

The pollination process in rice production is critical to overall productivity, as it directly impacts grain formation and yield. Optimal environmental conditions during pollination play a crucial role in the success of the crop, leading to potentially higher yields and better quality.

Rice plants have perfect flowers on the panicle, containing both pistils (stigmas, styles and ovaries) and stamens (two-celled anthers and filaments). Under normal conditions, self-pollination occurs when pollen grains fall from the anther onto the stigma. It takes about four to seven days for a full panicle to complete flowering.

Understanding the ideal pollination environment and the impacts of environmental stressors, such as high nighttime temperatures and excessive rainfall, is essential for optimizing yields.



Figure 1. Ideal conditions allow for proper pollination.



IDEAL POLLINATION ENVIRONMENTS

For optimal rice pollination, certain environmental conditions must be met (Figure 1):

- **Temperature:** Ideal daytime temperatures range from the mid – 80s to low 90s (F). Temperatures outside this range can impair pollen viability and stigmatic receptivity.
- **Humidity:** Moderate humidity levels are preferred. Extremely high or low humidity can adversely affect the pollination process.
- **Wind:** Gentle breezes facilitate the movement of pollen. However, strong winds can cause physical damage to the rice plants and result in pollen loss.

POLLINATION TIME OF DAY

Rice flowers, or florets, typically open for pollination during the early morning hours (Figures 2 and 3). The process usually begins around 9 a.m. and continues until noon, though this can vary slightly depending on the rice variety and environmental conditions. During this time, the anthers release pollen, which lands on the stigma, leading to fertilization.



Figure 2. Rice flowers, or florets, on rice panicle open for pollination.



Figure 3. Rice flowers begin at the tip, then move down the rice panicle.

IMPACTS OF HIGH NIGHTTIME HEAT

High nighttime temperatures, especially those exceeding 75 F, can severely impact rice pollination. Elevated temperatures during the night can cause the following:

- **Reduced pollen viability:** High temperatures can decrease the viability of pollen, leading to poor fertilization rates.
- **Stigmatic receptivity:** The stigma may become less receptive to pollen, further reducing the chances of successful pollination.
- **Respiration rates:** Increased nighttime temperatures elevate respiration rates, leading to a higher consumption of plant reserves and subsequently affecting the overall plant health and grain filling.



Figure 4. Anthers extended from the lemma and palea.



Figure 5. Two panicles that show multiple flowers during pollination.



Figure 6. Tips of the lemma and palea (hulls) are open and filaments are elongated.

EFFECTS OF RAINFALL ON POLLINATION

Excessive rainfall during the heading and pollination stages can pose significant challenges including:

- **Pollen wash-off:** Heavy rains can wash away pollen before it has the chance to fertilize the ovules, leading to poor grain set.
- **Humidity fluctuations:** Rainfall increases humidity levels, which can either promote or hinder
- pollination depending on the extent. Excessively high humidity can cause pollen grains to clump together, reducing their dispersal efficiency.
- **Physical damage:** Continuous rain can lead to physical damage to the rice plants, such as lodging, making pollination and subsequent grain filling more difficult.

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