iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** IX **Month of publication:** September 2019

DOI: http://doi.org/10.22214/ijraset.2019.9014

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue IX, Sep 2019- Available at www.ijraset.com

Influence of Integrated Weed Management in Bt Cotton (Gossypium hirsutum L.) over Sole Method

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Abstract: ***A field experiment was conducted during Kharif of 2018-19 at agricultural college farm UAS raichur, Karnataka, to study the effect of integrated weed management in Bt cotton over sole method. The experiment was laid out in RCBD consists of 10 treatments with three replications. Among all the treatments Pendimethalin PE @ 1.0 kg ha^{-1} fb Pyrithiobac Sodium PoE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS was recorded significantly lower weed index at harvest (4.13 %), higher herbicide efficiency index at harvest (4.55 %), higher seed cotton yield (25.23 q ha^{-1}) and zero crop phytotoxicity.***

Keywords: Crop phytotoxicity, Herbicide efficiency index, Integrated weed management, Seed cotton yied and Weed index

I. INTRODUCTION

India is a second largest cotton producing country in the world, plays an important role in the indian economy involving about 60 million people in cotton cultivation, textile industries and trade. In india first GM crop to be introduced was *Bt* cotton in 2002 and has been widely used for crop improvement. Cotton supports the livelihood of 7.7 million farmers and india is the second largest exporter. As crop typically takes 140-180 days to complete its life cycle, throughout the growth cycle it is exposed to weeds and the competition therein. Weeds deplete the soil by removing 5-6 times N, 5-12 times P_20_5 and 2-5 times K than cotton crop thus reducing the yield by 54-85 %. Weed control in cotton has relied mostly on herbicides, consisting of various functional groups (active ingredients) that are capable of impeding the growth and development of weeds. Successful chemical weed control requires the uniform application of the correct quantity of herbicide (s) over the target area, and also precision operation and accurate calibrations of sprayers are therefore very important since rates that are too high may injure the crop and it may give better result than single method.

II. MATERIAL AND METHODS

A field experiment was conducted during the Kharif 2018 in medium black cotton soil. The experiment having 10 treatments consists One hoeing at 15 DAS + Two hand weeding at 30 and 45 DAS, Three inter culturing through mechanical weeder at 20, 40 and 60 DAS, Pendimethalin PE @ 1.0 kg ha^{-1} fb One HW at 45 DAS, Oxyflurofen PE @ 0.1 kg ha^{-1} fb one HW at 45 DAS, Pendimethalin PE @ 1.0 kg ha^{-1} fb Pyrithiobac Sodium POE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS, Pendimethalin PE @ 1.0 kg ha^{-1} fb Quizalofop ethyl PoE @ 50 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS, Oxyflurofen PE @ 0.1 kg ha^{-1} fb Pyrithiobac Sodium PoE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS, Oxyflurofen PE @ 0.1 kg ha^{-1} fb Quizalofop ethyl PoE @ 50 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS, Weedy check, Weed free check. The cultivar used in the experiment was Jadoo BG-II is a hirsutum hybrid and sowing was done at August 16 on medium black soil having $P^H{}_{7.6}$, organic carbon 3.55 g kg^{-1}, Available nitrogen 254 kg ha^{-1}, Available P_2O_5 34 kg ha^{-1}, Available K_2O 299 kg ha^{-1} and having electrical conductivity 0.35 ds m^{-1} and had applied NPK at the rate of 190:80:80. The PRE herbicides were applied on soil surface a day after sowing and POE herbicides sprayed on foliage of weeds between rows of cotton as per the treatment details. The herbicide was applied using knapsack sprayer and quantity of water used was 1000 liters per hectare.

III. RESULTS AND DISCUSSION

A. Weed Index (%)

The data pertaining to weed index as influenced by different treatment is presented in Table 1 and the results revealed that Pendimethalin PE @ 1.0 kg ha^{-1} fb Pyrithiobac Sodium POE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS was significantly recorded lower weed index (4.13 %) after weed free check followed by all integrated weed management incorporated treatments and the higher weed index was noticed in weedy check (52.74 %). This might be due to the efficient weed management strategy introduced by integrated method which can control a major number of weeds associated with crop throughout its growing period. The same findings are also reported by Malarkodi (2017) and Mathukia *et al*. (2018).

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B. Herbicide Efficiency Index

The data in respect of herbicide efficiency index as influenced by different weed control treatments at harvest is presented in Table 1. Among the treatments Pendimethalin PE @ 1.0 kg ha^{-1} fb Pyrithiobac Sodium PoE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS was significantly recorded higher herbicide efficiency index (4.55) followed by Oxyflurofen PE @ 0.1 kg ha^{-1} fb Pyrithiobac Sodium POE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS (3.66). Significantly lower, zero herbicide efficiency index were found in weed free check, weedy check, One hoeing at 15 DAS + Two hand weeding at 30 and 45 DAS and three inter culturing through mechanical weeder at 20, 40 and 60 DAS. It indicates the weed killing potential of pendimethalin *fb* Pyrithiobac sodium herbicides and its effectiveness in weed management over other herbicides. The same results are also noticed by Walia (2010) and kumar (2015).

C. Crop Phytotoxicity

The data pertaining to crop phytotoxicity influenced by different weed management treatments are presented in Table 1. The data revealed that no herbicides had phytotoxical effect on crop plants as it was applied optimum dosage and couldn't find any negative impact. The results are in conformity with the findings reported by Malik *et al*. (2006) and Hiremath *et al*. (2013).

D. Seed Cotton Yield (q ha^{-1})

The results revealed that Pendimethalin PE @ 1.0 kg ha^{-1} fb Pyrithiobac Sodium POE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS was the best treatment depicted in Table 1, as its seed cotton yield was significantly higher than other treatments (26.79 q ha^{-1}**)**. The lower seed cotton yield (11.05 q ha^{-1}) was noticed in weedy check. Integrated method can manage most of the weed species arise at different period and gave better control especially during critical period of weed competitions as it contain different methods chemically, mechanically and culturally. It was earlier found by Leela Rani (2016) and Patel *et al*. (2013).

IV. CONCLUSION

It was presumed from the study that integrated method of weed management in cotton crop was the most effective for the control of weeds and resulted in significantly higher seed cotton yield as compared with the single method approach and the untreated check.

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Table 1. Influence of different weed management practices on weed index (%), Herbicide efficiency index, Seed cotton yield (q ha^{-1}) of *Bt* cotton at harvest and Phytotoxicity @ 60 DAS

Treatments	Weed index at harvest (%)	Herbicide efficiency index at harvest	Seed cotton yield (q ha^{-1})	Phytotoxicity @ 60 DAS
T1- One hoeing at 15 DAS + Two hand weeding at 30 and 45 DAS	4.95	0	26.64	0
T2-Three inter culturing through mechanical weeder at 20, 40 and 60 DAS	33.27	0	16.35	0
T3- Pendimethalin PE @ 1.0 kg ha^{-1} fb One HW at 45 DAS	20.67	1.99	19.63	0
T4- Oxyflurofen PE @ 0.1 kg ha^{-1} fb One HW at 45 DAS	24.64	1.87	18.82	0
T5- Pendimethalin PE @ 1.0 kg ha^{-1} fb Pyrithiobac Sodium POE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS	4.13	4.55	26.79	0
T6- Pendimethalin PE @ 1.0 kg ha^{-1} fb Quizalofop ethyl POE @ 50 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS.	30.15	1.99	18.32	0
T7- Oxyflurofen PE @ 0.1 kg ha^{-1} fb Pyrithiobac Sodium POE @ 75 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS	4.55	3.66	26.65	0
T8- Oxyflurofen PE @ 0.1 kg ha^{-1} fb Quizalofop ethyl POE @ 50 g ha^{-1} at 45 DAS + one interculturing through mechanical weeder at 60 DAS	32.98	1.77	16.49	0
T9- Weedy check	52.74	0	11.05	0
T10- Weed free check	0	0	25.23	0
S.E.±	0.35	0.03	0.30	0
C.D. at 5 %	1.04	0.08	0.88	0

fb- Followed by, PE- Pre emergence, POE- Post emergence and HW- Hand weeding

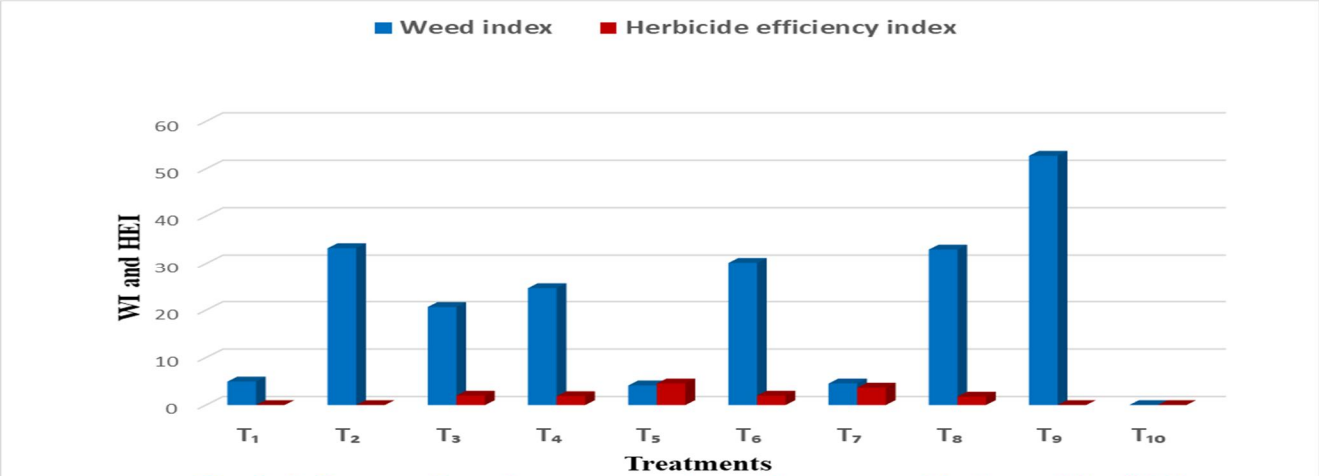

Fig. 1. Influence of weed management practices on weed index and herbicide efficiency index on *Bt* cotton

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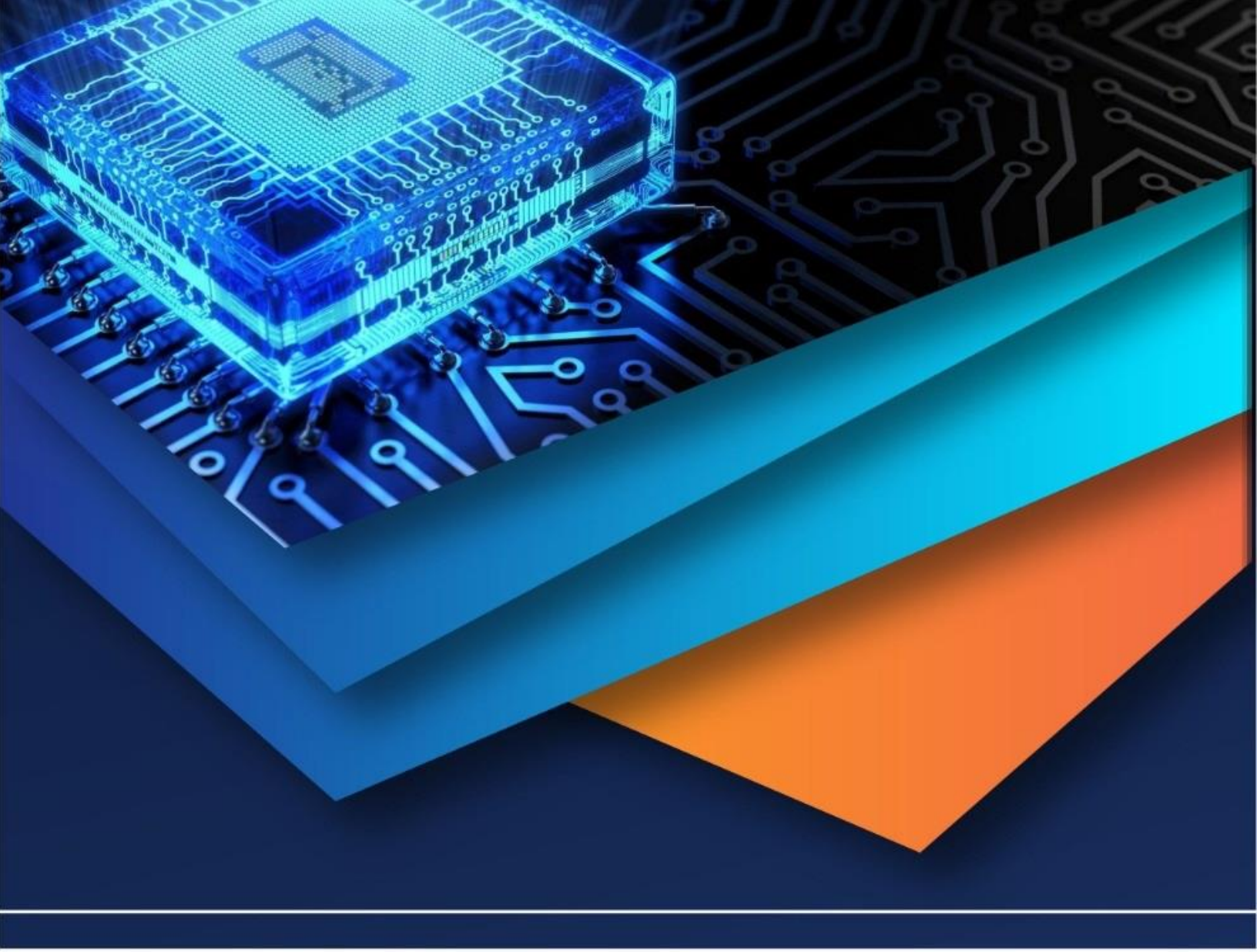

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