



Research Article



## The Population, Medicinal Potential, And Chemical Properties of the Field Blewit (Blue Stalk Mushroom) *Lepista Personata* (Fr.) Cooke

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**Abstract:** This study aims to describe the population of the field blewit (blue stalk mushroom) *Lepista personata* (Fr.) Cooke (= *L. saeva* (Fr.) P.D. Orton) on the territory of the botanical Garden of the Belgorod University as a model object for studying the territorial populations of the same and other species similar in bioecology. Eating it as long as the mushroom is cooked well should not cause any kind of illness. But if consumed raw, it may cause stomach upset, pain or diarrhea in the consumer. The main health advantage of the blewit is nutritional, however, it is considered by some to hold medicinal potential. It is traditionally utilized to prevent symptoms of thiamine deficiency (beriberi) and also in wound care. This work aimed to describe the population, medicinal potential, and chemical properties of *Lepista personata* (Fr.) Cooke (Tricholomataceae) on the grounds of the botanical garden of Belgorod University as a model facility for the study of territorial populations of the same and other, similar in bioecology, species. The object of research was the population education *L. personata* on the territory of the botanical garden of Belgorod University (NIU "BelSU"). The work used methods of mycofloristics and mycocenology. The population of *L. personata* was studied during the fungus's fruit-bearing period during the seasons 2012–2019. Intrapopulation structures were detected and outlined based on observations of fruit body clusters, configuration of clusters and their allocation. As a result of the research carried out on the territory of the botanical garden, 9 loci of *L. personata* have been identified and described. Of these, 2 loci represent elementary *L. personata* mycocells, 2 loci represent isolated mycocells, 4 loci represent an interconnected grouping of mycocells contacting at the propagule (propagulum) level; a complex *L. personata* mycocell represents 1 locus.

**Keywords:** *Lepista Personata*, Medicinal Potential, Micropopulation, Mycocell and Chemical Properties.

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## I. INTRODUCTION

The preliminary health advantage of the field blewit is nutritional. However, it is considered by scientists to hold medicinal potential as well. It is traditionally utilized to prevent symptoms of thiamine deficiency (beriberi) and wound care. Blewits are full of antioxidants and are believed to be whole food. Other natural products with the same content are tomatoes and red and green peppers. Those mixtures can counter free radicals and harmful chemicals that damage cells and spark illnesses, including cancer<sup>1-3</sup>. Mushrooms are regarded as a favorable source of selenium, a scarce mineral found in fruits and vegetables. It is required just in trace amounts but is essential for neutralizing some toxins that result in tumors and the liver's enzyme function. It restricts the development of cancer and decreases overall inflammation<sup>4,5</sup>. The study of macromycete fungi at the population level is important both for mapping their habitats, and for elucidating the features of their distribution in space and time and studying their bioresource potential. The aim of this work was to describe the population of the field blewit (blue stalk mushroom) *Lepista personata* (Fr.) Cooke (= *L. saeva* (Fr.) P.D. Orton)<sup>1-3</sup> on the territory of the botanical Garden of the Belgorod University as a model object for studying the territorial populations of the same and other species similar in bioecology. The tasks were set as follows<sup>6-8</sup>. *Lepista saeva*, the Field Blewit, differs from its close relative the Wood Blewit in having a greyish-brown to beige cap instead of purple even when young. Its preferred habitat is limestone grassland, although sometimes this large, prominent mushroom can also be found in forests. Field blewits rarely bear fruit singly, and it is not unusual to find them in fairy rings or in groups clustered together with their caps touching. Eating wood brew not only benefits our taste buds but also our whole body. Mushrooms are a valuable source of copper, zinc, and manganese, which are important for the health and well-being of our whole body. It is also rich in thiamine and riboflavin. Wood tea is also known for its antibacterial properties<sup>9-12</sup>. As long as the mushroom is cooked well, eating it should not cause any kind of illness. But if consumed raw, it may cause stomach upset, pain or diarrhea in the consumer. Overall, reviewing literature review, it can be observed that little research has been done on the population, medicinal potential, and chemical properties of the field blewit (Blue Stalk Mushroom) *Lepista Personata* (Fr.) Cooke. Hence, over the course of this study, it was aimed to 1-Identify and describe loci of *L. personata*. 2. Describe the bioecological and chemical features of *L. personata* in the identified loci (in situ). 3. To find out the ecological aspect of the spatial organization and configuration of the population and chemical properties of *L. personata*, based on the knowledge of the allocation and distribution of groups and groupings of fungal fruit within the boundaries of the botanical garden. 4. Propose a construction of a mathematical model for estimating the yield of *L. personata*. It should be noted that *L. personata* is a ubiquitous species that is distributed all over Central and Eastern Europe<sup>2,4</sup>. On the territory of the Belgorod region, it is found everywhere in its characteristic ecotopes. Finally, a mathematical construction is suggested that allows estimating the yield of *L. personata* in intact ecotopes. This model can make a contribution to the new knowledge within the context of this particular field of study.

## 2. MATERIALS AND METHODS

The object of research was the chemical properties and population formation of *L. personata* on the territory of the Botanical garden of the National Research University "BelSU" (hereinafter – the Botanical Garden). The work used methods of mycofloristics and mycocenology<sup>4-8</sup>. In the conducted studies, the floristic method (route method for detecting micromycetes) and the mycocenological method (isolation of mycocells and larger population formations) complemented each other. The yield was determined based on the basic methodology<sup>9-14</sup>. The population of *L. personata* was studied during the fruiting period of the fungus in the 2012-2019 seasons. Intrapopulation structures were identified and outlined based on observations of fungal fruit clusters, cluster configuration, and their allocation. The research was carried out on the basis of the scientific and educational center "Botanical Garden of the National State Research University, a unique object of the infrastructure of the Russian Federation. The research was carried out on the basis of the scientific and educational center "Botanical Garden of the National Research University "BelSU", a unique object of the infrastructure of the Russian Federation<sup>15-19</sup>.

## 3. STATISTICAL ANALYSIS

Groups of plants were categorized in excel file and analyzed mean of result with SPSS software. Comparison of means will be compared due to Duncan multirange test. P value was 0.05.

## 4. RESULTS AND DISCUSSION

Blue Stalk Mushroom are commonly considered edible mushrooms, provided they are fully cooked. It includes a unique, strong flavor and smells faintly of aniseed, and is good in stews, omelets, or fried in butter. Having said that, there are chances of it generating some health issues, including allergic reactions while consumed raw, and in some individuals, even when it is cooked. Also, it can be utilized as a dye, leading to a green-grass color – not purple or pink, as might be anticipated<sup>2,6</sup>. The chemical elements of mushrooms vary from species to species. Various factors affect the chemical composition, such as carbon/nitrogen (C/N) ratio, medium structure, temperature, air composition, pH, and so forth. Those kinds of results have been studied and classified as external and intrinsic, benefiting all those professionals, handlers, practitioners, scientists, researchers, academicians, and industrial people keen on mushrooms and its health benefits<sup>1,8,13</sup>. Blue Stalk Mushrooms have been used for food and medicinal aims for many years. However, they also provide a fruitful and novel source of biologically relevant mixtures that may act as health boosters in various human disease conditions. Mushrooms are deemed a good source of the distinctive molecule – ergothioneine, an incredible supply of essential antioxidants, boosting human health and offering potential as a preservative in food, encouraging their use as functional foods<sup>3,12</sup>. On the territory of the botanical garden during the 2012-2019 seasons, 9 loci (locations of fruit bodies) of *L. personata* were identified (Table I). A little about individual fruit bodies *in situ*. The fruit body of *L. personata* (Fig. 1) is quite large, fleshy. It consists of a rounded cap and a central leg. The cap is 5-15 cm in diameter, initially convex, then flat-curved, smooth, white-yellowish with pink tones. In

wet weather it is yellowish-watery. The lower part of the cap bears a lamellar hymenophore. The gills are frequent, adnated, descending, cream-pink in hue. Spore powder is pink<sup>2,5,7</sup>. The stem is cylindrical, thickening downwards, fibrous, dense, without a ring and volva, 3-8 cm long, 1.5-3 cm in diameter; covered with lilac-purple scales (see Fig. 1), which determine the color of the surface of the stem, which is a kind of differentia specifica. The flesh of the fruit body is whitish with a flour smell. This species belongs to the group of blewits

(Tricholomataceae family), is a ground saprotroph (Hu), prefers lightened places: copses, edges, lawns, pastures, abandoned gardens. It bears fruit in autumn, in local conditions, usually in September-November ( $t=+8...+12^{\circ}C$ ); sometimes, in moderately cold ( $t=+3...-2^{\circ}C$ ) and humid weather, it forms fruit bodies in December. Fruit bodies are more often formed in groups, less often – singly. *L. personata* bears fruit every year in separate loci. Mass fruiting is observed in 3-5 years. The most abundant is after 7-9 years<sup>9,12,13</sup>.

**Table I. Registration locations and coordinates of the centers of the *L. personata* locion the territory of the botanical garden**

Seq No.	Locus registration locations	Coordinates of the locus centers
1	«Shadow Garden» exhibition	N: 50.592114 E: 36.553
2	«Relict plants» exhibition	N: 50.591989 E: 36.552
3	«Japaneese thuja» arboretum	N: 50.591878 E: 36.552
4	«Small-leaved elm» arboretum	N: 50.591829 E: 36.552
5	«White mulberry» arboretum	N: 50.591651 E: 36.552
6	Larch Alley	N: 50.592901 E: 36.552
7	Red Oak Alley	N: 50.592223 E: 36.545
8	Windproof forest belt	N: 50.592082 E: 36.543
9	Pine forest edge	N: 50.593475 E: 36.540



**Fig 1: Appearance of *L. personata* fruit bodies**

The following is a description of the loci of *L. personata* on the territory of the botanical garden. Locus 1 (see Table I). Point configuration. The number of fruit bodies in different years is 2-6. The length is not more than 1 m. It is described as a separate elementary mycocell. Locus 2 (see Table I). Point configuration. The number of fruit bodies is 1-5. The length is less than 10 m. It is described as a mycocell in relation to mycocells from loci 3, 4, 5. Locus 3 (see Table I). The configuration is linear. The number of fruit bodies is 3-7. The length is less than 10 m<sup>10,21</sup>. It is described as a mycocell in relation to mycocells from loci 2, 4, 5. Locus 4 (see Table I). The configuration is curved. The number of fruit bodies is 1-5. The length is less than 10 m. It is described as a mycocell in relation to mycocells from loci 3, 2, 5. Locus 5 (see Table I). The configuration is linear. The number of fruit bodies is 3-11. The length is less than 10 m. It is described as a mycocell in relation to mycocells from loci 3, 4, 2. The distance between mycocells at loci 2, 3, 4, and 5 is no more than 40 m, which suggests the presence of an effective interaction at the level of propagules (propagum), due to the size of the radius of individual activity<sup>4,15</sup>, for fungi forming terrestrial spore-

bearing fruit bodies, up to 100 m<sup>16-19</sup>, and the close location of mycocells relative to each other. Locus 6 (see Table I). Point configuration. The number of fruit bodies is 1-2. The length is not more than 1 m. It is described as a separate elementary mycocell. Locus 7 (see Table I). The configuration is circular. The number of fruit bodies is 2-6. The length is less than 10 m. It is described as a separate mycocell. Locus 8 (see Table I). The configuration is linear. The number of fruit bodies is 5-18. The length is more than 10 m. It is described as a group of 2 mycocells that are in direct contact with each other. Locus 9 (see Table I). The configuration is circular. The number of fruit bodies is 3-11. The length is less than 10 m. It is described as a separate mycocell. Thus, on the territory of the botanical garden, 2 isolated elementary mycocells of *L. personata* (loci 1, 6), 2 separate mycocells (loci 7, 9), 4 separately located but interconnected mycocells contacting at the level of propagules (loci 2, 3, 4, 5), and 2 mycocells directly contacting each other through mycelium (locus 8) were identified. In other words, the population of *L. personata* on the territory of the botanical garden forms a spatial configuration of 4 elements (2 elementary mycocells and 2

mycocells) and 2 components (the 1st micropopulation, including 4 mycocells contacting at the level of propagules, and the 1st complex mycocell, consisting of two mycocells directly contacting each other)<sup>20-22</sup>. *L. personata* is an edible mushroom species, characterized by good nutritional properties and having commercial (bioresource) value<sup>2-5</sup>. In favorable years, it bears en masse, forming clusters of fairly large fruit bodies. This raises the question of assessing the yield of this species. The local population described within the botanical garden is an excellent model object that demonstrates the features of the existence and development of local chemical properties and population formations of *L. personata* in intact ecotopes. Using knowledge about the structure of this object, it is possible to construct a mathematical construct that allows you to estimate the yield of *L. personata*.<sup>18,20</sup> The yield of saprotrophic and symbiotrophic macromycete fungi (U) is generally defined as the ratio of the mass of fruit bodies collected in a given territory during the year (M) to the area of this territory (S) (kg × ha<sup>-1</sup> × year<sup>-1</sup>)<sup>14</sup>: U = M / S. The average values for a number of accounting years with different weather and climatic conditions are usually used. In our case: M = (m<sub>cp</sub> × n × N × k),

Where m<sub>cp</sub> is the average mass of a fungal fruit (kg), N is the average number of fruit bodies in a mycocell, n is the average number of mycocells in a local population, K is the average multiplicity of fruiting waves (layers). Then the yield capacity of *L. personata* can be estimated using the following ratio: U = (m<sub>cp</sub> × n × N × k) / S. Thus, based on the identified features of the configuration of the local population of *L. personata*, which serves as a model

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object, a mathematical construction is proposed that allows to estimate the yield of *L. personata* in intact ecotopes.

## 5. CONCLUSION

9 loci of *L. personata* have been identified and described on the territory of the botanical garden. Of these, 2 loci represent elementary mycocells of *L. personata*, 2 loci are isolated mycocells, 4 loci are an interconnected grouping of mycocells contacting at the level of propagules (propagum); 1 locus is represented by a complex mycocell of *L. personata*. The population of *L. personata* on the territory of the Botanical Garden of the Belgorod University is a spatial configuration of 4 elements (2 elementary mycocells and 2 mycocells) and 2 components (the 1st micropopulation, including 4 mycocells contacting at the level of propagules, and the 1st complex mycocell, consisting of two mycocells directly contacting each other). Based on the identified features of the configuration of the local population of *L. personata*, which serves as a model object, a mathematical construction is proposed that allows estimating the yield of *L. personata* in intact ecotopes. The presented model can greatly contribute to the new knowledge within the context of this particular field of study.

## 6. AUTHOR CONTRIBUTION STATEMENT

All authors had similar roles in conducting and writing the study.

## 7. CONFLICT OF INTEREST

Conflict of interest declared none.

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