A chromosome cellular study for some Papilionoideae plants

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Abstract - The study was conducted on ten types of plants belonging to sub family Papilionoideae which belong to the Leguminosae family. The aim of the study is to know the numbers of the chromosomes representing each type under study, also to know the length of these chromosomes and their types depending on the location of the centromere piece then studying the dimensions of the cells of the elongation zone of the types under the study.

The results of the study indicates that there are differences in the numbers of monocular chromosomes representing the types under study, thus it was noticed that the monocular number (N=17) represents the type of Vicia faba and the monocular number (1N=18) represents the type of Pisum sativum and Lathyrus sativus. The monocular number (N=11) represents Phaseolus vulgaris and the types of vinga unguiculata and Phaseolus mango and the monocular number (1N=11) represents the type of Cicer arietinum and Trigonella foenum graecum and the monocular Number (1N=20)represents Glycin max.

The results showed differences in the length of chromosomes belonging to the studied types and we find the longest type of chromosomes in Glycin max is an average of 93.6 micrometer. Phaseolus mango with a length of 64.6 micrometer. Phaseolus vulgaris with a length of 51.1 micrometer. Lathyrus sativus with a length of 48.5 micrometer. Pisum sativum with an average of 64.6 micrometer, vinga unguiculata with 45.1 micrometer, Trigonella foenum graecum with 31.6 micrometer, Vicia faba with 28.7 micrometer and the less is Cicer arietinum with 1.27 micrometer.

The results showed differences in types of chromosomes belonging to the studies plants in their classification according to the location of central piece. We notice the existence of five pairs in the middle of Centromere of vicia faba, the existence of six pairs in the middle of Centromere, one pair under middle of Centromere Lathyrus sativus. It was noticed that the pairs of Phaseolus mango all locate in the middle of Centromere, found four pairs the middle of Centromere in cicer arietinum, noticed four pairs the middle of Centromere and under the middle of centromere in Lens esculenta, ten pairs of the middle centromere and one pair under the middle of centromere in vinga unguiculata, eight pairs the middle centromere and three pairs under the middle of centromere Phaseolus mango, fourteen pairs the middle of centromere and sex pairs under the middle of centromere in Glycin max, six pairs the middle of centromere and two pairs the middle of centromere in Trigonella foenum graecum.

The results clear to differences existence in the dimensions of cells elongation zone of the studies types, thus it was noticed that the cells of vicia faba plant has an average of 26.6 micrometer is the longest, and the less one is Phaseolus vulgaris with an average of 19.7 micrometer, the average of the width of the cells was the highest on pisum sativum with an average of 16.9 micrometer and the less was in Lathyrus sativus of 13.0 micrometer.

Here we conclude, that every type of the studied species have their own genetic nature which are represented in number of chromosomes and their length, the location of central piece and the dimensions of the cells that give the special characteristics to these plants.

I. Introduction

The Papilionoideae is considere the plants which belong to fabaceae (Legumenosae) family and it is the most The biggest seed family after Asteraceae (composite) family from the number of its types [Banda, 1974] and one of the most important plant families from the economic perspective after Poaceae (Garminae) [Gust and Townsend, 1974].

The Papilionoideae is considere the third big family of the developing plants after Orchidaceae and Asteraceae family. It contains 440 Genus and 12,000 species [Raven and Polhill, 1981; 1996 Humphreys], the fabaceae family is divided to three sub-families which are The Papilionoideae, Mimosoideae and Caesalipinoideae [Ghafoor and others, 2003]. The Papilionoideae is considere the biggest included about 440 Genus and 12,000 species distributed in the rainy area and dry and cold deserts, it consists of 9 family but now includes 32 family [Giller and willson, 1991]. The Papilionoideae plants are usually grasses and less are trees, its leaves are compound and plumy, the flower is bisexual and the fruit is podded, and insect pollination [Dasgupta and Singh, 2003]. It has nutritional importance as it consists of much Protein and it is the most The big seed family after Asteraceae family. It is a big seed family after Asteraceae family. It contains 440 Genus and 12,000 species in the rainy area and dry and cold deserts, it consists of 9 family but now includes 32 family [Giller and willson, 1991]. The Papilionoideae plants are usually grasses and less are trees, its leaves are compound and plumy, the flower is bisexual and the fruit is podded, and insect pollination [Dasgupta and Singh, 2003]. It consists of much Protein and it is the most The big seed family after Asteraceae family. It contains 440 Genus and 12,000 species.

Economically the legume plants was the best importance in dicotyledeousous because was domesticated by human, the legumes supply Edible products further to seeds, study the cases of polyploidy for the fabaceae family in north of Nigeria and the rate reached 15.4% ,rate in The Papilionoideae arrived 1.92% and they noticed that the role of non chromosomal imbalance in the development of fabaceae family is limited in general but some genus have (n=11,12,13) and the imbalance sequence of chromosomes wide type this is seen clearly in some

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like genus *Senna* [Haecker and others, 2004; Khantoon and Ali 1993].

The cellular studies in The Papilionoideae Included different sides in chromosome like Number variations and composition and the study of the chromosomal features and the nature of meiosis division, the cellular characteristics and share in the study of classification relations specially in the level of species and genus, the importance of properties return the to the characteristics derived from chromosomes to the Genes exist on them, thus difference between the plants in the characteristics of the chromosomes reflects the genetic difference between them [2005 Okoli, Agbegwa] indicated [Bhattacharya, 2003] for the study the polyploidy in different genomes of this sub family like *Onobrychis capitgalli*, and thought that the development direction in most of these genus of this sub family was by reduce the basic number of chromosomes, and considered that *Coronilla emerus* that has (2N=14) chromosome is the most genus of species primitive and the developed the species like *C Viminalis*, *C scorpoide* that contain (12) bilateral chromosome dangerous more because of reducing of chromosome number from (14) to (12) chromosomes but *C Gluca*, *C Varias* in which each of them has (12) chromosomes was because of multiplication of the basic number of chromosomes after reducing has occurred. Because of importance of this sub family and the less of cellular and chromosomal studies which done to their economic types, the aim of this study was:

- determine and calculate the chromosomal number of some economic types belonging to the sub family
- determine the length of chromosomes and their types belonging to this sub family
- compare the length of the chromosomes of different types in length and location of centric piece
- study the dimensions of cells in the elongation zone - and its compare in studied species.

II. MATERIALS AND METHODS

This study was conducted in Department of Biology – college of Education for pure science/University of Anbar in academic year 2012/2013. By using ten plants belonging to the sub family papilionoideae (*Pisum Sativam, vicia faba, vagna unguiculata, cicer arietinum, Lens esculentus, phaseolus vulgaris, phaseolus mango, Trigonella foenum graecum, Lathyrus sativus, Glycin max*), where it was cultivation plant species above in Petri dishes on the filtering paper at a rate of 10 seeds each dish Paper under laboratory environmental conditions using the incubator. After fixing temperature at a rate of 25 °C with keeping wetting. Hydration seed which germinated after 4 days, the roots were cutting for Plant species in length (2) cm, then all the samples placed in a solution Colchicine 0.01% In the refrigerator For 4 hours degree 4°C. For the purpose of stopping cell division at stage of metaphase and activate chromosomes, Then it was moved from the solution Colchicine to Fixed Farmer For 24 hour. For the purpose of conservatism the structure of chromosomes and morphology, then washed by water to dispose of the effects of alcohol and acid and conserved In ethyl alcohol Concentration 70% to conservative on the foundation of the roots. The samples are then placed in a solution Hcl Concentration 1N In a water bath by temperature 60. To analyze the cell wall and the ease clarity of chromosomes, then transferred In a beaker containing stain Aceto -carmin For 5 minutes to conquest the chromosomes of the stain for ease of vision, then took the ends of the colored roots and place on a clean glass slide then worked in the longitudinal section for roots. It was covered by a Cover slide and gently pressure it between two layers of filtering papers to disposal from excess stain and put the roots of plants species samples under check by microscope under the power enlarge (40x, 100x), through it has been personification and discrimination cells, chromosomes and their numbers with the naked eye, the measurements of lengths and width of the cells and chromosomes Been measured by standard Ruler kind by Measure unity micrometer.

III. RESULTS AND DISCUSSION

In chromosomal studies the number of chromosomes were calculated in ten plants of sub Papilionoideae which are in *Vicia faba* as the table (1-4) and the image (1-4) represent the number of chromosomes that which carried cells of *Vicia faba*. The results show that the cells of the plant belonging to this species *Vicia* 1N=6 monocular chromosomes and the bilateral chromosome number 2N=12 chromosome, the results show that the total length of chromosomes are 28.7 micrometer, it was noticed that the longest chromosome is between 5.7 to 3.5 micrometer, these chromosomes included five metacentric pairs in and one pair sub metacentric of Centromer, from noticed chromosomes length found her that three pairs of chromosomes classified as long chromosomes and two pairs are middle length and one pair is short. This number of chromosomes and their length is considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [Kumar, 1990], this number of chromosomes carry all the genes needed to give their morphological properties to this species, the number may indicate a positive development in plants of this species, where the researchers that consider that less of chromosomes number which their carry by plant cells that consider positive development [2003, Bhattacharya], this development occurs because of environmental pressure and genetic mutations and new recombination that happen in the time of meiosis division, thus we notice that the *Vicia faba* plants has a different feature from other plants which belonging to the same sub family.

Image (1-4) number of chromosomes in *Vicia faba*

Explain in the plant *Lathyrus Sativus* as the table (1-4) and image (1-4) which indicate in to the numbers and dimensions of chromosomes. The results show that number of monocular
plants has a different feature from other plants which belonging of meiosis division, thus we notice that the *Lathyrus Sativus* genetic mutations and new recombination that happen in the time development occurs because of environmental pressure and that consider positive development [Bhattacharya, 2003], this less of chromosomes number which their carry by plant cells that this species, where the researchers that consider that less of chromosomes number may indicate a positive development in plants of this species, the number may indicate a positive development [Mercado, 1996]. This number of chromosomes and their length is considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [Klamt, 2000]. These numbers of chromosomes carry all the genes needed to give their morphological properties to this species, the number may indicate a positive development in plants of this species, where the researchers consider that less of chromosomes number which their carry by plant cells that consider positive development [Bhattacharya, 2003], this development occurs because of environmental pressure and genetic mutations and new recombination that happen in the time of meiosis division, thus we notice that the *Lathyrus Sativus* plants has a different feature from other plants which belonging to the same sub family.

**Image (2-4) shows numbers of chromosomes in *lathyrus Sativus***

In plant of *phaselous vulgaris* as the table (1-4) and image (3-4) represent the number of chromosomes that which carried cells of *phaselous vulgaris*. The results show that the cells of the plant belonging to this species *phaselous* (1N=11) monocular chromosomes and the bilateral number (2N=22) chromosome, the results show that the total length of chromosomes are 51.1 micrometer, it was noticed that the longest chromosome is between 6.5 to 3.5 micrometer and all chromosomes are metacentric, from noticed chromosomes length found her that four pairs of chromosomes classified as long chromosomes and four pairs are middle length and three pairs are short. This number of chromosomes and their length are considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [Mercado, 1996]. This number of chromosomes carry all the genes needed to give their morphological properties to this species, the number may indicate a positive development in plants of this species, where the researchers consider that less of chromosomes number which their carry by plant cells that consider positive development [2003, Bhattacharya], this development occurs because of environmental pressure and genetic mutations and new recombination that happen in the time of meiosis division, thus we notice that the *phaselous vulgaris* plants has a different feature from other plants which belonging to the same sub family.

**Image (4-4) indicates Number of single chromosomes in *Pisum Sativum***

In *Cicer arietinum* plant as the table (1-4) and the image (4-5) represent the number of chromosomes that which carried cells of *cicer arietinum*. The results show that the cells of the plant belonging to this species *cicer arietinum* (1N=7) monocular chromosomes and the bilateral number (2n=14) chromosome, the results show that the total length of chromosomes are 36.9 micrometer, it was noticed that the longest chromosome is between 3.4 to 6.9 micrometer, as it noted the existence of differences in the location of central piece where the results show that there are four pairs metacentric and three pairs sub metacentric, from noticed chromosomes length found her that four pairs of chromosomes classified as long chromosomes and three pairs are middle length. This number of chromosomes and the location of central piece indicates to identity of the plant and distinguishes it from others that belong to the same sub family, this was indicated [Neuman, 2002], as it carries a group of necessary genes that gives it different characteristics, the number of chromosomes indicates positive development.
that gives it different characteristics, the number of chromosomes indicates positive development.

Image (5-4) indicates number of chromosomes in *cicer arietenum*

In *Lens esculenta* plant as the table (4-1) and image (6-4) represent the results that have been obtained from the study of species *Lens esculenta* belonging to sub family Papilionoideae. The results show that the cells of the plant belonging to this species *Lens* 1n=7 monocular chromosomes and the bilateral number 2n=14, the results indicate to the existence of obvious differences in the lengths of chromosomes, that the total length of chromosomes are 84.5 μm, the longest one is 9.4 and the shortest is 4.8 micrometer, as it noted the existence of differences in the location of central piece where the results show that there are four pairs metacentric and three pairs sub metacentric, from noticed chromosomes length found here that three pairs of chromosomes classified as long chromosomes and four pairs are middle length. This number of chromosomes and their length is considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [1981, Pandey]. This number of chromosomes carry all the genes needed to give their morphological properties to this species, the number may indicate a positive development in plants of this species, where the researchers consider that less of chromosomes number which their carried by plant cells that consider positive development.

**Image (4-7) indicates chromosomal number belonging to *vigna unguiculata***

In *Phaselous mango* plant as the table (4-1) and image (8-4) represent the number of chromosomes that which carried cells of *Phaselous mango* belonging to sub family Papilionoideae family, the results show that the cells of the plant belonging to this species 1n=11 monocular chromosomes and the bilateral number 2n=22 chromosome, shows differences in the length of chromosomes, it was noticed that the longest chromosome is between (3.1) to (7.6), the results show that the total length of chromosomes 64.5 micrometer, as it noted the existence of differences in the location of central piece where the results show that there are eight pairs metacentric and three pairs sub metacentric, from noticed chromosomes length found here that four pairs of chromosomes classified as long chromosomes and five pairs are middle length. This number of chromosomes and their length are considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [Lewis and others, 2005]. This number of chromosomes carry all the genes needed to give their morphological properties to this species, the number may indicate a positive development in plants of this species, where the researchers consider that less of chromosomes number which their carry by plant cells that consider positive development [2003 Bhattacharya]. This development occurs because of environmental pressure and genetic mutations and new recombination that happen in the time of meiosis division, thus we notice that the *Lens esculenta* plants has a different feature from other plants which belong to the same sub family.

**Image (4-6) shows number of chromosomes in **"*Lens esculenta***

In *Vigna unguiculata* plant as the table (4-1) and image (7-4) represent the number of chromosomes that which carried cells of *vigna unguiculata*, the results show that the cells of the plant belonging to this species (1n=11) monocular chromosomes and the bilateral number (2n=22) chromosomes, the results show that the total length of chromosomes are 45.1 μm, it was noticed that the longest chromosome are between 3.1 to 5.3 micrometer, It was noticed that there are ten pairs of chromosomes of the metacentric and one pair in the sub metacentric, from noticed chromosomes length found here, that four pairs of chromosomes classified as long chromosomes and four pairs are middle length and three pairs are short. This number of chromosomes and their length is considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [1981, Pandey]. This number of chromosomes carry all the genes which needed to give their morphological properties to this species, the number may indicate a positive development in plants of this species, where the researchers consider that less of chromosomes number which their carried by plant cells that consider positive development.
Image (8-4) indicates number of chromosomes in the phaselous mango (x40)
In Glycin max plant as the table (4-1) and image (9-4) represent the number of chromosomes that which carried cells of Glycin max belonging to sub family Papilionoideae family. The results show that cells of the plant belonging to this species 1n=20 monocular chromosomes and the bilateral number 2n=40 chromosomes, the results show that the total length of chromosomes are 93.6, the longest one is 4.8 and the shortest one is 2.3, as it noted the existence of differences in the location of central piece where the results show that there are 14 pairs metacentric and six pairs sub metacentric, from noticed chromosomes length found her that eight pairs of chromosomes classified as long chromosomes and 7 pairs are middle length and 5 pairs short. This number of chromosomes and their length is considered special for this type as it represents plants of this kind and differentiates them from others of the same sub family, this was indicated [Blanc and Wolf, 2005]. It was noticed that there were no positive development in them as still the numbers of chromosomes are more, these numbers carry some gens needed to give the features of this kind.

Image (10-4) shows number of chromosomes belonging to Trigonella foenum graecum

In cellular Study the dimensions of the cells were studied in the elongation zone which the table (12-4) shows the width and length dimension of the studies cells, the numbers indicate the average of the longest 30 cells, we find that the first longest cells are in Vicia Faba plant with 27.4 micrometer, the second in Pisum Sativum with 26.6 micrometer, the third in phaselous mango with 26.0 micrometer, the fourth in cicer orientinum 25.8 micrometer, the fifth in Glycin max 25.2 micrometer, the sixth in Trigonella foenum graecum 24.5 micrometer, the seventh in Lathyrus Sativus 23.3 micrometer, the ninth in vigna anguiculata 23 micrometer, the less one in phaselous vulgaris plant with 19.7 micrometer. The average of the width of the plants, the table (12-4) shows that the widest cell belonging to Pisum sativum is 16.9 micrometer, in cicer orientinum and Vicia faba 15.2 micrometer, in phaselous 14.4 micrometer, in Trigonella foenum graecum and Vigna unguiculata 14.2 micrometer, in Lens esculenta 13.7 micrometer, in phaselous mango 13.2 micrometer and the less wide in Lathyrus sativus 13.1 micrometer. The of cells differences in sizes, may indicateto the size of the plant which according for studing species, the cells number and their size indicate to siz of plant, that the sizes of cells caused to increase in the size of plant.
Table (4-2) Explain average of length and and width of elongation zone cells of studied types which measured by micrometer.

<table>
<thead>
<tr>
<th>Plant species</th>
<th>Average of width the cells (micrometer)</th>
<th>Average of elongate the cells (micrometer)</th>
<th>Plant species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vicia faba L</td>
<td>15.2</td>
<td>27.4</td>
<td>- 1 Vicia faba L</td>
</tr>
<tr>
<td>2. Lathyrus sativus</td>
<td>13.0</td>
<td>23.3</td>
<td>- 2 Lathyrus sativus</td>
</tr>
<tr>
<td>3. Phaseolus vulgaris</td>
<td>14.4</td>
<td>19.7</td>
<td>- 3 Phaseolus vulgaris</td>
</tr>
<tr>
<td>4. Pisum sativum</td>
<td>16.9</td>
<td>26.6</td>
<td>Pisum sativum</td>
</tr>
<tr>
<td>5. Cicer arietinum</td>
<td>15.2</td>
<td>25.8</td>
<td>- 5 Cicer arietinum</td>
</tr>
<tr>
<td>6. Lens culinaris</td>
<td>13.7</td>
<td>23.9</td>
<td>- 6 Lens culinaris</td>
</tr>
<tr>
<td>7. Vigna unguiculata</td>
<td>14.2</td>
<td>23</td>
<td>- 7 Vigna unguiculata</td>
</tr>
<tr>
<td>8. Phaseolus mango</td>
<td>13.2</td>
<td>26.0</td>
<td>- 8 Phaseolus mango</td>
</tr>
<tr>
<td>9. Glycin max</td>
<td>13.3</td>
<td>25.2</td>
<td>- 9 Glycin max</td>
</tr>
<tr>
<td>10. Trigonella foenum graecum</td>
<td>14.2</td>
<td>24.5</td>
<td>- 10 Trigonella foenum graecum</td>
</tr>
</tbody>
</table>
Table (4-1) Indicates to numbers of single double chromosomes and pairs number of each sample from chromosomes in types of sub family papilionoideae which under study.

<table>
<thead>
<tr>
<th>Plant species</th>
<th>Chromosomes species</th>
<th>Chromosomes</th>
<th>chromosomes</th>
<th>Plant species</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>St.C</td>
<td>S.m.C</td>
<td>M.C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total short arm length (micrometer)</td>
<td>Total length arm lengths (m)</td>
<td>Total Chromosomes lengths (m)</td>
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<td>Vicia faba</td>
<td></td>
<td>10.9</td>
<td>17.8</td>
<td>28.7</td>
</tr>
<tr>
<td>Lathyrus sativus</td>
<td></td>
<td>20</td>
<td>28.1</td>
<td>48.1</td>
</tr>
<tr>
<td>Phaseolus vulgaris</td>
<td></td>
<td>21.5</td>
<td>29.6</td>
<td>51.1</td>
</tr>
<tr>
<td>Pisum sativum</td>
<td></td>
<td>13</td>
<td>23.8</td>
<td>36.9</td>
</tr>
<tr>
<td>Cicer arietinum</td>
<td></td>
<td>12.1</td>
<td>15.9</td>
<td>27.1</td>
</tr>
<tr>
<td>Lens culinaris</td>
<td></td>
<td>17.8</td>
<td>30.7</td>
<td>48.5</td>
</tr>
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<td>Vigna unguiculata</td>
<td></td>
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<td>25.9</td>
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<td>38.3</td>
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<td>Trigonella foenum graecum</td>
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<td>18.8</td>
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</table>
REFERENCES


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