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# Effect of processing on the nutritional value of Garden cress seeds (*Lepidium sativum*)

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**Abstract**
Garden cress is a lesser-known but highly nutritious seed rich in protein, iron, calcium, fiber, and antioxidants, making it a potential functional food. However, its nutritional efficacy is limited by the presence of antinutritional factors such as phytates and oxalates, which reduce the bioavailability of micronutrients. This study aimed to evaluate the impact of processing methods—roasting and soaking followed by roasting—on the nutritional quality of garden cress seeds (Lepidium sativum). Garden Cress seeds were divided into groups and subjected to different processing techniques like roasting and soaking followed by roasting. The processed seeds were then ground to powder, and coded as RGCSP and SGCSP, respectively and compared with the control (CGCSP). The prepared samples were analyzed for macronutrients, micronutrients, and antinutrients using standard AOAC methods. Results indicated significant reduction in antinutrient content, especially in SGCSP, while preserving or even improving levels of proteins and minerals. Roasting and soaking were effective in reducing antinutrients and enhancing nutrient availability. The findings suggest that simple processing methods can be instrumental in improving the bioavailability of nutrients in garden cress seeds, making them more suitable for inclusion in health-promoting food products.

**Keywords:** Garden cress seed, nutrient bioavailability, processing effect, antinutrients, antioxidants

## Introduction

*Lepidium sativum* (garden cress) is an edible herbaceous plant belonging to the Brassicaceae family. It is closely related to watercress and mustard and exhibits a comparable pungent flavour and aroma profile [1]. The seeds are characteristically small, smooth, oval-shaped, and reddish-brown in appearance [2]. Owing to the presence of essential fatty acids such as arachidic and linoleic acids, garden cress seeds have been associated with cognitive health benefits and are traditionally regarded as memory-enhancing foods. In addition, their relatively high protein and iron content makes them a valuable dietary component for supporting lean body mass and improving nutritional status [3].

Recent investigations have highlighted the potential of garden cress seeds as a natural source of antioxidant compounds with possible therapeutic applications. Their bioactive constituents may contribute to the prevention or retardation of oxidative stress-mediated aging processes and associated degenerative disorders. Studies have demonstrated that extracts of garden cress seeds possess appreciable free radical scavenging activity as well as reducing power. These antioxidant effects are believed to arise from the synergistic action of flavonoids, polyphenols, and other phytochemical compounds present in the seeds [4].

In the Ayurvedic system of medicine, *Lepidium sativum* is described as possessing hot potency and bitter taste characteristics, with recognized galactagogue properties. Traditionally, it has been used to balance Vata and Kapha doshas and has long been incorporated into indigenous therapeutic practices. The seeds are also a notable source of omega-3 fatty acids, which may contribute to lowering serum cholesterol levels in individuals with hypercholesterolemia. Owing to their diverse ethnopharmacological applications, garden cress seeds have been employed in the management of respiratory ailments, including bronchitis, asthma, and cough. In addition, *L. sativum* seeds contain appreciable amounts of phenolic compounds and amino acids, further enhancing their nutritional and therapeutic significance [5].

Garden cress is increasingly recognized as a nutrient-dense functional food because of its rich nutritional composition. The seeds contain approximately 24.2 g of protein per 100 g, making them a valuable dietary source for supporting tissue maintenance and muscle development. Their relatively high fat content (23.2 g/100 g) and carbohydrate content (30.7 g/100 g) contribute substantially to their energy value, which may be beneficial in addressing undernutrition. Furthermore, the naturally low moisture content of the seeds enhances their storage stability, extends shelf life, and helps preserve their nutritional quality during storage [6]. Iron deficiency remains a leading public health concern in India, particularly among women and children. While supplementation strategies are common, food-based solutions like the use of garden cress can offer a sustainable and culturally acceptable alternative. Unfortunately, the presence of antinutrients and limited awareness reduces its effective usage. Processing techniques such as roasting and soaking are simple methods known to improve nutritional bioavailability in seeds. Evaluating their effect on garden cress seeds is essential to unlocking their full dietary potential. Thus, the study was conducted to analyze the effect of processing (roasting and soaking followed by roasting) on the macronutrient, micronutrients (iron & calcium) and antinutrients (phytates and oxalate) content of garden cress seeds.

## Methodology

The study was carried out in the Department of Home Science. IIS Deemed to be university, Mansarovar, Jaipur. Garden Cress Seeds (GCS) were procured from the local market of Jaipur and were physically examined to ensure safety and hand sorted to clean and remove wrinkled seeds and other foreign materials. The seeds were divided into three groups; one group was kept as control and the remaining were subjected to two types of processing techniques -

### Roasting

100 gm of seeds were roasted on a flat-bottomed pan for 4-5 minutes at low flame & followed by grinding to make powder.

### Soaking and Roasting

100 gm of seeds were soaked in one litre of water for 6 hours. After soaking, seeds were dried and roasted on a flat-bottomed pan. The processed and control garden cress seeds were ground to a fine powder. Three types of powders thus obtained were coded as CGCSP (Control Garden Cress Seed Powder), RGCSP (Roasted Garden Cress Seed Powder), SGCSP (Soaked Garden Cress Seed Powder), respectively and packed in an airtight plastic container and stored at ambient temperature for further analysis.

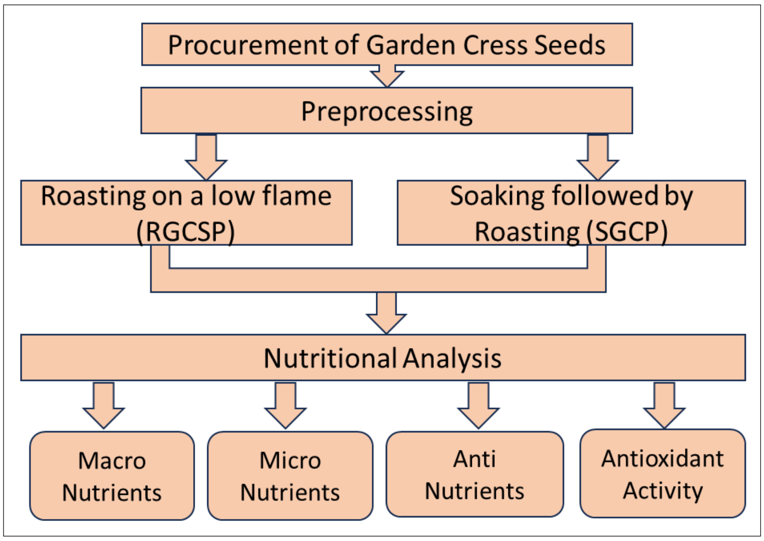


**Fig 1:** Research Design

### Macro and micro nutrient estimation

The methods described by AOAC (2019) [7] were used to estimate the moisture content, crude protein, ash, crude fibre and crude fat content of GCS powder samples, with carbohydrate content being calculated by difference. Micronutrients (iron and calcium) were estimated using the Atomic Absorption Spectrophotometry (AAS) method as per AOAC 2019, [7] after the wet-digestion of samples using nitric acid and perchloric acids, and the absorbance was measured at specific wavelengths for iron (248.3 nm) and calcium (422.7nm) using appropriate standards.

### Antinutrients estimation

Antinutrients- phytates and oxalates were estimated. Oxalate content was determined spectrophotometrically [7] by acid-extracting the sample, precipitating oxalate as calcium oxalate, dissolving it in sulfuric acid, and measuring absorbance at 510 nm. Phytate was also estimated spectrophotometrically [7] by extracting with 2.4% HCl and reacting with Wade reagent (iron (III) chloride and sulfosalicylic acid), followed by absorbance measurement at 500 nm.

All analyses were performed in triplicate using analytical-grade reagents to ensure the accuracy and reliability of the experimental results. The data generated were subjected to statistical analysis using SPSS software for Windows (Version 12.0). Descriptive statistics, including mean and standard deviation (Mean±SD), were calculated for all variables under study. Differences among the experimental groups were evaluated using one-way analysis of variance (ANOVA), and statistical significance was determined at the 5% probability level ($p < 0.05$).

## Result and Discussion

**Table 1:** Macronutrient Content of GCS powder

| Nutrients/100g | CGCSP | In viRGCSP | SGCSP |
|---|---|---|---|
| Moisture (g) | 3.79± 0.08 | 2.82 ±0.26 * | 2.49 ± 0.16* |
| Ash (g) | 5.18 ± 0.05 | 5.03±0.47 | 5.19 ± 0.04 |
| Protein (g) | 22.33 ± 0.11 | 22.60±0.07 * | 23.41 ± 0.02* |
| Fat (g) | 23.03± 0.01 | 23.86± 0.04 | 23.49 ± 0.14 |
| Crude fiber (g) | 8.14± 0.06 | 8.55± 0.54 | 8.33 ± 0.04 |
| Carbohydrate (g) | 37.51±0.12 | 37.81±1.10* | 38.21 ± 0.17* |
| Energy (kcal/100g) | 446.88±0.52 | 455.43±0.66* | 455.85 ± 0.56* |

Values are expressed as Mean±SD of three readings on DW basis.
***** Significant difference at ($p \leq 0.05$) level.

In the present study, the moisture content of CGCSP, RGCSP, and SGCSP was found to be 3.79 ± 0.08 g/100g, 2.82 ± 0.26 g/100g, and 2.49 ± 0.16 g/100g, respectively. Roasted garden cress seed powder exhibited significantly lower moisture content ($p \leq 0.05$) than both the control and soaked samples. These findings of the present study are consistent with the results reported by Malhotra *et al.* (2023), [8] who observed a moisture content of 3.67% in control garden cress seeds. It was also demonstrated that a significant reduction in moisture content occurred following roasting treatments, attributable to the evaporation of water during thermal processing. Furthermore, low moisture content is considered desirable in food products because it limits microbial proliferation and enzymatic activity, thereby reducing the risk of spoilage and improving product safety and preservation.

The ash content of CGCSP, RGCSP, and SGCSP was 5.11 ± 0.05 g/100g, 5.03 ± 0.47 g/100g, and 5.19 ± 0.04 g/100g, respectively. Roasted seed powder showed a slight, non-significant decrease in ash content, whereas soaked seed powder exhibited a marginal increase compared to the control ($p \geq 0.05$).

Protein content of CGCSP, RGCSP and SGCSP was recorded as 22.33 ± 0.11 g/100g, 22.60 ± 0.07 g/100g, and 23.42 ± 0.02 g/100g, respectively. The soaked sample exhibited a significantly higher protein content compared to the control ($p \leq 0.05$). The increase in protein content following soaking may be attributed to reduced cell wall rigidity and a decrease in fiber content, which enhances protein availability [8]. As an oilseed, garden cress is a rich source of essential fatty acids [9]. The fat content CGCSP, RGCSP and SGCSP was found to be 23.03 ± 0.01 g/100g, 23.86 ± 0.04 g/100g, and 23.49 ± 0.14 g/100g, respectively. This apparent increase may be attributed to moisture loss during processing, structural breakdown of the seed matrix, and improved extractability of lipids.

The crude fiber content of CGCSP, RGCSP and SGCSP was 8.14 ± 0.06 g/100 g, 8.55 ± 0.54 g/100g, and 8.33 ± 0.04 g/100g, respectively. These values are consistent with those reported by Hassan and Rahman (2019), [10] who found crude fiber contents of 8.33 ± 0.06, 8.32 ± 0.08, and 8.30 ± 0.06 g/100g in control, roasted, and soaked samples, respectively. No significant differences were observed among the treatments ($p > 0.05$). The stability of crude fiber content may be due to the heat-resistant nature of dietary fiber, which remains largely unaffected by roasting and similar processing methods.

Carbohydrate content of CGCSP, RGCSP and SGSCP was 37.51 ± 1.10 g/100 g, 37.81 ± 0.17 g/100 g, and 38.21 ± 0.17 g/100g, respectively. These findings are in close agreement with those reported by Malhotra *et al.* (2023), [8] who documented carbohydrate contents of 40.11, 40.91, and 40.74 g/100g for the corresponding samples. Both roasted and soaked garden cress seed powders exhibited significantly higher carbohydrate content than the control sample ($p \leq 0.05$). The observed increase may be attributed to concentration effects resulting from moisture reduction during processing.

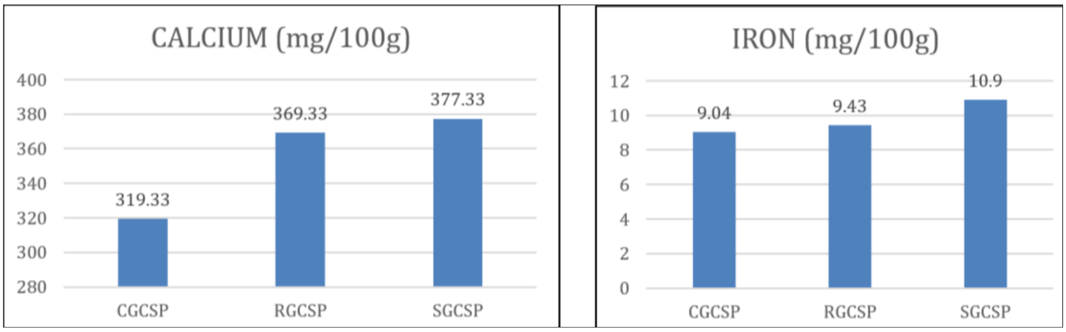


**Fig 2:** Calcium and Iron content of Garden Cress Seed Powders

### Micronutrients

A significant ($p \leq 0.05$) increase in the iron and calcium content was noticed in RGCSP and SGCSP in comparison to CGCSP (Fig 2). The enhancement in iron and calcium content may be attributed to improved mineral extractability, concentration effects resulting from moisture reduction, and the reduction of antinutritional factors such as phytates and tannins. These compounds are known to chelate minerals and limit their bioavailability. Soaking facilitates the leaching of phytates and tannins, thereby releasing bound iron, while roasting may further degrade these antinutritional constituents. Consequently, the measurable iron content and its potential bioavailability are enhanced following processing.

### Anti-nutrient profile

According to Agarwal and Sharma (2013)[1] household processing (dehulling, roasting and soaking) is an effective way to reduce antinutrients and enhance antioxidants. The obtained result show that phytates and oxalate content of control sample (987mg/100g & 53.03 mg/100g) was found to be significantly decreased ($p \leq 0.05$) in roasted (478.9mg/100g & 46.08mg/100g) and soaked sample (265.38mg/100g & 23.2mg/100g).

### Conclusion

The present study highlights that simple processing techniques such as roasting and soaking significantly enhance the nutritional potential of garden cress seeds.

Soaked and roasted seeds demonstrated the highest levels of bioavailable protein, iron and calcium along with the lowest levels of phytates and oxalates. These findings affirm the suitability of processed garden cress seeds as valuable components in iron-rich premixes and functional foods. Promoting their use through food fortification strategies could contribute to addressing nutrient deficiencies in vulnerable populations.

**References**

1. Agarwal N, Sharma S. Appraisal of garden cress (*Lepidium sativum* L.) and product development as an all pervasive and nutrition worthy food stuff. *Ann Food Sci Technol*. 2013;14(1).
2. Verma D, Rana M. Garden cress (*Lepidium sativum*) seeds—an important seed of medical purpose: A review. *Int J Creat Res Thoughts*. 2020;8:1518-1525.
3. Manju ND, Dhoba. Nutritional composition of raw and roasted garden cress seed (*Lepidium sativum* L.) flour. *Int J Curr Sci Res Rev*. 2022;5(1):140-146. doi:10.47191/IJCSRR/V5-I1-16.
4. Ahamad R, Mujeeb M, Anwar F, Ahmad A. Phytochemical analysis and evaluation of antioxidant activity of methanolic extract of *Lepidium sativum* L. seeds. *Der Pharm Lett*. 2015;7(7):427-434.
5. Ramadan MF, Oraby HF. *Lepidium sativum* seeds: Therapeutic significance and health-promoting potential. In: Preedy VR, Watson RR, Patel VB, editors. *Nuts and seeds in health and disease prevention*. London: Academic Press; 2020. p. 273-289.
6. Alsadee A, Agbashee S. Hepato-nephroprotective role of *Lepidium sativum* against oxidative stress induced by dexamethasone in rats. *Indian J Forensic Med Toxicol*. 2021;15(1). *(Note: The DOI provided, 10.1016/j.foodchem.2016.07.034, does not correspond to this article and appears to be incorrect.)*
7. AOAC International. *Official methods of analysis of AOAC International*. 21st ed. Rockville (MD): AOAC International; 2019.
8. Malhotra U, Sontakke M, Shams R, Pandey VK. Effects of pre-treatments on nutritional and mineral composition of garden cress seeds (*Lepidium sativum*). *Food Chem Adv*. 2023;3:100398. doi:10.1016/j.focha.2023.100398.
9. Jain T, Grover K, Kaur G. Effect of processing on nutrients and fatty acid composition of garden cress (*Lepidium sativum*) seeds. *Food Chem*. 2016;213:806-812.
10. Hassan MAM, Abdel-Rahman AM. The influence of dry roasting process on chemical and nutritional properties of garden cress seeds flour. *Int Adv Res J Sci Eng Technol*. 2019;6(11).