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Germination of certain genotypes in response to furfural

F. Cooke

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Abstract
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M. R. Emerson (1948 J. Bacteriol. 55:327) noted that the addition of certain concentrations of furfural (5-furaldehyde) to the germination medium stimulated the germination of ascospores of Neurospora crassa. When furfural was incorporated into the medium at a concentration of ten parts per million, over 60% of the ascospores were stimulated to germinate. In other words, it was as effective as a heat shock in stimulating germination.

In an attempt to improve germination of spores, this germination stimulus was tried out on a sample of spores from a cross arg-3, hist-2; pe^m x ad-3, nic-2; pe^m, fl; ad (U). The ad (U) mutation arose spontaneously in the ad-3 stocks and is unlinked to any of the other markers in the cross. Its precise location is unknown.

The furfural was found to stimulate germination, but there was a strong selection in favor of certain genotypes as can be seen in the accompanying table.

	$\frac{ad\text{-}3^+;\ ad\ (U)^+}{\text{genotypes}}$	$\frac{ad\text{-}3;\ ad\ (U)}{ad\text{-}3;\ ad\ (U)^+}$ $\frac{ad\text{-}3^+;\ ad\ (U)}{\text{genotypes}}$	Total
Response to furfural	99	38	137
No response to furfural but subsequent response to heat treatment	9	270	279
Total	108	308	416

Table 1. Differential germination responses of different genotypes to the addition of 1/100,000 furfural to the glucose germination medium.

The $ad\text{-}3^+;\ ad\ (U)^+$ spores were found to respond to furfural but spores which carried one or both of the adenine mutations seldom germinated. The furfural did not interfere with the availability of adenine in the medium, since many spores which did not germinate in response to furfural were found to germinate subsequently in response to a heat shock (45 min. at 60°C) even though the furfural was still present in the medium on which the spores were heated.

Owing to the selectivity of the furfural germination shock, the overall germination of spores from this cross was lower on furfural supplemented medium without heat shock than on unsupplemented medium with heat shock. It was not found possible to improve the overall germination by a combination of heat and furfural shock.

Perhaps the chief value of these results lies in the fact that with furfural one has a selective system. The germination by the use of furfural may be utilized as a selective technique when only certain genotypes are required from a sample of spores; for instance, in the selection of rare prototrophs from an interallelic cross. - - - Department of Biology, Queen's University, Kingston, Ontario, Canada.