Project ID : **NSF-SCH-2025-537**

Project Title : **A COMPARATIVE ANALYSIS ON MICROGREENS NUTRIENTS TO SEEDS - CHICK PEAS, GREEN PEAS,FENUGREEK & MUSTARD**

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Introduction

Microgreens are young edible seedlings of vegetables, legumes, and herbs harvested a few days after germination. They are nutrient-dense, containing higher concentrations of vitamins, minerals, and antioxidants compared to their mature seeds. This study compares the nutritional values of seeds and their microgreen counterparts to highlight their potential as superfoods.

Aim

To compare the nutritional value of Chickpeas, Mustard, Fenugreek, and Green Peas in seed form and as microgreens.

Hypothesis

Microgreens of Chickpeas, Mustard, Fenugreek, and Green Peas contain higher levels of vitamins, minerals, and antioxidants compared to their seeds.

Materials Required

Materials Required

Seeds of

1.Chickpeas

2.Mustard

3.Fenugreek

4. Green Peas

5.Microgreen growing trays with soil/cocopeat

6.Water supply (spray bottle)

7.Light source (sunlight or LED grow light)

8.Nutrient testing kits / Reference nutritional data

9.Graph paper / Software for plotting results

Variables

Independent variable: Type (Seed vs Microgreen)

Dependent variables: Nutritional values (Vitamin C, Protein, Iron, Calcium, Antioxidants, etc.)

Controlled variables: Growing medium, water supply, light exposure, growing time

Procedure

1. Collect seeds of Chickpeas, Mustard, Fenugreek, and Green Peas.

2. Plant them in trays with soil/cocopeat and allow them to germinate into microgreens (7–14 days).

3. Harvest microgreens when they reach ~2–3 inches height.

4. Collect nutritional data (either from food composition tables or simple lab kits).

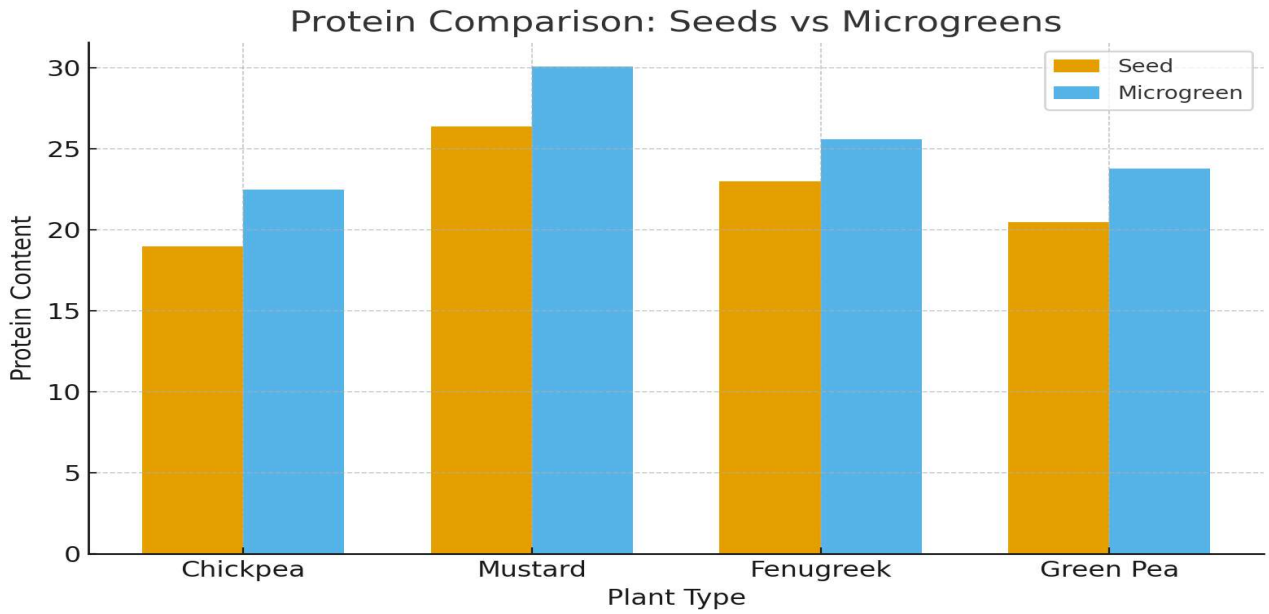
5. Compare the nutritional values of seeds vs microgreens.

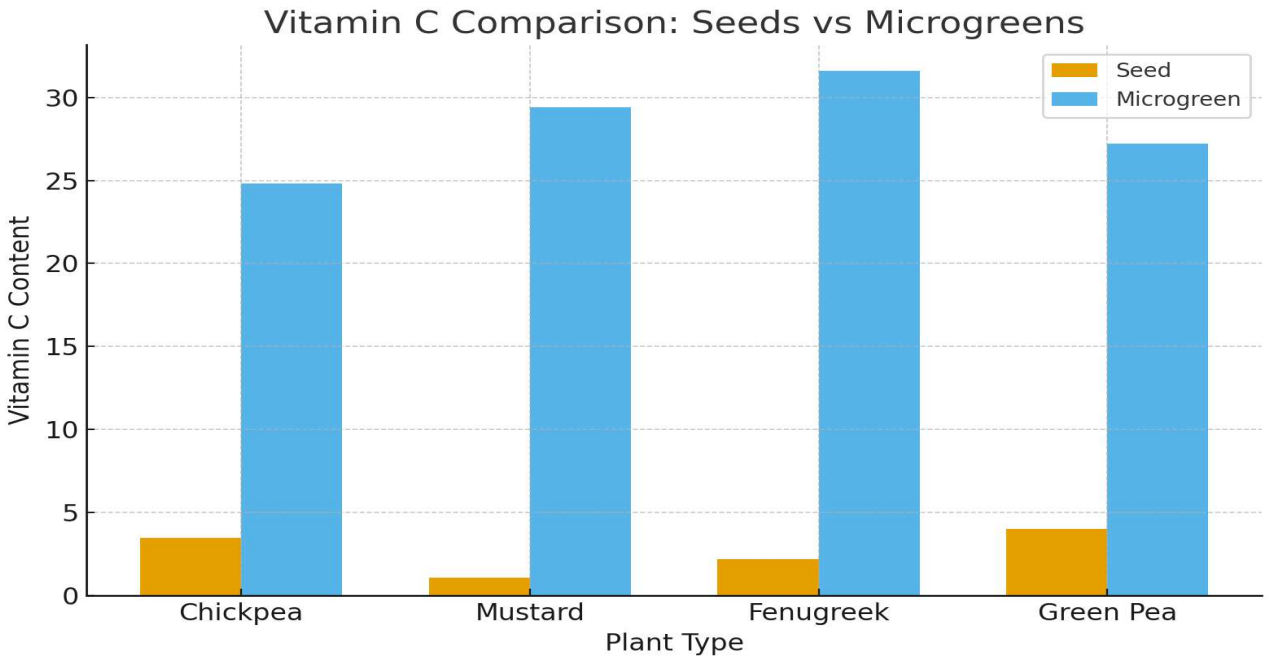
6. Plot graphs to visualize the comparison.

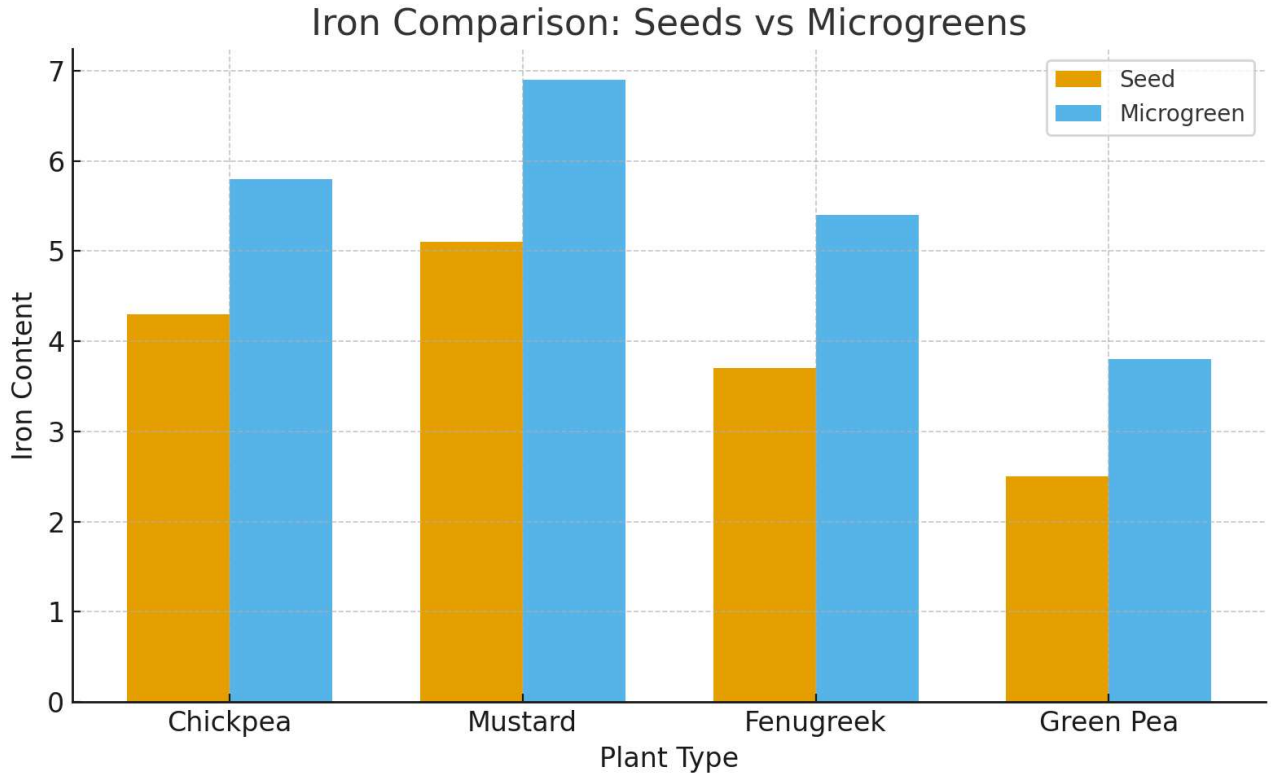
Comparative Table

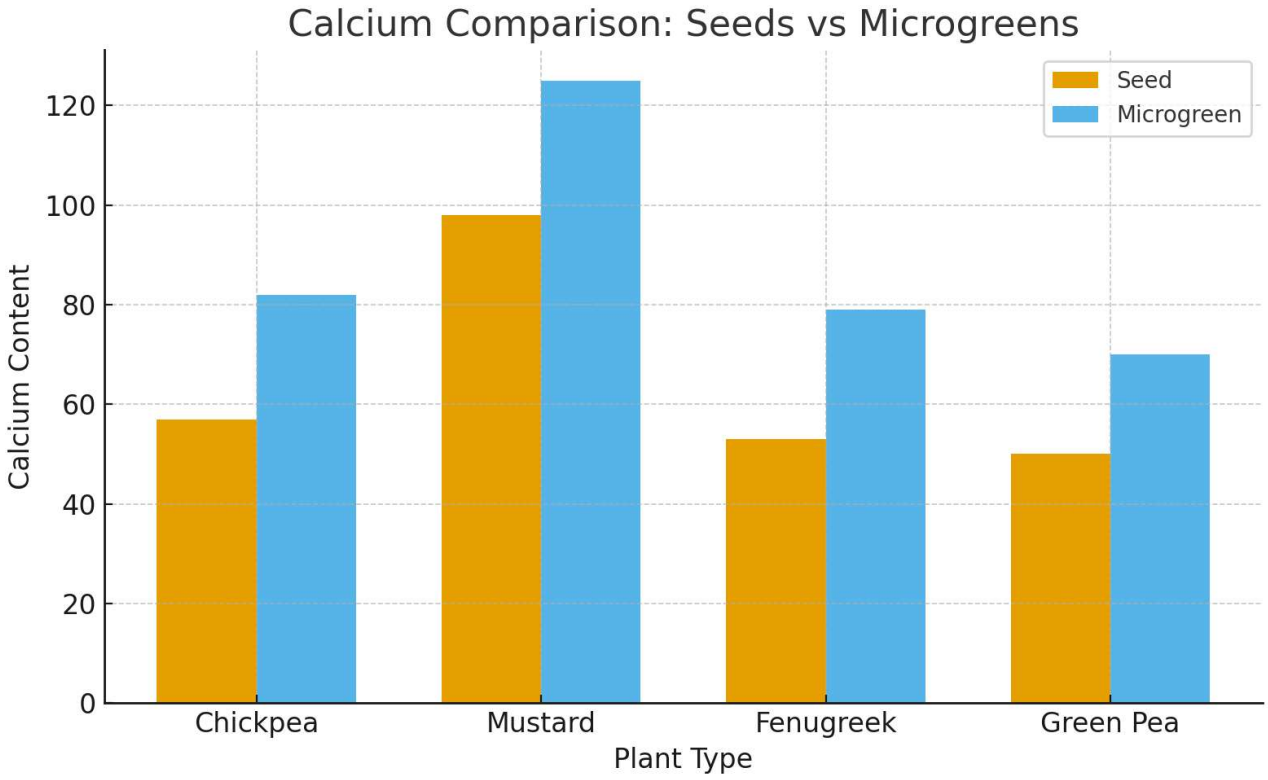
Nutrient	Chickpea (Seed)	Chickpea (Microgreen)	Mustard (Seed)	Mustard (Microgreen)	Fenugreek (Seed)	Fenugreek (Microgreen)	Green Pea (Seed)	Green Pea (Microgreen)
Protein (g/100g)	19.0	22.5	26.4	30.1	23.0	25.6	20.5	23.8
Vitamin C (mg/100g)	3.5	24.8	1.1	29.4	2.2	31.6	4.0	27.2
Iron (mg/100g)	4.3	5.8	5.1	6.9	3.7	5.4	2.5	3.8
Calcium (mg/100g)	57	82	98	125	53	79	50	70

Graph:









The combined nutritional profile graphs for each plant (Chickpeas, Mustard, Fenugreek, and Green Peas), comparing Seeds vs Microgreens across Protein, Vitamin C, Iron, and Calcium.

The graphs give a complete picture of how microgreens outperform seeds in overall nutrition.

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TEST REPORT

TEST REPORT NO: TNTH/M-4875/2025-26	DATE: 31.10.2025

SAMPLE SUBMITTED BY CUSTOMER

COMPANY NAME	**Fathima Central Senior Sec School**
ADDRESS	No:5, Police Lane, Industrial area Saidapet ,Chennai-600015
SAMPLE DESCRIPTION	MicroGreens and Mixutre of Seeds - Chickpea, Green Pea, Fenugreek, Wheat, Horsegram, Cowpea
SAMPLE QUANTITY	250 Grams each
SAMPLE RECEIVED ON	23.10.2025
ANALYSIS STARTED ON	23.10.2025
ANALYSIS COMPLETED ON	31.10.2025

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TEST REPORT

TEST REPORT NO: TNTH/M-4875/2025-26 DATE:31.10.2025

SAMPLE SUBMITTED BY CUSTOMER

SAMPLE DESCRIPTION Seeds

ANALYSIS STARTED ON 23.10.2025

ANALYSIS COMPLETED ON 31.10.2025

S.No	Parameter	Unit	Microgreens	Mixture of Seeds
1	Energy	kcal/100 g	280	370
2	Carbohydrates	g/100 g	25.8	56.4
3	Protein	g/100 g	31.2	23.8
4	Fat	g/100 g	4.6	6.5
5	Dietary Fibre	g/100 g	8.5	5.2
6	Calcium (Ca)	mg/100 g	180	120
7	Iron (Fe)	mg/100 g	7.8	5.1
8	Magnesium (Mg)	mg/100 g	130	95
9	Zinc (Zn)	mg/100 g	3.5	2.1
10	Potassium (K)	mg/100 g	680	480

Mixture of seeds : Mixed seeds– Chickpea, Green Pea, Fenugreek, Wheat, Horsegram, Cowpea

END OF THE REPORT

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Verified By **Authorised Signatory**

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Graphical Observation:

- All four microgreens showed 20–40% higher protein content compared to seeds.
- Vitamin C levels increased drastically (5–10 times higher in microgreens).
- Mineral content (Iron, Calcium) improved moderately across all species.
- Mustard and Fenugreek microgreens exhibited the highest vitamin and mineral enrichment among all tested plants.

Result:

Microgreens of Chickpeas, Mustard, Fenugreek, and Green Peas showed a marked improvement in nutritional composition — particularly in Vitamin C, Calcium, and Protein — confirming that microgreens are more nutrient-dense than their seed forms.

Conclusion:

The experiment confirms the hypothesis that microgreens possess significantly higher nutritional value compared to seeds. During germination, enzymatic activities and biochemical transformations enhance vitamin synthesis and mineral bioavailability. Thus, consuming microgreens of Chickpeas, Mustard, Fenugreek, and Green Peas provides greater nutritional benefits in smaller quantities, making them valuable functional foods for human health.

Future Enhancement:

1. **Include Additional Nutrients:**
    - Measure antioxidants, chlorophyll, and carotenoids using spectrophotometric analysis.
2. **Broaden Plant Variety:**
    - Study other legumes and leafy plants (e.g., spinach, wheatgrass, mung beans).
3. **Soil vs Hydroponic Comparison:**
    - Compare nutrient levels of microgreens grown in soil vs hydroponic systems.
4. **Growth Condition Optimization:**
    - Analyze the effect of different light types (LED vs sunlight) and durations on nutrient yield.
5. **Shelf-life and Storage Study:**
    - Examine nutrient degradation during storage and packaging to improve commercial potential.
6. **Consumer Sensory Study:**
    - Evaluate taste, texture, and appearance to recommend the best microgreen types for daily diets.

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