Some Peculiarities of Heavy Metal Accumulation by Fruiting Bodies of *Lentinus edodes* (Berk.) Sing.

Natalia Okhlopkova and Ludmila Shevtsova

Forest Institute of the National Academy of Sciences of Belarus, 71 Proletarskaya Str., 246654 Gomel, Belarus

*Lentinus edodes* (Berk.) Sing., a mushroom that possesses high nutritive and healing properties, is currently being introduced in Belarus. It is suggested that natural waste product available in the form of wood sawdust fortified with nutritive additives be used for mushroom cultivation. Since the risk of the use of wood tissue delivered from industrially polluted areas is not known, it is necessary to investigate processes for accumulation of heavy metals (HMs) by fruiting bodies of *L. edodes*, because cellulose is a good natural absorbent of these toxic elements.

We studied the peculiarities of the HM accumulation by fruiting bodies of *L. edodes* depending on their content in substrata. The substrata consisted of a mixture of alder sawdust and rye bran (in the ratio of 4 parts alder sawdust to 1 part rye bran) and treated by solutions of the salts as CuSO$_4$ (A), Pb(NO$_3$)$_2$ (B), ZnSO$_4$ (C), and CdCl$_2$ (D) that were applied one at a time. The Zn, Pb, Cu, and Cd contents in the substrata were determined by the AC polarization method.

Prior to the inoculation, the HM contents in the control substratum were as follows: ~18 mg/kg (Cu), ~0.37 mg/kg (Pb), ~13.4 mg/kg (Zn), and ~0.1 mg/kg (Cd).

Various HM contents in substrata exerted different effects on shiitake growth and yielding capacity. When the Cu content was ~300 mg/kg (A), the yield of mushrooms (the first flush) was 1.5 times lower when compared with that harvested from the control. The yield was 1.2–1.3 times higher where the Pb content varied from 160 (B1) to 700 mg/kg (B2). Where the Zn content varied from 40 (C1) to 190 mg/kg (C2), the yield was, respectively, 1.1 and 2.1 times lower than that obtained from the control. The Cd content equal to ~3 mg/kg (D) resulted in a 1.8-fold increase in the yield. (Fruiting bodies were the largest.) Higher HM contents inhibited the *L. edodes* growth and fruit producing capability.

We also obtained data on the dynamics of the HM accumulation in fruiting bodies depending on flushes. We revealed that fruiting bodies of *L. edodes* use to accumulate HM more intensively at low concentrations of the elements. For instance, the HM contents in fruiting bodies of the first flush was as follows: control; 42.8 mg Cu/kg, 0.52 mg Pb/kg, 0.27 mg Cd/kg and 35.6 mg Zn/kg; variant A: 202.9 mg Cu/kg; variants B1 and B2: 12.8 and 15.2 mg Pb/kg, respectively; variants C1 and C2: 105.4 and 157.5 mg Zn/kg, respectively; variant D: 55.2 mg Cd/kg dry weight. By the intensity of the HM accumulation in the shiitake fruiting bodies, these may be arranged in the following order: Cu > Zn > Cd > Pb.