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Original Article

Why Do Wheat Leaves Turn Yellow After the First Irrigation in Sakra block of Muzaffarpur District Bihar.

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ABSTRACT

Wheat (*Triticum aestivum L.*) is India's primary food grain, whose productivity depends mainly on the initial growth stages. In the Sakra block, the sowing period for wheat is from November 5 to December 15. The first irrigation takes place 22 to 25 days later—that is, in the month of January. During this time, the temperature in the Sakra block is quite low (around 4°C), and the humidity is 80%. There is no need for a large amount of water at this stage. Great caution must be exercised during this first irrigation, and fertilizers should also be applied with care.

Keywords: Wheat, Leaves, Irrigation, Yellow, Sakra Block, Muzaffarpur Bihar

INTRODUCTION

Wheat (*Triticum aestivum L.*) is India's primary food grain, whose productivity depends mainly on the initial growth stages. The first irrigation, given approximately 18–21 days after sowing, known as the crown root initiation (CRI) stage, is a very sensitive stage for wheat. Many farmers have observed that the leaves of the plants turn light green and yellow within a few days of irrigation. This phenomenon, although common, is scientifically significant because it is directly linked to the plant's physiological processes and the balance of soil, nutrients, and water.

MATERIAL AND METHODOLOGY

hThe total area of Sakra block is 177 square kilometers, of which 13,000–14,000 hectares are under cultivation; wheat is grown on 36.4% of this land. There are 120 villages in Sakra block. Between October 15, 2025, and January 20, 2026, we conducted surveys, visiting 10 of these villages: Chakrahi urf Maniyari, Chakhazrat Maniyari, Rasulpur Maniyari, Malpur Agrail, Chandan Patti, Sahdullapur, Majhauliya, Sadpura, Sarmastpur, and Dihuli Buzurg. In this region, the wheat crop experiences a significant reduction in grain yield because the leaves turn yellow following the first irrigation.

The primary reasons for this are as follows:

1. The role of water-air balance (Whapasa) in the soil

In dry or moderately moist soil, a microenvironment of approximately 50% air and 50% water vapour exists between the particles, known as Whapasa. Root respiration, microbial activity, and nutrient absorption depend on this. After the first irrigation, the soil often becomes completely waterlogged, disrupting the balance.

Scientific Effects

Roots receive less oxygen.

Aerobic respiration in root cells stops, and anaerobic respiration begins.

Energy (ATP) production decreases.

Roots are unable to absorb nutrients.

These processes slow down chlorophyll synthesis, and the leaves appear yellow.

2. Water Stress and Root Shock on the Root System

When a sudden excessive moisture is applied after the first irrigation, the root's performance decreases for 48 –72 hours.

This is called water stress or root shock.

Result: Root growth is inhibited.

Loss of fine, absorbent roots

Nutrient flow is disrupted.

When roots are not active, symptoms of nitrogen, sulfur, and iron deficiencies become clearly visible in the leaves, the main symptom of which is yellowing of the leaves (chlorosis).

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3. Transient Nitrogen Deficiency

Nitrogen is a crucial nutrient for wheat, as it directly contributes to chlorophyll formation and protein synthesis. After the first irrigation, nitrogen is present in the soil:

leaches into the soil with the water,

or becomes temporarily unavailable to plants.

This plant suffers from temporary nitrogen deficiency, the symptoms of which are: Yellowing of older leaves, Slow plant growth, Light greenness, yellow rings.

4. Temperature Shock

The first irrigation is often given in the early stages. When icy water reaches the soil, the soil temperature decreases by 3–6°C. Low temperatures:

Root enzyme activity slows

Nutrient absorption decreases

The photosynthesis rate decreases

The final result of this scientific chain is an increase in chlorophyll and yellowing of leaves.

5. Temporary micronutrient deficiencies (especially iron and sulphur)

Excessive moisture affects soil pH and chemical balance. Iron (Fe) and sulphur (S) are organic elements:

Plants cannot absorb conversion from soluble to insoluble forms

These cause yellowing (interveinal chlorosis) between leaves, while the leaves remain green. This is a characteristic symptom of iron chlorosis.

6. Soil structure and the effect of heavy clay

Black, heavy, or loamy soils have greater water retention capacity. After the first irrigation, they...

Water drainage is slower.

Water exchange is less

The root zone remains more anaerobic

Waterlogging is more intense and lasts longer.

7. Fertiliser Management Errors

If nitrogen is applied immediately after the first irrigation,

Top dressing is not done on time.

Or organic carbon is low,

Then nitrogen is rapidly degraded after the first irrigation and is not immediately available to the plant.

As a result, leaves begin to turn yellow.

8. Role of biological factors

Excessive moisture activates certain pathogenic fungi (such as Pythium and Fusarium), which cause root rot. While disease symptoms may not be evident in the initial stages, the leaves appear yellow due to impaired nutrient absorption in the plants.

Finally...

Yellowing of wheat leaves after the first irrigation is primarily a natural, but scientifically significant, result of disruptions in the soil's water-air balance, reduced root function, temporary nitrogen and micronutrient deficiencies, temperature changes, and the water-holding capacity of heavy soils. This condition is usually temporary, and with proper management, the plants become green and healthy again.

CONCLUSION

Given the environmental conditions and soil type in the Sakra block, the first irrigation for wheat should be provided 22 days after sowing; care should be taken not to over-irrigate. Urea should be applied 3–4 days after irrigation. If there is an excess of water, there must be a provision for drainage. If the leaves begin to turn yellow, apply a spray containing zinc, sulphur, or iron within 7–10 days of irrigation.

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