POTASSIUM CONTENT AND GROWTH RATE OF HIGHER FUNGI

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The chemical element potassium is, like for all organisms, indispensable for the life of fungi, including mushrooms. Just as in green plants, potassium is the most abundant metal found in members of the fungal kingdom. Not surprisingly, there is a marked and selective uptake of potassium from the substrate: in laboratory cultures concentration factors of up to 5000 have been observed, especially for media poor in potassium.

As an intracellular cation, potassium regulates the water content of the cells by its osmotic properties. Moreover, the metal also plays a more specific role as a co-factor of several enzymes. It has a key position in the metabolism of the fungi. If there is not sufficient potassium in the soil, it can, to a certain extent, be replaced by other monovalent metals, although in practice only the ubiquitous sodium would be available in sufficient quantity. Other monovalent metals like lithium, rubidium and cesium are just too rare in the earth's crust.

The growth of mushrooms requires not only an increase in volume, and, therefore, an accelerated absorption of salts having an osmotic activity, but also a rapid and efficient metabolism. Both procedures need potassium and, consequently, one finds appreciable concentrations of this metal in rapidly growing mushrooms having a high water content. There is a clear correlation between the potassium concentration and the water content, although there are also other substances, *e.g.* mannitol, a typical sugar-like constituent of many mushrooms, which could play a role.

It is clear that genetic factors should also be considered: the amount of potassium in fungal tissues is foremost species-dependent. If this was not the case, different mushrooms growing on the same substrate would have the same potassium content!

The table shows a number of mushrooms from various families and genera listed according to their potassium content. There is an obvious relationship between the concentration of this metal and the growth rate of the fruitbodies. Mushrooms like inky caps and Panaeoli that literally spring from the ground in a few hours contain an enormous amount of potassium, up to 12 per cent on dry matter! On the other hand, there are the fungi belonging to the Polyporus family that grow very slowly and are poor in potassium. Certain species like *Inonotus hispidus* and *Fistulina hepatica* which contain more of the metal, also grow more rapidly.

The position of the mushrooms in the various classes should not be taken as absolute, since it is based on average values. The fluctuation between the potassium content of several collections within one species is often appreciable. For example, Seeger (1978) found in 8 samples of *Macrolepiota procera* between 1.90 and 4.05 per cent potassium, with an average value of 2.84 per cent (all expressed on dry weight).

Generally speaking, slowly growing mushrooms also have a longer life span. The confluent sporophores of *Thelephora terrestris* often take more than two months to cover several square dm of the ground. The big Stinkhorn (*Phallus impudicus*) lives on the average 30 days between the formation of the ghost egg and its eclosion. Among the gilled fungi belonging to the genera *Marasmius* and *Collybia* there are reviviscent species which really live for a very long time, *i.e. Collybia peronata* the fruitbodies of which persist for more than 60 days!

On the other hand, every mycologist knows how difficult it is to keep the small inky caps for a sufficiently long time to permit their study. Even for *Coprinus micaceus*, one of the more persistent of its kind, an average lifetime of only 2.3 days has been reported (Leusink 1995).

References:

Leusink, L. (1995). De levensduur van paddestoelen. *Coolia* **38,** 106–114.

Seeger, R. (1978). Kaliumgehalt höherer Pilze. *Z. Lebensm. Unters. Forsch.* **167,** 23–31.

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% on dry weight	**MUSHROOMS LISTED IN CLASSES OF INCREASING POTASSIUM CONTENT AND GROWTH RATE**
0–1	*Hirneola auricula-judae, Stereum hirsutum, Fomitopsis annosa, Trametes versicolor, Ganoderma applanatum*
1–2	*Telephora terrestris, Morchella esculenta, Lentinellus cochleatus, Albatrellus ellisii, Phallus impudicus, Collybia confluens, C. peronata*
2–3	*Laetiporus sulphureus, Sparassis crispa, Langermannia gigantea, Lycoperdon gemmatum, Boletus edulis, B. luridus, Lepista nebularis, Lactarius piperatus, Collybia fusipes, Macrolepiota procera, Marasmius wynnei*
3–4	*Sarcosphaera coronaria, Helvella* sp., *Sarcodon imbricatus, Leccinum aurantiacum, Suillus luteus, Calocybe gambosa, Amanita muscaria, Macrolepiota rhacodes, Leucopaxillus giganteus, Russula cyanoxantha, R. xerampalina, Cantharellus lutescens*
4–5	*Verpa bohemica, Fistulina hepatica, Inonotus hispidus, Xerocomus chrysenteron, Cantharellus cibarius, Amanita phalloides, Agaricus augustus, Clitopilus prunulus, Laccaria amethystina, Lepista nuda, Tricholoma terreum, Panaeolus campanulatus*
5–6	*Agaricus arvensis, A. silvaticus, A. campester, Armillaria mellea, Cortinarius bulliardi, Hebeloma sinazipans, Hygrophorus hypothejus, Inocybe geophylla*
6–7	*Agaricus silvicola, Amanita lividopallescens, Clitocybe ditopa, Coprinus atramentarius, C. micaceus, Hygrocybe conica, Psathyrella hydrophila, Ps. velutina*
7–8	*Hygrocybe psittacina, Hygrophorus chrysodon, Panaeolus sphinctrinus, Pluteus atricapillus, Psilocybe semilanceata*
8–12	*Panaeolus phalaenarum, Panaeolina foenisecii*

ABRS PARTICIPATORY PROGRAM

Funding for the ABRS Participatory Program was reduced by about 20 per cent this Financial Year, in line with cuts made to all Federal Government agencies, as the Government attempts to reduce the Budget deficit. On current planning, there are likely to be more cuts next year, which would reduce even further the capacity of ABRS to initiate new grants. The following ABRS grants in Mycology have been offered for 1997:

Beilhartz, V. C. Cercosporoid fungi on Australian native plants (new project). $18,532.

Bougher, N. L. Taxonomic revision of the truffle-like Cortinariaceae (*Hymenogaster s. l.* and *Thaxterogaster*) in Australia. $5,000.

Hyde, K. D. Flora accounts of family Phyllachoraceae. $20,364.

Johnston, P. R. Rhytismatales of Australia, Part 1. $8,000.

Shipton, W. A. Taxonomic studies of the family Saprolegniaceae and the order Leptomitales in tropical Australia. $20,364.

Within the constraints outlined above, the ABRS Advisory Committee, which makes recommendations to the Minister for the Environment concerning the award of grants, assesses all applications against the Research Priorities as determined each year. For the year 1998, the Research Priorities will include three mycological taxa: *Cortinarius*, *Dermocybe*, and Hygrophoraceae. A call for applications for 1998 grants will be made in early February 1997, by means of an advertisement in the Weekend Australian, and in the ABRS Newsletter, *Biologue*. *Biologue* will be mailed to everyone listed on the ABRS Participatory Program Register.

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