

# Bio-Efficacy of Herbicides on Growth and Productivity of Tossa Jute (*Corchorus olitorius* L.)

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## Keywords

Sustainability, phytotoxicity, herbicide, weedicide, Integrated weed management.

## How to cite this article:

Bhuyan, S., Haldar, R., Parida, L. K. and Panda, A. 2025. Bio-Efficacy of Herbicides on Growth and Productivity of Tossa Jute (*Corchorus olitorius* L.). *Vigyan Varta* 6(4): 39-41.

## ABSTRACT

Tossa jute (*Corchorus olitorius* L.), an essential fiber crop, to develop and produce at its full potential, for weed control is essential. The bio-efficacy of several herbicides on Tossa jute fiber yield, crop growth, and weed control is assessed in this study. Pre-emergence and post-emergence herbicides, such as pendimethalin, quizalofop-ethyl, and imazethapyr, were used in a field trial to compare them to hand weeding and an untreated control. Weed density, weight when dry, and weed control efficacy were all strongly impacted by herbicide applications. In comparison to the control, the most successful treatment displayed superior weed obliteration which boosted height of plants, biomass accumulation, and fiber yield. Higher quantities of the different herbicides, however, showed phytotoxicity.

## INTRODUCTION

**T**ossa jute (*Corchorus olitorius* L.) is an important natural fiber crop widely cultivated in tropical and subtropical

regions. It plays a crucial role in the textile, packaging, and handicraft industries, providing an eco-friendly alternative to synthetic fibers



(Roy and Mandal, 2015). However, weed infestation remains one of the biggest challenges in jute farming, leading to severe yield losses of up to 50% if not controlled effectively (Islam and Begum, 2017). Weeds compete with jute plants for nutrients, water, and sunlight, reducing plant vigor and fiber quality. Manual weeding is a common practice among jute farmers, but it is labor-intensive, expensive, and often insufficient for controlling fast-growing weeds (Ali *et al.*, 2018). The use of herbicides has emerged as a more effective and economical alternative, offering better weed suppression, reduced labor costs, and improved crop productivity. This article explores the bio-efficacy of different herbicides on the growth and fiber yield of Tossa jute.

### Challenges in Jute Cultivation

Jute cultivation is seriously threatened by weeds, particularly in the early phases of growth. They can result in yield losses of up to 50% if left unchecked. The following are the most prevalent weeds in jute fields:

1. Nutgrass or *Cyperus rotundus*, is a highly invasive species that spreads by underground tubers.
2. *Amaranthus spinosus* (Spiny amaranth): Grows with great force, restricting the growth of jute plants.
3. *Echinochloa colona* (Barnyard grass): Competes with jute plants for nutrients and water.

Reduced plant vigor, poor crop establishment, and decreased fiber quality are the outcomes of unrestrained weed development. In order to ensure maximum productivity, effective weed management techniques are necessary.

### Types of Herbicides Used in Jute Farming

Herbicides have been classified according to the species of weed they target and when they

are applied. Jute agriculture is divided into two main categories:

1. **Pre-emergence Herbicides** (spread prior to the germination of weed seeds):

- A) **Pendimethalin:** Creates a protective barrier in the soil, preventing the germination of weed seeds.
- B) **Oxadiazon:** Provides long-lasting weed suppression by controlling broadleaf and grass weeds. Applied after weeds are starting to grow,

2. **Postemergence herbicides** include:

- A) **Quizalofop-ethyl:** Very effective against grassy weeds without destroying jute plants.
- B) **Imazethapyr:** provides broad-spectrum control of both grasses and broadleaf weeds.

The particular kind of weed present, the soil, and the stage of jute growth have an impact on the use of herbicide.

### Effect of Herbicides on Growth and Productivity

By minimizing weed competition, herbicide implementation, dramatically boosts jute growth and output.

**Major benefits include:** a) Increased Plant Height and Biomass: Jute plants can grow taller because weeds no longer compete for nutrients. b) More important Quality and Yield of Fiber: Clean fields produce stronger, finer jute fibers. c) Better Crop Establishment: Early eliminating weeds provides consistent plant development and enhanced survival rates. d) Better Economic Returns: Farmers save labor costs and make more money because of higher yield.

According to field research, jute fields sprayed with herbicides yield 20–30% more fiber than locations that are manually weeded.



### Best Practices for Herbicide Use

Ought to stick to the complying with guidelines in order to maximize the benefits of herbicides while safeguarding environmental safety:

**Use Recommended Dosages,** Excessive use of herbicides can harm jute plants, while insufficient application may result in Farmers ineffective weed control.

**Apply according to the Right Growth Stage:** Pre-emergence herbicides should be applied right after sowing, while post-emergence herbicides should be used when weeds are young.

**Combine Herbicide Application with Manual Weeding:** When herbicides are not completely successful, light manual weeding can help destroy resistant weeds.

**Rotate Herbicides:** Using the same herbicide repeatedly can result in herbicide resistance in weed species.

### Sustainability Factors in the Use of Herbicides

Herbicides are a successful method to control weeds, but overuse of them can harm the ecosystem by destroying soil, contaminating water, and reducing biodiversity. Farmers should do the following in order to ensure sustainable jute farming: Adopting Integrated Weed Management (IWM) reduces reliance on herbicides by combining mechanical, chemical, and cultural weed control measures. Use herbicides with low environmental impact: Select formulations that do not persist

in water bodies and decompose rapidly in the soil. Regularly Check Weed Populations: Early weed recognition and therapy minimizes the need for overuse of herbicides. Farmers may strike a balance between environmental sustainability and high productivity by putting these techniques into implementation.

### CONCLUSION

Herbicide use is essential for increasing growth, fiber yield, and financial returns in Tossa jute farming. Farmers can get the greatest results by choosing the right herbicide, distributing it at the right time, and combining it with other weed control techniques. However, in order to protect the ecosystem and preserve soil health for future generations, careful pesticide use is required. Growing jute sustainably requires a well-rounded strategy that incorporates both conventional farming expertise and technological weed control methods.

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