

The Pani Pipe Method: A Case Study on Water Conservation in Rice Farming

Hemadevi S¹ and Raju Manda²

¹ M.E in Irrigation water Management, Department of Civil Engineering, Anna University, Tamil Nadu, India

² M.Tech in Farm Machinery and Power, Department of Agricultural Engineering, Assam University, Silchar, Assam, India

Abstract - This study examines the effects of the Pani Pipe Method, a water-saving irrigation technique, on rice cultivation in Periyakkurchi Village, Ariyalur District, Tamil Nadu, India. It was found that the usage of water was significantly lesser than that of traditional flood irrigation. The Pani Pipe Method needed 16 irrigations whereas flood irrigation required 22. This water-saving trend was accompanied by increases in productive tillers per square meter (292 for Pani Pipe vs. 268 for flood irrigation), panicle number per plant (15 vs. 13), and a reduced occurrence of bacterial leaf blight (11% vs. 28%). The findings suggest an optimistic direction for sustainable rice cultivation in the Periyakkurchi Village through optimizing the use of available water resources and enhancing the productivity of crops. There is a need for more research on these results within different agro-climatic zones and to understand how the Pani Pipe Method can economically and socially benefit local farmers in the region.

Key Words: Pani Pipe, Paddy, Yield, flood Irrigation, Irrigation water management.

1.Introduction

Alternate Wetting and Drying (AWD) irrigation is a promising water-saving technique for rice cultivation, reducing water use and greenhouse gas emissions without compromising yields, but it requires validation across varied soils and climates for wider adoption. Avil kumaret al.,2019.

The Pani Pipe method, a smart modification of the AWD system introduced by IRRI, helps poor and marginal farmers improve water use efficiency in rice cultivation by providing a simple, cost-effective way to decide when and how much to irrigate, thereby sustaining or enhancing yields. Prithwiraj et al., 2017.

Rice is one of the most staple food crops for a major portion of the world population, mainly in South Asia. But rice cultivation has always been associated with heavy water usage, which makes people think about water scarcity and sustainability in the environment. In regions like Periyakkurchi Village in Tamil Nadu, India, where water resources are scarce, optimizing irrigation practice is important for ensuring food security and reducing the impact on the environment.

Although commonly adopted, the traditional flood irrigation techniques often cause waterlogging and nutrient leaching besides unproductive water use. Recent years have seen the adoption of other irrigation techniques in rice cultivation, including the Pani Pipe Method to enhance water management efficiency. According to this technique, PVC pipes with holes drilled along the length of the pipe are installed into the rice field.

These pipes are moisture indicators for water, enabling farmers to gauge soil moisture and provide water only when necessary.

This study investigates the Pani Pipe Method impact on rice cultivation in Periyakkurchi Village, which focuses on its potential for conserving water, increasing crop productivity, and decreasing the incidence of diseases like bacterial leaf blight (BLB). The research aims to provide valuable insights into the effectiveness of the Pani Pipe Method as a sustainable irrigation strategy for rice farmers in the region and contribute to the development of more water-efficient agricultural practices.

2.Methodology

In July 2024, the Pani Pipe was provided at Periyakkurchi Pani Pipe method, an AWD method of Alternate Wetting and Drying, was applied in Periyakkurchi Village during the Samba season in July 2024 to optimize water usage in ADT44 variety of paddy grains.

Rice seeds were coated with *Pseudomonas fluorescens* at 10g/kg, and the field was applied with ZnSO₄ at a rate of 10kg/acre through fertilizers. This method used 30 cm long plastic pipes with a 15 cm diameter, drilled with multiple holes. These pipes were buried vertically in the field near the bund to a depth of 15 cm, with half the pipe protruding above the ground. Twenty days after transplanting, the pipes were installed. Irrigation was triggered when the water level within the Pani Pipe dropped to 15 cm below the ground level. The field was kept under continuous flooding with water to the depth of 5 cm for one week before or after flowering while the Pani Pipe was kept under submerged condition.

This approach of AWD aimed to reduce water consumption, improve the yield of paddy by ADT44, and enhance soil health by minimizing the chances of waterlogging.

Data on water use, irrigation events, and paddy yield were collected and analyzed for assessing the effectiveness of this method in comparison with conventional irrigation practices.



Fig 2.1 Installation of Pani pipe



Fig 2.2 Measuring water Level inside Pani pipe

3.Results and Discussion

The research compared the performance of Pani Pipe irrigation with traditional flood irrigation in rice cultivation. The Pani Pipe method showed significant advantages. It had fewer irrigation events, 16 versus 22, which meant water saving. In addition, Pani Pipe showed more productive tillers per square meter (292 vs. 268) and more panicles per plant (15 vs. 13), which showed better plant growth and yield potential. Notably, the BLB (Bacterial Leaf Blight) incidence was 11% in the Pani Pipe treatment compared to 28% in the flood irrigation treatment, indicating that soil moisture and aeration are better controlled by Pani Pipe. Such results suggest that Pani Pipe technology is a good alternative for

flood irrigation with benefits of both yield and sustainability of rice.

Table -1: Comparison of flooding and Pani pipe AWD method irrigation

Observation recorded	Pani pipe technology	Flood irrigation method
No of irrigation given	16	22
No of Productive tillers/m ²	292	268
No of Panicle/Plant	15	13
Incidence of BLB (%)	11	28

The graph comparing Panipipe AWD and flood irrigation methods shows several significant advantages of the Panipipe technology. It reduces the number of irrigation events considerably, thus saving water. This method also promotes better growth of the plant, thus having more productive tillers per square meter. It also enhances the reproductive development, which makes more panicles per plant. Finally, the graph presents a lower incidence of BLB in the Panipipe treatment, which denotes better disease control. In summary, the graph presents an argument that the Panipipe AWD method is more sustainable and efficient in rice irrigation than the traditional flood irrigation method.

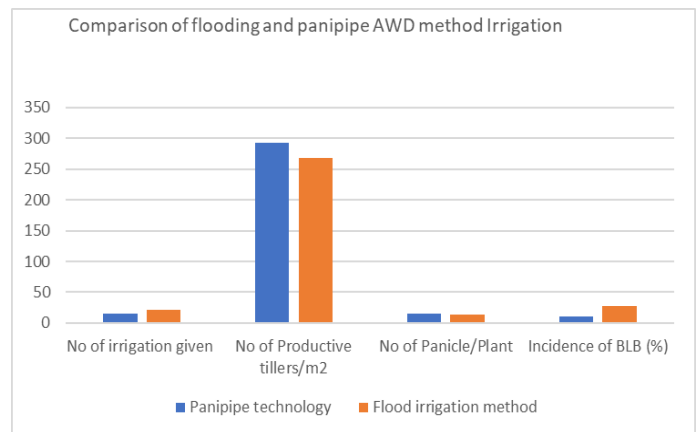


Fig.3.1 comparison of flooding and pani pipe AWD irrigation

4. Conclusion

We discovered that the AWD threshold had a major effect on yields and that yields could be maintained in most soils under mild AWD. Using AWD also gave a 37 per cent reduction in number of irrigations given.

Lastly, these results show that AWD is a promising management practice in terms of judicious application of irrigation water, besides reducing the BLB to the 154.5 per cent.

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