

## Alternate Wetting and Drying-A strategy for efficient Rice cultivation

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Rice is grown on 164.19 million hectares worldwide, yielding 497.7 million metric tonnes of rice. Rice is a one-of-a-kind crop and the only cereal that can be produced in water. The most prevalent rice farmed around the world are deepwater rice and floating rice. Rice requires a large amount of water for soil preparation and crop establishment, and water resources are rapidly diminishing. Water management strategies aiming at increasing water production would aid in the conservation of limited resources. Because the reductions in water inputs were greater than with the old method, AWD boosted water productivity in terms of total water input.

In rice fields, alternate watering and drying is a clever way to preserve water. This process entails soaking the soil for a length of time and then drying it. The field is initially inundated for 1-2 weeks later which Bowman's pipes or pani pipes made of plastic or bamboo of 40 cm length and 15 cm in diameter with drilled holes, are inserted in the field up to a depth of 20 cm and emptied of soil. These pipes are used for monitoring water levels in the field. The ponded water may evaporate in 3-4 days, depending on soil conditions and weather, but the plants' growth is unaffected because water is still available to the roots. Initially the field is flooded for 1-2 weeks since the early stages of crop growth to avoid water stress. The ponded water may disappear within 3-4 days depending upon the soil conditions and weather but the plants doesn't experience any growth reduction as the water is still available to the root zone.. The time it takes to re-irrigate the field varies between 7 and 10 days. The crop needs are met by the available water, hence the water level has no effect on the production. Because the crop requires more water for its metabolism at critical stages such as flowering and panicle initiation, the water level is kept at flood level without falling. Throughout the crop's growth, the cycle of low-level flooding and drying is repeated.



Water levels of 3-5 cm above ground level are maintained under continuous flood method, which consumes a large amount of water. Except for correct field levelling to prevent water collection near ditches, this system requires no significant alterations. Because the soil is not covered, the roots grow faster and deeper in search of water, and better anchorage reduces lodging, according to certain scientific research, AWD can help increase yields by 10-15%. As a result, it is referred to as "Safe AWD" because it saves 30% more water than typical flooding methods. It also aids in lowering the amount of water required to produce 1 kg of rice. Farmers can increase their income by 30% by conserving water through alternate wetting and drying method. Although flowering is a vital stage when the soil must be saturated, the cycle of alternate low-level flooding and drying can be repeated throughout the crop's growth.

Rice fields are a major source of greenhouse gases, which contribute to global warming. When compared to other gases, methane emitted from rice fields is significantly higher. Although N<sub>2</sub>O emissions from AWD fields were found to be higher than flooded fields because of the lack of submergence, the global warming potential was determined to be modest when compared to flooded conditions (Linguist *et al.*, 2015, Balaine *et al.* 2019)

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