CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1253717

Available online at: http://www.iajps.com Research Article

THE PECULIARITIES OF ARTIFICIAL REPRODUCTION OF RARE WOOD-BREAKING MUSHROOMS OF THE PRIMORSK TERRITORY, THEIR FOOD AND MEDICINAL PROPERTIES

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Abstract:

This article describes some rare wood-destroying fungi that grow on the territory of Primorsky Krai, and the opportunities for their full use are offered by an artificial breeding on large areas. The observations on the natural development of valuable red-listed tree-destroying fungi are conducted on the territory of the forest area of Primorsky State Agricultural Academy "The Relict of Primorye" for almost 15 years. In the forest area of the PSAA, after the selective cutting of Mongolian oak, felling residues infected with mycelium provide the annual yields of valuable edible and medicinal fungus after 5-10 years, without any further human intervention. This principle of the natural spread of plant species is taken as the basis for the cultivation of wood-destroying fungi on the entire territory of the "Great Vladivostok" green zone.

Key words: *wood-destroying fungi, the process of artificial cultivation of wood-destroying fungi, Leucopholiota lignicolla (P. Karst.) Harmaja), Chroogomphus tomthtosus (Murrill) OK Miller.), Grifola frondosa (Disks.) Grey.), Hericium erinaceus (Bull.) Pers.), Japanese flavored mushroom, shiitake, siitake (Lentinula edodes (Berk.) Pegler.).*

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Please cite this article in press Natalya G. Rozlomiy et al., ***The Peculiarities of Artificial Reproduction of Rare Wood-Breaking Mushrooms of the Primorsk Territory, Their Food and Medicinal Properties,*** *Indo Am. J. P. Sci, 2018; 05(05).*

1.INTRODUCTION:

Primorye Territory is located in the south-eastern part of the Russian Far East and occupies more than 160 thousand square meters. km. The territory of the region stretches along the coast of the Sea of Japan, which has a significant impact on the climate and the vegetation of Primorye. The flora of the region has 280 species of trees, shrubs and ligneous lianas, many of which are relic and endemic [1]. Tree-destroying fungi are the fungi that destroy the cell walls of wood and alter its physical and mechanical properties significantly.

A famous expert-mycologist of the Far East E.M. Bulah praises these mushrooms. She writes: "As an integral part of plant communities, fungi play a huge role in the nature and the forest life. Forest exists due to mushrooms. All coniferous and deciduous wood species can not live in nature independently without mycorrhiza-forming fungi. The mushrooms growing on wood and forest litter, decompose dead wood litter - dry leaves, branches and dead trees to fertile humus. Mushrooms are the favorite food of animals and insects" [3].

2. OBJECTS OF THE STUDY

According to the type of food and growing conditions edible wild mushrooms are divided into the following ecological groups: humus saprotrophs, wood-destroying fungi and mycorrhiza-forming agents. **Leucopholiota lignicolla (P. Karst.) Harmaja)**

Fig.1. Leucopholiota lignicolla

***Chroogomphus tomthtosus* (Murrill) O.K. Miller.)**

Humus saprotrophs include the species of fungi, the mycelium of which develops in soil, in a surface humus layer. Such mushrooms (for example, champignons, etc.) can grow in open spaces - on fields, meadows, steppes, etc.

Tree-destroying fungi or xylotrophs, settle on wood, eat the substances that make up the wood (cellulose, etc.), thereby causing its destruction. They are typical inhabitants of forests and are divided into two subgroups: parasite fungi and saprotroph fungi. Parasite mushrooms are the first ones which settle on growing trees and cause the destruction of wood.

Saprotroph fungi are developed on dead wood, stumps, felling residues and other wood substrates buried in soil or lying on its surface. These mushrooms (oyster mushroom, siitake, etc.) are mostly relic species, they have good nutritional and medicinal properties, yield to artificial year-round cultivation in special rooms on cellulose-containing waste from agriculture and forestry relatively easily. Many saprothrophic fungi, due to a small area and a narrow range of decaying tree species on which they can normally develop and produce for a long time, are included in the "Red Book" of the Primorye Territory for many years, which means a complete prohibition on the use of these fungi bodies possessing various properties useful for a person.

It grows in small groups on stumps and the fallen trunks of soft and hardwood species (Figure 1). The hat is 4-9 cm in diameter, densely-hairy-scaly yellow or reddish-brown. A leg is cream, monochrome with a hat. The flesh is white, with a slight pleasant odor. These mushrooms become ripe in August.

It grows singly, rarely in large groups in fir-spruce-broad-leaved forests (Figure 2). It ripens in September-October. The hat is 2-10 cm in diameter, yellowish-brown. A monochrome leg with a hat. The flesh is with a pink wine tint, without a special smell. It is edible and fairly tasty, but it is collected seldom and rarely.

Fig. 2. Chroogomphus tomthtosus

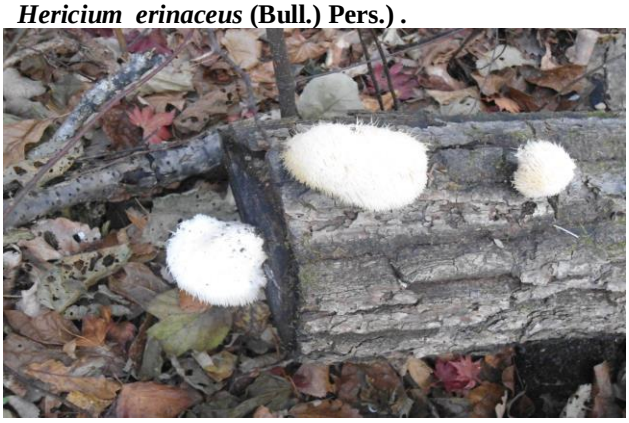
Grifola frondosa (Disks.) Grey.)

This fungus has many names - Grifola frondosa, ram mushroom, dancing mushroom, geisha mushroom, etc. Its body makes up to 40 cm and more in diameter, it consists of a set of gray-brown hats, the legs of which merge into one common thick base (Figure 3). The flesh is white with a pleasant smell. It grows in the oak forests in September. It is edible and has various healing properties.

In China, the fungus is used to treat diabetes, it helps to reduce sugar and cholesterol in blood, and also for the prevention of many other diseases.

Fig.3. Grifola frondosa

***Hericium erinaceus* (Bull.) Pers.) .**



This wood-destroying, tasty and medicinal mushroom has a significant area, many useful properties and hence many names - mushroom noodles, monkey head, bearded tooth, lion mane, shishigashira, houtou, jambushitake and a number of others. In Russia it is called "Mushroom noodles", less often - "Chinese noodles".

Fig.4. Hericium erinaceus (mushroom noodles)

In Russian Far East, it grows naturally in the Primorsky and Khabarovsk Territory and the Amur Region. It is listed in the "Red Book" of Primorye Territory with the status (VU) - vulnerable. This fungus develops and spreads on fallen trees, stumps, felling residues and damaged Mongolian oak trees (Figure 4). Less often it occurs on the trees of other hardwoods.

In the south of the Primorye Territory, in the Ussuri region this fungus can grow on the felling remains of Mongolian oak along with another, equally useful

food and medicinal Japanese flavored mushroom - Lentinula edodes (Berk.) Pegler.

The forest area "The Relic of Primorye" of the Primorsky State Agricultural Academy has the bodies of these fungi on the same felling remains of the Mongolian oak. This indicates that these fungi have the same nutritional needs, and with an artificial cultivation on the same oak cuttings, it is possible to obtain completely different fungi according to external signs, nutritional and medicinal properties.

Hericium erinaceus has various medicinal properties like the Japanese flavored mushroom. In eastern medicine, it is used for any malignant and benign neoplasms, especially for esophagus and stomach cancer. The fungus helps to reduce blood pressure, lowers blood sugar, improves blood circulation, increases immunity, and is used as the stimulator for nerve cell growth and recovery.

Japanese flavored mushroom, shiitake, siitake (Lentinula edodes (Berk.) Pegler) - This exotic mushroom has been introduced into the culture by a man more than 2000 years ago due to its food and medicinal properties. At present, it occupies the second place (after champignons) in the world volume of mushroom production (Figure 5, 6). The largest producers of these fungi are the countries of southeast Asia, where the primacy belongs to Japan, China and Korea. This fungus naturally occurs in the Russian Far East, in the southern regions of the Primorye Territory and Sakhalin region, i.e. on the northern boundary of its areal. It grows on dead wood and felling remains of Mongolian oak, very rarely on other hardwoods. Sometimes it can be found on growing oak trees that have bark damage in the lower part of a trunk in the form of fire wounds, frost cracks, mechanical damages, etc.

Fig.5. Japanese flavored mushroom (shiitake, siitake, edible lentinulum) on the felling remains of oak.

Fig.6. Two relic edible and medicinal mushrooms on felling remains of oak.

Japanese flavored mushroom (lentinul) has a wide range of health-improving effects. It lowers the level of cholesterol in blood, regulates cardiovascular pressure, prevents the development of cancer cells. With regular and reasonable use of this fungus in food a human body activates protective and immune properties, the aging process is slowed down, antiviral, antibacterial, antifungal and other protective functions of a body are increased, stresses are overcome more easily.

Siitake is widely used in Chinese, Korean and Japanese cuisines. Freshly harvested fruit bodies can be consumed immediately, and can be prepared for future use by drying, pickling, marinating and freezing. Mushroom caps are usually used, since siitake legs are very hard, and they should be removed for all storage methods. Given that the fungus has various medicinal properties (the treatment of avitaminosis, hypertension, liver cirrhosis, allergies, viral and oncological diseases and many others), one should eat mushroom with some cautions.

3. STUDY RESULTS:

The forest area of the PSAA after the selective cutting of Mongolian oak and the felling residue infection with mycelium for 5-10 years provides the annual yields of valuable edible and medicinal fungus

without any further human intervention. This principle of plant species natural spread is taken as the basis for the cultivation of wood-destroying fungi on the entire territory of the green zone "Great Vladivostok". The whole process of the artificial cultivation of wood-destroying fungi consists of the following two stages.

1. The procurement of substrate. The creation of felling heaps. The main areas of the green zone of the project under consideration are the secondary oak forests, with the predominance of Mongolian oak and the participation of a number of hardwood species - the Manchurian and Daurian birches, aspen, alder, etc. Since oak is the main mycorrhiza forming agent, the future substrate of many mushrooms intended for artificial cultivation will consist mainly of oak wood. In some more lowered areas, several trees are cut, trunks and branches are divided into 1-2-meter lengths and stacked in heaps as felling residues. The heaps should be up to 2-3 m in diameter and up to 1.5 m high. Heaps are recommended to be placed in the shadow of the remaining trees or their groups to prevent their rapid drying. During the laying of branches and brushwood in heaps, one should strive to make it denser and more compact. To do this, the thicker and larger parts of the trunks and branches are placed in the lower part of a heap so that they lie flat on the ground. A ready heap is useful to press down with a large-sized heavy piece of a trunk from above. It is planned to place 4-5 such heaps on 1 hectare preliminary. With positive results the number of places for wood-destroying fungi growth in the green zone of forests can be increased.

2. The infestation of decomposing mounds with the mycelium of wood-destroying fungi. After 2-3 years of lying in wet piles, the hardwood and softwood species lose their structure, which makes the spores of mushrooms sprout under prepared heaps and form the filaments of mushrooms, called mycelium. Expanding, the mycelium extracts water from decomposing wood with various mineral substances and forms fruit bodies in the coming years. The very process of heap infection with the mycelium of wood-destroying fungi is quite simple and does not require significant monetary and material costs. Individual pieces of wood infected with mycelium are placed in the lower part of these heaps, trying to avoid their further drying. In the coming years, the growing mycorrhizas will infect all the heaps of wood that have lost their structure and fruit bodies should appear on these felling piles. Over time, the harvest of edible wood-destroying fungi can be regulated by the creation of new felling piles, having infected them with the mycelia of new edible and medicinal mushrooms.

4. CONCLUSIONS:

The observations on the natural development of valuable red-listed tree-destroying fungi are conducted on the territory of the forest area of Primorsky State Agricultural Academy "The Relics of Primorye" for almost 15 years.

It is proved that the majority of these fungi develops on half-decomposed wood of Mongolian oak, spreads on the same substrate for 5-6 years or more - from May to November, at that in the summer and the autumn months the harvest of these fungi depends mainly from the presence of moisture in a substrate, from which the mycelium extracts fluid for a normal growth of a fruit body. The spores begin to germinate in favorable conditions (decomposing, wet, rotten wood), mycorrhizas grow, accumulate nutrients and form fruit bodies (Fig. 4, 5). Among the tree-destroying fungi a special place is occupied by the fungus siitake, whose mycelium, settling on the oak tree that has lost its structure, absorbs the spring moisture like a sponge and loses it very slowly. Thus, the fruiting bodies of this fungus appear first. They are the main species for the use by small animals and a man in May.

REFERENCES:

1. Bulakh E.M. Rare and new species of bazidial fungi from Primorsky Krai / E.M. Bulakh, O.K. Govorova // Mycology and phytopathology, 2000. V.34. Issue 2. pp. 21-25.
2. The mushrooms of the Sikhote-Alin Reserve and the adjacent part of the Terney District // The materials of Sikhote-Alin State Reserve, 1963. Issue 3. pp. 71-119.
3. Gukov G.V. The biological productivity of Lentenula edodes (Berk.) Pegler in Primorsky Krai / G.V. Gukov, V.G. Ivanov, P.A. Comin // Scientific-practical journal "Bulletin of IrGSKhA" issue 53. Irkutsk 2012. pp. 52-58.
4. The cadastre of plants and mushrooms of "Kedrovaya pad" reserve. - Vladivostok: Dal'nauka, 2002. - 156 p.
5. Red Book of the Primorye Territory. Plants. Rare and endangered plant species. Official publication. Vladivostok, 2008. 687 p.
6. Kolesnikov B.P., L.V. Lyubarsky. Tree-destroying fungi of the eastern slopes of the middle Sikhote-Alin // The works of Sikhote-Alin State Reserve, 1963. Issue 3. pp. 59-70.
7. Nikolaeva T.L. Blackberry mushrooms. The flora of the USSR spore plants. V.4. Mushrooms (2).

M.; L.: The Publishing House of the USSR Academy of Sciences, 1961. - 432 p.
8. Flora, mycobiota and vegetation of the Lazovsky Reserve. - Vladivostok: Russian Island, 2002. pp. 202-216.
9. Flora, vegetation and mycobiota of the Ussuriysky Reserve. - Vladivostok: Dal'nauka, 2006. - 300 p.
10. Stalpers J.A. The Aphyllophoraceous Fungi – II. Keys to the species of the Hericiales // Studies in Mycology, 1996. № 40. pp. 1-186.