TOXIN PRODUCTION BY FUSARIUM OXYSPORUM F. SP. VASINFECTUM

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Abstract

Each of 124 isolates of *F.o.v.* secreted three families of toxic compounds. These included polyketide naphthazarin quinones of which bikaverin and norbikaverin were identified, cyclic depsipeptides of which beauvericin was identified, and substituted pyridines of which fusaric acid was identified. The 16 avirulent isolates of *F. oxysporum* failed to synthesize or secrete some or all of these toxins. Thus, the toxins may have a role in virulence. The production of these toxins was highly regulated by pH, carbon/nitrogen ratios, and availability of minor elements, especially zinc. The synthesis of polyketides increased progressively as pH was lowered downward from 7.0 and as carbon/nitrogen ratios were increased by decreasing the amount of nitrogen normally added to media. Glutamine inhibited bikaverin syntheses, even at low nitrogen levels, indicating that it may be a key regulator of the bikaverin pathway. Beauvericin production was favored by conditions optimal for growth of the fungus (pH 5-6, high nitrogen concentrations, and readily available minor elements). In contrast, fusaric acid synthesis was triggered only when iron, copper, zinc, manganese, or a combination of these elements was partially deficient in the growth medium. The quantities synthesized in response to zinc deficiency were 10 to 50 times greater than those synthesized in response to other elemental deficiencies. Fusaric acid synthesis also occurred more readily at pHs above 7.0, possibly because high pH limits solubility of zinc. Zinc appears to be the key regulator of fusaric acid synthesis. While bikaverin and norbikaverin are the major polyketides accumulated in synthetic media at pH 4.5 and below, these compounds apparently can be converted at pH 5.0 and above to a family of quinones and tetralones that are more water soluble than bikaverin. These polyketides are the major natural products formed when *F.o.v.* isolates are grown on sterilized stems of susceptible cotton cultivars. Work is in progress to isolate and identify these compounds.

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