International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 9, Issue 17, 2017, pp.-4154-4155.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

Research Article

SMART WATER MANAGEMENT IN RICE BY IRRI'S COST EFFECTIVE PANI-PIPE METHOD FOR SUSTAINABLE AND CLIMATE SMART RICE DEVELOPMENT- A SHORT COMMUNICATION

DEY PRITHWIRAJ

Department of Agronomy, G.B. Pant University of Agriculture &Technology, Pantnagar, Uttarakhand, 263153
*Corresponding Author: Email-prithwiraj.apdj@gmail.com

Received: March 19, 2017; Revised: March 23, 2017; Accepted: March 25, 2017; Published: April 12, 2017

Abstract- The water use efficiency of rice is drawing attention of scientists' community from a very long back. But to get it popularized by poor and marginal farmer community, IRRI has introduced a precise water management in rice very economically by Pani Pipe method. It is actually the smart modification of AWD system in rice specially aiding the farmers in taking decision that how much and when to irrigate the crop so that the efficiency Increases as well as yield remain sustained or enhanced.

Keywords- Pani Pipe, AWD, Field Water Pipe, Rice, Water management.

Citation: Dey Prithwiraj, (2017) Smart water Management in Rice by IRRI's Cost Effective Pani-Pipe Method for sustainable and Climate Smart Rice Development- A Short Communication. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 9, Issue 17, pp.-4154-4155.

Academic Editor / Reviewer: Er Rajinkumar Jadavbhai Patel

Introduction

Rice is the major food grain crop for most of the Asian countries. The traditional water management viz. continuous flooding system makes the production of rice to be critically judged if it is environmentally sustainable or not. Estimate by IRRI, Philippines says that being one of the least water use efficient crop, rice needs about 5000 liters of water for producing 1 kg of unmilled rice. [1]On today's context, water economy is one of the prime objective of modern agriculture. Climate change is mainly getting attention for the enhanced mean temperature, elevated carbon di oxide levels so far but it is also worth of noticing the erratic rainfall patterns over the rice growing areas. In kharif season also, rice requires a lump sum amount of supplemental irrigation due to larger dry spells. It has been witnessed many times that transplanting delayed due to late on set of monsoon resulting in poor yield due to shortening of the length of growing season. In some areas, late sown kharif rice also encounter terminal rains at the time of harvest causing a huge yield loss. Not only kharif, many states has already started to demotivate boro rice cultivation due to lowering of ground water table and arsenic contamination problems. So, it will not be a solution to just put a stop to water intensive crops like rice as the country feeds on it. Efforts should be made to enhance the water use efficiency not with the cost of lesser production but with increased productivity instead [2].

Existing water management strategies: Economizing the water productivity of rice is in the most discussed research topics since end of 90's. Several methods had been developed and tested in rice based cropping systems so far. All the irrigation method is generally evaluated using the continuous deep flooding method as the standard checks for the water use efficiency and yield [3].

Very much water efficient systems like drip irrigation system and sprinkler irrigation system are also tested on rice and they have registered a significant yield jump in crop like rice too. But when we come out of theoretical research fields to our farmer's field, then the question comes in mind that are the irrigation systems involving very high initial and operation cost is suitable for mass technology dissemination to very large number of small and marginal farmers? Off course it's a matter to think twice on the applicability of the research demonstrated technologies. Other water economizing technologies are use of Aerobic Rice Technology. Though aerobic rice is very water efficient system, it has lower yield potential to that of conventional puddled rice system. Besides it also has acute problem of Fe & Zn deficiency and weed infestation. SRI system of rice has gained a noticeable popularity amongst resource poor farmers due to its high yield potential and cost effective technologies. The water is managed in SRI system is with alternate wetting and drying system or AWD. The AWD system keeps field flooded for some time followed by aerating the field and again flooding. An optimistic estimate by IRRI says, with AWD system, 30% water can be saved.

What is AWD & Pani Pipe Method ? As stated above the theme of AWD system is to alternatively make the field flooded and aerated to reduce the water requirement as well as boost the yield. But it often seems to be difficult to schedule the water in right time and right amount in AWD system too. To address this draw back in the system, Pani Pipe method is introduced. Pani Pipe method is actually the modification of AWD system to indicate proper scheduling of irrigation water in AWD system. It is invented by International Rice Research Institute, Philippines. The method is alternatively called the Field Water Tube method.

It is a PVC, or HDPE, or just normal bamboo made cylinder with a length of about 300-400 mm. The diameter should be in the range of 100-150 mm so that the water table inside can be easily visualised and during installation, the soil remaining inside the pipe can be removed easily. In the lower 150-200 mm or in the lower half, several holes are drilled to facilitate easy movement of water to the soil. It is very easy to make the instrument in home by the farmers himself with minimum level of expertise.

Use of Pani Pipe: Use of Pani Pipe is so simple and user friendly that it needs very low levels of expertise on the part of the user. Pani pipe is better to be set up in a representative part of field representing the average field level and should be

easily accessible. The ready Pani Pipe is hammered to the soil of rice field up to half (or up to the height of 150-200mm). The soil remaining inside the pipe is digged out so that up to the base of pipe is visible. Now the field is irrigated and it is checked that the water level in the field matches with the water level inside the Pani pipe. If not, the device should be checked and any clogging of drilled hole is made clear by careful supervision. Once the device is calibrated, the field is allowed to dry. The water level inside the Pani pipe is regularly monitored. When the water level within the Pani pipe reaches to a level which is below 150mm or 15 cm below ground level, the field is re irrigated with 5 cm water. The AWD system can be started from 1-2 weeks after transplanting.

Safe AWD Technique & Benefits: The main utility of Pani Pipe lies in the generation of knowledge of proper irrigation scheduling. It saves the crop from over drying as well as saves irrigation water. The 15 cm threshold limit has been decided by the scientists of IRRI by researching different rice based ecosystems. Up to that indicated level of drying, rice can maintain its yield. It has been reported that rice roots can efficiently use water present in the form of perched water after even recession of water from saturation. So, water needs significantly reduce in the tune of 30%. Due to aeration of the root zone, yield potential automatically increases due to more active and healthy roots till maturity. It has also been reported that AWD system decreases the methane emission from the rice field in the tune of 30-70%. Lodging problem also reduces with AWD system. Countries like Bangladesh and Philippines have adopted the technology and registered a yield enhancement of 15% over the conventional methods of water management. Deficiency of Zinc in rice also can be improved by AWD due to oxidization of the rhizosphere soil [3].

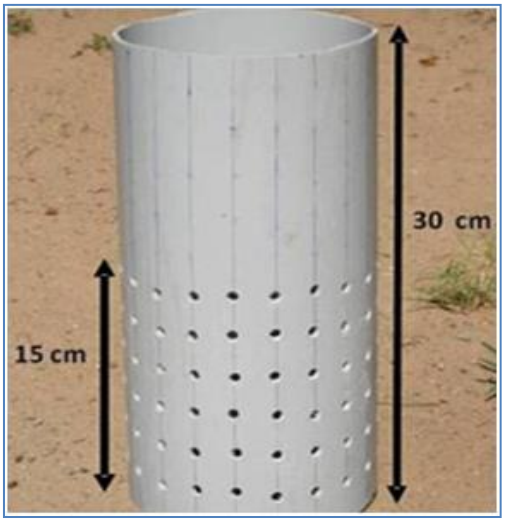

Fig 1- General dimensions of Pani-Pipe

Fig 2- Condition of Pani-Pipe just after irrigation

Fig 3- Water level is being measured in the fitted Pani-Pipe

Conclusion

On the present day, thrust area of agriculture should be aimed at the sustainability of the production even in the varied climatic condition. Water sustainability is one of the major issue. As we all know that rice is a major crop and it is highly water inefficient, it is very much essential to enhance the water productivity. However, the existing advanced technologies like drip irrigation is quite successful in this context but the problem lies in the socio economic acceptance of the technology. Rice farmers are mostly small and marginal, mainly present in the India, Bangladesh, and Indonesia etc. developing countries. So a prime motivation for water saving in that socially targeted population can be done with simpler technology like IRRI's Pani Pipe approach. The main tag line of the technology lies in the efficient water management within the economically suitable and environmental friendly technology. Though, the mass success of the technology will mostly depend upon how well the useful knowledge is being disseminated to the ultimate clientele, the farmers.

Acknowledgement

Thanks to IRRI's indirect support in the form of online resources. Sincere gratitude to my Teachers, Researchers and Colleagues of Department of Agronomy, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand-263145

Abbreviations: IRRI: International Rice Research Institute, AWD: Alternate Wetting and Drying, SRI: System of Rice Intensification, PVC: Poly Vinyl Chloride, HDPE: High Density Poly Ethylene

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest: None declared

References

[1] Sander B.O., Asis C.A. and Wassmann R. (2012) *Greenhouse Gas Emissions from Farmers' Rice Fields in the Philippines: 'Reality Check' for Water Management as Mitigation Option. Poster presented at the International Symposium on Managing Soils for Food Security and Climate Change Adaptation and Mitigation, Vienna, Austria*, 23-27 July 2012.

[2] Palis F.G., Lampayan R.M., Kürschner E. and Bouman B. (2013) *Adoption and Disemmination of Alternate Wetting and Drying Technology in Pump Irrigation Systems in Bangladesh.*

[3] Kumar A. *Mitigating Water Shortage Challenges in Rice Cultivation: Aerobic and Alternate Wetting and Drying Rice Water Saving Technologies. Manila, Philippines: Asian Development Bank (in press).*

[4] Bouman B.A.M., R.M. Lampayan and T.P. Tuong (2007) *Water Management in Irrigated Rice: Coping with Water Scarcity. Los Baños, Philippines: International Rice Research Institute.*