Food and Agriculture Organization of the United Nations

Rice farming: saving water through Alternate Wetting Drying (AWD) method, Indonesia

Source	The International Rice Research Institute (IRRI)
Keywords	Rice, paddy, water saving, irrigation, yields, fertilizer application
Country of first practice	Indonesia
ID and publishing year	7939 and 2013
Sustainable Development Goals	Climate action and life on land

Summary

Alternate wetting and drying (AWD) is a water-saving technology that lowland (paddy) rice farmers can apply to reduce their water use in irrigated fields. In AWD, irrigation water is applied to flood the field a certain number of days after the disappearance of ponded water. Hence, the field is alternately flooded and non-flooded. The number of days of non-flooded soil in AWD between irrigations can vary from 1 day to more than 10 days depending on the soil type.

Description

To implement alternate wetting and drying (AWD) method of rice field flooding, you will need a tube of 40 cm length and a measuring tape to measure water depth.

1. Making the field water tube

The field water tube can be made from a plastic pipe or bamboo:

- cut the plastic pipe or the bamboo to a 30 cm length with a diameter of 10 to 15 cm to easily see the water level inside the tube; and
- drill the bottom 15 cm of the tube with holes on all sides; these holes should be about 0.5 cm each and 2 cm away from one another.

2. Placing the tube

- Place the tube in a readily accessible part of the field, close to the bund (not less than 1 m away) for easy monitoring. The location should be representative of the average water depth in the field (for example it should not be in a high spot or a low spot).
- Bury the tube up till 20 cm depth so that half of its length remains on the surface.
- Remove the soil inside the tube so that the bottom of the tube can be seen. Ensure that the level of water inside the tube is the same as the level of water on the field.

3. Practicing alternate wetting and drying (AWD)

- To implement AWD, the best way is to monitor the depth of ponded water on the field using a 'field water tube' (Figure 1).
- After flooding, the depth of pounded water will gradually decrease.
- When the ponded water has dropped to 15 cm below the surface of the soil, irrigation should be applied to re-flood the field with 5 cm of ponded water. This practice is known as Safe AWD (Figure 2).
- AWD can be started a few days after transplanting

(or with a 10 cm tall crop in direct seeding). When many weeds are present, AWD can be postponed for two to three weeks until weeds have been suppressed by the ponded water.

Figure 1. Field water tube from PVC

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- Local fertilizer recommendations for flooded rice can be used. Apply nitrogen fertilizer preferably on the dry soil just before flooding.
- From one week before to one week after flowering, ponded water should always be kept at 5 cm depth above soil level to avoid water stress which could result to potentially severe yield loss.
- After flowering, during grain filling and ripening, the water level can drop again to 15 cm below the surface before flooding (Safe AWD).
- In Safe AWD, water savings may be up to 15 to 25 percent with no yield penalty. The depth of water can be allowed to drop from 15 cm to 20 or even 25 cm below the soil surface.

4. Users and benefits of AWD technology

Water savings may be up to 15 to 25 percent with no yield penalty. AWD promotes good root anchorage, thus reduction in plant lodging problems. In pump irrigation systems, it reduces pumping costs and fuel consumption and an increased income of USD 67 to 97 per hectare. It reduces 30 to 70 percent of methane emissions depending on the combination of water usage and management of rice stubble. It also promotes higher zinc availability in soil and grains by enabling periodic aeration of the soil, which releases zinc from insoluble forms and makes it available for plant uptake. AWD is a water saving technology for lowland (paddy) rice production under irrigation.

Figure 2. Water at 15 cm depth: time to irrigate and flood the field again

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To learn more about AWD see video.

Video: Alternate wetting and drying (AWD) - Using less water to grow rice

5. Validation of the practice

This technology has been field tested and validated by rice farmers in the in the Philippines, Vietnam and Bangladesh, Myanmar, Indonesia and Lao PDR. AWD is mainstreamed in extension efforts by formal extension institutes and NGOs in a number of countries in Southeast Asia. Training and extension materials on AWD are included in curricula of agricultural colleges, universities and extension certification schemes.

6. Agro-ecological zones

- Tropics, warm

7. Objectives fulfilled by the project

7.1 Resource use efficiency

AWD technology saves water, promotes good root anchorage, and reduces plant lodging problems. It also reduces methane emissions, and promotes higher zinc availability in soil and grains.

7.2 Pro-poor technology

The technology reduces pumping costs, fuel consumption and increases income per hectare.