



P-ISSN: 2349-8528

E-ISSN: 2321-4902

[www.chemijournal.com](http://www.chemijournal.com)

IJCS 2021; 9(1): 3630-3633

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Received: 15-11-2020

Accepted: 19-12-2020

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## Quality parameters in linseed (*Linum usitatissimum* L.) varieties grown under sodic soil

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DOI: <https://doi.org/10.22271/chemi.2021.v9.i1ay.11795>

### Abstract

The present study entitled "Evaluation of fatty acid profile and nutritional quality of some linseed (*Linum usitatissimum* L.) varieties grown under sodic soil" was conducted at Agronomy Research Farm and analysis was carried out in the Laboratory of Department of Agricultural Biochemistry, A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) during Rabi season in the year 2017-18 and 2018-19. Ten varieties of linseed NDL-1 NDL-3 Parvati, Shikha, Shubhra, Shekhar, Chambal, T-397, Mukta, and Garima, were collected from department of Genetics and plant breeding of this University, and used as experimental material in the field trail. The seeds of linseed varieties were sown in Completely Randomized Design with three replications on 2017-18 and 2018-19. The row to row and plant to plant spacing was kept 10 cm and 30 cm, respectively.

The seeds were sown at the rate of 30-40 kg per hectare. All agronomical practices were adopted to achieve a good crop. After harvesting the seeds of each variety were collected separately and used for the analysis various physical parameters. The seeds of each varieties were ground into fine powder stage and stored in air tight container for further physical parameters such as number of pods per plant, 1000-seed weight, colour of seeds, yield per plant. The data obtained in the experiment showed the Morphological characters such as number of pods per plant 59.80 to 45.50 pods and 59.88 to 45.53 pods, 1000 seed weight 08.23 to 06.50 g and 8.27 to 06.53 g, in variety NDL-3 and Garima, seed yield per plant 8.70 to 06.80 (g) and 08.70 to 06.83(g) during year 2017-18 and 2018-19, respectively. Variety Garima and NDL-3, recorded maximum and yield parameter was superior in physical parameters.

**Keywords:** number of pods per plant, 1000-seed weight, colour of seeds, and yield per plant. Where quality (plant mention some quality data)

### Introduction

Flax seed (*Linum usitatissimum* L.) is belongs to linaceae family having diploid chromosome number ( $2n=30$ ). Flax seed is presently grown for its oil and rich source of fatty acid by increased on health benefit. Flax seed suffers from the fact that the level of fatty acid instauration in the triglyceride oil is high and is subject to oxidative polymerization. The industrial properties of linseed oil are legendary for use in linoleum and paint products. There has been considerable interest shown in a class of minor compounds contained in flax seed collectively referred as lignans. The main lignan in flax seed is secoisolariciresinol diglucoside (SDG), which is present in large quantities. The lignans are generally cinnamic acid dimmers containing a dibenzylbutane skeleton. When part of the human diet, contain lignans are believed to be converted into mammalian lignans known as enterolactone and enterodiol. Essam (2012) [5]. Observed that flax seeds are the richest source of  $\alpha$ -linolenic acid and lignans. It is also a considerable potential source of soluble fiber, antioxidant and high quality protein. The role of flaxseed lignans and  $\omega$ -3 fatty acid in reducing the risks associated with cardiac and coronary disease, atherosclerosis, diabetes, cancer (breast colon, ovary and prostate) arthritis, osteoporosis, autoimmune, neurological disorders and other human health risk factor has been well known. Flax protein helps in the prevention and treatment of heart disease and in supporting the immune system. Flaxseed can contribute in improving the availability of healthy food choices, specifically by improving the nutrient profile of foods through reductions in the salt, sugar and saturated fat content; and by increasing the content of  $\omega$ -3 fatty acids and other bioactive compounds. (Goyal, 2014) [6].

The major linseed growing states in India are Madhya Pradesh, Chhattisgarh, Maharashtra, Uttar Pradesh and Orissa which all together contributes more than 83 per cent of total linseed

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area under production. During 2015-16 in India, the linseed had an area of 3.592 lakh hectare with the production of 1.465 lakh tonnes and productivity 408 kg per ha. Uttar Pradesh occupied an area of 0.65 lakh hectare with the production of 0.294 lakh tonnes and productivity 453kg/ha (Anonymous *et al.*, 2015)<sup>[1]</sup>.

These health benefits are mainly attributed to the high content of essential omega-3 fatty acid, alpha-linolenic acid, dietary fiber and biologically active components such as lignans, phenolic acids and flavonoids (Westcott and Paton, 2001; Tarpila *et al.*, 2005; Hosseinian *et al.*, 2006)<sup>[14, 13, 8]</sup>.

### Material and methods

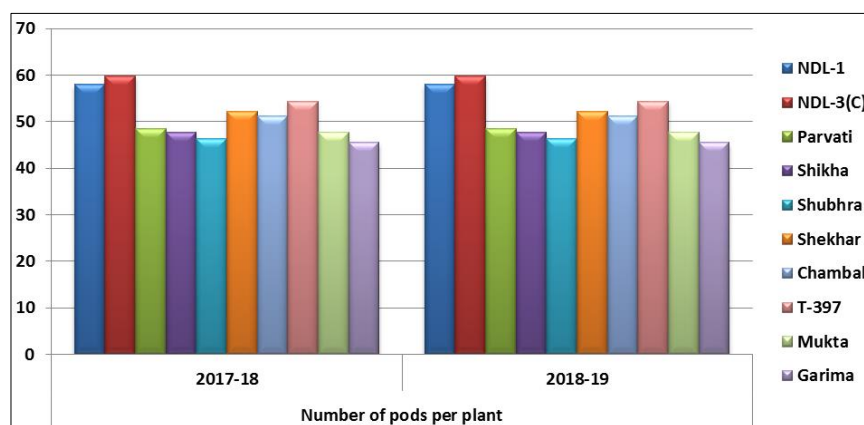
The experiment was conducted from Department of Agronomy Research Farm and laboratory of Agriculture Biochemistry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj Ayodhya (UP). During the Rabi season 2017-18-2018-19. The climate of Ayodhya comes under the category of semi-arid. The Physical Parameters were as total number of seeds bearing mature capsules were counted separately from sampled five plants in each row and averaged out for single plant. 1000 seeds were collected randomly, counted manually and weighed with the help of an electronic balance and finally weight was recorded up two decimal places in gram. This parameter was recorded by visual observation. The total seeds produce from six randomly taken plants, after threshing and cleaning were weighed in grams with the help of electronic balance and averaged out for seed yield per plant (g).

### Results and Discussion

The Number of pods per plant ranged from 45.50 to 59.80 pods per plant and 45.53 to 59.88 pods per plant in the year 2017-18 and 2018-19, respectively. Among all ten varieties NDL-3 resulted maximum number of pods per plant in both of the year which was found 59.80 (2017-18) and 59.88 pods per plant (2018-19). These differences may be due to changes in genetical characteristics, time of sowing and irrigated/ rain fed condition. The results indicate close correlation with the observations of Strasil and Vorlicek (2004)<sup>[12]</sup> Grant *et al.* (1999)<sup>[7]</sup>.

**Table 1:** Variation of Number of pods per plant of linseed varieties

S. No.	Varieties	Number of pods per plant	
		2017-18	2018-19
1.	NDL-1	58.03	58.07
2.	NDL-3(C)	59.80	59.88
3.	Parvati	48.50	48.57
4.	Shikha	47.63	47.67
5.	Shubhra	46.27	46.30
6.	Shekhar	52.23	52.27
7.	Chambal	51.27	51.30
8.	T-397	54.37	54.40
9.	Mukta	47.77	47.80
10.	Garima	45.50	45.53
	SEm ±	0.45	0.46
	CD at 5%	1.29	1.32



**Fig 1:** Variation of Number of pods per plant of linseed varieties

Variation in 1000 seed weight was found 6.50 to 8.23 g and 6.53 to 8.27 g in the year 2017-18 and 2018-19, respectively. Out of ten linseed varieties NDL-3 recorded maximum 1000 seeds weight in both of the year which was found 8.23 and 8.27 g, respectively Variation in 1000 seeds weight might be

due to variations in the genetical characteristics, time of sowing and irrigated/ rainfed condition. The results are in agreement with the reports of Diepenbrock *et al.* (1995)<sup>[4]</sup> D'Antuono *et al.* (1995)<sup>[3]</sup> Arora *et al.* (2003)<sup>[2]</sup> Zajac (2005)<sup>[15]</sup>, Klimek- Kopyra *et al.* (2013)<sup>[9]</sup>.

**Table 2:** Variability of Test weight (g) of linseed varieties

S. No.	Varieties	Test Weight (g)	
		2017-18	2018-19
1.	NDL-1	7.80	7.83
2.	NDL-3(C)	8.23	8.27
3.	Parvati	7.60	7.63
4.	Shikha	7.87	7.90
5.	Shubhra	7.83	7.87
6.	Shekhar	7.70	7.73
7.	Chambal	7.93	7.96
8.	T-397	7.77	7.80
9.	Mukta	7.60	7.63
10.	Garima	6.50	6.53
	SEm±	0.04	0.42
	CD at 5%	0.1	1.2

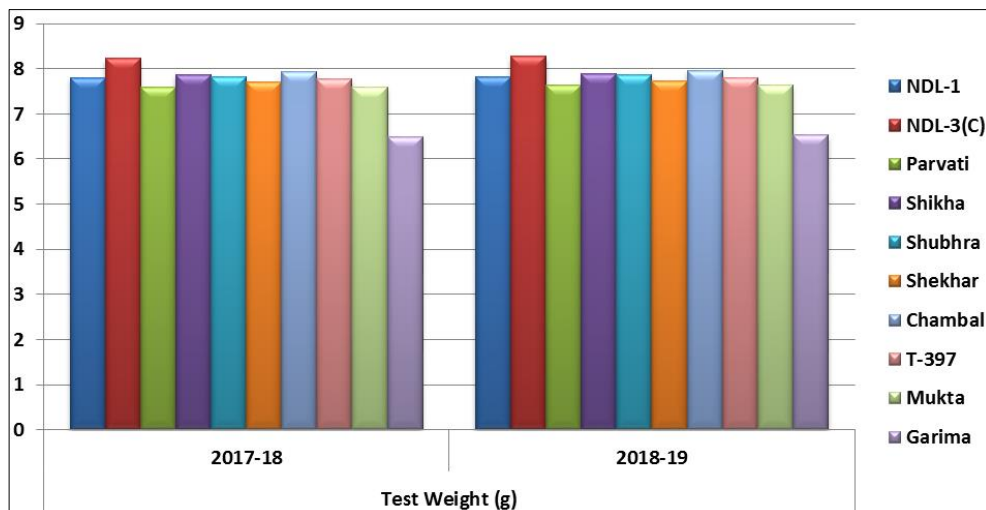


Fig 2: Variability of Test weight (g) of linseed varieties

Colour of seed in linseed varieties were noticed as brown colour by visual observation. The brown colour was visually observed in the varieties NDL-1, NDL-3, Parvati, Shikha, Shubhra, Shekhar, Chambal T-397, Mukta, and Garima. The colour of seed is one of important factor which determine the

presence of pigment, and contribute to product quality in terms of appearance. Variation in the colour within the variety is common, which is evident in linseed varieties. Similar findings were also reported by Shinde EM *et al.* (2019) [10].

Table 3: Colour of seeds of linseed varieties

S. No.	Varieties	Number of pods per plant	
		2017-18	2018-19
1.	NDL-1	Brown	Brown
2.	NDL-3(C)	Brown	Brown
3.	Parvati	Brown	Brown
4.	Shikha	Brown	Brown
5.	Shubhra	Brown	Brown
6.	Shekhar	Brown	Brown
7.	Chambal	Brown	Brown
8.	T-397	Brown	Brown
9.	Mukta	Brown	Brown
10.	Garima	Brown	Brown

The Seed yield per plant of linseed varieties ranged from 6.80 to 8.70 (g) in the year 2017-18 and 6.83 to 8.73 (g) per plant in the year 2018-19. Maximum yield per plant was marked in varieties Garima (8.70g) in year 2017-18 and Garima (8.73 g) in 2018-19. Zajac (2004) reported that variability in

genotypes was found due to sowing time. These variation in genotypes might be the cause of irrigation/rainfed conditions. Similar findings were also reported by Singh, K.K. *et al.* (2011) [11].

Table 4: Variation of yield per plant (g) of linseed varieties

S. No.	Varieties	Yield per plant (g)	
		2017-18	2018-19
1.	NDL-1	7.93	7.97
2.	NDL-3(C)	8.20	8.23
3.	Parvati	6.80	6.83
4.	Shikha	7.10	7.13
5.	Shubhra	7.87	7.90
6.	Shekhar	7.37	7.40
7.	Chambal	7.67	7.70
8.	T-397	8.07	8.10
9.	Mukta	7.22	7.25
10.	Garima	8.70	8.73
	SEm ±	0.09	0.29
	CD at 5%	0.25	0.84

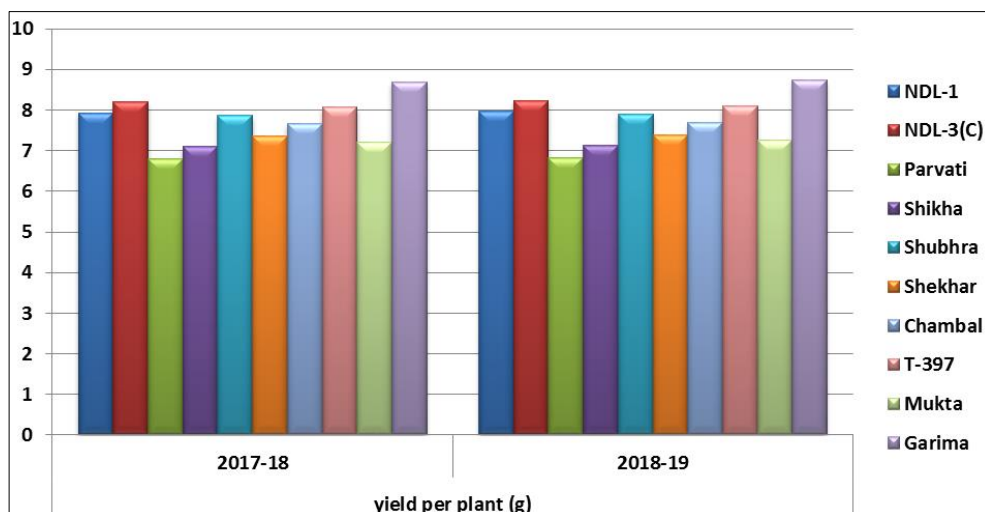


Fig 3: Variation of yield per plant (g) of linseed varieties

### Conclusion

On the basis of Physical observation it can be conducted that ten varieties of linseed (NDL-3 and Garima) was found most superior by comparing with number of pods per plant, 1000-seed weight, colour of seeds, yield per plant in comparison to drought susceptible (NDL-3) Looking its importunes of this variety might be recommended for human consumption as good source of  $\alpha$ -linolenic acid (ALA) present awareness about health especially for control of heart ailment and many of other diseases.

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