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Socio-ethnomycological validation of Maru Khumbhi (*Phellorinia herculeana*) occurring in Indian Thar Desert

Sunita Gehlot[1], Praveen Gehlot[2]*

[1]Department of Education, Lucky Institute of Professional Studies, Jodhpur, Rajasthan-342 003
[2]Department of Botany, Jai Narain Vyas University, Jodhpur, Rajasthan- 342 001
*Corresponding author: drpg73@rediffmail.com

Abstract

Indian Thar desert is treasure of trove of maru khumbhi scientifically known as Phellorinia herculeana. Local rural peoples have the knowledge to utilize this mushroom as food and medicine. However, socio-ethnomycological knowledge pertaining to the mushroom is scarcely documented. Therefore, a survey was conducted for socio-ethenomycological validation of neutraceutical and pharmaceutical value of this wild edible mushroom. A survey was conducted and response of people of different age groups were documented from Barmer, Jaisalmer and Jodhpur districts of Western Rajasthan with the help of a questionnaire containing 22 questions related to various aspects of the mushroom. Survey report revealed that rural folk hunted this mushroom for nutritional as well medicinal purposes during rainy seasons and the excess quantity of the mushroom is sold in the market to earn extra income. The rural people are not aware of sustainable use and conservation of the mushroom. The present study is of significance towards acquired ethnic information and scientific validation of wild mushroom P. herculeana.

Keywords: *Phellorinia herculeana*, Ethnomycology, Sociobiology, Indian Thar desert

Introduction

Desert wild edible mushroom *Phellorinia herculeana* commonly known as 'maru khumbhi' grows on the sandy soil or on sand dunes during the rainy season (Gehlot and Singh, 2015a). It is hunted by local rural populace for the food and medicinal purpose (Gehlot, 2016). *P. herculeana* (maru khumbhi) is only edible gastroid fungus growing in the semi-arid and arid area of Rajasthan (Gehlot and Singh, 2015a). The fruiting body of this mushroom appears individually or in groups during the rainy season. It is usually grown on sandy and sandy loam soil of the sand dunes (Gehlot and Singh, 2015b; Solanki *et al.,* 2016). It is morphologically characterized by white to cream color sporophore with a size of 8 to 12 cm in length. The sporophore consists of a long, thick stipe and round to obclavate pileus. Pileus composed of an outer multilayer sterile wall (peridium) and an inner fertile portion called gleba fully loaded with basidiospores (Gehlot, *et al.,* 2016).

Rural folks of Indian Thar Desert, Rajasthan have different opinions regarding

the application of desert mushroom with special reference to use as food, nutritive value, medicinal purpose, myths and/or belief. Therefore, socio-ethnomycological study was undertaken to sum up indigenous information for scientific documentation/validation.

Materials and Methods

A survey was conducted at gastroid mushroom *P. herculeana* occurring site in Indian Thar desert, Rajasthan. A questionnaire containing 22 questions related to vernacular names, season of occurrence, habitat of growing, method of collection, nutritional value, edibility, culinary method, medicinal properties, how to use the mushroom as medicine, marketing of mushroom, local vendor, price of mushroom, who is consumer, preservation method and other information that rural folks want to share information related to it were prepared for the study. The question paper was given to local people for their responses. Ten people (5 men and 5 women) of different age groups were selected from Barmer, Jaisalmer and Jodhpur districts of Western Rajasthan. A total of 100 question papers were employed for the survey. The data were analyzed through the evaluation and interpretation of answers. Personal interaction and interview with some local persons were also composed. Photography and video were also taken as verification of ethnic acquaintance. Results were tabulated, statistically analyzed and conclusions were drawn as per the method suggested by workers (Kumari *et al.,* 2012; Mridu and Atri, 2015).

Results (Sociobiology)

The rural people of districts of Indian Thar Desert *viz*., Barmer, Jaisalmer and Jodhpur were asked to respond to the following questions related to wild mushroom *P. herculeana*:

Q 1. What is the local name of mushroom given in this photograph?
Ans. 100% people replied it as “maru khumbhi”.

Q 2. What is the scientific name?
Ans. 100% of rural people said they don’t know about it.

Q 3. Is it edible or poisonous?
Ans. 86% of people replied, it is edible, 6% of people replied poisonous while 8% of people replied as don’t know.

Q 4. Where is it growing?
Ans. 95% of people said it is grown on sand dunes and sandy soil during monsoon (rainy) season.

Q 5. When do you collect it?
Ans. 75% of people said it is collected during the rainy season.

Q 6. Who collect wild mushroom?
Ans. Any family member (men, women and children) collect the mushroom from agricultural sites and sand dunes during farming and animal grazing. It is a traditional

practice.

Q 7. Have you applied any specific method for the collection of mushroom?

Ans. People replied that they don't know any specific method for collection but they hunt it by direct pulling out from soil.

Q 8. **Who is selling this mushroom in the market?**

Ans. Mostly the mushroom is collected for domestic purposes. If it is in excess quantity then the grazers sell it to local vendors at the rate of Rs. 100-200/- per kilogram for household income. Local vendors sell the mushrooms to the district vegetable market at about Rs. 400-500/- per kilogram.

Q 9. Who is the consumer of wild mushrooms?

Ans. Generally urban people purchase the mushroom to prepare shahi vegetable and special dishes during rainy days. Standard hotels are also good buyers of this mushroom and serve the mushroom as a special vegetable with high prices. This is considered as royal cuisine. Some foreigners also demand this mushroom as regional specialty.

Q 10. Do you eat wild mushrooms?

Ans. 65% of people said they eat this wild mushroom.

Q 11. Which kind of dishes cook (culinary) in the house?

Ans. 80% of people said that it is used to cook vegetables (Sabji), 10% of people said they eat it directly after removal of the upper layer and soil particles.

Q 12. How does it taste?

Ans. It is very delicious and tastes like cheese. Some people said it is just like a boiled egg.

Q 13. How many days can it be used after harvesting?

Ans. It is traditional practice that it can be used for 2-3 days after harvesting. The mature mushroom having coloured powdery mass is not consumed to avoid any toxicity.

Q 14. How can it preserve for off-season use?

Ans. Some ethnic persons cut mushrooms in small pieces and dried them on the roof of the house in sunlight. These dried pieces are used as a dry vegetable and dry powder is applied on the wounds for healing.

Q 15. How do you prepare a recipe?

Ans. Young mushroom is washed with luke warm water for removing soil particles and contamination of other dust adhered on the surface of pileus and sporophore. It is cut into small pieces followed by shallow frying with usual ingredients including, onion, garlic and red tomato. Red chili powder, coriander powder, turmeric powder and salt are added as spices according to the taste. Some water is also added for proper cooking of mushroom pieces and gravy. Coriander leaves are added for flavor and garnish of the dish.

Q 16. Do you know any medicinal application of this mushroom?

Ans. People suggested several medicinal applications of the mushroom for example, 90% of people said it is used as healthy food, 45% of people said they eat it for energy, 35% of people said it is used for the strengthening of bones. 18% of people said it is used for healing bone crack. 40% of people said it is applied externally on wounds as healing agents and antimicrobial agents. 8% of people said it is used for the treatment of skin disease.

Q 17. How do you use it for medicinal purposes?

Ans. Both fresh and dried mushroom is used as medicine. Fresh mushrooms are directly given to a person suffering from small fractures in the bone. Dried powder of spores is directly applied as ointment on the wound. Traditional herbal doctors recommended it to diabetic and heart disease patients. Some (2-3) people said that it is also given to camel suffering from leg bone fracture.

Q. 18. Do you have any knowledge about using this mushroom in heart disease and diabetes

Ans. Yes, we are using this mushroom to cure heart and diabetes disease.

Q 19. Are you aware of any myths or beliefs regarding mushroom?

Ans. Villagers believed that the growing of mushroom is connected with the lightning flash of the sky during the rainy season. Some people said that the mushroom seeds (Spores or inoculums) came with rains and grow on sand dunes. Some people said that spores are germinated by the effect of electrical discharge during the lightning.

Q 20. Are any myths that Maru khumbhi grows only at the site of snakes resided?

Ans. Maximum people replied that there is not any myth that Maru khumbhi grows only at the site of snakes resided.

Q. 21. How do you know about this knowledge?

Ans. They replied that they got the information from their parents and grandparents.

Q. 22. Is any literature available regarding information about the application of this mushroom?

Ans. No, we have no idea about any literature having the information related to this mushroom.

Discussion

As was outcome during the present socio-ethenomycological survey, *P. herculeana* is known to have various applications. Normally it is cooked as a vegetable due to nutritional value and delicacy. Doshi and Bohra (2000) analyzed the sporophore of *P. herculeana* contains 23.30% crude protein, 9.39% carbohydrates and 1.77% lipid and other nutritive value. The survey report revealed that it is given to people for extra nutrient supplement especially calcium for early recovery of bone crack. Jandaik (1976) studied nutritive elements values of *Phellorinia* and found that it is a rich source of calcium. Singh (1994) also reported that the local rural people used *P. herculeana* for

bone cracks due to its high contents of calcium. The survey report also validates that the dry powder of mature mushroom is used as medicine to heal the external wounds. Panwar and Purohit (2002) studied that *P. herculeana* exhibited very strong antimicrobial activity against human pathogenic bacteria *Pseudomonas aeruginosa* and *Proteus mirabili*s.

Survey revealed that maximum people believed that this mushroom has the potential to cure heart and diabetes disease. This belief is due to fact that mushroom contains potassium that is directly linked with heartbeat and pulse rate while mushroom contains less amount of sugar and a high amount of protein which is beneficial for patients suffering from diabetes. Doshi and Bohra (2000) analyzed the nutritional status of the fruiting body of *P. herculeana* and confirmed the presence of the high amount of different essential amino acids (Lysine, Leucine, Tyrosine, Tryptophan, Phenylalanine and Histidine) with minerals (0.42%, Ca, 0.09% Mg, 0.65% P, and 98% K). During the investigation, it was noticed that this mushroom may be a good source of earning money for poor villagers. It can be collected from the large barren sand dunes and can be sold in the market. Local vendors also sell it in the streets of the city. Gehlot (2016) also stated that women and children of this region are major collectors of mushroom and sell it in the market to increase their income. Gehlot and Singh (2015a) reported that *P. herculeana* is collected from the arid region of Rajasthan and is sold in the other state of India. Due to high price and magnificent demand in market and availability only in monsoon season, some young people took startup to collect natural growing mushroom with the help of daily workers and transfer to the city vegetable market. It is also alarming that collection of mushroom is done in an unscientific manner that may be dangerous to their natural growth and may result in to extinction. Therefore, the conclusion remark that the collection of *Phellorinia* for business purposes should be banned and a conservation policy must be drawn for the protection of *Phellorinia* mushroom. Awareness campaigning is also required for safe and long-lasting use of this mushroom. The state government, forest department and gram panchayats should have to take action immediately through awareness programs to educate rural people toward conservation of mushroom germplasm. The present study may be useful in documenting the indigenous socio-ethnomycological knowledge of Indian Thar Desert.

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