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To study the protein and carbohydrate content in defatted cake of linseed

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Abstract

This study determined of protein content and carbohydrate content of defatted cake of linseed. The protein content in defatted cake was recorded between 18.9 to 22.9 per cent. The carbohydrate content in defatted cake was recorded between 28.85 to 32.34 per cent. Flax has been used for centuries as a source for oil extraction. In recent years it has attracted considerable interest as a result of studies which attribute potential health benefits to its components, including the prevention of chronic non communicable diseases.

Keywords: Protein and carbohydrate, cake of linseed, chronic non communicable diseases

1. Introduction

Flax or linseed is among the oldest crop plants cultivated for the purpose of oil and fibre. It belongs to the genus *Linum* and family *Linaceae*. The botanical name, *Linum usitatissimum* was given by Linnaeus in his book "Species Plantarum". It is an annual herbaceous plant with shallow root system. The common names flax and linseed are used in North America and Asia, respectively, for *L. usitatissimum*. Oilseed varieties and fibre varieties are specialized development of this species (Anonymous, 2005) [1]. Linseed is one of the best dietary sources of lignans. The main lignan in linseed is secoisolariciresinol diglucosidw (SDG), which is present in large quantities. The lignans are generally cinnamic acid dimmers containing a dibenzylbutane skeleton (Essam *et al.* 2012) [2].

Flax, while a minor crop, is grown in a wide range of countries, climates and for many different products. Because of its adaptability and product diversity, it is being considered as a platform for the development of novel bio products. Linseed oil is suitable for human consumption and is used as a nutritional supplement. It is rich in omega-3 fatty acids, especially alpha-linolenic acid that was beneficial for heart disease, inflammatory bowel disease, arthritis and a variety of other health conditions. It also contains a group of chemicals called lignans that play a significant role in the prevention of cancer. Linseed is also used in making papers and plastics. Linolenic acid omega-3 and omega-6 linoleic acid, essential fatty acids are also found in linseed. Linseed oil contains three times as much omega-3 fatty acid than omega-6 fatty acid (Singh *et al.*, 2013) [7].

Linseed has a shallow root system and needs sufficient moisture during the growing season (Hocking *et al.*, 1997) [3]. Seedling establishment is generally slow and seedlings have poor competitive ability. Germination and seedling emergence may be influenced by temperature, sowing depth and seedbed conditions like available moisture and salinity (Kurt and Bozkurt, 2006) [4]. In arid and semi-arid regions where rainfall is insufficient to leach salts out of the root zone, the salinity is a major problem which limits plant growth (Kaya *et al.*, 2003). Salinity leads to delayed germination and emergence, low seedling survival, irregular crop stand and lower yield due to abnormal morphological, physiological and biochemical changes (Muhammad and Hussain, 2010) [6].

2. Materials and methods

The experiment was conducted during Rabi season 2017 at the Agronomy research farm. The seeds of linseed varieties were sown in Completely Randomized Design with three replications on 20 October 2016. 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 ha. All agronomical practices were adopted to achieve a good crop. For biochemical analysis observations were made on total protein content and carbohydrate content in linseed defatted cake.

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2.1. Protein Content in defatted cake

Protein content in grain was determined by the Lowry's method, (1951). This method is based upon the reaction of protein with Cu²⁺ ion in alkaline medium as observed in biuret method of protein estimation. One gram sample was taken and homogenized in the presence of 10 ml of distilled water and centrifuged at 4000 rpm for 15 minutes. The residue was discarded. Thereafter, 1 ml supernatant was taken and mixed with 1 ml 10 per cent trichloric acid. It was kept for 30 minutes and residue obtained was dissolved in 5 ml 0.1 N NaOH. 0.5-1.0 ml sample extract was taken in test tube and volume was made up to 1 ml with distilled water. Then 5 ml alkaline copper reagent was added and it was mixed properly. After 10 minutes, 0.5 ml folin reagent was added and it was kept at room temperature to 30 minutes. Finally, colour intensity was recorded at 660 nm on spectronic-20 against blank reagent.

2.2. Carbohydrate Content in defatted cake

Carbohydrate content in linseed sample were observed by the method of Yemm and Willis (1954). 1gm of biological material was taken in a conical flask and added 100ml distilled water. It was shaken properly with the help of glass rod. Then added 13 ml of 32% HClO₄. It is stirred frequently for 20 minutes with the help of long glass rod. Washed the flask 3-4 times with distilled water. Poured the washing and finally made up volume up to 250ml. Took 10ml aliquot in to a 100 ml conical flask and made up the volume with distilled water. After that took 3 test tubes and added the reagents as under.

Material Water Anthonereagent

Blank 1ml 5ml

Std.glucose 1ml 5ml

Sample 1ml 5ml

All the test tubes were kept in boiling water bath for 12 minutes for development of colour and cooled at room temperature. Finally the intensity of colour was recorded at 620 nm on spectrophotometer against blank reagent. Total carbohydrate content was calculated on percent basis.

3. Experimental results

The field and laboratory experiments of the present investigation entitled "To study the protein and carbohydrate content in defatted cake of linseed". The observations recorded in the linseed were analysed statistically.

Protein and carbohydrate content in defatted cake of linseed

The protein content in defatted cake was recorded between 18.9 to 22.9 per cent. Maximum protein content was found in defatted cake of linseed in NDL-3 (19.7%) followed by Shubhra (18.80%), Shekhar (18.79%) and T-397 (18.20%). Minimum protein content in defatted cake was noticed in the variety Garima (17.62%). Statistical analysis showed a significant variation regarding protein content in various treatment of defatted cake of linseed varieties in the present investigation. The carbohydrate content in defatted cake was recorded between 28.85 to 32.34 per cent. Maximum carbohydrate content in defatted cake was found in the Parvati (32.34%) followed by Garima (31.96%), Shekhar (30.84%) and Chambal (30.14%). Minimum carbohydrate content in defatted cake was noticed in the variety NDL-3 (28.85%). Statistical analysis showed a significant variation regarding carbohydrate content in various treatment of defatted cake of linseed varieties in the present investigation.

Table 1: Protein and carbohydrate content in defatted cake

S. No.	Variety	Protein (%)	CHO (%)
1	Garima	17.62	31.96
2	Shikha	18.17	30.02
3	Parvati	17.89	32.34
4	Mukta	18.44	29.87
5	Shubhra	18.80	28.85
6	Shekhar	18.79	31.14
7	Chambal	18.02	30.48
8	T-397	18.20	29.15
9	NDL-1	17.96	29.49
10	NDL-3(c)	19.7	28.99
	SEM ±	0.59	0.60
	CD at 5%	1.71	1.75

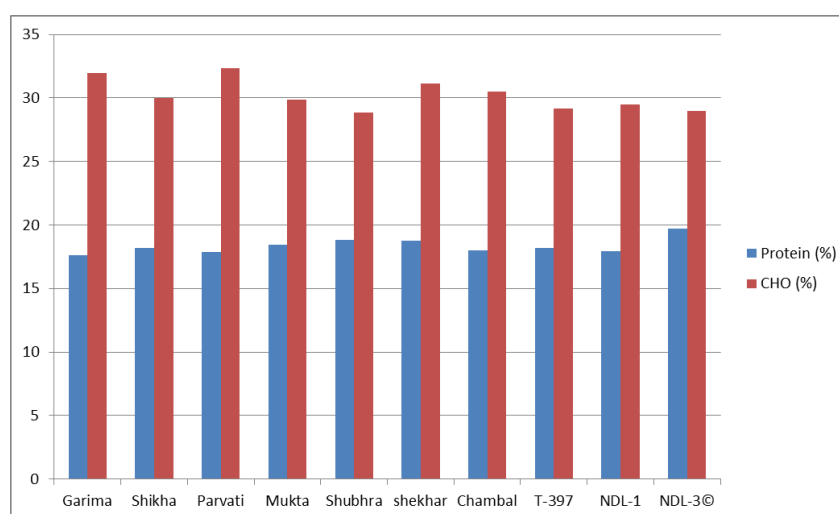


Fig 1: Protein and carbohydrate content in defatted cake

4. Conclusion

The protein content was recorded between 17.62 to 19.70 % in linseed cake. Linseed cake protein is limiting in arginine, aspartic acid methionine, tryptophane, glutamic acid and lysin

(Singh *et al.* 2011; Chung *et al.* 2005) [8]. The maximum protein content in defatted cake in NDL-3 (19.70%) and minimum in Garima (17.62%). The carbohydrate content was recorded between 28.88 to 32.34 per cent. Oomah and Mazza

(1998) ^[9] studied the composition of flaxseed cake and found carbohydrate content 30.24 per cent. The maximum carbohydrate content in defatted cake in Parvati (32.34 %) and minimum in NDL-3 (28.99 %).

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