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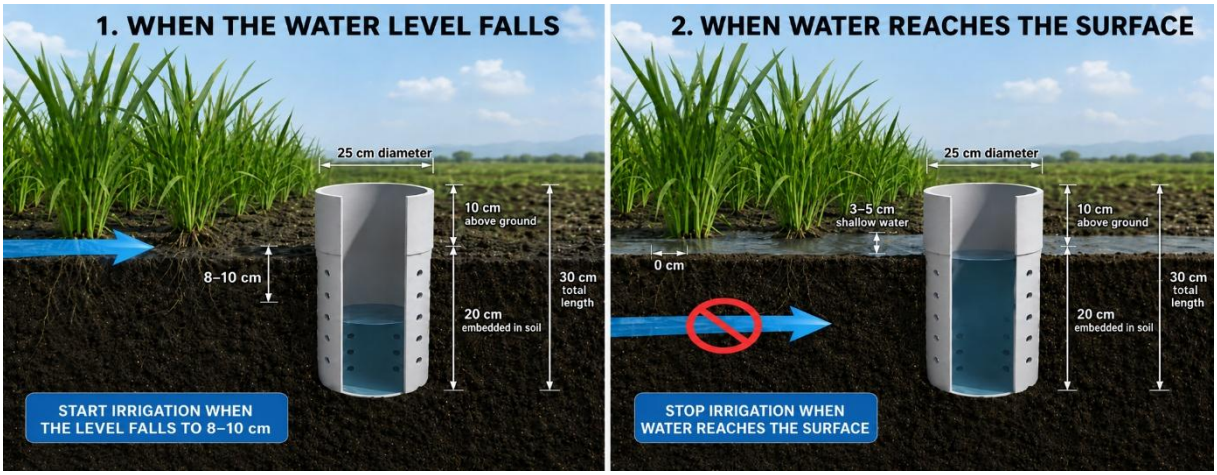
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GUIDELINE

IRRIGATION AND NITROGEN MANAGEMENT IMPLEMENTATION GUIDELINE FOR BAFRA RİCE

PROMEDRICE CS4 | Ammonium sulfate containing AWD and DMPP| Technical draft

This guide has been prepared based on the implementation methods and results of a rice trial conducted in the Bafra Plain during the 2024 and 2025 seasons. It explains to producers and technical personnel how to monitor AWD irrigation, plan nitrogen dosage, and determine the appropriate stage for using fertilizers containing DMPP. The trial data reflect local conditions and do not replace field-specific soil analysis or site-specific water management decisions.



1. AWD (Alternate wetting and drying method)

In AWD, the paddy field is not kept continuously submerged under a deep layer of water. Once the surface water recedes, the water level in the root zone is monitored, and re-irrigation occurs when a predefined threshold is reached. The aim is not to subject the rice crop to drought stress, but to prevent water from being kept unnecessarily high at all times. This method requires regular monitoring and control of water inflow and outflow.

PRIMA IN THE MEDITERRANEAN AREA
This project is part of the PRIMA programme supported by the European Union
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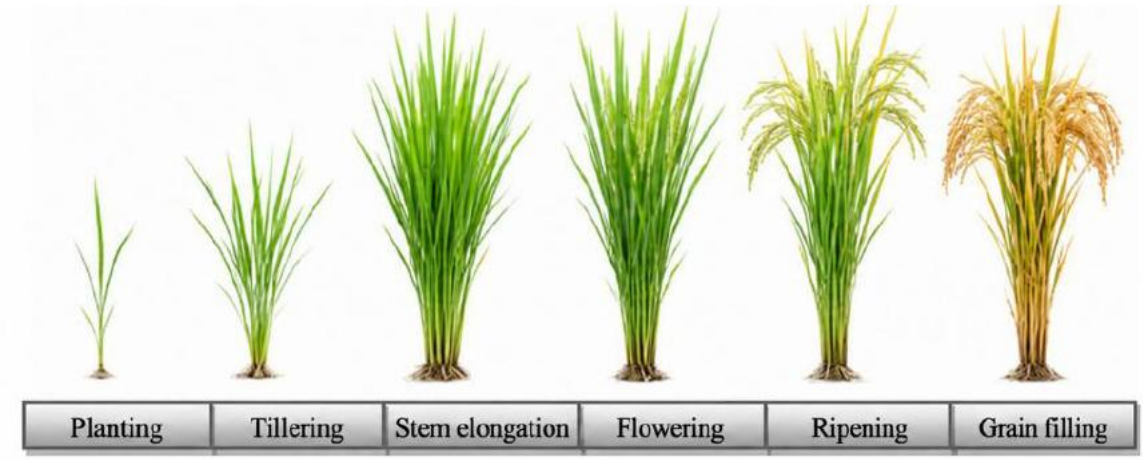
2. Field application procedure

- **Prepare the basin.** Check the levees and the water inlet/outlet points. Water leakage between adjacent basins creates a discrepancy between the level in the observation tube and the actual irrigation applied. Verify that the irrigation water reaches the basin uniformly.
- **Install the water observation tube.** The perforated PVC pipes used in the trial have a diameter of 7–10 cm and are installed to a depth of approximately 20 cm. The water level in the pipe is read relative to the soil surface. Placing the tube at a non-representative high or low spot can lead to misleading conclusions.
- **Read the water level regularly.** Do not automatically initiate irrigation just because surface water has disappeared. Monitor the water level inside the tube; take measurements again after rainfall or irrigation. Increase the frequency of observations based on temperature, rainfall, and the rate of water recession.
- **Re-irrigate at the threshold.** In the Bafra trial, irrigation was performed when the water level in the tube dropped to 8–10 cm below the soil surface. This threshold serves as the management rule for the trial. After irrigation, check the water distribution across the basin; record the timing and the new water level.
- **Protect sensitive growth stages.** Suspend the drying cycle during heading and, especially, during flowering; avoid water stress by keeping the field moist with shallow water. Waiting for visible wilting of the plant is not a safe criterion for irrigation.

A controlled cycling approach may be implemented during the tillering and stem elongation stages, with management becoming more stringent as the crop approaches flowering. As the crop progresses toward maturity, the timing of water withdrawal is determined based on grain development and the local harvest schedule, rather than relying solely on a fixed calendar date. The fact that water was cut off on September 18 during the 2024 trial season does not establish a fixed date for future seasons.

3. What should be recorded during AWD?

At a minimum, record the date, the crop growth stage, the water depth in the tube, irrigation or rainfall events, the amount of water applied (if measured), and any unusual plant symptoms. These records make it possible to evaluate whether the method was actually implemented based on the 8–10 cm threshold and to assess the conditions under which water savings were achieved.



4. Nitrogen management with DMPP-containing fertilizer

The trial compared two fertilizer forms: conventional ammonium sulfate containing 21% N, and ammonium sulfate containing 21% N and 0.8% DMPP. DMPP is a nitrification inhibitor that delays the conversion of ammonium to nitrate for a period of time; it does not provide additional nitrogen to the fertilizer. Therefore, describing the product simply as "slow-release" is technically incomplete: unlike a polymer-coated fertilizer, it does not physically release nitrogen over time but rather affects the rate of nitrogen transformation in the soil.

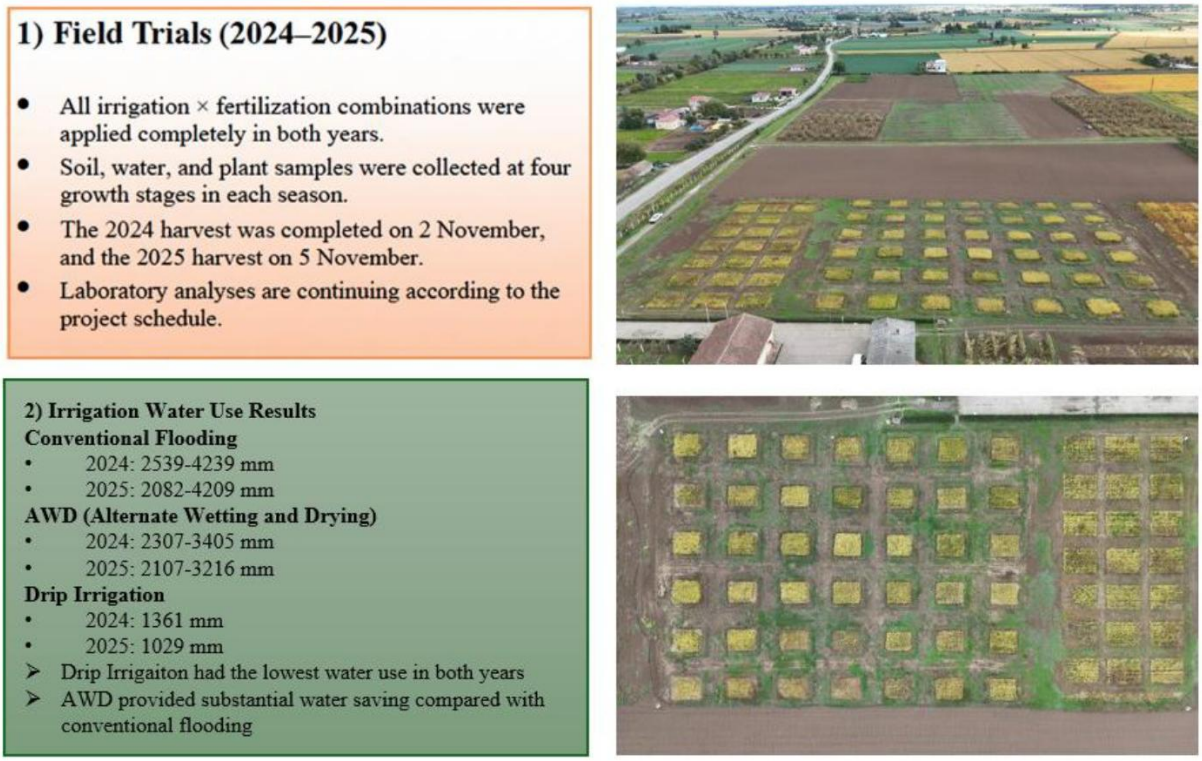
5. Dose determination before administration

Assess the soil. Before planting, evaluate the soil's existing and available nitrogen, residues from previous fertilizers and crops, organic matter content, and the expected yield. Consideration must be given not only to the risk of nitrogen deficiency but also to the costs and potential losses associated with applying excessive amounts.

6. Convert the amount of nitrogen to the amount of product.

Nitrogen application rates of 12, 18, and 24 kg N/da were used in the trial. For a product containing 21% N, these correspond to approximately 57, 86, and 114 kg of product/da, respectively (N rate ÷ 0.21). These figures represent the product equivalents for the experimental treatments, not standard recommendations to be applied without soil analysis. Recalculate the amounts if the actual N content on the product label differs.

Consider using ammonium sulfate containing DMPP to delay nitrate formation during the wetting-drying cycles of AWD. Soil pH, moisture, and nutrient status can influence its effectiveness. The inhibitor does not completely eliminate potential losses resulting from high application rates or improper timing.



7. When and how should it be administered?

In the Bafra trial, the DMPP-containing product is defined as a fertilizer application made in the vicinity of the crop at the time of sowing. Therefore, the guideline's core program involves applying the total dosage—determined via soil

analysis—in a single application either before or during sowing. The fertilizer must be distributed evenly across the field, applied to the designated plot, and followed immediately by controlled water management. The exact timing is determined based on the seedbed conditions, water status, and product label instructions. The DMPP-containing product is not automatically re-applied during the same growing season.

Monitor the crop's nutritional status during the tillering and stem elongation stages by observing plant color and growth, and—if possible—by conducting plant analysis. Should a subsequent need for nitrogen arise, the form and dosage of any additional nitrogen must be determined through a separate decision-making process. In particular, do not regard leaf yellowing or paling solely as definitive proof of a fertilizer requirement; water stress and other nutrient deficiencies can produce similar symptoms.

8. Integrated water and nitrogen management

While the AWD cycle alters the field's oxygenation and water conditions, DMPP aims to delay the conversion of ammonium to nitrate. Integrating these two practices requires monitoring both irrigation decisions and the timing of plant nutrient uptake. The application of fertilizer does not imply that water stress is permissible; similarly, allowing the soil to dry beyond the 8–10 cm threshold to save water falls outside the scope of the method tested in the trial.

9. Summary of the decision based on the stage of development

Sowing and emergence. Complete soil analysis and nitrogen (N) calculations; apply the chosen form of nitrogen evenly in a single planned application. Check that the water gauge and observation tube are functioning correctly.

Tillering. Conduct the AWD cycle under appropriate conditions by monitoring the water level in the tube. Record plant development and nitrogen status.

Stem elongation and panicle initiation. Increase the frequency of water monitoring. Do not intensify the drying process as panicle initiation approaches; evaluate plant nutrition and water status together.

Flowering. Pause the AWD drying cycle. Maintain shallow water and adequate moisture; intervene before signs of stress appear.

Grain filling and ripening. Monitor water levels and plant condition. Plan the timing of water withdrawal based on crop development and harvest conditions; avoid routine late-season nitrogen applications, as yield response has not been proven.

10. How should the trial results be used?

In the yield table, which evaluates the combined results of two years, average grain yields were 716 kg/da for traditional flooding, 653 kg/da for AWD, and 608 kg/da for drip irrigation. The numerical difference of approximately 9% between AWD and traditional irrigation was not found to be statistically significant. The number of panicles per square meter was also similar, at 329 for traditional irrigation and 322 for AWD. These findings indicate that, under Bafra conditions, threshold-controlled AWD can maintain yields close to those of the traditional method; however, this does not guarantee the same yield outcome for every field.

Among the nitrogen treatments, the highest average grain yield was obtained from treatment T6 (24 kg N/da + DMPP). However, since both the dosage and the product formulation varied, one cannot conclude from this single result that DMPP alone increased the yield or that 24 kg N/da is the most economically optimal dose for every field. Total plant nitrogen content peaked during the second sampling period in both years and subsequently declined; therefore, monitoring fertilizer management—particularly during the early and mid-growth stages—is crucial.

Although drip irrigation involved lower water application in the trial, it also resulted in lower grain yields. This guide does not provide a specific setup or fertilization protocol for drip irrigation. Before quantifying water savings, verified seasonal water records converted to a common unit must be compared.