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Biochemical evaluation of Linseed (*Linum usitatissimum* L.) varieties grown under sodic soil

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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 Biochemical parameters. The seeds of each varieties were ground into fine powder stage and stored in air tight container for further Biochemical parameters such as protein content, methionine content, tryptophan content, lysine content. The data obtained in the experiment showed the Morphological characters such as Biochemical contents were recorded in variety NDL-3 and Garima in both the year. In the total protein content was ranged from 21.60 to 24.13 per cent and 21.63 to 24.17 per cent, metionine 0.39 to 0.49 and .40 to 0.51 (g/16gN), tryptophan 0.33 to 0.44 and 0.34 to 0.45(g/16gN), lysine 0.83 to 0.94 and 0.85 to 0.95 (g/16gN).

Keywords: protein content, methionine content, tryptophan content, and lysine content.

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) [4]. Observed that flax seeds are the richest source of α-linolenic acid and lignans. It is also aconsiderable potential source of soluble fiber, antioxidant and high-quality protein. The role of flaxseed lignans and ω-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 ω-3 fatty acids and other bioactive compounds. (Goyal, 2014) [6].
Linseed is widely cultivated in Russia, U.S.A., Argentina, Uruguay, India, Pakistan, China, Japan, Morocco, Australia, Ireland, Scotland, Poland, and a few other European countries. The major linseed growing states in the country are Madhya Pradesh, Chhattisgarh, Maharashtra, Uttar Pradesh and Orissa which all together contributes more than 83 percent of total linseed area under production. During 2013-2014 in India, the linseed had an area of 3.592 lakh hectare with the production of 1.465 lakh tonnes and productivity 408kg 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, 2014) [1].

The components of linseed are protein (21%), dietary fibre (28%) and fat (41%) has unique fatty acid profile. Linseed has high polyunsaturated fatty acids (PUFA) (73% of total fatty acids), moderate in monounsaturated fatty acids (18%) low in saturated fatty acids on moisture free basis. Linoleic acid as Omega-6 fatty acid, constitutes about 16 per cent of total fatty acid whereas, ALA constitutes about 57 per cent. Due to the nutritional profile of linseed, many researchers have recognized linseed as tiny double powerhouse in disease prevention. The effect of dietary factors of linseed on health promotion and disease prevention has been an issue of interest since antiquity and has become a subject of renewed research activity in recent years.

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 Biochemical parameters were as Protein content in linseed seeds was determined by the Lowry's method (1951) [8], The methionine content was analyzed by method of Horn *et al*. (1946) [7]. Tryptophan content was analyzed by the method of Spice and Chamber (1949). Lysine content was estimated by the methods of Felker *et al*. (1978) [5].

Results and Discussion

Total Protein content ranged between 21.60 to 24.13 and 21.63 to 24.17 per cent during 2017-18 and 2018-19, respectively. Highest value of Total protein content in Linseed seeds was recorded 24.13 per cent (2017-18), 24.17 per cent (2018-19) in the Varieties NDL-3, respectively. The results are prominently supported with observations of Alalshoimy *et al.* (2007) [2].

On an average it contains 21% protein. Majority of the protein is concentrated in the cotyledons.

Nutritional value and amino acid profile of linseeds are comparable to that of soya proteins (Mudhusudan and Singh 1985; Oomah and Mazza 1993) [9, 10]. Linseed protein is limiting in arginine, aspartic acid methionine, tryptophane, glutamic acid and lysin (Singh *et al*. 2011; Chung *et al*. 2005) [11, 3].

Table 1: Variability of Total protein content of linseed varieties

S.No.	Varieties	Total protein content	
		2017-18	2018-19
1.	NDL-1	23.23	23.27
2.	NDL-3(C)	24.13	24.17
3.	Parvati	21.60	21.63
4.	Shikha	21.87	21.90
5.	Shubhra	23.20	23.22
6.	Shekhar	22.87	22.90
7.	Chambal	23.33	23.36
8.	T-397	23.87	23.89
9.	Mukta	22.47	22.50
10.	Garima	21.67	21.70
	SEm ±	0.11	0.42
	CD at 5%	0.33	1.22

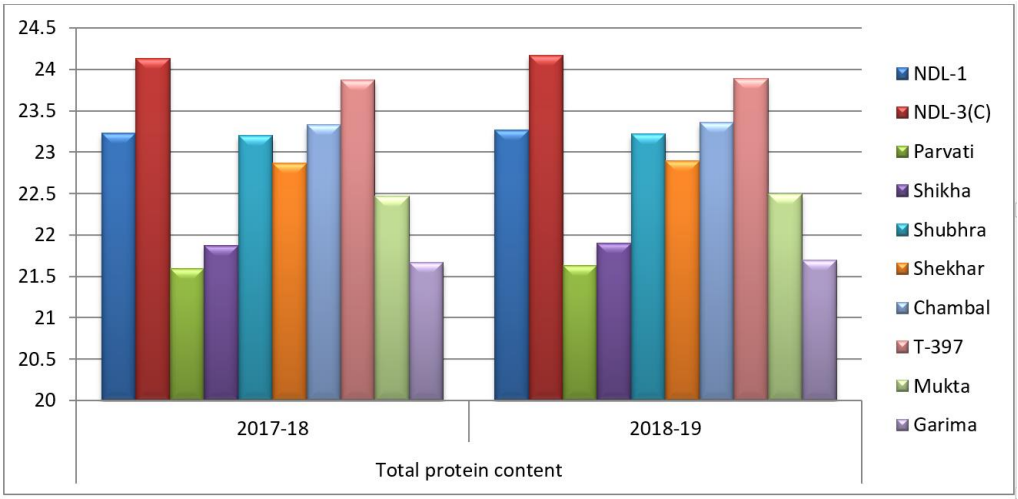

Fig 1: Variability of Total protein content of linseed varieties

The Methionine (g/16 g N) ranged between 0.39 to .40 and 0.49 to 0.51 (g/16 g N) during 2017-18 and 2018-19, respectively. Highest value of Methionine (g/16 g N) in Linseed seeds was recorded 0.49 (g/16 g N) (2017-18), 0.51 (g/16 g N) (2018-19) in the Varieties NDL-3, respectively. The amount of methionine variation among the varieties may be due to their genetical character. The other reason for the differences in the methionine content of linseed varieties may be due to their amino acid composition as reported by Alalshoimy *et al.* (2007) [2]. Majority of the protein is concentrated in the cotyledons. Nutritional value and amino acid profile of linseeds are comparable to that of soya proteins (Mudhusudan and Singh 1985; Oomah and Mazza, 1993) [9, 10]. Linseed protein is rich in arginine, aspartic acid and glutamic acid, while lysine is limiting (Singh *et al.* 2011; Chung *et al*. 2005) [11, 3].

Table 2: Variation of Methionine (g/16 g N) of linseed varieties

S.No.	Varieties	Methionine (g/16 g N)	
		2017-18	2018-19
1.	NDL-1	0.48	0.49
2.	NDL-3(C)	0.49	0.51
3.	Parvati	0.43	0.44
4.	Shikha	0.41	0.42
5.	Shubhra	0.42	0.43
6.	Shekhar	0.40	0.41
7.	Chambal	0.45	0.45
8.	T-397	0.47	0.48
9.	Mukta	0.46	0.47
10.	Garima	0.39	0.40
	SEm ±	0.01	0.02
	CD at 5%	0.02	0.04

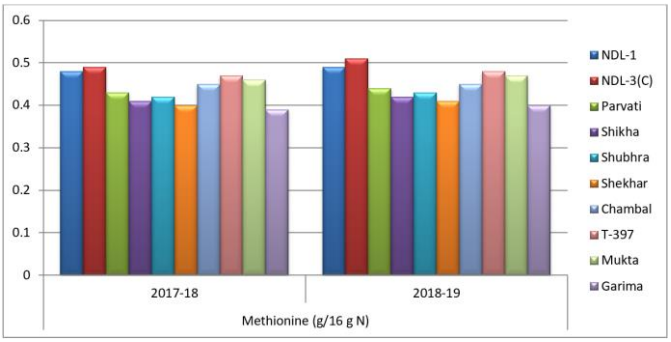

Fig 2: Variation of Methionine (g/16 g N) of linseed varieties.

The Tryptophan (g/16 g N) ranged between 0.33 to 0.44 and 0.34 to 0.45 (g/16 g N) during 2017-18 and 2018-19, respectively.

Highest value of Tryptophan (g/16 g N) in Linseed seeds was recorded 0.44 (g/16 g N) (2017-18), 0.45 (g/16 g N) (2018-19) in the Varieties NDL-3, respectively. The results are prominently supported with observations of Rabetafika *et al.* 2011 reported that tryptophan content in linseed between 0.35 to 0.48 per cent.

Table 3: Variability of Tryptophan (g/16 g N) of linseed varieties

S.No.	Varieties	Tryptophan (g/16 g N)	
		2017-18	2018-19
1.	NDL-1	0.41	0.42
2.	NDL-3(C)	0.44	0.45
3.	Parvati	0.33	0.34
4.	Shikha	0.37	0.37
5.	Shubhra	0.38	0.39
6.	Shekhar	0.35	0.36
7.	Chambal	0.39	0.40
8.	T-397	0.40	0.41
9.	Mukta	0.36	0.37
10.	Garima	0.34	0.35
	SEm ±	0.01	0.02
	CD at 5%	0.02	0.06

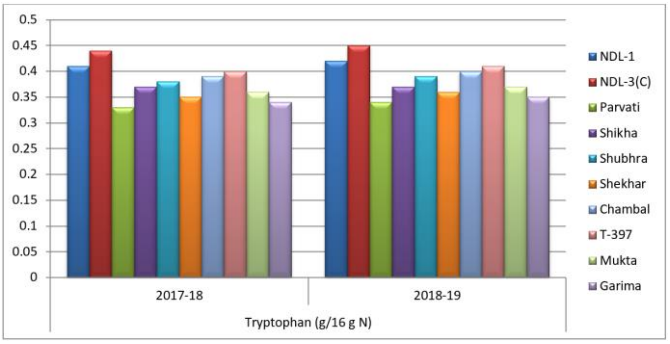

Fig 3. Variability of Tryptophan (g/16 g N) of linseed varieties.

The Lysine (g/16 g N) ranged between 0.83 to 0.94 and .85 to 0.95 (g/16 g N) during 2017-18 and 2018-19, respectively. Maximum value of Lysine (g/16 g N) in Linseed seeds was recorded 0.94 (g/16 g N) (2017-18), 0.95 (g/16 g N) (2018-19) in the Varieties NDL-3.

Variation in lysine content may be due to difference in genetic potential and protein content of linseed varieties. Chung *et al.* 2005 [3] reported that lysine content in linseed between 0.80 to 0.92 per cent.

Table 4: Variation of Lysine (g/16 g N) of linseed varieties

S.No.	Varieties	Lysine (g/16 g N)	
		2017-18	2018-19
1.	NDL-1	0.85	0.84
2.	NDL-3(C)	0.94	0.95
3.	Parvati	0.87	0.87
4.	Shikha	0.88	0.88
5.	Shubhra	0.91	0.90
6.	Shekhar	0.92	0.91
7.	Chambal	0.89	0.89
8.	T-397	0.92	0.93
9.	Mukta	0.86	0.87
10.	Garima	0.83	0.85
	SEm ±	0.01	0.2
	CD at 5%	0.04	0.05

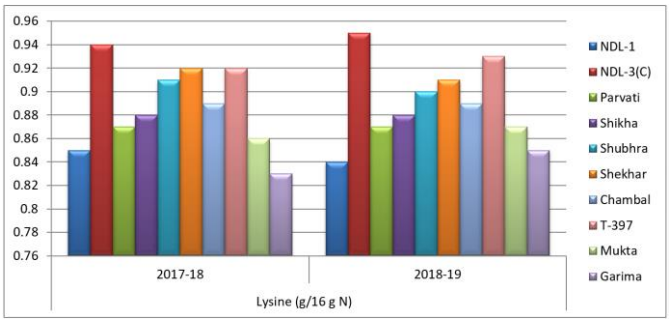

Fig 4: Variation of Lysine (g/16 g N) of linseed varieties.

Conclusion

On the basis of Biochemical observation it can be conducted that ten varieties of linseed (NDL-3) was found most superior by comparing with protein content, methionine content, tryptophan content, lysine content. in comparison to drought susceptible (NDL-3) Looking its importunes of this variety might be recommended for human consumption as good source of α-linolenic acid (ALA) present awareness about health especially for control of heart ailment and many of other diseases. Even this variety may also be best for qualitative livestock feeds and widely used as raw nutrient for agri-industries.

References

1. Anonymous. Annual report of Linseed, ICAR, PC, Unit (Linseed), CSAUA&T, Kanpur 2014.
2. Alasohoimt SA, Sitohy MZ, El-Masry RA. Isolation and partial characterization of chickpes, lupine and lentil seed proteins. World Jour. Of Agric. Sci 2007;3(1):123-129.
3. Chung M, Lei B, Li-Chan E. Isolation and structural characterization of the major protein fraction from Nor Man flaxseed (*Linum usitatissimum* L) Food Chem.; 2005;90:271-279.
4. Essam FAJ, Ali OA, Shimarya A, Shubbrb EK. Extraction and Purification of lignan compound from flax seed (*Linum usitatissimum).* Asian J. Plant Sci. and Res 2012;2(3):306-312
5. Felker C, Libamuskas CK, Warner G. Crop. Sci 1978;18(3):489-490.
6. Goyal A, Sharma V, Upadhyay N, Gill S, Sihag M. Flax and flaxseed oil: an ancient medicine & modern functional food. Association of Food Scientists & Technologists 2014.

7. Horn JM, Jones JB, Blum AE. Colorimetric determination of methionine in protein and foods. J. Bio. Chem 1946;1(16):313.
8. Lowery OH, Rosebrough NJ, Farr, Randal RJ. Protein Measurement with the follin phenol reagent. Journal Biochemistry 1951;193:265-275.
9. Madhusudan KT, Singh N. Isolation and characterization of major protein fraction (12S) of flaxseed proteins. J. Agric. Foof Chem 1985;33:673-677.
10. Oomah BD, Mazza F. Flaxseed proteins a review. Food Chem 1993;48:109-114.
11. Singh KK, Mridula D, Rehal J, Barnwal P. Flaxseed: a potential source of food, Feed and Fiber. Critical Reviews in Food Science and Nutrition 2011;51(3):210-222.
12. Spies J, Chmber DC. Chemical determination of tryptophan in protein, Analyt. Chem 1994;21:12-49.
13. Zajac T. Analysis of linseed (*Linum usitatissimum* L.). Plant branching as related to variability and interdependence of traits. Acta Agrobotanica 2005;57:187-205.