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A COMPARATIVE STUDY BETWEEN SEEDS OF SWEET BASIL AND PSYLLIUM ON THE BASIS OF PROXIMATE ANALYSIS

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Abstract

In addition to the medicinal values of selected plants, aim of current study was to estimate the nutrient profile of seeds of selected medicinal plant (sweet basil and psyllium) whether the intake of these seeds is not harmful. In view of proximate composition of seeds of psyllium and sweet basil not only remarkable source of biochemicals and can be used as potent nutrient elements in the diet. The seeds of selected medicinal plants analyzed using the standard methods (AOAC, 2000), findings showed that seeds have adequate amount of nutritional qualities. The seeds of sweet basil have sufficient amount of protein and mineral matter as compared to psyllium seeds. These findings seem to be good for health purposes. Moreover, results of this study indicated that seeds of psyllium are being abundant in energy values whereas excellent source of fiber too as compared to sweet basil. These results are promising to do further investigation in this vast field of research to explore novel sources of nutrient might be used for various purposes in different sector.

Key words**:** *proximate analysis, sweet basil, psyllium, medicinal plants, seeds*

INTRODUCTION

Plants influence our life on earth by providing us basic necessities such as food and shelter since time immemorial. Herbs not only play the crucial for maintenance of health in human beings by providing chemicals of medicinal value as well as nutrition required by our bodies for various biological functions [2]. At present, medicinal plants still play important role to generate income to the people of many developing countries of Asia and Europe such as: *Ocimum basilicum* and *Plantago ovata* which were focused plants of our study.

Ocimum basilicum L., commonly known as sweet basil is a foliage rich plant. It belongs to the family Lamiaceae cultivate throughout the world. Sweet basil is medicinally aromatic plant. From ancient times, basil (an aromatic herb) extensively cultivated and used to add distinctive aroma and flavor to food. The leaves (fresh or dried) and essential oils extracted from flowers of plants used by food, pharmaceuticals and cosmetic industries as aroma additives in food, phytochemicals in medicines and fragrance in cosmetics respectively [14]. On the other hand, *Plantago ovata* L. is belonging to the family Plantaginaceae. The common name of the plant is psyllium and locally known as Isabgol. It is herbaceous, stem less medicinal herb. Because of its utilization as health care purposes for many centuries in South Asia, and now different parts of the plant are widely consumed for its medicinal properties all over the world. Psyllium husk obtained from membranous covering of the seed traditionally prescribed for gastrointestinal problems. It is given as a safe laxative and particularly considered as beneficial in habitual constipation, dysentery and chronic diarrhoea when consumed with various modes of formulation. Moreover, it is extensively used in lower blood cholesterol levels on scientific basis and further utilized as stabilizer in ice cream making as well as in cosmetic industries [10]. Besides all this, deficiency of nutrients is wide spread due to limited resources as well as unawareness of non conventional source of nutrients from economically important but neglected species such as sweet basil and psyllium. There is need to explore nutritional

significant resources to promote health in addition to overcome food related problems of daily life. In comparative assessment by using the finding of this study we made a conclusion which plant or plant parts are rich in nutrition easily available for making healthy food products. It might be helpful for understanding that seeds of which plant has valuable source of nutrients and will give potential usefulness as food fiber, proteins, fats and mineral matter.

MATERIALS AND METHODS

The seeds of selected medicinal plants were collected from local market of Sibiu, Romania in month of May 2015. Clean seeds of both plants were examined under microscope for evaluation of morphological characteristics. Samples were prepared by coarsely ground the seeds of selected medicinal plants to 20 mesh on the basis of analysis requirement and stored in dry clean bottles for further analysis. For moisture analysis, we prepared samples of selected medicinal plants and then temperature in the moisture analyzer (Infrared AND ML.50) was set as 105˚C and moisture of the samples were determined in percentage (%) after 47 minutes. Standard methods were used to perform the proximate analysis of the samples for total ash, crude fiber, crude fats and proteins [3] [4]. Protein content of the samples was estimated by nitrogen values obtained which was performed by micro Kjeldahl method with three basic steps such as digestions, distillation and finally titration of the sample gave the amount of nitrogen [13]. The protein content was calculated by nitrogen value obtained multiply with a factor 6.25. The fat content (lipids) of the samples was determined by using solvent extraction method whereas solvent used was ethyl ether. The crude fiber was also calculated by the method described by [7]. Difference method was applied for obtaining the total carbohydrates of the samples analyze. Calculation of total carbohydrates was based on formulae such as; 100- (percentage (%) of protein+ percentage (%) of fats+ percentage (%) of ash+ percentage (%) of crude fiber) [4]. Total energy values of the sample material were estimated by multiplying the values of carbohydrates (%) by a factor 4 and then multiplying protein content (%) by a factor of 4 and finally fat content (%) by a factor of 9 after that took the sum of all obtained values gave the total energy concentration in kilocalories [9]. At the end all the resulted values were presented in percentage [8]. Proximate analysis was carried out three times for each parameter (protein, fats, fiber, mineral matter) of a plant sample. Hence, we derived the mean values in percentage by using Microsoft Excel.

RESULTS AND DISCUSSIONS

From the history to date, plants play the crucial role for both human and animals as source of food, nutrition and health care and also have significant participation in drugs preparation. On the base of present situation of increasing human population day by day and shortage of fertile land, there is a strong need to explore high-quality but cheap sources of protein and energy in order to alleviate hunger and nutrient deficiency of daily life [17]. The results found for moisture contents by use of moisture analyzer were described in Table 1. The values of moisture contents for psyllium seeds found as 7.7% and percentage of moisture contents by moisture analyzer for sweet basil seeds as 7.0%. Findings showed that there was a noteworthy difference between seeds for moisture results; this might be due to climate and storage conditions of seeds in Romania.

Fig. 1. Seeds of Ocimum basilicum (left) and Plantago ovata (right)

Mineral matter is considered as inorganic components of plant materials. Mineral are the nutrients that are essential factors for maintaining human body functions such as metabolism and other vital physiological processes. In this perspective, mineral matter as a whole from plant sources such vegetables, grains and seeds as a mineral supplement in diet required for human well being in daily life.

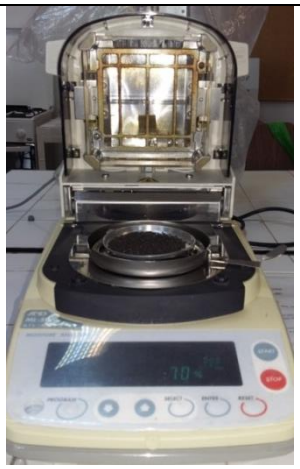

Fig. 2. Sweet basil seeds in moisture analyzer

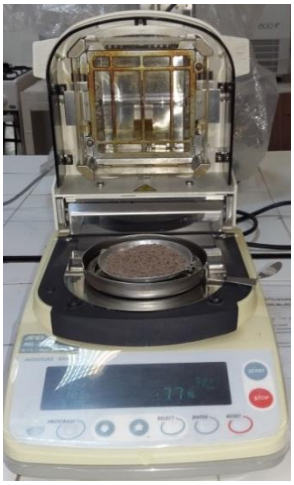

Fig. 3. Psyllium seeds in moisture analyzer

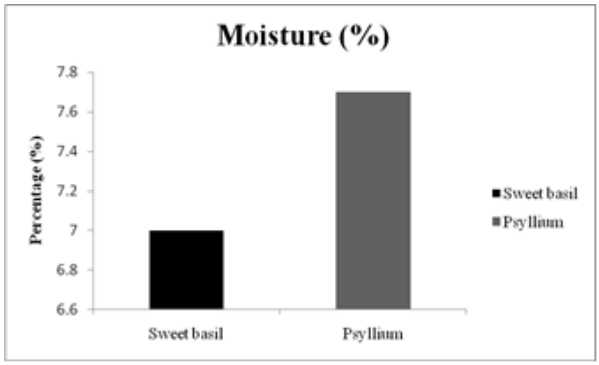

Fig. 4. Moisture percentage (%) comparison between seeds of Sweet basil and Psyllium

Total mineral of selected medicinal plant (sweet basil and psyllim) estimated by standard method through calcinations we found that sweet basil contained the high amount of mineral (6.5 %) as compared to psyllium seeds (3.4 %) presented in (Fig. 5).

Ocimum seeds have characteristics properties as a source of mucilage which contains a remarkable concentration of cellulose and hemicelluloses forming non digestible part of the plant.

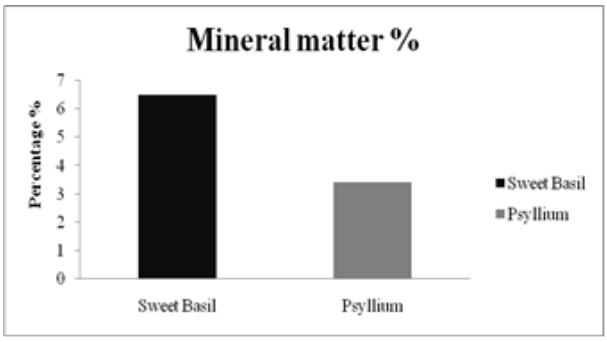

Fig. 5. Mineral matter percentage (%) comparison between seeds of Sweet basil and Psyllium

They become bulky accounting for their hydrophilic characters. Seeds and husk of both plants contained reasonable amount of soluble fiber and associated nutritional properties, and might be dietary supplements as a new enhancement in food products.

The importance of soluble fiber in the diet is very well established due its potent characteristic properties in terms of maintaining better bowel functions [5]. Scientific literature has shown that, basil seeds as new non-conventional sources of dietary fiber have already been discussed specifically [5] [12]. *Plantago ovata* as a whole plant basis contained fiber content 7.3% and proteins 2.3% reported by [19]. On the basis of these findings, our results for crude fiber (2.1%) for basil seeds were in against of reported study on basil seeds as crude fiber were found as 22.6% [12].

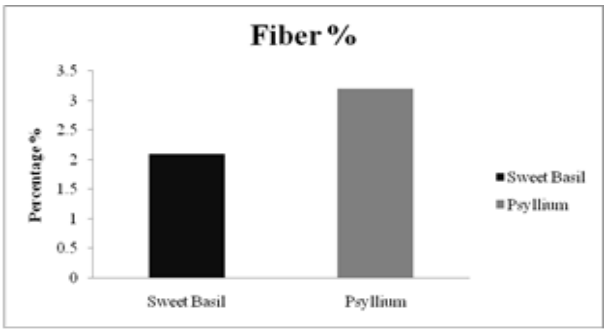

Fig. 6. Fiber percentage (%) comparison between seeds of Sweet basil and Psyllium

In case of protein content, sweet basil had higher amount of protein content compared to psyllium (Table 1).

It has been reported in the previous studies that protein deficiencies in food is a major factor of malnutrition and responsible for nutritional pathology [15]. The plant based food that provide more than 12 % its calorific value of protein is considered as remarkable supply of protein [13].

The results indicated that sweet basil seeds contained high protein contents (29%) as compared to psyllium seeds (24.5%).

These findings suggested that sweet basil seeds with rich source of protein contents might be valuable for human health in nutritional point of view as compared to seeds of psyllium.

The protein content of sweet basil and psyllium seeds determined on the basis of the nitrogen analysis using Kjeldahl method and protein value is observed in the range of 29 % to 24.5 % respectively. According to WHO [18], daily proposed amount of protein for men and women is different as men required lesser protein (14.5%) as compared to women (53.3%). Based on these observations, if the seeds of sweet basil become part of food products on daily basis then they might be satisfying the recommended values of protein.

Table 1 presented proximate compositions of seeds of selected medicinal plants.

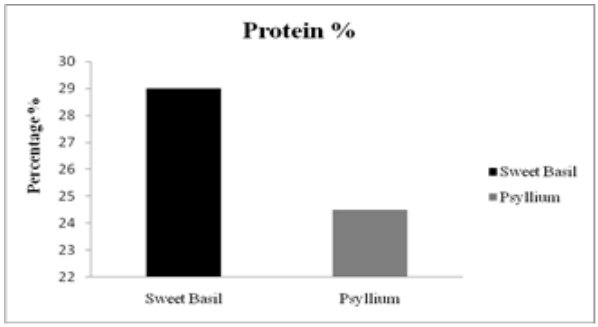

Fig. 7. Protein percentage (%) comparison between seeds of Sweet basil and Psyllium

Based on the observations of current study for estimation of fats contents (Lipids), sweet basil seeds contained low fat contents (15.36%) in comparison with psyllium seeds (16.55%) but there was not great difference in the values of fat contents in both selected seeds of sweet basil and psyllium (Figure 8). According to the authors of reported work, seeds of sweet basil possessed fat content in perecentage of 20.2% whereas crude fats was reported in psyllium seeds as 43.2% which was not in aggreement with our findings [6] [16]. Moreover results in other scientific study supported our finding for fats content in the seeds. They reported the fat contents in sweet basil seeds as 13.8% which was closer to our findings for fat contents in sweet basil seeds [12]. Fats (lipids) are a good source of energy in nutritional point of view as one gram of lipids provide 9 Kcal of energy. The results indicated that both the seeds of sweet basil and psyllium might be good source of lipids.

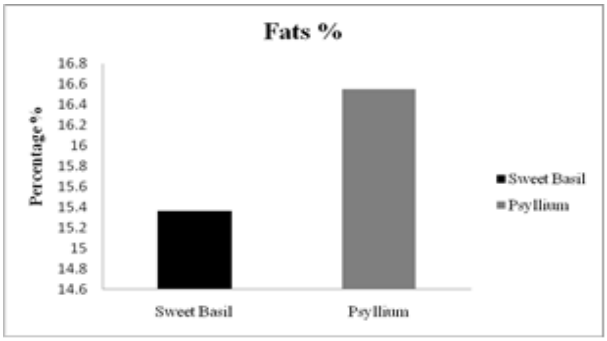

Fig. 8. Fats (%) comparison between seeds of Sweet basil and Psyllium

Table 1. Proximate analysis of seeds of Sweet basil and Psyllium (Sweet basil (*Ocimum basilicum*) and Psyllium (*Plantago ovata*)

Sample Name	Moisture (%)	Fats (%)	Protein (%)	Fiber (%)	Mineral matter (%)
Basil seed	7	15.36	29	2.1	6.5
Psyllium	7.7	16.55	24.5	3.2	3.4

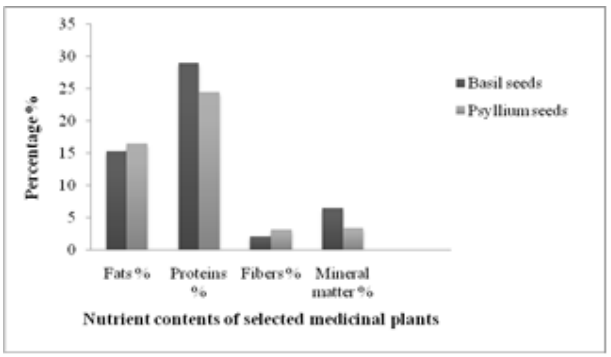

Fig. 9. Percentage (%) comparison among proximate compositions of selected medicinal plants

Carbohydrates are the principle and primary source of energy in the body. Looking at the results of present study, we observed that lower carbohydrate contents of sweet basil seeds

might be due to lesser amount of dietary fiber in the seeds.

The dietary fiber contains the cellulose, hemicelluloses, gums and mucilage which are considered as indigestible carbohydrates.

Human dietary fibers mainly come from plant cell walls in seeds, fruits and vegetables [11].

The results of the study suggested that seeds of psyllium have higher amount of carbohydrates (52.35%) as compared to seeds of sweet basil (47.04%).

According to (WHO, 1990), recommended ration of the carbohydrate content as an energy in a food is from 55 to 75%.

Although, the range of carbohydrates of both selected seeds were lower than proposed value of (WHO, 1990). However, seeds of both plants can be used as a source of energy and a valuable contribution in a food chain.

According to scientific work of Agunbiade, Ojezele, & Alao [1], leaves of basil contained the carbohydrates (66.65%) which were not correlated to our findings.

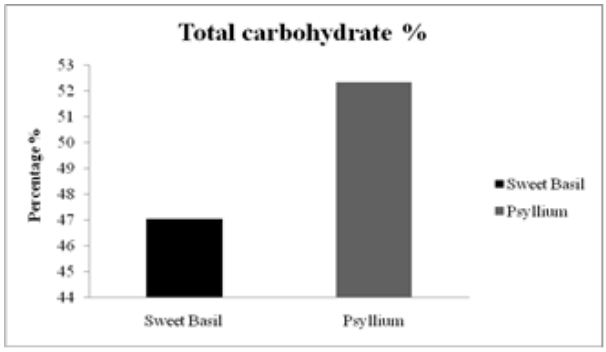

Fig. 10. Total carbohydrate percentage (%) comparison between seeds of Sweet basil and Psyllium

This difference of carbohydrates was due to source of carbohydrates from leaves of plants not from seeds until now there was no proper study was conducted on the seeds of sweet basil for assessment of total carbohydrates whereas *Plantago ovata* leaves and seeds contained the carbohydrates in the percentage values of 15.9 % and 8.4 % respectively reported by [6] which was not in accordance to our observations. According to total energy calculations based on percentage values of carbohydrates, proteins and fats, they possessed, we found higher energy values in the seeds of psyllium seeds (456.35 kcal) whereas basil seeds contained lower energy values (442.4 kcal) presented in the Table 2.

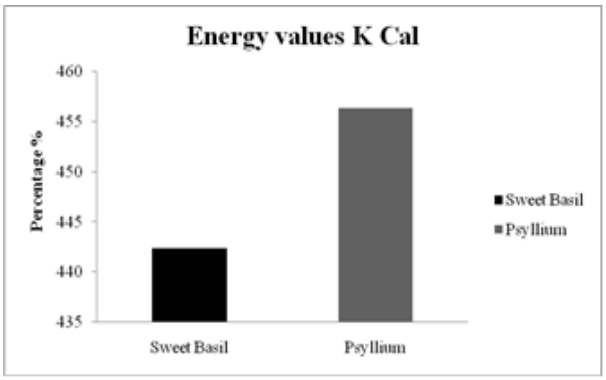

Fig. 11. Total Energy values percentage (%) comparison between seeds of Sweet basil and Psyllium

We concluded from these observatons, psyllium seeds had highest energy values might be due high percentage of fibers, fats and carbohydrates as compared to swet basil seeds that had only protein and mineral matter contents in higher quantity in comparison with psyllium seeds.

Table 2. Quality analyses of seeds of Sweet basil and Psyllium (Sweet basil (*Ocimum basilicum*) and Psyllium (*Plantago ovata*)

Sample Name	Total carbohydrate %	Total Energy (kCal/100 g)
Basil seed	47.04	442.4
Psyllium	52.35	456.35

According to the reported work of [7], on different medicinal plants which were commonly used as anti-inflammatory, antiviral, antimicrobial and as laxative like our selected medicinal plants, results for energy values were in the range of 389.20 kcal to 331.50 kcal considered as good source of energy that was close to our findings. Moreover, under careful review of literature we could not found the exact scientific study related to our current work.

CONCLUSIONS

As we already know herbs, nutrients and dietary supplement are major contributors of food which help to enhance the structure and function of the body. Therefore, in this work

we focused to find non conventional source of nutrients by screening and comparative assessment for possible enrichment of food products to tackle health related problems of daily life. So we evaluated our work with respect to nutritional analysis of seeds of selected medicinal plants. Evaluating nutritional significance of sweet basil and psyllium together on comparative basis can play a vital role in controlling minor ailments thus help to maintain health and further to promote the quality of life.

ACKNOWLEDGMENTS

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REFERENCES

[1] Agunbiade, S. O., Ojezele, M. O., & Alao, O. O. 2015, Evaluation of the Nutritional, Phytochemical Compositions and Likely Medicinal Benefits of Vernomia amygdalina, Talinum triangulare and *Ocimum basilicum* Leafy-Vegetables. Advances in Biological Research, 3 (9), 151-155.

[2] Akerle, O., Heywood, V., & Synge, H. 1991, The conservation of medicinal plants. Cambridge University Press, Cambridge.

[3] AOAC. 2000, Association of Official Analytical Chemists (AOAC). Official Methods of Analysis of AOAC International. AOAC International: Gaithersburg, MD, USA.

[4] AOAC. 1990, Official Methods of Analysis. Association of Official Analytical Chemists. Washington, D.C, USA: Association of Official Analytical Chemists.

[5] Dreher, M. L. 1987, In Handbook of Dietary Fiber, An Applied Approach. New York: Marcel Dekker Inc., New York, USA.

[6] Ellahi, B., Malik, S. A., & Ahmad, S. S. 2007, Estimation of nutritional value and trace elements content of *Carthamus Oxyacantha*, *Eruca Sativa* and *Plantago Ovata*. Pak. J. Bot, 4 (39), 1181-1187.

[7] Hussain, A. I., Anwar, F., Shahid, M., Ashraf, M., & Przybylsk, R. 2010, Chemical composition, antioxidant and antimicrobial activities of essential oil of spearmint (*Mentha spicata* L.) from Pakistan. Journal of Essential Oil Research (22), 78-84.

[8]Hussain, J., Khan, A. L., Rehman, N., Zainullah, S. T., Hussain, F. K., & Shinwari, Z. K. 2009a, Proximate and nutrient analysis of selected medicinal plant species of Pakistan. Pakistan J.Nut, *1* (8), 620 -624.

[9] Imran, M., Talpur, F. N., Jan, M. I., Khan, A., & Khan, I. 2007, Analysis of nutritional components of some wild edible plants. J. Chem. Soc. Pak., *5* (29), 500-505.

[10]Koocheki, A., Tabrizi, L., & Nassiri Mahallati, M. 2007, The effects of irrigation intervals and manure on quantitative and qualitative characteristics of *Plantago ovata* and *Plantago* psyllium. Asian J. Plant Sci., 6:1229-1234.

[11] Lattmer, J. M., & Haub, M. D. 2010, Effects of dietary fiber and its components on metabolic health. Nutrients, *2* (12), 1266-1289.

[12] Mathews, S., Singhal, R. S., & Kulkarni, P. R. 1993, *Ocimum basilicum*: A new non- conventional source of fiber. Food chemistry (47), 399-401.

[13] Pearson, D. 1976, The Chemical Analysis of Foods,7th ed. London: Churchill Living stone, London.

[14] Radoias, G., Bosilcov, A., & Batiu, I. 2005, Odorante naturale in parfumeria moderna. Editura Cartii de Stiinta, Cluj-Napoca, 51-52, 143-147.

[15]Roger, P. F., Roger, P., Elie, F., Rose, L., Martin, F., Jacop, S., *et al*. 2005, Methods of preparation and nutritional evaluation of Dishes consumed in a malaria endemic zone in Cameroon (Ngali II). Afr. J. Biotechnol, *3* (4), 273-278.

[16]Sarfraz, Z., Anjum, F. M., Khan, M. I., Arshad, M. S., & Nadeem, M. 2011, Characterization of Basil (*Ocimum basilicum* L.) parts for antioxidant potential. African Journal of Food Science and Technology , *2* (9), 204-213.

[17]Shinwari, Z. K. 2010, Medicinal plants research in Pakistan. Journ. Med. Pl. Res, 3 (4), 161-176.

[18]WHO. 1990, Diet nutrition study group.Technical report series WHO. Geneva: (WHO) World Health Organization.

[19] Zaheer, S., Inam Ullah, K., Ullah, H., Shah, S., Hussain, Z., Bibi, S., *et al*. 2014, Mineral profile of different medicinal plants and their quantitative analyses collected from north west of Pakistan. Pak. J. Weed Sci. Res, *2* (20), 145-154.