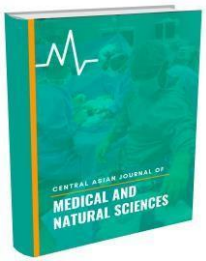

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Article

A Comparative Taxonomic Study of Pomegranate Plants Punica Granatum and Linna and the Physiological Diseases that Affect it in Kirkuk Governorate

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Abstract: The current research dealt with a comparative taxonomic study of the Pomegranate plant Punica granum, which belongs to the Pomegranate family Punica ceae. Where the extent to which this plant is affected by environmental conditions in many areas in Kirkuk Governorate was clarified, the research was conducted in Al-Zab district (Sharia village, Ranji village), Hawija district, Al-Abadat village / Daquq district, Kirkuk governorate. The phenotypic study included the characteristics of stems, leaves, flower heads and quantitative and qualitative reproductive organs, and it was found that these traits have great taxonomic importance and the variations within the traits were discussed. The current study showed that the studied pomegranate varieties have been infected with some physiological diseases such as cracking fruits and sun blight.

Keywords: Classification, Kirkuk Governorate, Pomegranate plant, Hawija District, Daquq District, Cracking of fruits, Sun blight.

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1. Introduction

The pomegranate Punica granatum L of the fruits of the temperate region, which belongs to the family Pomegranate Punicaceae and is one of the oldest types of fruit that eat its fruits, which were mentioned in the Holy Quran and as mentioned in many Pharaonic writings where the trees and fruits of pomegranate were known to the ancient Egyptians and found painted on the walls of their tombs as trees were planted in the hanging gardens in Babylon (1–3) ,Most sources indicate that Central Asia in general and Persia and its surroundings are the original home of pomegranates, from which its cultivation spread in different countries of the world, and it is believed that China, India and Iraq may be among the first places of origin of pomegranates (4).

Pomegranate cultivation in Iraq succeeds well to suit the environmental conditions for it, despite the need to provide protection for its fruits from the sun blight in summer and is grown in Iraq more than 23 varieties, the most important of which is the most common Salimi variety in the central and southern regions (5)Pomegranate also has some medical and therapeutic benefits, the most important of which are anthocins, vitamins

and phenolic substances, which have proven their effectiveness as anti-inhibitory substances for a number of pathogens (6,7).

He explained (8) in a study conducted for some varieties of pomegranate that the predominant sugars are glucose and fructose while the proportion of both sucrose and maltose is very few, but for organic acids, malic acid and citric acid are predominant in the juice. The pomegranate tree grows in soils of varying texture, fertility and nutrient content, and is grown in soils that border low-fertility soils (9).

The pomegranate tree is infected with some physiological diseases such as cracking fruits (10) and also the phenomenon of sun (11).

Research Objectives: -

1. Study of the biodiversity of pomegranates in Hawija District / Daquq District in Kirkuk Governorate.
2. Formal description of the studied varieties.
3. Determine the appropriate varieties for manufacturing or fresh consumption.
4. Study the extent to which the pomegranate plant is affected by harsh environmental conditions (high temperatures, drought, water salinity)
5. Study the diseases that affect the pomegranate varieties current

2. Materials and Methods

A. Study Area: Study aeris the study area, which includes these areas (the villages of Sharia, Zararia, Ranji) belonging to the Hawija district, and the village of Al-Abadat of the Daquq district in Kirkuk Governorate, is characterized by the presence of pomegranate plant planted in orchards. In terms of area for each area, it was 10 km.

B. Specemens Collection: The samples of the study were collected from the Pomegranate plant Punica granatum L by making field trips from the beginning of March of 2022 until the end of June of 2022, and the plant was collected during the flowering and fruiting stages and its phenotypic characteristics were studied.

3. Results

All results for pomegranate plant members are in table (1) and figure (1).

1. Botanical classification of Pomegranate Punica granatum L. The pomegranate plant was classified in 1753 by the scientist Linnece as shown in Table (1).

. Common names of the pomegranate plant Punica granatum L2

French Name:- Grenadier

English Name :- Pomegranate

Arabic Name :- Pomegranate (12)

Morphological description of the pomegranate plant Punica granatum L .3

A. A tree study :is a small tree or deciduous shrub in dry desert areas and semi-deciduous in coastal areas. The height of the tree usually reaches between 4-5 m, although it can be much higher (13). The shape of the trees is irregular they are many branches and give many cancers come out of near the surface of the earth (14) and branches cylindrical smooth striking tanning flexible and turn some of the lateral branches to short thorns (13) and this is what was illustrated in Figure(1).

B. Study of Leaves : The leaves of the pomegranate plant are full smooth shiny located opposite lanceolate shape, the leaf has a short stand, the length of the leaf is 1-8 cm, and its width is 0.5-2 cm. [11](15).

C. Study of flowers: Flowers Pomegranate flower is red large size hermaphrodite be single or in inflorescences Each inflorescence contains 1-5 flowers and the length of the flower 4-6 cm and diameter 5-7 cm shaped tubular or bell, the cup

of the flower is thick fleshy conjunctiva, red color petals loose vary the number of each of the spikes and the number of petals even within one tree and ranges between 5-7, The stamens are many red, the anther is pale yellow and has two heart-shaped lobes(15,16)

D. **Study of fruits:** The cover of the fruit for the tube of the cup that grew inside the ovary and the top of the fruits are the same sepals and inside the stamens and the color of the peel varies from yellowish white or greenish to dark crimson even black according to the varieties (15,16).

The reading was taken on an average of 4 ripe fruits from each tree for each studied model, where they are taken randomly on the perimeter of the tree, studying the following characteristics:

Fruit shape: The fruit shape index was calculated by length/width ratio (17). -
- Fruit base shape: planar as in healthy red - convex as in the two varieties Laffan 1 and Laffan 2 (17)
- Cup shape: Collected sepals as in the red Salimi variety - semi-open as in Laffan 2 - Open as in Laffan 1 (18).
- Shell color: green tinged with copper color as in the class of Laffan 1 - Red tinged with a copper color as in the class of red Selimi - Yellowish green as in the class of Laffan 2.
- The presence of cracking in the fruit: not cracked as in the two varieties Laffan 1 and Laffan 2 - cracked as in the variety of red Salimi.
- Rate of thorn presence: spinless as in Laffan 2 – Few thorns as in the red varieties [13], [14], [17] Salimi and Laffan 1 (19).

E. **Study of seeds**

The seed is ribbed shell is a thin or thick gelatinous layer of water texture containing some dissolved substances such as sugars and acids, and the color of this layer varies from white to red according to varieties. The seeds and their gelatinous layers are the part of the fruit that is eaten. The inner seeds (nucleus) are hard corneal skin inside which the embryo is located [13], [14]10].

Morphological specifications of the studied varieties the varieties were named and their specifications were mentioned based on what was mentioned in (20)**.**

Turnip 1

Tree: drooping up to m long, few thorns. -
- Leaves: full edge light green color with a waxy texture elongated shape and with a rounded top. Vegetative buds begin to bloom at the end of February.
Flowering: The flowering period begins at the end of March; the color of the flower is orange-
Fruits: spherical flat medium size, the color of the peel is yellowish-green. -
The top of the fruit: slightly convex, and the cup is large with spaced petals. -
Seeds: pink color the color darkens as the fruit matures. -

(Salimi) The Red

ree: drooping, few thorns, length of - m.
Leaves: the leaf is small in size, lanceolate of dark green color with a compact top, buds bloom in mid-February until early March.
Flowering: Flowering begins at the end of March; the flower is light red in color.
Fruits: flat spherical with a red color tinged with a copper color, the fruits ripen in November and crack as maturity progresses.
Seeds: crimson in color and regularly compacted.

Turnip 2

The tree is pyramidal and thornless. -
- Leaves: The leaf is small, lanceolate, full-edge, green with a pointed top, buds bloom in mid-February and continue until the beginning of March.
-Flowering: flowering begins at the end of March and lasts until mid-April; the color of the flower is orange. -- -Fruits: The fruit is spherical with a yellowish-green color tinged with an orange color in terms of exposure to sunlight, the color spreads with maturity, and it is on the tree and the fruits are not cracked and can remain for a long time on the tree.
- The calyx has semi-open and short petals.
-Seeds: white dry color.

- Some physiological diseases that affect the pomegranate plant5

1: the fruits cracked

Date of infection: The infection occurs at all stages of fruit growth, but its percentage varies from one stage to another, so most of them are in the stage of completion of fruit growth and maturity, and this problem causes damage to approximately a third of the marketable crop.
Symptoms of infection: The infection appears on the fruits in the form of cracks and cracks take different forms in the fruits may be longitudinal, transverse or oblique in the middle with the splitting of the fruiting bearer.

Causes of cracking:

1-The sensitivity of some varieties to infection, especially thin-shelled varieties.
- High air or ground humidity inside the farm.2
3 - Irregular irrigation, especially during the growth and ripening of the fruit, causes an imbalance of water inside the fruits, as the thirsting and then heavy irrigation, especially in the summer, leads to the loss of moisture from the rind of the fruit and an increase in the growth rate of seeds from the rate of growth of the shell, which creates severe pressure from the inside out that leads to splitting.
- Deficiency of some nutrients especially (calcium, boron, copper) (11).

2: The phenomenon of sun: blight increased exposure to sunlight and the length of time with high temperature and lack of water with the sensitivity of some varieties. Reasons (11):
Exposure of fruits to direct intense sunlight, especially when the temperature rises above 35 °C.-1
Lack of vegetation as a result of poor soil and lack of care for fertilization. **-2**

: Sensitivity of some varieties3

Symptoms of infection: Symptoms appear in the form of many brown spots sunken somewhat, may be separated or connected to each other and then be a large or small sunken spot prevails color, especially around the base of the fruiting carrier of the fruit. The results showed that the Laffan 1 variety reached the highest height for the crown, reaching 3 m compared to the other two varieties, and it is precipitated and has few thorns (19). While the height characteristic in the leaves, the record of the Selimi variety was the highest limit, reaching 8.7 cm and a width of 3.2 cm with an elongated shape and a rounded top. As for the fruits, they were large in the Salimi variety, where the length of the fruit reached 10 cm and a width of 7.6 cm.

Environmental conditions such as high temperature and water salinity made the seed color in the Laffan 1 variety white, semi-ripe, dry, rocky with low water content, while the color of the seeds in the other two varieties Al-Saleem and Al-Laffan 2 was crimson red, pink respectively.

We noticed through the results that some of the currently studied varieties have been infected with some physiological diseases such as cracking fruits and sun blight, the red variety has been infected with cracking disease, a physiological disease that affects both large and small fruits and that the reason for the occurrence of this

disease mentioned above to reduce the phenomenon of cracking and treatment must be sprayed pomegranate trees with gibberellic acid (GA3) and this may be due to the role of gibberellik in controlling the process of water balance within the fruits because it is a source of attraction for water and nutrients and delay yellowing of leaves Increasing the efficiency of photosynthesis in addition to organizing the irrigation process and following the drip program (10)

Spraying pomegranate trees with potassium nitrate led to a decrease in the percentage of cracking and the reason is due to the role of potassium nitrate in building cell walls and then obtaining a coherent coherent crust covered with cuticle well.

We also note that the Laffan 1 variety has been infected with sun blight disease as a result of the reasons that have been mentioned above and to reduce this phenomenon, the fruits must be bagged after the contract stage by about three weeks using a bergamine bag, which helps to permeate the light of the fruits and thus produce high-quality fruits in terms of fruit shape and coloring, as well as maintaining the fruits from wounding, birds and insects, especially pomegranate fruit worm infestation, as well as spraying trees with kaolin at a concentration of 4% in the months of June and July, taking into account Repeated spraying process, especially at high temperatures (11).

4. Conclusion

1. The presence of a great diversity of pomegranate varieties in this region.
2. These varieties vary in terms of their maturity.
3. The two categories are distinguished by the 1 and the Fann 2 by not cracking their fruits, so they can be kept late in the year.
4. Sulay -red red variety with fruit cracking, while the Lafan 1 variety suffered from sunlight.
5. Varieties are affected by environmental conditions (temperature, salinity of water), especially the peeling category 1, where its fruits were low water content and rocky stiff seeds.

Table 1. Pomegranate Plant Classification Punica granatum L

Kingdom	Plantae	Plante	Regne
Phylum	Seed plants	Spermaphyte	Embranchement
Sub phylum	Angiosperms	Pingiosperme	Sos embranchement
Classe	Bicotyledonia	Magnoliopsida	Classe
Order	Exponential	Myntales	Ordre
Family	Punicaceae	Punicaceae	Famille
Genus	Pomegranate	Punica	Genus
Species	Fruitful Pomegranate	Punica granatum L.	species

Table 2.) Crown characteristics of the studied pomegranate varieties

Crown height	**Crown shape Thorns**	**Ltem**

Big	**3 m**	**Few**	**Lying down**	**Turnip 1**
Medium	**2.70 m**	**Few**	**Dangling**	**The Red**
Medium	**2.90 m**	**Nothing**	**Pyramidal**	**Turnip 2**

Table 3.) Some formal specifications of the papers of the studied varieties.

The shape of the top	Leaf shape	Sheet width	Sheet length	Item
Pointed	Spear	cm 1.3	6.7cm	Turnip 1
Compressed	Spear	cm 3.2	cm 8.7	(Salimi) The Red
Rounded	Elongated	1.4 cm	cm 8.6	Turnip 2

Table 4.) Length and diameter of pomegranate fruit

The diameter of the fruit	Fruit length	Ltem
cm 6.5	**cm 7.3**	**Turnip 1**
cm 7.6	**cm 10**	**(Salimi) The Red**
cm 7.2	**cm8.5**	**Turnip 2**

Table 5.) Phenotypic characteristics of pomegranate fruits.

The degree of cracking of the fruits	Shell color	Cup shape	The shape of the base of the fruit	The shape of the top of the fruit	The shape of the fruit	Item
Not cracked	Green like a copper color	Open	Convex	Flat	Flat spheroid	Turnip 1
Cracked	Red like a copper colour	Gathered	Flat	Flat	Flat	The Red (Salimi)

Not cracked	Yellowish green	Semi-open	Convex	Flat	Spherical	Turnip 2

Table 5. Pomegranate seed color variation of the studied varieties.

Chemical Components	Plant Compounds
Anthocyanins, glucose, ascorbic acid, gallic acid, caffeic acid, catechin Quercetin, minerals, amino acids.	Pomegranate Juice
.95 % Gallic acid, punicic acid, other fatty acids and sterols	Pomegranate Seed Oil
Gallic acid, catechin, quercetin, flavonols, flavonones, flavones, anthocyanins	Pomegranate Peel
Tannins, flavonoid glycosides.	Leaves
Gallic acid, triterpenes.	Flowers
Alkaloids, triterpenes.	Roots and bark

Fig. 1. The shape of the crown at the pomegranate tree

Fig. 2. Leaf top shapes

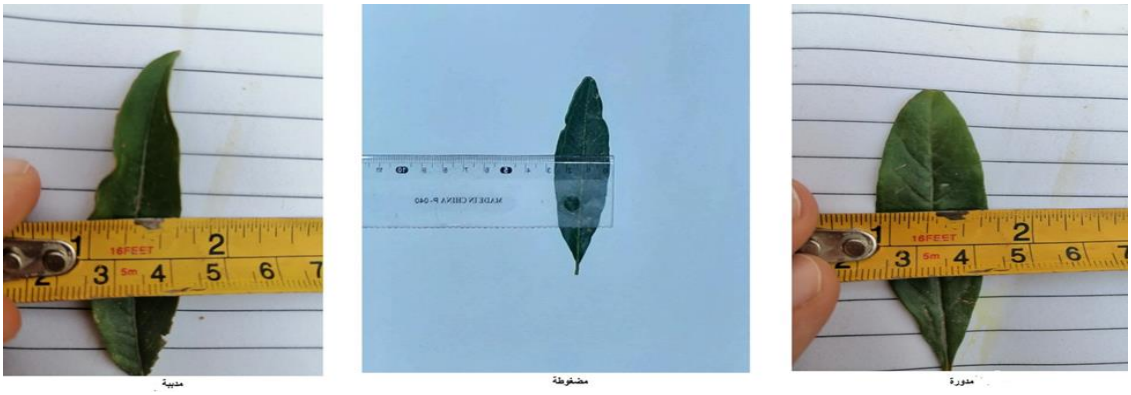


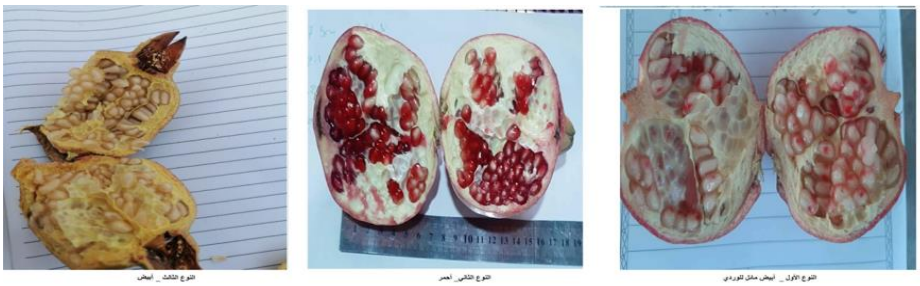
Fig.3. Pomegranate plant flowers

Fig.4. Cup characteristic in pomegranate plant

Fig.5. The shape of the base of the fruit in the studied varieties.

Fig.6. 1shows the cracking of pomegranate fruits for some of the studied

Fig.6. Pomegranate seed color variation of the studied varieties.



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