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Role of Leaf Colour Chart (LCC) for Site Specific Nutrient Management(SSNM)

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Abstract

The Leaf Colour Chart (LCC) is a non-destructive, cost-effective tool used to assess the nitrogen status of maize crops. By comparing the color of the maize plant's leaves to a standardized chart, farmers can determine the optimal timing and amount of nitrogen fertilizer to apply. The LCC has been shown to improve nitrogen use efficiency, increase crop yields, and reduce environmental pollution. This abstract highlights the benefits and limitations of using the LCC in maize farming, and emphasizes its potential as a valuable tool for sustainable agricultural practices. The Leaf Colour Chart (LCC) plays a significant role in nitrogen (N) fertilizer management in maize crops.

Key Words:- Leaf Colour Chart (LCC), Nitrogen Management, Maize Crops, Sustainable Agriculture, Nitrogen Use Efficiency, Crop Yields, Environmental Sustainability

What is a Leaf Colour Chart?

A Leaf Colour Chart is a simple, low-cost tool used for site specific nutrient management (SSNM) to assess the nitrogen status of crops. It consists of a series of colored cards or charts that represent different levels of nitrogen deficiency.LCC comprised of four coloured and six color strips (from yellowish green to dark green) fabricated with veins matching the leaves of maize crops. LCC was developed by International Rice Research Institute (IRRI) in collaboration with Philippine Rice Research Institute (Manila). Maize LCC was very much popularized by Punjab Agricultural University, Ludhiana and IRRI.

Benefits of using LCC in maize crops

1. Improved nitrogen use efficiency: LCC helps farmers apply the right amount of nitrogen fertilizer at the right time, reducing waste and environmental pollution.
2. Increased crop yields: Optimal nitrogen management leads to healthier plants, better growth, and higher yields.
3. Cost savings: By avoiding excessive nitrogen fertilizer applications, farmers can reduce their input costs.
4. Environmental benefits: Reduced nitrogen fertilizer use minimizes soil and water pollution.

Here are the disadvantages of using Leaf Colour Charts (LCC) in maize crops:

Working principle of LCC in Maize crop

Randomly select at least 10 disease-free plants in a field with uniform plant population. Select the topmost fully expanded leaf from plant. Place the middle part of the leaf on a chart and compare the leaf color with the color panels of the LCC.

1. Select a disease-free plant with a fully expanded leaf
2. Place the middle of the leaf on the LCC
3. Compare the leaf color to the color panels on the LCC
4. Determine if the plant needs more, less, or the right amount of nitrogen

Apply 25 kg urea (basal). If > 6 leaves show <5 reading at 21 DAS, then apply 25 Kg urea. Repeat

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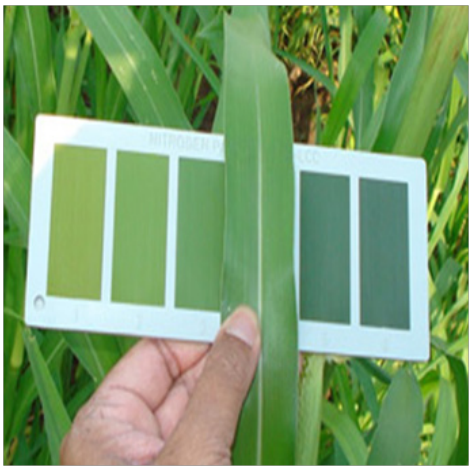
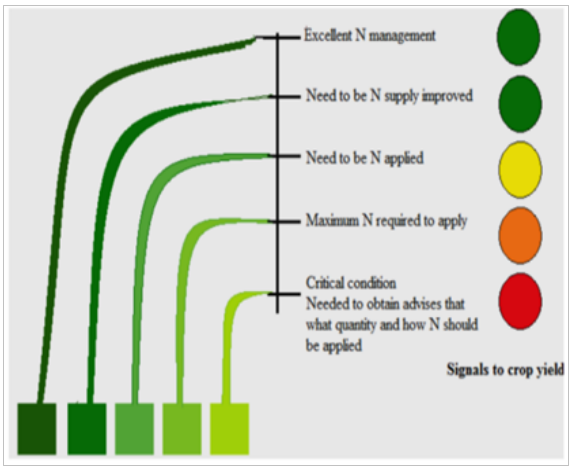
LCC at 10 days interval. Stop applying fertilizer after Silking. LCC is used only to fine tune the top dressed N but one cannot decide the basal nitrogen application by LCC. LCC can be more successful in integrated site-specific nutrient management strategy in which to achieve optimum response to N fertilizer, other nutrients (P, K, S, Zn) must not be limiting.

P or K deficiencies may cause darker leaf colour which leads to erroneous LCC readings. Hence local calibration of LCC is always required. But SPAD meter is less affected by these deficiencies.





Source : Maize (PAU Ludhiana)

Disadvantages of Leaf Colour Chart (LCC):

1. Subjectivity: LCC readings can be subjective, as the interpretation of leaf color depends on the observer's judgment.
2. Varietal Differences: Different maize varieties may have varying leaf colors, making it challenging to develop a single LCC for all varieties.
3. Environmental Factors: Environmental factors like temperature, light, and water stress can affect leaf color, leading to inaccurate LCC readings.
4. Nutrient Imbalance: LCC only measures nitrogen status, ignoring other essential nutrients like phosphorus, potassium, and micronutrients.
5. Limited Accuracy: LCC may not accurately detect nitrogen deficiency in maize plants under certain conditions, such as when other nutrients are limiting.
6. Requires Calibration: LCC needs to be calibrated for specific maize varieties, growth stages, and environmental conditions, which can be time-consuming and costly.
7. Limited Applicability: LCC may not be suitable for maize crops grown under diverse conditions, such as irrigated vs. rainfed, or in areas with high levels of soil nitrogen.
8. Dependence on Observer Expertise: Accurate LCC readings require observers with experience and knowledge of maize crop nutrition.
9. Time-Consuming: Regular LCC assessments can be time-consuming, especially for large-scale maize farms.
10. Limited Integration with Other Technologies: LCC may not be easily integrated with other precision agriculture technologies, such as drones, satellite imaging, or soil sensors.

Limitations and considerations

1. Calibration: LCCs must be calibrated for specific maize varieties and growing conditions.Farmers need training to accurately interpret LCC readings and calibrate the chart for their specific maize variety and growing conditions.
2. Interpretation: Farmers need training to accurately interpret LCC readings and make informed fertilizer

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decisions.Regular LCC assessments should be conducted throughout the growing season to ensure optimal nitrogen management.

3. Integration with other management practices: LCC should be used in conjunction with other best management practices, such as soil testing and crop monitoring.

LCC values are influenced by diurnal variations of the day, varieties and seasons, hence needs calibration.

1. Nitrogen Deficiency Detection: Maize plants with inadequate nitrogen levels will have lighter-colored leaves. By comparing the leaf color to the LCC, farmers can identify nitrogen deficiencies.
2. Fertilizer Application Guidance: Based on the LCC reading, farmers can determine the optimal timing and amount of nitrogen fertilizer to apply.
3. Real-time Monitoring: Regular LCC assessments enable farmers to monitor the crop's nitrogen status throughout the growing season.

Management Practices: LCC should be used in conjunction with other best management practices, such as soil testing and crop monitoring.

By adopting the Leaf Colour Chart, maize farmers can optimize their nitrogen fertilizer management, leading to improved crop yields, reduced environmental impact, and increased profitability.

Explaining about fertilizer application by using leaf colour chart at Field level

Distribution of leaf colour chart at adopted villages

Creation of awareness on Importance of LCC in Maize crop