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Abstract

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A strain of Neurospora, Vickramam, mating type A, isolated from soil collected in July 1976 from Thanjavur District, Tamil Nadu in South India by a "soil pasteurization" method described earlier (Maheshwari and Antony 1974 J. Gen. Microbiol. 82:505-507) shows an unusual development in submerged liquid culture. Macroconidia from agar-grown cultures germinate but the elongation growth of the germ tubes is soon arrested. The entire germ tube directly differentiates into asexual spores. This type of differentiation of asexual spores is similar to "premature conidiation" (Plesofsky-Vig et al. 1983 Bxp. Mycol. 7:283-286) or "microcycle conidiation" (Guignard et al. 1984 Can. J. Microbiol. 30:1210-1215) which is inducible in some laboratory wild-type N. crassa and also in a few other fungi, by the manipulation of the physical or chemical conditions of the culture. In contrast, neither exposure to high temperature nor to nutrient-poor growth medium is necessary for premature sporulation in the Vickramam strain. All germinated conidia of this strain show spontaneous and synchronous development of asexual spores in agitated liquid culture. Unlike the spores in the induced premature conidiation in wild-type Neurospora referred to above, the spores produced by Vickramam show a strong tendency to separate.

The time course of the morphological differentiation of the conidial germ tubes in cultures grown in Vogel's minimal medium supplemented with 1.5% glucose on a gyratory shaker at 30°C is as follows. The elongation growth of the germ tube is arrested at 10-12 h (Fig. 1A). By 14 h, the germling becomes distinctly septated with thick walls (Fig 1B). By 18 h, cells begin to enlarge basipetally (Fig. 1C). Some cells of the germling ooze protoplasm and function as disjunctor cells. (Fig. 1D), facilitating the disarticulation of the chain of spores. By 24 h, a small percentage of spores, either while still attached to the other spores in the chain (Fig. 1E) or after their separation, begin to germinate. Spores may enlarge considerably in 48 h and produce hyphal growth. The cycle of premature conidiation is not repeated. Another distinctive feature of the Vickramam strain is the production of a strong fruity odor, both in agar- or in liquid-grown cultures.

In crosses of the Vickramam strain with the wild-type N. crassa 74-ORS-6a (FGSC 4200), a reasonable number of strains derived from the progeny ascospores also show "premature conidiation". The synchronous differentiation of germ tubes into asexual spores suggest that such strains may be potentially useful experimental material for the study of gene expression during asexual reproduction. The Vickramam culture has been deposited in the FGSC (No. 6688).

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Fig. 1. Stages in the differentiation as asexual spores in conidial germ tube by Vickraman. Light micrographs of cotton blue-stained preparations were made at the same magnification. Bar length is 50 um. A. 10 hours B. Bipolar germination. Septae are distinct. C. 18 hours. Note basipetal differentiation of spores and of a disjunctor cell subtending the branches in the germling. D. 24 hours. Enlargement of spores and development of disjunctor cells. E. 24 hours. In situ germination of a spore in the chain of spores. F. 36 hours. Disarticulation of the spore chains and the germination of spores.