

Wide Spread Phyto Hormonal Activity among Natural Yeasts



Streletskiy RA*, Kachalkin AV and Demin VV

Lomonosov Moscow State University, Russia

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***Corresponding author:** Streletskiy RA, Lomonosov Moscow State University, Russia, Email: streletskiyrostislav@mail.ru

Short Communication

Yeasts belong to the fungi that can reproduce vegetatively in unicellular form, including with mycelial phase in the life cycle. As known, yeasts produce enzymes and vitamins [1], but some aspects of their role in nature practically unknown. In particular, it concerns their ability of plant hormones synthesis that determines the growth and development of higher vascular plants. Currently, the researchers show the ability of yeast to synthesize auxin, although these data often require further confirmation by mass spectrometry [2]. However, it can be argued that the ability to synthesize auxin is widespread among ascomycetous yeasts [3].

We are aimed to evaluate the spread of phyto hormonal activity of yeasts from different phylogenetic groups, isolated from different substrates in different climatic zones. We were interested in hormones, stimulants of plant growth: 3-indoleacetic acid (IAA, auxin), zeatin and gibberellic acid (GA3).

The object of this study were 147 yeast strains belonging to 46 species, most of which were isolated from phyllosphere, rhizosphere, litter, soil, entomophilic flowers. Some strains were isolated from substrates such as silt, sea and fresh water algae. We applied sample preparation scheme of culture liquid including purification using cation exchanger Dowex 50W×8, concentration using C-18 cartridges (Chromabond or J.T. Baker) and liquid microextraction [4-6]. The limit of quantification is 2mg/l for the auxin and 20ng/l for zeatin and gibberellic acid. Quantification of IAA, zeatin and gibberellic acid was performed by HPLC Agilent 1200 series with quadrupole-time of flight mass spectrometry detector (6520 Accurate-Mass Q-TOF LC/MS Agilent Technologies). Ionization source- ESI.

More than a third of the studied strains were isolated in Russia. Some strains isolated on the islands Svalbard and Dixon. The tropical region was represented by strains from Vietnam, Morocco and Bali.

Yeast cells was incubated as the initial inoculum in 15ml vials with 10ml of the nutrient medium on a shaker incubator at 20 °C for 4 days, then transferred 100mkl. Accrued culture in microbiological 250mL mattresses (Greiner) with 50ml nutrient medium and incubated under the same conditions for 10 days [2].

The 137 strains was investigated for the presence of 3-indoleacetic acid in the culture broth, 76 strains - for the presence of zeatin and 50 strains for the presence of gibberellic acid. 93% of the strains are able to synthesize IAA, including 88% among ascomycetous, among basidiomycetous - 95%. The 55% of the strains can synthesize zeatin, among ascomycetous - 36%, among basidiomycetous - 65%. Gibberellin synthesized 40% of the strains. Among basidiomycetous 36% of strain is active, ascomycetous - 44%. 8 strains were able to synthesize all three hormones. Member of genus *Aureobasidium*, *Sporobolomyces*, *Taphrina* and *Metschnikowia* were among them. These yeasts belong to epiphytic microorganisms.

Average production of auxin was 605,6mg/kg wet biomass by studied yeast. The highest values of IAA concentration in the culture liquid were detected for strains *Metschnikowia pulcherrima* - 7990,4mg/kg wet biomass, which in terms of dry cell mass is 60,9, and based on the amount of culture fluid, 53269mg/l. *Metschnikowia pulcherrima* is typical inhabitant of sugary plant substrates.

Average production of zeatin was 88.5ng/g wet weight. Maximum values was fixed for strains *Sporobolomyces roseus*, 881,21ng/g wet biomass, which corresponds to 8850ng/g of dry cell biomass or 5874.7ng/l culture medium. *Sporobolomyces roseus* form *ballistoconidia* and often occurs on plants surface.

Average production of gibberellic acid by yeast was 29.5ng/g wet biomass. The maximum values recorded for strains *Metschnikowia pulcherrima*, 182.3ng/g wet biomass, which

corresponds to 1215.3ng/g dry cell biomass , and 1840.2ng/l culture broth.

It is possible to make the final conclusion that the ability to produce phyto hormone is widespread among yeasts, is the dependence of strains and fluctuates widely. The ability to synthesize auxin and gibberellin distributed equally among the ascomycetous and basidiomycetous, but the zeatin is synthesized with greater frequency by basidiomycetous yeasts.

References

1. Abbas CA (2006) Production of antioxidants, aromas, colours, flavours, and vitamins by yeasts. Springer Berlin Heidelberg, Germany, pp. 285-234.
2. Limtong S, Koowadjanakul N (2012) Yeasts from phylloplane and their capability to produce indole-3-acetic acid. World J Microbiol Biotechnol 28(12): 3323-3335.
3. Kanokjun J, Noppon L, Pitayakon L, Savitree L (2016) Yeasts from peat in a tropical peat swamp forest in Thailand and their ability to produce ethanol, indole-3-acetic acid and extracellular enzymes. Mycological Progress 15(7): 755-770.
4. Ma Z, Ge L, Lee AS, Yong JW, Tan SN, et al. (2008) Simultaneous analysis of different classes of phytohormones in coconut (*Cocos nucifera* L.) water using high-performance liquid chromatography and liquid chromatography-tandem mass spectrometry after solid-phase extraction. Anal Chim Acta 610(2): 274-281.
5. Han Z, Liu G, Rao Q, Bai B, Zhao Z, et al. (2012) A liquid chromatography tandem mass spectrometry method for simultaneous determination of acid/alkaline phytohormones in grapes. J Chromatogr B Analyt Technol Biomed Life Sci 83-89.
6. Urbanová T, Tarkowská D, Novák O, Hedden P, Strnad M (2013) Analysis of gibberellins as free acids by ultra performance liquid chromatography-tandem mass spectrometry. Talanta 112: 85-94.



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