Impact of gamma rays on the *Phaffia rhodozyma* genome revealed by RAPD-PCR

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Iran J Microbiol. 2011 Dec; 3(4): 216–221.
PMCID: PMC3330186
PMID: 22530091

Background and Objectives

*Phaffia rhodozyma* is a red yeast which produces astaxanthin as the major carotenoid pigment. Astaxanthin is thought to reduce the incidence of cancer and degenerative diseases in man. It also enhances the immune response and acts as a free-radical quencher, a precursor of vitamin A, or a pigment involved in the visual attraction of animals as mating partners. The impact of gamma irradiation was studied on the *Phaffia rhodozyma* genome.

Materials and Methods

Ten mutant strains, designated Gam1-Gam10, were obtained using gamma irradiation. Ten decamer random amplified polymorphic DNA (RAPD) primers were employed to assess genetic changes.

Results

Nine primers revealed scorable polymorphisms and a total of 95 band positions were scored; amongst which 38 bands (37.5%) were polymorphic. Primer F with 3 bands and primer J20 with 13 bands produced the lowest and the highest number of bands, respectively. Primer A16 produced the highest number of polymorphic bands (70% polymorphism) and primer F showed the lowest number of polymorphic bands (0% polymorphism). Genetic distances were calculated using Jaccard's coefficient and the UPGMA method. A dendrogram was created using SPSS (version 11.5) and the strains were clustered into four groups.

Conclusion
RAPD markers could distinguish between the parental and the mutant strains of *P. rhodozyma*. RAPD technique showed that some changes had occurred in the genome of the mutated strains. This technique demonstrated the capability to differentiate between the parental and the mutant strains.

Keywords: astaxanthin, *Phaffia rhodozyma*, RAPD, UPGMA