

**ARAŞTIRMA MAKALESİ/RESEARCH ARTICLE**

**CHROMOSOME NUMBERS AND KARYOTYPE ANALYSIS OF *Anemone blanda*  
SCHOTT & KOTSCHY (Ranunculaceae)**

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**ABSTRACT**

The genus *Anemone* L. is represented in Turkey with 7 species. *Anemone blanda* Schott & Kotschy is a native geophyte's of Turkey, which is exporting to European countries. Its chromosome numbers and karyotype are reported here for the first time on Turkish material. Chromosome numbers of *Anemone blanda* (Windflower) was found as  $2n=16$ . The apparent chromosome size ranges from 8.65-17.33  $\mu\text{m}$ . The karyotype of *A. blanda* was characterized by three pairs of metacentric (m) chromosomes (1,2 and 3), three pairs of (4,6 and 8) submetacentric (sm), one pair (5) of subtelocentric (st) and one pair (7) of acrocentric (t) chromosomes.

**Key Words:** *Anemone blanda*, chromosome numbers, karyotype analysis.

***Anemone blanda* SCHOTT & KOTSCHY (Ranunculaceae)'nın KROMOZOM SAYISI VE  
KARYOTİP ANALİZİ**

**ÖZ**

*Anemone* cinsi Türkiyede 7 türle temsil edilmektedir. *Anemone blanda* Schott & Kotschy Avrupa ülkelerine ihraç edilen Türkiyenin doğal bir bitkisidir. Türkiye materyali için kromozom sayısı ve karyotipi ilk kez bu çalışmada verilmiştir. *Anemone blanda*'nın (Anemon) kromozom sayısı  $2n=16$  olarak bulunmuştur. Belirgin kromozom boyları 8.65-17.33 mm arasındadır. *A. blanda* üç çift metasentrik (m) kromozomla (1,2 ve 3), üç çift submetasentrik (sm) kromozomla (4,6 ve 8 bir çift subtelosentrik (st) kromozomla (5), ve bir çift (7) akrosentrik (t) kromozomla karakterize edilmektedir.

**Anahtar Kelimeler:** *Anemone blanda*, kromozom sayısı, karyotip analizi.

**1. INTRODUCTION**

*Anemone* L. (commonly known as Windflowers) consists of 120 species of perennials, which grow from tubers belong to the Buttercup family, *Ranunculaceae*. They grow in wild in Europe, North America and Japan. 7 species of the genus *Anemone* L. distributed in Turkey (Davis et al. 1965 ) *A. blanda* is a native of south eastern Europe and Turkey and has flowers in an array of colors. The bulbs of this geophyte are collected from nature and exported to some European countries (DHKD, 1996, Ekim et al. 1991). Ekim et al. stated that *A. blanda* has a second place as an order at the list of importing geophytes of Turkey (Ekim et al. 1991).

Ünal stated that the chromosome numbers of *Anemone pavonina* and *A. coronaria* as  $2n=16$ , but there is no report of the chromosome number or karyotype analysis of *A. blanda* (Ünal 1978, Ünal 1979).

The aim of the present work is devoted to study the karyological characterization of the species *Anemone blanda* and to state chromosome numbers of this taxon.

**2. MATERIAL AND METHOD**

Seeds material for this study was collected from Fethiye, Muğla (C2) in 2000. Chromosome numbers were obtained from somatic mitosis of root tips of seeds

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Figure 1. Somatic Metaphase Chromosomes of *Anemone blanda*.



Figure 2. Karyogram of *Anemone blanda*.

germinated in petri dishes at 180°C. Root tips were fixed in acetic alcohol (acetic acid- alcohol 1-3 v/v). Root tips were stained in 1% aceto-carmin. Micrographs were made to document karyotypes and karyograms. Five cells with well spread metaphase chromosomes were used for constitution of karyotype. The eight homologous chromosome pairs were designated by the numbers 1 to 8, according to decreasing length. The morphological identification of the chromosome pairs was performed in accordance with the localization of the centromere, estimated as the ratio between the arms and as a centromeric index. Measurements obtained from 5 metaphase plates (long arm and short arm length) allowed the construction of the idiogram.

Using the computer program the mean values (in mm) for the long and short arm lengths (with their respective standard errors), total length, arm ratio

( $r = \text{long arm} / \text{short arm}$ ), centromeric index

$$i = \left( \frac{\text{The sum of the chromosome length of the long arms in chromosome set}}{\text{The sum of the chromosome length in its set}} \times 100 \right)$$

chromosome designation was determined. The values of the arm ratio, the centromeric index and the nomenclature proposed by Levan *et al.* were used for assessing the chromosome type (Levan *et al.* 1964).

### 3. RESULTS AND DISCUSSION

Chromosome numbers of *Anemone blanda* Scott & Kotschy (Windflower) was found as  $2n=16$  (Fig.1), consisted 8 pairs of homologous chromosomes, their karyogram are given in Fig.2.

Karyomorphological details of the species are given in Table 1. The karyotype of *A. blanda* are characterized by three pairs of metacentric (m) chromosomes (1,2 and 3), 3 pairs of (4,6 and 8) submetacentric (sm), one pair (5) of subtelocteric (st) and one pair (7) of acrocentric (t) chromosomes according to Levan (Levan *et al.* 1964), (Fig. 1). This karyotype thus has the idiogrammatic formula:  $3m + 3sm + 1st + 1t$ , according to Levan (Levan *et al.* 1964).

An idiogram of haploid chromosomes exhibiting the average morphological features and similarities in size of chromosomes shown in Fig. 3.

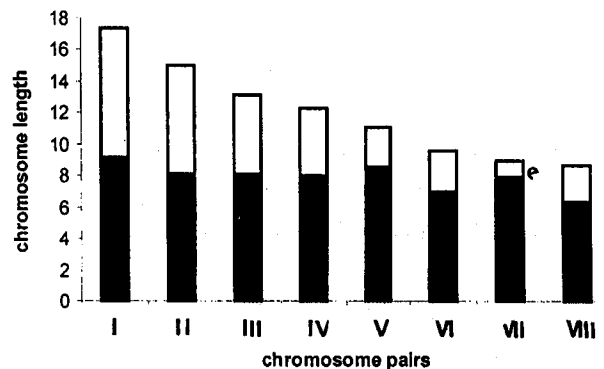


Figure 3. Idiogram of *Anemone blanda*.

Table 1. Details of Karyotype Analysis of *Anemone blanda* ( $2n=16$ ).

chromosome pairs	chromosome length ( $\mu\text{m}$ )		total length	arm ratio $r=L/S$	centromeric index	chromosome position
	short arm (standard error)	long arm (standard error)				
I	8,19 $\pm$ 0,35	9,14 $\pm$ 0,56	17,33	1,12	47,26	m
II	6,89 $\pm$ 0,57	8,09 $\pm$ 0,43	14,98	1,17	45,99	m
III	5,04 $\pm$ 0,48	8,1 $\pm$ 0,51	13,14	1,61	38,35	m
IV	4,24 $\pm$ 0,99	8,06 $\pm$ 0,42	12,3	1,9	34,47	sm
V	2,51 $\pm$ 0,75	8,56 $\pm$ 0,46	11,07	3,41	22,67	st
VI	2,61 $\pm$ 0,43	7 $\pm$ 0,65	9,61	2,68	27,16	sm
VII	1 $\pm$ 0,47	7,91 $\pm$ 0,79	8,91	7,91	11,22	t
VIII	2,35 $\pm$ 0,41	6,3 $\pm$ 0,43	8,65	2,68	27,17	sm

The apparent chromosome size ranges from 8.65-17.33  $\mu\text{m}$ . The last chromosome pair is roughly twice as short as the first one. While the first chromosome set is the longest chromosome (17.33 $\mu\text{m}$ ), II and III rd ones are the second longest chromosomes the chromosome set and do not show a significant difference in total length 14,98  $\mu\text{m}$ -13, 14  $\mu\text{m}$ . IVth, Vth and VIth pairs of chromosomes have medium length varied from 12.3mm and 9.61 $\mu\text{m}$ . Last two pairs of chromosomes are the shortest chromosomes of the chromosome set (8.91 $\mu\text{m}$ - 8.65 $\mu\text{m}$ ).

The chromosome numbers of two other species of this genus reported previously are  $2n=16$  in *Anemone coronaria* and *Anemone pavonia* (Ünal 1978,1979), but no data has been reported about the chromosome number and karyotype analysis of *A. blanda*. Therefore chromosome counts and karyotype analysis of *A. blanda* is given here for the first time.

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