

Sordaria fimicola crossing over lab



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ABSTRACT:

The objective of this lab was to study and test the *Sordaria fimicola* fungus crossover by determining what color it will yield during meiosis; a cross over that will be between the wild type and the mutant alleles. My hypothesis for this experiment is that all the mutant allele will appear in the final results because at the final phase of meiosis, the mutant allele is the one raised. The experiment was started by receiving a Petri dish containing a mycelia mass of hyphae, wild-type black and tan cultures, cut into small squares. Two squares from each mass were removed using the aseptic method; which involved dipping a metal rod in ethanol and then into the flames to sterilize it, and then placed into a sterile Petri dish which we labeled our bench letter "c." the squares were flipped onto the surface of the matching crossing agar and then put away in a 22-24 degree environment to incubate for approximately seven days, after which the *Sordaria Fumicola* were mature and also hybrids had developed. The spores were carefully removed from the petri dish and onto a slide with a drop of water, a cover slip was put on it, and then it was examined under the microscope at the 10X magnification for observation. Twenty-five asci were observed for the meiosis I and meiosis II, and out of the twenty-five, eleven had undergone the meiosis I pattern and fourteen showed the meiosis II pattern. Within that fourteen that underwent meiosis II, there were nine that were in the two plus two plus two plus two crossover arrangement, while the other five were in the two plus four plus two arrangement. With the result that we got, we were able to conclude that the percentage of asci that actually crossed over was fifty-six percent.

INTRODUCTION:

Sordariaceae is the family of fungus the ascomycete fungus *Sordaria fimicola* falls under, they are mainly used for gene mapping and crossing over during the meiosis cycle (Ellis & Ellis, 1998). The majority of the fungus life cycle is spent in its haploid state (El-Ani, 1967). The body is mostly comprised of long filamentous haploid cells, hyphae; which form the Mycelium when it accumulates. The nucleus contains a diploid zygote because of two combined haploid cells that come from two different mycelia. At this point, meiosis occurs resulting in four haploid cells, returning the organism back to its unique haploid stage. In order for the *Sordaria fimicola* to form ascospores; resistant cell wall, the organism undergoes mitotic division because it produces 8 haploid cells that thicken to form this resistant cell wall (Helms). The *Sordaria* mainly has black strains but with the occurrence of mutation, variations have developed in the colors of the *sordaria* strains, for example the mutant tan strain (Cox & Gill, 1967). The purpose of this study is to observe the genetic material transfer between the black strains and the tan strains of *Sordaria fimicola*. These studies need to be done because the fungus is used extensively in biological laboratories, and also help give scientist better understanding about fungal genetics (Mertens, 1968). The first laboratory culture of the *Sordaria Fimicola* was at the University of North Carolina by Dr. Lindsay S. Olive in 1956. She discovered that when two similar cultures are matched distantly apart on a agar plate, a distinct line of crossed, mutant and/or wild-type perithecia will form. Crosses containing both color mutant and wild-type spores will produce perithecia that has both heterozygous and homozygous asci (Olive, 1956). For my hypothesis, I predict that all the resulting alleles from crossover will be tan,

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the reason I say so is because the organism is haploid, this increase the chances of mutation given that the mycelia will be together. At the same time there are other possible outcomes that could that cross over doesn't happen which would leave us with black spores alone.

MATERIALS AND METHODS:

This experiment took place at university of Houston, in the science building room... during the course of which many laboratory equipment were used in order to aide in the studying and testing of the sordaria fimicola fungus crossover by determining what color it will yield during meiosis. There were two types of petri dishes used, one sterile and the other one containing the agar covered with mycelia hyphae. The next step of the procedure involved the instrument called the spatula. The spatula was used in transferring a square of mycelium in an aseptic method. First the spatula was dipped in ethanol, then it was put over to flames. After the flame had gone out, the spatula was allowed about fifteen minutes to cool off first before continuing with the experiment. To check the temperature of the spatula, a brief test was made by touching the sides of the petri dish. When the spatula was cool enough, a square of mycelium was removed and placed upside so the surface contacts the crossing agar which has been marked either + or -. The same thing was done with the square for another wild type allele and two other mutant tan strains. A total of four squares in the petri dish, it was covered and allowed to incubate for about seven days in the dark at a temperature of 22-24 degrees. After a week of incubation, there appeared to be an "X" pattern on the petri dish and also scattered dots. In order to observe the Sordaria, it had to be moved onto a slide to be viewed under a

microscope. A toothpick was used to collect the perithecia, by gently glazing over it carefully and avoiding piercing the agar. After collection, it was smudged on the slide with a drop of water and a coverslip was put on it. In order to rupture the perithecia so that we could view the asci, small pressure was put on the cover slip. The slide was placed under the microscope viewing objective 10X where eight asci were found and accounted for.

RESULTS:

Chi-square Test

The Chi-square test is used to determine the significant differences, if found, between my data, the observed, and the hypothetical values, the expected (Helms).

$$\chi^2 = \sum \frac{(81 - 80.6)^2}{80.6} + \frac{(74 - 74.4)^2}{74.4}$$

$$\chi^2 = 0.16/80.6 + 0.16/74.4$$

$$\chi^2 = 0.004$$

$$\chi = 0.06325$$

The formula for the Chi-square is calculated by: $\chi^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}$

Chart 1 My Data Class Data

$$\chi^2 = \sum \frac{(81 - 80.6)^2}{80.6} + \frac{(74 - 74.4)^2}{74.4}$$

$$\chi^2 = 0.16/80.6 + 0.16/74.4$$

$$\chi^2 = 0.002 + 0.002 \hat{=} 0.004$$

$\frac{1}{2} = 0.063$

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