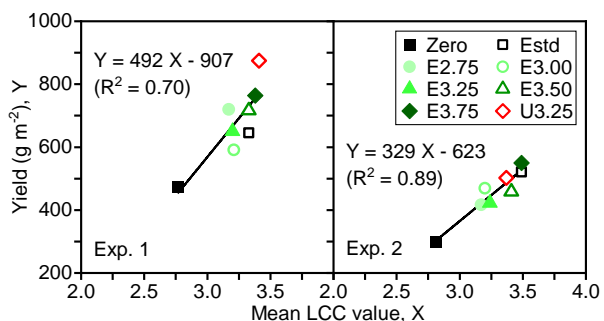


図2 各実験における平均LCC値と籾収量の関係
Fig. 2. Relationships between the mean LCC values and rice grain yields in two experiments

Yield is expressed as 14% moisture content.