Parasexuality in Aspergillus awamori NRRL 3112 and interspecific hybridization with A. niger.

A. Vialta

R. Bonatelli Jr.

Follow this and additional works at: http://newprairiepress.org/fgr

Recommended Citation

This Regular Paper is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in Fungal Genetics Reports by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.
Parasexuality in Aspergillus awamori NRRL 3112 and interspecific hybridization with A. niger.

Abstract
Parasexuality in Aspergillus awamori NRRL 3112 and interspecific hybridization with A. niger.

Creative Commons License
This work is licensed under a Creative Commons Attribution-Share Alike 4.0 License.

This regular paper is available in Fungal Genetics Reports: http://newprairiepress.org/fgr/vol35/iss1/25
Vialta, A.¹ and R. Bonatelli Jr.²

Parasexuality in *Aspergillus awamori* NRRL 3112 and interspecific hybridization with *A. niger*

Although *A. awamori* is widely used in industry, we were not able to find a description of the parasexual cycle for that species in the literature. So we decided to start from strain NRRL 3112 which has been used in several research programs aiming to isolate improved glucoamylase producing strains (Banks et al. 1976-Prog. Ind. Microbiol. 6:95-139).

In conidial platings, 20% of the progeny were auxotrophic for proline and attempts to isolate a prototrophic strain by selection of monosporic colonies, or by purification of sectors were unsuccessful. One strain, M16, which segregated only 0.6% of prol conidia was selected for analysis. All prol segregants were stable in respect to the requirement with a reversion frequency of $<10^{-8}$. Auxotrophic and morphological mutants were induced in strain M16 with ultraviolet light. The frequency of auxotrophic mutants was 0.1% but filtration enrichment techniques improved the frequency of recovery to 2%. One reason for such a low frequency could be multinucleate conidia.

Heterokaryons were made between mutant strains complementary for auxotrophic markers, and diploids were isolated at a frequency of $10^{-5}$. Diploid strains showed a high sensitivity to Benlate fungicide and could easily be distinguished from haploids by conidial diameter measurements. Four linkage groups have been detected from analyses involving 9 markers. A master, and single mutant strains have been deposited with the Fungal Genetics Stock Center. Genotype of the master strain is:

<table>
<thead>
<tr>
<th>Linkage group</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW1</td>
<td></td>
<td>bwml</td>
<td>morl</td>
<td>leul morl pabl</td>
</tr>
</tbody>
</table>

Additional information about linkage was obtained following interspecific hybridization with an *A. niger* strain, using protoplast fusion methods. The *A. niger* strain used was proline prototrophic and unable to form a detectable halo on starch medium (*shh*). The hybrid was normal in respect to sporulation and growth and the segregation pattern was very similar to intraspecific diploids. The *shh* (starch hydrolysis halo) trait cosegregated with proline prototrophy allocating *shh* to mitotic linkage group I.

In general, interspecific heterokaryons were difficult to maintain on minimal medium. They grew slowly and had an abnormal morphology. Fusions were more easily maintained on Pontecorvo's complete medium when typical *A. awamori* sectors and mixed growth sectors, which segregated up to 2% of *A. niger* conidia, were observed. After transfer to fresh medium, vigorous sectors, which showed complementation of mutations for conidial color emerged. These were shown to be interspecific hybrids. It appears that incompatibility is stronger at the heterokaryon level that at the nuclear (chromosomal) level. These results, coupled with the isolation of recombinants which were the result of haploidization following mitotic crossing over, indicate the phylogenetic closeness of these species. — — 1 Department of Genetics and Evolution, IB-UNICAMP, P.O. Box 13081 Campinas, SP, Brazil, and 2 NUVLCEBRAS, Pocos Andradas Road, km13, Pocos de Caldas, MG, Brazil.