Influence of repeated DNA in the viability of the pollen grains in three species of the genus Asphodelus

Francisca Robles*, Pablo Lacuesta, Rafael Navajas-Pérez, Roberto de la Herran, Alexander Garcia Zea, José Carmelo Ruiz Rejón.

Departamento de Genética. University of Granada. Granada. Spain.

*frobles@ugr.es

Repeated sequences represent an important fraction of the eukaryotic genomes which tends to accumulate in heterochromatic regions. In this study, we have carried out an analysis of interphasic nucleus of three species of the genus Asphodelus (*A. fistulosus* L., *A. cerasiferus* J. Gay, and *A. tenuifolius* Cav.), belonging to the Family Xanthorrhoeaceae (Dumortier), to test if there are significant differences in the amount of heterochromatin in their nuclei. In previous studies, a direct relationship between the amount of heterochromatin and repeated DNA quantity has been established, so here differences in size of heterochromatic blocks were considered as differences in total amount of repeated DNA (Stebbins 1966). *A. tenuifolius* was the less heterochromatic species (then, with less amount of repeated DNA), followed by *A. fistulosus* and *A. cerasiferus*, being the latter the most heterochromatic species (with higher amount of repeated DNA). The influence of the amount of DNA repeated in many phenotypic characters have been described (Watson 1988). In this study, after the analysis of 4500 pollen grains, we found that the amount of repeated DNA in these species of Asphodelus correlates negatively with its viability. It is known that a large amount of heterochromatin is adaptive in extreme environments, while a smaller amount accelerates cell division times by shortening the development time. Thus, and considering the life cycle *A. cerasiferus* (perennial) and *A. tenuifolius* (annual), a greater amount of heterochromatin, which increases the resistance of the perennial species in extreme environments, would act as an evolutionary reinforcement to guarantee a greater number of reproductive seasons, thus compensating the loss of fertility. While, on the other hand, the smaller amount of DNA repeated that we found in *A. tenuifolius* would reinforce the fertility and the smaller time of development, acting like beneficial factor in the annual biotype. For its part, *A. fistulosus* can behave as a biennial or triennual plant, which would explain its intermediate position. A molecular analysis revealed that satellite DNA family (CL90 family) is part of the heretochromatin of these species. This repeated DNA was first described in the genome of the plant *Dipcadi serotinum* (L.) Medik. Considering that both the genus Asphodelus (Xanthorrhoeaceae), and the genus Dipcadi (Hyacinthaceae) belong to Order Asparagales, this family of satellite DNA exhibit a high degree of conservation, something that is not usual in this type of sequences, usually with a rapid rate of change.

COMMENTS: