

LEAF COLOUR CHART: TOOL FOR NITROGEN MANAGEMENT

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INTRODUCTION

The leaf colour chart (LCC) was the first time introduced in the agricultural sector of the world by scientists of Japan. They made it for estimation of chlorophyll formation and its availability in plants, after the continuous studies, many researchers proved that it is pivotal for the measurement of nitrogen deficiency and its correction. The leaf colour chart has six (06) colours varies from yellowish to dark greenish just like lush green colour of plants, each colour is changed from the one another. Nutrient management is a major component of a soil and crop management system. Increase in fertilizer nutrient input, especially N fertilizer, has contributed significantly to the improvement of crop yields in the world. Knowing the required nutrients for all stages of growth and understanding the soil's ability to supply those needed nutrients is critical to profitable crop production. Nitrogen is the major nutrient limiting the high yield potential of rice cultivars. Farmers generally apply fertilizer N in several split applications, but the number of splits, amount of N applied per split and the time of applications vary substantially. The apparent flexibility of rice farmers in adjusting the time and amount of fertilizer application offers potential to synchronize nitrogen application with the real time demand of the rice crop. The optimum use of N can be achieved by matching N supply with crop demand. Farmers generally use leaf colour as a visual and subjective indicator of

the rice crop's nitrogen status and need for N fertilizer application. Leaf colour intensity is directly related to leaf chlorophyll content which, in turn, is related to leaf N status.

The leaf colour chart (LCC) is an innovative cost effective tool for real-time or crop-need-based N management in Rice, Maize and Wheat. LCC is a visual and subjective indicator of plant nitrogen deficiency and is an inexpensive, easy to use and simple alternative to chlorophyll meter /SPAD meter (soil plant analysis development). It measures leaf color intensity that is related to leaf N status. LCC is an ideal tool to optimize N use in Rice at high yield levels, irrespective of the source of N applied, viz. organic manure, biologically fixed N, or chemical fertilizers. Thus, it is an eco-friendly tool in the hands of farmers. One of the recently introduced N management approach was estimating the leaf N concentration by the measurement of leaf greenness. Among the different tools available to measure the leaf greenness, the non-destructive measurement of leaf green colour intensity using leaf green colour charts are gaining importance. A potential solution has been tried to regulate the timing of nitrogen application in rice using a leaf colour chart to determine the plant nitrogen. About leaf colour chart (LCC): The LCC had been jointly developed by International Rice Research Institute (IRRI) and Philippines Rice Research Institute from a

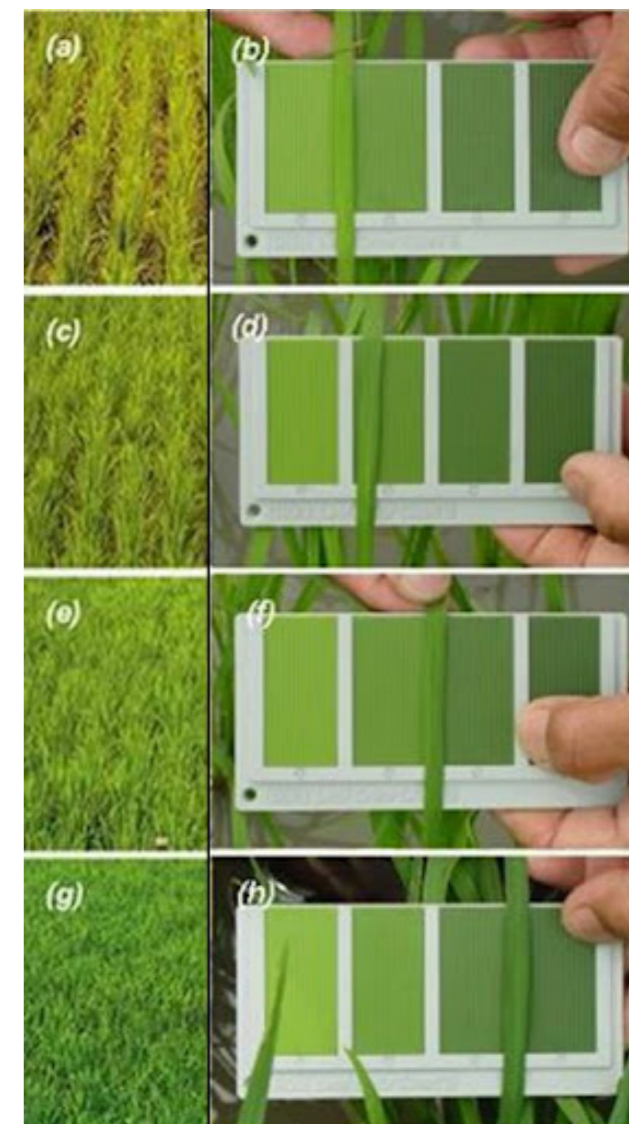
Japanese prototype, to measure green colour intensity of rice leaves, serves as cheaper tool to assess the nitrogen requirement and thereby to get a maximum productivity. The LCC is also suitable for maize and wheat providing farmers with a good diagnostic tool for detecting N deficiency. The LCCs relevant to use for sugarcane, potato, cotton, cassava, etc. are under Research and Development in order to maximize the yield of these crops.

PURPOSE OF USING LCC:

Purpose of using LCC is to apply adequate amount of nitrogen and avoid application of fertilizer more than required. Use of LCC helps to determine nitrogen demand of the crop and guide right time of fertilizer nitrogen application so as to prevent unwanted nitrogen losses and their serious impacts on the ecosystem. Farmers generally apply too much N (and little P and K and other nutrients) that results in high pest and disease incidence and serious lodging. The consequence of high N application is high pesticide use to control pests, more expenditure on pesticides and reduced yield and poor grain quality due to lodging.

ADVANTAGES OF USING LLC

- More Crop
- Less Cost
- Avoid Disease
- Reduction of GHG Emission



SITE SPECIFIC NUTRIENT MANAGEMENT (SSNM)

Approach for Fertilizer N Management: Site-specific nutrient management (SSNM) enables Rice farmers to optimally supply their crops with essential nutrients. The SSNM approach aims to apply nutrients at optimal rates and times to achieve high yield and high efficiency of nutrient use by the Rice crop, leading to high cash value of the harvest per unit of fertilizer invested. With the SSNM approach, N-fertilizer recommendations for rice can be developed by:-

1. Estimating the total N-fertilizer required for rice in a typical season
2. Formulating a dynamic N management to distribute N-fertilizer to best match the crop's need for N.

HOW TO USE THE LCC

- Take the first LCC reading at 14 days after transplanting (DAT).
 - For direct wet-seeded rice, start taking readings at 21 days after direct wet seeding.
1. Randomly select 10 healthy plants in your field where plant distribution is uniform.
 2. Select the topmost, fully expanded, and healthy leaf of each of the 10 plants. Take LCC readings by placing the middle part of the leaf on top of the LCC's colour strips for comparison. Do not detach the leaf and do not expose the LCC to direct sunlight during readings. The same person should take the LCC readings at same time of the day between 8:00 a.m. and 10:00 a.m. from first up to the last reading.
 3. If more than 5 out of 10 leaves have readings below 4 in transplanted rice and below 3 in direct wet-seeded rice, apply 30 kg N/ha during dry season (DS) or 23 kg N/ha during wet season (WS).
 4. Repeat LCC readings every seven days until the first flowering. Different sets of 10 leaves can be used for each weekly reading.

CONCLUSION:

The leaf colour chart (LCC) is an easy to use and inexpensive diagnostic tool for monitoring the relative greenness of a rice leaf as an indicator of the plant N status. Leaf colour chart is a low-cost tool to assist farmers and effective in improving nitrogen fertilizer management. The LCC is used at critical growth stages to decide whether the recommended standard nitrogen rate needs to be adjusted up or down based on the leaf colour. Using LCC will help farmers to estimate plant nitrogen demand, to produce high rice yield

