

Delaying permanent water on drill sown rice

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Summary

- Four years of research on two soil types have proven delayed permanent water to be a viable management option for drill sown rice.
- 17% (2.5 ML/ha) average saving in water use compared to conventional drill sown rice and 15% average increase in water productivity.
- Rice handles moisture stress very well and recovers quickly with little grain yield reduction.
- Moisture stress increases the rice crop's growth duration. Sowing should therefore occur 10 to 14 days earlier than for a conventional drill sown crop, allowing microspore to fit into the target window.
- Aquatic weed problems are eliminated due to soil drying between flush irrigations. Therefore spray drift onto sensitive crops such as cotton, soybeans or grapes is not an issue.

Irrigation frequency

- To ensure good establishment do not severely moisture stress rice before the two leaf stage.
- Once the rice plants are established, increase the time period between flush irrigations.
- The longer the period between flush irrigations the greater the water savings, but also the longer the delay in crop development.
- Use cumulative evapotranspiration (ETo) levels of 100 to 120 mm with crop coefficients of 0.6 and 0.8 for early and late November and 1.0 for December to schedule irrigations. Using ETo allows a good level of planning for future irrigations.
- Alternatively, flush irrigate the crop once it starts to show visible signs of moisture stress (Figure 1). If you use this method you must be able to access irrigation water quickly.

When to apply permanent water

- The later permanent water is applied the greater the water savings. Permanent water must be applied no later than 10 to 14 days before panicle initiation (PI) so moisture stress does not occur during the reproductive period.
- NSW DPI recommends permanent water is applied prior to Christmas, before any potential water supply difficulties caused by high irrigation water demand may occur.
- If weeds or other problems develop you can apply permanent water earlier if required.



Figure 1. Moisture stressed rice prior to the application of nitrogen and permanent water.

Irrigation layout and sowing

- Delayed permanent water (DPW) is only recommended for rice grown in fields with good level layouts. There must also be good irrigation supply and no low lying areas in bays with poor drainage.
- A good management option for drill sowing is to prepare the field and grade it in the autumn, then control weeds by spray over winter and sow the rice into a firm uncultivated seed bed.

- Sow the seed 3 to 5 cm deep, below the crusting layer, so the soil near the seed does not dry quickly between flush irrigations.
- Only apply fertiliser with the seed at sowing if soil phosphorus levels are low. If Colwell P is less than 30 mg/kg, NSW DPI recommends sowing phosphorus with the seed. MAP is often the cheapest form of phosphorus and is used in this case.



Figure 2. Nitrogen (urea) applied to dry soil prior to delayed permanent water is very efficient.

Nitrogen Management

- The best nitrogen option is to apply 100 to 125 kg N/ha (approx. 2 bags urea/acre) onto dry soil within 24 hours of permanent water being applied (Figure 2). Research experiments have shown this strategy to provide the highest yield and best nitrogen efficiency.
- Large nitrogen losses occur when nitrogen is applied at sowing or between flush irrigations.
- When delayed permanent water has been practiced, sampling at panicle initiation (PI) for the PI Tissue Test results won't provide accurate results. But, PI nitrogen should not be needed if 100 to 125 kg N/ha is applied to dry soil before permanent water.



Figure 3. Rice yields achieved after delayed permanent water have been very high.

Weed Control

- Effective grass weed management is critical to profitable DPW practice. Often the window for effective chemical application is small so weed presence and growth must be monitored regularly.
- NSW DPI recommend spraying with a paraquat (Gramoxone[®]), pendimethalin (Stomp[®]), clomazone (Magister[®]) mix after the first flush and before any rice emerges. This provides a knockdown for already established weeds and some residual grass weed control.
- See the Rice Crop Protection Guide for details on this and other chemical control options.

Chemical options to consider

- Cyhalofop (Barnstorm[®]). Weeds must not be moisture stressed at time of application. Spray soon after a flush irrigation or rain and early in the morning. It is important not to overuse Group A herbicides as it will lead to resistance.
- Propanil can be used when weeds are moisture stressed. Best results are achieved if sprayed when temperature is above 25°C.
- Dicamba and MCPA can be used to control clover and other weeds, but these generally die anyway once permanent flood is applied.
- Rates will be determined by weed size, please read the labels.

Conclusion

- DPW provides good water savings, minimal yield reduction, high nitrogen use efficiency and aquatic weed control, making it a viable management option for drill sown rice.

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