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CARYOLOGICAL ASPECTS OF *ALLIUM WILLEANUM* AND *ALLIUM JUNCEUM (ALLIACEAE)*

Riassunto — *Aspetti cariologici di* Allium willeanum *e* Allium junceum (Alliaceae). Sono state esaminate dal punto di vista cariologico due entità raccolte a Cipro, *Allium willeanum* endemico dell'isola e *Allium junceum*, distribuito anche in Turchia. Le due specie, appartenenti alla Sect. *Allium*, sono risultate diploidi, 2n=16.

Abstract — Two species of *Allium* Sect. *Allium* have been caryologically examined: *Allium willeanum* endemic of Cyprus and *Allium junceum*, known for Cyprus and Turkey. Both are diploid, 2n=16. Caryotype analysis and some chorological considerations have also been reported.

Key words — *Allium* - chromosome numbers - Cyprus.

It is well-known that chromosomal analysis is often useful in resolving systematic or chorological problems in insular floras (CONTANDRIOPOULOS, 1962; CONTANDRIOPOULOS and CARDONA, 1984). Research has been in progress for some years on *Allium* on Mediterranean islands (GARBARI, 1987; GARBARI et al., 1979, 1988; MICELI and GARBARI, 1979, 1987, 1988) and this paper reports on chromosomal analyses carried out on two eastern Mediterranean *Allium* belonging to the Sect. *Allium* and hitherto caryologically unexplored. These are *Allium willeanum* Holmboe (**) endemic to Cyprus and *Allium junceum* Sm. known for Cyprus and in Turkey (KOLLMANN, 1984; MEIKLE, 1985).

Chromosomal analyses were carried out by the common Feulgen staining method on plants gathered on Cyprus and cultivated in Pisa University Botanic Gardens (H.B.P.). *Exsiccata* in PI.

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(**) Typus in G: Herb. Univ. Christianensis - *Plantae insulae Cypri N. 1070.* Kaminaria 8-7-1905, Jens Holmboe (! vid. F. Garbari, July 1986).

Sources are as follows:

Allium willeanum Holmboe

— halfway between Ormida and Xylophagos, along the road, 500 m above s.l. *Leg.* Garbari, Del Prete, Grünanger, Arnold, 30-III-1986. *Cult. in H.B.P.* n. 131/1986;

— at the turning for Kornas, 5 km from Pano Lefkara, at the valley bottom. *Leg.* Garbari et al., 1-IV-1986. *Cult. in H.B.P.* n. 151/1986;

— «Baths of Aphrodite», Akamas, garigue and copses. *Leg.* Garbari et al., 3-IV-1986. *Cult. in H.B.P.* n. 72/1986.

Allium junceum Sm.

— «Baths of Aphrodite», Akamas, garigue and copses. *Leg.* Garbari et al., 3-IV-1986. *Cult. in H.B.P.* n. 73/1986;

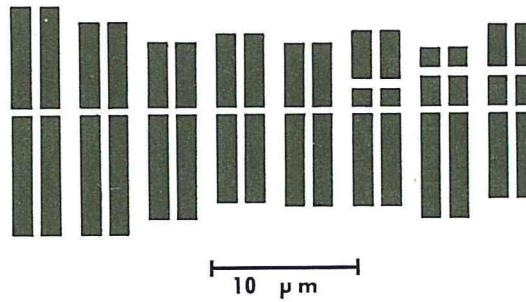
— between Kathikos and Peya, in *Pinus brutia* wood. *Leg.* Garbari et al., 4-IV-1986. *Cult. in H.B.P.* n. 57/1986.

Allium willeanum Holmboe

Species endemic to Cyprus (MEIKLE, 1985), this entity hitherto caryologically unexplored proved to be diploid, 2n=16. The caryotype can be expressed by LEVAN et al.'s (1964) formula as follows:

$$2n = 16 = 10m + 2sm^s + 2st^s + 2sm^s.$$

There are three pairs of satellited chromosomes, two submedial (sm^s), one subterminal (st^s). The «sm^s» types are one «sativum-type» (6th) and one «scorodoprasum-type» (8th) whereas the «st^s» pair is a «scorodoprasum-type» (7th). This type of chromosomal morpholo-



Allium willeanum, 2n = 16 : 10m + $2sm^s$ + $2st^s$ + $2sm^s$.

gy (VED BRAT, 1965) is found in most of the *Allium* of the Sect. *Allium* (BOTHMER, 1970).

According to MEIKLE (1985) *Allium willeanum* is a species well distinguished from *Allium margaritaceum* (*) on the basis of its leaf characters. We consider that a comparison of caryotypes between *Allium willeanum* and *Allium margaritaceum* enhances this distinction. *Allium willeanum*, we have said, is diploid, while *Allium margaritaceum* is both diploid and polyploid (MENSINKAI, 1939; PASTOR, 1982; ÖZHATAY, 1984; TZANOUDAKIS, 1985). Two cytotypes are present in Greece (TZANOUDAKIS, 1985), one of which is diploid (2n = 16 + O/1B) and the other triploid (2n = 24).

When the *A. margaritaceum* cytotype is compared with the *A. willeanum* caryotype the same two «sativum-type» and «scorodoprasum-type» satellited pairs can be observed, although in different positions. Nonetheless *A. willeanum* always possesses a third pair of satellited chromosomes («scorodoprasum-type») and the accessory chromosomes are lacking (TZANOUDAKIS, 1985).

Caryological studies on *Allium margaritaceum* (sub. *A. guttatum* ssp. *sardoum*) were carried out for the Iberian peninsula (PASTOR, 1982) from which it always results a polyploid (2n = 32-40-48). An examination of the tetra and pentaploid caryotypes reveals differences from *A. willeanum* in chromosome morphology: absence of «sm^s» and «st^s» chromosomes, and the presence of only two «sativum-type» pairs in the tetraploid. Also the caryotype of *A. margaritaceum* (sub. *A. guttatum* ssp. *sardoum*, ÖZHATAY, 1984) diploid populations from European Turkey are distinguished from *A. willeanum* in chromosome morphology (only 2 «m» pairs in place of 10) and in the number and type of satellited pairs (4 «sativum-type» pairs in place of one «sativum-type» and 2 «scorodoprasum-type»).

An examination of several specimens referrable to *A. margaritaceum* s.l. from Cape Sounion (Greece) (**) showed a diploid caryotype (2n = 16 = 12m + $2M^s$ + $2sm^s$) with two «sativum-type» satellit-

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(*) The taxonomy of *A. margaritaceum* is known to be complex (Wilde Duyfjes, 1976; Stearn, 1978). The name used here includes *A. sardoum* Moris (= *A. guttatum* Steven ssp. *sardoum* (Moris) Stearn) but excludes *A. guttatum* Steven (= *A. margaritaceum* Sm. var. *guttatum* (Steven) Gay). Meikle (1985) considers the differences between *A. margaritaceum* and *A. guttatum* not to be very significative: *A. guttatum* is considered a variety of *A. margaritaceum*.

(**) Plants gathered at Cape Sounion, from rocks, 18-IX-1975. *Leg.* Garbari (*Cult. in H.B.P.* n. 448/1975; *exsiccata* in PI).

ed chromosomes pairs (7th and 8th). Three «sativum-type» pairs have been found in tetraploid cytotypes (2n = 32) of *A. margaritaceum* s.l. from Apulia (Italy) (*).

In the light of all this evidence it can be assumed that *A. willeanum* is an entity distinguished and separate from *A. margaritaceum* in both morphology and caryology.

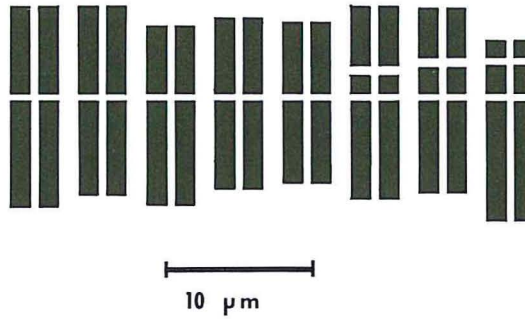
Allium junceum Sm.

This species is known for Cyprus (Boissier, 1882; Meikle, 1985) but is known also for Turkey (Kollmann, 1984) where it is represented by an endemic subspecies (Kollmann et al., 1983) which Meikle (1985) however does not consider valid.

Although it has been noted for a long time (Sibthorp and Smith, 1809), the caryology of this species does not hitherto seem to have been examined. An investigation shows it to be diploid, 2n = 16; its caryotype by Levan et al.'s (1964) formula is:

$$2n = 16 = 10m + 2m^s + 2sm^s + 2st^s.$$

Three satellited chromosome pairs are present, one medial (m^s) one submedial (sm^s) and one subterminal (st^s). These can be classified on the basis of the position and size of satellites as two «sativum-type» pairs (6th and 7th) and one «scorodoprasum-type» (8th).



Allium junceum, 2n = 16 : 10m + $2m^s$ + $2sm^s$ + $2st^s$.

(*) Plants gathered at 1) Gravina di Petruscio, 29-IV-1975. *Leg.* Garbari (*Cult. in H.B.P.* n. 238/1975); 2) Parco delle Pianelle, Martina Franca, 29-IV-1975. *Leg.* Garbari (*Cult. in H.B.P.* n. 237/1985; *exsiccatum* in PI).

MEIKLE (1985) carries a note concerning the apparent affinity between *A. junceum* and *A. rubrovittatum,* a species to which it is connected but from which it differentiates for certain floral and stamen characters. A further distinction can be made on a chromosomal

Fig. 1 - *Allium willeanum,* 2n = 16. Mitotic metaphase, × 1500.

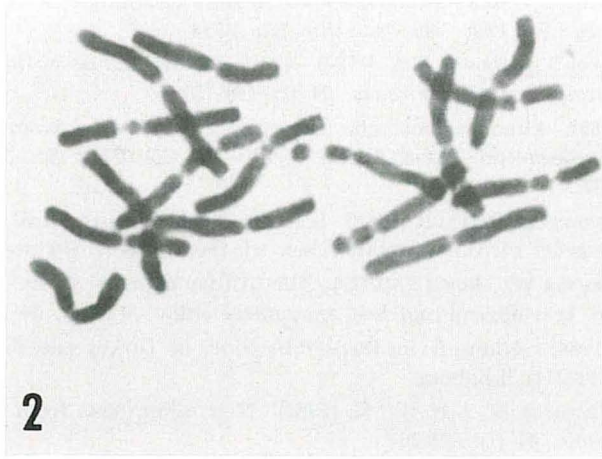


Fig. 2 - *Allium junceum,* 2n = 16. Mitotic metaphase, × 1500.

basis since although *A. junceum* has a certain degree of similarity to *A. rubrovittatum* in its caryotype, it has three satellited pairs in contrast with *A. rubrovittatum* which has only two or even one and shows a marked variability in caryotype (MICELI and GARBARI, 1979; TZANOUDAKIS, 1985). The «sativum-type» pairs in *A. junceum* are medial (m^s) and submedial (sm^s) while in *A. rubrovittatum* they are either medial (m^s) (MICELI and GARBARI, 1979) or one medial (m^s) and one submedial (sm^s) but in the later case they are not present together in the caryotype (TZANOUDAKIS, 1985).

TZANOUDAKIS (1985) has found a «scorodoprasum-type» pair in *A. rubrovittatum* as in *A. junceum* but in the former case it is formed by morphologically different chromosomes i.e. in *A. rubrovittatum* they are submedial (sm^s) while in *A. junceum* they are subterminal (st^s). For this reason we consider these two entities to be genomically differentiated too.

One final consideration: it seems necessary to check the caryological characteristics of the Turkish *A. junceum* populations to resolve their taxonomical controversy.

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