Optimal grain matrices for cyclopiazonic acid production by *Penicillium griseofulvum*

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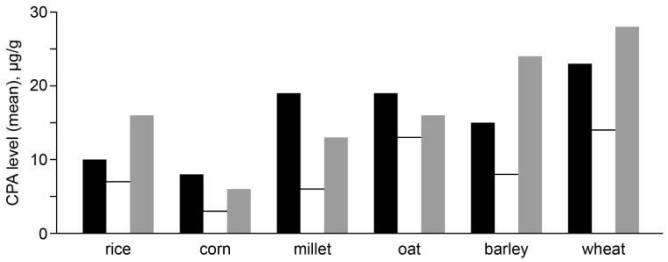
Abstract

Cyclopiazonic acid (CPA) is a well-known mycotoxin with the dangerous ability to alter intracellular calcium flux in animals and a widely occurring contaminant of feed grasses and hay. Recently a 10-fold increase of the intensity of CPA biosynthesis by *Penicillium griseofulvum* Dierckx (= *P. urticae* Bainier) strains from mixed grass hay (Moscow region, 2013) on rice solid substrate in comparison to agar medium was revealed by the rapid screening procedure. The purpose of this study was to carry out the same test using the set of grain matrices. Each toxigenic strain was grown on watering polished rice (the control cultural matrice), oat flakes, corn and millet grits, barley and wheat groats in 15-ml vials in three replicates, and incubated for 7 days at 25°C without lightening. Fungal biomass samples were extracted with acetonitrile-water mixture (84:16 v/v) and CPA quantitation was made by ELISA with detection limit of 1.0 ng/ml. On rice toxin levels were equal to 10, 7 and 16 µg/g for the strains. Strain # 434/3 was inferior to the others in intensity of toxin biosynthesis on all substrates. On corn, millet and oat, the ratio of CPA amounts formed by # 201/4 and # 584/4 were reversed to those found on rice due to the mismatch of reactions of strains to the change of medium. The ratio of CPA level in the strains formed on barley and wheat were the same as on rice. The accumulation of toxin produced by both strains increased 1.5 times, and for # 434/3 it remained the same. On the wheat substrate, the intensity of production of all three strains increased 2.3, 2.0 and 1.75 times. Thus, according to the received data, wheat and barley could be considered as the most appropriate cereal substrates for laboratory assessment of producing potential of *Penicillium griseofulvum.*

Image



CPA accumulation by *P. griseofulvum* strains (# 201/1, black; # 431/3, white; # 584/4, grey) on grain substrates (25°C, 7d, darkness)

Recent Publications

1. Burdock GA, Flamm WG (2000) Safety assessment of the mycotoxin cyclopiazonic acid. International Journal of Toxicology 19: 195–218.
2. Ostry V, Toman J, Grosse Y, Malir F (2018) Cyclopiazonic acid: 50th anniversary of its discovery. World Mycotoxin Journal 11: 135-148.
3. Burkin AA, Kononenko GP, Gavrilova OP, Gagkaeva TY (2017) Mycotoxins in the legumes of natural fodder of the European Russia. Agricultural Biology 52(2): 409–417.
4. Burkin AA, Ustyuzhanina MI, Kononenko GP (2018) Mycotoxicological monitoring: Occurrence of cyclopiazonic acid in a wide variety of feeds. Journal of Veterinary Science & Technology 9: 94.
5. Burkin AA, Kononenko GP, Piryazeva EA (2019) Toxin-producing fungi of the genus *Penicillium* in coarse fodders. Agricultural Biology 54(3): 616–625.

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