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Research Paper :

Study of cost economics and water quality aspect of different floating materials in small farm ponds

S.P. NIKAM, P.P. JADHAV AND N.D. BHAGAT

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See end of the article for authors' affiliations

Correspondence to:

S.P. NIKAM
Department of Soil and Water Conservation Engineering, College of Technology and Engineering, Maharana Pratap Agricultural University and Technology, UDAIPUR (RAJASTHAN) INDIA
Email : sp_nikam@rediffmail.com

ABSTRACT

India receives an average annual rainfall of 370 Mha-m. Out of this amount about 210 Mha-m are lost as river flow and deep percolation. The balance of 160 Mha-m is only available for evaporation and transpiration. Efforts are made in this to test the different floating materials for cost economics and water quality aspect. The main objectives in this study was to study the cost economics and water quality aspect of different floating materials as thermacol balls, sorghum straw, cottonseed oil and cetyl alcohol The twenty plastic tubs of dimensions having 60cm as top diameter, 40cm as bottom diameter and 30cm depth were selected for the experiment. The evaporation was measured by point gauge. It is seen that the average evaporation rate of 30 days experiment (19th Oct-21st Nov) were 2.45, 4.23,3.35 and 3.52 in case of thermacol balls, sorghum straw, cottonseed oil and cetyl alcohol, respectively. The cost of saving of one litre of water in case of thermacol balls, sorghum straw, cottonseed oil and cetyl alcohol was found to be Rs. 0.29, Rs. 0.03, Rs. 0.10 and Rs. 0.62 per liter of water, respectively. The cetyl alcohol showed more cost of saving of one litre of water than other treatments. The ratio of Mg and Ca were estimated to be 0.56, 0.92, 0.73, 1.07 and 0.35 in case of control, thermacol balls, sorghum straw, cottonseed oil and cetyl alcohol, respectively. This also show that there was no effect on the quality of water due to covering of these materials as the value of Mg/Ca ratio is less than 1.5.

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Evaporation from water storages can account for between one third and one half of all water lost on farm with every 100mm of evaporation resulting in 1 ml of water lost to the atmosphere from every hectare of surface area. Evaporation reduction achieved under ideal conditions, actual, reduction was much lower and use of monomolecular films to reduce evaporation has no practical application. Instead more success has been obtained with floating objects like ping pong balls, Styrofoam blocks or empty bottles (Myers and Frasiers, 1970, Codey and Myers, 1973, Andrew Brier, 2004). Floating objects use the same principle as floating covers, however, rather than a continuous cover; multiple individual units are used, often floating freely. This allows for easier installation and maintenance of the cover but reduces the evaporation reduction efficiency.

In the present study, the different floating materials as thermacol balls, sorghum straw, cottonseed oil and cetyl alcohol are selected for reducing evaporation losses and the methodology and results are presented here.

METHODOLOGY

The twenty plastic tubs were used for evaluation of different covering materials for reducing the evaporation. The tubs were fixed into the soil up to the collar by digging a pit. The plastic tubs of dimensions having 60cm as top diameter; 40cm as bottom diameter and 30cm depth were selected for the experiment. Experimental Treatments: Experimental treatments selected as thermacol balls, sorghum straw, cottonseed oil and cetyl alcohol. T_1 - Control, T_2-Thermacol balls, T_3- Sorghum straw, T_4- Cotton seed oil and T_5- Cetyl Alcohol Evaporation analysis: All tubs were filled with water up to 25cm height. The point gauge with the least count of 0.1 mm was used to measure fall in water level due to evaporation. The evaporation was measured daily at 8.30h and 17.30h. Statistical, water quality and cost analysis were carried out by standard procedures

RESULTS AND DISCUSSION

The data in respect of evaporation during day hours,