

Precision Nitrogen Management in Organic Agriculture of Paddy and Wheat Crops through Leaf Color Chart (LCC) and SPAD Meter

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Introduction:

Farmers cultivate field crops extensively in the Indo Gangetic regions of India and other plains of South Asia. Generally, farmers here use far more fertilizers than required in their crops. Chemical fertilizers are generally used at the time of sowing and at certain stages of the crop. The method of using chemical fertilizers in the field varies from one field to another. It has often been seen that the farmers apply chemical fertilizer such as urea on their crop according to their misconceptions. Due to excessive use of fertilizers soil health is being affected adversely day by day. Therefore a strategy is needed to maintain the fertility of the soil. If we talk about the state of Uttar Pradesh, then the land holdings are very small. Some farmers also do not have irrigation facilities, due to which farmers should use fertilizers efficiently.

There is also a possibility of burning of crops due to the use of high quantities of urea. It is believed that the use of urea at the right time and right amount will also increase the yield. If farmers do not apply urea at the right time, crop yield can be affected up to 75 per cent. Use of urea and other chemical fertilizers to meet nitrogen requirements in organic farming is prohibited. In the context of continuously growing population, organic farming is not the best option, but if farmers use organic components as much as possible, then the use and dependence on chemical fertilizers can be reduced considerably. In such situations, leaf color charts and chlorophyll meters developed for good nitrogen management, which

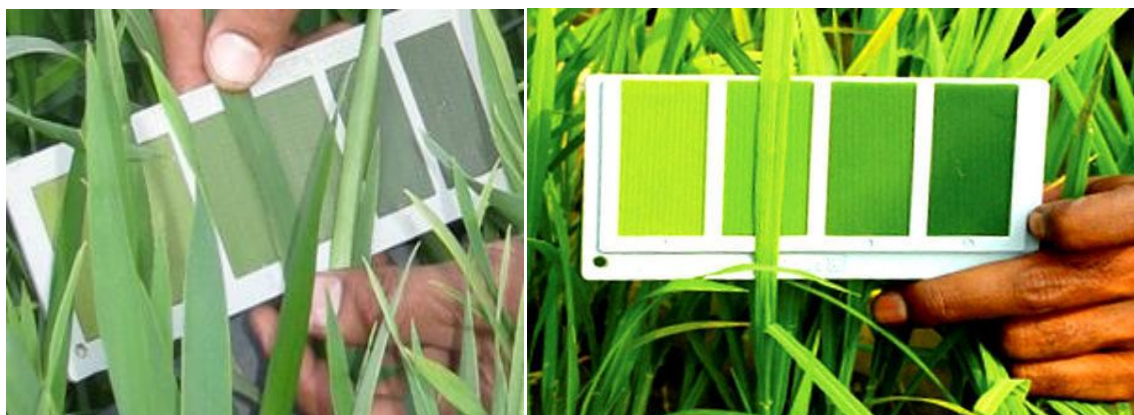
recommends nitrogen according to the color of the leaves of plants, can prove very useful. In organic farming, various components of organic agriculture are commonly used. Nitrogen requirement is met by planting bio-fertilizers such as *Rhizobium*, *Azotobacter*, *Azospirillum* etc. in seedlings or soil at the time of sowing or by adding organic fertilizers such as compost, vermicompost, cow dung, soil etc. to the soil before sowing. Both these tools can estimate the quantity of chlorophyll in the leaves of the crop very accurately. Use of portable diagnostic tools for accurate nitrogen management can give an accurate knowledge of nitrogen application and the correct use of urea fertilizer. Due to all these techniques, never forget the basic principles. To increase the productivity of the soil, use organic fertilizers as much as possible. Apart from nitrogen, the soil must be tested for other nutrients.

Leaf color chart:

Talking about the leaf color chart, the efficiency of the eyes should be very fast and accurate to use this tool so that the color of the leaves can be evaluated by this tool. Leaf color chart is a device made of plastic in which four or more panels are made from yellow to dark green. Their colors are similar to the color of leaves. The colors of the leaf color chart combine the colors of the second or third leaf of the crop and indicate the availability of nitrogen in the crop. Nitrogen in paddy at the rate of 30 to 35 kg/ha, whenever the leaves appear lighter than a certain green color, when they match the colors of different panels of leaf color chart at intervals of 10 days (10–10 days). If the color of the leaves is thicker than the green fixed in the leaf color chart, there is no need to provide nitrogen separately.

Based on the leaf color chart in a broad-based paddy, nitrogen recommended about 30 kg at the time of planting. Apply nitrogen per hectare through chemical fertilizers or other components of organic farming. After 14 days of transplanting, at the difference of 6 days, start mixing the color of the full open leaves before the tip with the leaf color chart. Whenever the greenness of 4 or more of 10 leaves is less than 4 shades of leaf color chart, apply 30 kg of nitrogen per hectare through chemical fertilizers or other components of organic farming. There is no need to colonize nitrogen if the color of the leaves is equal to or darker than the shade 4 in the leaf color chart. Also keep in mind that after the release of earrings, do not apply nitrogen. While dealing with the leaf color chart, also ensure that only representative plants are matched to the color of the leaf color chart. The leaves and plants

selected for color matching should be normal and disease free, pest free, waterlogged / stress and other nutrient deficiencies. One more thing, do not add fertilizer to the stagnant water in the paddy and do the next irrigation only after 2 days of adding urea.



Similarly, at the rate of 25-30 kg nitrogen per hectare at the time of sowing in medium fertile soil for wheat, be applied through chemical fertilizers or other components of organic agriculture. It can be beneficial to complete requirements through D.A.P. Urea is not required to be treated at the time of sowing. Approximately 25 to 50 days after sowing, apply with the first irrigation at a rate of about 45-50 kg nitrogen per hectare through chemical fertilizers or other components of organic agriculture. Subsequently, approximately 50-55 days after sowing (before the second irrigation), the color of the fully developed leaf before the upper end should be matched to the leaf color chart only once.

At the time of second irrigation, if the greenness of 4 or more leaves out of 10 is greater than the shade of leaf color chart at 5.0, then at the rate of 20 kg of nitrogen per hectare, from 6.5 to 0.5, only 60. Apply at the rate of 60 kg of nitrogen per hectare, less than 5.0, through chemical fertilizers or other components of organic agriculture. Apart from this, keep in mind that always mix the leaf color chart under the shade of your body only on unbroken leaves. There should be no disease or insect pest on the selected leaves and plants. There should also be no shortage of water and other nutrients in the crop. If the second irrigation is delayed due to rain, nitrogen fertilizer must be added after 50-55 days of sowing after mixing the color of the leaves with leaf color chart.

Chlorophyll Meter (SPAD Meter):

The Chlorophyll Meter (SPAD Meter) is a measuring device which can measure chlorophyll content in the leaf non-destructive chlorophyll concentration index (CCI) and provides an

indicator of photosynthetic activity relating to the nitrogen concentration of the sample. The chlorophyll meter (SPAD meter) is an instrument used to evaluate chlorophyll based on the color of leaves. To evaluate the chlorophyll in paddy-wheat from the SPAD meter, mark 4 to 10 plants, then calibrate the spad meter and hold the second or third leaf on top of the paddy or wheat and keep it in the middle of its sensor. Some readings or measurements are seen on our screen which we record. If we talk about the state of Uttar Pradesh, then this standard has been kept from 35 to 36 for paddy crop and 60 to 42 for wheat. If the paddy has less than the standard given above, then 30 to 35 kg/ha of nitrogen should be deposited and if wheat also has less than the given standard, 20 to 25 kg/ha of nitrogen should be applied.

The chlorophyll meter also recommends nitrogen-containing fertilizers by examining the green depth of the leaves as in the leaf color chart. The main variation in chlorophyll meter and leaf color chart is in the process of checking the depth of green color itself. While another leaf color chart depends on the efficiency of a person's eyes, the other digital sensor available in a chlorophyll meter helps to detect green depth.

By using both these tools, we can supplement urea better so that we can save 25 to 30 kg/hectare of nitrogen and also we can increase the yield of paddy and wheat. As per standard measurement of these devices in rainfed areas, application of nitrogenous fertilizers and other organic matter in right amount & at right time, along with saving of chemical fertilizers, better effect of organic fertilizers is visible and our soils can also be preserved.



Chlorophyll meters and leaf color charts can be a part of the need-based nitrogen management system in paddy and wheat. It shows the actual requirement of nitrogen in the crop in the field and the supply of nitrogen in the changing circumstances of the crop. These

devices can also monitor the nitrogen status in the crop at a regular interval and can help in recommending nutrients if needed. This is an ideal tool to optimize nitrogen use appropriately. Farmers can use these tools easily as they are very easy to use. It is better to take readings only after 10 o'clock in the morning when there is no dew on the leaves. Analysis of colors in the leaf color chart should be done very carefully as it is very important to match colors in it.

Conclusion:

Precision nutrient management enhancing crop production and input use efficiency. Optimizing the amount, time and method of fertilizer application with suitable source are all helpful in achieving the goal of enhancing crop productivity and sustainability. By practising organic dependence upon chemical fertilizers can be reduced. So use of leaf color charts and chlorophyll meters can be very beneficial for proper nitrogen management.

