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Short Communication

CYTOGENETIC STUDY OF *BRASSICA NAPUS* L.VAR.MADONA

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ABSTRACT
Brassica napus L. is one of the most important sources of oil. This species with common name of Canola is a member of the Brassicaceae family. For studying of chromosome morphology in *B. napus* var. Madona were used of scratching method and pretreatment withα-Bromonaphtaline. Cytological study showed that *B. napus* var. Madona had 2n=38 chromosomes with karyotypic formula of 13m+6sm in which chromatin lengths were 92.14µm and 68/4% was metacentric, 37/6% submetacentric. Maximum and minimum chromosomes lengths were 3.16µm and 1.63µm respectively. Mitotic investigations pointed probably trisomic amphiploedy in chromosome number 3.

KEY WORDS: *Brassica napus* L.var.madona, Canola, Cytogenetic, Karyology, amphiploedy

INTRODUCTION

Oilseed rape (canola) (*Brassica napus* L.) is an important oil producing species extensively cultivated in Europe, china, north America and Iran. *B.napus* is belong to Brassicaceae family of Rhoedales order. Oilseed rape (canola) (*Brassica napus* L.) is an important oil producing species extensively cultivated in Europe, China, North America and Iran. *Brassica. napus* is an amphidiploid species with 19 pairs of chromosomes and has evolved from interspecific crosses between *B. rapa* (2n=2x=20) and *B. oleracea* (2n=2x=18) (10). Both summer and winter annual forms are cultivated in Iran.

Winter oilseed rape could be cultivated in rotation with wheat in order to reduce diseases of wheat.

Experiments have shown increases in wheat yields of up to 10% after rapeseed. High seed yield (over two tones per hectare) and high oil content (approximately 40%), in addition to low water needs in dry regions of Iran, have made it one of the most important crop plants that provide the oil needs of the country (8). Due to the economic importance of oilseed rape, several *B. napus* cultivars have been introduced in Iran during the last decade and at present, germplasm evaluation as well as hybridization programs are in hand both by researchers in the Seed and Seedling Breeding Research Center, Karaj, Iran. Therefore, a cytogenetic, electerophoretic and agro-morphological study of *B. napus* accessions/cultivars has been initiated (by the authors) in order to provide the basic information on the genetic variability of the cultivars available for planning future breeding and hybridization programs. Some basic cytogenetic information characteristics have already been reported in a few *B. napus* cultivars available in Iran (8,9).

Regarding to great importance of the oil seed plants, it is appeared necessarily to pay more attention to study on such plants and increasing data about their different characteristics of karyology, cytology, phonology, physiology, morphology, etc. for better utilization of natural resources and reaching to sustainable development. The purpose of this study was to introduce plant species of *Brassica napus* L.var.madona and to investigate the karyotypic characteristics, finally using this data, the plant karyotype was drawn as an ideogram.

MATERIALS AND METHODS

According to most researches made on plant karyology, best part of a plant for studying mitosis division and identification of chromosomes arrangement and preparation of karyotype is apical meristems of roots, because root induction is occurred rapidly, mitosis division is very fast in this area and lacking chlorophyll in the root cause to study easily the cytogenetic characteristic (7). In the present study, The seeds of the *Brassica napus* L. var madona were planted in petri dishes on filter paper in a strile environment. After two days of germination, the radicles were reached to long enough for sampling (1 to 1.5 centimeters).

The mitotic study of karyotype, morphological characteristic of chromosome of species of canola was done on the meristematic cells of root tips, from seed germination. The root tips were pretreated with α-Boromonaphtaline. After four hours the samples were rinsed with water for 20 minutes to remove solution. Then were fixed in lowitsky(A+B) for 16-24 hours. After fixation the samples were washed for 30 to 40 minutes then root tips were hydrolyzed in NAOH at the temperature condition of 60°c. Then the samples were rinsed with water for 1 minutes. after this stage samples were stained by Hematoxylin solution for 4 hours in the environment temperature (25°c- 30°c). Then squashed in 45% acetic–acid. Five metaphase cells were studied for several karyotypic parameters. The chromosome studying including to determine of chromosomes number, poloidy level and to provide of karyotype was been carried. For the karyotype

studying were been determined total length of chromosome (TL)(12), long arm length (LA), short arm length(SA), length of satellite (LS), length of NOR (LN), percent of relative length of chromosome(RL%)(6), Percent of relative length long arm (LA%), Percent of relative length short arm (LA%), arm ratio(AR), total length of chromatin in karyotype (X), difference of range of relative length(DRL)(2,3),total form percentage(TF%)(1,3), centromeric index(CI) The chromosomes type was determined by Levania et al's table. (4). To determine evolution status and symmetrical studying is used of Stebbins table. (11). The comparison of the karyotypes using the Stebbins method have showed different degree three on the basis ratio of the tallest chromosome to the shortest chromosome and degree four on the basis ratio of the acrocentric or telocentric chromosomes. In Stebbins table have twelve groups in which symmetrical karyotype decrease from left to right and from upper to down. So that karyotype of 1A group will be symmetric lest karyotype and the karyotype of 4A group will be non- symmetric lest karyotype.

Asymmetric intra chromosome index determined based on Romerozarko method (A1) and Pearson's coefficient of variation (A2) (5).

RESULTS AND DISCUSSION

Cytological studies showed the chromosome number of *Brassica napus* var. Madona is 2n=38 (figure1) and with 13m+6sm karyotypic formula (fig1, table1,2). including 68.4% metacentric and 37.6% submetacentric. In this karyotype the total length of haploid chromosome was 46.06µm, and the total length of the tallest and the shortest arm were estimated 27.93µm, and 18.13µm respectively. Length of the tallest and shortest chromosomes was estimated 3.16 µm and 1.63 µm. The chromosomes of *B.napus* on the basis stebbins table to take place in the 1A class table therefore this species has highest relative symmetrical.

Romerozarko index (A1) is equal 0.35 therefore this index shoes relative symmetric intra chromosome in this variety. Pearson's coefficient of variation (A2) was 0.19. Total form percentage (TF%) and difference of range of relative length (DRL) were 39.36% , 1.93 respectively.

Based on above symmetric Indices and lowitsky classification, *B. napus* var. Madona has symmetrical Karyotype. Symmetrical Karyotype is status in which chromosomes are the same size and have mid centromere approximately middle.

Mitotic studies show a trisomy in chromosome number 3. It is suggested meiotic diakinese investigation for confirmed the trisomy.

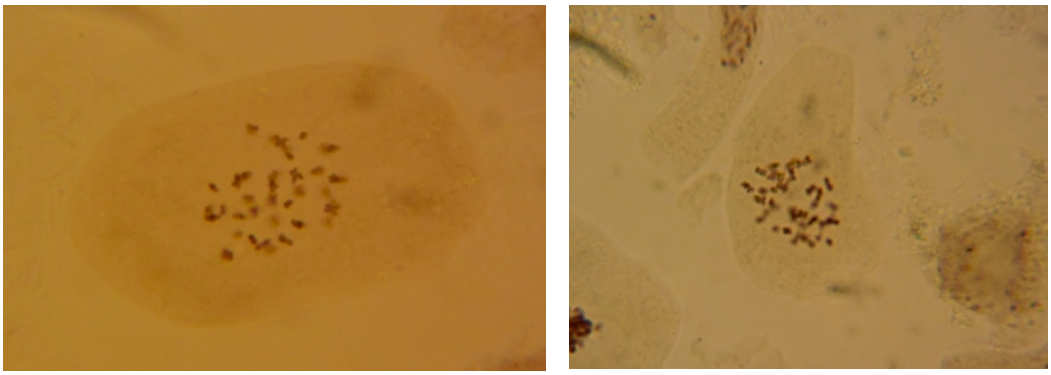
TABLE1. Characteristics of *Brassica napus* L.var.madona chromosomes.

Type	AR	CI	%SA	%LA	%RL	LS	LN	SA (µm)	LA (µm)	TL (µm)	CN
m	1.65	0.60	2.58	4.27	6.85	-	-	1.19±0.02	1.97±0.12	3.16±0.10	**1**
Sm	1.71	0.58	2.45	4.20	6.65	-	-	1.13±0.01	1.93±0.04	3.06±0.04	2
m	1.42	0.70	2.64	3.75	6.39	-	-	1.22±0.07	1.73±0.07	2.94±0.01	3
m	1.33	0.75	2.66	3.53	6.19	-	-	1.22±0.01	1.63±0.08	2.85±0.07	4
m	1.48	0.68	2.41	3.56	5.97	-	-	1.11±0.06	1.64±0.06	2.75±0.01	5
Sm	1.74	0.57	2.17	3.77	5.93	-	-	1.00±0.01	1.74±0.02	2.73±0.02	6
m	1.26	0.79	2.58	3.26	5.84	-	-	1.19±0.02	1.50±0.01	2.69±0.01	7
Sm	1.95	0.51	1.87	3.65	5.52	-	-	0.86±0.11	1.68±0.09	2.55±0.02	8
Sm	1.78	0.56	1.89	3.37	5.26	-	-	0.87±0.03	1.55±0.09	2.42±0.06	9
m	1.30	0.77	2.20	2.86	5.06	-	-	1.01±0.02	1.32±0.06	2.33±0.05	10
Sm	1.62	0.62	1.91	3.08	4.99	-	-	0.88±0.16	1.42±0.16	2.30±0.01	11
m	1.47	0.68	2.00	2.95	4.95	-	-	0.92±0.10	1.36±0.11	2.28±0.01	12
m	1.49	0.67	1.96	2.92	4.88	-	-	0.90±0.04	1.35±0.02	2.25±0.02	13
m	1.41	0.71	1.93	2.72	4.65	-	-	0.89±0.08	1.26±0.07	2.14±0.01	14
m	1.64	0.61	1.71	2.82	4.53	-	-	0.79±0.07	1.30±0.02	2.09±0.04	15
m	1.41	0.71	1.84	2.61	4.45	-	-	0.85±0.06	1.20±0.01	2.05±0.06	16
m	1.56	0.61	1.64	2.70	4.24	-	-	0.75±0.01	1.25±0.13	1.99±0.13	17
Sm	1.72	0.58	1.47	2.53	4.01	-	-	0.68±0.01	1.17±0.05	1.84±0.05	18
m	1.43	0.70	1.46	2.09	3.55	-	-	0.67±0.06	0.96±0.03	1.63±0.09	19

TABLE2. Total characteristics of *Brassica napus* L.var.madona chromosomes.

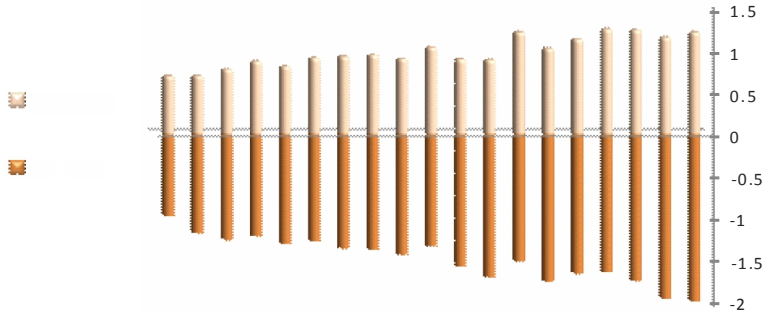
TF%	DRL	S.Class	A2	A1	X	ΣTL	TLA/TSA	Karyotype formulae	2n
39.36	1.93	1A	0.19	0.35	92.12	46.06	1.54	13m+6sm	38

A



B

c



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