www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(6): 826-829

www.thepharmajournal.com
Received: 12-04-2023
Accepted: 15-05-2023

Wilson J
Student, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Joseph PA
Professor, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Umesh Chimmalagi
Assistant Professor, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Alex Immanual Jeyasingh
Student, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Sabarieswaran K
Student, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Balachandar N
Student, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Corresponding Author:
Wilson J
Student, School of Agriculture and Sciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, India

Impact of weed control efficiency and growth parameters in non-chemical weed management in okra (*Abelmoschus esculentus* (L) Moench) in Coimbatore region

Wilson J, Joseph PA, Umesh Chimmalagi, Alex Immanual Jeyasingh, Sabarieswaran K and Balachandar N

Abstract
This study aimed to standardize non chemical methods of weed management and effects on growth of hybrid Okra. The study was conducted in the South farm of the School of Agricultural Sciences, Karunya Institute of Technology and Sciences, Coimbatore during the Rabi season of 2022. The experimental design consisted of seven treatments in a Randomised Complete Block Design (RCBD) that was duplicated thrice. Mulching with black LDPE is practiced in T_4 and intercropping with fodder cowpea is done in T5 and the other five treatments is based on different non chemical weed management practices. The result showed that T_2 (29.73 cm) had a significant positive effect on plant height, while T_4 (26.69) recorded the maximum number of leaves plant^{-1} and T7 (72.87) for maximum number of days to first flowering and T_5 (5865 Kg ha^{-1}) recorded maximum dry matter production when compared to all the other treatments. Intercropping with fodder cowpea has shown positive effect on the weed control efficiency in T_5 (96.22%) during the rabi season of 2022.

Keywords: Okra, weed management, growth attributes, mulching

1. Introduction
Okra (*Abelmoschus esculentus* (L) Moench) is one of the major vegetable crops of India. It is also called as lady's finger in English, and French, qumgombo in Spanish, Bhendi in Hindi. It is grown in tropical and also in warmer parts of temperate zones. In south Indian conditions, the crops can be grown throughout the year since frost and severe winters are absent. Okra is one of the important vegetables grown in Tamil Nadu. Farmers cultivate it by applying large quantities of chemical fertilizers, pesticides and herbicides. Herbicides pollute the environment and causes respiratory tract irritation, allergic sensitisation, eye and skin irritation, diarrhoea, vomiting, loss of consciousness, reduces fertility, limbs abnormalities etc. Therefore, environment friendly and sustainable forms of crop production is needed in Okra cultivation (Chacko *et al.*, 2021) [3]. In this study an attempt is made to find out an alternate weed management in Okra without the use of herbicides. In Tamil Nadu major Okra crop growing districts are Vellore, Salem, Coimbatore, Dindigul. Okra hybrid Co (Bh) H1 is a cross between Varsha Uphar selection and PA 4(T) (Sharma *et al.*, 2011) [9]. It has resistance to yellow vein mosaic virus disease was has high level of market preference. The fruits are dark green, slender, less fibrous and sparsely.

2. Materials and Methods
2.1 Study area location
The effects of Non-Chemical Weed Management in Okra were the subject of a field experiment at Karunya University in Coimbatore, Tamil Nadu During the *rabi* (Oct-Jan) season of 2022–2023, the experiment was conducted in the South Farm, School of Agricultural Sciences, Division of Agronomy, Karunya Institute of Technology and Sciences, Coimbatore. 10.9362° N latitude and 76.744° E longitude are the farm's coordinates. In this experiment, the Randomized Block Design was used, with Three replications, and Seven Treatments. Below are the treatments described.

2.2 Experimental details

Field experiment is Randomized block design and the treatments were replicated. The treatment followed for the field experiments were, T_1- Weed management as per package of practices and recommendations (Spray Oxyfluorfen at 0.25 kg ha^{-1} pre-emergence application on third day of sowing.) + One hand weeding at 30 DAS, T_2 –Hand weeding twice at 20 DAS and 40 DAS, T_3-Mechanical weeding by roto-weeder twice at 20 DAS and 40 DAS, T_4- Mulching with black LDPE in the interspaces, T_5-Intercropping with fodder cowpea and incorporation at flowering, T_6- One hand weeding at 20 DAS + 1 weeding with roto-weeder at 40 DAS, T_7- Control- No weeding. Five plants were selected randomly from the net plot area of each treatment and tagged. The following parameters were recorded in those tagged plants at different days. Plant height was measured at 60, 90 DAS and at final harvest stage in the five tagged plants from the ground level to tip of the plant, and the mean value were expressed in cm. The number of leaves was manually counted in the five tagged plants at 60, 90 and at final harvest stages, and the means were recorded. Five plants selected at random at all stages from each plot outside the net plot but within the border rows were cut close to the ground level and the samples were collected. These samples were shades dried and then oven dried at 80 °C for 72 hours.

2.3 Dry matter production and weed control efficiency

From each plot outside the net plot but inside the border rows, five randomly chosen plants at all stages were cut down to the ground level, and samples were taken. These samples were shade-dried before being oven-dried for 72 hours at 80 °C. Growth parameters and dry matter production was computed per unit area and expressed in kg ha^{-1} during 60, 90 DAS and at final harvest. The plants were observed daily after 35 days of sowing to see the appearance of first flower and total number of days from sowing time to the date when first flower appear were counted. The efficiency of controlling the weeds in treated plots in comparison with controlled plot (weedy check) and is expressed in percentage. It was computed by the formula given by Gautam *et al*. (1975) [11]. The weeds were controlled at 30 and 60 DAS.

Weed control efficiency (WCE) = DMC-DMT/DMC X 100 (1)

Where,
DMC - Dry matter weight of weeds in control plot and DMT- Dry matter weight of weeds in treatment plot.

2.4 Statistical Analysis

The data collected on various characters studied during the experiment were subjected to statistical analysis in randomized block design following the method of Gomez and Gomez (1984) [4]. Critical difference was worked out the at five percent probability level wherever the treatments were significant. The treatments differences that were non-significant at 5 per cent denoted as NS.

3. Results and Discussion

3.1 Effect of Non chemical weed management on growth parameter of Okra

3.1.1 Effect of Non chemical weed management on plant height

The result of plant height was presented in the Table 1, at 60 DAS, T_2 (19.80 cm) recorded the highest plant height and there was no significant difference between treatments. The lowest plant height (15.91) was observed in T_6. At 90 DAS, the plant height was significantly influenced by the treatments, maximum plant height (28.73) was observed in T_2 and it was at par with T_4, T_5 and T_6 was significantly superior over T_1, T_2 and T_3. The lowest plant height (20.73) was observed in T_5 and was at par with T_1, T_2, T_3 and T_4. At final harvest, also plant height was significantly influenced by the treatments. The maximum plant height was observed in T_2 (29.73) and it was at par with T_4, T_5 and T_7 was significantly superior over T_1, T_2, T_3, T_4 and T_6. The lowest plant height (21.73) was observed in T_5 and was at par with T_1, T_2, T_3 and T_4. In general, T_6 produced taller plants then other treatments at all times. The result indicated that T_2 had a significant positive effect on plant height when compared with other treatments. The lowest plant height was registered in T_5. These findings were consistent with the previous research that demonstrated the benefits of regular hand weeding at 20 DAS and 40 DAS.T_5 had the lowest plant height when compared to other treatments, this shows that intercropping with fodder cowpea reduces the plant growth. Similarly, the result was also observed by (Shamla *et al.*, 2017) [8].

Table 1: Effect of Non chemical weed management on plant height (cm) of Okra

Treatments	60 DAS	90 DAS	At Harvest
T_1	17.20	24.67	25.67
T_2	19.80	28.73	29.73
T_3	16.50	22.50	23.50
T_4	18.93	21.13	25.13
T_5	17.17	20.73	21.73
T_6	15.91	21.33	23.33
T_7	16.92	24.40	26.40
Mean	17.49	23.36	25.07
SE(m)	0.96	1.32	1.42
CD (p=0.05)	NS	4.06	4.38

3.1.2 Effect of Non chemical weed management on Leaves plants^{-1}

Table 2 the result of Leaves plants^{-1} is presence at 60 DAS, T_7 (20.23) recorded the highest Leaves plants^{-1} and there was no significant difference between treatments. The lowest Leaves plants^{-1} (16.57) was observed in T_1. At 90 DAS, the Leaves plants^{-1} was significantly influenced by the treatments, maximum Leaves plants^{-1} (24.33) was observed in T_3 and it was at par with T_4, T_6 and T_7 and was significantly superior over T_1, T_2, T_5 and T_6. The lowest Leaves plants^{-1} (16.67) was observed in T_2 and was at par with T_1, T_5 and T_6. At Harvest, also maximum Leaves plants^{-1} was observed in T_4 (26.69) and it was at par with T_3, and T_6 and was significantly superior over T_1, T_2, T_5 and T_7. The lowest Leaves plants^{-1} (19.33) was observed in T_2 and was at par with T_1, T_5 and T_7.

The result shows that T_4 had maximum number of leaves plants^{-1}. This was even superior than T_3 which received mechanical weeding by roto - weeder twice at 20 DAS and 40 DAS. The result suggests that mulching with black LDPE in the interspaces could be an effective strategy for improving number of leaves plants^{-1}. According to the result of (Rajasree *et al.*, 2017) [7] leaves plants^{-1} is similarly observed in okra. More number of leaves may be due to vigorous growth of the crop under less interference of weed. These results are in accordance with the findings of (Baraiya *et al.*, 2017) [2].

Table 2: Effect of Non chemical weed management on number of Leaves plants^{-1} of Okra

Treatments	60 DAS	90 DAS	At Harvest
T_1	16.57	18.00	20.30
T_2	16.81	16.67	19.33
T_3	18.58	24.33	26.31
T_4	20.05	23.00	26.69
T_5	16.62	17.00	19.72
T_6	19.01	20.00	22.01
T_7	20.23	21.67	19.68
Mean	18.27	20.09	22.01
SE(m)	0.93	1.00	1.20
CD (p=0.05)	NS	3.08	3.70

3.1.3 Effect of Non chemical weed management on days to first flowering

The results of days to first flowering is presented in table 3 for various treatments, among the all the treatments, T_7 (72.87) recorded the highest Days to first flowering and It was at par with T_5 and T_6. These treatments were significantly superior over T_1, T_2, T_3, T_4. The lowest Days to first flowering (59.75) was observed in T_1 and it was par with T_2, T_3, and T_4.

The result indicated that T_1 shows lowest number of days to flowering in which the package of practices followed by spraying oxyflouren at 0.25 kg ha^{-1} pre-emergence application on third day of sowing and one hand weeding at 30 DAS. And T_7 has maximum number of days to first flowering in which these findings were consistent with the previous research that demonstrated that plants in un-weeded control treatment took a greater number of days for first flowering. Similar findings were reported earlier by (Olabode *et al.*, 2007) [6]. According to them, plants in weedy check took a greater number of days for flowering because of higher competition from weeds.

Table 3: Effect of Non chemical weed management on Days to first flowering of Okra

Treatments	Days to first flowering
T_1	59.75
T_2	70.12
T_3	70.57
T_4	70.85
T_5	71.27
T_6	72.28
T_7	72.87
Mean	74.58
SE(m)	3.02
CD (p=0.05)	9.29

3.1.4. Effect of Non chemical weed management on dry matter production (kg ha^{-1})

Table 4 the result of days to first flowering is presence at 60 DAS, T_5 (6.21 kg ha^{-1}) recorded the highest dry matter production and it was at par with T2, T3, T4 and T6 significantly superior over other treatments. The lowest dry matter production (4.15 kg ha^{-1}) was observed in T_7. At 90 DAS, all the stages of observation in plant dry matter production were significantly influenced by the treatments, maximum dry matter production (19.53 kg ha^{-1}) was observed in T_5 and it was at par with T_3, and was significantly superior over T_1, T_2, T_4, T_6 and T_7. The lowest dry matter production (9.50 kg ha^{-1}) was observed in T_1 and was at par with T_2, T_4, T_6 and T_7. At Harvest, all the of observation in plant dry matter production was significantly influenced by the treatments, maximum dry matter production was observed in T_5 (25.50 kg ha^{-1}) and it was at par with T_3 and T_7 and was significantly superior over T_1, T_2, T_4 and T_6. The lowest dry matter production (13.80 kg ha^{-1}) was observed in T_4 and was at par with T_1, T_2, T_6.

The result shows that T_5 had the highest dry matter production which is even superior than T_6 which received one hand weeding at 20 DAS + 1 weeding with roto – weeder at 40 DAS. This demonstrates that intercropping with fodder cowpea effectively increases the dry matter production in plants. Lowest dry matter production was observed on mulching with black polythene sheet throughout the growth period. The superiority of black polythene sheet in suppression of weed growth was also reported by (Aniekwe *et al.*, 2013) [1].

Table 4: Effect of Non chemical weed management on dry matter production (kg ha^{-1}) of Okra

Treatments	60 DAS	90 DAS	At Harvest
T_1	4.33	9.50	19.53
T_2	5.34	12.14	16.20
T_3	5.67	17.90	22.63
T_4	5.12	14.06	13.80
T_5	6.21	19.53	25.50
T_6	5.21	12.10	18.30
T_7	4.15	14.50	20.10
Mean	5.15	14.25	19.44
SE(m)	0.26	0.66	0.86
CD (p=0.05)	0.79	2.03	2.66

3.1.5. Effect of Non chemical weed management on weed Control Efficiency

Data pertaining to weed control efficiency (WCE) of various weed management treatments are presented in Table 5.An appraisal of data indicated that treatment T_1 at 30 and 60 DAS recorded the highest weed control efficiency of 498.61% in 30 DAS and 91.48% in 60 DAS and it was closely followed by all other treatments T_5 (15.11% in 30 DAS and 96.22% in 60 DAS), T_2 (14.30% in 30 DAS and 95.50% in 60 DAS), T_6 (11.30% in 30 DAS and 90.32% in 60 DAS), T_3 (10.11% in 30 DAS and 89.65% in 60 DAS), T_4 (9.48% in 30 DAS and 87.34% in 60 DAS) and the lowest weed control efficiency in the experiment is T_4 when compare to all other treatments respectively.

The result shows that T_1 has maximum weed control efficiency which is even superior than all other treatment and These findings were consistent with the previous research that shows WCE of 87% with pre-emergence application of pendimethalin followed by two hand weeding. T_4 shows lowest weed control efficiency in which mulching with black LDPE is followed. As reported by (Muhammed *et al*, 2015) [5], better weed management in okra could be achieved by organic mulching, thereby increasing crop yield. (Sultana *et al*, 2008) [10] had also reported a WCE of 87% with pre-emergence application of pendimethalin followed by two hand weeding.

Table 5: Effect of non-chemical weed management practices on Weed Control Efficiency of Okra

Treatments		Weed Control Efficiency (WCE%)	
		30 DAS	60 DAS
T_1	Weed management as per package of practices and recommendations (Spray Oxyflourfen at 0.25 kg/ ha pre-emergence application on third day of sowing.) + One hand weeding in 50 DAS.	49.61	91.48
T_2	Hand weeding twice at 20 DAS and 40 DAS	14.30	95.50
T_3	Mechanical weeding by roto-weeder twice at 20DAS and 40DAS	10.11	89.65
T_4	Mulching with black LDPE in the interspaces	9.48	87.34
T_5	Intercropping with fodder cowpea and incorporation at flowering	15.11	96.22
T_6	One hand weeding at 20DAS+ 1 weeding with rotoweeder at 40 DAS	11.30	90.32
T_7	Control-No weeding	-	-

Conclusion

Through this study we can conclude that intercropping in okra with fodder cowpea will helps to reduce the weed intensity, and gives you additional profit, and also helps to enrich the soil by fixing nitrogen in to the soil. In our experiment the treatment T_5 (Combination of intercropping of Okra and fodder cowpea) has found superior treatment combination in controlling weed effectively through organically. And it also this treatment combination out yielded very good result for increasing yield and productivity of Okra when compared to other treatments.

Acknowledgement

The authors are thankful to the School of Agriculture and science, Karunya Institute of Technology and Sciences (Deemed University), for their support and providing required facilities to carrying this work.

References

1. Aniekwe NL. Comparative effects of organic and plastic mulches on the environment, growth and yield of okra in a derived savanna zone of Nigeria. Int. J Sci. Res. 2013;4(1):1860-1864.
2. Baraiya M, Yadav KS, Kumar S, Lal N, Shiurkar G. Effect of integrated weed management on growth and development of okra. The Pharma Innovation Journal 2017;6(7):1024-8.
3. Chacko SR, Raj SK, Krishnasree RK. Integrated weed management in vegetables. Journal of Pharmacognosy and Phytochemistry. 2021;10(2):2694-2700.
4. Gomez KA, Gomez AA. Statistical procedures for Agricultural Research. International Rice Research Institute. Book, Wiley-Inter Science Publishers, New York, USA; c984. p. 680.
5. Muhammed FBUP. Efficacy of mulches for weed management in okra (*Abelmoschus esculentus* (L.) Moench.). M. Sc. (Ag) thesis, Kerala Agricultural University, Thrissur; c2015. p. 95.
6. Olabode OS, Ogunyemi S, Adesina GO. Response of okra (*Abelmoschus esculentus* (L.) Moench.) to weed control by mulching. J Food Agric. Environ. 2007;5(3-4):324-326.
7. Rajasree VA, Sathiyamurthy T, Shanmugasundaram, T Arumug. Integrated Weed Management on Growth, Yield and Economics in Okra (*Abelmoschus esculentus* (L.) Moench) Under Kharif V. Madras Agric. J 2017;104(1-3):81-84.
8. Shamla K, Sindhu PV, Menon MV. Effect of weed management practices on growth and yield of okra (*Abelmoschus esculentus* (L.) Moench.). Journal of Tropical Agriculture. 2017;55(1):57-62.
9. Sharma S, Patel BD. Weed management in okra grown in kharif season under middle Gujarat conditions. Indian Journal of Weed Science. 2011;43(3&4):226-227.
10. Sultana R, Pathania NK, Angiras NN, Sood M.. Integrated weed management in brinjal (*Solanum melongena* L.). Himachal J Agric. Res. 2008;34(2):35-39.
11. Gautam KC, Mani VS, Sharma RK. A Note on Comparative Efficiency, Selectivity and Residual Toxicity of Some Soil-Applied Herbicides in Soybean1. Indian Journal of Weed Science. 1975;7(1):72-74.