



A study on the effect of waste jute on engineering properties of soil for smart irrigation system

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Abstract— Water retting of whole jute plant is convenient to the majority of farmers. Jute bundles are extensively retted in isolated stagnant inland freshwater bodies, often having insufficient water, during the months of August-October in the indo bangla subcontinent.

It leads to transportation expense, improper retting with low fiber quality, complete loss of huge organic retting residue and transitory deterioration of the aquatic environment affecting local ecology. Water scarcity due to climate change has aggravated jute retting. This article details a comprehensive retting technology where 1-1.35 m deep circular or rectangular lined or unlined (in clay soil) micro-pond of area 80 (i.e. 2 decimal) is sufficient for retting a jute plot of 0.135 ha and that of 130 (i.e. 3.5 decimal) for 0.340 ha harvest area in a batch. Staggered jute sowing or harvesting at 10-15 days interval enables two more successive batch retting in a pond with shorter retting time and improved fiber quality. Water requirement in it is only 43.1 kg of good quality fiber, compared to 693.1 kg in traditional retting. It is suitable primarily for small and marginal land holdings. Also described modifications of local retting methods addressing practical difficulties acceptability. Using ground water on rainwater under deficit rainfall, it produced desired golden colored and lustrous fiber in 15-30 days in a hygienic extraction setting. It abolished usual labor requirement of 30 man-days ha or more to carry jute bundles to distant retting spots. In a micro pond of 2 decimal area for retting 1 acre jute, with an initial investment of Rs 15900, its benefit-cost ratio is envisaged at 1.28:1, signifying a substantial economic return in the course of 5 years. In a new integrated farming system (IFS) model, it sustained jute retting in low volume water strengthened farm income from improved fiber quality, conserve organic manure (10-15bags/year), diversified production by optimizing resource use in the production of rice, vegetables and fish and reduced environmental pressure. Additionally, a well-developed network of these tanks can support to improve groundwater recharge, provide lifesaving irrigations, save crops from early water logging stress and in-situ composting of agricultural residues during dry months.

Introduction

Jute is the cheapest material industrial fiber of great economic importance to South Asian countries. The final important management step of a well raised jute crop is the process separation and extraction of fibers from the best layer of jute stem by retting process for the majority where plants undergo microbial decomposition. It is followed for whole plant retting and ribbon retting.

2. LITERATURE REVIEW

- According to the secretary of JMDC, Bhattacharya (2009), jute industry in India, with a turnover of Rs 5,500 cr, is seeing growing international interest for diversified lifestyle jute products, of the Rs 1,200-crore jute exports lifestyle products
- Experiments were conducted at CRIJAF (2011-13) to explore utilization potential gunny bag and woven jute fabrics in agricultural field to diversify anaerobic rice fields developing gunny bags/woven jute fabrics based soil columns (30-45 cm height and 15 cm diameter).
- Khalid (2011) proposes that, if the environmental impact is considered, jute and jute products have always been able to prove their superiority from the perspective of practical.



Fig. 1

Keywords- Jute bag, Irrigation, Microbes, Properties of soil.

3.PROPERTY OF WASTE JUTE FIBER

- Jute is a natural fibre.
- It has high water absorption capacity.
- Reduce the soil temperature for long time.
- Long duration water retaining capacity.
- After decaying it can be used as fertilizers.



Fig.2

4. INTRODUCING JUTE BASED IRRIGATION

We have brought up a solution to reduce the soil temperature and improve the soil moisture ,growth and health ultimately reducing drought conditions to some extent .Jute has an excellent water absorption capacity which is 400 to 500% of its dry weight. Being a natural fiber, it does not cause any kind of harm to the soil .Instead it acts as a natural fertilizers after its degradation in the soil .So the use of jute will absorb the rainwater and hold it under the soil keeping the soil cooler and improving the crops growth .Thus at some extent it will help to reduce the extreme drought conditions in some places in India and help the farmers. A very simple way to implement at least cost will never be a problem to the farmers. Being cheap, easy to implement and efficient is the core idea of the solution to the problem. This will tentatively reduce the growing food prices, anti-bio-hazards medium, and remove further causing problems in the chain .



5.METHODOLOGY

- Collection of jute bags.



- General field without use of jute and with fertilizer



- Field using crushed jute and jute in upper layer.



- Watering the field and crop.



6. LABORATORY TEST

a) Evaporation pan test

- In this method, pan is filled with water and the loss of water from the pan is measured. Provided that there is no rainfall, the evaporation rate, which is recorded as mm per day, is quite easy to measure.
- This method of measurement takes into account wind, temperature, radiation and humidity, which are the same factors that affect crop transpiration rate.
- However, there are a few factors that prevent this recording from being entirely accurate. For one, the solar radiation results in heat storage in the pan. This can lead to increased reading of the evaporation rates at night, when transpiration usually does not occur. In addition, temperature and humidity levels above the pan surface will vary from what would naturally occur.



b) Soil fertility test

- Soil testing is often performed by commercial labs that offer a variety of tests, targeting groups of compounds and minerals. The advantages associated with local lab is that they are familiar with the chemistry of the soil in the area where the sample was taken. This enables technicians to recommend the tests that are most likely to reveal useful information
- Laboratory tests often check for plant nutrients in three categories:
- Major nutrients: [nitrogen](#) (N), [phosphorus](#) (P), and [potassium](#) (K)
- Secondary nutrients: [sulfur](#), [calcium](#), [magnesium](#)
- Minor nutrients: [iron](#), [manganese](#), [copper](#), [zinc](#), [boron](#), [molybdenum](#), chlorine



8. CONCLUSION

- The application of jute in irrigation leads to the use of biodegradable fertilizers.
- It is eco-friendly.
- Commercialisation of jute for making gunny bags.
- Minimising the problem of water loss due to evaporation .
- Decrease in use of chemical fertilizers.

9. REFERENCE

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7. FUTURE SCOPE

- Reduce water loss due to evaporation.
- Jute work as a fertilizer after decay in water and do not easily evaporate due to indirect contact with sun.
- Mostly suitable in drought region where water is less available for irrigation.
- Commercialization of jute fibres on large scale enhance the production of jute crop at large scale.
- No skilled labour are required.
- It easy and convenient.

