

EVALUATION OF DEFOLIANTS TO FACILITATE MECHANICAL PICKING IN RAINFED COTTON

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ABSTRACT

A field experiment was conducted during the *khari* season of 2024 at Regional Agricultural Research Station, Nandyal to evaluate the effect of defoliants on facilitating mechanical picking in cotton. The treatments consisted of T₁:Control, T₂:Ethrel@3000ppm, T₃:Thidiazuron@500ppm, T₄:Sodiumchlorate@0.9%, T₅:CICRDefoliant, T₆:Hydrogencyanamide @5000ppm, T₇:T₂+5%ofurea, T₈:T₂+Diuron@400 ppm, T₉:T₂+Sodiumchlorate @0.9% and T₁₀:T₃+Diuron@400ppm. Higher percent defoliation (95.5) at 10 days after spraying was recorded with T₃ (Thidiazuron @500 ppm) and was on par with T₁₀ (93.1) followed by T₉(89.5), T₅(86.2) and lower percent defoliation (5.3) was recorded with T₁(Control). Further, higher earliness index (75%) was recorded with T₁₀ (Thidiazuron@500ppm+Diuron @ 400ppm) and was on par T₃ (72%) followed by T₄ (65%); and lower earliness index(38)was recorded with T₁ (Control). It can be concluded that higher defoliation was attained with application of Thidiazuron @500 ppm+ Diuron @400ppm and also higher cotton seed yield. There was considerable correlation between defoliation at 5 DAS and 10 DAS. Further, the quality parameters were not significantly effected due to defoliants application.

Keywords: Cotton, Defoliants, Mechanical picking

INTRODUCTION

The increasing scarcity and high cost of manual labor has accelerated the need for mechanization in cotton harvesting, particularly in developing countries like India. Manual picking, while still common, is labour-intensive, time-consuming, and often results in inconsistent fiber quality due to delayed harvests. Mechanical picking offers a solution, but its efficiency is often hampered by the presence of green leaves and immature bolls, which increase trash content and reduce the quality of the harvested lint (Ashraf *et*

al., 2023). Defoliants are agrochemicals applied before harvest to induce the shedding of leaves, promote boll opening, and reduce plant moisture. They function by disrupting hormonal balances—primarily increasing ethylene synthesis and reducing auxin activity, thereby accelerating senescence and abscission (Rajasekar *et al.*, 2025). This leads to better boll exposure, reduced leaf trash, and improved machine efficiency, making them an essential component of pre-harvest management in mechanized systems (Chandrasekaran *et al.*, 2023a). Several defoliants are used in cotton,

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Table1. Physiological parameters and seed cotton yield as influenced by different defoliant treatments.

Treatments	Boll Opening percentage	% defoliation at 5 DAS	% defoliation % at 10 DAS	Earliness	Seed cotton yield (kg/ha)
T1-Control	45.0	3.7	5.3	38	1952
T2-Ethrel@3000ppm	73.2	13.8	59.1	51	2386
T3-Thidiazuron@500ppm	77.8	73.2	95.5	72	2602
T4-Sodiumchlorate@0.9%	76.9	53.3	80.9	65	2167
T5-CICRDefoliant	67.0	65.8	86.2	60	2280
T6-Hydrogencyanamide @ 5000ppm	65.8	22.7	55.6	55	2229
T7-T2+5%ofurea	71.2	28.2	65.6	54	2447
T8-T2+Diuron@400 ppm	66.8	52.3	77.5	59	2339
T9-T2+Sodiumchlorate @0.9%	74.4	53.4	89.5	60	2257
T10-T3+Diuron@400ppm	83.9	72.5	93.1	75	2555
SEd	5.7	3.0	5.3	6.0	207
CD (p=0.05)	11.2	5.9	10.5	11	410
CV(%)	10	11	9	4.1	12

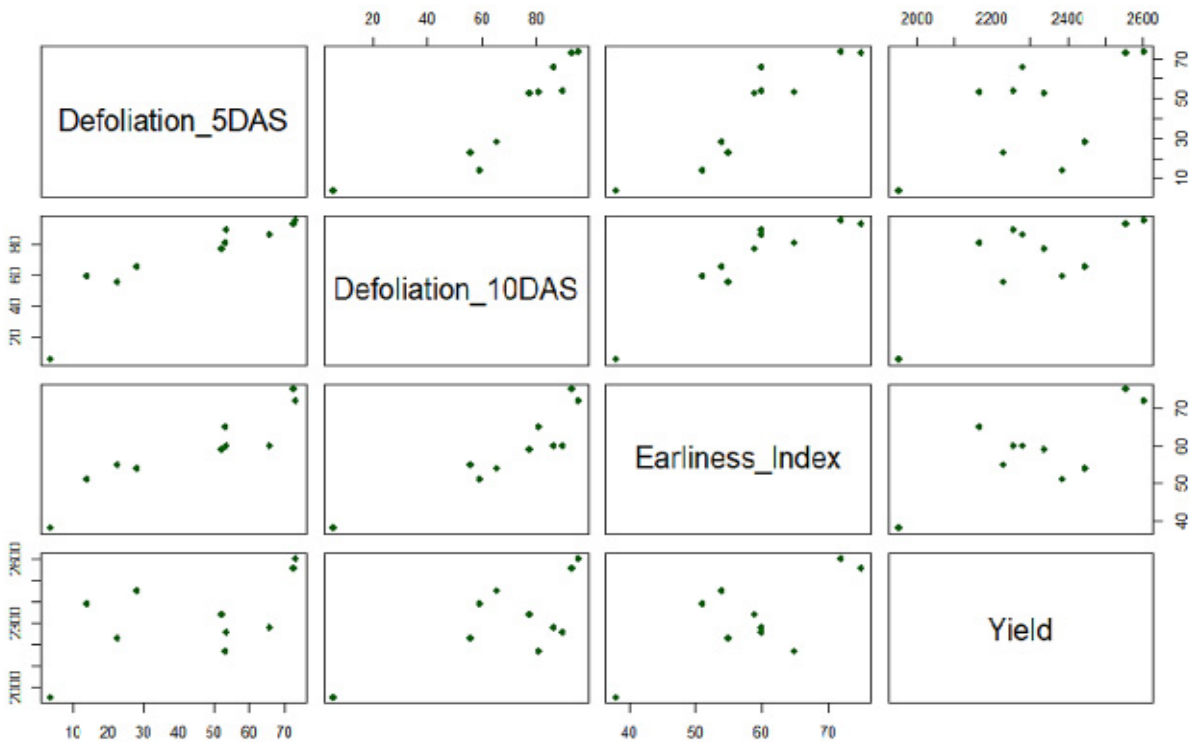


Fig.1. Correlation studies between defoliation at 5 days and 10 days after application, earliness index and seed cotton yield

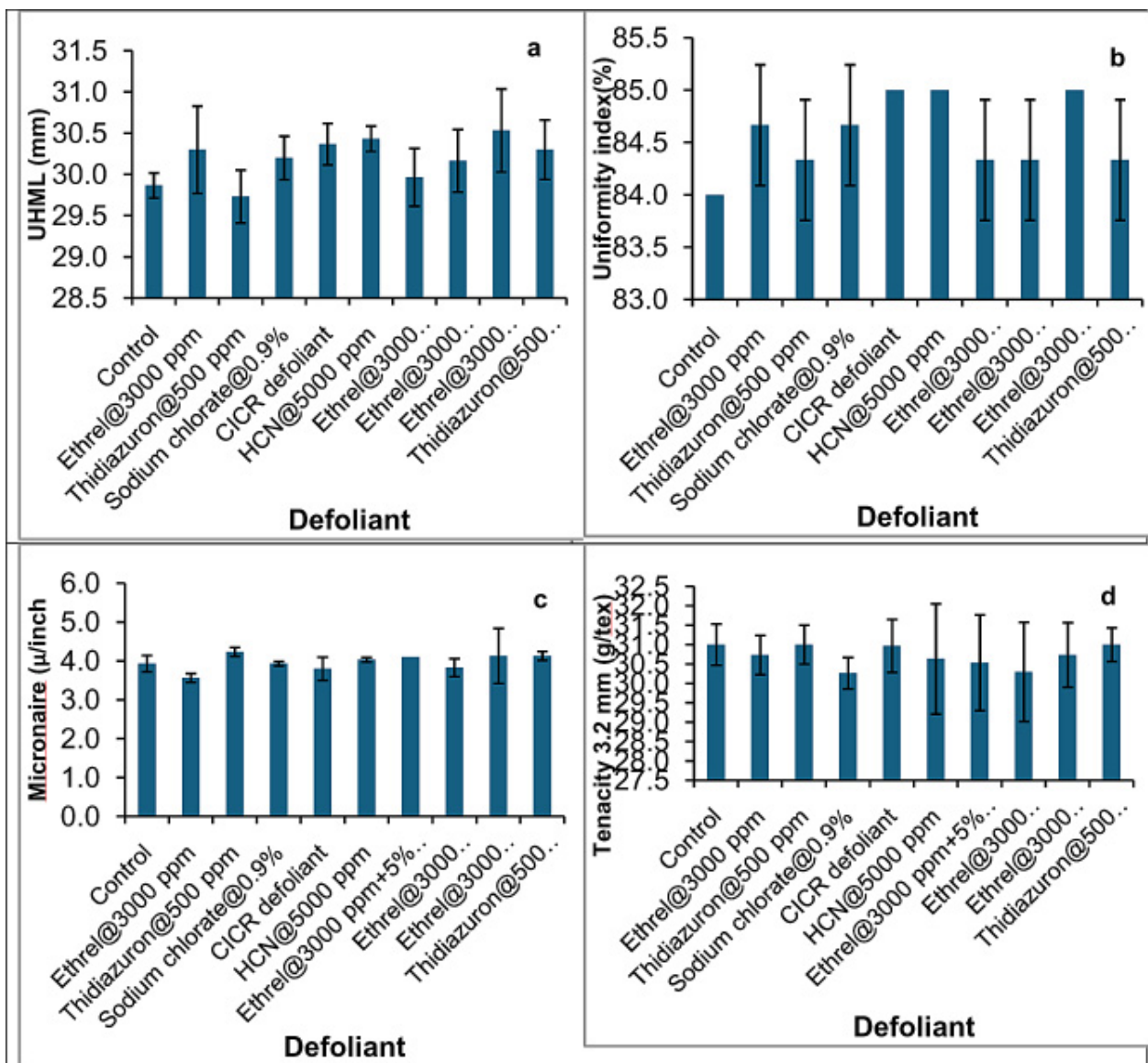


Fig.2. Quality parameters as influenced by various defoliants in cotton during 2024-25 at RARS, Nandyal

including thidiazuron, ethephon, tribufos, and their combinations. Their effectiveness depends on crop age, variety, climatic conditions, and application timing. Recent field studies in China reported that the application of a 10% thidiazuron + 40% ethephon mixture significantly improved boll opening (from 77.3% to 84.9%) and increased lint yield by 14.8%, highlighting its potential for enhancing mechanical harvest readiness when applied 4–5 days earlier than conventional timings (Chen *et al.*, 2024).

In India, research on high-density cotton planting systems has shown that defoliants like thidiazuron and ethephon not only assist in efficient leaf drop but also preserve fiber quality and maintain photosynthetic efficiency until harvest (Chandrasekaran *et al.*, 2023b). Adequate literature supports the adoption of defoliants as a cost-effective and agronomically viable solution for facilitating clean, timely, and efficient mechanical picking. In this context, the present study was undertaken to evaluate the

effect of selected defoliant on leaf shedding, boll opening and seed cotton yield with the aim of optimizing conditions for mechanical harvesting under the prevailing agroclimatic conditions.

MATERIAL AND METHODS

A field study was carried out during the *kharif* season of 2024 at Regional Agricultural Research Station, Nandyal to assess the effect of defoliants on facilitating mechanical picking in cotton. The soil at the test location is classified as deep Vertisols, characterized by a clay texture with a moisture-holding capacity of 14.5 %, pH of 8.5, EC 0.46 dS m⁻¹, Organic carbon 0.35%, low in available Nitrogen (118 kg/ha), high in available phosphorus (71 kg/ha) and potassium (453 kg/ha). The experiment was laid out in a Randomized Block Design (RBD) with 10 treatments and 3 replications. Each plot measured 5.4 m × 3.6 m. The treatments consisted of T₁:Control, T₂:Ethrel@3000ppm, T₃:Thidiazuron @500ppm, T₄:Sodiumchlorate @0.9%, T₅:CICRDefoliant, T₆:Hydrogency anamide @5000ppm, T₇:T₂+5%ofurea, T₈:T₂+Diuron @400 ppm, T₉:T₂+Sodiumchlorate @0.9% and T₁₀:T₃+Diuron@400ppm. The cotton hybrid Dr.Chandra Gold BGII was sown with inter row spacing of 90 cm and intra-row spacing of 45 cm. The crop received 150 kg N, 60 kg P₂O₅ and 60 kg K₂O/ha, and were applied as urea, single super phosphate and muriate of potash, respectively. The 100% recom-mended dose of P₂O₅ was applied as basal. The nitrogen and K₂O were applied in 3 equal splits at 30,60 and 90 days after sowing. Need based plant protection measures were taken up. The treatments were imposed after 65% boll opening stage. The data pertaining to leaf shedding at 5 days and 10 days after defoliant application, earliness index and seed cotton yield was recorded. The data were subjected to Analysis of Variance (ANOVA) using RBD. The means of treatments were compared

using the critical difference (CD) at 5% probability level ($p = 0.05$) to determine statistical significance.

RESULTS AND DISCUSSION

The outcomes of the field experiment showed that significantly lower seed cotton yield (1952 kg ha⁻¹) was recorded with T₁(Control) compared to other treatments. Higher boll opening percentage (83.9) was recorded with T₁₀ (Thidiazuron @500 ppm+ Diuron @400ppm) and was on par with T₃ (77.8), T₄ (76.9) and lower boll opening percentage (45) was noticed with T₁(Control). Higher percent defoliation (73.2) at 5 days after spraying was recorded with T₃ (Thidiazuron @500 ppm) and lower percent defoliation was recorded with T₁(Control). Higher percent defoliation (95.5) at 10 days after spraying was recorded with T₃ (Thidiazuron @ 500 ppm) and was on par with T₁₀ (93.1), T₉(89.5), T₅(86.2) and lower percent defoliation (5.3) was recorded with T₁(Control). Further, higher earliness index (75%) was recorded with T₁₀(Thidiazuron @ 500ppm+Diuron @ 400ppm) and was on par with T₃ (72%) and T₄ (65%); lower earliness index (38%) was registered with T₁ (Control) (Table 1). The correlation between defoliation at 5 DAS and 10 DAS was considerable (Fig.1). Further, the quality parameters were not substantially influenced due to defoliants application (Fig.2).

CONCLUSION

The findings of the trial clearly showed that higher defoliation was attained with Thidiazuron application @500 ppm+ Diuron @400ppm and also higher cotton seed yield and is effective to ease mechanical picking in rainfed cotton.

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