# IMPROVEMENT IN RAINFED COTTON PRODUCTIVITY BY INTEGRATED WEED MANAGEMENT PRACTICES UNDER HIGH DENSITY PLANTING SYSTEM GROWN ON BROAD BED FURROWS

**Abstract**

At Dr. Panjabrao Deshmukh Krishi Vidhyapeeth's cotton research station in Akola, field tests were carried out to determine the best agricultural techniques for high density planting methods in cotton crops. During the Kharif season from 2015 to 2018, four herbicides were applied either alone or in combination with cultural practices, weed-free check, and control as a weedy check in a randomized block design with eight treatments and three replications. Pendimethalin was the pre-emergence treatment, and glyphosate, pyrithiobac sodium, and quazalofop ethyl were the post-emergence treatments. Broad bed furrow (BBF) planting was used for the genotype AKH 081, with a size of 60 x 10 cm and 1.66 lakhs per hectare. The trial's outcomes showed that in terms of plant height, dry weight per plant, number of bolls per plant, boll weight, and cotton seed yield, the weed-free control treatment performed better than the other treatments. It was also the most successful at keeping weeds under control. Pendimethalin 38.7 CS PE 1.25 a. i. kg ha-1 + hoeing at 30 DAS + hand weeding at 45 DAS took second position. As a result, seed cotton and lint yields were equal under the weed-free check and pendimethalin + cultural practices treatments. The application of pendimethalin (38.7 CS PE 1.25 a. i. kg ha-1), weed free check, hoeing at 30 DAS, and hand weeding at 45 DA all produced greater gross and net return values from an economic standpoint.

**Key words:** Weeds, herbicides, seed cotton yield, high density planting, broad bed furrows

**Authors**

**M.D. Yenpreddiwar**
Department of Agronomy,
College of Agriculture,
Sonapur, Gadchiroli,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth,
Akola, Maharashtra, India

**B.C. Nandeshwar**
Department of Genetics and Plant Breeding,
College of Agriculture,
Sonapur, Gadchiroli,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth,
Akola, Maharashtra, India.
nandubhupesh123@gmail.com

**P.V. Mahatale**
Department of Agronomy,
College of Agriculture,
Sonapur, Gadchiroli,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth,
Akola, Maharashtra, India.

## I. INTRODUCTION

Cotton, or *Gossypium hirsutum* L., is a highly important commercial crop farmed in India that is prized for its financial advantages by farmers all over the world. As the largest component of the organized industrial sector, the country's cotton textile industry is supported by it. a high density planting (HDP) method that promotes quicker canopy closure and less soil water evaporation. Narrow row planting has gained popularity in several nations due to higher cotton production. One option under rain-fed farming to reverse the current trend of stagnating Bt cotton yield in the Vidarbha region of Maharashtra, India, is high density planting, which accommodates more plants per unit area, along with better genotype with good fertilizer, early weed and boll worm management, and 325 lint kg $ha^{-1}$.

Narrow row planting has gained popularity in several nations due to higher cotton production. One option under rain-fed farming to reverse the current trend of stagnating Bt cotton yield in the Vidarbha region of Maharashtra, India, is high density planting, which accommodates more plants per unit area, along with better genotype with good fertilizer, early weed and boll worm management, and 325 lint kg $ha^{-1}$.

## II. MATERIALS AND METHODS

Field trials were conducted from 2015–16 to 2017–18 as part of the TMC 1.4 project at Dr. PDKV, Akola, to develop agro techniques for a high density planting system in medium depth soils. The soil's characteristics included a clayey texture, pH 8.9, EC 0.30 $dSm^{-1}$, 4.70 g kg ha-1 of organic carbon, and 342 kg $ha^{-1}$ of accessible N, P, and K, in that order. The seasons' total rainfall from 2015 to 20 was 645. In order to seed the genotype AKH 081, a broad bed furrow (BBF) with 125% RDF (75:37.5: 37.5 NPK+ 2.5 Zn kg $ha^{-1}$) was utilized at 60 x 10 cm and 1.66 lakhs per hectare. To inhibit the Bollworm complex, spinosad 50 ml/acre and flubendamide 480 SC @ 40 ml/acre were used. Under HDPS, eight integrated weed control techniques were assessed. In addition to cultural practices such weed free check and weedy check, pre- and post-emergence herbicides (Pendimethalin 38.7 CS PE, Quizalofop ethyl 5 EC, Pyrithiobac sodium 10 EC, and glyphosate 71 G) were utilized. The amount of weeds per square meter was used to determine the efficacy of weed management. Pre-emergence herbicides were applied as early as the first day after planting, and post-emergence herbicides were sprayed 20–25 days after cotton seed was sown. We calculated the economics, growth, yield characteristics, SCY, and lint yield.

## III. RESULTS AND DISCUSSION

By mixing pre- and post-emergence herbicides with a range of cultural techniques, the effectiveness of integrated weed management under HDPS was evaluated. Commelina benghalensis, Cynodon dactylon, Cyperus rotundus, and Euphorbia geniculata, Parthenium hysterophorus, Celosia argentea, and Digera arvensis were the most frequently occurring weed species in the testing.

 

## IV. WEED CONTROL EFFICIENCY (%)

The best results for weed control under HDPS of cotton were obtained with PE Pendimethalin fbHoeing at 30 DAS + weeding at 45 DAS, (81%) at 60 DAS, and weed free check (83%). The cotton was sown in broad bed furrows, which retained moisture and aided in growth and SCY. However, pre-emergence application of pendimethalin 38.7 CS PE at 1.25 kg a.i./ha (3.3 liter in 700 liter water) seemed to be the best way to lessen early weed competition in cotton HDP (high density planting) pattern, and comparable with maintaining weed-free check condition until 45 DAS with only cultural practices. This was followed by one hand weeding at 45 DAS (days after sowing). The weed-free plot outperformed the weedy check in terms of plant height, boll numbers per plant, boll weight, and dry weight per plant after receiving treatments with glyphosate and PE Pendimethalin spray. Compared to the plots treated with PE Pendimethalin fbHoeing at 30 DAS and weeded at 45 DAS, the one left weed-free produced a higher yield of seed cotton. Comparing the net and gross returns from Pendimethalin 38.7 CS PE @ 1.25 kg a.i./ha fbhoeing at 30 DAS and one-handed weeding at 45 DAS, the weed-free check yields significantly greater returns. Nonetheless, the Vidharbha district of Maharashtra had a lint yield (748 kg $ha^{-1}$) that was twice as high as the national average.

## V. CONCLUSION

In order to suppress the growth of cotton, the development of the plant canopy, and the formation of bolls, it was found that weed-free conditions lasting up to 45 days or the application of an integrated weed management technique—pre-emergence Pendimethalin 38.7 CS PE @ 1.25 kg a.i./ha fbhoeing at 30 DAS and hand weeding at 45 DAS—were highly effective. The many types of weeds, both dicot and monocot, are mainly rivalrous. Therefore, it is possible to recommend using these improved integrated weed management strategies under high density planting systems developed on wide bed furrows to farmers cultivating cotton in the Vidharbha region of Maharashtra, where the crop is planted to optimal economic return.

## REFERENCES

[1] Kakade, S. U. 1996. Integrated weed management in Cotton. Crop- Research-Hissar 14(3):120-125.
[2] Manickam , G. and P. Gnanamoorthy, 1994. Control of *Cyperus rotundus* with herbicides. Indian J.Agron.39: 514-515
[3] Pawar, A. K., B. M. Patil., A. P. Karunakar and R. N. Satao, 2000.Effect of pre and post emergence herbicides on weed control and yield of cotton. Pestology.24 (7):35-36.

 

**Table 1:** Weed Control Efficiency (WCE), Growth, Yield and Economics as influenced by various weed management practices under HDPS cotton grown on Broad Bed Furrow.

| Treatments | Weed control efficiency (%) at 60 DAS | Plant height (cm) | Number of per plant | Boll weight (g) | Dry Weight/ plant (g) | Seed cotton yield (kg/ha) | Lint yield (kg/ha) | Gross returns (Rs/ha) | Net Returns (Rs/ha) |
|---|---|---|---|---|---|---|---|---|---|
| Pendimethalin 38.7 CS PE @ 1.25 kg a.i./ ha *fb*hoeing at 30 DAS and one hand weeding at 45 DAS. | 81.05 | 68.95 | 5.12 | 2.51 | 50.87 | 1866 | 700 | 72774 | 38664 |
| Quizalofop ethyl 5 EC@ 0.075kg a.i./ha POE 20-25 DAS (2-4 leaf weed stage) *fb*hoeing at 45 DAS | 62.11 | 58.68 | 4.41 | 2.27 | 39.47 | 1415 | 518 | 55198 | 26441 |
| Pyrithiobac sodium 10 EC @ 0.075 kga.i./ ha POE 20-25 DAS (2-4 leaf weed stage) *fb*hoeing at 45 DAS | 62.52 | 59.50 | 4.45 | 2.22 | 40.29 | 1405 | 516 | 54808 | 25001 |
| Pendimethalin 38.7 CS PE @ 1.25 kg a.i./ha*fb*Quizalofop ethyl 10 EC@ 0.060kg a.i. /ha + Pyrithiobac sodium 10 ECPOE @ 0.062 kg a.i./haPOE (tank mix) (2-4 leaf weed stage). | 65.07 | 61.46 | 4.92 | 2.40 | 41.42 | 1520 | 561 | 59280 | 27600 |
| Hoeing at 20-25 DAS *fb*Glyphosate 71G @ 1.50 kg a.i./ha as directed spray at 45 DAS. | 73.97 | 63.11 | 4.70 | 2.46 | 41.58 | 1643 | 596 | 64064 | 35271 |
| Hoeing at 20-25 DAS *fb*Glyphosate 71G @ 0.5 kg a.i./ha as directed spray at45 DAS. | 60.30 | 59.13 | 4.31 | 2.39 | 40.43 | 1523 | 551 | 59410 | 31513 |
| Weed free check (2 Weeding *fb*2Hoeing) | 83.20 | 72.08 | 5.57 | 2.55 | 52.73 | 2011 | 748 | 78442 | 38305 |
| Weedy check | 0.00 | 44.87 | 1.30 | 2.15 | 25.87 | 455 | 168 | 17732 | 3121 |
| CD at 5% | - | 8.93 | 0.55 | 0.31 | 7.50 | 253 | 91 | 9876 | 8610 |