



EFFICIENCY OF PRE-EMERGENCE HERBICIDE AND CULTURAL METHODS OF WEED MANAGEMENT ON GROWTH AND YIELD OF HYBRID COTTON (RCH-2)

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Abstract

A field experiment was conducted during summer season 2016 at Annamalai University, Experimental Farm, Annamalai Nagar, to study the efficiency of pre-emergence herbicide and cultural methods of weed management on growth and yield of hybrid cotton the experiment was laid out in Randomized Block design with three replication and eight treatments. The treatments viz., T1 – unweeded control. T2 – twice and weeding on 20 and 45 days, T3 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} , on 3 DAS, T4 – Pre-emergence application at pendimethalin 0.68 kg ha^{-1} on 3 DAS + One hand weeding on 45 DAS, T5 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} on 3 DAS + intercropping with (blackgram); T6 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} on 3 DAS + mulching on 21 DAS, T7 – intercrop alone and T8 – mulching alone. Observation on total weed count, weed biomass, and weed control efficiency were recorded cotton yield attributes and seed cotton yield were observed. Results of the experiment it can be concluded that application of pre-emergence herbicide pendimethalin 0.68 kg ha^{-1} + intercrop with blackgram recorded higher seed cotton yield and maximum economic returns in hybrid cotton beside obtaining broad spectrum weed control throughout the crop growth period.

Key words: Weed control efficiency weed biomass, seed cotton yield and hybrid cotton.

Introduction

Cotton (*Gossypium hirsutum* L.) considered as “King of Fiber and white Gold” is one of the important commercial crop in India. It sustains the cotton textile industry which is perhaps the largest segment of organized industries in the country and contributes more than 80 per cent of raw materials to textiles industry (Prabhu *et al.*, 2012) it generates employment for about 60 million people either directly or indirectly involved in the agricultural and industrial sector of cotton production, processing textile and related activities. Cotton seed provides potential seed cake, meal, hull etc.,

In Tamilnadu cotton grown in area of 1.17 lakh hectares with production of 2.80 lakh bales and average productivity of 726 0.68 kg ha^{-1} (AICCIP, 2014). In 202, hybrid cotton technology was commercially approved for four hybrids (MECH 12, MECH 162, MECH 184 and RCH 2) in India (Jayakumar, 2002). All the three hybrids cotton (MECH 184, MECH 164 and RCH 2) recorded

significantly higher seed cotton yield than their hybrid cotton, counterparts which might be attributed to higher retention of bolls from the first flush of flowers. Losses caused by weed in cotton ranges from 50 to 85 percent depending upon the nature and intensity of weeds.

Weeds primarily compete for nutrients, moisture and sunlight during early growth period than at later stage. The critical period of weed competition in cotton was found to be 15 to 60 days (Rajiv Sharma, 2008).

Traditional methods of hand hoeing addition is being expensive and time consuming and ineffective in controlling these weeds as new germinate after every hoeing. No doubt that the weed control through chemical is easy economical, labour efficient and the over dependence regulated in some serious environmental, ethological implications and continuous use of herbicides for weed controls leads to residue hazards, weeds shift and buildup the resistance in weeds. Integration of cultural, mechanical and chemical weed control practices in any

crop offers better management of all types of weeds and it is preferable in terms of bio efficacy, eco-friendly nature.

Materials and Methods

The field experiment was conducted during summer season February, 2015 to June 2015) at Annamalai University, Experimental Farm, Annamalai Nagar to evaluate the efficiency of pre-emergence herbicide and in combination with cultural practices on yield of hybrid cotton RCH-2. The details of the experimental materials used and the methods adopted during the course of investigation are described briefly. Soil of the experimental field was clay loam low in nitrogen, content medium in phosphorus and high in potassium content.

The design adopted as randomized block design (RBD) with eight treatments and replicated thrice. The treatments are as follows *viz.*, T1–unweeded control T2–Twice hand weeding (20 and 40 DAS), T3–Pre-emergence application of pendimethalin 0.68 kg ha^{-1} on 3 DAS, T4–Pre-emergence application of pendimethalin @ kg ha^{-1} on 3 DAS + one hand weeding on 45 days. T5 – Pre-emergence application of pendimethalin @ 0.68 kg ha^{-1} on 3 DAS intercropping (Blackgram), T6–Pre-emergence application of pendimethalin @ 0.68 kg ha^{-1} on 3 DAS + mulching on 21 DAS, T7- intercropping alone and T8–mulching alone. The experimental field was prepared to optimum tilth by poughing twice with tractor drawn mould board plough followed by harrowing twice and leveled. The ridges were formed after leveling at an interval of 120 cm f with ridge plough. Healthy viable seeds of hybrid cotton RCH 2 were dibbled with spacing of 60 cm at the rate of one seeds per hill on the side of ridges. Gap filling

was done at 7 DAS so to maintain uniform plant population. Thinning was done at 15 DAS to maintain. One healthy plant per hill. Nitrogen phosphrous and potassium were applied in the form of urea, single super phosphate and murate of potash at 120:60:60 kg NPK ha^{-1} respectively based dose of N and K as 50 percent, full dose of P were applied as basal placement of 8 cm away, 5 cm below the seeds row. The balance dose of N and K were applied at the time of square initiation (45 DAS) followed by earthing up application of the pre-emergence herbicide pendimethalin 0.68 kg ha^{-1} were mixed with water at the rate of 500 linters ha^{-1} and sprayed over the soil uniformly by hand operated backpack sprayer using deflector nozzle on 3 DAS of cotton. Immediately after herbicide spray, one light irrigation was given so to incorporate the chemical to soil. Herbicide application followed by one hand weeding on 45 DAS was included. Pendimethalin herbicide spray followed by intercropping with blackgram ADT-3 was sown in between two rows of cotton crop followed by mulching was done with sugarcane trash No. 12 t ha^{-1} on 21 DAS.

Results and Discussion

Total Weed Count

All the treatments exerted significant influence on total weed count. Among the treatment, pendimethalin 0.68 kg ha^{-1} + intercropping with black gram was observed to be superior in restricting the total weed population as indicated by the lesser total weed count of 48.34 m^2 at 45 DAS. This was followed by twice hand weeding on 20 and 45 DAS (85.54 m^2). The highest total of 287.04 m^2 was recorded in the unweeded control. Effective weed control measures such as pre-emergence application

Table 1: Efficiency of pre-emergence herbicide and cultural methods of weed management on growth and yield of hybrid cotton.

Treatment Schedule	Total Weed count (m^2) on 45DAS	Weed Bio-mass kg ha^{-1}	Weed Control efficiency (%)	No. of Bolls Plaint	Seed Cotton yield kg ha^{-1}
T1 – Unweeded Control	16.96 (287.04)	1301	—	13.05	923
T2 – Twice hand weeding on 20 & 45 DAS	9.27 (85.54)	200	83.21	25.37	2462
T3 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} + 3 DAS	16.3 (265.23)	1051	12.39	16.42	1335
T4 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} + one hand weeding on 45 DAS	10.97 (119.82)	386	62.81	22.42	1959
T5 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} on 3 DAS + intercropping (Blackgram)	6.98 (48.34)	110	94.84	28.62	2750
T6 – Pre-emergence application of pendimethalin 0.68 kg ha^{-1} on 3 DAS + Mulching on 21 DAS.	9.54 (90.55)	251	76.49	24.82	2431
T7 – Intercropping at one	11.62 (134.48)	666	34.28	20.42	1679
T8 – Mulching alone	13.46 (180.58)	768	21.38	17.93	1548
SED	0.23	31.23	—	0.22	2367
C.D (P=0.05)	0.49	67.21	—	0.47	50.79

pendimethalin 0.68 kg ha⁻¹ on 3 DAS + inter cropping blackgram might have helped in minimizing the weed population and thereby reducing the weed competition for light, moisture, and nutrient as compared to other treatments. Weed density as well as weed dry weight were reduced significantly due to pre-emergence application of herbicide. Pendimethalin resulted in effective control of grasses broad leaved weeds and black gram as intercrop it has the weed smothering effect in control of weeds.

Weed biomass

The weed biomass was significantly influenced by all the treatments. Among the different weed control treatment. The least weed biomass of 100 kg ha⁻¹ was recorded in pendimethalin 0.68 kg ha⁻¹ + intercropping with blackgram. This was followed by two hand weeding on 20 and 40 DAS (200 kg ha⁻¹). The highest weed biomass of 1301 kg ha⁻¹ was recorded in control. Weed dry weight was reduced significantly due to pre-emergence herbicide application.

Pendimethalin resulted in effective control of grass broad leaved weeds and some extent sedges due to broad spectrum action. It enters grasses through coleoptiles and shoot of the seedling below the ground. The grasses were effectively controlled by with this herbicide was reported by Kalaisudarsan and Srinivasaperumal, (2018).

Weed Control Efficiency (WCE):

Among the different weed control treatments, pendimethalin 0.68 kg ha⁻¹ + intercropping with blackgram was found to be superior as indicated by the highest weed control efficiency of 94.84 percent at 45 DAS followed by two hand weeding on 20 and 40 DAS (82.21 percent). This might be attributed to the efficiency of pendimethalin in controlling the dominant weed species at the early stages.

Number of Bolls Plant⁻¹

All the treatment exerted significant influence over the number of bolls plant⁻¹. The highest number of bolls plant⁻¹ (28.62) was recorded in pendimethalin 0.68 kg ha⁻¹ + intercropping with blackgram. This was followed by two hand weeding on 20 and 40 DAS. The lowest number of bolls plant⁻¹ of 13.05 was observed in unweeded control. This could be attributed to significantly lower weed

population, dry matter accumulation of weeds and hence the higher number of symibodal branches and number of bolls plant this treatment. The superior performance might be attributed to reduce crop-weed competition in crop growth stages which helped on synchronization of number of sympodial branches, number of monopodial branches and number of bolls per plant.

Seed Cotton Yield

Seed cotton yield was significantly influenced by the weed control treatments. Among the weed control measures, pendimethalin 0.68 kg ha⁻¹ + intercropping with blackgram treatment recorded the highest seed cotton yield of 2750 kg ha⁻¹. This was followed by twice hand weeding on 20 and 45 DAS (2462 kg ha⁻¹) the least seed cotton yield of 923 kg ha⁻¹ was recorded in the unweeded control. This combination also offers efficient and prolonged weed free conduction favoured the crop with better rooting highest LAI, pre and post flowering photosynthesis and yield attributes. This might be due to timely and effective control of weeds by herbicide as well as intercrop. This results is in consonance with the findings of Sudha, 2008; Razabhathi and Shanidakhali, (2014) and Ganavel and Babu, 2008).

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