E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; 7(3): 163-165
Received: 20-12-2023
Accepted: 25-01-2024

Kalal PH
Assistant Professor,
Department of Agronomy,
Rai School of Technology,
Ahmedabad, Gujarat, India

Desai LJ
Research Scientist, OFR, SDAU,
Banaskantha, Gujarat, India

Virdia HM
Professor & Head, Department of Agronomy, N.M. C. A., N.A.U.,
Navsari, Gujarat, India

Corresponding Author:
Kalal PH
Assistant Professor,
Department of Agronomy,
Rai School of Technology,
Ahmedabad, Gujarat, India

Effect of integrated weed management on oil quality and oil yield of linseed (*Linum usitatissimum* L.) under south Gujarat condition

Kalal PH, Desai LJ and Virdia HM

DOI: https://doi.org/10.33545/2618060X.2024.v7.i3c.399

Abstract
At the college farm of the N. M. College of Agriculture, NAU, Navsari, an experiment was conducted to determine how integrated weed control affects the oil production and quality of linseed (*Linum usitatissimum* L.) during the Rabi season of 2016-2017. When labour is readily accessible, keeping the crop weed-free during the crop's growth period can boost output potential, increase profit, and effectively manage weeds while also improving the quality of the oil in the linseed. Pendimethalin was equally effective in the absence of labour at 0.75 kg/ha PE fb 2, 4-D and 0.50 kg/ha PoE, 40 DAS.

Keywords: Linseed, weed management, economics, pendimethalin, isoproturon, 2, 4-D, oil quality

Introduction
Linseed, often known as flax, is one of the earliest crops farmed for its oil and fibres. It is part of the family *Linaceae* and genus *Linum*. In book of "Species Plantarum" (Linnaeus, 1857), Linnaeus gave it the scientific name *Linum usitatissimum*. It is an annual herbaceous plant with short roots. Linseed and flax, respectively, are the common names for *L. usitatissimum* in North America and Asia. Oilseed and fibre cultivars of this plant have developed over time. The varieties that are specifically cultivated for the aim of producing plants are short and have more secondary branches and seed capsules. Straight, tall-growing culms with few secondary branches characterise the cultivars created for the production of fibre. The fruit is a globose capsule with shiny, flattened, brown seeds and a short, blunt beak on an upright annual herb plant with blue or white flowers and erect terminal panicles.

Oil content ranges from 33% to 47% in the seed. A tiny amount is utilized directly for food purposes. Farmers 20% of the total oil produced is used., whilst the remaining 80% is utilized by industry in a number of ways, such as boiling oil, borated oil, eposidized oil, aluminated oil, urethane oil, and isomerized oil, and so on. Each and every part of the linseed plant has a commercial use, whether it is used raw or processed. Linseed seeds are rich in omega-3 fatty acids, various minerals, and dietary fibres called lignans. The oil (Which has a linolenic acid content of >66%) performs well as a drying oil. Despite costing 50% more than rapeseed-mustard cake, the oil cake is an acceptable animal feed for dairy cows and poultry. It has a delightful flavour and 36% protein, of which 85% is digestible. The production of organic manure also uses it. It contains 1.4% P_2O_5 and 1.8% K_2O, and about 5% N. 100 g of linseed contain 28.88 g of carbohydrates, 1.55 g of sugar, 42.16 g of fat, 18.29 g of protein, and 27.39 g of dietary fibre, according to Anonymous (2013) [2]. Around 55% of the oil in linseed, which contains around 40% oil overall by weight, is alpha linolenic acid (omega-3 fatty acid), which has anti-inflammatory properties in the treatment of arthritis. Additionally, it has the capacity to lower mammalian cholesterol levels. Heart disease, arthritis, and cancer can all be treated with linseed.

Weed is one of the issues impacting linseed production, and it is responsible for a significant loss of output. Weeds produce an alarming drop in production of linseed ranging from 20-40% to complete loss in crop yield, with a key period for weed treatment of 20-25 days. Weeds struggle for water, sunlight, space, and nutrients along with agricultural crop plants.

According to scientific evidence, reducing or eliminating interference of unwanted plants can boost seed and oil yield of linseed. Weeds, due to their slow starting growth, produce significant yield decreases in linseed if left unchecked. Loss of crop yield are lesser if limited unwanted plants are present, but significant infestation may result in yield losses, and in some circumstances, once perennial weeds have established, the area cannot be used for agricultural production until the infestation is eliminated. Weed presence during the cropping season reduced seed production by 35-45%.

Materials and Methods

A field experiment was carried out during the 2016–17 rabi season on plot B–12 of the College Farm at the N. M. College of Agriculture, NAU, Navsari. The campus of the NAU is situated 10 metres above mean sea level at 20º 57' N latitude and 72º 54' E longitude. There are twelve treatments, including the following weed control methods: T_1: Weeded free; T_2: A single hand weeding at 20 DAS; T_3: A pair of hand weedings at 20 and 40 DAS; T_4: Pendimethalin 1.0 kg/ha PE. T_5: Isoproturon, 1.0 kg/ha PoE, 20 DAS; T_6: 2,4-D, 0.5 kg/ha, PoE, 20 DAS; T_7: Pendimethalin, 0.75 kg/ha PE fb Isoproturon, 0.75 kg/ha PoE, 40 DAS; T_8: Pendimethalin, 0.75 kg/ha fb 2,4-D, 0.5 kg/ha PoE, 40 DAS; T_9: Pendimethalin 0.75 kg/ha plus manual weeding at 40 DAS; T_{10}: Isoproturon 0.75 kg/ha PoE, 20 DAS plus manual weeding at 40 DAS; T_{11}: 2,4-D 0.5 kg/ha PoE, 20 DAS plus manual weeding at 40 DAS; T_{12}: Weedy check. Treatments were tested using a RBD and three replications. The experimental soil was clayey in texture, Available nitrogen content was low (254.01 kg/ha), available phosphorus content was medium (32.67 kg/ha), and available potassium content was moderately rich (430.08 kg/ha). The soil's pH was somewhat alkaline (7.64), and it had a good capacity for retaining moisture. Local variety linseed was sown in November 23, 2016, and it was harvested in March 10, 2017. Fertilizer was applied to the crop in the amount of 60 kg N and 30 kg P_2O_5/ha. An observation on yield, namely yield of seeds and stover (kg/ha), oil content (%), oil yield (kg/ha), and economics.

Results and Discussion

Effect on yield and yield attributes

The highest seed and stover yields (1420 and 2962 kg/ha, respectively) were achieved by the weed-free treatment (T_1). Test weight did not significantly respond to weed control methods, but the overall yield parameters of seed yield (kg/ha) and stover yield (kg/ha) did (Table 2). T_8, which involved applying pendimethalin at a rate of 1.0 kg/ha before to emergence, and then 2,4-D at a rate of 0.5 kg/ha at 40 DAS, was comparable to T_3, T_9, T_7, and T_3. Compared to the weedy control (T_{12}), the grain yield increased by 56.2% under treatment T_1, 56.10% under treatment T_8, 53.4% under treatment T_9, and 52.04% under treatment T_7. The percentage increase in stover production attributable to weed-free conditions (T_1) was 71.3% above weedy checks (T_{12}), whereas increases attributable to weed-free conditions (T_8), (T_3), (T_9), and (T_{12}) were 70.4%, 68.6%, and 66.7% respectively. Due to effective weed management during these treatments, weed-free conditions were maintained throughout the crucial crop weed competition phase, which contributed significantly to the increase in seed output. The buildup of photosynthates, which leads to improved growth and yield qualities, is the main determinant of seed production. Therefore, it can be assumed that significant improvements in these traits have resulted in increased grain output. The yield loss study also demonstrates that weed management between 25 and 30 DAS, whether through post-emergence herbicide application, manual weeding, or both, results in a reduced yield loss. According to this study, if plants developed noticeably better in terms of plant height, branch count, and dry matter production per plant, those treatments could dramatically increase seed and stover yield. Linseed showed a comparable influence, as reported by Giriyapla *et al*. (2016) [3] and Jain and Jain (2016) [4].

Effect on Oil quality and Oil yield

The data on quality in terms of content (%) and yield (kg/ha) of oil are presented in Table 1.

Table 1 shows that different weed management techniques have no significant effect on oil content. Numerically, the weed free treatment (T_1) had the highest content (39.93%), while the weedy check had the lowest amount (34.63%) compared to the other treatments. The maximum oil concentration were found in (T_1) weed-free condition. This could be due to a hereditary trait that cannot be changed through agronomic practices. Kumar *et al*. (2012) and Husain *et al*. (2015) [9] reported similar findings.

The effects of various weed management techniques on oil yield were substantial (Table 1). Weed free treatment (T_1) had a considerably greater oil output (567.3 kg/ha), while treatments T_8 (533.9 kg/ha), T_3 (505.1 kg/ha), T_9 (499.8 kg/ha), and T_7 (480.6 kg/ha) were statistically equal. The weedy check had the lowest oil yield (214.1 kg/ha) compared to the other treatments. Higher oil yields were obtained with treatment T_1 due to higher seed yields, which were directly responsible for higher oil yields. Weedy check had a lower oil output (T_{12}, 214.1 kg/ha). Husain *et al*. (2015) [9] indicated that the enhanced oil yield with two-handed weeding may be due to weedicides' detrimental effects on crop development and the transfer of nutrients from soil to plants.

Table 1: Oil parameters influenced by various weed management treatments

Treatments		Seed yield (kg/ha)	Stover yield (kg/ha)	Oil content (%)	Oil yield (kg/ha)
T_1	Weed free	1420	2962	39.9	567
T_2	One HW at 20 DAS	0955	1646	35.3	336
T_3	Two HW at 20 and 40 DAS	1321	2708	38.1	505
T_4	Pendimethalin 1.0 kg/ha PE	1181	2337	36.1	428
T_5	Isoproturon 1.0 kg/ha PoE, 20 DAS	0979	1958	36.0	353
T_6	2,4-D 0.5 kg/ha, PoE, 20 DAS	0969	1864	39.1	378
T_7	Pendimethalin 0.75 kg/ha PE *fb* Isoproturon 0.75 kg/ha PoE, 40 DAS	1297	2465	37.1	480
T_8	Pendimethalin 0.75 kg/ha *fb* 2,4-D 0.5 kg/ha PoE, 40 DAS	1417	2872	37.9	533
T_9	Pendimethalin 0.75 kg/ha + One HW at 40 DAS	1334	2576	37.5	499
T_{10}	Isoproturon 0.75 kg/ha PoE, 20 DAS + One HW at 40 DAS	1045	2090	36.2	378
T_{11}	2,4-D 0.5 kg/ha PoE, 20 DAS + One HW at 40 DAS	1021	1997	37.6	384

T_{12}	Weedy check	622	851	34.6	214
	S.Em. ±	74.43	146.5	1.79	33.7
	C.D at 5%	232	456	NS	105
	C.V. %	11.41	11.57	8.37	13.8

Note: HW: Hand weeding, DAS: Days after sowing

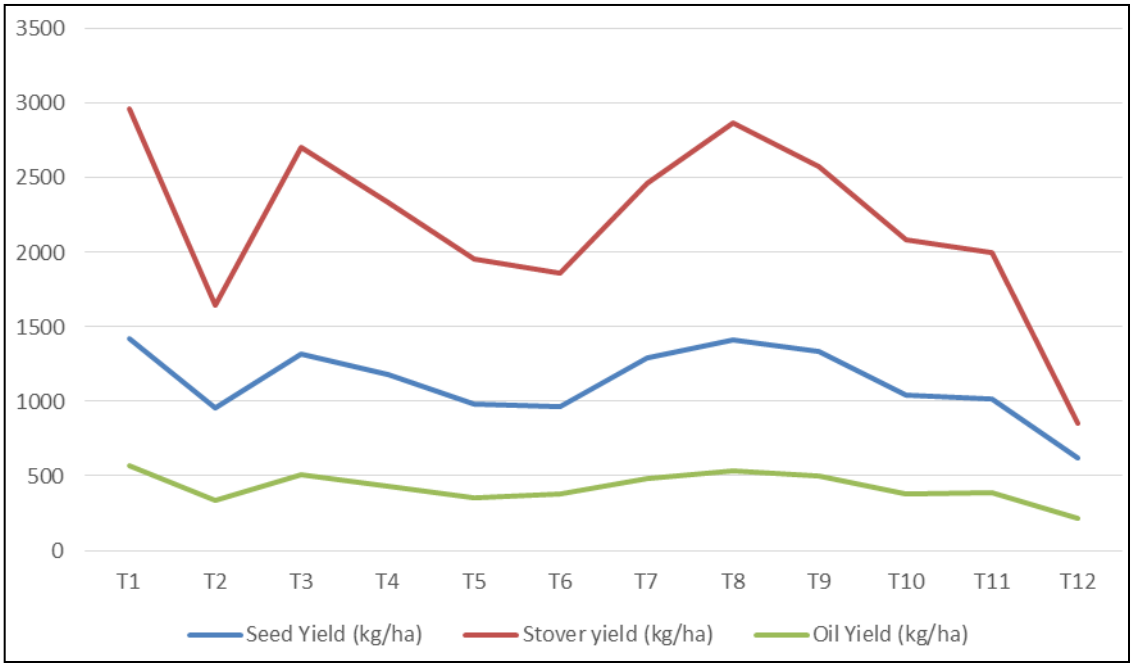

Fig 1: Oil parameters influenced by various weed management treatments

Conclusion

Depending on the findings of the field experiment, it seems reasonable to assume that keeping weed-free by hand weeding during the crop growth phase, while labour is still easily accessible, can increase production potential, higher profit, and effective oil content and yield from linseed. Pendimethalin 0.75 kg/ha PE *fb* 2,4-D 0.5 kg/ha PoE, 40 DAS was similarly efficient in the absence of labour.

References

1. Angiras NN, Badiyala D, Singh CM. Comparative efficacy of herbicides for weed control in flax (*Linum usitatissimum* L.). Indian Journal of Weed Science. 1991;23(3-4):19-23.
2. Anonymous. Linseed; c2013 [cited 2024 Mar 8]. Available from: www.wikipedia.org/linseed.
3. Giriyapla S, Chittapur BM, Biradar SA, Koppalkar BG, Swamy M. Bio-efficacy of herbicides for weed management in linseed (*Linum usitatissimum* L.). Journal of Farm Science. 2016;29(1):19-22.
4. Jain DN, Jain V. Weed management with pre- and post-emergence herbicides in linseed. Indian Journal of Weed Science. 2016;48(1):93–94.
5. Kalhapure AH, Shete BT, Bodake PS. Integration of chemical and cultural methods for weed management in groundnut. Indian Journal of Weed Science. 2013;45(2):116–119.
6. Kumar P, Nagaich VP. Studies on bio-efficacy of new herbicides for weed management in irrigated linseed. Progressive Research (Special); c2013. p. 219-220.
7. Mane SV, Kanade VM, Shendage GB, Sarawale PP, Shetye VN. Weed management in sesamum (*Sesamum indicum* L.) grown under coastal region of Maharashtra. Journal Indian Society Coastal Agricultural Research. 2017;35(1):31-33.
8. Panse VG, Sukhatme PV. Statistical methods for Agricultural workers. New Delhi: ICAR; c1985. p. 187-197.
9. Shahiri AM, Husain W. A review on predicting student's performance using data mining techniques. Procedia Computer Science. 2015 Jan 1;72:414-22.