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The Mycoflora of Gorski Kotar in Yugoslavia

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The Gorski Kotar is a mountainous region in Croatia, between Rijeka and Karlovac, and contains the Risnjak National Park with the Risnjak peak (1528 m). The investigations of the mycoflora were carried out partly within the National Park, and partly in its neighbourhood; mostly at an altitude of about 700 m, but several excursions were also made up to the top of the mountain. For this part of our country maps of the vegetation cover have been prepared by H o r v a t (1962), showing the plant associations in detail. Therefore, the fungi were collected, whenever possible, in definite forest associations.

On the territory investigated, the most widely spread forest association is *Fagetum croaticum*, particulary the subassociation *abietetosum*, composed of beech and fir, with many characteristic plants like *Omphalodes verna, Ruscus hypoglossum, Daphne laureola, Galium rotundifolium, Scopolia carniolica, Rhamnus fallax* etc. This forest is developed on basic to slightly acid soils overlying limestones and dolomites.

Another forest association which covers great areas is *Blechno-Abietetum*. It develops on acid soils overlying silicate rocks. The predominant tree is fir, but beech is frequent, although it never reaches the higher levels in the forest, while on some sites spruce is also present. For this forest association the characteristic plants are *Blechnum spicant, Dryopteris oreopteris, Vaccinium myrtillus, Melampyrum vulgatum, Lycopodium* spp., *Luzula* spp., many kinds of mosses etc.

These two associations were particularly investigated, and their mycoflora was compared. Some other associations were examined less exhaustively. A great number of fungal species were also found in mixed woods of *Betula, Populus, Fagus, Abies* and *Picea*, which develop on sites where the original associations have been cut down. Other fungi grew on the forest edges, under solitary trees, in meadows etc.

During the investigations, 282 species were determined; 180 of them had not been noted for this region by earlier investigators. These are only a part of the total number of species to be expected because, owing to favourable ecological conditions, the mycoflora of Gorski Kotar seems to be very rich.

The number of species found during any one year varied according to the weather conditions. While in 1963, which was a particularly good year for fungi, 225 species were noted, in each of the following years only about 130 were found. The seasonal aspect is naturally also variable. The smallest number of species is to be found in spring. Excluding the *Polyporaceae*, which grow usually more or less during the whole year, most common or characteristic for this season are *Morchella esculenta* and *M. conica*, *Discina ancilis*, *Omphalina ericetorum* and *Nolanea hirtipes*. The summer aspect is dominated by the species *Amanita*, *Russula* and some *Boletaceae*. The chief season for fungi, with the greatest number of species and individuals, is September, and, particularly, October, not only in the Gorski Kotar but also in other parts of our country. At this time there appear, along with some of the summer genera, various species of *Lactarius*, *Tricholoma*, *Cortinarius* s.l. and many other genera, some in great numbers, also *Hygrophoraceae*, especially the meadow species.

Among the most common fungi, found in greatest quantities, are *Amanita muscaria*, *Boletus edulis*, *Camarophyllus pratensis*, *Cantharellus cibarius*, *Collybia confluens*, *Fomes fomentarius*, *Hebeloma crustuliniforme*, *Hypholoma fasciculare*, *Lactarius subsalmoneus*, *Leccinum aurantiacum*, *Pleurotellus porrigens*, *Pseudohydnum gelatinosum*, *Russula foetens* and *Tremiscus helvelloides*.

Some of the fungi found are described in the literature as rather rare: *Amanita virosa*, *Bondarzewia montana*, *Clitocybe sinopica*, *Fomes corrugis*, *Panellus serotinus*, *Hygrophorus barbatulus*, *Lentinellus bisus*, *Leucopaxillus amarus*, *Omphalina wynniae* and *Tricholomopsis decora*. Most of them were found only once or only in small numbers; the last two are not uncommon in the Gorski Kotar.

A large number of species (85 in all) belong to the wood-destroying fungi. Of these, 47 species were found on hardwoods, and 46 on softwoods. It is interesting to note that the ratio of *Polyporaceae* to *Agaricales* was 24 : 14 for hardwoods, and 15 : 24 for softwoods (completely reversed). One large specimen of *Inonotus dryadeus* was found on the base of a living fir tree.

Many of the fungi found form mycorrhiza with various trees, but in most cases it could not be ascertained whether they were bound only with one tree genus or with several. The following typical symbionts of *Betula* were recognized: *Lactarius glyciosmus*, *L. pubescens*, *L. tor-*

minosus, *Leccinum scabrum* and *Tricholoma flavobrunneum*, growing always under birch. Two *Lactarii* with orange milk, determined as. *L. semisanguifluus* and *L. subsalmoneus*, were always found under spruce and fir, respectively. The latter species is mentioned in the literature as groving under spruce. I have found this species in some other parts of Croatia also, always only under fir, and it seems to be common in our fir forests. *L. semisanguifluus* grows in our country under spruce but also occurs under pine.

Comparison of the fungi in the associations mentioned, excluding wood-destroying species, shows a total of 113 in the *Blechno-Abietetum* and only 61 species in the *Fagetum abietetosum*. Not only is *Blechno-Abietetum* more rich in species than *Fagetum abietetosum*, but the fungi common to both grow in greater quantities in the former association. As many of the species were found only once or are only represented by a few specimens, it is not yet possible to decide which of them are typical for the one or the other association. Moreover, some of those found only in one association grew also in mixed woods, or at the edges of woods.

In mixed woods 41 species were noted in total, whilst 69 species grew on the edges of woods and forests or under solitary trees. Over thirty species were found only in such habitats.

The members of the family *Hygrophoraceae* were particularly typical for meadows, where 13 species were determined, most of them growing in groups, some very abundantly, such as *Camarophyllus pratensis*, *C. niveus* and *C. russocoriaceus*, and *Hygrocybe chlorophana*.

Of the species selected for the mapping of macromycetes of Europe, 33 have been found in Gorski Kotar, although some are only known as yet from a single specimen. Those belonging to the first twenty five are: *Tremiscus helvelloides*, *Pseudohydnum gelatinosum*, *Ganoderma applanatum*, *Pycnoporus cinnabarinus*, *Oudemansiella mucida*, *Marasmius alliaceus*, *Amanita citrina*, *Rozites caperata* and *Phallus impudicus*. The first three and *Amanita citrina* are common there. Of the other mapped species particularly common are *Fomes fomentarius*, *Fomitopsis annosa*, *Laccaria amethystea*, *Armillaria mellea*, *Schizophyllum commune* and *Kuehneromyces mutabilis*.

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Mikoflora pasma Gorski Kotar w Jugosławii

Streszczenie

Badania przeprowadzono głównie w obrębie *Fagetum croaticum* i *Blechno-Abietetum*, najbardziej rozpowszechnionych w górach Gorski Kotar w Kroacji. Oznaczono 282 gatunki, co stanowi tylko część znanej stamtąd bogatej flory grzybów. Bogactwem flory odznaczało się *Blechno-Abietetum* (113 gat.). Wymieniono niektóre gatunki pospolite i rzadkie oraz pojawiające się na wiosnę i współżyjące z drzewami. Znaleziono również 33 gatunki wytypowane do skartowania ich stanowisk w Europie.