

Mid-season drainage

A water-saving irrigation technology that increases rice yield and water productivity in fields affected by iron toxicity

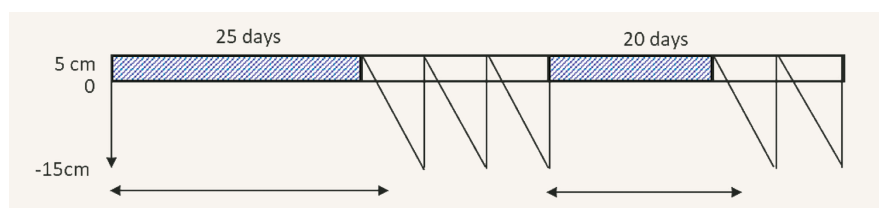


Introduction

Mid-season drainage involves forced drainage to remove all surface water from the rice field at mid to late tillering, allowing the soil to dry and re-aerate after which the soil is re-flooded. Mid-season drainage stimulates root development and inhibits ineffective tillers. It is suitable for irrigated systems where flooded water conditions inhibit mineralization of soil organic carbon and where iron toxicity and/or water scarcity are challenges for rice cultivation. It has been validated in irrigated systems in Côte d'Ivoire, and reduced water use by 37% and increased water productivity by 67% compared to continuous flooding, while maintaining rice yield and grain quality. Mid-season drainage reduced methane emissions and global warming potential by 59% compared to continuous flooding, and in fields with iron toxicity issues, it decreased the concentration of reduced iron. Mid-season drainage can be used by individuals or farmers' organizations, promoted by local and national governments that aim to reduce water use and greenhouse gas emissions from irrigated systems without negative effects on rice yield and grain quality. It can also be used in irrigated schemes where iron toxicity is a constraint to rice cultivation. Under alternate wetting and drying (AWD), water is allowed to percolate naturally until the water level drops to certain depth below the soil surface, while under forced drainage, surface water is removed from the field to the canals.

How to use mid-season drainage

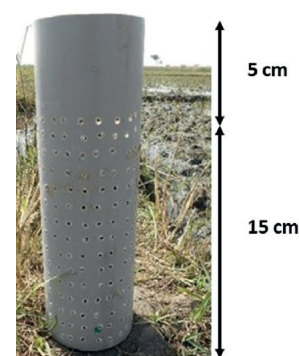
Perforated field water tubes are installed to a depth of 15 cm in the plot to monitor water depth. During the 25 days after transplanting, field water depth is kept at 2–5 cm. Forced drainage is conducted at 25 days after transplanting, corresponding to the



maximum tillering stage. The field is allowed to dry until the water level drops below –15 cm in the field tube, and then the field is irrigated up to 5 cm above the soil surface. The field is maintained flooded at 2–5 cm during the flowering stage to avoid yield loss due to water stress at this critical stage. After flowering, the irrigation schedule is based on the water level in the field tube 7 days before harvest.

Step 1: Field water tube installation

- A field water tube made from plastic pipe should be perforated with many holes on all sides, so that water can flow readily in and out of the tube. It should have a diameter of 10–15 cm so that the water table is easily visible, and it is easy to remove soil inside. Install the tube to a depth of 15 cm below the surface of the soil in the plot before transplanting or direct seeding. Use one perforated field tube in the center of each plot.



Step 2: Flooding the field during the 25 first days after transplanting

- Maintain the field flooded during the first 25 days after transplanting.

Step 3: Forced drainage at 25 days after transplanting

- Conduct forced drainage by removing all surface water from the field at 25 days after transplanting.

Step 4: Irrigate on the basis of the water level in the field tube

- Monitor the water level in the field tube. Whenever the water level drops below 15 cm below the surface of the soil, irrigate to 5 cm above the soil surface.

Step 5: Flooding the field during the flowering stage

- Maintain the field flooded during the flowering stage to avoid yield loss due to water stress at this critical stage.

Step 6: Irrigate after flowering stage to 5 cm whenever water disappears in the field tube

- After the flowering stage until 7 days before maturity, monitor the water level in the field tube, and irrigate to 5 cm whenever water disappears in the field tube.



A farmer measuring the water level in the field tube

Contact information

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