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Appendix I

Institutional Human Ethics Committee Clearance Certificate of Avinashilingam Institute for Home Science and Higher Education for Women

INSTITUTIONAL HUMAN ETHICS COMMITTEE



Avinashilingam

Institute for Home Science and Higher Education for Women
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3
of UGC Act 1956) Re-accredited with 'A+' Grade by NAAC.
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20th January 2020

To
Ms. Vineetha Antony
Department of Food Service Management and Dietetics
Avinashilingam Institute for Home Science and
Higher Education for Women
Coimbatore – 641 043

Dear Vineetha Antony.

Ref: Your proposal No. IHEC /19-20/FSMD/29 entitled "Study on the Growth and Cultivation of Selected Varieties of Microgreens" submitted for approval to the IHEC on 30.10.2019

The Institutional Human Ethics Committee of our University hereby grants approval to your research proposal No. IHEC /19-20/FSMD/29 entitled "Study on the Growth and Cultivation of Selected Varieties of Microgreens" submitted by you. The Approval number for the same is AUW/IHEC/FSMD-19-20/XMT-29.

We wish you all the best in your research endeavours.

Regards.

Dr. S. Uma Mageshwari
Dr. S. Uma Mageshwari
Member Secretary



Appendix II

AOAC Method for Vitamin and Mineral Analysis

VITAMIN – A

Procedure

Standard Vitamin A Solution

About 4 to 5 mg of all-trans vitamin A acetate were weighed from a sealed vial containing 5 g of the vitamin and dissolved in 100 ml of chloroform (A.C.S. grade, Fisher Scientific, Fair Lawn, NJ) and stored in an amber colored bottle at -10°C.

Trichloroacetic Acid Reagent

A 30% TCA (A.G.S. grade) solution was prepared by dissolving in chloroform (GHC13) and methylene chloride (CH₂Cl₂) and stored in a glass stoppered amber bottle at refrigeration temperature. Before use, the reagent was warmed to room temperature (24 ± 1°C) and an appreciable amount transferred to a repipet dispenser bottle (low actinic).

Dichloro-2-Propanol (1, 3-DCP)

Two batches of 1, 3-DCP activated with 1-2% antimony trichloride (SbCl₃) were purchased from Eastman Kodak (Rochester, NY). The reagent was stored at room temperature in an amber bottle. Before use the reagent was warmed to 25°C.

Sample Analysis

After separation an aliquot (1.0 ml) of the solvent extract was carefully pipetted with an autopipet into a 1-cm quartz cell. To this was added 1 ml of TCA in either chloroform or methylene chloride from a fast delivery pipette with maximum absorbance recorded at full scale deflection (usually within 5-7 seconds) at 620 and 616nm at different analysis times (within each day of analysis). All samples were run in duplicates within each day of analysis. Furthermore, 1, 3-dichloro-2-propanol (1, 3-DCP) activated with SbCl₃ practical grade was utilized in sample analysis.

Colorimetric Determination

Wavelength Experiment

The wavelength (nm) of maximum absorption for the reagents 1, 3- DCP and (TCA) in either chloroform or methylene chloride was investigated over a period of 4 days using known concentrations of vitamin A acetate in chloroform stored at -20°C. The relationship between concentration and absorbance at 616 and 620nm were noted and further studied during later quantitative and qualitative experiments.

VITAMIN – D

Standard calibration solutions

The Vitamin D standards (vitamin D₃ and vitamin D₂) were dissolved in absolute ethanol to form 1 mg/mL stock solutions. Portions of these vitamin D stock solutions were used for the purity check using a UV/Vis spectrophotometer. Aliquots of the vitamin D stock solutions were mixed and diluted with acetonitrile (ACN) to form vitamin D mix stock solutions. The vitamin D mix stock solutions were spiked with IS (SIL-D₃), and diluted with ACN to obtain a series of standard calibration solutions ranging from 1 ppb to 500 ppb (or ng/mL). The IS level was kept at constant concentration in these standard solutions.

Sample solutions

About 0.5 g (weighted to 0.001 g) of samples were separately spiked with IS (20 ng SIL-D₃), mixed with 4 mL of water and 16 mL of pyrogallol ethanolic solution (2 g/100 mL). 8 mL of KOH (50%) solution was then added and mixed. The solutions turned black after mixing. The solutions were put in a hot water bath (75 °C) for 1 hour with periodical mixing every 30 min. After the solutions were cooled to room temperature in an ice bath, 12 mL of hexanes (with 12.5 mg/L BHT) was added, mixed, and centrifuged. The hexane layer portion was taken and washed with 8 mL water 4 times. A centrifuge (1500 rpm for 2 min) was used to aid the phase separation.

Derivatization

100 μ L of each standard calibration solution or 6 mL of the hexanes extract from each sample was dried with a gentle nitrogen stream at 30 °C, then mixed with 0.6 mL PTAD solution (1 mg/mL in ACN). The mixtures were kept at room temperature in the dark for 40 minutes. The derivatization reaction was quenched with 0.4 mL water and the sample was filtered with a 0.2 μ m PTEF syringe filter before injection.

VITAMIN – E

Analytical Procedure

Operate in subdued light. Dilute ethanolic solution of α -T to concentration between 2 and 6 μ g/mL.

Nitrosation.-Pour 20.0 mL ethanolic solution into 250 mL separatory funnel. Add 0.6 mL 100% acetic acid, then 9 mL sodium nitrite (e). Stir, and wait exactly 2 min. Add 6 mL potassium hydroxide (b) and stir. Add 20 mL isooctane, shake 1 min, and let phases separate. Discard bottom phase and wash upper phase with 20 mL buffer solution (j). After separation, filter upper phase through hydrophobic filter (m) into 100 mL round-bottom flask. Rinse separator and filter with 10 mL 55 isooctane. **Oxidation to α -TR.**-Add 30 mL oxidizing solution (h), set flask in heating bath at 50 °C with cooler, and wait 30 min. Quantitatively transfer contents to 250 mL separatory funnel with help of 30 mL water. Shake 1 min, let phases separate, discard bottom phase, and wash upper phase with 30 mL buffer solution (j); separate and filter organic phase through hydrophobic filter (m) into 250 mL round-bottom flask. Rinse separator and filter with 10 mL isooctane.

Reaction of α -TR with DMPD.- Add 40 mL DMPD solution (i). Set flask in heating bath at 90 °C with cooler (not under nitrogen) and wait 30 min. Cool rapidly and transfer contents to 250 mL separatory funnel. Wash flask with 40 mL 16% HCl and rinse to separatory funnel, shake 1 min, and let phases separate. Wash upper phase twice with 40 mL buffer solution (j). Filter organic phase through hydrophobic filter (m) into 50 mL volumetric flask. Rinse separator and filter with 10 mL isooctane. Bring volume to 50 mL with isooctane. If fluorometry is performed the next day, keep solution in refrigerator (+ 4 °C). Before measurement, pipet 10.0 mL isooctane solution, add 10.0 mL ethanol (a), and stir. Fluorometry Calibrate fluorometer at 90% fluorescence with quinine sulfate working solution (l) and perform fluorescence measurement.

Blank assay (H₂O).-Only the oxidation (to α -TR) step is changed: Add 30 mL oxidizing solution (h), then add 1.0 mL water and set flask in heating bath at 50 °C. Let stand 2 min, and stir to obtain one phase. Then wait 28 min, and transfer to 250 mL separatory funnel...(as in normal assay procedure).

Calibration line.-Carry out 2 determinations according to above procedure with each α -T standard working solution (d). Check reagent blank (normal procedure with all reagents but no α -T). Usually it is equal 3-4 %. Subtract water blank assays from values obtained for each point and plot fluorescence intensity concentration.

Calculation.-For each sample assay, subtract water blank from normal assay value and calculate α -T concentration with help of calibration line.

Operating notes: (1) If irregular results occur, then make sure that glassware is clean (in particular, pipets). (2) Oxidation of α -T to α -TR is sensitive to water. Absolute ethanol used to prepare solution (h) usually contains 0.1% water. This content varies somewhat, so it is preferable to use the same batch for calibration curve and samples. When determinations are carried out during the whole day, it is better to separate the oxidizing solution (h) in 2 parts (for morning and afternoon). Make sure that glassware used to carry out this reaction is dry. (3) Fluorescence measurements must be performed at approximately the same temperature. Use a thermostatically controlled cell holder if temperature varies too much.

VITAMIN – K

The extraction and concentration of phyloquinone from food matrices used organic solvents with subsequent quantification by HPLC. After 5 minutes centrifuging at 3000 rpm and 4 °C, the supernatant was collected, filtered through a membrane, and transferred to a 50 mL evaporation flask and evaporated at 40 °C for 15 minutes using a rotary evaporator and vacuum system. The residue was dissolved in 200 μ L of mobile phase and 50 μ L was injected. A Shimadzu HPLC included a

CBM-20A system (SCL-10AVP), LC-Solution Software, a SIL-20A auto sampler, an LC-20AT isocratic pump, and an RF-10AXL fluorescence detector. The separation was in reverse phase with a LiChrospher RP-18 5 μ m endcapped LiChroCART 250-4.6 column, with a pre-column from Merck and a mobile phase consisting of dichloromethane/ methanol (10:90 v/v) with the addition of 5ml of methanol solution with zinc chloride (1.37 g), sodium acetate (0.41 g) and acetic acid (0.30 g) per litre of mobile phase and was pumped at a flow rate 1.00 mL min⁻¹ with isocratic elution. The post-column reduction (20 x 4.0 mm id) was filled manually with zinc dust p.a. grade from Merck with particles.

VITAMIN – C

1. Pipette a 20 mL aliquot of the sample solution into a 250 mL conical flask and add about 150 mL of distilled water and 1 mL of starch indicator solution.
2. Titrate the sample with 0.005 mol L⁻¹ iodine solution. The endpoint of the titration is identified as the first permanent trace of a dark blue-black colour due to the starch-iodine complex.
3. Repeat the titration with further aliquots of sample solution until you obtain concordant results (titres agreeing within 0.1 mL).

Calculations

1. Calculate the average volume of iodine solution used from your concordant titres.
2. Calculate the moles of iodine reacting.
3. Using the equation of the titration (below) determine the number of moles of ascorbic acid reacting.

$$\text{ascorbic acid} + \text{I}_2 \rightarrow 2 \text{I}^- + \text{dehydroascorbic acid}$$
4. Calculate the concentration in mol L⁻¹ of ascorbic acid in the solution obtained from fruit/vegetable/ juice. Also, calculate the concentration, in mg/100mL or mg/100g of ascorbic acid, in the sample of fruit/ vegetable/juice.

CALCIUM

Calcium Analysis:

- Indirect titration with the disodium salt of ethylenediaminetetraacetic acid was used, and the titrations were conducted using a calcium carbonate solution.
- Amounts of MSM (10 g) were digested in a solution of hydrochloric acid, the solution cooled and filtered through filter paper.
- The aliquoted digests were diluted volumetrically with distilled water and potassium hydroxide and potassium cyanide were added; the final pH was 12.5 \pm 0.2.
- The solutions were titrated, with the titration end point being the appearance of violet color for the indicator hydroxyinamol blue, but two other indicators were used in parallel: disodium hydroxyphenol blue (end point a purple colour) and eriochrome black T (end point a red colour). (AOAC, 2012)

NIACIN

A stock culture needs to be prepared and maintained by inoculating the freeze- dried culture on Bacto Lactobacilli agar followed by incubation at 37°C for 24 h prior to sample and standard inoculation. A second transfer may be advisable in the case of poor growth of the inoculum culture. In general, growth is measured by turbidity. If lactobacilli are employed as the test organism, acidimetric measurements can be used as well. The latter may be necessary if a clear sample extract cannot be obtained prior to inoculation, and incubation (which is a prerequisite for turbidimetry) cannot be obtained. In making a choice between the two methods of measurement, one needs to bear in mind that a prolonged incubation period of 72h is required for acidimetry.

THIAMIN (BY THIOCHROME PROCEDURE)
Sample Preparation

Weigh out sample containing thiamin, add volume of 0.1 M HCl equal in ml to $\geq 10X$ dry weight of test portion in g, mix, autoclave for 30 min at 121–123°C, then cool. Dilute with 0.1 M HCl to measured volume containing ca. 0.2–5 μg thiamin/ml.

Enzyme Hydrolysis

Take aliquot containing ca. 10–25 μg thiamin, dilute to ca. 65 ml with 0.1 M HCl and adjust pH to 4.0–4.5 with ca. 5-ml 2 M CH_3COONa . Add 5 ml of enzyme solution, mix, incubate for 3 hr at 45–50°C. Cool, adjust to ca. pH 3.5, dilute to 100 ml with deionized H_2O , and filter.

Sample Extract Cleanup

Apply an aliquot of the test sample extract containing ca. 5 μg thiamin to a specified ion-exchange resin column, and wash column with 3X 5-ml portions of almost boiling water. Then elute thiamin from the resin with 5X 4.0 to 4.5-ml portions of almost boiling acid-KCl solution. Collect the eluate in a 25-ml volumetric flask and dilute to volume with acid-KCl solution. Treat standards identically.

Oxidation of Thiamin to Thiochrome

To a test tube, add 1.5 g of NaCl and 5 ml of the thiamin · HCl standard solution (1 $\mu\text{g}/\text{ml}$). Add 3 ml of oxidizing reagent [i.e., basic $\text{K}_3\text{Fe}(\text{CN})_6$], swirl contents, then add 13 ml of isobutanol, shake vigorously, and centrifuge. Repeat steps for the standard blank but instead replace the oxidizing reagent with 3 ml of 15% (w/v) NaOH. Decant the isobutanol extracts (i.e., the standard and blank) into fluorescence reading tubes, and measure at $\text{Ex } \lambda = 365 \text{ nm}$ and $\text{Em } \lambda = 435 \text{ nm}$. Treat the test solution identically, and record the fluorescence intensity of the test sample and blank.

RIBOFLAVIN (BY FLUORESCENCE PROCEDURE)
Sample Preparation

Weigh out homogenized sample, add volume of 0.1 M HCl equal in ml to $\geq 10X$ dry weight of test portion in g; the resulting solution must contain $\leq 0.1 \text{ mg}$ riboflavin/ml. Mix contents, autoclave for 30 min at 121–123°C and then cool. Precipitate interfering substances by adjusting pH to 6.0–6.5 with dilute NaOH immediately followed by a pH readjustment to 4.5 with dilute HCl. Dilute with deionized H_2O to ca. 0.1 μg of riboflavin/ml, and filter.

Oxidation of Interfering Materials

Oxidize as follows: Transfer 10 ml of test filtrate to each of four tubes. To two of these tubes, add 1.0 ml of deionized H_2O , and to the remaining ones add 1.0 ml of a standard solution (i.e., 1 $\mu\text{g}/\text{ml}$ of riboflavin). Then to each tube, one at a time, add 1.0 ml of glacial HOAc followed by 0.5 ml of 4% (w/v) KMnO_4 . Allow the mixture to stand for 2 min, and then add 0.5 ml of 3% (v/v) H_2O_2 . Shake vigorously until excess O_2 is expelled.

Measurement of Fluorescence

Measure fluorescence at $\text{Ex } \lambda = 440 \text{ nm}$ and $\text{Em } \lambda = 565 \text{ nm}$. First read test samples containing 1 ml of added standard riboflavin solution, and then samples containing 1 ml of deionized H_2O . Add, with mixing, 20 mg of $\text{Na}_2\text{S}_2\text{O}_4$ to two of the tubes, and measure the minimum fluorescence within 5 sec.

IRON (COLORIMETRIC ASSAY)
Preparation of Standards

Prepare solutions of 10, 8, 6, 4, 2 μg iron/ml from a stock solution of 10 μg iron/ml.

Make dilutions using 0.1 N HCl.

Analysis of Sample

Place ~5 g sample into crucible and accurately weigh.

↓

Heat on hot plate until well charred and sample has stopped smoking.

↓

Ash in furnace at ca 550°C until ash is white.

↓

Dissolve ash in small amount 1 N HCl and dilute to 50 ml volume with 0.1 N HCl

↓

Transfer 0.500 ml of diluted sample and standards into 10 ml test tubes.

↓

Add 1.250 ml ascorbic acid (0.02% in 0.2 N HCl, made fresh daily). Vortex and let set 10 min.

↓

Add 2.000 ml 30% ammonium acetate. Vortex. (pH needs to be >3 for color development)

↓

Measure absorbance at 562 nm. Determine iron concentration in sample digest (μg iron/ml) from standard curve.

Appendix III

Qualitative Estimation of Phytochemicals

Test for Flavanoids

A few drops of 1 % NH₃ solution are added to the aqueous extract of each plant sample in a test tube. Yellow coloration is observed if flavonoid compounds are present.

Quantitative Estimation of phytochemicals

Estimation of Flavonoid

The total flavonoid content was measured with an aluminum chloride colorimetric assay. 1ml of sample and 1ml standard quercetin solution (0.05, 0.1, 0.2, 0.4, 0.6, 0.8 µg/ml) was taken and added with 4ml of distilled water and 0.3ml of 5% sodium nitrite solution. After 5 minutes, 0.3ml of 10% aluminum chloride was added followed by 2ml of 1M sodium hydroxide after 6 minutes. Finally made up to 10ml with distilled water and mixed well. The absorbance of the orange yellowish color was measured at 510nm in a UV-Vis spectrophotometer. The calibration curve was plotted using standard quercetin. The data of total flavonoid was expressed as mg of quercetin equivalent/g of dry mass.

Determination of total antioxidant activity

The total antioxidant activity was determined by the phosphomolybdenum method. 0.3ml of the sample (1mg/ml) was mixed with 3ml of phosphomolybdenum reagent. The blank solution was also prepared. All the tubes were incubated at 97°C for 90min. cooled and the absorbance was measured at 695nm using a UV-Vis spectrophotometer against the blank. The antioxidant capacity was expressed as ascorbic acid equivalent by using standard ascorbic acid.

Assay for Total Carotenoids and chlorophyll

The Chlorophyll a, Chlorophyll b, and total carotenoids were determined by the method of Yang et al. (1998). The extract preparation procedure was identical to the previously described method. The acetone-water mixture (4:1) was used as a solvent. The absorbance maxima were read at 663.6 nm for Chlorophyll a, 646.6 nm for Chlorophyll b, and 470.0 nm for carotenoids. Contents of Chlorophyll a, Chlorophyll b, and total carotenoids were calculated from the following equations:

$$\text{Chlorophyll a } (\mu\text{g/ml}) = 12.25 A_{663.6} - 2.25 A_{646.6}$$

$$\text{Chlorophyll b } (\mu\text{g/ml}) = 20.31 A_{646.6} - 4.91 A_{663.6}$$

$$\text{Total carotenoids } (\mu\text{g/ml}) = \frac{1000 A_{470} - 2.27 (\text{Chl a}) - 81.4 (\text{Chl b})}{227}$$

227

Appendix IV

Analysis of Heavy Metals

- Weigh out sample aliquots (typically 0.25 g of as-received or wet sample) into microwave digestion vessels.
- Add 4 mL of concentrated HNO₃ and 1 mL of 30% hydrogen peroxide (H₂O₂) to each digestion vessel.
- Add 0.1 mL of the 50 mg/L Au + Lu solution to each digestion vessel.
- Cap the vessels securely (and insert into pressure jackets, if applicable). Place the vessels into the microwave system according to the manufacturer's instructions, and connect the appropriate temperature and/or pressure sensors.
- Samples are digested at a minimum temperature of 190°C for a minimum time of 10 min. Appropriate ramp times and cool down times should be included in the microwave program, depending on the sample type and model of microwave digestion system.
- Microwave digestion is achieved using temperature feedback control. Microwave digestion programs will vary depending on the type of microwave digestion system used. When using this mechanism for achieving performance-based digestion targets, the number of samples that may be simultaneously digested may vary.
- The number will depend on the power of the unit, the number of vessels, and the heat loss characteristics of the vessels. It is essential to ensure that all vessels reach at least 190°C and be held at this temperature for at least 10 min.
- The monitoring of one vessel as a control for the batch/carousel may not accurately reflect the temperature in the other vessels, especially if the samples vary in composition and/or sample mass.
- Temperature measurement and control will depend on the particular microwave digestion system. (AOAC, 2012)

Appendix V

Method of Preparation of Formulated Microgreens Based Recipes and Determination of its Nutrients

STARTERS

VIBRANT SPRING SOUP

Ingredients

Mustard Microgreens	20g
Oil	5m
Beans	10g
Carrot	10g
Spring Onion	5g
Salt	5g
Water	As needed
Corn flour	5g
Pepper	5g



Method of preparation

1. Chop the vegetables
2. Heat oil in a pot, sauté spring onions for 2 minutes
3. Meanwhile in a separate bowl stir in cornstarch powder with half cup water
4. When the vegetables turn slightly tender pour the corn starch to boiling vegetable soup
5. Stir continuously and cook until it turns slightly thick

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	114	15.6	2.05	5.21	3.02	35.73	2.41	163.52	15.2	3.94

GREEN BAJJI

Ingredients

Onion	15g
Sesame microgreen	20g
Besan flour	15g
Green chilli	15g
Oil	10ml



Method of preparation

1. Take the sesame microgreen, onion and greenchilli and make them into a mixture.
2. Take Besan flour in a bowl. Mix it with water. Dip the mixture into the batter.
3. Fry the mixture until golden brown. Serve hot.

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	167.26	14.45	2.07	12.99	1.84	24.54	.48	3.12	15.1	0.01

GREEN BALLS

Ingredients

Chia microgreen	15g
Rice flour	15g
Beans	5g
Coconut	5g
Oil	5ml



Method of preparation

1. Saute the chia microgreen for 2-3 minutes.
2. Add cooked beans and microgreen to a pan. Put the rice flour and coconut. Mix the ingredients well and make them into ball shapes.
3. Fry the balls until it turns golden brown.

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	177.92	15.79	10.5	7.58	127.28	176.32	81.93	3.76	0.44	57.96

GREEN CUTLET

Ingredients

Fenugreek Microgreens	20gm
Turmeric powder	1/2 teaspoon
Cumin powder	1 teaspoon
Kashmiri chilli	1/2 table spoon
Crushed black pepper	1/2 teaspoon
Salt	to taste
Onion	5g
Chilli	2
Egg	1
Oil	5ml



Method of preparation

1. Cook onions, carrot, green chilli, and fenugreek microgreens along with the spice powders and make small patties.
2. Mix the above with wheat flour
3. Fry the cutlets and serve hot.

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	111.82	15.58	2.92	11.16	37.62	70.2	154.7	271.75	1.83	11.67

HEALTHY GREEN MOMOS

Ingredients

Wheat flour	15g
Carrot	5g
Radish microgreen	20g
Oil	5ml

Method of preparation

1. Mix the microgreen and carrot well.
2. Keep the ingredients stuffed in wheat flour dough.
3. Make them into the shape of momos.
4. Fry the momos and serve.



Nutritive value calculation

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	95.1	10.08	6.71	8.21	27.91	65.44	45.64	60.46	.31	.65

GREEN SEMOLINA VEGGIE ROLLS

Ingredients

Mustard Microgreens	20g
Semolina	100g
Carrot	5ml
Beans	5g
Green Chilly	5g
Mint	5g

Method of preparation

1. Take 100g of semolina add mint, carrot and beans, mix well and knead
2. Make a ball and leave for 1 hour.
3. Take the dough, divide it into 2 balls.
4. Flatten the dough balls, add cooked green chilly and steam the rolls
5. Green semolina veggie rolls are ready to serve



Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	105.4	16.23	10.6	7.45	55.31	16.53	147	51.07	9.21	5.63

GREEN DAL VADA

Ingredients

Besan flour	15g
Dal	10g
Sesame microgreen	20
Salt	As needed
Turmeric Powder	½ teaspoon
Chilly Powder	1 Tablespoon
Oil	5ml

Method of preparation

1. Boil the dal. Mix them with sauted sesame microgreen.
2. Besan flour is mixed with water to make it as a dough.
3. Stuff the mixture into dough and fry the vada for 10-15 mins.



Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	136.21	22.08	10.7	7.61	54.95	13.34	147.57	1.57	3.9	5.63

GREEN KEBAB

Ingredients

Fenugreek Microgreen	20g
Cornflour	15g
Refined Wheat Flour	15g
Ginger	5g
Onion	15g
Beans	5g
Green chilli	5g
Chilly Powder	1 Tablespoon
Turmeric Powder	1\4 teaspoon
Oil	20g



Method of preparation

1. Add the microgreens, ginger,onion ,beans ,flours ,red chilli powder and salt,Pulse until you have a coarse batter.
2. Transfer the mix and shape it into required size.
3. Heat the pan and fry them.

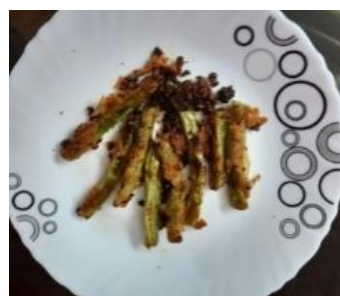
Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	173.9	30.85	2.15	6.23	37.83	70.71	170.62	4.08	6	11.66

GREEN FRITTERS

Ingredients

Rice flour	15g
All purpose flour	10
Onion	5g
Potato	10g
Radish microgreen	20
Oil	5ml



Method of preparation

1. Sauté the microgreen and onion.
2. Boil the potatoes, mash it and mix it with the sauted microgreen and onion.
3. Shape the above mixture and fry.

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	154.61	26	7.14	6	38.11	65	155	1	2.65	11.7

GREEN GODDESS DRESSING

Ingredients

BeetMicrogreen	20gm
Parsley leaves	20 gm
Coriander leaves	10 gm
Basil Leaves	5gm
Lemon Juice	5 ml
Spring onion	10 gm
Curd	10 ml
Pepper Powder	1 Teaspoon
Salt	As needed



Method of preparation

1. Combine all of the ingredients in the bowl of a food processor. Process until smooth and green, with tiny flecks of herbs.
2. Taste, and add more salt or pepper if desired. Use as desired, or cover and refrigerate for later. This dressing will keep well in the fridge for 5 to 7 days.

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	18.57	2.14	1.19	0.94	3.54	64.5	65.61	6.6	17.17	2

READY TO EAT

GREEN BHEL PURI

Ingredients

Mustard Microgreens	50gm
Puffed Rice	20 gm
Potato	2 No(40gm)
Onion -	40 gm
Tomato	15gm
Peanuts	10gm
Chilli Powder	1 tsp
Lemon juice	0.25ml
Salt	To taste



Method of Preparation

1. Roast the puffed rice
2. Chop the mustard microgreens. Add onion,tomato ,peanuts ,Chili powder,lemon juice and salt as needed
3. Bhel puri is ready for consumption

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	195.54	33.27	8.11	-	-	31.18	10.47	28.12	-	0.96

GREEN PEA DIP

Ingredients

Fenugreek microgreen -	50gm
Pea -	30 gm
Onion -	20 gm
Green Chilly	5gm



Method of Preparation

1. Boil the peas
2. Grind the peas into fine paste
3. Add the grinded peas, fenugreek microgreens, onion, salt and green chilly
4. Green pea dip is ready to serve

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	218.53	29.89	16.55	2.76	-	102.63	11.5	-	18.04	-

GREEN FRIES

Ingredients

Radish Microgreens	50 gm
Fenugreek Microgreens	50gm
Onion	20 gm
Green Chilly	5gm
Oil	3ml
Curry Leaves	3gm
Salt	To taste



Method of preparation

1. Finely chop the radish and fenugreek microgreens
2. Cut onions and green chilies
3. Add little oil to the pan and add the cut onions and green chilies
4. Then add the chopped microgreens and add adequate curry leaves and salt
5. The green microgreens fries are ready to serve

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	235.84	27.08	16.25	5.9	-	116.55	1.16	-	6.31	-

GREEN NUTRIA MIX

Ingredients

Chia Microgreens	20 gm
Sesame microgreens	20gm
Mustard microgreens	20gm
Fenugreek microgreens	20 gm
Almond	5gm
Peanut	5gm
Jaggery	15gm



Method of preparation

1. Dry roasts all the ingredients on a medium flame.
2. Allow it to cool completely
3. Grind these to a powder
4. The green nutria mix is ready

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	358.74	31.96	10.67	20.76	-	260.3	1.5	1.15	0.19	11.65

GREEN MIXTURE

Ingredients

Radish Microgreens	20 gm
Chia Microgreens	20gm
Fenugreek Microgreens	20gm
Beet Microgreens	20gm
Gram flour	15 gm
Chilly powder	5gm
Turmeric Powder	3gm
Asafoetida	2gm
Oil	3ml
Peanut	10gm
Curry Leaves	3gm
Salt	To taste



Method of preparation

1. Grind all the microgreens and add it to the gram flour
2. Prepare the dough well by constantly mixing using a spoon
3. Insert the mix into kitchen press
4. The resulting thread like contents are then transferred to a kadai filled with hot oil
5. Fry the entire mixture, add curry leaves, salt as needed and a pinch of asafoetida
6. The Green Mixture is ready

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein	Fat	Fibre	Cal	Iron	Vit A	Vit C	Vit D	Vit E
Total	280.81	31.19	10.3	12.91	19.77	236.62	-	-	19.09	-	7.5

GREEN PIZZA BASE

Ingredients

Fenugreek microgreens	20 gm
Mustard microgreens	20gm
Wheat Flour	30 gm
Yeast	5gm
Oil	5ml
Sugar	5gm
Salt	To taste



Method of preparation

1. Grind the microgreens into fine paste
2. Add the paste into the wheat flour
3. Then add lukewarm water, yeast, sugar, oil and salt to the above mix and make an adequate dough
4. The dough is allowed to rest for one hour
5. Then make small balls out of the prepared dough, roll it to the desired shape and the pizza base is ready

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein	Fat	Fibre	Cal	Iron	Vit A	Vit C	Vit D	Vit E
Total	203.03	31.14	7.48	3.95	0.15	92.25	1.82	0.15	11.67	0.1	1.8

GREEN COOKIES**Ingredients**

Radish Microgreens	20 gm
Fenugreek Microgreens	20gm
Sesame Microgreens	20gm
Wheat Flour	40 gm
Egg	2No
Vanilla Extract	2ml
Baking Powder	3gm
Sugar	20gm

**Method of preparation**

1. Preheat the oven to 180°C
2. Take a bowl and add all the ingredients to it one by one.
3. Mix it thoroughly and make small cookie shape out of it.
4. Place the cookies on a baking tray.
5. Bake them for 10-15 minutes.
6. Leave them to cool and firm up.
7. After 5-10 minutes the green microgreen cookies can be served.

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein	Fat	Fibre	Cal	Iron	Vit A	Vit C	Vit D	Vit E
Total	389.57	51.09	15.2	16.09	1	259.96	6.97	-	11.74	0.07	0.7

GREEN JAM**Ingredients**

Mustard Microgreens	50 gm
Fenugreek Microgreens	50gm
Chia Microgreens	50gm
Sugar	50gm

**Method of preparation**

1. Wash the microgreens very well
2. Heat the pan and add all the microgreens until the raw taste disappears
3. Add adequate sugar and mix well
4. The microgreen jam is ready

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein	Fat	Fibre	Cal	Phos	Iron	Potassium	Zinc	Vit A	Vit C	Vit D	Vit E
Total	337.13	62.05	8.52	9.52	1.15	266.95	2	0.36	3	1.34	1.15	11.65	1.1	10.6

GREEN PICKLE**Ingredients**

Sesame Microgreens	50 gm
Fenugreek Microgreens	50gm
Green Mango	40 gm
Mustard Seeds	5gm
Chilly Powder	10gm
Turmeric Powder	5gm
Asafoetida	3gm
Gingelly oil	10ml
Curry Leaves	5gm
Salt	To taste

**Method of preparation**

1. The microgreens are washed well and are chopped
2. Unripe mangoes are washed thoroughly and are sliced
3. Heat a pan and add gingelly oil
4. Crackle the mustard seeds in gingelly oil
5. Add the mangoes and stir well
6. Add the chopped microgreens and curry leaves
7. Add a pinch of asafoetida, adequate chili powder and turmeric powder
8. Mix the above mixtures very well and switch off the flame

Nutritional composition of the recipe

Ingredients	Energy (kcal)	CHO (g)	Protein	Fat	Fibre	Cal	Iron	Vit A	Vit C	Vit D	Vit E
Total	187.52	14.76	5.83	12.18	20.77	126.22	4.78	-	11.83	0.07	0.7

GREEN MAYONNAISE**Ingredients**

Mustard Microgreens	50 gm
Fenugreek Microgreens	50gm
Egg	2No
Sunflower oil	25ml
Vinegar	5ml
Garlic	5gm
Salt	To taste

**Method of preparation**

1. Grind the microgreens into fine paste
2. Whisk the egg yolks very thoroughly
3. To the above mixture add sunflower oil constantly without hindering the whisking
4. Add garlic, microgreen paste, salt and vinegar to the mix and whisk properly
5. Microgreen Mayonnaise is ready to serve

Nutritional composition of the recipe

Ingredients	Energy	CHO	Protein	Fat	Fibre	Calcium	Iron	Vit A	Vit C
Total	333	3	9	32	1.15	148	2	1.15	11.65

READY TO COOK**Green Leaves Steam Cake Powder****Ingredients**

Mustard Microgreens	50 gm
Chia Microgreens	50gm
Raw Rice	40gm
Coconut	10gm
Salt	To taste

**Method of preparation**

1. Grind the mustard and chia microgreens into very fine paste
2. Soak the raw rice in water for 5hours and then grind the rice to powdered form.
3. Add the grinded microgreens along with the flour prepared and salt and mix thoroughly
4. The prepared mix is ready to cook item for making steam cake.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)
Total	439.43	55.44	13.18	19.82	21.01	370.8	4.98	278.74	35.88

SOUP POWDER ENRICHED WITH GREENS**Ingredients**

Mustard Microgreens	50 gm
Radish Microgreens -	50gm
Onion	10gm
Carrot	10gm
Green Chilly	5gm
Pepper Powder	5gm
Coriander seeds	2gm
Fennel Seeds	2gm
Curry Leaves	3gm
Bay leaves	1gm
Oil	3ml
Salt	To taste

**Method of Preparation**

1. Dry roast the microgreens in a pan and make the greens to fine powder
2. Dry the onions, carrot and green chilies and make it to powdered form
3. To the above powder add the dried and grinded coriander seeds, fennel seeds, curry leaves, bay leaves and pepper powder
4. The instant soup powder is ready to use

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)
Total	82.78	7.35	4.159	4.919	4.282	126.08	2.4	38.79	148.87

GREEN CUSTARD POWDER

Ingredients

Sesame Microgreens	50 gm
Mustard Microgreens	50gm
Milk Powder	80gm
Corn flour	15gm
Sugar	30gm



Method of Preparation

1. Dry the microgreens and grind it to make powder form
2. Add milk powder ,sugar powder and cornflour,
3. Mix 1 and 2 ,the green custard powder is ready for instant use.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)
Total	496.5	89.22	33.03	0.23	2.87	1192.35	9.83	302.3	42.3

HEALTHY NOODLES

Ingredients

Fenugreek Microgreens	20 gm
Mustard Microgreens -	20gm
Chia Microgreens	20gm
Wheat Flour	30gm
Oil	5ml
Salt	As needed



Method of Preparation

1. Knead the dough and using an idiyappam maker strain out the noodle .
2. Dry the noodle and add the microgreens (grinded) and pack in a airtight container or pouch.
3. Use as required

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	101.2	137.18	25.88	7.224	9.786	142.4	36.168	4.3	11.1	0.07

INSTANT GREEN PAYASAM MIX

Ingredients

Chia Microgreens	20 gm
Radish Microgreens	20gm
Beet Microgreens	20gm
Vermicelli	30gm
Milk Powder	40gm
Cashew	10gm
Pistachio	10gm
Cardamom	5gm
Sugar	50gm



Method of preparation

1. Add the roaseted vermicelli ,milk powder and after semi cooked stage, add the dried microgreens. Add sugar. Roast well
2. As it gets roasted, turn off the flame and add pistachios, cardamoms, and cashews for flavour.
3. Dry the contents .Store and use as needed

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	615.42	102.18	25.88	13.224	9.786	666.87	6.168	277.88	13.36	8.82

READY TO COOK GREEN UPPUMA MIX

Ingredients

Sesame Microgreens	20 gm
Mustard Microgreens	20gm
Radish Microgreens	20gm
Rava	50gm
Mustard Seeds	5gm
Curry leaves	10gm
Green chillies	7gm
Ginger	5gm
Salt	3gm



Method of preparation

1. Take a wide pan. Heat 1 tablespoon clarified butter (ghee) in the pan.
2. Add groundnuts and fry till they change colour. Fry on low flame
3. Fry bengal gram ,black gram, mustard seeds, cumin seeds. Fry till they change colour slightly.
4. Add 1 1/2 teaspoon chopped ginger pieces and fry them in oil for some time.
5. Add 2 dried chillies and fry for a minute. Add 5-6 green chillies and fry for 1-2 minutes .Fry on low flame.
6. Add microgreens along with the curry leaves and fry till they turn crispy. Coriander leaves also could be added here.
7. Add roasted rava and fry till it turns light brown
8. Add 3 teaspoons salt or salt to taste. Fry on low flame only or else the base will burn off.
9. Turn off the stove after it turns light brown.
10. Let the mixture cool down and store it in an air tight container

11. Take instant upma mix as desired into a bowl and add hot water to it
12. For 1 cup upma mix, add 3 cups hot water and mix. Close lid. Let it sit for 8-10 minutes, Upma is ready.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	221.18	38.46	9.16	2.736	8.62	141.02	6.716	276.85	16.55	24.22

INSTANT SAMBAR MIX

Serving Size - 1 Portion

Ingredients

Chia Microgreens	20 gm
Fenugreek Microgreens	20gm
Radish Microgreens	20gm
Coriander seeds	5gm
Cumin Seeds	5gm
Urad Dal	10gm
Turmeric	5gm
Curry leaves	5gm
Red chillies	7gm
Salt	3gm
Coconut oil	5ml



Method of preparation

1. Add the microgreens as per the required quantity and mix well.
2. Add the urad dal, tamarind, cumin seeds, coriander seeds, red chillies and coconut oil to the mix, which should be in powdered form. Add salt for taste.
3. The powder can be used as instant sambar mix with hot water.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	178.54	21.562	9.03	6.044	14.15	261.97	7.336	204.46	14.04	0.45

INSTANT RASAM POWDER

Ingredients

Mustard Microgreens	20 gm
Fenugreek Microgreens	20gm
Chia Microgreens	20gm
Chana dal	10gm
Toor dal	10gm
Jeera seeds	5gm
Pepper seeds	5gm
Coriander seeds	5gm
Cumin Seeds	5gm
Curry leaves	10gm
Red chillies	5gm
Salt	3gm



Method of preparation

1. Add all the ingredients in a bowl.
2. Mix the ingredients into a powdered form.
3. The powdered form can be used with hot water for Instant rasam.
- 4.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	178.54	21.562	9.03	6.044	14.15	261.97	7.336	204.46	14.04	0.45

GREEN PANCAKE MIX

Ingredients

Radish Microgreens	20 gm
Fenugreek Microgreens	20gm
Mustard Microgreens	20gm
Wheat flour	50gm
Baking powder	3gm
Baking Soda	2gm
Egg	2 no
Salt	3g



Method of preparation

1. Mix the microgreens into fine powdered form.
2. Add the wheat flour and beat egg. Mix them well without forming any lumps.
3. Add baking powder and baking soda with salt as per the taste. Keep it aside for 15-20 minutes.
4. Mix the microgreens and batter for the instant green pancake.
5. This batter can be stored in refrigerator and used as desired.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	178.74	36.05	6.52	1.316	6.21	252.47	4.386	130.93	7.78	24.13

SIDE DISH**GREEN CHUTNEY****Ingredients**

Sesame Microgreens	20 gm
Fenugreek Microgreens	20gm
Mustard Microgreens	20gm
Coconut	30gm
Ginger	10gm
Green chillies	8gm
Salt	5gm

Method of preparation

1. Add mint and coriander leaves to a blender jar
1. Add peanuts, ginger, garlic, green chilli, lemon, jeera, chaat masala, salt and sugar to it
2. Pour little water and begin to blend
3. Blend until smooth.

**Nutritional composition of the recipe**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	138.98	4.52	2.34	12.52	4.7	32.53	5.496	70.75	15.41	0.86

GREEN PACHADI**Ingredients**

Mustard Microgreens	20 gm
Chia Microgreens	20gm
Radish Microgreens	20gm
Coconut	30gm
Ginger	5gm
Cumin Seeds	2gm
Green chillies	8gm
Curry leaves	5gm
Salt	3gm

**Nutritional composition of the recipe**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	205.74	10.372	5.03	17.684	11.146	179.75	3.234	123.54	12.73	1.08

GREEN BUTTERMILK**Ingredients**

Fenugreek Microgreens	20 gm
Radish Microgreens	20gm
Chia Microgreens	20gm
Curd	30gm
Green chillies	8gm
Curry leaves	5gm
Salt	3gm

**Method of preparation**

1. Put all ingredients in to a mixer grinder.
2. Blend it for 3-4 min. until the green leaves get grinded.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	83.74	7.832	3.98	5.594	6.186	167.28	3.248	69.85	7.4	0.18

GREEN THORAN**Ingredients**

Beet Microgreens	20 gm
Mustard Microgreens	20gm
Fenugreek Microgreen s	20gm
Coconut	30gm
Green chillies	8gm
Curry leaves	5gm
Salt	3gm

Method of preparation

1. Soak green gram in water
2. Put green gram in water, add salt and cook in pressure cooker.
3. Scrape the coconut and Chop the onion, spinach and green chillies.
4. Heat the Vessel and add oil then put the mustard after this add onions and green chillies.
5. After it withers add green gram and spinach.
6. Add turmeric powder and salt then off the flame.
7. Green gram spinach thoran is ready.

**Nutritional composition of the recipe**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	138.21	4.28	2.6	12.53	5.57	48.74	5.446	124.95	20.72	2.93

GREEN ERUCHERY

Ingredients

Radish Microgreens	20 gm
Mustard Microgreens	20gm
Chia Microgreens	20gm
Coconut	30gm
Pumpkin	40gm
Green chillies	8gm
Curry leaves	5gm
Salt	3gm



Method of preparation

1. Pressure cook all the ingredients except coconut and add salt for taste.
2. Crush some coconut and pepper in a mixer and add it into the above mixture.
3. Mix well and put some curry leaves and oil.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	201.1	10.572	4.59	16.884	10.826	144.69	2.144	110.32	17.56	1

GREEN DAL CURRY

Ingredients

Sesame Microgreens	20 gm
Mustard Microgreens	20gm
Beet Microgreens	20gm
Dal	30gm
Chili Powder	2gm
Turmeric powder	1gm
Green chillies	5gm
Curry leaves	3gm
Salt	2gm



Method of preparation

1. Cook the small onion and green dal in pressure cooker for 15minutes by adding water into it
2. Add seasonings into it
3. The tasty healthy green dal curry is ready.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	117.14	19.32	8.25	0.58	5.31	85.09	7.786	146.67	19.92	2.16

GREEN AVIYAL

Ingredients

Fenugreek Microgreens	20 gm
Radish Microgreens	20gm
Beet Microgreens	20gm
Black pepper	2gm
Asafoetida	A pinch
Cumin seeds	2gm
Brinjal	15gm
Ladies finger	3gm
Drumstick	10gm
Coconut	20gm
Garlic	5gm
Shallots	10gm
Curry Leaves	5gm
Oil	5ml
Salt	2gm



Method of preparation

1. Take a vessel. Add some oil, mustard, cumin seeds ,asafoetida, dried chilli, chopped garlic cloves ,mix it well and add chopped shallots, curry leaves and sauté well.
2. Add all the cleaned and boiled vegetables.Add little water to it and cook.
5. Add Curry leaves and serve .

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	140.33	7.79	3.64	11.75	45.286	114.75	6.978	19.67	51.35	2.6

GREEN GRAM CURRY

Ingredients

Sesame Microgreens	20 gm
Mustard Microgreens	20gm
Radish Microgreens	20gm
Green gram	30gm
Mustard seeds	2gm
Curry leaves	5m
Coconut	20gm
Oil	5ml
Salt	2gm



Method of preparation

1. Boil the green gram till it is soft
2. To a pan, add the mustard seeds ,curry leaves ,microgreens ,cooked green gram ,saute well for 5 minutes.
3. Add coconut and salt to the above mixture and serve hot

Nutritive value calculation

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	269.98	21.16	10.65	16.99	8.586	120.73	6.174	140.07	8.84	0.72

GO GREEN BOWLS

Ingredients

Chia Microgreens	20 gm
Beet Microgreens	20gm
Mustard Microgreens	20gm
Sprouted Green gram	30gm
Rajma	30 gm
Curry leaves	5gm
Coconut	20gm
Oil	10ml
Salt	2gm



Method of preparation

1. Mix all the microgreens, sprouted green gram, curry leaves, grated coconut with boiled rajma.
2. Add adequate salt and oil .

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	466.49	41.76	18.05	24.47	20.25	253.88	8.76	174.16	21.42	2.75

GREEN MEZHUKUPERATTY

Ingredients

Sesame Microgreens	20 gm
Chia Microgreens	20gm
Radish Microgreens	20gm
Bitter Gourd	20gm
Garlic	5gm
Shallots	10gm
Curry leaves	5gm
Oil	5ml
Salt	2gm



Method of preparation

1. Heat oil in a pan ,add garlic, shallots and curry leaves and saute them.
2. To this, add salt and turmeric powder. Add bitter gourd and mix all together.
3. Pour ¼ cup water and cook them.
4. After 8-10 minutes , mezhukupuratti is ready to serve.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	200.19	11.38	5.01	15.41	8.88	224.55	6.08	172.63	15.19	0.21

METHOD OF PREPARTION OF FORMULATED MICROGREEN BASED RECIPES AND ITS NUTRIENT CONTRIBUITION

MAIN DISH

GREEN ELA ADA

Ingredients

Mustard Microgreens	20 gm
Chia Microgreens	20gm
Radish Microgreens	20gm
Rice flour	20g
Salt	5g
Grated coconut	10g
cardamom	5g
Split urad dal	10g



Method of preparation

1. Melt jaggery in a pan. Add grated coconut, cardamom powder, Cumin powder, split urad dal and stir it.
2. Take rice flour and boiled water and make dough.
3. Put the dough in the center of the banana leaf and flat it and fill coconut mixture and spread it and seal the banana leaf. Place it in steamer and cook it for 10-15 minutes in steamer.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	315.1	34.36	7.405	12.75	11	153.1	11.329	33	3.45	0

GREEN SANDWICH

Ingredients

Sessame Microgreens	20 gm
Chia Microgreens	20 gm
Radish Microgreen	20 gm
Bread	60gm
Coriander leaves	60gm
Mint leaves	40gm
Green chilly	20gmm
Cucumber	20gm
Tomato	10g
Lemon juice	2tsp
Sugar	a pinch
Salt	a pinch



Method of preparation

1. Add all the microgreens (paste form), green chilli, mint leaves, coriander leaves, lemon juice, sugar and salt in a blender. Blend it to make a green chutney.
2. Take one slice of bread and spread green chutney to it and add cucumber, tomato to it then, cover it with the other slices.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	358.4	29.82	12.675	18.115	8.7105	142.1	41	32.47	1.73	0

GREEN BIRIYANI

Ingredients

Fenugreek microgreens	20gm
Chia microgreens	20gm
Radish Microgreens	20gm
Beet microgreens	20gm
Green peas	10g
Tomato	10g
Potato	10g
Basmati Rice	60g
Chilly Powder	5gm
Turmeric Powder	2gm
Coriander Powder	4gm
Salt	As required
Oil	5g



Method of preparation

1. In a cooker or deep pan, add oil, jeera, and 1 green chilli, also add a pinch of heme or asafoetida.
2. Add chopped potatoes, cook potatoes for 2 minutes or so. Then add microgreens, green peas and tomato, now add all dry masalas.
3. Add pre-soaked rice with water and cover the pan till the rice is scooped. It will take around 15-20 minutes.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	226.96	47.63	15.62	13.3	17.31	210.38	13.88	38.3	10.65	0

GREEN KOZHUKATTA

Ingredients

Mustard microgreens	-20gm
Chia microgreens	-20gm
Beet microgreen	-20gm
Rice flour	-100g
Coconut	-30g
Jaggery	-10gm
Salt	-As required



Method of preparation

1. Take some rice flour, add boiled water and microgreen paste.
2. Dough is ready, take some dough and add coconut and jaggery into it.
3. Steam this, ready to serve.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	481.47	60.7	19.28	25.31	18.63	2465	3.44	0.13	3.14	62.57

GREEN PUTTU

Ingredients

Mustard microgreen	20gm
Sesame microgreen	20gm
Fenugreek microgreen	20gm
Rice flour	50gm
Grated coconut	10gm
Salt	as required

Method of Preparation

1. Puree the microgreens
2. Measure the rice flour in a bowl and add salt and microgreen puree and mix.
3. Break any lumps formed and make the flour moist, so that it will hold the shape when it is steamed.
4. In a puttu maker add a rice flour mix with little of grated coconut to form a thin layer .Steam it for 4-5 minutes.



Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	384.06	47.88	13.42	25.62	11.42	59.55	4.81	5.77	2.08	4.22

GREEN MASALA RICE

Ingredients

Mustard microgreen	20gm
Sesame microgreen	20gm
Chia microgreen	20gm
Beetmicrogreen	20gm
Rice	60gm
Coriander leaves	5gm
Curry leaves	5gm
Onion	20gm
Tomato	15gm
Coriander powder	½ tsp.
Turmeric	½ tsp.
Whole species	½ tbsp.
Oil	10ml

Method of preparation

1. Pour oil in a kadai and heat, put the whole spices then tomato,onion with turmeric and salt .
2. Add the microgreen paste into the above mix,cook the rice and mix all ingredients
3. Garnish with curry leaves and coriander leaves



Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	517.99	58.48	32.24	27.45	133.16	255.27	9.29	224.46	4.09	63.11

GREEN OROTTI

Ingredients

Sesame microgreen	20gm
Chia microgreen	20gm
Wheat flour	50g
Coconut	20gm
Salt	1/2 teaspoon

Method of preparation

1. Take a pan and keep it on medium flame.
2. Eventually add wheat flour, water ,grated coconut and salt along with the microgreen paste and make a dough
3. Spread this mixture in the pan by hand. Microgreen Orotti is ready



Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	483.43	48.88	13.09	26.43	18.07	470.8	5.47	10.17	0.48	0.59

GREEN IDIYAPPAM

Ingredients

Mustard microgreen	20gm
Radish microgreen	20gm
Rice flour	80g
Coconut	5gm
Warm water	½ cup
Salt	to taste

Method of preparation

1. Take rice flour in a bowl and add the grinded microgreens and salt to taste.
2. Make soft dough out of it by adding warm water.
3. Make idiyappam layering coconut
4. Steam them for 5-8 minutes.



Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	287.99	25.96	10.01	16.35	30.69	148.42	5	87.61	13.18	0.56

GREEN CHAPPATHY

Ingredients

Chia microgreen	20
Radish microgreen	20
Beet microgreen	20
Wheat flour	50



Method of Preparation

1. Knead the dough with wheat flour ,water ,salt and microgreen paste
2. Roll the dough and place it on a hot pan, microgreen chappathy is ready

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	312.02	43.53	37.54	10.3	10.99	270.61	5.93	236.92	34.04	0.812

AKFAST WRAPS

Ingredients

Mustard microgreen	20gm
Fenugreek microgreen	20gm
Sesame microgreen	20gm
Beet microgreen	20gm
Wheat Flour	50gm
Cheddar Cheese	30gm
Mushroom	30gm
Onion	20gm
Tomato	15gm
Salt	As required



Method of preparation

- 1.Knead the dough using wheat flour ,salt and adequate water.
2. Roll the dough and make chapatis ,stuff it with sauted microgreens,onion and tomato with roasted mushrooms and cheese

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	442.53	44.59	19.68	18.57	0.04	175.52	4.43	58.53	24.43	0.8

DESSERTS

KULFI

Ingredients

Radish microgreen	20
Mustard microgreen	20
Chia microgreen	20
Milk	100
Sugar	40



Method of preparation

1. Simmer the milk for 20 minutes ,add sugar ,microgreen paste .
2. Pour the cooled content into popsicle moulds and freeze overnight

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	475.1	213.28	24.46	41.4	10.8	328	4.3	219.98	18.91	4

GREEN FRUIT YOGURT

Ingredients

Beetroot microgreen	20
Fenugreek microgreen	20
Mustard microgreen	20
Curd	100
Apple	20
Orange	20
Banana	30
Pineapple	20



Method of preparation

1. Add curd and microgreens in the blender.
2. Cut the fruits into small pieces and mix it well and serve.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total		34.6	13.75	12.66	11.01	250.73	9.02	28.02	16.1	3.93

GREEN PUDDING**Ingredients**

Beetroot microgreen	20gm
Fenugreek microgreen	20gm
Radish microgreen	20gm
Gelatin	5gm
Egg	50gm
Milk	100 ml
Sugar	70gm

Method of preparation

1. Add boiled milk to whipped egg and caramelized sugar .
2. Add the pasted microgreens and stir well. Off the flame and cool it.
3. Transfer to the batter on the bowl, refrigerate in to 2-3 hours, and serve it.

**Nutritional composition of the recipe**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	441.8	58.84	22.23	10.95	6.3	207.26	121.98	302.95	19.21	.84

GREEN KHOA**Ingredients**

Radish microgreen	20
Mustard microgreen	20
Chia microgreen	20
Milk	100
Sugar	40

Method of preparation

1. Add the microgreens, milk and sugar. Blend it well
2. Steam the mixture in steam cooker. After 10 minutes, turn off the flame.
3. Let the mixture gets cool down. Cut into small pieces and serve.

**Nutritive value calculation**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	475.1	108.64	12.23	20.7	10.8	328	3.76	219.98	18.91	0

GREEN MIX STUFFED GULAB JAMUNS**Ingredients**

Radish Microgreens	20gm
Mustard Microgreens	20gm
Chia Microgreens	20gm
Sugar	40gm
Milk	100ml
Rice flour	80gm
Butter	40ml
Rava	20gm

Method of preparation

1. Mix the rice flour, butter, and boiled milk.
2. Stuff the microgreens in the batter.
3. Fry the balls.
4. Make sugar syrup and put the balls in the syrup.

**Nutritional composition of the recipe**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	1,006.05	68.02	24.83	47.1	13.05	328.43	6.02	502.01	18.91	4.95

GREEN HONEY CAKE**Ingredients**

Radish microgreen	20gm
Beetroot microgreen	20gm
Fenugreek microgreen	20gm
Sugar	40gm
Milk	100ml
Wheat flour	80gm
Egg	2 No
Honey	5ml
Butter	40 ml

Method of preparation

1. Make cake dough with microgreen juice.
2. Mix it well, pour it to a container and bake for 20 minutes. after 20 minutes the cake is ready, cool it and serve

**Nutritional composition of the recipe**

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	913.3	121.36	15.01	38.56	11.55	202.7	7.85	498.25	19.21	.95

GREEN PRALINE

Ingredients

Radish microgreen	20gm
Mustard microgreen	20gm
Chia microgreen	20gm
Sugar	40 gm
Nuts	20gm



Method of preparation

1. Take nuts like almond, pistachio, cashew .Roast it on a pan and put aside.
2. Next add a little amount of ghee to the pan with 40g of sugar and microgreen juice.
3. When the jaggery reaches hard crack stage add the roasted nuts and mix well.
4. Pour the mix to counter and spread it with roller after cooling cut it using knife and serve

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	523.6	107.43	13.57	24.72	12.93	237.55	4.67	221.31	16.9	10.7

NUTRIENT-RICH MACRONS

Ingredients

Almond flour	100gm
Egg whites	2 nos
Sugar	40gm
Radish microgreen	20gm
Mustard microgreen	20gm
Chia microgreen	20 gm



Method of preparation

1. Make dough using almond flour ,egg whites sugar powder and microgreen juice.
2. Flatten the mix with a fork and place in the preheated oven.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	1020.08	123.7	33.31	69.54	17.5	445.26	3.79	217.7	16.9	4

GREEN CUSTARD

Ingredients

Milk	100 ml
Cheese	40 gm
Egg	50gm
Corn starch	20gm
Radish microgreen	20gm
Beetroot microgreen	20gm
Fenugreek microgreen	20 gm



Method of preparation

1. Pour milk to a heavy bottom pan. Add 50g sugar to it. Begin to heat it on a medium flame. Stir and dissolve the sugar.
2. Meanwhile add custard powder to a small mixing bowl and pour some milk and mix well without lumps.
3. When the milk boils add custard mixture and mix well to incorporate it with the milk.
4. Regulate the flame and stir well as it continues to boil and turn off flame when the mixture turns thick.
5. Cook microgreens and grind it into a paste and mix with the custard mixture.
6. Keep it aside and when it cools down keep it in the fridge until chilled.
7. Serve chilled.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	466.56	36.81	23.44	22.15	9.63	234.47	9.08	422.8	24.98	1.09

BISCUIT CAKE

Ingredients

Radish microgreen	20gm
Beetroot microgreen	20gm
Fenugreek microgreen	20gm
Biscuits	40gm
Coco powder	10gm
Milk	30ml
Sugar	20 gm



Method Of Preparation

1. Boil milk and add the coco powder with sugar and stir regularly until the mixture gets thick.
2. Puree the microgreens and set aside,take the biscuits dip in the warm water and layer it on a pan .
3. Pour the thick mixture and the microgreen puree ,then layer the biscuits on top, add the microgreen puree on top and serve chilled.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	381.83	56.28	12.22	10.61	12.19	306.8	9.27	276.05	24.98	0.45

SALADS

SPROUTS GREEN SALAD

Ingredients

Mustard microgreens	20gm
Sesame microgreens	20gm
Fenugreek microgreens	20gm
Green gram sprouts	50gm
Onion	20gm
Tomato	15gm
Curry leaves	5gm



Method of preparation

1. Sauté the microgreens, turn off the flame.
2. Mix the vegetables and microgreens.
3. Salad is ready to serve.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	329.73	24.22	12.71	17.65	52.59	153.85	42.55	96.99	12.36	0.13

NUTRI SALAD

Ingredients

Radish microgreen	20gm
Chia microgreen	20gm
Mustard microgreen	20gm
Beet microgreen	20gm
Cucumber	20g
Carrot	10g
Green gram sprouts	40g
Lemon juice	10ml
Salt	As needed



Method of preparation

1. Cut the cucumber, tomato and carrot nicely
2. Add the sprouted green gram and microgreens to the above mix
3. Then squeeze a lemon in to it and add some salt to taste.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	69.48	8.072	3.21	4.414	104.97	126.59	6.486	169.49	17.19	2.12

PROTEIN GREEN SALAD

Ingredients

Sesame microgreen	20gm
Mustard microgreen	20gm
Fenugreek microgreen	20gm
Bengal gram	10g
Sprouted Green gram	10g
Oats	10g
Onion	5g
Coriander leaves	10g
Tomato	5g



Method of preparation

1. Add Bengal gram and green gram into a glass jar of water and leave for two days.
2. Wrap the green gram in a cloth for germination.
3. Chop the tomatoes, onions, microgreens and coriander leaves.
4. Then these ingredients mixed with oats, salt and pepper powder. Protein green salad is ready to eat

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	178.69	24.21	6.89	6.53	50.2	160.97	3.96	78.96	15	0.27

GREEN FRUIT SALAD

Ingredients

Radish microgreen	20gm
Beet microgreen	20gm
Mustard microgreen	20gm
Milk	100ml
Custard powder	10g
Sugar	40gm
Grapes	5g
Apple	20gm
Pomegranate	20gm
Peanut	10gm



Method of preparation

1. First the custard powder and sugar are added to the milk and boiled. Add cooked blended microgreen leaves to it. Add cut fruits and peanut to it. Cool in a refrigerator.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	103.34	9.303	4.4	5.57	131.53	107.5	3.86	264.8	34.8	0.11

MIXED GREEN SALAD

Ingredients

Sesame microgreens	20
Mustard microgreens	20
Fenugreek microgreens	20
Beet microgreens	20
Urad dal-	20
Curry leaves	10



Method of preparation

1. Mix all the microgreens and add boiled green gram. Serve the healthy salad.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	276.19	11.81	15.51	18	514.4	378.93	19.08	151.61	13.8	2.2

FISH GREEN SALAD

Ingredients

Radish microgreens	20gm
Chia microgreens	20gm
Fenugreek microgreens	20gm
Boiled Tuna	30gm
Olive oil	5ml
Salt	as needed
Pepper Powder	as required



Method of preparation

1. Mix all the ingredients with cooked fish. Add adequate salt and pepper .

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	134.13	6.26	8.98	9.784	72.53	189.73	5.06	9.43	0.22	0.28

ROASTED VEGETABLE SALAD WITH GREEN MIX

Ingredients

Sesame microgreens	20
Mustard microgreens	20
Fenugreek microgreens	20
Carrot	10
Onion	10
Tomato	10
Cabbage	5



Method of preparation

1. Cut the vegetables for salad preparation.
2. Roast the vegetables and microgreens.
3. Take a bowl and add the vegetables into it. Add a pinch of salt to it.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	26.57	4.67	1.47	0.13	39.23	27.37	2.2	174.05	14.69	0.05

CHICKEN GREEN SALAD**Ingredients**

Sesame microgreens	20g
Mustard microgreens	20g
Fenugreek microgreens	20g
Cooked Chicken	20g
Lettuce	10g
Cabbage	10g
Cucumber	15g
Spring Onion	5g
Salt	½ teaspoon
Pepper	½ teaspoon
Olive Oil	½ teaspoon

**Method of preparation**

1. To a bowl add chopped lettuce, julienne cabbage, chopped cucumber and chopped r
2. Add salt and pepper and mix them.
3. Add cooked chicken pieces and pour 10g olive oil and mix them.
4. Garnish them using chopped spring onion. Healthy chicken microgreen salad is ready to serve

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	164	10.97	18.57	15.66	158.44	199.25	83.47	59.14	8.75	6.61

CLASSIC GREEN SALAD**Ingredients**

Radish microgreen	20gm
Chia microgreen	20gm
Mustard microgreen	20gm
Fenugreek microgreens	20gm
Drumstick leaves	50g
carrot	20g
tomato	10g
cucumber	10g
mint leaves	10g

**Method of preparation**

1. Cut the vegetables for salad preparation
2. Take a bowl and add the vegetables into it.
3. Add the chopped microgreens and mint leaves to it
4. Add a pinch salt for taste.
5. The healthy and tasty salad is ready to taste.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	84.48	7.83	5.04	3.62	232.19	151.76	7.49	654.47	57.26	0.42

GRILLED GREEN VEG SALAD**Ingredients**

Mustard microgreens	20
Fenugreek microgreens	20
Beet microgreens	20
Carrot	20
Cabbage	20
Tomato	10

**Method of preparation**

1. Cut all the vegetables and mix it with the microgreens.
2. Healthy salad is ready.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	34.3	8.42	3.49	6.14	56.79	98.72	158.11	211.13	31.24	17.58

JUCES

GREEN SMOOTHIE

Ingredients

Sesame Microgreens		50gm
Oats	20 gm	
Coriander leaf	15 gm	
Green Apple	30 gm	
Spinach	15gm	
Mint	5 gm	
Sugar	5 gm	
Ice	1 cup	



Method of preparation

1. Place all ingredients in a blender and blend until smooth.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	421.53	38.69	10.89	26.59	9.99	133.45	4.21	91.83	16.19	0.79

MUSTARD SHOT

Ingredients

Mustard microgreen	50
Orange	40
Apple	40
Sugar	20gm



Method of preparation

1. Mix all the ingredients in a blender.
2. Add sugar for taste.
3. Mustard shot is ready.
- 4.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	94.95	19.56	1.89	0.52	3.52	109.98	1.54	220.54	48.68	0.34

GREEN LIME JUICE

Ingredients

Radish Microgreen	20gm
Fenugreek Microgreen	30gm
Mint	5 g
Lemon	50 g
Sugar	50 g



Method of preparation

1. Add some water, microgreen and mint leaves and sugar, mix thoroughly.
2. Juice is ready to serve

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	86.23	17.45	2.01	0.56	3.11	156.7	3.08	592.68	39.044	0.18

GREEN PASSION FRUIT JUICE

Ingredients

Fenugreek microgreen	30g
Radish microgreen	30g
Passion fruit	40g
Ginger	10g
Sugar	



Method of preparation

1. Put all the ingredients in a blender, add some sugar and blend well. Serve the juice.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	161.51	24.88	8.85	2.09	19.5	56.5	3.41	7.99	18.24	0.03

GREEN MANGO JUICE

Ingredients

Fenugreek microgreen	30gm
Mustard microgreen	30gm
Mango	40gm
Ginger	10gm
Sugar	20gm



Method of preparation

1. Place all the ingredients in the blender, mix well.

Nutritive value calculation

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	282.87	21.88	13.86	14.04	19.48	167.78	6.85	95.75	12.4	0.14

GREEN APPLE JUICE

Ingredients

Fenugreek Microgreens	30gm
Mustard Microgreens	20gm
Apple	70g
Ginger	5gm
Sugar	20gm



Method of preparation

1. Wash the microgreens and apple nicely.
2. Cut the apple into small pieces.
3. Grind apple and the microgreens in a mixer.
4. Microgreen apple juice is ready to serve

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	284.36	31.78	12.82	11.1	25.68	234.1	5.08	7.98	0.75	0.06

GREEN MINT JUICE

Ingredients

Fenugreek microgreen	30gm
Radish microgreen	30gm
Lime	1 No
Mint	5gm
Sugar	10gm



Method of preparation

1. Place all the ingredients in a blender, blend well.
2. Serve the thick smooth juice.

Nutritive value calculation

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	104	22.58	1.81	0.42	3.09	94.64	2	465.87	25.99	0.15

GREEN MOJITO

Ingredients

Sesame microgreen	50gm
Soda	40ml
Lemon	20ml
Ginger	5gm
Sugar	40gm



Method of preparation

1. Place all the ingredients in a blender, mix them well. Serve the juice.

Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	352.08	28.99	8.72	20.3	9.71	73.61	4.11	1.98	1.7	0.71

GREEN FRESHNER JUICE

Ingredients

Beet microgreen	50gm
Grape	40gm
Sugar	30gm
Lemon	1 No

Method of preparation

1. Place all the ingredients in a blender, blend well.
- 2.



Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	101.11	22.08	1.38	0.6	3.49	21.35	0.7	71.74	16.36	0.26

Green Cucumber Juice

Ingredients

Sesame microgreens	30gm
Radish Microgreens	30gm
Cucumber	50gm
Mint Leaves	10gm
Sugar	40gm

Method of Preparation

1. Mix all the cleaned ingredients and the green cucumber juice is ready



Nutritional composition of the recipe

Ingredients	Energy (Kcal)	CHO	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron	Vit A (mcg)	Vit C (mg)	Vit E (mg)
Total	104	22.58	1.81	0.42	3.09	94.64	2	465.87	25.99	0.15

Appendix VI

Interview Schedule to Elicit Knowledge, Attitude and Practice of the Selected Samples Regarding the Cultivation and Importance of Microgreens

Interview Date: ___/___/___ (DD/MM/YYYY)

I Background Information

1. Name:
2. Age:
4. Address:
5. Mobile Number:
6. Religion:

- Hindu
 Christian
 Muslim
 Others

7. Educational Qualifications:

Sl. No	Educational Details	Put tick mark <input type="checkbox"/>
1	SSLC	
2	HSC	
3	Degree	
4	PG	
5	Diploma	
6	Professional courses	
7	Others	

II Socio-Economic Status

1. Job description of the head of the family:.....

2. Family Income per annum (**Modified Kupusamy,2019**)

- ≤ 2,640
 2,641-7,886
 13,161-19,758
 19, 759-26,354
 26,355-52,733
 ≥52,734

3. Type of Family:

- Joint Family
 Extended Family
 Nuclear family

4. Marital status:

- Married
 Unmarried
 Widow

5. Details of family Members

SI No	Name	Relationship	Age	Sex	Educational status	Marital status	Employment status	Income

III Consumption pattern of Green leafy vegetables**1. Number of meals prepared with greens?**

One meal Two meals Between two – four meals Not using

2. Food Frequency Table

FOOD ITEMS	FREQUENCY				
	Daily	3-4 per week	1-2 per week	1-3 per month	Never
Cereals and cereal products					
Pulses and legumes					
Milk and meat products					
Fruits and Vegetables					
Fats and Sugars					

Consumption of other food items

FOOD ITEMS	FREQUENCY				
	Daily	3-4 per week	1-2 per week	1-3 per month	Never
Bakery Products					
Ready to eat foods					
Processed foods					
Savouries and sweets					
Desserts					

3. How often do you cook with greens ?

- Once in a week
 Two to four times
 Five times or more a week
 Occasionally
 Monthly once or twice

4. Specify the types of green leafy vegetables you prepare for meals:**5. List the type of green leafy recipes you prepare:.....****6. Specify the amount (in grams) of green leafy vegetables you commonly purchase for meal preparation:****7. How much budget is being used for the purchase of green leafy vegetables Per day?**

- Less than 50 Rupees
 Rs.50 -150
 Rs.150-300
 Above Rs .300

IV Cultivation Awareness

S.No	Question	Yes	No
1	Are you a consumer of greens?		
2	Do you have kitchen garden?		
3	Do you cultivate green leafy vegetables in your kitchen garden?		
4	Do you know the importance of green leafy vegetables?		
5	Are you having a thought that the conception that the farming of vegetables will add to expenses?		
6	Are you having a concept that large amount of water is lost for cultivation purpose?		
7	Do you use pesticide /insecticides for protection of crops in your kitchen garden?		
8	Have you thought of the need for cultivation of green leafy vegetables ?		

1. What type of vegetables/micro-greens are grown in your garden/farm

.....

If no, what are the reasons for not having a kitchen garden

- Lack of space
 No time
 Not Interested
 Don't know the how to cultivate
 A lot of effort is needed
 Large amount of expenses

2. How do you preserve soil fertility?

- Fertilization (Chemicals, animal manure, green manure etc)
- Crop rotation (Cultivation of a series of dissimilar types of crops in the same area in sequential seasons)
- Intercropping (Cultivation of two or more dissimilar types of crops in the same area in the same season)
- Tillage

Other (specify):

V Knowledge Regarding Micro-greens

1. Describe your knowledge on microgreens.

- I am fully aware of microgreens
- I am somewhat aware
- I have no awareness of microgreens

2. What are microgreens?

- It is a leaf
- It is a small plant
- Something like vegetables
- Don't know

3. What are the benefits of microgreens?

- It can be used as food
- It is good for health
- It is easy to grow
- I don't find any benefits

VI. Knowledge Awareness

S.No	Question	Yes	No
1	Do you know about microgreen seeds?		
2	Do you know that microgreen seeds are available for sale?		
3	Do you know about nutrients?		
4	Do you know about micronutrients?		
5	Do you know that microgreens are rich in micronutrients?		
6	Are you a microgreen consumer?		
7	Do you like the taste of microgreens?		
8	Are you aware of the health benefits of microgreens?		
9	Do you know the growing medium of microgreens?		
10	Are you aware of the shelf life of the microgreens?		
11	Do you know the storage techniques of microgreens (applicable for cultivators)?		
12	Do you find that microgreen cultivation as a costlier cultivation?		

13	Do you know the approximate amount required for the microgreen cultivation (applicable for microgreen cultivators)?		
14	Do you have come across the word 'Microgreens' through any of the print, electronic media etc.. ?		
15	Are you interested in growing microgreens ?		
16	Do you need to know more on microgreens ?		
17	Are you ready to grow microgreens if proper training is given!		
18	Is there a need of a booklet containing all the steps of cultivation that would serve as reference for future		

4. If you are a microgreen cultivator, specify the types of seeds you commonly use for cultivation

.....

5. Mention from where you have purchased microgreen seeds

.....

6. Specify the types of nutrients you know ?

.....

7. Mention the nutrients present in microgreens :

8. Which medium was found to be suitable for the growth of microgreens

- Coco-peat
- Normal Soil
- Soil+ kitchen waste
- Soil+ kitchen waste + Cocopeat
- Hydroponics

9. Mention the type of containers used for cultivation of greens :.....

10. Mention the watering methods adopted for cultivation of greens.

11. Mention the environment ~~with~~ to which microgreens are subjected to.

12. What type of techniques are been used for the storage of microgreens?

- Food Grade Containers
- Paper Bags
- Paper towels
- Polyethylene bags

13. Specify the approximate money required for the microgreen cultivation (applicable for microgreen cultivators).....

14. Through which means you came to know about the microgreens

- Newspaper
- Magazines and Journals
- Social Medias
- Other Mass Medias

15. Specify the social media through which you became aware of the greens.

- Facebook
- Instagram
- Twitter
- Whats app
- Telegram

16. What are the microgreen recipes you prepare?


17. Describe the taste of microgreens?

18. What was your opinion when you came to know about the microgreens?

- Very Interesting
- Thought of trying it
- Searched for more information
- Haven't found anything beneficial
- Haven't understood the term

Appendix VII

Plagiarism Report

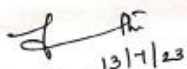
 **Avinashilingam Institute for Home Science and Higher Education for Women**
(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD)
Re-accredited with 'A++' Grade by NAAC.CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India


PLAGIARISM CHECK REPORT (THESES)

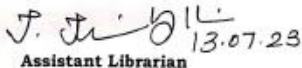
1.	Name of the Research Scholar	Vineetha Antony
2.	Roll No. and Year of Registration	19PHFDP003
3.	Department	Food Service Management and Dietetics
4.	Name of the Research Guide	Dr. R. Radha
5.	Title of the Thesis / Dissertation	Cultivation and Nutritional Profiling of Selected varieties of Microgreens and their Acceptability in Incorporated Recipes
6.	Similarity Content (%) Identified	8%
7.	Software Used	Turnitin
8.	Date of Verification	13-07-2023


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Information Scientist


Research Scholar


13.07.23
Assistant Librarian


Research Guide

Date: 13-07-2023

Cultivation and Nutritional Profiling of Selected varieties of Microgreens and their Acceptability in Incorporated Recipes

ORIGINALITY REPORT

8%	4%	3%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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Cultivation and Nutritional Profiling of Selected varieties of Microgreens and their Acceptability in Incorporated Recipes

by Vineetha Antony

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Cultivation and Nutritional Profiling of Selected varieties of Microgreens and their Acceptability in Incorporated Recipes

**CHAPTER I
INTRODUCTION**

It is health that is our wealth, not pieces of gold and silver

Hikmah Gustik

The global population is growing at unprecedented rates, and demand for natural resources is increasing. As a result, healthy food crops and other more sustainable methods of environmental preservation have become increasingly critical in individual use of natural resources as well as the development of new strategies for being sustainable in the future (Chahal et al., 2018). According to Food and Agriculture Research Institute (FARI, 2017), the world's population is growing, and by 2050, it is predicted to reach over nine billion people. As the population grows, there is a great likelihood that the demand for natural resources will grow by 70% (FARI, 2017).

According to Kulkarni et al. (2017), the phrase of completeness contains the idea of health. Health is characterized as the ability to effectively perform physical, mental, social, and spiritual, in order to express the entire spectrum of our individual personalities, which the ability to which one lives. Nutrition and health are, therefore, prevention, and each individual member on a great scale of numerous decisions must be made regarding food choices and general functioning on all aspects of one's life and used to ensure working in stability or integrity of the whole.

Individuals who are concerned about their health and fitness often consume a lot of food, and get adequate sleep. Being healthy and fit helps people to keep their minds for after thinking they will perform and increase the satisfaction in their work and lives. However, one may not be happy to consume and produce food items in response to their health, nutritional knowledge, and consumption of naturally produced foods (Kulkarni et al., 2017).

Eating nutritious food, exercising, getting enough sleep, and avoiding hazardous substances are just a few basic methods to keep individuals healthy, and in these are found to

Appendix VIII

Journal Publication in UGC CARE Listed Journals



Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University under Category A by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with A+ Grade by NAAC. Recognised by UGC Under Section 12 B
Coimbatore-641043, Tamil Nadu, India

APPENDIX L2

(Item No 5 of Check List)
Details of Research Publications

S.No	Article	Journal	Other Details Vol/No/Page No/Year	Published in UGC-CARE/ Scopus Indexed/ Web of Science (*List of Journals in that category including the particular Journal to be attached)
1	Micro farming Through Cultivation of Selected Varieties of Microgreens	Indian Journal of Home Science	Volume 32, No. 2, July 2020, Pp 206- 212.	UGC-CARE
2	Study On The Formulation And Organoleptic Evaluation OF Microgreen Salads	Indian Journal of Home Science	Volume 33 ,No.2, July, 2021, Pp- 183-193	UGC-CARE

*Proof of list of Journals from Internet to be attached along with copies of reprints.

Scholar : Vincetha Antony

Supervisor : Dr. R. Radha

The scholar Ms Vincetha Antony's publication is verified and is available in "The Indian Journal of Home Science" which is indexed and active in Ugc care list Group I as of today 27.01.2023.

J. J. J. J.
27.01.23

Checked By: Dr. V. Premala Prasad
-Shri m
On. 27-1-2023.

HoD/Dean

Alapud
27.1.2023

MICROFARMING THROUGH CULTIVATION OF SELECTED VARIETIES OF MICROGREENS

Vineetha Antony¹, Dr.R.Radha²

¹Lecturer, Dept of Home science,
Assumption College, Changanacherry, Kerala.

²Assistant Professor,
Dept of FSMD,

Avinashilingam Institute for Home science and Higher education for women ,
Coimbatore ,Tamil Nadu.

E-mail- vineethaantony93@gmail.com; radhaskmegg@gmail.com.

ABSTRACT

Elaboration in the area of nutrition has rapidly increased as community is looking forward to combating many of the lifestyle disorders. The science deals with the process of acquiring the essential nutrients that are needed for the body for essential growth and maintenance of body. Many researchers pointed out the strong link between nutrition and agriculture. Both share the usual term that is *food*. The major result of all farming practices is food, and this is the main input that paves the way to nutrition. Food may be a major outcome of agricultural activities, and, in turn, may be a key input into good nutrition. The field of farming and agriculture has deliberately paved newer methods to increase the availability of nutrients. One such innovation that grabs attention is the microgreens or Lilliputian vegetables. These greens are loaded with micronutrients and can be easily grown in home gardens. The microgreens are also associated with lowering the risk of many communicable disorders. The present study aims to identify the growth pattern and cultivation of selected varieties of microgreens.

Keywords: Nutrition, Agriculture, Microgreens, Outcome.

INTRODUCTION

Microgreens began to show up on chefs' menus during twentieth century in San Francisco that is in California. The initial varieties which were grown there were very specific. But the case has changed drastically now and the industry has spread across U.S providing various varieties of Microgreens. The term microgreens has been known as a innovative ingredient to promote the flavor and texture of various salads, appetizer ,main courses and various recipes (**Treadwell et al, 2010**).Research comparing microgreens to more mature greens reports that nutrient levels in microgreens are often up to nine fold above than those found in mature greens. Though microgreens are packed with nutrients, they are not so common in our country mainly towards the southern part of India. The introduction of these greens will be remarkable advantage in our diets (**Xiao et al , 2012**).

OBJECTIVES

The proposed research objectives are as follows:

- To Study growth pattern in selected varieties of microgreens.

- To study on the harvesting techniques adopted for the harvest of microgreens
- To study about the climatic condition and type of medium required for the growth of the selected microgreens.

HYPOTHESIS

To analyze the Growth pattern, harvesting and cultivation of the selected varieties of micro greens

METHODOLOGY

The study entitled “Micro farming through cultivation of selected varieties of micro-greens” is discussed under the following headings:

- a. Selection of samples
- b. Selection of tools
- c. Selection of growing medium
- d. Cultivation of micro-greens

Selection of sample

Micro-greens are available in wide varieties and can be purchased from online shopping sites as well as from seed growing nurseries in metropolitan cities. The samples selected for the study belongs to three families. The selection of samples was done based on their adaptability to grow in tropical climate. The samples selected for the study include:

Table – 1: Samples selected for the study

Family	Commercial name	Genus and species
<i>Brassicaceae</i>	Mustard	<i>Brassica nigra</i>
	Broccoli	<i>Brassica oleracea</i>
	Bok Choy	<i>Brassica chinensis</i>
<i>Apiaceae</i>	Celery	<i>Apium graveolens</i>
	Dill	<i>Anethumgraveolens</i>
<i>Lamiaceae</i>	Mint	<i>Anethumgraveolens</i>

The table 1 gives the detail on the selected family of microgreens with its commercial name and scientific name.

b. Selection of tools

The tools required for growing micro-greens include:

- a. Container: containers can be of any shape and measurement. The containers selected for the study were rectangular trays of 29×24×6cm respectively.

- Coco peat: This was selected as a growing medium for the cultivation of micro-greens. It has known to absorb moisture which enables them to be the best growing medium.
- Water: a sprayer was used to water the micro-greens seeds.
- Micro-green seeds: the micro-green seeds which was used for the study comprises from the families of *Brassicaceae*, *Apiaceae* and *Lamiaceae*
- Aluminium foil paper: this was used to cover the trays after sowing the seeds to block out the seeds.

c. Selection of growing medium

The growing medium selected for the growth the micro-green was coco peat. It consists of a mixture of coco pit compost and coconut fiber in 2:1 proportion. It has the ability to retain and absorb water and maintains the moisture level for the growth of the greens.

d. Cultivation of micro-green seeds

Cultivation of micro-greens can be discussed under different steps:

- a. Preparation of the trays: the trays used for sowing were of 29×24×6cm. Wet the tray by sprinkling some water and spread out the coco peat evenly up to a height of 3cm. Sprinkle some water on to the peat.
- b. Sowing of seeds: transfer the entire seeds in the packet into a glass and spread the seeds over the peat by shaking the glass so that it falls evenly. Tap the seeds with a piece of thick paper so that the seeds come in contact with the peat.
- c. Covering the tray: cover the tray with an aluminium foil and place the tray in a darker area for the first 4-5 days.
- d. Watering the seeds: sprinkle water on the seeds, twice a day by removing the cover and then place the foil over the tray. Continue this for about 4-5 days and then remove the cover and place the tray in an area where it receives sunlight.

FINDINGS AND DISCUSSION

The findings and discussion of the study entitled “Micro farming Through Cultivation Of Selected Varieties Of Micro-greens” is discussed under the following headings:

- a. Growth of the micro-greens
 - b. Harvest of micro-greens
 - c. Climatic conditions and type of medium used for the growth of micro-greens
- a. Growth of the micro-greens

The three different families of micro-green selected for the study have different degree of germination and growth. For the faster growth rate the seeds were covered with aluminum foil paper to block out the tray so as to prevent the entry of sunlight. This enabled the seeds to use up the stored nutrients within them so that when they reached a height of 4 inches they were rich in micronutrients.

Table – 2: Growth pattern of selected sample of micro-greens

Common name	No of days taken for germination	No of days taken to attain mature stage
Mustard	1	12
Broccoli	4	16
Bok Choy	4	15
Celery	7	20
Mint	10	21
Dill	18	30

The table 2 describes the growth pattern of the three various families chosen for the conduct of the study which is discussed below.

The Micro-greens selected from *Brassicaceae* family include broccoli, bok choy and mustard greens. Out of these three, mustard micro-greens have a faster germination and growth rate. They sprouted within 24 hours and about 100% of the seeds germinated. The broccoli and bok choy micro-green seeds germinated after 2 days of sowing and their growth rate was slow. Only 60% of the seeds germinated. On the 3rd day, foil cover was removed from the mustard micro-greens and was placed in sunlight, while the foil cover of broccoli and bokchoy was removed after four days. Mustard micro-green seeds had a faster germination capacity than the other two seeds of the same family. About 100% of the seeds germinated within 24 hrs and after two days they attained a height of one inch. On the 5th day they reached a height of 2.5 inches and were light green in colour.

Micro-greens selected from *Apiaceae* family include celery and dill. Both of them have slow germination capacity. Celery seeds germinated after 7 days of sowing and only 50% of the seeds germinated while the celery micro-green seeds germinated on the 20th day of sowing and their growth rate was slow but 90% of the seeds germinated.

Micro-green selected from *Lamiaceae* family includes mint. They were very slow growers and germinated after 10th day of sowing. About 60% of the micro-greens had positively germinated but the growth was not adequate.

b. Harvest of micro-greens

Harvest of micro-greens was done once they reached a height of 4 inches and at this stage the microgreens are known as the ‘baby leaf’ stage. The micro-greens at this stage are rich in micronutrients especially antioxidant-rich vitamins and minerals (Tomasi et al 2015). Harvest was done with the help of scissors. The greens were harvested by cutting their stem and leaving the portion which was in contact with the peat.

c. Climatic conditions and type of medium used for the growth of micro-greens

Micro-greens of all varieties can be grown in any climatic condition but their germination and growth rate may vary. Table 3 and Table 4 discuss on the growth pattern on the microgreens.

Table -3: Rate of growth

Family name	Rate of growth
<i>Brassicaceae</i>	Faster
<i>Apiaceace</i>	slow
<i>Lamiaceae</i>	Very Slow

From the table-3 it is clear that, *Brassicaceae* family has faster growth rate in tropical climate. The micro-greens from the *Apiaceace* family has slower growth rate and that of *Lamiaceae* family has much more growth rate than *Apiaceace*. The medium used for the growth was coco peat which consisted of coco pit compost and coconut fibers in 2:1 proportion. Coco peat helped in retaining and absorbing water which provided the optimum moisture level for the growth of the microgreens.

Table -4: Average height of sample plants

Family name	Average height attained (inches)
<i>Brassicaceae</i>	3.5
<i>Apiaceace</i>	2.8
<i>Lamiaceae</i>	1.1

From table 4, it is observed that the average height attained by *Brassicaceae* family was 3.5 inches and that of *Apiaceace* family was 2.8 inches. The average height attained by *Lamiaceae* family was 3 inches. The graphical representations given below shows the relation between average height and average number of days to mature.

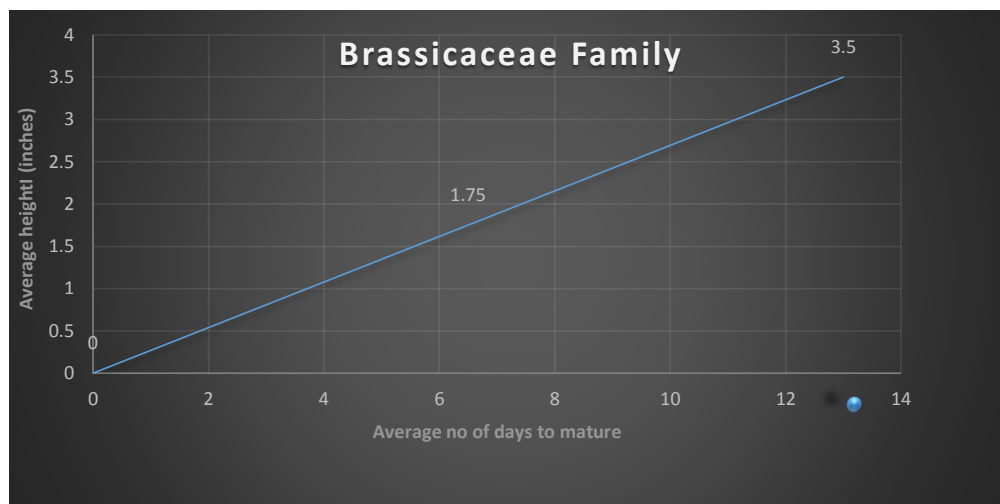


Fig - 1 Average height obtained and the average number of days taken by the micro-greens selected from the Brassicaceae family

Figure -1 represents the graphical relation between the average height obtained and the average number of days taken by the microgreens selected from the Brassicaceae family. From the graph, it is clear that, on an average 7th day of sowing the greens attained an average height of 1.75 inches and on an average 13th day the greens attained an average height of 3.5 inches.

SUMMARY AND CONCLUSION

As discussed above, the Microgreens are clearly very tender and also young seedlings which had been cultivated with various varieties of edible species. Considering small size of the greens compared to its mature counterparts as micro-herbs, which intensify flavors, texture and appeal of the recipes prepared. They point out the most welcoming category with various traits with in reference to sprouts. Awarding micro-greens as a novel crop, the researches regarding the same are not yet progressing and a very little scientific information are available in the same field. With more research insights and supportive studies micro-greens can definitely be the super foods.

Therefore, the study entitled “Micro-farming Through Cultivation of Selected Varieties of Micro-greens” was carried out and the salient findings of the study were listed as follows:

a. Growth of the microgreens

- The three different families of microgreen selected have different degree of germination and growth. For the faster growth rate the seeds were covered with aluminium foil paper to black out the tray so as to prevent the entry of sunlight. This enabled the seeds to use up the stored nutrients within them so that when they reached a height of 4 inches they were rich in micronutrients.
- The Micro-greens selected from *Brassicaceae* family include mustard, broccoli and bok choy. Out of these three, mustard microgreens have a faster germination and growth rate. They sprouted within 24hrs and about 100% of the seeds germinated. The rest of the two micro-greens were slow in their growth and germination. Micro-greens selected from

Apiaceace family include celery and dill. Both of them have slow germination capacity. Micro-green selected from *Lamiaceae* family includes mint. They were also found to be very slow in growth and germination.

b. Harvest of micro-greens

Harvest of micro-greens was done once they reached a height of 4 inches and at this stage the micro-greens are known as the baby leaf stage. The micro-greens at this stage are rich in micronutrients especially antioxidant rich vitamins and minerals. Harvest was done with the help of scissors. The greens were harvested by cutting their stem and leaving the portion which was in contact with the peat.

c. Climatic conditions and type of medium used for the growth of microgreens

- Micro-greens of all varieties can be grown in any climatic condition but their germination and growth rate may vary. Among the three families selected, *Brassicaceae* family has faster growth rate in tropical climate. The micro-greens from the *Apiaceace* family has slower growth rate and that of *Lamiaceae* family has much more growth rate than *Lamiaceae*. The medium used for the growth was coco peat which consisted of coco pit compost and coconut fibres in 2:1 proportion. Coco peat helped in retaining and absorbing water which provided the optimum moisture level for the growth of the micro-greens.
- The graphical relation between the average height obtained and the average number of days to mature, by the micro-greens selected from the *Brassicaceae* family shows that, on an average 7th day of sowing the greens attained an average height of 1.75 inches and on an average 13th day the greens attained an average height of 3.5 inches.

CONCLUSION

The dissertation work on the topic “Micro-farming Through Cultivation Of Selected Varieties of Micro-greens” found that micro farming can be possible with selected varieties of micro greens with very little expense and, much more nutrient contents. The study revealed that the growth of selected varieties of micro-greens was found to be positive in tropical climate in terms of height. The type of medium used for the growth of micro-greens was coco peat which consists of coco pit compost and coconut fibers in 2:1 proportion.

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STUDY ON THE FORMULATION AND ORGANOLEPTIC EVALUATION OF MICROGREEN SALADS

¹Vineetha Antony and ²Dr.R.Radha

¹Lecturer, Dept of Home science, Assumption College, Changanacherry, Kerala

²Assistant Professor, Dept of FSMD,

Avinashilingam Institute for Home science and Higher Education for Women,
Coimbatore, Tamil Nadu.

E-mail- vineethaantony93@gmail.com

ABSTRACT

The Micro greens are younger and tender edible seedlings produced using the seeds of different species of vegetables, herbaceous plants, aromatic herbs and even wild edible plants. Based on the micro green species that has been used, they can be harvested from 7-21 days after germination when the cotyledonary leaves have fully developed and the first true leaves have emerged. They are also rich in phytochemicals like vitamin C, vitamin B9, and vitamin K1 .They help in reducing the risk of heart diseases, Alzheimer's disease, diabetes and certain cancers. Though the microgreens are packed with nutrients, they are not so common in our country mainly towards southern part of India. Introduction of these greens will be remarkable advantage in our diets. Therefore an initiative was taken to incorporate the microgreens into salads that make the nutrients more available to body. The microgreens which were selected were grown and an initiative was done to incorporate the micro greens to diet through incorporating micro greens in salad preparations.

Keywords: Microgreens, Nutrition, Incorporate, Salads, Diet

INTRODUCTION

Depending on the microgreen species that has been used, they can be harvested 7-21 days after germination when the cotyledonary leaves have fully developed and the first true leaves have emerged. Microgreens have a good content of minerals. They represent a good source of potassium and calcium. They are also characterized by a high content of nitrates which are considered anti-nutritional factors (Xiao et al, 2014). Microgreens contain higher amounts of important phytonutrients (ascorbic acid, β -carotene, α -tocopherol, and phylloquinone) and minerals (Ca, Mg, Fe, Mn, Zn, Se, and Mo) and lower nitrates (Pinto et al, 2015). The fully matured Microgreens are collected by cutting the single seedlings above the soil line when their height is 3 to 9 cm without the rootlets. The eatable portion is composed of single stem, the cotyledonary leaves and, often, by the emerging first true leaves. In some cases, when small and tender, also the integuments of the seeds that remain attached to the cotyledons may be considered edible. Even though its size is so small, microgreens, also known as “vegetable confetti” or “microherbs” refers to aromatic herbs, can provide a wide variety of intense flavours, bright colours and a good texture; therefore, they may be proposed as a new ingredient to enhance and garnish drinks, salads, appetizers, main and second courses, soups, sandwiches and dessert (Treadwell et al, 2010).

Though the microgreens are packed with nutrients, they are not so common in our country mainly towards southern part of India. Not much research in this area has fruitful results to modify the behavior of community to accept microgreens as common vegetable greens. Introduction of these greens will be remarkable advantage in our diets. Therefore, the study focuses on the incorporation of the cultivated selected microgreens in salads and aims to formulation of salads with selected microgreens and conduct organoleptic evaluation of the formulated salads.

OBJECTIVES

The proposed objectives are as follows:

- To select varieties of microgreens that are suitable for growth in tropical climate.
- To formulate microgreen incorporated salads using the selected varieties of cultivated microgreens.
- To evaluate the macronutrient and micronutrient analysis of the prepared microgreen salads.
- To analyze the organoleptic criteria of prepared microgreen salads

METHODOLOGY

The study is discussed under the following headings:

- a. Selection of samples**
- b. Cultivation of Microgreens**
- c. Development of Microgreen Salads**
- d. Organoleptic Evaluation of the Developed Salads**
- e. Analysis of the Nutritional Adequacy of the Microgreen Salads**

a. Selection of sample

The Microgreens were purchased from online shopping sites. The microgreen seeds selected were from three different families. The microgreens which were selected were based on their adaptability to grow in tropical climate. The final selection of the seeds for the making of the salads was decided based on the easy availability of the seeds and its easy growth. The samples selected were then cultivated and further been used for salads. The Six micro green seeds which were purchased from online shopping site were 1.Red cabbage 2. Radish ,3.Celery, 4.Coriander and 5.Amaranthus . 6. Arugula

b. Cultivation of Microgreens

The selected microgreens which were suitable for the growth in tropical climate were purchased. These Microgreens were cultivated and used for salad preparation.

Cultivation of microgreens can be discussed under different steps:

- a. Making of the trays: take trays measuring 29×24×6cm for sowing seeds. Sprinkle some water and spread out the coco peat evenly up to a height of 3cm.
- b. Sowing of seeds: transfer the entire seeds in the packet into a glass and spread the seeds over the peat by shaking the glass so that it falls evenly. Tap the seeds with a piece of thick paper so that the seeds come in contact with the peat.
- c. Covering the tray: cover the tray with an aluminium foil and place the tray in a darker area for the first 4-5 days.
- d. Watering the seeds: sprinkle water on the seeds, twice a day by removing the cover and then place the foil over the tray. Continue this for about 4-5 days and then remove the cover and place the tray in an area where it receives sunlight.

c. Development of Microgreen Salads

The cultivated microgreens (the cultivation procedures were discussed briefly in the above point) were then selected and planned to prepare vegetable salads. Coriander, Red cabbage, Radish, Celery, Arugula and Amaranthus were selected for the preparation of the salads.

d. Organoleptic Evaluation of the Developed Salads

The sensory evaluation were carried out to find the overall acceptability, taste, texture, colour and flavor. The six microgreens which were selected from online shopping sites were selected to adequately plan the preparation for salads.

e. Analysis of the Nutritional Adequacy of the Microgreen Salads

The nutritive value of the developed microgreen salads were computed for energy, protein, carbohydrates, fat, vitamin A, vitamin C, vitamin E, vitamin K, calcium and iron according to United States Department of Agriculture, Assessment Of Nutrient Concentrations, July 2013. Both micronutrient and macronutrient analysis of the salads were done and results were analyzed.

FINDINGS AND DISCUSSION

The findings of the study are discussed below:

- a. **Microgreens selected for salad preparation**
- b. **Development of Microgreen Salads**
- c. **Organoleptic Evaluation of the Developed Salads**
- d. **Assessment of Nutritive Value of the Developed Microgreen Salads**

a. Microgreens selected for salad preparation

The samples used for the study were selected according to the growth of the greens with respect to the climatic conditions suitable.

Table 1

SI No	Common name
1	Red cabbage
2	Arugula
3	Radish
4	Celery
5	Coriander
6	Amaranth

The above table I depicts the microgreens which were selected for the cultivation and preparation of salads. Six microgreens were selected for the preparation of green salads. The selected microgreens were Red cabbage, Arugula, Radish, Celery, Coriander and Amaranthus.

b. Development of Microgreen Salads

Microgreen salads were developed with the grown varieties of microgreens. For the preparation, Vegetable salads were made with grown varieties of microgreens.

Table 2

Types of Salads	Salads Prepared
Vegetable salads	<ul style="list-style-type: none">• Coriander arugula microgreen salads• Coriander celery pulses microgreen salad• Radish amaranth microgreen salad

The above table describes on the developed salads. The details are given below

Under veg-microgreen salads, three salads where made. The three salads differ in the method of preparation and the ingredients used.

1. Coriander microgreen salad

Ingredients:

- Coriander microgreens 60g
- Arugula 60g
- Chopped Onion 10g
- Chopped Cauliflower 10g
- Grated carrot 10g
- Chopped tomato 10g
- Garlic dressing 2tsp
- Olive oil 2tsp
- Salt and pepper

Method of preparation

In a bowl, add chopped onion, cauliflower, tomato and grated carrot. To this add 2tsp of olive oil and garlic dressing. Mix with salt and pepper. Finally add coriander and arugula microgreens.

2. Coriander celery pulses microgreen salad

Ingredients

- Coriander microgreens 20g
- Celery microgreens 20g
- Red Cabbage 20g
- Green gram 5g
- Red gram 5g
- Bengal gram 5g
- Rajmah 5g
- Chopped onion and tomato 20g each
- Olive oil 2tsp
- Salt and Pepper
- Garlic dressing 2tsp

Method of preparation

In a bowl, add chopped onion and tomato. To this add boiled green gram, red gram, Bengal gram and rajmah. Mix well with olive oil, salt and pepper. To this add coriander, red cabbage and celery microgreens and finally add some garlic dressing.

3. Radish amaranth microgreen salad

Ingredients

- Radish microgreens 30g
- Amaranth microgreens 30g
- Boiled Bengal gram 5g
- Chopped Onion 10g
- Chopped Tomato 10g

- Garlic dressing 2tsp
- Boiled pasta 5g
- Olive oil 2tsp
- Salt and pepper

Method of preparation

In a bowl, add chopped onion and tomato. To this add boiled Bengal gram and pasta. Mix them with garlic dressing and olive oil. To this add a pinch of salt and pepper. Finally add freshly cut radish and amaranth microgreens.

c. Organoleptic Evaluation of the Developed Microgreen Salads.

The organoleptic evaluation of the developed salads were done by a panel of 25 members (N=25). The panel members who have no prior knowledge about the products were invited for the analytical sensory testing as there will be no bias in the results. The evaluation was done using 9 point hedonic scale. The developed salads were evaluated for their taste, texture, colour, flavour and overall appearance. All the 25 score cards were combined and their average was taken for the final assessment of the sensory properties.

TABLE 3: Organoleptic parameters of prepared microgreen salads

N=25

Sl. No.	Salads	Taste	Texture	Colour	Flavour	Overall appearance
1	Coriander microgreen salad	7	7	7.5	8	7
2	Coriander celery pulses microgreen salad	7.5	8	7	8.3	8
3	Radish amaranth microgreen salad	8.3	8	7	8.5	8.5

*Like extremely-9 Like very much-8 Like moderately-7 Like slightly-6
 Neither like nor dislike-5 dislike slightly-4 Dislike moderalty-3
 Dislike very much-2 Dislike extremely-1

The score cards were given to 25 panel members and the scores were consolidated and tabulated.

It is clear in table -3, that coriander microgreen salad has obtained 7 i.e. like moderately for its taste, texture and 7.5 for its colour. For flavour, it has obtained 8 i.e. like very much and for overall appearance got 7 i.e. like moderately.

Coriander celery pulses microgreen salad has obtained 7.5 i.e. between like moderately and like very much, for its taste, scored 8 i.e. like very much for texture. It has got 7 for its colour i.e. like moderately and for flavour 8.3. For overall appearance it scored 8 i.e. like very much.

Radish Microgreen Salad scored 8.5 for both overall appearance and flavor. The taste of the salad was scored to be 8.5 and the texture was scored as 7.



Coriander microgreen salad

Coriander celery pulses microgreen salad



Radish amaranth microgreen salad

d. Assessment of Nutritive Value of the Developed Microgreen Salads

Nutritive content present in 100g of each salads were obtained for both macronutrients and micronutrients using the United States Department of Agriculture (USDA), Assessment of Nutrient Concentrations, July 2013.

Table 4: Macronutrients of the selected microgreen salads in 100g

Salad	Energy (Kcal)	CHO (g)	Protein (g)	Fat (g)
Coriander Microgreen salad	31	4.53	1.19	0.89
Coriander celery pulses salad	94.1	15.81	4.93	6.17
Radish amaranth Salad	45.2	8.64	1.38	1.14

From the above table-4, it is clear that 100g of coriander salad provides 31Kcal and provides 4.53g of CHO. When talking about protein, it provides 1.19g of protein and 0.89g of fat.

Coriander celery pulses salad provides 94.1Kcal and 15.81g of CHO. It also provides 4.93g of protein and 6.17g of fat.

The calorie obtained from radish amaranth salad is 45.2Kcal and that of carbohydrate is 8.64g. It also provides 1.38g of protein and 1.14g of fat.

Table 5 :Micronutrients of the selected microgreen salads in 100g

Salad	Vitamin A (mcg)	Vitamin C (mg)	Vitamin E (mg)	Vitamin K (mg)	Calcium (mg)	Iron (mg)
Coriander Microgreen Salad	311.15	26.25	26.57	4.39	79.6	4.28
Coriander celery pulses salad	247.19	28.27	10.6	1.66	51.94	1.13
Radish amaranth salad	49.42	73.59	31.35	5.13	43.89	0.41

From table-5, it is seen that coriander microgreens salad provides 311.15mg of vitamin A, 26.25mg of vitamin C, 26.57mg of vitamin E, 4.39 µg of vitamin K, and 79.6mg of Calcium and 4.28mg of iron.

As far as the coriander celery pulses salad is concerned, it is clear that, it provides 247.19mg of vitamin A, 28.27mg of vitamin C, 10.6mg of vitamin E, 1.66 µg of vitamin K, 51.94 mg of calcium and 1.13mg of iron.

Radish amaranth salad provides 49.4mg of vitamin A, 73.59mg of vitamin C, 31.35mg of vitamin E, 5.13 µg of vitamin K, 43.89mg of calcium and 0.41mg of iron.

SUMMARY AND CONCLUSION

The clear discussion was done above regarding the formulated salads using developed microgreens. The Microgreens are mostly admired by its texture ,color and flavor compared to sprouts .The microgreens were cultivated with various varieties of edible species .Even though the size of the greens are very small compared to its mature counterparts as micro-herbs, it doubles the flavors, texture and appeal of the recipes prepared . There are various varieties of microgreen seeds which had been used efficiently for the preparation of salads and even other recipes also.

The microgreens are considered as a novel crop, but more investigations are needed in the same field for the better utilization and knowledge regarding microgreens. Considering the required literature the microgreens are the best greens that can be used in several recipes with more micronutrient bioavailability.

Therefore the study entitled “Formulation And Organoleptic Evaluation Of Microgreens Salads” was carried out and the salient findings of the study were listed as follows:

- a. Microgreens selected for salad preparation**
- b. Formulation of Microgreen Salads**
- c. Sensory Evaluation of the Developed Salads**
- d. Assessment of Nutritive Value of the Developed Microgreen Salads**

a. Microgreens selected for salad preparation

The microgreen seeds which were purchased from online shopping sites were selected for the cultivation purposes .The seeds were selected based on the availability and their adaptation to tropical climate.

b. Formulation of Microgreen Salads

The selected seeds which were purchased form online shopping site were used for the cultivation process. The seeds were sowed in cocopeat and were wet with adequate amount of water .These were done in a rectangular shaped boxes .After the sowing purposes these were covered using aluminum foil which been termed as ‘black out period’.

Within a week or two ,the true leaves emerges and were ready for harvest .The selected microgreens were harvested and were freshly used for the preparation of salads . The cultivated microgreens were then selected and planned to prepare vegetable salads. Coriander, Red cabbage, Radish, Celery, Arugula and Amaranthus had been selected for the preparation of the salads.

c. Sensory Evaluation of the Developed Salads

The prepared salads were subjected to sensory evaluation. The developed salads were evaluated for their taste, texture, colour, flavour and overall appearance. All the 25 score cards were combined

and their average was taken for the final assessment of the sensory properties. Nine point hedonic scale was used for the sensory evaluation of the salads.

The coriander microgreen salad has appreciable color, flavor and texture. Coriander celery pulses microgreen salad has good taste and flavor. Radish Microgreen Salad was scored 8.5 for both overall appearance and flavor. The taste of the salad was excellent.

d. Assessment of Nutritive Value of the Developed Microgreen Salads

Macronutrient assessment were done and results were analyzed. The coriander salad provides 31Kcal and provides 4.53g of CHO. In case of Coriander celery pulses salad provides 94.1Kcal and 15.81g of CHO. It also provides 4.93g of protein. The calorie obtained from radish amaranth salad is 45.2Kcal and that of carbohydrate is 8.64g. It also provides 1.38g of protein and 1.14g of fat.

Micronutrient assessment was also done and the results were summarized. Coriander microgreens salad provides 311.15mg of vitamin A, 26.25mg of vitamin C, 26.57mg of vitamin E, 4.39 µg of vitamin K, 79.6mg of Calcium and 4.28mg of iron. Coriander celery pulses salad is concerned it is clear that, it provides 247.19mg of vitamin A, 28.27mg of vitamin C, 10.6mg of vitamin E, 1.66 µg of vitamin K, 51.94 mg of calcium and 1.13mg of iron. Radish amaranth salad provides 49.4mg of vitamin A, 73.59mg of vitamin C, 31.35mg of vitamin E, 5.13 µg of vitamin K, 43.89mg of calcium and 0.41mg of iron.

From the nutrient analysis it was clear that the microgreens are rich in both micronutrients and macronutrients. The salads were prepared with more than one microgreens to enhance the micronutrient content.

CONCLUSION

The research work found that exotic salads can be prepared using various species of microgreens. The salads prepared were then both organoleptically and nutritionally analyzed. It was clear that various food products can be prepared using the microgreens. Salad consumption can more effectively utilize the micronutrients from microgreens and in long run can prevent micronutrient malnutrition. As part of the study Microgreen salads were developed with the grown varieties of microgreens and sensory evaluation of the same was conducted with 9 point hedonic scale. As the micronutrient deficiencies are increasing it is needed to impart awareness on microgreens and its consumption. The cultivation process of microgreens are very easy and requires very less space. This can be grown in a very small space even inside kitchen spaces or window seats. The widespread knowledge regarding the nutritional power of these greens are yet to be unfolded and explored. Several researchers are carrying out continuous investigations to find out more information regarding microgreens.

FUTURE RECOMMENDATIONS

- Advanced studies in the field of Micro greens are a must and can become a part of dietician diet prescription.
- More research should be conducted in the field of microgreens to analyze the nutritive content of various greens.

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