



# DEVELOPMENT AND QUALITY EVALUATION OF IRON RICH CANDY INCORPORATED WITH GARDEN CRESS SEEDS

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## ABSTARCT

**Introduction:** Iron deficiency anemia in India prevails as a widespread health issue, understanding and incorporating iron-rich food supplements into daily diets is imperative. This research focuses on the development and nutritional quality evaluation of food products enriched with garden cress seeds, aiming to offer a practical solution to address iron deficiency and enhance dietary diversity. Garden cress seeds (*Lepidium sativum*) which is known as Halim seeds in India, are valued for their medicinal properties.

**Objective:** To develop iron rich candy incorporated with Garden cress seeds and to evaluate its sensory & nutritional qualities.

**Methodology:** The procedure of development of iron rich candy using Garden cress seed was standardized. Three variations of Garden cress seed candy were developed using pepper, jeera and chat masala as flavoring agents. The developed products were evaluated for its sensory quality by semi trained panelist using 9-point hedonic scale. The best accepted candy was analyzed for its proximate composition using standard procedure.

**Results:** Sensory qualities such as appearance, color, taste, texture, flavor, and overall acceptability were evaluated and showed that the variation 2 candy added with jeera flavor proved to be best accepted with the highest scores for Appearance (8.23), Color (8.23), Taste (8.07), Texture (7.9) & Overall acceptability (8.1) in mean score. This was followed by Variation 1 candy which was added with pepper powder and the mean score of overall acceptability of this variation was (8).

Nutritional composition of candy with jeera flavour revealed 394.47kcal of Energy & 13.69mg of Iron per 100g of the product.

**Conclusion:** The iron rich candy added with jeera flavour proved to establish functional and nutritious food source. The study indicates that these candies have the potential to serve as a regular and healthier alternative to conventional supplements, providing a convenient choice for individuals aiming for a comprehensive and iron-rich dietary option supplement.

**Keywords:** Iron deficiency anemia, Garden cress seeds, Nutritional quality, Sensory qualities.

## **INTRODUCTION**

Iron is one of the essential heavy metals for human nutrition, and it is a vital element for human life. It plays critical roles in oxygen and electron transport, cell division, differentiation, and regulation of gene expression. 70 percent of the iron in the human body binds to the hemoglobin, the pigment of red blood cells (RBCs) that gives the blood its red color, and the rest binds to other proteins, such as myoglobin, transferrin, and ferritin, or is stored in the cells. The reticuloendothelial system, which clears damaged RBCs by macrophages of the spleen, liver, and bone marrow, plays a role in systemic iron homeostasis. **(Elif Piskin et al., 2022).**

The prevalence of iron-deficiency anemia is high in developing countries. Infants, young children, women of childbearing age and adults with internal bleeding are at high risk of developing iron-deficiency anemia. Since one of the main causes of iron deficiency is poor intake of iron in the diet, it can be corrected by food-based approaches such as the development of iron-rich food products. Our body requires iron and other nutrients to form hemoglobin and red blood cells. So, it is important to get a regular supply of iron through our diet. India is a country that is rich in natural resources and the majority of the population are vegetarians (which has decreased bioavailability), so consumption of iron-rich foods immensely helps in the prevention of iron deficiency anemia. **(Chellan, R., et al., 2010).**

Garden cress seeds (*Lepidium sativum*.L.) commonly known as Hadim seeds, Land cress seeds and Haliv in India. It is considered to be an important medicinal crop. They are used in treating many health conditions like asthma, diarrhea, cough with expectoration, dysentery, skin disease, scurvy etc. Garden cress seeds are an important source of iron, calcium, vitamin A, C, E and folic acid. It is the richest source of iron as 100 grams of seeds contains 17.2 mg of iron. Studies show that consumption of this seed for 1-2 months helped immensely to increase hemoglobin levels. **(Singh et al., 2017).**

Niger seeds (*Guizontia Abyssinia*) is an oilseed crop cultivated in India. They are commonly known as Kala til, ram til and sorguja. They are a good source of energy, protein, iron and linoleic acid. Niger seeds due to their high level of vitamin k1 help in the blood clotting mechanism, the high content of linoleic acid helps in lowering LDL cholesterol which in turn helps in the prevention of cardiovascular disease and arrhythmias. Niger seeds due to their high iron content also helps in the prevention of anemia. This seed provides 56.7 mg of iron/100 grams which is high when compared with other oilseeds. So, Niger seeds were also incorporated as the second main ingredient in the development of iron-rich candy. **(Gopalan et al., 2007)**

## **AIM**

Development and quality evaluation iron rich candy using Gardencress seeds.

## **OBJECTIVES**

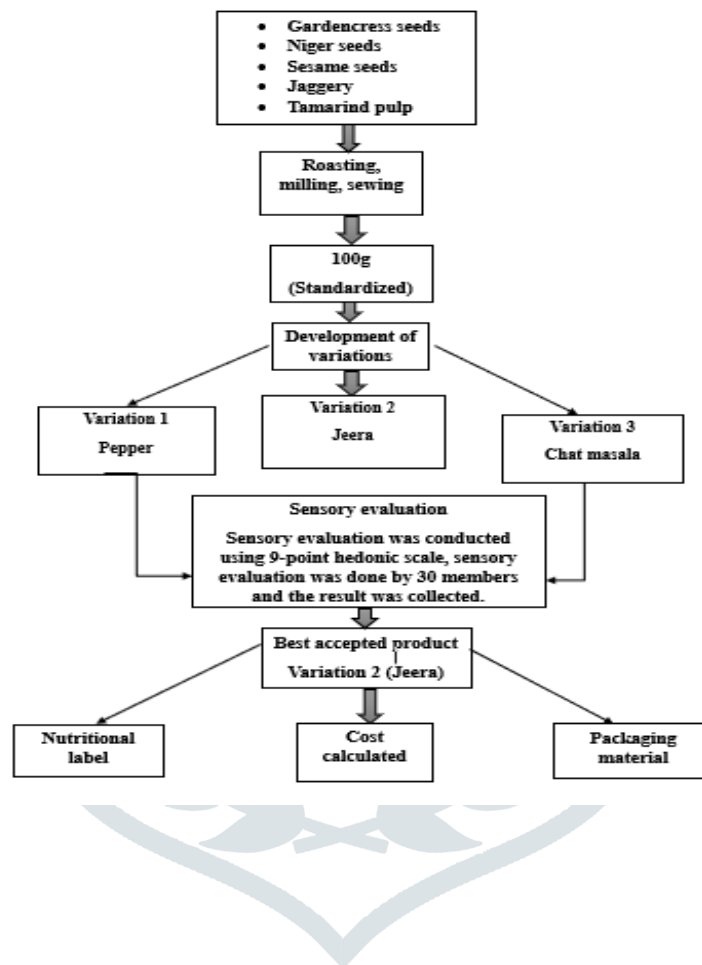
- To standardize procedure of development Gardencress seed candy
- To study the acceptability of Gardencress seed candy using sensory evaluation

**METHODOLOGY & MATERIAL**

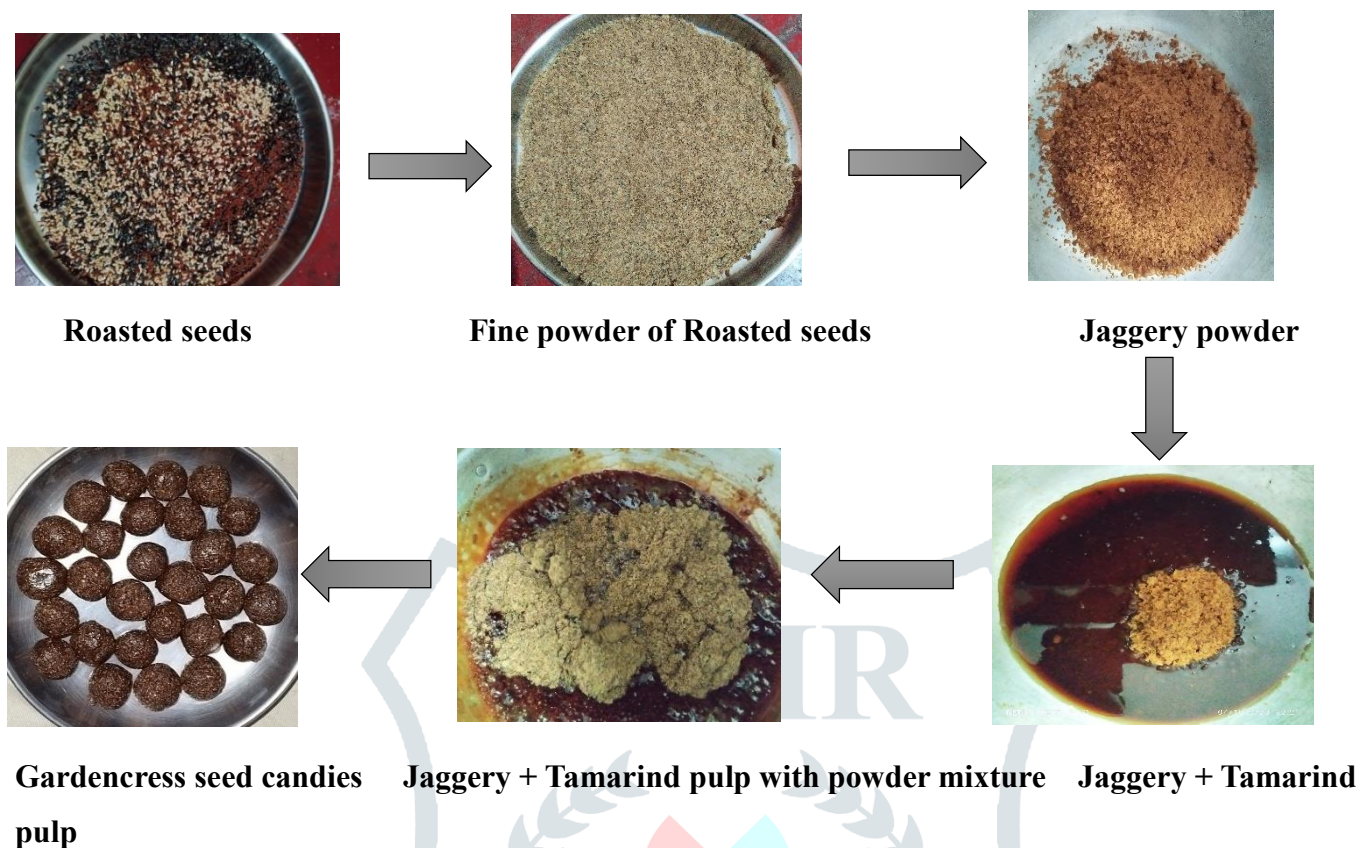
The experiments were carried out in laboratory of Food and nutrition department at Smt. VHD Central Institute of Home Science and Research Centre, Bangalore.

The standardization flowchart ensures that garden cress seed candy is not only palatable but also retains its nutritional benefits, making it a valuable addition to the diet. The standardization flowchart for garden cress seed candy involves several key steps to ensure the product meets quality and nutritional standards. The candy can be easily incorporated into the traditional diet, to provide essential nutrients and promote overall health.

PLATE 1: STANDARDIZATION & DEVELOPMENT OF GARDENCRESS SEED CANDY



**RESULT AND DISCUSSION**



**figure 1: preparation of iron rich candy incorporated with gardencress seed**



**figure 2: sensory evaluation of gardencress seed candy**

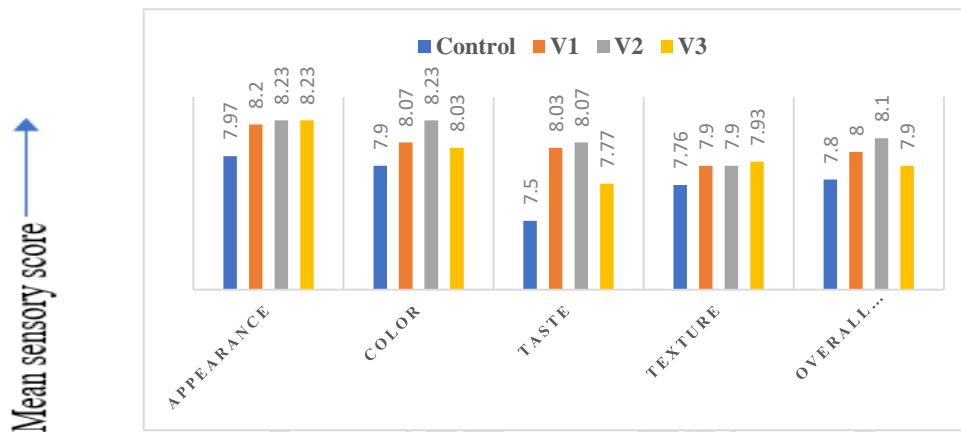
**Table 1: Mean Sensory Score Of Iron Rich Candy Incorporated with Gardencress Seed**

	Appearance	Colour	Taste	Texture	Overall Acceptability
<b>Control</b>	7.93 ± 0.93	7.9 ± 0.99	7.5 ± 0.97	7.76 ± 1.0	7.76 ± 0.92
<b>Variation I</b>	8.2 ± 0.71	8.07 ± 0.74	8.03 ± 0.81	7.9 ± 0.88	8 ± 0.84
<b>Variation II</b>	8.23 ± 0.77	8.23 ± 0.86	8.07 ± 0.87	7.9 ± 0.88	8.1 ± 0.8
<b>Variation III</b>	8.23 ± 0.86	8.03 ± 0.96	7.77 ± 0.9	7.93 ± 1.0	7.9 ± 0.88

Variation I: Pepper flavour      Variation II: Jeera flavour      Variation III: Chat masala flavor

Mean sensory scores and standard deviation for the variations developed are presented in the table 1. Among the three variations, Variation II was highly acceptable. The variation I was with pepper incorporation for garden cress seeds receives a score of 8.2 for appearance, 8.07 for colour, 8.03 for taste, 7.9 for texture and 8 for overall acceptability. The variation II had received score of 8.23 for appearance, 8.23 for colour, 8.07 for taste, 7.9 for texture, 8.1 for overall acceptability. The variation III had received scores 8.23 for appearance, 8.03 for colour, 7.77 for taste, 7.93 for texture and 7.9 for overall acceptability.

The highest sensory scores for variation II may attributed due to taste & flavour of jeera, which was accepted by most of the panelists.



**Figure 3: Graphical representation of sensory scores of Gardencress candy**

**Kaur et al., (2015)** investigated the enrichment of Indian traditional food with garden cress seeds which are a rich source of iron, protein and beta vitamin, to control iron deficiency anemia. Organoleptic evaluation using Hedonic nine-point scale was conducted to determine product acceptability and analysis of variance (ANOVA) was used for data interpretation which showed that among recipes incorporated by roasted garden cress seeds, atta besan laddu had the best acceptability and matrey had the least acceptability, whereas among recipes incorporated by soaked garden cress seeds, sweet and sour vegetable had high acceptability and salty lassi had the least acceptability. Increase in the iron content ranging from 79.3%(shakarpara) to 311.6% (mathri and matrey) in the roasted garden cress seed incorporation and 37% (sweet and salty lassi and cool drink) to 500%(kheer) in the soaked garden cress seeds were observed which confirms that enrichment of food with garden cress seeds can improve their iron status.

**Uma Rani M et al., (2016)** formulated and standardized iron-rich laddu incorporating an iron-rich ingredient, garden cress seeds (*Lepidium sativum*) which provides 100mg of iron/100g of seeds. The samples were prepared in 2 different variations. The nutrient composition standardized for fifty grams of laddu and nutrient calculations of 2 samples showed that, of the two samples; sample 2 had a high iron content when compared with sample 1, as more amount of garden cress seeds were added in that sample. The organoleptic evaluation using 5 point hedonic scale showed that sample 1 had high acceptability than sample 2. So, this product developed as a convenient snack for adolescents can be very beneficial to them as it contains a high amount of iron and protein and it can also help in preventing iron-deficiency anemia.

**Singh et al., (2017)** examined the potentiality of garden cress seed (*Lepidium Sativum. L*), a medicinal plant which belongs to the Cruciferae family, in the development of functional foods. Study of biologically active compounds and antioxidants capacity of garden cress seeds showed that it is a rich source of amino acids, fatty acids, minerals and phenolic compounds (which makes them act as antioxidants both in in-vitro and in vivo). The ability of the garden cress seeds to act as a galactagogue, emmenagogue, gastrointestinal tract cleansing agent, hematic agent, a rich source of iron, alpha-linoleic acid and other nutrients makes it consider as a prime ingredient for the formulation and fortification of healthy functional foods.

### **NUTRITIONAL COMPOSITION**

The results of nutrient analysis of Gardencress seed candy showed that the Iron content of candy is 13.63mg/100g.

The nutrient calculation Table 2 was done for the ingredients used for making gardencress seed with the help of Indian Food Composition Tables, NIN (2017). The gardencress seed candy contained 394.47kcal of energy, 14.49g protein, 19.97g fats, 45.93g carbohydrate, 13.69mg Iron and 10.89 g fiber. It was found that Gardencress seeds candy had good amount of Iron, which is meeting the 1/12th of the Recommended Daily Allowance.

**Table 2: Nutritional Composition of Gardencress seed candy per 100gm**

Sl.no	Ingredients	Quantity
1.	Energy	394.47 kcal
2.	Protein	14.49g
3.	Fats	19.97g
4.	Carbohydrate	45.93g
5.	Iron	13.69mg *
6.	Fiber	10.89g

\*Analyzed value

### **CONCLUSION**

The development and nutritional quality evaluation of iron-rich candy incorporated with garden cress seeds present a promising solution to address global iron deficiency concerns. The project successfully optimized the candy formulation, balancing palatability with the nutritional integrity of garden cress seeds. The comprehensive nutritional assessment confirmed the candy's efficacy as an iron supplement, with positive sensory evaluations suggesting potential widespread acceptability. This initiative not only offers a convenient and enjoyable alternative to traditional iron supplementation but also aligns with the growing trend towards sustainable, plant-based nutrition. The outcomes underscore the potential of functional foods to contribute significantly to public health by addressing nutritional gaps in a practical and appealing manner.

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