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RESEARCH ARTICLE

NUTRITIONAL COMPOSITION OF WHEAT GRASS POWDER AS AFFECTED BY DIFFERENT DRYING PROCESS.

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Abstract

Background: Wheatgrass is one grass that has been demonstrated to be of particular use to humans as a nutritional source of vitamins, enzymes, minerals, trace minerals and chlorophyll in addition to its various health benefits.

Objective: In this study the nutritional composition of wheat grass powder was estimated which is obtained by different drying methods. Materials and Methods- Different drying methods used for preparation of wheat grass powder were 1) Hot air oven drying [50˚C,6 hr, 60˚C,5 hr.] 2) Microwave drying [600W,15 min, 800W,10 min] 3) Vacuum oven drying [50˚C,25kPa,6 hr] the proximate and ultimate analysis of the wheat grass powder samples was done by the method described by **AOAC (2005)** and obtained data was statistically analyzed by F-test Method.

Results: In the proximate analysis microwave dried wheat grass powder [800W, 10 min] gave the highest mean value of crude fat (6.11), protein (21.28) and crude fiber (30.52), while the hot air dried wheat grass powder sample [50˚C, 6hr] gave the lowest value. In the ultimate analysis vacuum dried wheat grass powder gave highest mean value of vitamin and minerals such as ascorbic acid (10.21), calcium (22.49) and iron (12.74).

Conclusion: Thus it was observed that microwave drying method and vaccume drying method is a best method to preserve nutritional benefits of wheat grass and can be added into our daily diet to reduce the risk of degenerative diseases.

Introduction:-

The mature sprouts of Wheat seeds (Triticum aestivum) known as Wheat Grass and it is one grass that has been demonstrated to be of particular use to humans as a good nutritional source. The nutritional composition of Wheat Grass contains good amount of calcium, iron, sodium, potassium, and magnesium, as well as trace minerals, all B vitamins, pro-vitamin A, vitamin E, and vitamin K. In addition, wheatgrass also contain seventeen amino acids, eight live enzymes, and chlorophyll **(Kulkerni et.al., 2006)**. Advantages of using wheatgrass are that it is a fast growing grass, its seeds are easily obtained, and it is inexpensive to procure and use. Wheat grass should be harvested at the jointing stage because at this stage the plant is having its peak nutritional value; after jointing, concentrations of chlorophyll, protein, and vitamins decline sharply **(Meyerowitz and Steve, 1999)**.

Traditionally, Wheatgrass is known to be taken in juice form. In today's modern life most individuals are lacking time, space, manpower and know-how of growing Wheatgrass. It is difficult to transport fresh Wheatgrass economically everyday too far off places as it has very less shelf life. At this junction, making the availability of

Wheatgrass in Powder form has proven to be very convenient and effective. Wheat grass powder retains all important nutrients of wheat grass and having higher quantity of dietary fiber, cost effective and higher shelf life than wheat grass juice.

Objective:-

- To determine the effect of different drying treatments on the proximate and ultimate components of wheat grass powder.

Materials and Methods:-

Procurement of raw material:- The wheat grass leaves grown indoors in the mud pots and it was cut when the wheatgrass growth was at the first node stage having length of 10-12 inches, known as pre-jointing stage.

Experimental Site:- Research Laboratory of the Centre of Food Technology, University of Allahabad, Allahabad.

Method of preparation of wheat grass powder:- The fresh wheat grass leaves was collected for washing, sorting, cutting and grading to remove micro-organism and dirt. After that leaves were dried by different drying methods i.e. hot air oven drying (50˚C, 6 Hour and 60˚C, 5hr), microwave drying (600 W, 15 min and 800 W, 10 min) and vacuum oven drying (50˚C, 15lb, and 7hr). Dried leaves grinded in powdered form and stored for the analysis.

Chemical analysis:- The method described by **AOAC (2005)** was used for determination of proximate composition (crude fat, protein and crude fiber), while determination of calcium by titration method, iron by colorimetric method and Ascorbic acid by 2,6 dichlorophenolendophenol method was done for all the samples of Wheat Grass Powder developed by different drying process **(Rangana, 2005)**.

Statistical analysis of the data:- F- test was applied for analysis of variance to find the significant difference in the means of the sample.

Results and Discussions:-

Table 1: Average Proximate contents (g/100g) in wheat grass powder obtained by different drying processes.

Proximate Component				
Nutrient	**Drying Variation**	**Mean ± SD**	**F_{Cal}**	**F_{tab}**
Protein	Hot Air Oven (50 C /6 H)	11.276 ± .96	12.56	3.48*
	Hot Air Oven (60 C /5 H)	11.383 ± .66		
	Microwave (600 W/ 15 m)	17.816 ± .40		
	Microwave (800 W/ 10 m)	21.276 ± .24		
	Vaccume Oven (1)	11.853 ± 1.82		
	Total	14.721 ± 4.3		
Fat	Hot Air Oven (50 C /6 H)	3.1867 ± .80	553.76	3.48*
	Hot Air Oven (60 C /5 H)	3.2767 ± .075		
	Microwave (600 W/ 15 m)	4.2000 ± .10		
	Microwave (800 W/ 10 m)	6.1167 ± .07		
	Vaccume Oven (1)	3.9133 ± .10		
	Total	4.1387 ± 1.09		
Fibre	Hot Air Oven (50 C /6 H)	27.9833 ± .67	8.356	3.48*
	Hot Air Oven (60 C /5 H)	28.1833 ± .48		
	Microwave (600 W/ 15 m)	30.3033 ± 1.06		
	Microwave (800 W/ 10 m)	30.5167 ± .82		
	Vaccume Oven (1)	28.4833 ± .36		
	Total	29.0940 ± 1.2		

It is evident from the table-1 that the mean score of protein content of wheat grass powder obtained by microwave drying [800W, 10 min]is the highest (21.3) and is significantly ($p \leq 0.05$) higher than the wheat grass powder prepared by microwave drying [600W, 15 min] (17.8), vacuum oven drying [50˚C, 15lb, 6 hr] (11.9), hot air oven drying[60˚C, 5hr] (11.3) and hot air oven drying[50˚C, 6hr] (11.2). The illustrated in the table-1 that the mean score

of fat content of wheat grass powder obtained by microwave drying [800W, 10 min]is the highest (6.1) and is significantly ($p \leq 0.05$) higher than the wheat grass powder prepared by microwave drying [600W, 15 min] (4.2), vacuum oven drying [50˚C, 15lb, 6 hr] (3.9), hot air oven drying[60˚C, 5hr] (3.2) and hot air oven drying[50˚C, 6hr] (3.1). It is evident from the table-1 that the mean score of fibre content of wheat grass powder obtained by microwave drying [800W, 10 min]is the highest (30.5) and is significantly ($p \leq 0.05$) higher than the wheat grass powder prepared by microwave drying [600W, 15 min] (30.3), vacuum oven drying [50˚C, 15lb, 6 hr] (28.4), hot air oven drying[60˚C, 5hr] (28.1) and hot air oven drying[50˚C, 6hr] (27.9). Similar study has been reported by **James and Phyllis (2001)** observed that the average protein content of the wheat grass powder was 31.5 g/100g, average fat content was 6.5 g/100g and average fibre content of the wheat grass powder was 34.5g/100g. Another study about proximate nutrient content of wheat grass powder was reported by **Sagliano et al. (1998).**

Table 2: Average Mineral contents (mg/100g) in wheat grass powder obtained by different drying processes.

Proximate Component				
Nutrient	**Drying Variation**	**Mean ± SD**	**F_{Cal}**	**F_{tab}**
Calcium	Hot Air Oven (50 C /6 H)	17.0667 ± .41	15.18	3.48*
	Hot Air Oven (60 C /5 H)	15.2000 ± 1.6		
	Microwave (600 W/ 15 m)	21.0667 ±1.6		
	Microwave (800 W/ 10 m)	20.0000 ± 1.6		
	Vaccume Oven (1)	22.4933 ± .81		
	Total	19.1653 ± 2.9		
Iron	Hot Air Oven (50 C /6 H)	7.7867 ± 1.01	2.341	
	Hot Air Oven (60 C /5 H)	12.0707 ± 1.77		
	Microwave (600 W/ 15 m)	10.5267 ± .79		
	Microwave (800 W/ 10 m)	12.3733 ± .13		
	Vaccume Oven (1)	12.7467 ± .44		3.48*
	Total	11.1008 ± 2.06		
Ascorbic Acid	Hot Air Oven (50 C /6 H)	7.3600 ± 1.5	6.851	
	Hot Air Oven (60 C /5 H)	4.6000 ± 1.5		
	Microwave (600 W/ 15 m)	9.2000 ± 1.5		
	Microwave (800 W/ 10 m)	6.4400 ± 1.5		
	Vaccume Oven (1)	10.2133 ± .82		
	Total	7.5627 ±2.4		3.48*

It is evident from the table-2 that the mean score of calcium content of wheat grass powder obtained by vacuum oven drying [50˚C, 15lb, 6 hr] is the highest (22.4) and is significantly ($p \leq 0.05$) higher than the wheat grass powder prepared by microwave drying [600W, 15 min] (21.1), microwave drying [800W, 10 min] (20.0), hot air oven drying[50˚C, 6hr] (17.1) and hot air oven drying[60˚C, 5hr] (15.2). It is also illustrated in table-2 that the mean score of iron content of wheat grass powder obtained by vacuum oven drying [50˚C, 15lb, 6 hr] is the highest (12.7) and is significantly ($p \leq 0.05$) higher than the wheat grass powder prepared by microwave drying [800W, 10 min] (12.3), hot air oven drying[60˚C, 5hr] (12.0),microwave drying [600W, 15 min] (10.5) and hot air oven drying[50˚C, 6hr] (7.8). It is also shown in the table-2 that the mean score of ascorbic acid content of wheat grass powder obtained by vacuum oven drying [50˚C, 15lb, 6 hr] is the highest (10.2) and is significantly ($p \leq 0.05$) higher than the wheat grass powder prepared by microwave drying [600W, 15 min] (9.2), microwave drying [800W, 10 min] (6.4), hot air oven drying[50˚C, 6hr] (7.3) and hot air oven drying[60˚C, 5hr] (4.6). Similar study has been reported by **Meyerowitz and Steve (1999)** observed that the average calcium content of the wheat grass powder was 7.2 mg/oz (28.35g) i.e. 25.39 mg/100 g, average iron content of the wheat grass powder was 2.77 mg/oz (28.35g) and average ascorbic acid content of the wheat grass powder was 3 mg/oz (28.35g) i.e. 10.58mg/100 g.

Conclusion:-

Thus the results summarized above, it can be concluded that proximate analysis of wheat grass powder obtained by different drying methods, microwave dried sample gave the highest value while hot air dried sample gave the lowest value. In the ultimate analysis of wheat grass samples with drying variation, vacuum dried samples had highest value of ascorbic acid, calcium and iron while hot air dried samples of wheat grass powder gave the lowest value.

Recommendation:-

Traditionally, Wheatgrass is known to be taken in juice form but it is recommended to use the prepared wheat grass powder because it retains all important nutrients of wheat grass, having higher quantity of dietary fiber and having more shelf life in contrast with wheat grass juice. So Wheat grass powder can be easily included in the daily life of every age group which can definitely increase their vitamins, minerals and antioxidants intake and in return it will protect the body from degenerative diseases.

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