Naturwissenschaften 77, 388 - 389 (1990)

Growth-Promoting Effect of a Brassinosteroid in Mycelial Cultures of the Fungus *Psilocybe cubensis*

J. Gartz
Institut fur Biotechnologie der AdW der DDR, DDR-7050 Leipzig

G. Adam and H.-M. Vorbrodt
Institut fur Biochemie der Pflanzen der AdW der DDR, DDR-4010 Halle/S.

Brassinosteroids represent a new class of steroidal plant-growth regulators regarded from several laboratories as a further group of phytohormones. Till now about 30 members have been detected in a wide variety of higher plants including Angiospermae and Gymnospermae as well as in a green alga [1,2]. The strong growth-promoting activity of brassinosteroids involves complex physiological effects, including increase in cell elongation and cell division [3]. Promising results in the application of such compounds to produce higher crop yields and anti-stress effects have also been reported [4, 5]. However, hitherto no studies on occurrence and activity of brassinosteroids on fungi have been published. Here, we report on a strong promoting effect of a brassinosteroid on mycelial growth and fruiting of the subtropical fungus *Psilocybe cubensis* (Earle) Singer.

In our studies an earlier described strain of this fungus was used which is characterized by a high stability in growth and fruiting with various substrates [6]. The cultivation of the mycelium was carried out on 6 % malt agar and a horse dung/rice grain mixture in water was used to produce fruiting. Additionally, the substrates contained 5 g KH_2PO_4 per 1. As brassinosteroid, synthetic 22S,23S-homobrassinolide (Fig. 1) prepared from stigmasterol (see [2]) was applied.

In both cultivation systems the influence of 10^{-2} ppm brassinosteroid on growth of the fungus was investigated (ten runs each). In the experiments with agar we observed that growth of mycelia took place two to three times

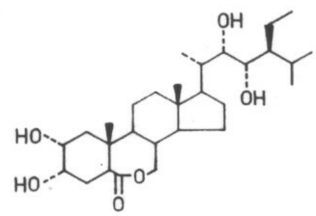

Fig. 1. Structure of 22S,23S-homobrassinolide

faster than in the control series without steroid. In the dung/grain substrate the first flush of fruit bodies appeared remarkably earlier. Thus, whereas in the control the first sporocarps were produced within 4 to 5 weeks, the addition of the brassinosteroid caused a fruiting of the mycelia already in 3 to 3.5 weeks. Furthermore, a variation of the number of formed fruit bodies in the five flushes during fructification was observed, e.g., with brassinosteroid four to seven mushrooms were produced in the first flush compared to one to three in the control (Fig. 2). The steroid-treated cultures afforded also a remarkably higher dry mass than the control cultivations (3.4—3.9 g versus 2.3-2.9 g/10 g substrate). The formation of incomplete fruit bodies, normally present in mushroom cultivation, was almost completely suppressed by the brassinosteroid. Interestingly, the added brassinosteroid also influenced the morphology of the formed fruit bodies which lacked the typical membranous annulus on the stems.

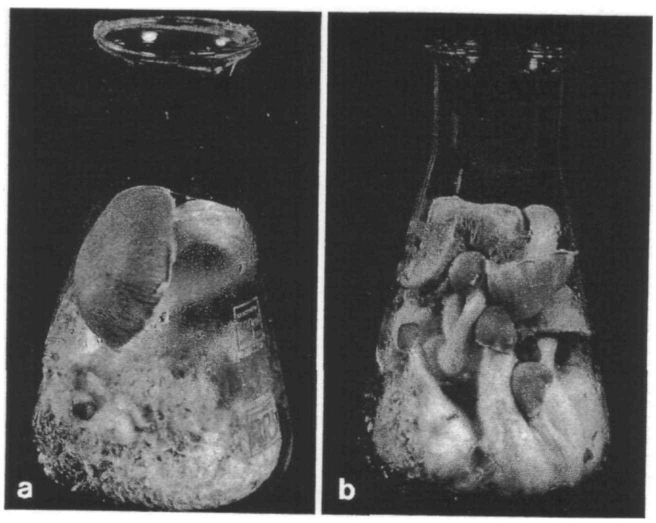

Fig. 2. Fruit bodies of *Psilocybe cubensis* on dung/grain substrate, a) Five weeks after inoculation, b) with 22S,23S-homobrassinolide 3 weeks after inoculation

In summary, the observed strong growth-promoting effect of 22S.23S-homobrassinolide in mycelial cultures of *Psilocybe cubensis* suggests that brassinosteroids could also play a physiological role in higher fungi. Further studies, including commercially important species, are in progress.

Received May 2, 1990

1.Yokota, T., Takahashi, N., in: Plant Growth Substances, p. 129 (M. Bopp, ed.). Heidelberg: Springer 1986
2. Adam, G., Marquardt, V.: Phytochemistry25, 1787(1986)
3. Meudt, W. J.: ACS Symp. Ser. *325,* 53 (1987)
4. Maught, T. H.: Science*212*, 33 (1981)
5. Hamada, K.: FFTC Book Ser. *34,* 188 (1986)
6. Gartz, J.: Biochem. Physiol. Pfl. *184*, 337 (1989); J. Basic Microbiol. *29,* 347 (1989)