

“The Satellite-DNAs could trace the phylogeny of the Genus *Rumex* (Polygonaceae)”

R. Navajas-Pérez¹, R. de la Herrán¹, C. Ruiz Rejón¹, M. Ruiz Rejón¹ and M.A. Garrido-Ramos¹

¹Departamento de Genética; Facultad de Ciencias; Universidad de Granada;
18071 Granada, SPAIN

In recent years, the genus *Rumex* is becoming an important key to solve some unanswered questions in plant sex-determination systems that still remain puzzling. In fact, *Rumex* constitute a big group of species in which almost every mating system is present, comprising hermaphrodite, polygamous, gynodioecious, monoecious and dioecious representatives. This supposes a particular case to test hypothesis concerning sexual systems and sex-chromosomes evolution.

Regarding to dioecy, there are two main groups: simple sex-chromosome system species (XX/XY) and complex systems ones (XX/XY₁Y₂). *Rumex acetosa* and closer relatives have been widely studied due to the presence of this complex system. In fact, three different satellite-DNA families have been described so far in this type species. Two of them, RAE-180 and RAYSI, constitute the major constituents of the Ys heterochromatin, being the other one, RAE-730, specific for heterochromatic supernumerary segments. We have used satellite-DNA sequences as cladistic markers. According to this, we have analysed the presence/absence status and the location of this set of satellites in the rest of species of the genus *Rumex*.

We have found that, firstly, the family RAE-180 characterize the main group of dioecious species, including both system of sex determination and being probably involved in the origin of the mature sex-systems of chromosomes. Secondly, the families RAYSI and RAE-730 are present only in those dioecious species bearing complex sex-systems. This data could suggest these families are related to the formation of the XX/XY₁Y₂ system. We have not found evidences of the presence of these satellites in the rest of species. Finally, we found a new satellite-DNA family, RUSI, specific for the gynodioecious-polygamous group of species. It is remarkable, that the hermaphrodite-monoecious clade lacks of any known satellite-DNA by date.

In previous studies, we established a new classification of the group based in different molecular markers (nuclear and chloroplastial), basic chromosome number and sex-chromosome systems. This proposed new grouping assume three main clades within *Rumex* consistent with the mating system of the species: one clade is composed of hermaphroditic species, other clade is composed of polygamous, gynodioecious and incipient dioecious species and the third clade is composed of dioecious species (including both XX/XY and XX/XY₁Y₂ species in different subclades). The present study reinforces this discussion and demonstrates the utility of satellite-DNA sequences in *Rumex*. Implications on sex-determination systems in plants and origin and evolution of sex chromosomes are discussed as well.