iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** V **Month of publication:** May 2024

DOI: https://doi.org/10.22214/ijraset.2024.62345

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Exploring the Nutritional and Sensorial Enhancement of Traditional Indian Laddu through Flaxseed Fortification

Pranali Pustode[1], Varsha There[2], Bharti Uke[3], RamakantThawkar[4], Lilesh Pustode[5], Prashant Watkar[6]
[1, 2, 3, 4]*Department of Food Technology, BIT Ballarpur, India*
[5]*Assistant Professor, Department of Food Technology, BIT Ballarpur, India*
[6]*Head of Department, Department of Food Technology, BIT Ballarpur, India*

Abstract: ***The purpose of the current study was to cultivate laddu by adding different amounts of flaxseed. to evaluate laddu, including its microbiological, tactile, and textural qualities, as well as its chemical and fatty acid composition and antioxidant activity. The primary objective of this research endeavor was to explore the potential enhancement of laddu, a traditional Indian sweet, through the incorporation of varied proportions of flaxseed. This exploration encompassed a multifaceted evaluation, including microbiological scrutiny, tactile discernment, textural analysis, chemical profiling, fatty acid characterization, and assessment of antioxidant potency. The procedural standardization entailed the utilization of sesame seeds, jaggery, and whole flaxseed in the formulation of Nutra Laddu. Distinct formulations denoted as T1, T2, T3, T4 were devised, featuring incremental adjustments in the proportion of whole flaxseed, ranging from 0% to 50%. Subsequent to the preparation process, the laddu specimens underwent meticulous evaluation of their organoleptic attributes, encompassing considerations such as color and visual appeal, flavor profile, textural attributes, taste perception, and overall palatability. This comprehensive assessment was facilitated through the application of a 9-point hedonic scale, enabling nuanced appraisal. Furthermore, it emerged from the analysis that Nutra Laddu fortified with flaxseed presents a notable nutritional profile, characterized by heightened levels of dietary fiber and protein. This underscores the potential of flaxseed as a valuable adjunct in laddu formulation, given its recognized nutritional and therapeutic attributes.***

Keywords: ***Flaxseed, Jaggery, Sesame Seed, Almonds, Nutra Laddu, Functional Food, Antioxidant Activity.***

I. INTRODUCTION

Flaxseed, a versatile ingredient in food technology, offers a range of benefits for both nutrition and product innovation. Derived from the *Linum usitatissimum L* plant, flaxseed presents a rich source of essential nutrients, including lignans and ALA oil, which contribute to its functional properties. Its composition, characterized by soluble fiber and high-quality protein, lends itself well to diverse food formulations. In food technology, flaxseed is prized for its ability to enhance both the nutritional profile and sensory characteristics of food products. Its inclusion can elevate the fiber content, improve texture, and impart a pleasant nutty flavor to a variety of baked goods, such as bread, waffles, muffins, and crackers. By incorporating whole flaxseed into doughs or sprinkling it atop baked items, food technologists can achieve desired textural attributes and visual appeal while boosting the nutritional value. (1) Ground flaxseed, another popular form, serves as a versatile ingredient in food formulations. It can be seamlessly integrated into energy bars, bread, and other products to enhance their nutritional content and texture. Its finely ground nature allows for uniform dispersion within food matrices, ensuring consistent product quality and sensory experience. From a technological standpoint, flaxseed oil stands out for its unique fatty acid composition, predominantly comprising polyunsaturated fatty acids with a favorable ω-6:ω-3 ratio. This characteristic makes it an attractive ingredient for formulating functional foods aimed at promoting cardiovascular health and overall well-being. Additionally, flaxseed oil's anti-inflammatory, anti-arrhythmic, and anti-atherogenic properties offer further potential for innovation in food product development. (2) Innovative food formulations, such as nutra laddu and nutra cookies enriched with flaxseed, present an exciting frontier in food technology. Research endeavors focused on evaluating the impact of flaxseed incorporation on proximate composition, fatty acid profile, sensory attributes, and microbiological quality contribute valuable insights to the field. By understanding consumer perceptions and attitudes toward flaxseed consumption, food technologists can tailor product development strategies to meet evolving dietary preferences and health-conscious consumer demands. (3,4)

II. MATERIALS AND METHODOLOGY

This prospective comparative project was carried out at Department of Food Technology Ballarpur Institute of Technology, Ballarpur, Chandrapur, India from September 2022 to November 2023.

1) Study Design: Product development with various material compositions and evaluation of product for sensory analysis.
2) Study Location: Department of Food Technology Ballarpur Institute of Technology, Ballarpur, Chandrapur, India
3) Study Duration: September 2022 to November 2023

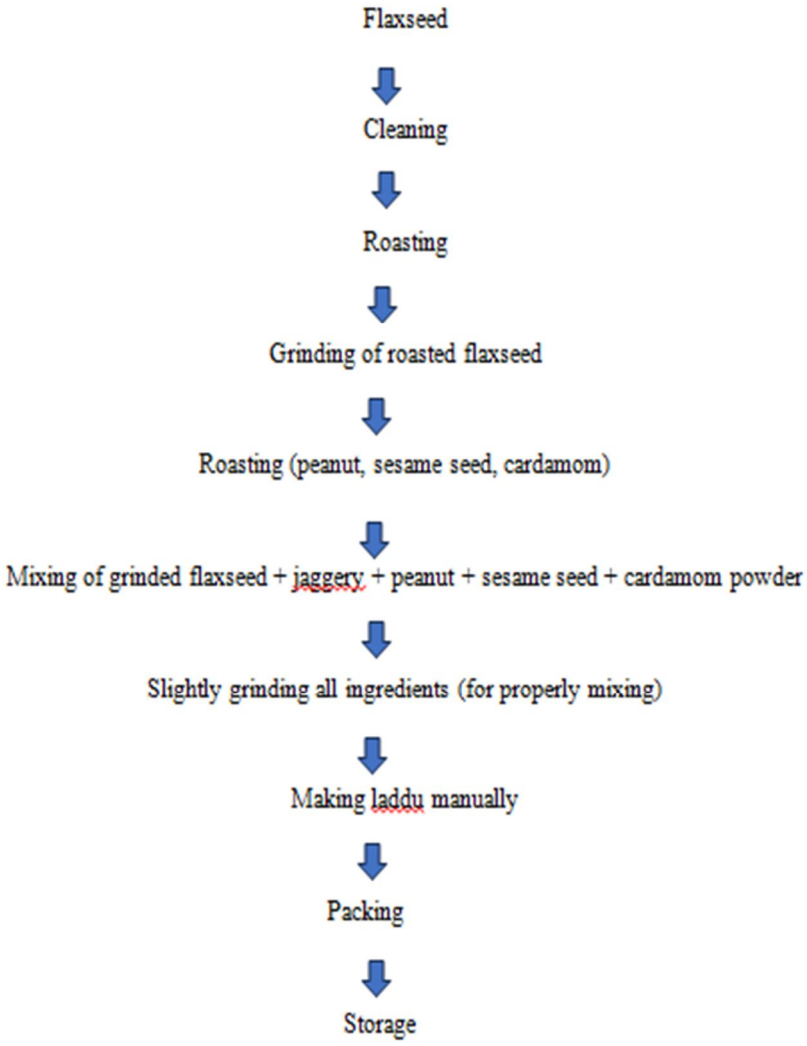
A. *Materials*

The Raw material like Flaxseed, Jaggery Peanut, Sesame, Cardamom. Almonds, etc. will be procured from the local market of Ballarpur. Chemical and reagent will be obtained from laboratory, Department of Food Technology, BIT Ballarpur.

B. *Methodology*

1) *Preparation of Flaxseed laddu*

Flaxseed was cleaned to remove impurities. The cleaned flaxseeds were roasted slightly in a pan at low flame till it become crispy and dark brown in colour. The roasted flaxseeds were then grinded into powder mixer grinder. Other ingredients such as Jaggery, Peanut, Sesame seed, Cardamom and almond are mixed uniformly with flaxseed and grind lightly. Finally, the round shaped laddu was made manually and packaged.



Flow chart for preparation of flaxseed laddu

C. Estimation of Moisture

Using the oven drying process, the moisture content was ascertained. On pre-weighed petri plates (W1), about 2 grammes of the sample were weighed (W2) and baked for 5 hours at 60º C. To stop moisture from evaporating into the surrounding air, the samples were chilled in airtight desiccators once they had dried. When there were only 5 mg differences between two successive weighing done an hour apart, the drying process was said to be finished. By deducting the dried weight from the initial sample weight, the moisture content was computed and reported as a percentage. [Adya Yadav, et al, 2016]

$$\%\ Moisture = \frac{\text{Loss in weight} \times 100}{Weight\ of\ sample}$$

D. Estimation of Fat

The Kjeldahl method was utilized to ascertain the protein content of the specimens. Until the contents of the Kjeldahl flask were carbon-free, two grammes of the sample were digested using five grammes of a digestion combination (10 parts potassium sulphate and 1 part copper sulphate) and twenty milliliters of concentrated sulfuric acid. Then, 100 millilitres of the digested sample were added. After distilling a 10-milliliter aliquot with 20 millilitres of 30% sodium hydroxide, the ammonia that was released was collected in 20 millilitres of 2% boric acid with two to three drops of a mixed indicator (0.1 percent methyl red and 0.1% bromo-cresol green of 95% ethyl alcohol, combined in a 1:5 ratio, respectively). The ammonia that was trapped was titrated against 0.1N hydrochloric acid.

The nitrogen content in the sample was calculated by the following expression:

$$\%\ Nitrogen = \frac{14 \times \text{N of HCL} \times \text{Titre value (ml)} \times \text{Dilution factor} \times 100}{Weight\ of\ sample(g) \times 1000}$$

E. Estimation of Total Ash

For ash determination two gram of sample taken in a silica crucible was ignited on a heater and later shifted to a muffle furnace until clean ash was obtained. The temperature of

furnace was raised to 550º C ± 15º C5. The weight of residue was noted and the percent ash was calculated as under**:**

$$\%\ Ash = \frac{\text{Weight of residue} \times 100}{Weight\ of\ sample}$$

F. Estimation of Carbohydrate:

The percent carbohydrates were calculated by subtracting the sum of moisture, protein, fat, ash and fiber from 100**.**

% CHO = 100 - (% Moisture + % Protein + % Fiber + % + Ash)

III. RESULT AND DISCUSSION

A. Proximate composition of ingredients of flaxseed laddu

Prior to adding value to products, the immediate composition of raw materials is a crucial factor to take into account. It will improve the prepared items' nutritional worth.

Hence, the proximate composition of jaggery, sesame seed, flaxseed, almond was calculated.

TABLE 1. Proximate composition of ingredients of flaxseed laddu

Parameter (%)	Flaxseed	Sesame seed	Jaggery	Peanut
Moisture	4.80 ± 0.27	3.49 ± 0.04	4.2 ± 0.03	5.69 ± 0.30
Ash	3.80 ± 0.05	5.48 ± 0.14	1.39 ± 0.02	2.67 ± 0.35
Protein	23.84 ± 2.15	15.67 ± 0.28	0.51 ± 0.03	30.38 ± 0.64
Fat	31.82 ± 0.54	56.56 ± 0.62	1.90 ± 0.02	48.61 ± 1.24
Carbohydrates	20.55 ± 0.01	18.44 ± 0.51	91.50 ± 0.03	10.28± 1.83
Dietary fiber	8.97 ± 0.19	8.22 ± 0.18	0.50 ± 0.03	2.37 ± 0.29

B. Nutritional analysis of laddu:

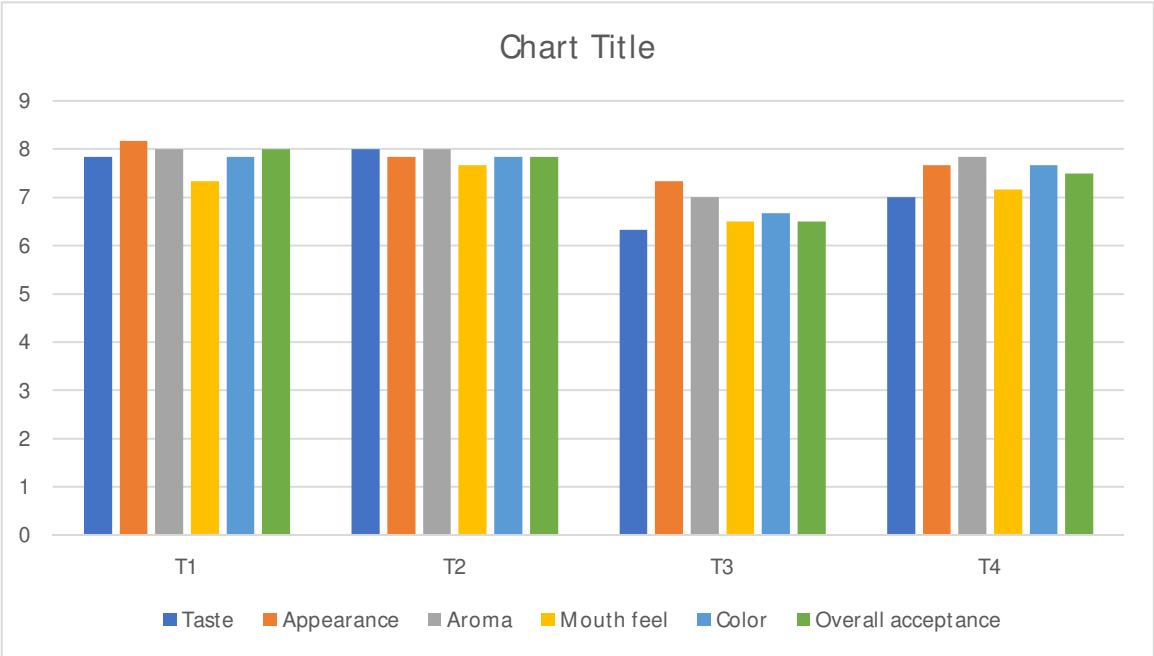
TABLE 2. Nutritional analysis of laddu per 100g of sample.

Parameter	Nutrional composition (g/100g)
Moisture	6.89 ±0.50
Ash	2.35 ±0.01
Protein	15.79 ±0.05
Fat	19.27 ±0.24
Carbohydrates	55.79 ±0.50
Sucrose	56.42 ±0.05
Total sugar	59.59 ±0.05
Energy	459.99 kcal

The fore treatment (T1, T2, T3 and T4 were made differently with different flaxseed, and jaggery to achieve a highly acceptable product. The organoleptic evaluation of nutra laddu carried out by a 10-semi trained panel member based on 9-point hedonic scale and the score were given by evaluating the sensory attributes for nutra laddu such color, appearance, texture, taste and overall acceptability which was compared with control sample and expressed table 3.

TABLE 3. Sensory analysis of flaxseed ladoo

Sample	Taste	Appearance	Aroma	Mouth feel	Colour	Overall acceptance
T1	7.83	8.16	8	7.33	7.83	8
T2	8	7.83	8	7.66	7.83	7.83
T3	6.33	7.33	7	6.5	6.66	6.5
T4	7	7.66	7.83	7.16	7.66	7.5



Graphical representation of sensory analysis of flaxseed laddu

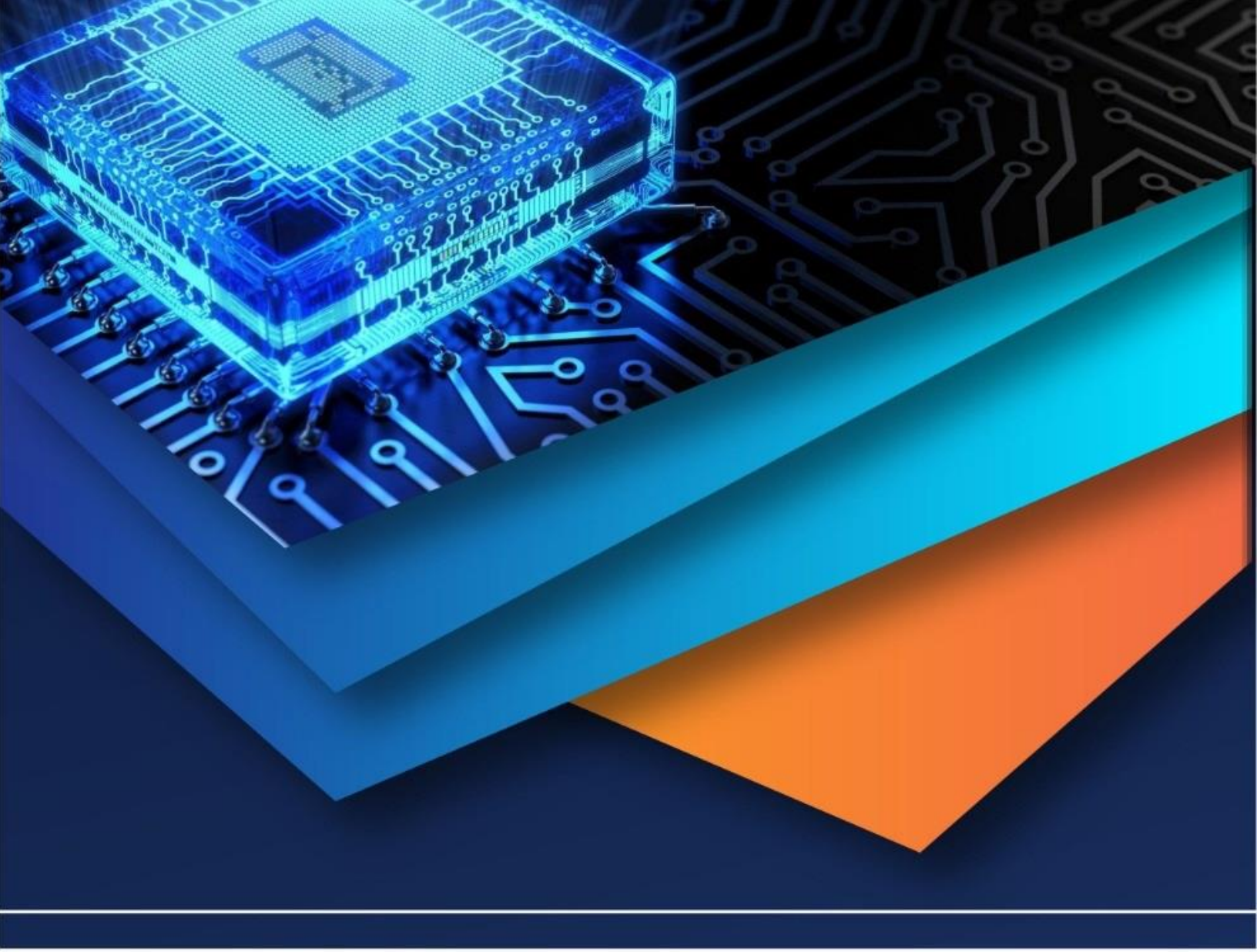
IV. CONCLUSION

Nutra Laddu flaxseed supplementation in distinctive amounts. In this way, based on the logical information from the current ponder, it can be said that the T2 of flaxseed laddu was decided to be way better with respectable sensorial consistency. Including shifting sums of flaxseed to nutra laddu will moreover progress its dietary consistency. Entire flaxseed and jaggery were utilized in the detailing handle for the planning of nutra laddu.

Diverse details were delivered with variety over the entire Flaxseed run for T1, T2, T3, and T4, individually. Arranged nutra laddu assessed organoleptic qualities in terms of colour and appearance, enhance, surface, taste, and common worthiness utilizing a 9-point hedonic scale. The flaxseed laddu made in the T3 group outflanked the other tests, agreeing to the information. It has been found that nutra laddu made with flaxseed is an fabulous source of fiber and protein. In this manner, flaxseed has critical wholesome and restorative esteem and may be utilized as a useful fixing in the fabricate of nutra laddu. The innovative and money related reasonability of the nutra laddu arrangement prepare underpins the appropriateness of flax seed as a ample source of vitality and protein. All ages of communities and children blissfully expend nutra laddu.

REFERENCES

[1] Gutte KB, Sahoo AK, Ranveer RC. Bioactive components of flaxseed and its wellbeing benefits. Worldwide Diary of Pharmaceutical Sciences Survey and Investigate. 2015 Mar;31(1):42-51.
[2] Pellizzon MA, Billheimer JT, Bloedon LT, Szapary PO, Rader DJ. Flaxseed diminishes plasma cholesterol levels in hypercholesterolemic mouse models. Diary of the American College of Sustenance. 2007 Feb 1;26(1):66-75.
[3] Gogus U, Smith C. n-3 Omega greasy acids: a audit of current information. Worldwide diary of nourishment science & innovation. 2010 Mar;45(3):417-36.
[4] Morris DH. Flax: A wellbeing and nourishment preliminary. Flax Chamber of Canada; 2007. Preparation of flaxseed laddu
[5] Van Kleef E, van Trijp HC, Luning P. Utilitarian nourishments: wellbeing claim – nourishment product compatibility and the affect of wellbeing claim surrounding on buyer assessment. See comment in PubMed Common underneath Craving. 2005: 44: 299-308
[6] Kalra EK. Nutraceutical—definition and presentation. See comment in PubMed Commons below AAPS PharmSci. 2003; 5 :E25
[7] Doyon M, Labrecque J. Useful nourishments : a conceptual definition. British Nourishment Diary. 2008; 110 : 1133- 1149.
[8] Daun JK, Barthet VJ, Chotnick TL, Duguid S. Stucture, composition, and assortment development of flaxseed. Flaxseed in human nourishment Thompson LU, Cunnane SC. 2003: 1-40.
[9] Oomah Db. Flaxseed as a flaxseed as utilitarian nourishment source. J Sci Nourishment Agr. 2001: 81:889- 894.
[10] Bhatty RS. Dietary composition of entire flaxseed and flaxseed supper. Flaxseed in HumanNutrition. Cunnane Sc, Thompson LH. Editors. AOCS Press, Champaign IL. 1995: 22-45.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY