IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified ⁜ Impact Factor 7.105 ⁜ Vol. 9, Issue 9, September 2022

DOI: 10.17148/IARJSET.2022.9909

EFFECT OF DIFFERENT PROCESSING OPERATIONS ON THE NUTRITIONAL COMPOSITION AND ANTIOXIDANT ACTIVITY OF WHEATGRASS INCORPORATED PRODUCTS

Madumitha. R[1], Kiruthika. M[2], Lakshmy Priya[3]

Department of Food Technology and Management, M. O. P. Vaishnav College for Women,

Nungambakkam, Chennai- 34[1,2,3]

Abstract: This study explores the effect of different processing operations on the nutritional composition, bioactive compounds, and antioxidant activity of wheatgrass incorporated products. The standardized recipe was formulated for chips and then wheatgrass powder was incorporated into the standardized recipes. Carbohydrates, Protein, Ash, Iron, Vitamin- C, Polyphenol, and crude fiber analyses were done and the results found that the frying and baking of wheat grass have reduced the nutritional composition when compared to the sundried wheat grass.

I.INTRODUCTION

Wheat Grass refers to the young grass of the common wheat plant, Triticum aestivum. Wheatgrass provides energy by fulfilling the nutritional deficiencies and removing waste that clogs cells, blood, tissues, and organs. Wheatgrass contains an abundance of chlorophyll and the structure of chlorophyll is similar to that of hemoglobin, which makes it possible for our body to convert chlorophyll into hemoglobin. So, wheat grass increases the blood level of hemoglobin which makes it a better choice for treating anemia. It is either freshly juiced or dried into powder for human consumption. Drying and powdering wheatgrass is a method for preserving wheatgrass nutrients. Both provide chlorophyll, amino acids, minerals, vitamins, and enzymes.

Although the amazing benefits of wheatgrass are being discovered only now in India, they have been known in the west for many years. Wheatgrass is the richest source of Vitamin A, B, C, E, and K, calcium, potassium, iron, magnesium, sodium, Sulphur, and 17 forms of amino acids (Rajesh Mujoriya et al., 2011). The leaves are tough to digest, so they're usually crushed and squeezed to make juice. Wheatgrass leaves also can be dried and made into tablets or capsules. Some people mix wheatgrass with water and use it as an enema to cleanse the digestive system. Others eat raw wheatgrass because they believe that cooking foods destroy the natural enzymes that provide a real health kick.

II.MATERIALS AND METHODOLOGY WHEATGRASS CULTIVATION

Wheatgrass seeds are also called hard winter wheat seeds or wheat berries. Before the seeds were soaked and germinated, they were measured and rinsed. For a 16" x 16" tray, two cups of seeds were used. The seeds were rinsed in cool, clean water using a colander with very small holes or a strainer. After draining the seeds well, the seeds were soaked in a bowl. Soaking the seeds initiates germination. By the end of the process, the seeds had sprouted small roots. The bowl was covered with a lid and placed on the counter to soak for about 10 hours, or overnight. Afterdraining the water from the seeds, replace it with colder, filtered water again, about three times as much water as the seeds. Let it soak for another 10 hours. The process was repeated one more time, for a total of three long soaks. By the end of the last soak, the seeds had sprouted roots. An even one-inch layer of organic compost was spread in the seed tray. The sprouted seeds were sprinkled onto the seed tray and placed in a shady place. The grass is ready to harvest after 9 or 10 days of growth. The grass was harvested and dried.

Drying of wheat grass

The fresh wheat grass leaves was collected for washing, sorting, cutting and grading to remove microorganism and dirt. After that wheatgrass samples dried under sun were ground into fine powder and packed in airtight plastic pouches. The dried samples were stored in deep freezer at
− 18 °C until further analysis.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified ⁜ Impact Factor 7.105 ⁜ Vol. 9, Issue 9, September 2022

DOI: 10.17148/IARJSET.2022.9909

Incorporation of wheat grass powder into Chips (fried)

Raw material: ½ cup wheat flour, ½ cup wheatgrass powder, ½ tsp. salt, sunflower oil

In a medium-sized bowl, combine flour and salt. The mixture should form a stiff dough. If needed, stir in 1 to 2 tablespoons of water. On a lightly floured surface, knead the dough for about 3 to 4 minutes. With an extruder, roll out the dough to the desired shape. Use a machine or knife to cut into strips of the desired width. Deep fry the rolled-out dough at 180°C for 3 minutes

Chips (baked)

Raw material: ½ cup wheat flour, ½ cup wheatgrass powder, ½ tsp. salt, sunflower oil

In a medium-sized bowl, combine flour and salt. The mixture should form a stiff dough. If needed, stir in 1 to 2 tablespoons of water. On a lightly floured surface, knead the dough for about 3 to 4 minutes. With an extruder, roll out the dough to the desired shape. Use a machine or knife to cut into strips of the desired width. Bake at 350 for 12 minutes.

Effect of drying, extrusion, frying, and baking On the nutritional composition of wheatgrass

The proximate composition and ascorbic acid were determined according to the standard AOAC methods. The proximate composition analyzed were moisture, protein, ash, and crude fiber.

Ash analysis

Note the tare weight of three silica dishes (7-8 cm diameter). Weigh 5-10g of the sample into each. If the sample is moist dry in a water bath. After determining the moisture content the same dishes may be used for ashing. Ignite the dish and the contents on a Bunsen burner. Ash the material at not more than 525°C for 4 to 6 hours; if need be, ash overnight, in a muffle furnace. Cool the dishes and weigh. The difference in the weights gives the total ash content and is expressed as a percentage % of ash content in the given sample (on a dry basis)

= (Wt. of Ash / Wt. of the sample) * dry matter coefficient Where dry matter coefficient = % solids/ 100

Carbohydrate analysis by Anthrone method

Carbohydrates are first hydrolyzed into simple sugars using diluted hydrochloric acid. In hot acidic medium glucose is dehydrated to hydroxyl methyl furfural. This compound forms with anthrone, a green coloured product with an absorption maximum at 630 nm. 1. Weigh 100mg of the sample into a boiling tube. Hydrolyze by keeping it in a boiling water bath for three hours with 5ml of 2.5 N HCl and cool to room temperature. Neutralize it with solid sodium carbonate until the effervescence ceases. Make up the volume to 100ml and centrifuge. Collect the supernatant and take 0.5 and 1 ml aliquots for analysis. Prepare the standards by taking 0, 0.2, 0.4, 0.6, 0.8 and 1 ml of working standard. '0' serves as blank. Make up the volume to 1 ml in all the tubes including the sample tubes by adding distilled water. Then add 4 ml of anthrone reagent. Heat for eight minutes in a boiling water bath. Cool rapidly and read the green to dark green colour at 630 nm. Draw a standard graph by plotting concentration of the standard on the X - axis versus absorbance on the Y axis. From the graph calculate the amount of carbohydrate present in the sample tube.

Protein analysis by kjeldhal method

Weigh the samples and add the sample along with 3g of catalyst mixture (each tube) in to the digestion tube. Add 10ml of concentrated sulphuric acid into each tube and place the digestion tubes into the manifold. Place the above on to the aluminium block; cover the tubes with the manifold holder. Press RUN command for the digestion unit. Simultaneously open the taps for inlet water for digestion. The digestion is carried out for 90 mins at 420ºC. Once the digestion is complete the tubes are allowed to cool for 30 mins. To the cooled digestion tubes 30ml of distilled water is added. Once the distillation unit is switched on press the POWER button to give a green color indication, then press ALKALI button followed by BORIC ACID button after which the cleaning of the distillation unit is to be done using DILUTION and PROCESS buttons for 3 mins. Open the inlet tap water for distillation. The digestion tubes needs to be neutralized and distilled using 40ml of 40% NaOH followed by 25ml of 4% boric acid for the process to be carried out. Press RUN command. The distillation step proceeds for 9 mins for each digestion tube. The ammonia generated through distillation is collected in boric acid receiver which is further titrated against 0.1N Hcl. Once the titration unit is switched ON the BLANK mode is set for titration of blank and the PROTEIN mode is set for the titration of sample. To start the titration, first drop the magnetic stirrer into the boric acid solution containing the nitrogen. The electrode is inserted in the solution. Press START and set the knob speed to "3-4" for stirring.

Then enter the protein mode followed by sample ID, press OK after which enter the sample weight and press START. Once the titration is complete the total % of nitrogen could be read. For the final calculation of protein, use the conversion factor 6.25

Total protein in = %Nitrogen × 6.25Crude fiber analysis

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified ⁜ Impact Factor 7.105 ⁜ Vol. 9, Issue 9, September 2022

DOI: 10.17148/IARJSET.2022.9909

Weigh 5g of the sample into a 500ml beaker and add 200ml of boiling 0.255N sulphuric acid. Boil the mixture for 30 minutes, keeping the volume constant by adding water at frequent intervals (a glass rod inserted in the beaker helps smooth stirring and boiling). At the end of the period, filter the mixture through a muslin cloth and wash the residue with hot water till free from acid. Transfer the mixture to a beaker containing 200ml of boiling 0.313N sodium hydroxide. After boiling for 30 minutes (keeping the volume constant as before) filter the mixture through a muslin cloth. Wash the residue with hot water till free from alkali followed by washing with some alcohol and ether. Transfer it into a crucible, dry overnight at 80-100°c and weigh. Heat the crucible in a muffle furnace at 600°c for 2-3 hours. Cool and weigh again. The loss in the weight represents the weight of the fibre

Ascorbic acid analysis by Redox titration

Blend a 100 g sample with ~50 ml of distilled water. Strain the mixture. Wash the filter with a few milliliters of distilled water. Add distilled water to make a final solution of 100 ml in a volumetric flask. Add 25.00 ml of sample solution to a 125 ml Erlenmeyer flask. Add 10 drops of 1% starch solution. Rinse your buret with a small volume of the iodine solution and then fill it. Record the initial volume. Titrate the solution until the endpoint is reached. This will be when you see the first sign of blue color that persists after 20 seconds of swirling the solution. Record the final volume of iodine solution. The volume that was required is the starting volume minus the final volume.

Polyphenol analysis by Folin ciocalteu method

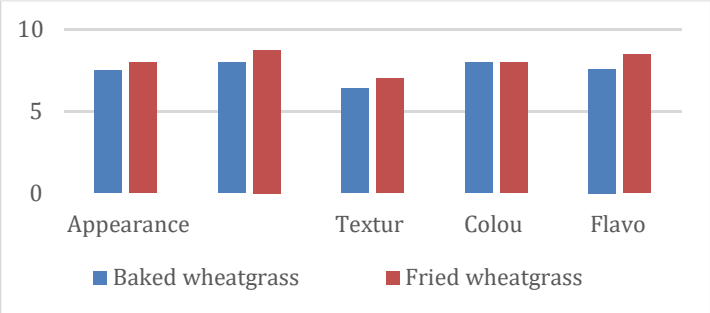
Weigh 500mg of sample in 250ml flask. To this 100ml distilled water is added and boiled for 1/2hr. and allowed to cool. The extract is filtered to a filter paper into a volumetric flask. Take 0.1ml of sample extract, add 7.5ml of distilled water, 0.5ml of folin ciocalteu reagent, to this mixture add 1ml of 35% of (Na2Co3) solution, dilute to 10ml with distilled water. Shake and leave at room temperature for 30min. absorbance is measured at 760nm in UV-VIS spectrophotometer. Pipette out standard solution 0.2, 0.4, 0.6, 0.8 and 1ml of a standard tannic acid solution in 20ml test tube. Add 0.5ml of folin ciocalteu reagent, 1ml of (Na2Co3) solution. Dilute to 10ml with distilled water. Shake and leave at room temperature for 30min. absorbance is measured at 760nm in UV-VIS spectrophotometer.

Iron analysis by colorimetry

Use ash solution of the sample prepared by dry ashing for iron content estimation. Pipette 0.0, 0.5, 1.0, 1.5, 2.0 and 2.5 of standard solution to test tubes. Add 0.5 ml of conc H2SO4, 1ml of potassium persulphate, and 2 ml of potassium thiocyanate and make up the volume to 15 ml. Measure the color as early as possible. Plot the absorbance against concentration. The concentration of iron in the aliquot of the sample can then be read directly from the calibration curve.

Sensory Characteristics The overall acceptability of chips was done by using a 9-point hedonic scale. The evaluation was done on basis of color, taste, texture, flavor, and crispiness. (H, 2010)

Diagram1: Sensory analysis of wheatgrass incorporated products



III.RESULT:

The nutritional properties, antioxidant activity and the sensory properties were analyzed. Ash, carbohydrate, protein, iron, polyphenol, ascorbic acid and crude fiber were performed for the products obtained from different processing operation was given in the table 1

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified ⁜ Impact Factor 7.105 ⁜ Vol. 9, Issue 9, September 2022

DOI: 10.17148/IARJSET.2022.9909

Wheatgrass	Ash %	Carbohydrate (g/100g)	Protein %	Iron (mg/100g)	Ascorbic acid (mg/100g)	Polyphenol (mg/100g)	Crude fiber%
Fried	3.78	58.97	17.106	0.32	8.24	14.54	5.73
Baked	4.11	43.21	20.56	0.41	12.43	19.23	8.56
Sundried	5.4	21.34	30	0.64	19.88	24.53	33.43

IV.CONCLUSION

The research was conducted with the aim of identifying the effect of different processing operations on the nutritional, physical and sensory properties of wheatgrass incorporated products. The research found the nutritional properties of wheatgrass incorporated products obtained from different processing operations and concluded that frying and baking have a profound impact on the nutritional composition. The physical properties does not change with the processing operation. The sensory properties in diagram 1 showed that the fried wheatgrass incorporated chips was better than baked. Although, wheatgrass based products contains beneficial nutrients which makes it an excellent alternative to commercial low calorie products.

REFERENCES

2005, Official Methods of Analysis of the Association of Official Agricultural Chemists, A.O.A.C., 18th Edition, AOAC International, Suite 500, 481 North Frederick Avenue, Gaithersburg, Mary land, 20877-2417, USA.