How to optimize carotenoid production.
David D. Perkins

Background

The orange pigmentation of Neurospora has been a valuable asset for studies of photobiology (Lauter 1996), gene silencing (Romano and Macino 1992), carotenoid biosynthesis (Harding and Turner 1981, Perkins *et al.* 2001), and readily visualized allelic variation (Perkins 1989). Alterations in both external conditions (Harding 1974) and genotype (Shrode *et al.* 2001) can be used to intensify the pigment.

Procedure

Harding's protocol (Harding 1974 and personal communication) for maximum carotenoid production: 6 days at 18°C in dark. 2 hr. 6°C in dark; 2 min. light exposure; 24 hr. 6°C in dark. *Alternative*: 26 hr. 6°C in light. Colonies embedded in agar will develop pigment, as will standing cultures in liquid. (Liquid medium should be supplemented with Tween 80 to prevent conidiation.)

The hue of wild type and mutant carotenoids varies with different sources of illumination. Appearance under various fluorescent and incandescent light sources, and in daylight, can be strikingly different.

Intensity of pigmentation is markedly increased in strains containing the mutant *vvd* (*vivid*) (Shrode *et al.* 2001).

References

Harding, R.W. 1974. The effect of temperature on photoinduced carotenoid biosynthesis in *Neurospora crassa*. Plant Physiol. 54: 142-147.

Harding, R. W., and R. V. Turner 1981. Photoregulation of the carotenoid biosynthetic pathway in *albino* and *white collar* mutants of *Neurospora crassa*. Plant Physiol. 68: 745-749.

Lauter, F. R. 1996. Molecular genetics of fungal photobiology. J. Genet. 75: 375-386.

Perkins, D. D. 1989. Visibly distinguishable *albino* alleles in *Neurospora crassa*. Fungal Genet. Newslett. 36: 63.

Perkins, D. D., A. Radford, and M. S. Sachs 2001. *The Neurospora Compendium: Chromosomal Loci.* Academic Press. (Fig. 7)

Romano, N. and G. Macino 1992. Quelling: transient inactivation of gene expression in *Neurospora crassa* by transformation with homologous sequences. Mol. Microbiol. 6: 3343-3353.

Shrode, L. B., Z. A. Lewis, L. D. White, P. D. Bell, and D. J. Ebbole 2001. *vvd* is required for light adaptation of conidiation-specific genes of *Neurospora crassa*, but not circadian conidiation. Fungal Genet. Biol. 32 169-181.

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