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Proximate Analysis of Mushrooms of Azad Kashmir

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Abstract: Experiments were carried out to find out the chemical composition of eleven species of edible mushrooms reported from the Forests of Azad Kashmir. The results obtained were used to compare with those of some commonly known edible mushrooms. Some lesser known edible mushrooms identified in Azad Kashmir Such as *Amanita ceciliae*, *Volvariella bombycina*, *Collybia dryophila*, *C. ellipsoidia*, *Flammulina velutipes*, *Laccaria globosia*, *Marasmiellus najmii*, *Marasmius oreades*, *Oudemansiella radicata*, *Russula aeruginea* and *R. chamaeleontina* were analyzed for their chemical constituents including total dietary fiber, crude protein, fat, ash, moisture and carbohydrate. Despite the differences in the chemical composition of mushroom samples, when compared to the common edible mushroom *Lentinus edodes* (shiitake), the overall nutritional values of the mushrooms were good.

Key words: Edible mushrooms, proximate analysis, forests of Azad Kashmir, high protein content, low fat

Introduction

Mushrooms are good source of quality protein, minerals and vitamins (Wahid *et al.*, 1988). It is a saprophytic plant which can easily be grown on agricultural waste materials (Zafar, 1986). Mushrooms have been relished as a delicacy for centuries because of their subtle flavor (Priestly, 1984), nice aroma and physical taste appeal (Bhatti *et al.*, 1989). They have medicinal (Bukhari, 1375 A.H.) and ritual use (Ramzan, 1982). People of Pakistan are suffering from malnutrition especially diets are deficient in protein. During last decades, efforts have been made to increase the production of mushrooms by many governmental agencies and in the private sector.

Stewart (1924) collected mushrooms from Kashmir at an elevation varying from nine to twelve thousand feet. Khan (1962) described some wild mushrooms in Kashmir. Gardezi (1998) collected and reported three new Species of mushrooms from Forests of Azad Kashmir. These species were identified by following the Alexopoulos and Mims (1979) and Courtenay and Burdsall (1982). These three Specimens were later on identified as edible. Edible mushrooms contain high level of dietary fiber, Substantial amount of protein, vitamins and minerals but are low in fat. They also have various health benefits such as antioxidative, antitumour and hypercholesterolemic effects (Wong and Cheung, 2001). Therefore, edible mushrooms are regarded as an ideal health food. Our objective was to investigate the chemical composition in some novel edible mushrooms in order to evaluate their nutritional values. The results obtained were used to compare with those of some commonly known edible mushrooms. Some lesser known edible mushrooms identified in

Azad Kashmir Such as *Amanita ceciliae*, *Volvariella bommbycina*, *Collybia dryophila*, *C. ellipsoidia*, *Flammulina velutipes*, *Laccaria globosia*, *Marasmiellus najmii*, *Marasmius oreades*, *Oudemansiella radicata*, *Russula aeruginea* and *R. chamaeleontina* were analyzed for their chemical constituents including total dietary fiber, crude protein, fat, ash, moisture, carbohydrate and compared with one of the most important mushroom *Lentinus edodes*, commonly called shiitake. This flavorful mushroom is mainstay in the Japanese diet and is highly regarded for its nutritional and healthful qualities. Infact, shiitake ranks second in the world in total yearly mushroom production. The proteins in shiitake are composed of 18 types of amino acids and researchers have found over 30 enzymes in shiitake. Nutritional analysis of this mushroom shows 15% moisture, 15-18% protein, 1-2% fat, 65-75% carbohydrate, 7-14% fiber and 5-7% ash (Anonymous, 2002).

Materials and Methods

Proximate analysis

Proximate analysis for moisture, crude protein, crude fat, crude fiber and ash was performed in accordance with the official Methods of Analysis of the Association of Official Analytical Chemist (AOAC, 1984) from the mycelium of mushrooms. Percentage of total carbohydrates was determined by subtracting the sum percentage of moisture, crude protein, crude fat and ash from one hundred. All the calculations were carried out on dry weight basis of mushrooms.

Results and Discussion

The present investigation was to find out the chemical composition in some novel edible mushrooms in order to evaluate their nutritional values. The results obtained were used to compare with those of some commonly known edible mushrooms. Some lesser known edible mushrooms identified in Azad Kashmir Such as *Amanita ceciliae*, *Volvariella bommbycina*, *Collybia dryophila*, *C. ellipsoidia*, *Flammulina velutipes*, *Laccaria globosia*, *Marasmiellus najmii*, *Marasmius oreades*, *Oudemansiella radicata*, *Russula aeruginea* and *R. chamaeleontina* were analyzed for their chemical constituents including total dietary fiber, crude protein, fat, ash, moisture and carbohydrate.

Crude protein

The total protein in eleven samples of mushrooms varied from 15.65 to 30.56% as shown in Table 1. The protein contents of the mushrooms were *Amanita ceciliae* (15.65%), *Volvariella bommbycina* (30.56%), *Collybia dryophila* (24.92%), *C. ellipsoidia* (17.28%), *Flammulina velutipes* (25.32%), *Laccaria globosia* (21.18%), *Marasmiellus najmii* (19.88%), *Marasmius oreades* (20.21%), *Oudemansiella radicata* (20.23%), *Russula aeruginea* (23.58%) and *R. chamaeleontina* (22.21%). *Amanita ceciliae* had the lowest 15.65% protein while, *Volvariella bommbycina* had the highest 30.56% protein. The protein content of these mushrooms was reported highest among vegetables.

Crude fiber

The total fiber in eleven samples of mushrooms varied from 5.44 to 17.93% as shown in Table 1. The fiber contents of the mushrooms were *Amanita ceciliae* (5.44 %), *Volvariella*

Table 1: Proximate analysis of mushrooms of Azad Kashmir (Percentage g×100⁻¹g)

Mushrooms	Protein	Fiber	Moisture	Ash	Fat	Carbohydrate
<i>Amanita ceciliae</i>	15.65	5.44	10.27	18.97	1.54	48.13
<i>Volvariella bombycina</i>	30.56	10.24	20.17	13.14	1.11	24.78
<i>Collybia dryophila</i>	24.92	12.49	10.92	12.42	1.25	38
<i>C. ellipsoidia</i>	17.28	7.54	10.92	5.99	2.66	55.61
<i>Flammulina velutipes</i>	25.32	11.90	13.14	8.17	1.95	39.21
<i>Laccaria globosia</i>	21.18	11.74	13.29	7.62	1.29	44.88
<i>Marasmiellus najmii</i>	19.88	14.43	19.23	20.23	0.20	26.03
<i>Marasmius oreades</i>	20.21	12.90	11.83	20.38	0.07	34.61
<i>Oudemansiella radicata</i>	20.23	17.93	11.15	14.57	1.74	34.38
<i>Russula aeruginea</i>	23.58	17.85	10.17	17.01	2.66	28.73
<i>R. chamaeleontina</i>	22.21	14.14	10.99	13.95	0.05	38.66

bombycina (10.24%), *Collybia dryophila* (12.49%), *C. ellipsoidia* (7.54%), *Flammulina velutipes* (11.90%), *Laccaria globosia* (11.74%), *Marasmiellus najmii* (14.43%), *Marasmius oreades* (12.90%), *Oudemansiella radicata* (17.93%), *Russula aeruginea* (17.85 %) and *R.chamaeleontina* (14.14 %). *Amanita ceciliae* had the lowest (5.44 %) fiber while, *Oudemansiella radicata* had the highest fiber (17.93%).

Moisture

The moisture in eleven samples of mushrooms varied from 10.17 to 20.17% as shown in Table 1. The moisture contents of the mushrooms were *Amanita ceciliae* (10.27%), *Volvariella bombycina* (20.17%), *Collybia dryophila* (10.92%), *C. ellipsoidia* (10.92%), *Flammulina velutipes* (13.45%), *Laccaria globosia* (13.29%), *Marasmiellus najmii* (19.23%), *Marasmius oreades* (11.83%), *Oudemansiella radicata* (11.15%), *Russula aeruginea* (10.17%) and *R.chamaeleontina* (10.99%). *Russula aeruginea* (10.17%) had the lowest while; *Volvariella bombycina* (20.17%) had the highest moisture. *Collybia dryophila* and *C. ellipsoidia* contained the same amount of water 10.92%.

Ash

The quantity of ash in different mushrooms varied from 5.99 to 20.38 % as shown in Table 1. The quantity of ash in the mushrooms was *Amanita ceciliae* (18.97%), *Volvariella bombycina* (13.14%), *Collybia dryophila* (12.42%), *C. ellipsoidia* (5.99%), *Flammulina velutipes* (8.17%), *Laccaria globosia* (7.62%), *Marasmiellus najmii* (20.23%), *Marasmius oreades* (20.38%), *Oudemansiella radicata* (14.57%), *Russula aeruginea* (17.01%) and *R.chamaeleontina* (13.95%). *C. ellipsoidia* (5.99%) had the lowest while; *Marasmius oreades* (20.38%) had the highest amount of ash.

Crude fat

The quantity of fat was reported very less i.e. from 0.05 to 2.66% in different mushrooms as shown in Table 1. The fat content of the samples was *Amanita ceciliae* (1.54%), *Volvariella bombycina* (1.11%), *Collybia dryophila* (1.25%), *C. ellipsoidia* (2.66%), *Flammulina velutipes* (1.95%), *Laccaria globosia* (1.29%), *Marasmiellus najmii* (0.20%), *Marasmius oreades* (0.07%), *Oudemansiella radicata* (1.74%), *Russula aeruginea* (2.66%) and *R.chamaeleontina* (0.05%). *R.*

chamaeleontina had the lowest (0.05%) fat while, *C. ellipsoidia* and *Russula aeruginea* had the highest (2.66%) crude fat.

Carbohydrate

The carbohydrate content of these mushrooms ranged from 24.78 to 55.61% as shown in Table 1. The amount of carbohydrate in these mushrooms was *Amanita ceciliae* (48.13%), *Volvariella bombycina* (24.78%), *Collybia dryophila* (38%), *C. ellipsoidia* (55.61%), *Flammulina velutipes* (39.21%), *Laccaria globosia* (44.88%), *Marasmiellus najmii* (26.03%), *Marasmius oreades* (34.61%), *Oudemansiella radicata* (34.38%), *Russula aeruginea* (28.73%) and *R.chamaeleontina* (38.66%). *Volvariella bombycina* had the lowest (24.78%) while; *C. ellipsoidia* had the highest (55.61%) carbohydrate.

The proximate analysis showed a difference in the chemical composition of mushrooms. Despite the differences in the chemical composition of mushroom samples when compared to the common edible mushroom *Lentinus edodes* (shiitake), the overall nutritional values of the mushrooms were good. These mushrooms should be surely incorporated into our diets to play an important role in overall health and well-being.

References

- Alexopoulos, C.J. and C.W. Mims, 1979. *Introductory Mycology* 4th Ed. John Wiley and Sons. New York, pp: 572.
- Association of Official Analytical Chemist (AOAC), 1984. *Official Methods of Analysis*, 14th Edn., Washington, DC.
- Anonymous, 2002. *North American Medicinal Mushroom extracts*. North American Reishi Ltd. Box 1780, Gibsons, BC, Canada.
- Bukhari, M.B.I., 1375 A.H. *Sahieh-ul-Bukhari* 2:850 chap. *Kitab-ul-Tib* . Pub. Kutab Khana Rashidia, Dehli, India.
- Bhatti, M.A., N.Z. Perwaz, D. Mohammad, M.I. Mukhdum, R.A. Riaz and S.M. Khan, 1989. Effect of blanching and storing conditions on the chemical composition of oyster. *Mushrooms. Pak. J. Sci. Ind. Res.*, 32: 201-206.
- Courtenay, B. and H.H. Burdsall, 1982. *A field guide to mushrooms and their relatives* by Van Naostrand Rheinland company New York, pp: 144.
- Gardezi, S., 1998. *Taxonomy, Morphology and Biochemical analysis of Mushrooms of Azad Kashmir*. Ph.D. Thesis, Deptt. Biological Sciences, Quaid-I-Azam University, Islamabad, Pakistan.
- Khan, A.H., 1962. *Fleshy fungi of Kashmir*. *Pak. J. Forest.*, 12: 33-45.
- Priestly, B.J., 1984. *Effect of heating on Food Stuff*. *Appl. Sci. Publ. Ltd.*, pp: 327-328.
- Ramzan, M., 1982. *Studies on the cultivation of oyster mushrooms (Pleurotus spp.)*, M.Sc. Hons. Thesis, Deptt. Plant Pathology, Univ. Agric., Faisalabad, Pakistan.
- Stewart, R.R., 1924. *Kashmir fungi. Mycologia*, 16: 130-133.

- Wahid, M., A. Sattar and S. Khan, 1988. Composition of wild and cultivated mushrooms of Pakistan. *Mushroom J. Tropics.*, 8: 47-51.
- Wong, W.C. and P.C.K. Cheung, 2001. Food and Nutritional Sciences programme, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong, China.
- Zafar, S.I., 1986. Pakistan Suited to mushroom cultivation. *The Pakistan Times*, August, 22.