Auxin biosynthesis of the ascomycete Neurospora crassa in the context of plant-fungus interaction

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Production of the plant phytohormone auxin has been reported in several phytopathogenic fungi (Jameson, 2000; Tsavkelova et al., 2012). In those cases, auxin is considered a regulator of the plant-fungus interaction. Surprisingly, several non- phytopathogenic fungi are also able to produce auxin (Kollath-Leiß, Bönniger, Sardar, & Kempken, 2014), however, reportedly only in tryptophan-supplemented media (Gruen, 1959). Our investigations are focused on the auxin biosynthesis in the ascomycete Neurospora crassa. We discovered the biosynthetic network with several interdependent pathways (Sardar & Kempken, 2018). Phenotypical analyzes of an auxin-deficient mutant strain led to the conclusion, that auxin does play a physiological role in the fungus and influences its, both sexual and asexual, development. We investigated the interaction of N. crassa with diverse plant species and found, that the new model plant organism Brachipodium dystachion tends to interact with the fungus. Moreover, we found evidence for a possible influence of the plant on the fungal auxin metabolism. Our data indicate the double-role of auxin as a fungal growth regulatory hormone and as a signal molecule in plant-fungus communication. Gruen, E. H. (1959). Auxin and fungi. Annual Review of Plant Physiology, 10, 405–440. Jameson, P. E. (2000). Cytokinins and auxins in plant pathogen interactions-an overview. Plant Growth Regul., 32, 747-761. Kollath-Leiß, K., Bönniger, C., Sardar, P., & Kempken, F. (2014). BEM46 shows eisosomal localization and association with tryptophan-derived auxin pathway in Neurospora crassa. Eukaryotic Cell, 13(8), 1051–1063. https://doi.org/10.1128/EC.00061-14 Sardar, P., & Kempken, F. (2018). Characterization of indole-3-pyruvic acid pathway mediated biosynthesis of auxin in Neurospora crassa. PLOS ONE. Tsavkelova, E., Oeser, B., Oren-Young, L., Israeli, M., Sasson, Y., Tudzynski, B., & Sharon, A. (2012). Identification and functional characterization of indole-3-acetamide-mediated IAA biosynthesis in plant-associated Fusarium species. Fungal Genetics and Biology : FG & B, 49(1), 48–57. https://doi.org/10.1016/j.fgb.2011.10.005