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Senescence in strains of Neurospora from southern India

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Abstract
Natural isolates of Neurospora which cannot be vegetatively propagated continuously have been identified among collections from distant geographical locations (X. Yang and A.J.F. Griffiths 1993 Mol. Gen. Genet. 237:177-186). We have found that senescence is common in strains of N. intermedia growing on burned sugar cane in fields in Maddur, approximately 80 km southwest of Bangalore. In a survey of 150 strains, 29 strains have died to date in 57 serial subcultures made at intervals of 5-10 days on slants of Vogel's N medium + 1.5% sucrose. Senescence was first observed after a minimum of 9 subcultures. Nearly 30 more strains have lost their vigor or have become aconidial.

Senescence in strains of Neurospora from southern India

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The expression of senescence in most strains occurred abruptly. In a subculture series, conidial transfer from a previously healthy looking culture resulted in only a thin mycelial growth which failed to produce aerial hyphae and conidia. The surface mycelium ceased growth altogether in 1-3 subsequent transfers and considered dead.

To determine if the time of death is reproducible, a duplicate subculture series was made with some identified senescence-prone strains. These strains had been stored at - 20oC for 12 months as conidial cultures. As shown in Table 1, there was considerable variability among the strains with regard to the subculture number in which senescence was expressed. In all cases, senescence in the second series occurred after fewer passages. In one instance, an identified senescence-prone strain did not resume growth from the frozen stock culture. These observations indicate the possibility of molecular/subcellular degenerative changes occurring even under conditions of apparent dormancy.

Table 1. Subculture number in which death occurred in some strains of N. intermedia

Strain	Series 1	Series 2
Maddur 1991-1	21	16
Maddur 1991-3	25	17
Maddur 1991-59	29	14
Maddur 1991-60	15	12
Maddur 1992-18	29	9

Inheritance of the senescence phenotype and the time of its expression was studied in the progeny of a successful cross between two senescent strains when crossed after two different numbers of passages. In the initial series, strains Maddur 1991-21a and Maddur 1991-3A had become senescent in the twentieth and twenty-fifth subcultures, respectively. These parents were crossed prior to terminal subculture by inoculating them together on a synthetic crossing medium containing filter paper as the carbon source. Forty random ascospore progeny were analyzed of which 39/40 (98%) died in 3-9 subcultures; the average subculture number in which death occurred was five. When the cross was repeated with stocks which had been subcultured only three times before, only 3 out of 40 progeny cultures died in up to the tenth subculture. These observations are similar to those of A.J.F. Griffiths and H. Bertrand (1984 Curr. Genet. 8:387-398) and are indicative of progressive damage with subculturing. Yet, surprisingly, when the parents were crossed prior to the terminal stage, the sexual progeny was invariably rejuvenated at first. This observation, and the fact that our senescent strains came from the same locality where we have found sexual reproduction to be prevalent, suggests that senescence in nature is maintained through outbreeding.

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