Sci. Annals, Fac. Phys. & Mathem., Univ. Thessaloniki, 20a, 77 (1980)

KARYOTYPE ANALYSIS ON SOME GREEK WILD SPECIES OF *HORDEUM* (*MARINUM* GROUP) AND *TAENIATHERUM*

By

H. D. COUCOLI and L. SYMEONIDIS

(Department of Botany, University of Thessaloniki)

(Received 8.11.80)

Abstract: *The karyotypes of four diploid wild speeies of Gramineae (North-Greek in origin) were defined. Thrce of them belong to Hordeum marinum group, taken as a species in sensu lato, and they are namely: H. marinum, H. marinum* I *(morphologieal type) and H. hystrix. The fourth material is Taeniatherum eaput-medusae. The karyotypes were determined qualitatively (chromosome morphology, eentromere position, SAT pairs) and quantitatively (total ehromosome length, arm lengths and variation of size). The analysis resulted in: 1) almost identical karyotypes between H. marinum and H. marinum* I *(similarity in ehromosome morphology, absolute values and variation of size); 2) significant karyotypic similarity between H. hystrix and the two representatives of H. marinum (in arm ratios, SAT pairs and relative lengths) yct difference in quantitative features (higher values in H. hystrix); 3) different karyotypic synthesis of T. caput-medusae which was recognized as more symmetrical, with predominance of mesocentric chromosomes and different morphology of the SAT pair. This study eorroborates the aspect that the three materials belong to the same species-aggregate (perhaps conspecific) whereas Taeniatherum represents certainly another genus, possibly more primitive than Hordeum.*

INTRODUCTION

Chromosome morphology has proved a valuable aid in showing the degree of relationships between species or populations of Gramineae (Morrison 1959). The karyotype analysis, though does not by itself indicate any definite phylogenetic affinity, it can fairly set up definite groups of species. Besides, combined with morphological or biochemical data, chromosome morphology increases the possibility of a more accurate identification of species relationships (Καράταγλης 1973, Booth and Richards 1978, Bothmer and Jacobsen 1979).

With regards to genus *Hordeum* L. the majority of work referred to chromosome morphology have mostly been confined to common barley, because of its significance as a crop plant (Levitsky 1931, Hagberg and Tjio 1952, Morrison 1959, Kasha and Noda 1979), with fewer reports about wild species (Chin 1941, Covas 1949, Oinuma 1952). However, no other cereal has so many wild relatives as barley (Rajhathy et al. 1964).

Morrison (1959) first gave considerable detail, by studying chromosome morphology in 16 *Hordeum* species, distinguished in seven groups with evident relationships. More recently Richards and Booth (1976) and Booth and Richards (1978) using both karyomorphological and biochemical methods of study gave sound evidence of evolutionary trends in *Hordeum murinum* group.

Taeniatherum, although defined as a separate genus by Nevski (1934) has for long by many taxonomists been given specific rank in the genus *Hordeum* (*H. asperum, H. crinitum*). Reports concerning any case of *Taeniatherum* karyotype have not so far been met in bibliography. Even chromosome numbers, by contrast to other genera of Gramineae are scarcely referred, and only by Griffee (1927) and Hunziker (1954), (Love and Love 1961).

In later years, the interest on wild species of *Hordeum* was revived. Within a project involving an investigation on world-wide scale (Bothmer and Jacobsen 1978) chromosome banding patterns in cultivated and wild barleys were defined (Vosa 1976, Linde-Laursen et al. 1979).

A project on native taxa of Gramineae, is in currency at our Department of Botany. Within it, Symeonidis (in publication) using electrophoretic analysis of various enzyme systems made essential steps towards identifying intraspecific, interspecific and intergeneric variation in local representatives of *Hordeum* and *Taeniatherum* species. Among the materials used, we selected some diploid species of *Hordeum* and *Taeniatherum,* in order to study their chromosome morphology and determine the corresponding karyotypes. The exact materials were chosen on the basis 1) of ploidy level (all diploids) and 2) of geographical limitation (all found in biotopes of Northern Greece).

The paper aims at contributing to the completer knowledge of Greek wild taxa of Gramineae.

MATERIALS AND METHODS

Two diploid species of the genus *Hordeum* were used, and namely *H. marinum* and *H. hystrix.* Both belong to *H. marinum* complex of

Trichostachys section. Besides, in the present study, one form of *H. marinum*, differing by only minor characters (ear hairiness) from the typical one has been included. One species of the genus *Taeniatherum*, concretely *T. caput-medusae*, completes the diploid taxa used here.

All materials represent local Greek populations collected during 1976-79, by the one of the authors (Symeonidis) in different areas of Macedonia.

1. *Hordeum marinum* Huds. (*H. maritimum* Stokes)
Site of collection: Kalohori, on the west of Thessaloniki.
2. *Hordeum marinum* I (with hairs in lemmas)
Site of collection: Georgiki Scholi, on the east of Thessaloniki.
3. *Hordeum hystrix* Roth (*H. maritimum* subsp. *gussoneanum* (Parl.) Asch. and Graebn., *H. geniculatum* All.)
Site of collection: Ptolemais.
4. *Taeniatherum caput-medusae* (L.) Nevski. (*Elymus caput-medusae* L., *Hordeum asperum* (Sim.) Degen, *H. crinitum* (Shreb.) Desf., *T. asperum* (Sim.) Nevski, *T. crinitum* (Shreb.) Nevski)
Site of collection: Mount Chortiatis.

Microscopic slides were prepared and the observations carried out on mitotic metaphase cells of root-tips. The usual Feulgen technique of staining and squashing was applied (Riley et al. 1958, Coucoli and Karataglis 1973, Καράταγλης 1973).

Good metaphase cells that were observed to have a similar degree of contraction and separately recognizable chromosomes were selected and immediately photographed. Photographs were also taken of a micrometer at the same power. The chromosome lengths were determined with a divider and measured on a 0.2mm scale and then converted to microns by comparison of scale with the photo of the micrometer at the same enlargement as the photo of the chromosomes (Joseph and Bouwkamp 1978).

The mean of the measurements of 10 cells from each material were taken (5 cells in *marinum* I). Total chromosome size, arm lengths and length of satellites (in SAT pairs) were calculated and karyotypes established by using quantitative and qualitative indices. More concretely: centromere class was defined by using the arm ratio (short/long arm) as suggested by Shrivastava et al. (1973) in the following way: median (M) = 1.00 - 0.76, submedian (SM) = 0.75 - 0.51 and sub-terminal (ST) = 0.50 - 0.26. Karyological terminology was supplemented according to the terms applied by Levan et al. (1965) and Κουκόλη

(1963). Relative length % (chromosome length X 100 / total chromosome length) was also calculated. In the idiograms the chromosomes were put in decreasing values of length.

RESULTS

A. Hordeum marinum

The karyotype of *H. marinum* was observed to contain the following synthesis of chromosome members (Table Ia, Figs. 1a, 2a).

1. One pair of satellited chromosomes, approximating the lowest threshold of SM class (a. r. 0.52, Fig. 1a, No. 4).
2. Two pairs of mesocentric (M class), the one among the longest, the other one of the shortest in the complement (2nd and 6th in the idiogram respectively).
3. One pair of strongly heterobrachial, acrocentric chromosomes (ST class), the shortest member of the set (No. 7).
4. Three pairs of submesocentric chromosomes, with arm ratio falling in SM class and representing index values 0.69, 0.65 and 0.69 respectively. (Table III, Nos. 1, 3 and 5 in the idiogram).

The chromosomes of this particular species were found to have small absolute size, ranging from 5.90μm up to 4.32μm (mean values).

According to the data presented in Table I, the variation in chromosome size of the different members of the complement appeared rather low, i.e. the relative length of the longest pair represents 16.40% of the total chromosome length, whereas that of the shortest pair corresponds to 12.01%. Or, the shortest chromosome is equal to 73.2% of the longest one.

The numbering, as well as the arrangement of chromosomes in order of decreasing length should be considered partly conventional, because the estimation of standard deviation (S) showed no significant differences between the length of most SM pairs, which proved to be overlapping in size. Thus, the constant chromosome markers are apparently: a) The presence of a satellited pair b) the existence of the two isobrachial pairs, significantly different in length and c) the appearance of one pair with subterminal centromere. The satellite size represents less than half the length of the short arm (ca. 40%).

By comparing the present results with the data given by Morrison for *H. marinum* (without numerical indices) a striking simi-

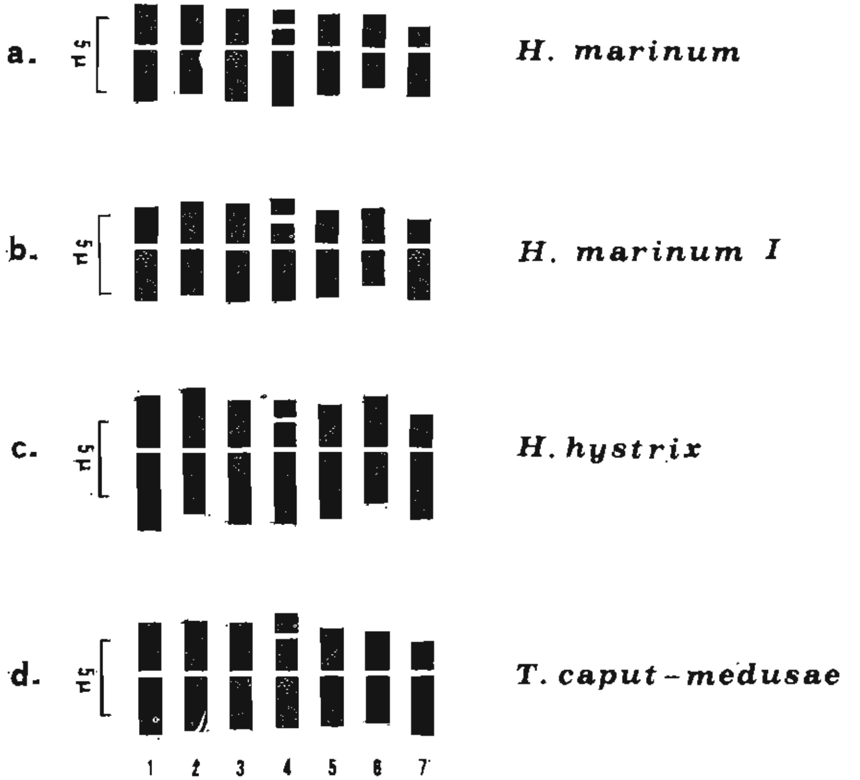

Fig. 1. Idiograms of the four karyotypes.

larity was noticed, concerning the morphological features of the chromosomes, in particular centromere class, yet in our material absolute size seemed to be more limited.

B. Hordeum marinum I

There was recognized a sound analogy to the karyotype of the previous species (Table Ib, Figs. 1b, 2b). The qualitative distribution of the chromosomes and the values of arm ratios are almost identical. The decreasing order of the size appeared also very similar, with the exception of the chromosomes Nos. 6 and 7 which showed a reversed relation. However, being given that these two members of the complement differ essentially in centromere class, the overlapping of size cannot

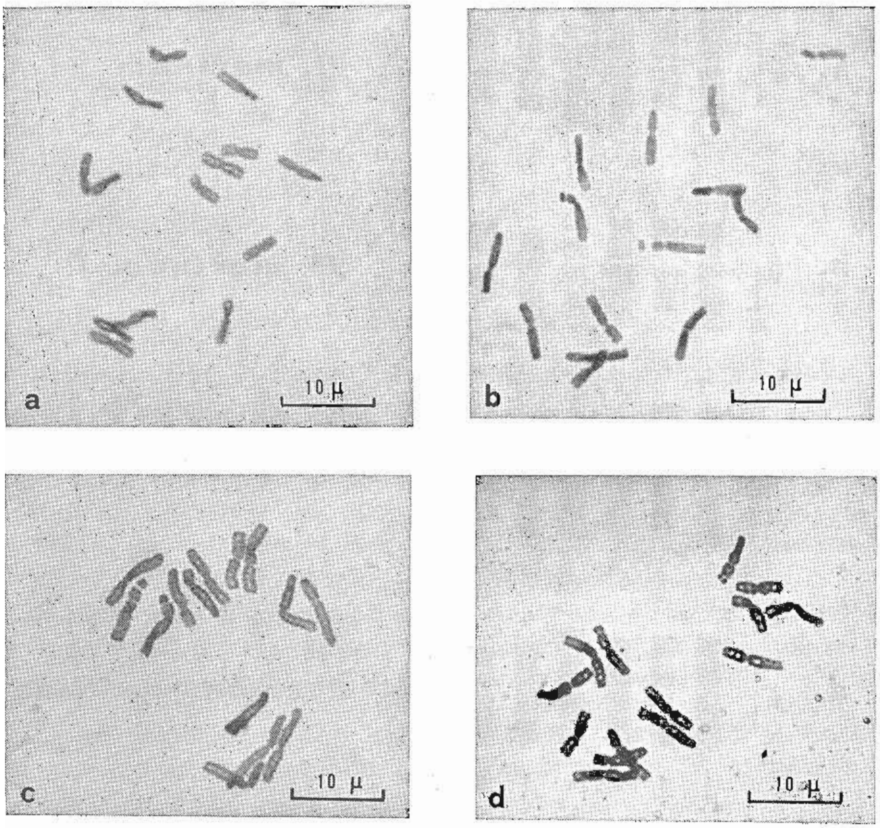

Fig. 2. Metaphase eells from root-tips of the four materials. a H. marinum, b H. marinum I, *e H. hystrix, d T. caput-medusae.*

cause any confusion. The relative length ranges between the same values and the shortest pair represents 72.2% of the longest one. The satellite length corresponds to 36.9% of the proximal short arm. The SAT pair falls in the same SM class, manifesting also the lowest value of arm ratio (0.62), comparatively to the rest SM members of the genome.

C. Hordeum hystrix

The karyotype of this material appeared qualitatively similar, but quantitatively different from *H. marinum*. The absolute length values of the chromosomes proved higher, ranging between 8.36μm and 6.20μm (Table IIa, Figs. 1c, 2c). Arm ratios were found to fall within the same centromere classes with the corresponding values of *H. marinum* chromosomes (Table III). The shortest member is equal to 73.8% the size of the longest one. SAT pair seems to be typically SM, representing the most heterobrachial member among SM chromosomes of the compliment. The length of satellite was measured to possess 41.8% the size of the proximal arm. The deviation in length of the particular chromosomes proved more intensive, something rather expected with increased chromosome size.

Consequently, the three materials (*H. marinum, H. marinum* I and *H. hystrix*) showed evident qualitative similarity of karyotypes, *hystrix* being recognizable by only different absolute values of chromosome length.

D. Taeniatherum caput-medusae

A soundly different karyotype was observed in this species, which can be defined by the following characteristics.

(a) The variation of size proved more restricted, the shortest member representing 76.2% of the longest one, and the relative length ranging from 15.96% to 12.17% of the total chromosome length (Table IIb, Figs. 1d and 2d).

(b) Almost all members of the genome were recognized with less unequal chromosome arms. Six of them belong to the M centromere class among which only two approximate the mean values of 0.80 and 0.79 arm ratio respectively (Table III, fig. 1d, Nos. 1, 5). It is in the M class that the SAT pair belongs too, a feature quite distinctly separating this karyotype from those of the previous species. Satellite itself possesses 35.7% of the short proximal arm.

(c) One pair with subterminal position of centromere was constantly present which seems to be a typical index for all materials studied in this work.

(d) The decreasing order of size is more conventional, since it makes difficult to distinguish between the 2nd and 3rd chromosome pair as well as between the 5th and 6th members of the set. The only clearly recognizable chromosomes are the satellited pair and the ST pair.

DISCUSSION

Morphological characters, as a means of classifying grass species, have a limited application in *Hordeum* genus, because spike features are useful to delimit species groups rather than single species. In other words, distantly related species are sometimes quite similar, whereas considerable morphological variability is often displayed in conspecific populations (Rajhathy et al. 1964).

The fact resulted in a great deal of confusion in the classification of *Hordeum* species. Some taxa have been described either as subspecies, or as species belonging to a broader complex, that is to a species taken in "sensu lato". This case holds for *Hordeum marinum* complex. On the other hand, *Taeniatherum* was ranked in the past by many authors in the genus *Hordeum* (*H. asperum* or *H. crinitum*) but in later years (Flora Europaea, Vol. 5, Gramineae, pp. 205-206) botanists returned to Nevski's aspect (1934), who accepted that as a distinctly separated genus, due to floral construction (number of spikelets per node). In addition, Baum (1978a, 1978b, 1978c) by using a numerical method of clustering, placed *Taeniatherum* in a different, not overlapping with *Hordeum,* cluster of taxa.

The establishment of karyotypes gives evidence about the constancy of chromosome morphology and permits justifiable comparison between or within species as well as, between species belonging to different genera. In karyotypical analysis 5 parameters can basically be applicable: (a) absolute size of chromosomes, (b) centromere position, (c) relative length of chromosomes, (d) basic chromosome number, and (e) number and position of secondary constriction (Stebbins 1971). All material studied in the present work was diploid ($2n = 2x = 14$) with symmetrical karyotypes. *H. marinum* of our collection was similar karyomorphologically with the material used by Morrison in 1959 (origin: Botanic Garden of Uppsala), as regards both centromere class and variation of chromosome length between the members of the complement. The slightly higher values of chromosome length at least to the point they could be calculated from the photos in Morrison's paper (no numerical data) may be due chiefly to the different origin. *H. marinum* I showed the same karyotypical features with the former concerning the prominent size of the longest SM chromosome, (No. 1) the distinction between the 2nd and the 3rd chromosome pair by arm ratio and not by size, and the separation of the 6th and 7th pairs also by centromere class (overlapping in length). Total chromosome length reaches almost the same values, whereas the distribution of relative chromosome length follows a similar variation. The results suggested no karyotypical differences, qualitative or quantitative, between the two forms of *H. marinum* which might reflect the morphological differences that forced us to consider them as distinct taxa. The close relationships between the two above types was defined also by analysing the isoenzymic pattern of certain systems (Symeonidis, in publication) which gave evidence of an essential number of common electrophoretic zones, identified by using the hypergeometric method.

The karyotypical distance of *H. hystrix* from *H. marinum* is based on the observed definite differences in chromosome size. However, a significant degree of resemblance regarding the qualitative characteristics of chromosome morphology was recognized. Centromere class was found almost identical. Besides, arm ratio of SAT pair appeared again as an indicator of extreme SM pair. The findings suggest that the two species, *H. marinum* and *H. hystrix* both belonging to the *marinum* group, sensu lato, might be considered to be conspecific (Morrison 1959, Rajhathy et al. 1964). Yet, we must admit that the present data cannot lead us to overlook Covas's view (1949) according to which only cytogenetic evidence can decide whether two entities are or are not conspecific.

The karyotype of *Taeniatherum caput-medusae* proved to deviate markedly from those found in *marinum* group. It was recognized even more symmetrical, with predominance of mesocentric chromosomes and lower rate between the shortest and the longest chromosome of the genome. Since *Taeniatherum* is a restricted genus of S. Europe, and only a variant from Krym (*T. crinitnm*) which does not seem to merit specific rank is referred (in Flora Europaea), it could possibly be considered a rather primitive genus, on the assumption that evolution tends towards increasing of karyotypical assymetry (Levitsky 1931). Irrespective of this, the morphology of chromosomes as defined in this study corroborates the position of *Taeniatherum* as a distinct genus, different from *Hordeum*. Recent data provided by Symeonidis (in publication), who established enzymic ratios to determine phylogenetic relationships in the same materials, confirm even strongly the aspect that *Taeniatherum* is quite remote comparatively to the diplod *marinum* species.

TABLE I

Total chromosome legth, arm length, arm ratio, and relative length in the speeies

Chrom. pairs	(a) *H. marinum* total chrom. length	short arm	long arm	arm ratio	relat. length	(b) *H. marinum* I total chrom. length	short arm	long arm	arm ratio	relat. length
	(a) Length in microns					(b) Length in microns				
1	5,90±0,80	2,42	3,48	0,69	16,40	6,10±0,56	2,42	3,68	0,65	16,21
2	5,62±0,46	2,78	2,84	0,92	15,55	5,74±0,25	2,74	3,00	0,91	15,25
3	5,56±0,38	2,23	3,33	0,65	15,45	6,03±0,61	2,55	3,48	0,73	16,02
4	5,42±0,18	1,86*	3,56	0,52	14,35	5,60±0,28	2,17*	3,43	0,62	14,88
5	5,02±0,28	2,06	2,96	0,69	13,95	5,13±0,37	2,07	3,06	0,67	13,63
6	4,42±0,28	2,15	2,27	0,94	12,29	4,40±0,42	2,09	2,31	0,90	11,71
7	4,32±0,46	1,38	2,94	0,46	12,01	4,63±0,23	1,49	3,14	0,47	12,30

(a) total genome length 36,26
*sat length 0,74

(b) total genome length 37,63
*sat length 0,80

TABLE II

Total chromosome length, arm length, arm ratio, and relative length in the species

(a) H. hystrix *(b) T. eaput-medusae*

(a) Length in microns

Chrom. pairs	total chrom. length	short arm	long arm	arm ratio	relat. length
1	8,36±0,72	3,33	5,03	0,66	16,58
2	7,68±0,16	3,75	3,93	0,95	15,18
3	7,64±0,71	3,06	4,58	0,63	15,10
4	7,22±0,46	2,58*	4,64	0,56	14,27
5	7,20±0,13	2,76	4,44	0,62	14,24
6	6,26±0,48	3,12	3,14	0,96	12,38
7	6,20±0,70	1,95	4,25	0,45	12,25

total genome length 50,56
* sat length 1,08

(b) Length in microns

Chrom. pairs	total chrom. length	short arm	long arm	arm ratio	relat. length
1	6,68±0,36	2,97	3,71	0,80	15,96
2	6,50±0,55	3,19	3,31	0,94	15,53
3	6,34±0,28	3,07	3,27	0,92	15,13
4	5,96±0,62	2,80	3,16	0,88	14,23
5	5,78±0,36	2,56	3,22	0,79	13,80
6	5,10±0,60	2,31	2,79	0,82	12,17
7	5,52±0,46	1,74	3,78	0,46	13,18

total genome length 41,88
* sat length 1,00

TABLE III

Arm ratios of the materials studied

Chrom. pairs	1	2	3	4	5	6	7
a							
H. marinum	0.69	0.92	0.65	0.52	0.69	0.94	0.46
	SM	M	SM	SAT	SM	M	ST
b							
H. marinum I	0.65	0.91	0.73	0.62	0.67	0.90	0.47
	SM	M	SM	SAT	SM	M	ST
c							
H. hystrix	0.66	0.95	0.63	0.56	0.62	0.96	0.45
	SM	M	SM	SAT	SM	M	ST
d							
T. caput - medusae	0.80	0.94	0.92	0.88	0.79	0.82	0.46
	M	M	M	SAT	M	M	ST

ACKNOWLEDGEMENTS

The work was executed within a research project on wild taxa of Gramineae, financed by the N.A.T.O. Organisation. The skilful technical assistance by Mr. A. Nicodimos, paraskevastis of the Department of Botany, is greatly acknowledged.

REFERENCES

1. BAUM, B. R. 1978a: Taxonomy of the tribe Triticeae (Poaceae) using various numerical techniques. II Classification. Can J. Bot. 56, 27-56.
2. BAUM, B. R. 1978b: III. Synoptic key to genera and synopses. Can. J. Bot. 56, 374-385.
3. BAUM, B. R. 1978c: Generic relationships in Triticeae based on computations of Jardine and Sibson Bk clusters. Can J. Bot. 56, 2948-2954.
4. BOOTH T. A., and A. J. RICHARDS, 1978: Studies in the *Hordeum murinum* L. aggregate: disc electrophoresis of seed proteins. Botanical J. of the Liuuean Society 76, 115-125.
5. BOTHMER, R. von, and N. JACOBSEN, 1979: A taxonomic revision of *Hordeum secalinum* and *H. capense*. Bot. Tidsskr. 74, 223-235.
6. CHIN, T. C. 1941: The cytology of some wild species of *Hordeum*. Ann. Botany, N.S. 5, 535-545.
7. COUCOLI, H. and S. KARATAGLIS, 1973: Intraspecific variation shown by cytological and electrophoretic studies in two diploid species of *Aegilops* Proc. 4th Intern. Wheat Genet. Symp. Missouri Agr. Exp. Sta. Columbia, Mo.
8. COVAS, G. 1949: Taxonomic observations on the North American species of *Hordeum*. Madrono 9, 1-21.
9. GRIFFEE, F. 1927: Chromosome numbers in species of *Hordeum*. Minu. Univ. Stud. Biol. Sci. 6, 319-331.
10. HAGBERG, A. and J. H. TJIO, 1952: Cytological studies ou some homozygous trauslocations in barley. An. Estac. Exptl. Aula Dei 2, 215-223.
11. HUNZIKER, J. U. 1954: Estudios citologicos en las Hordeas (Gramineae). I. Revista Invest. Agric. Bueuos Aires, 8, 99-104.
12. JOSEPH. L. S. aud J. C. BOUWKAMP, 1978: Karyomorphology of several species of Phaseolus and Vigua. Cytologia 43, 595-600.
13. ΚΑΡΑΤΑΓΛΗΣ, Σ. Σ. 1973: Συγκριτικὴ ἔρευνα τοῦ καρυοτύπου καὶ τῶν ἠλεκτροφορημάτων ἐνζύμων ἐστεράσης αὐτοφυῶν τινων ἑλληνικῶν εἰδῶν τοῦ γένους *Aegilops*. Διατριβὴ ἐπὶ διδακτορίᾳ. Α.Π. Θεσ/ νίκης.
14. KASHA, K. J. aud K. NODA, 1979: A proposed revision of the barley karyotype. Barley Genet. Newsletter 9, 45-46.
15. ΚΟΥΚΟΛΗ, Ε. 1963: Ἔρευνα τοῦ καρυοτύπου εἰδῶν τινων τοῦ γένους *Lathyrus* καὶ τῆς ἐπιδράσεως ἐπ' αὐτοῦ ἁλάτων βαρέων μετάλλων. Ἐπιστ. Ἐπετ. Γεωπ. Δασ. Σχ. Α.Π.Θ., 1-86.
16. LEVAN, A., FREDGA, K. and A. A. SANDBERG, 1965: Nomeuclature for centromeric position on chromosomes. Hereditas 52, 201-220.

17. LEVITSKY, G. A. 1931: The karyotype in Systematics. Bull. Appl. Bot. Genet. Plant Breeding 27, 220-240.
18. LINDE-LAURSEN, I. BOTHMER, R. von and N. JACOBSEN, 1979: C-banding pattern of Asiatic taxa of *Hordeum*. Barley Genet. Newsletter 9, 59-60.
19. LOVE, A. and D. LOVE, 1961: Chromosome numbers of Central and Northwest European Plant Species. Opera Botanica (Suppl. Ser. Botanisk. Notis. Ed.) 5, 61.
20. MORRISON, J.W. 1959: Cytogenetic studies in the genus *Hordeum*. I. Chromosome Morphology. Can. J. Bot. 37, 527-538.
21. NEVSKI, S. A. 1934: Tribe XIV. Hordeae Benth. In flora od the U.S.S.R. vol. 2. Edited by R. Yu. Rozlevitz and B. K. Shishkin. (Translated from Rnssian by the Israel program for Scientific Translations. Jerusalem, 1963). pp. 589-736.
22. OINUMA, T. 1952: Karyomorphology of cereals. Biol. J. Okayama Univ. 1, 12-71
23. RAJHATHY, T., MORRISON, J.W. and S. SYMKO, 1964: Interspecific and intergeneric hybrids in *Hordeum*. Barley Genetics I, 195-213.
24. RICHARDS, A. J. and T. A. BOOTH, 1976: Karyological indications of evolution in *Hordeum murinum* L. sensu lato. In Current Chromosome Research (pp 167-174). Ed. K. Jones and P.E. Brundham. Elsevier, North-Holland Biom. Press, Amsterdam.
25. RILEY, R., UNRAU, J. and V. CHAPMAN, 1958: Evidence on the origin of the B genome iu wheat. J. Heredity 49, 91-98.
26. SHRIVASTAVA, M. P., SINGH, L. and D. SHARMA, 1973: Karyomorphology of different ecotypes of green gram (*Phaseolus aureus* Roxb.) JNKVV Res. J. 7, 86-90.
27. STEBBINS, G. L. 1971: Chromosomal evolution in higher plants. Ed. Arnold Ltd. London.
28. VOSA, C. G. 1976: Chromosome banding pattern in cultivated and wild barleys (*Hordeum* spp.). Heredity 37, 395-403.

ΠΕΡΙΛΗΨΗ

ΚΑΡΥΟΤΥΠΙΚΗ ΑΝΑΛΥΣΗ ΟΡΙΣΜΕΝΩΝ ΑΥΤΟΦΥΩΝ ΕΛΛΗΝΙΚΩΝ ΕΙΔΩΝ HORDEUM (ΟΜΑΔΑ MARINUM) ΚΑΙ TAENIATHERUM

Ὑπὸ

Ε. Δ. ΚΟΥΚΟΛΗ καὶ Λ. ΣΥΜΕΩΝΙΔΗ

(Ἐργαστήριο Βοτανικῆς Πανεπιστημίου Θεσσαλονίκης)

Καθορίσθηκαν οἱ καρυότυποι σὲ τέσσερα διπλοειδῆ αὐτοφυῆ εἴδη Gramineae τοῦ Βορειοελλαδικοῦ χώρου. Τὰ τρία ἀνήκουν στὴν ὁμάδα Hordeum marinum (εὐρύτερη ἔννοια εἴδους), καὶ εἶναι τὰ ἀκόλουθα: H. marinum, H. marinum I (μορφολογικὸς τύπος) καὶ H. hystrix. Τὸ τέταρτο ἀνήκει στὸ γένος Taeniatherum (T. caput-medusae). Οἱ καρυότυποι μελετήθηκαν ποιοτικὰ (μορφολογία χρωμοσωμάτων, θέση κεντρομέρους) καὶ ποσοτικὰ (μῆκος χρωμοσωμάτων, μῆκος βραχιόνων, διακύμανση μεγεθῶν, σχετικὰ μεγέθη). Διαπιστώθηκε: 1) Πλήρης σχεδὸν ταύτιση τῶν καρυοτύπων τῶν H. marinum καὶ H. marinum I, τόσο ὡς πρὸς τὴ μορφολογία τῶν χρωμοσωμάτων, ὅσο καὶ ὡς πρὸς τὶς τιμὲς καὶ τὴ διακύμανση τῶν μεγεθῶν τους (ἀπόλυτα καὶ σχετικὰ μεγέθη). 2) Σημαντικὴ ποιοτικὴ καρυοτυπικὴ ἀναλογία μεταξὺ τοῦ H. hystrix καὶ τῶν δύο τύπων τοῦ marinum ὡς πρὸς τὴ χρωμοσωμικὴ μορφολογία (SAT ζεῦγος, λόγος βραχιόνων, κατανομὴ σχετικῶν μεγεθῶν) ἀλλὰ διαφορὰ ὡς πρὸς τὶς ἀπόλυτες τιμὲς τοῦ χρωμοσωμικοῦ μεγέθους (μεγαλύτερες τιμές στὸ H. hystrix). 3) Διαφορετικὸς καρυότυπος στὸ T. caput-medusae, δηλ. συμμετρικότερος μὲ πλειονότητα μεσοκεντρικῶν μελῶν καὶ διαφορετικὴ μορφολογία τοῦ SAT ζεύγους. Ἀπὸ τὴ μελέτη τῶν καρυοτύπων συμπεραίνεται καὶ ἐπιβεβαιώνεται ἡ ἐκδοχὴ ὅτι τὰ τρία πρῶτα ὑλικὰ ἀνήκουν στὴν ἴδια ὁμάδα (σύμπλοκο εἶδος), ἐνῶ τὸ Taeniatherum ἀντιπροσωπεύει ἄλλο γένος, πιθανὸν πιὸ ἀρχέγονο ἀπὸ τὸ Hordeum.