INNSPUB

International Journal of Agronomy and Agricultural Research (IJAAR)
ISSN: 2223-7054 (Print) 2225-3610 (Online)
http://www.innspub.net
Vol. 11, No. 5, p. 1-6, 2017

RESEARCH PAPER OPEN ACCESS

Weed control methods in sesame

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Article published on November 30, 2017

Key words: Weeding, Sesame, Weed control efficiency, Dry weight and yield

Abstract

An experiment was conducted at the BARI, Regional Station, Jamalpur during kharif 2016 to find out the suitable weeding methods for controlling weeds in sesame. The experiment consisting of 05 treatments were: Pre-emergence of weeding, Pre-emergence with one weeding at 20 DAE, One weeding at 20 DAE, Two weeding at 20 and 40 DAE and Control. Sesame along with higher yield and net returns could be achieved by keeping the crop weed free in several times through hand weeding and pre-emergence of herbicide application. Two weeding at 20 and 40 DAE have more significant among treatments which results less dry weight (g), high weed control efficiency (WCE %) and high yield.

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Introduction

Sesame (*Sesame indicum* L.) is thought to be the oldest oil producing plant, and its seeds have the highest oil content close to 50% (Anonymous, 2006). Sesame was a major oilseed in the ancient world because of its easy extraction, great stability and drought resistance (Bedigian and Harlan, 1986). Mechanisation of sesame cultivation therefore requires good weed control for 50 to 60 days after planting (Langham *et al.*, 2007).

Consequently, the presence of weeds can reduce the sesame yield (Ibrahim *et al.* 1988, Beltrao *et al.* 1991, Grichar *et al.* 2001a, b). Reduction of up to 65% in sesame yield has been reported and sesame needs a critical weed-free period of up to 50 days after planting (Hussein *et al.*, 1983, Beltrao *et al.*, 1991, Grichar *et al.*, 2001a, b). Depending on row spacing and phenotype, mechanization of sesame requires careful weed management for the first 30 to 60 days after planting (Langham, 2007). Kropff and Spitters (1991) reported that the major factor influencing sesame yield in a competitive situation is the ratio between the relative leaf area of the weed and the crop at the time of crop canopy closure.

The effects of weeds on sesame establishment and growth have been well-documented. Balyan (1993), Gurnah (1974), Singh *et al.*, (1992) and Upadhyay (1985) reported weed induced reductions of sesame yield up to 65% and a need for a critical weed-free period up to 50 days after planting. Under weedy conditions, Eagleton *et al.*, (1987) recorded a weed biomass six times that of sesame 48 days after planting and Bennett (1993) reported a weed biomass 1.3 fold that of sesame 42 days after planting.

A pre-emergence herbicide is applied to the soil before emergence of the specified weed or crop, whereas a post emergence herbicide is applied after emergence of the specified weed or crop (Senseman, 2007).

As a part of this programme was conducted to find out the suitable weeding methods for controlling weeds in sesame.

Methods and materials

The experimental site was of medium high land belonging to the agro-ecological zone Old Brahmaputra Floodplain under Agro-Ecological Zone 9 (UNDP & FAO, 1988).

Design of the experiment was RCB with 03 (three) replications having the unit of plot 4m × 4m. BARI Til-4 (sesame variety) used as a variety in the experiment.

Treatments included in the experiment were: a. Pre-emergence of weeding b. Pre-emergence with one weeding at 20 DAE c. One weeding at 20 DAE d.

Two weeding at 20 and 40 DAE e. Control. Fertilizers were applied 58-30-25-20-2 kg ha^{-1} of N-P-K-S-Zn in the form of Urea, triple super phosphate, Muriate of potash, Zypsum, Zinc and Sulphate respectively.½ N and all other fertilizers as basal. Rest N will be applied at 25 DAS. Seeds are sown in 10 February, 2016. Intercultural operations like watering, weeding and spraying insecticides were followed as and when necessary. Irrigation was applied if necessary.

Five plants of sesame in each plot were selected randomly to collect data on yield components. Collected data were analyzed statistically with the help of STAR software and mean separation was done as per LSD test at 5% level of significance. Economic analysis was performed considering the price of sesame and herbicide in the local market.

Results and discussions

Diversity in weed species

In Table 1 seventeen different weed species belonging to 7 families were found growing in the experimental field. Fourteen species were annuals, while three were perennial. Among these, the grass family was the most common with five species.

The common name, family and intensity of weed types of these weeds are presented in the Table 1.

Table 1. Weed species, family names and their intensity of infestation in the experimental plots.

Sl. No	Weed species	Family of weeds	Intensity of weeds
01	Bermuda grass	Graminae	high
02	Small burnyard grass	Graminae	low
03	Burn yard grass	Graminae	low
04	Prostrate spurge	Euphorbiaceae	low
05	Milk weed	Euphorbiaceae	low
06	Lambs quarter	Chenopodiaceae	low
07	Water primersse	Compositae	low
08	Joina	Compositae	low
09	Goose/crab grass	Compositae	low
10	Small crab grass	Compositae	low
11	Wild heliotroph	Borannaceae	low
12	Kakpaya grass	Poaceae	low
13	Goicha	Poaceae	low
14	Mona grass	Compositae	low
15	Yellow nutsedge	Cyperaceae	low
16	Badail	Cyperaceae	high
17	Halud nakfuli	Compositae	low

Among the infesting species of weeds bermuda grass, burn yard grass, goicha, and badail were the most important ones in terms of value.

Growth and yield of sesame

As presented in Table 2, a number of different characteristics except seed yield were not statistically significant with the treatments: plant height, number of branches plant^{-1}, number of capsules plant^{-1}, number of seed capsule^{-1}, seed yield.

Table 2. Effect of weeding regime on the crop characters of sesame.

Treatments	Plant height (cm)	No of branches plant^{-1}	No of capsules plant^{-1}	capsules length	No. of seeds capsule^{-1}	Seed yield (kg ha^{-1})
Pre-emergence of weeding	60.4	1.87	12.4	2.05	39.22	260
Pre-emergence with one weeding at 20 DAE	69.2	2.93	20.8	2.02	45.22	490
One weeding at 20 DAE	67.8	3.07	23.73	2.04	45.07	440
Two weeding at 20 and 40 DAE	76.07	3.13	25.8	2.15	46.83	510
Control	57.27	1.73	14.37	1.97	38.2	310
CV (%)	13.03	25.39	28.1	9.93	19.53	23.01
Lsd	-	-	-	-	-	0.174

The two weeding at 20 and 40 DAE and one weeding at 20 DAE treatment resulted significantly superior performance over no weeding in respect of plant height, number of branches plant^{-1}, capsules length, number of capsules plant^{-1}, number of seeds capsule^{-1} and seed yield.

The tallest plant was observed in two weeding at 20 and 40 DAE with statistically similar value with pre-emergence with one weeding at 20 DAE, whereas the lowest value was in control plots.

In the case of number of branches plant^{-1}, all treatments (except the pre-emergence of weeding and control plots) produced statistically identical (that is, not statistically significant difference) in branches. The number of capsules plant^{-1}, capsules length and number of seeds capsule^{-1} resulted in a similar trend giving the highest value in the two weeding at 20 and 40 DAE followed by one weeding at 20 DAE; the pre-emergence of weeding and control were last. The highest seed yield was obtained from two weeding at 20 and 40 DAE followed by pre-emergence with one weeding at 20 DAE and one weeding at 20 DAE.

Weed parameters

Weed population count

The total number of weeds present in 0.25 m^2 area in a permanently marked sampling area was counted at 20, 40 and 60 DAS in each treatment.

Dry weight of weeds (g/0.25 m^2)

Dry weight of weeds was recorded at periodical intervals *i.e.*, 20, 40 and 60 DAS in each treatment. The weeds were uprooted from the 0.25 m^2 area selected at random each time and were oven dried to a constant weight at 75°C and the oven dry weight of weeds was recorded. The dry weight of weeds was expressed as g per 0.25 m^2.

Table 3. Effect of weed control on weed parameters of sesame.

Treatments	Weed dry matter (g/0.25 m^2)				Weed density (g/0.25 m^2)				WCE (%)	WI (%)
	20 DAS	40 DAS	60 DAS	Total	20 DAS	40 DAS	60 DAS	Total		
Pre-emergence of weeding	13.24	41.25	127.38	181.87	59	44.75	59.5	163.25	7.13	49.02
Pre-emergence with one weeding at 20 DAE	6.97	17.68	92.41	117.06	27.3	33.25	52.75	113.3	40.23	3.92
One weeding at 20 DAE	7.91	20.45	73.31	101.67	33	43.75	55.5	132.25	48.1	13.73
Two weeding at 20 and 40 DAE	8.11	19.82	29.02	56.95	29.5	41.25	41.5	112.25	70.92	0
Control	16.1	48.11	131.63	195.84	55	69.25	85.75	210	0	39.22

Weed control efficiency (%)

Weed control efficiency (WCE) denotes the magnitude of weed reduction due to weed control treatment. It was worked out by using the formula suggested by Mani *et al.* (1973) and expressed in percentage.

$$WCE\,(\%) = \frac{\text{Dry weight of weeds in unweeded control} - \text{dry weight of treatment plot}}{\text{Dry weight of weeds in unweeded control}} \times 100$$

Weed index (%)

Weed index is defined as the magnitude yield reduction due to presence of weeds in comparison with weed free check. In other words weed index expresses the competition offered by weeds measured by per cent reduction in yield owing to their presence in the field (Gill and Vijayakumar, 1969).

Weed index was calculated by using following formulae. Weed index (%) = $\frac{X-Y}{X} \times 100$

Where

x = Total yield from the weed free check

y = Total yield from the treatment for which weed index has to be calculated.

Results and discussion

Weed population count

The total number of weeds was highest in control treatment followed by pre-emergence of weeding while, significantly lowest total number of weeds were found in two weeding at 20 and 40 DAE. Similar results were also obtained by Pandey *et al.* (1992) in onion.

Total dry weight of weeds (g/0.25 m²)

The total dry matter accumulation of weeds was significantly higher in control treatment and the lowest total dry weight of weeds was observed with two weeding at 20 and 40 DAE followed by pre-emergence with one weeding at 20 DAE and one weeding at 20 DAE these data were recorded after 20, 40, 60 DAS respectively. The lower weed dry weight in weed control treatments may be ascribed to the less number of weeds, rapid depletion of carbohydrate reserves of weeds through rapid respiration (Dakshinadas, 1962) and may be due to reduced photosynthetic activity (Hilli and Santkemann, 1969).

Table 4. Economic performances of sesame.

Treatments	Yield kg ha^{-1}	Total cost of cultivation (Tk ha^{-1})	Gross return (Tk ha^{-1})	Gross margin (Tk ha^{-1})	BCR
Pre-emergence of weeding	260	20750	31200	10450	1.5
Pre-emergence with one weeding at 20 DAE	490	28250	58800	30550	2.1
One weeding at 20 DAE	440	26250	52800	26550	2.01
Two weeding at 20 and 40 DAE	510	37800	61200	23400	1.62
Control	310	18750	37200	18450	1.98

Price: sesame Tk. 120 kg^{-1}.

Weed control efficiency (WCE %)

In Table 3 among the different treatments of weed control efficiency was found significantly higher two weeding at 20 and 40 DAE and the lowest WCE was observed in pre-emergence of weeding. These data were calculate after 20, 40 60 DAS respectively. Similar results have been obtained by Nadagouda (1995) and Nekar (1997).

Economic performance

In Table 4 the result indicated that the highest gross return (Tk. 61200/ha) and cost of cultivation (Tk. 37800/ha) were obtained from two weeding at 20 and 40 DAE followed by pre-emergence with one weeding at 20 DAE. The highest gross margin (Tk 30550/ha) and BCR (2.1) were obtained from pre-emergence with one weeding at 20 DAE followed by one weeding at 20 DAE.

Conclusion

The present study revealed that sesame along with higher yield and net returns could be achieved by keeping the crop weed free in several times through hand weeding and pre-emergence of herbicide application. Two weeding at 20 and 40 DAE have more significant among treatments which results less dry weight (g), high weed control efficiency (WCE %) and high yield.

References

Anonymous. 2006. Sesame: Past and Future. SPORE. (CTA), Netherland, **125,** 5-6.

Balyan RS. 1993. Integrated weed management in oilseed crops in India. Indian Soc Weed Sci.

Bedigian D, Harlan JR. 1986. Evidence for cultivation of sesame in the ancient world. Econ Bot **40,** 137–154.

Beltrao NE, Vieira DJ, Nobrega LB, Santos JW. 1991. Effects of fertilizers, cultivar and weed control in sesame. Pesq Agropec Brasil **26,** 605–611.

Bennett M. 1993. Sesame Research Report 1991-92. Wet season, Katherine. Northern Territory, Australian Dept. of Primary Industries and Fisheries, Technical Bulletin No. 215.

Dakshinadas DS. 1962. Mode of action of plant growth regulator type weedicides Indian J. Agron., **6,** 233-244.

Eagleton G, Sandover S, Dickson M. 1987. Research Report: Sesame Seed 1982-1986. Dept. Agric. Kununurra, West Australia.

Gill GS, Vijayakumar. 1969, "Weed index" A new method for reporting weed control trials. Indian J. Agron., **16,** 96-98.

Grichar WJ, Sestak DC, Brewer KD, Besler BA, Stichler CR, Smith DT. 2001a. Sesame (*Sesamum indicum* L.) tolerance and weed control with soil-applied herbicides. Crop Protect **20,** 389–394.

Grichar WJ, Sestak DC, Brewer KD, Besler BA, Stichler CR, Smith DT. 2001b. Sesame (*Sesamum indicum* L.) tolerance with various postemergence herbicides. Crop Protec **20,** 685–689.

Gurnah A. 1974. Critical weed competition periods in annual crops. Proceedings of the Fifth East African Weed Control Conf., Nairobi, Kenya, 89-98 p. www.intechopen.com Weed Control and the Use of Herbicides in Sesame Production.

Hilli LV, Santlemann PV. 1969. Comparative effect of annual weeds on Spanish peanut. Weed Sci., **17,** 1-2.

Hussein MA, El-Hatlab AH, Abd-El Raouf MS, Shaban SA, El-Deek MH. 1983. Effect of soil herbicides on weeds, yield and quality of sesame (*Sesamum indicum*). Pflanzenbau **152,** 173–185.

Ibrahim AF, Wekil HR, Yehia ZR, Shaban SA. 1988. Effect of some weed control treatments on sesame (*Sesamum indicum* L.) and associated weeds. J Agron Crop Sci **160,** 319–324.

Kropff M, Spitters C. 1991. A simple model of crop loss by weed competition from early observations on relative leaf area of weeds. Weed Res. **31,** 97-105.

Langham DR, Grichar WJ, Dotray PA. 2007. Review of preemergence herbicide research on sesame. (Available at: www.sesamegrowers.org)

Mani VS, Malla ML, Gautam KC. 1973. Bhagwndas., Weed killing chemicals in potato cultivation. Indian Farm., VXXII, 17-18.

Nadagouda BT. 1995. Integrated weed management in drill sown onion (*Allium Cepa* L.). M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India),

Nekar M. 1997. Integrated weed management in garlic (*Allium Cepa* L.) in Northern transition tract of Karnataka. M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India),

Pandey RP, Shukla N, Tiwari JP. 1992. Efficacy of herbicidal weed control in onion Indian J. Weed Sci., **22,** 34-37.

Senseman S. 2007 (Editor). Herbicides Handbook. 9th ed. Lawrence, KS: Weed Science Society of America. 458 p.

Singh D, Dagar J, Gangwar B. 1992. Infestation by weeds and their management in oilseed crops – a review. Agric. Rev. **13,** 163-175.

UNDP – FAO. 1988. Land resources appraisal of Bangladesh for agricultural development. Report to Agro-ecological regions of Bangladesh. UNDP- FAO, BGD/81/ 035 Technical Report 2 . 570 p.

Upadhyay U. 1985. Weed management in oilseed crops. In Oilseed Production Constraints and Opportunities. Srivastava, H., Bhaskaran, S., Vatsya, B., Menon, K.K.G. (Eds.), 491-499 o, New Delhi, Oxford & IBH Publishing Co. **1,** 317–323.69.