Karyotype Analysis Of Fennel From Ankara Province

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Abstract
Fennel belongs to Apiaceae family is medicinal and aromatic species with economic importance rich essential oils. In this research; we try to obtain cytological parameters on Fennel. Six chromosomal parameters were measured by Micro Measure 3.3 program; i.e., chromosome length (c), relative length (RL), the long arm (L) and short arm (S) lengths, arm ratio (AR: L/S), centromeric index (S/C). Maximum chromosome length was measured 1.71 µm and max arm ratio was determined 2.79 µm. Relative length was ranged between 3.76-5.38%. Maximum centromeric index was measured in1.81 µm. Karyotype formula were obtained 2n=2x= 8 median + 4 submedian (18 m + 4sm).

INTRODUCTION
The gene center of the genus Foeniculum is the Mediterranean basin and is represented in the world by three species. The species that have economic importance of the genus Foeniculum vulgare Mill. (Fennel). Fennel is a perennial, herbaceous plant, growing upright, reaching 2 m in length, with a filamentous piece of leaves and a yellow flowering plant. All parts of the plant can be evaluated, including seeds. It is a highly aromatic and flavourful herb with culinary and medicinal uses. Fennel seeds are anise (Pimpinella anisum L.) like in aroma and are used as flavour agents in baked goods, meat and fish dishes, ice cream, alcoholic beverages and herb mixtures [1, 2, 3].

Fennel is a widespread uses as medicinal plant because of various pharmacological activities. Also, it is believed to be one of the oldest medicinal plant in the World [4]. It is commonly used to treat amenorrhea, angina, asthma, heartburn, high blood pressure a mild appetite suppressant with culinary and medicinal uses. Fennel seeds are anise (Pimpinella anisum L.) like in aroma and are used as flavour agents in baked goods, meat and fish dishes, ice cream, alcoholic beverages and herb mixtures [1, 2, 3].

Fennel is well-recognized for its essential oil. The major components which are in fennel seed essential oils are trans-anethole, fenchone, estragol (methyl chavicol), and α-phetlrandrene and The relative concentration of these compounds varies considerably depending on the phonological stage and origin of the fennel [5]. Fennel has been reported to contain 6.3% of moisture, 9.5% protein, 10% fat, 13.4% minerals, 18.5% fibre and 42.3% carbohydrates. The minerals and vitamins in F. vulgare are calcium, potassium, sodium, iron, phosphorus, thiamine, riboflavin, niacin and vitamin C [6].

In general, there is a lack of cytogenetic report on Fennel in TURKEY. This paper provides cytogethenical knowledges about Fennel (Foeniculum vulgare Mill.) from Ankara, TURKEY

MATERIAL AND METHODS
Fennel seed were obtained from USDA (United States Department Of Agriculture). It is presented in table 1.

All cytological observations were made from root tips. For visualizing somatic chromosomes, root tips were obtained from germinated fennel seeds germinated in petri dishes at room temperature (25 °C). 2-3 days old root tips were pre-treated in 0.002 M 8 hydroxyquinoline in +4 °C for 2.5 hour then fixed in glacial acetic acid for 30 minutes and transferred to 70% ethanol for long storage. When the root tips were analyzed, they hydrolyzed with 1 N HCl for 12 minutes in room temperature (25 °C). After hydrolyzing, root tips were transferred to 70% ethanol for long storage. When the root tips were analyzed, they hydrolyzed with 1 N HCl for 12 minutes in room temperature (25 °C). After hydrolyzing, root tips stained with 2% aceto orcin in darkness for 2.5 h. Then, finally squashed in 45% acetic acid. Slides were observed with Olympus BX-51 microscope and photographs were taken with Olympus BX-51 camera, magnification was 800x. Six chromosomal parameters were measured by Micro Measure 3.3 program [7]; i.e., chromosome length (c), relative length (RL), the long arm (L) and short arm (S) lengths, arm ratio (AR: L/S), centromeric index (S/C). Ideograms were drawn based on long arm length/short arm length. Karyotype formulas and chromosome positions of Fennel were determined by [8].

RESULTS and DISCUSSION
According to the cytologic studies that is carried out on the root tips of the fennel the number of somatic chromosome and the caryologic characteristics. It’s found out that Fennel has the number of chromosomes as 2n=22 and its caryotype formula has been measured as 18 median + 4 submedian (18 m + 4sm) (Figure 1). In reference to results, our findings are parallel the other researchers findings [9, 10, 11]. As it is presented in table 1, the species who has a total chromosome length of 32.18 µm, the length of the chromosomes with haploid (n) numbers are within the range of 1.71-1.212

Table 1. Knowledges about Fennel

<table>
<thead>
<tr>
<th>Group</th>
<th>Plant Name</th>
<th>Taxonomy</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 117336</td>
<td>113</td>
<td>Foeniculum vulgare Mill.</td>
<td>Ankara-TURKEY</td>
</tr>
</tbody>
</table>
µm and the average of the chromosome length has been measured 1.463 µm. Relative length has been measured for the maximum level as 5.38% and for the minimum level as 3.76%. It’s been observed that the long arm lengths of fennel are within the range of 1.06-0.69 µm and its short arm lengths are within range of 0.84-0.38 µm. The arm ratio of the chromosomes have reached values between 2.79-1.04 µm. When centrometric index has been observed, the chromosome number 1 had the highest value as 0.74 and the chromosome number 7 had the lowest value as 1.81.

### REFERENCES


and food chemistry, 54(18), 6814-6818.


