ISSN (Online) 2456-1290

International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE)
Vol 3, Issue 2, February 2018

"Used of Galvanized Iron Sheet to Control Evaporation Losses in Farm Pond"

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***Abstract:* -- One of the precious gifts of nature which sustain life on earth is water. Water has been used since antiquity as a symbol by which to express devotion and purity. As per Indian standard near about 1150 mm depth of water in a traditional farm pond is evaporated per year in India. To overcome of evaporation losses by the traditional method we used the modified method by using Galvanized Iron sheet near farm pond. For this work, we choose farm pond located at Pimplegaon in Jalna district. By using the modified method, we got a significant amount of water control in evaporation losses.**

***Keyword*: Evaporation, Farm pond, GI sheets, Water.**

I. INTRODUCTION

The evaporation is the process of liquid is converted into gases state is called as evaporation. Evaporation is the process by which water is converted form it's also known as water vapor. In other words, water leaves the earth's surface and enters the atmosphere as a gas. In fact, the United States geological survey (the USGS) says that up to 90% of the water vapor in the air comes from surface rivers, with the rest coming from plant. [1]

The National Commission on Agriculture (1976) had estimated that the annual evaporation losses from reservoir surfaces will be of the order of 50,000 MCM. Central Water Commission in their publication "Status Report on Evaporation Control in Reservoirs, 1988" had indicated that on an average there is a loss of about 450 MCM of water every month from an area of 2,000 Sq. km. Which amounts to an annual loss of 5,400 MCM? The Water Management Forum (WMF), a national body of the Institution of Engineers (India), in their publication "Water Conservation by Evaporation Control, 1988" had indicated that on the Indian sub-continent the estimate total loss of water from large, medium and small storages will be to the tune of 60,000 MCM, which according to WMF would be adequate to meet the entire municipal and rural water needs of India by 2000 AD. [3]

The assessment of evaporation losses had been reviewed by CWC in 1990. Average annual evaporation from reservoirs/water bodies in India varies from 150 cm to 300 cm. The total surface area of existing large and medium storages, tanks and lakes in the country is of the order of 12,000 Sq. Km. This is likely to increase to about 25,000 Sq. Km. at the ultimate stage of development. Assuming annual evaporation loss rate of 225 cm, the evaporation loss from existing water bodies works out to 27,000 MCM. In the ultimate stage, the evaporation losses may be of the order of 56,000 MCM. Thus, likely evaporation losses appear to be high, considering capital costs involved in creation of storages. It may not, however, be possible to take remedial measures of evapo- retardation on all storages/water bodies. Assuming even 20% of the above area falls in scarcity and drought areas, it may be necessary to tackle around 2,400 Sq. Km. of surface area in the present stage and about 5,000 Sq. Km. at the ultimate stage. It is further seen that about 30% of evaporation retardation may be achieved by known evapo-retardation methods. Thus, it may perhaps be possible to effect a saving to the extent of 1,620 MCM at present and 3,375 MCM at the ultimate stage. Further reduction in evaporation losses may be possible with development of cost effective and economic methods of evapo-retardation. [7]

Causes of Evaporation:

- Temperature
- Vapor Pressure Difference
- Wind Effect
- Atmospheric Pressure

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- Quality of Water

Materials:

Following materials are used to cover evaporation such as continues Plastic Sheet Suspended Covers sheet, Modular Covers Chemical Covers etc.

Fig. 1: Plastic Balls

Fig. 2: Thermo-coal Sheet

Fig. 3: Polystyrene

Fig. 4: Styrofoam

METHODOLOGY

Following traditional methods are commonly used to reduce evaporation as

Wind Breakers

Reduction of Exposed Water Surface

Underground Storage

Treatment with Chemical Water Evaporation Retardants [WER]. [6]

Integrated Operation of Resources

But these are old methods which will not reduce evaporation as much hence to overcome this problem will introduce modified method to reduced evaporation.

ANALYSIS AND DESIGN

For analysis and design purpose, we choose farm pond located at Pimplegaon in Jalna district. The district has dry and tropical climate with very hot summer and mild winter with humid monsoon of moderate rainfall. The climate can be divided into three main season's viz. Hot to warm humid monsoon season from June to September

Cool dry winter season from October to February.

Hot dry summer season from March to June,

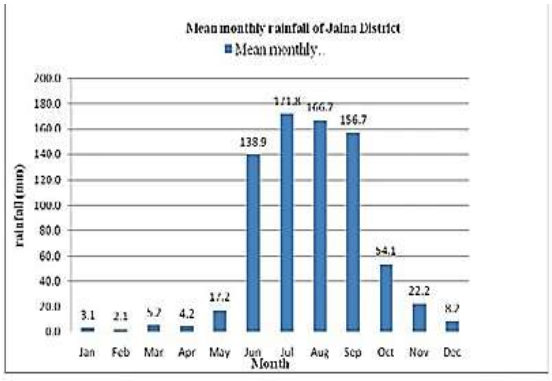

Fig. 5: Monthly Rainfall of Jalna District

ISSN (Online) 2456-1290

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Fig. 6: Layout & Details of field

Table 1: Season wise crop and their source of fulfillment

Season	Crop	Source of fulfillment
Rainy	Cotton Tur Soyabin Dalimb Guava	Rainfall + Well
Winter	Jawar Harbar Wheat Dalimb Guava	Well
Summer	Mosambi Mango Guava Dalimb	From pond

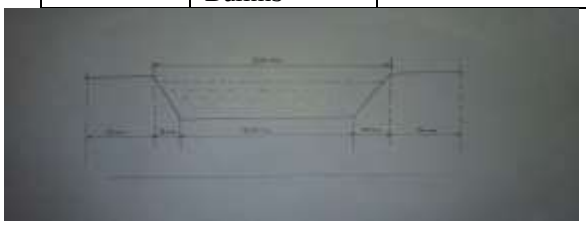

Fig. 7: Details of Farm Pond

Table 2: Water requirement of crops

Sr. No	Crop	Area in acres	Daily duration in minute	Crop irrigation Days	Water required by crop in liter
1	Dalimb	4.0	20	60	4194480
2	Peru	3.0	20	60	3145860
3	Mosambi	3.0	20	30	1572930
4	Mango	1.0	20	19	332063
				Total =	= 9245333 = 9246000

Table 3: Pure Evaporation from Pan 1

Date	Day	Temperature	Volume of Evaporation in liter
19-02-17	1	360/170	0.613
20-02-17	2	360/180	0.859
21-02-17	3	360/200	1.841
22-02-17	4	360/200	2.209
23-02-17	5	350/150	2.699
24-02-17	6	350/160	3.681
25-0217	7	360/170	4.404
26-02-17	8	380/170	4.663
27-02-17	9	360/170	5.153
28-02-17	10	350/170	5.521
		Total	5.154

Table 4: Evaporation using Plastic Balls from Pan 2

Date	Day	Temp.	Evaporation from pan in liter	
			With ball pan 2	Without ball pan 1
19-02-17	1	360/170	Nil	0.613
20-02-17	2	360/180	Nil	0.859
21-02-17	3	360/200	0.102	1.841
22-02-17	4	360/200	0.245	2.209
23-02-17	5	350/150	0.490	2.699
		Total	0.49	3.068

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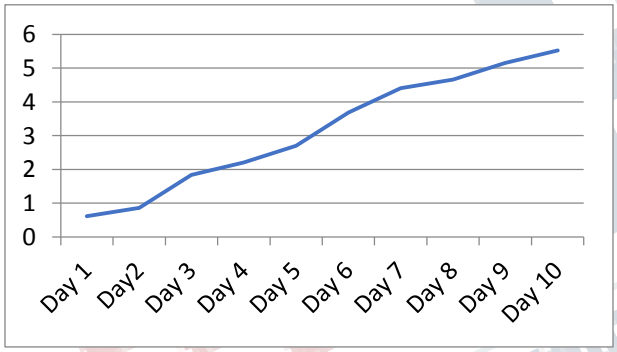
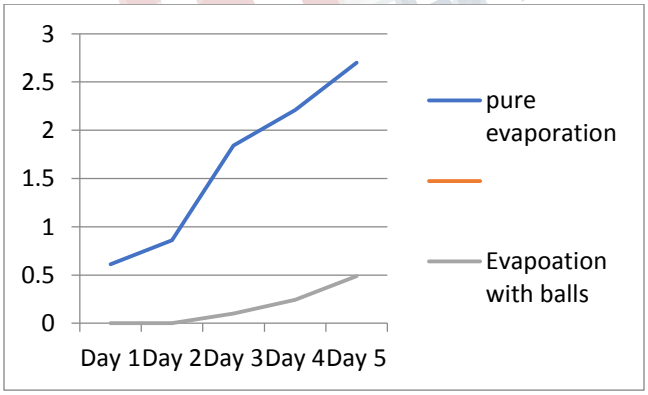
Table 5: Evaporation using Thermo-coal from Pan 2

Date	Day	Temp.	Evaporation from pan In liter	
			With Thermo-coal pan 2	Without Thermo-coal pan 1
24-02-17	1	350/160	0.122	3.681
25-02-17	2	360/170	0.245	4.404
26-02-17	3	380/170	0.613	4.663
27-02-17	4	360/170	0.859	5.153
28-02-17	5	350/170	1.104	5.251
		Total	1.182	2.086

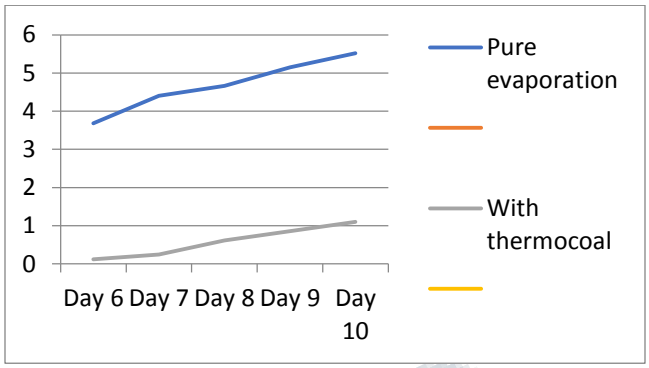
II. RESULTS AND GRAPHICAL PRESENTATION



Graph 1: Pure Evaporation in 10 Days



Graph 2: Evaporation Using plastic balls in first 5 days



Graph 3: Evaporation using thermos-coal in next 5 days

III. CONCLUSION

Balls reduce evaporation up to 84.02% and the thermos-coal reduces evaporation up to 43.33% from the auxiliary pan. Less evaporation is observed as compare to thermos-coal sheet. Initial cost of thermos-coal sheet is low as compare to plastic balls but it requires frequent maintenance. We required 500 balls of diameter 4.5 cm to cover water surface of IS pan of diameter 125cm and 3 thermo-coal sheets of size 45cm x 120cm x 1cm For our tests initial investment for plastic ball is Rs 1150/- and thermos-coal sheet is Rs 50/- Hence balls are easy to use and durable than thermos-coal.

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