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# Linking leaf color charts and crop N-status to guide fertilizer application in highland rice production systems of Rwanda

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## Introduction

In farmers fields, leaf color charts (LCC) are often the only means to determine the nutritional status of rice. It has been shown that SPAD measurements correlate well with crops N status. Thus, correlating SPAD with LCC allows estimating the crop N status. Specific leaf area (SLA) is a measure for leaf thickness. Leaf thickness increases with low temperatures. Temperatures decrease with increasing altitude. SLA biases LCC as thicker leaves appear greener and thus indicate a higher than real N status.

## Objectives

- To verify the link between LCC and SPAD for rice grown at different altitudes
- to evaluate the effect of altitude on genotypic SLA

## Conclusions

- LCC is highly correlated with SPAD at both altitudes
- SLA is influences by altitude, fertilizer rate and genotype
- Effects on SLA may render fertilizer recommendations based on LCC invalid in high altitudes

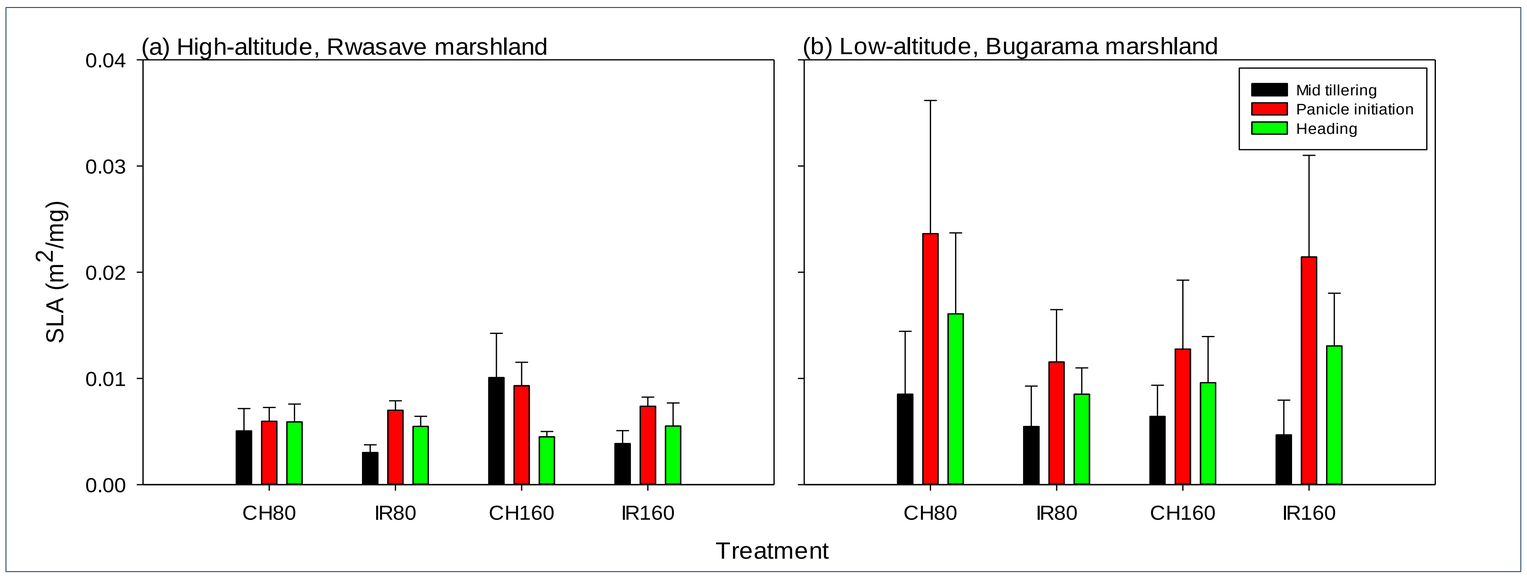


**Figure 1.** Specific leaf area (SLA) for two genotypes at three growth stages at (a) high-altitude, and (b) low-altitude locations. *Abbreviations: CH,* variety Chhomrong; *IR,* variety IR-64; *80,* N-rate 80 kg ha$^{-1}$; *160,* N-rate 160 kg ha$^{-1}$. *n = 3.*

## Results

- SLA is strongly affected by altitude, fertilizer application rate, genotype, and development stage

## Results

- LCC strongly correlates with SPAD at both altitudes.
- Leaves appear greener at high altitudes
- This may be an effect of SLA

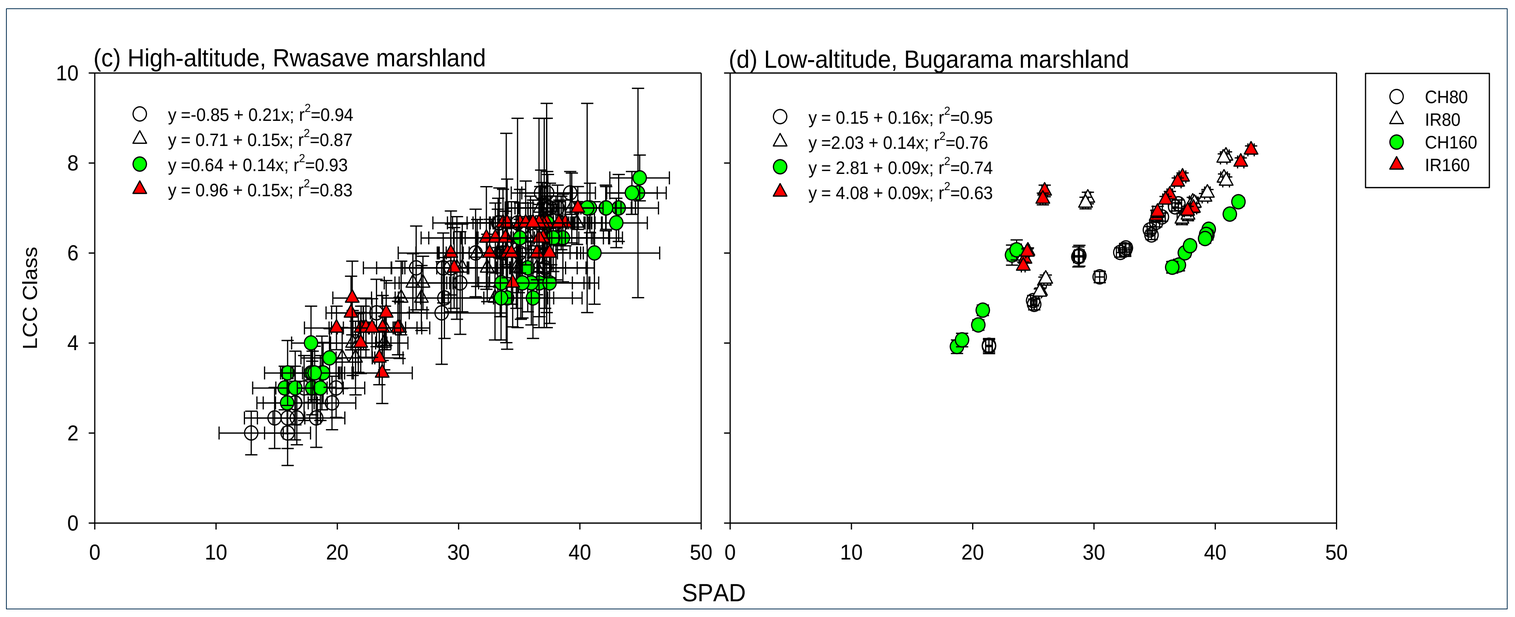


**Figure 2.** Pooled data for relationship between LCC class and SPAD values for two genotypes across three growth stages at (c) high-altitude, and (d) low-altitude locations. *Abbreviations: LCC,* leaf color chart class value; *CH,* variety Chhomrong; *IR,* variety IR-64; *80,* N-rate 80 kg ha$^{-1}$; *160,* N-rate 160 kg ha$^{-1}$. *n* = 3.

## Materials and Methods

Leaf chlorophyll content was determined using SPAD meter and LCC values taken up to five consecutive days after fertilizer applications at high-altitude, and at 1, 4, and 8 days after fertilizer at low-altitude locations. LCC values were recorded to the nearest 0.5 value to create 8 LCC classes. SPAD values were corrected for leaf area via SLA. SLA was determined as the ratio of leaf area (m$^2$) to dry weight (mg).

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