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Utilizing the olive trees for developing green area in kurdistan

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Abstract

Olive trees native to the Middle East and Iraqi Kurdistan region, it can survive severe ecosystems including sandy and rocky soils with high calcite content and extreme temperature fluctuations between -7°C up to +45°C giving yields even with minimum rainfall requirement. Results show that olive is currently grown in a very limited area of less than 250 ha, under drip irrigation system, which mostly depended on supply of water from ground water in Sulaymaniyah governorate. In contrast, 90% of the world's olive is dependent on precipitation. In addition, olive can grow and survive minimum rainfall of 300 mm and give satisfactory yields with rainfall of 500 mm without irrigation. The majority of olive fields were established in best fertile agricultural lands. Meanwhile, the aforementioned lands are rich with montmorillonite, which swells when it is moisten and shrinks when it is dry. Therefore, resulting in deep cracks in the soil which causes breaking down of the roots and weakening of the trees. The total rainfall in Sulaymaniyah governorate, during the last 72 years (1941 to 2013), had dropped down below the minimum rainfall requirements for olive growing. This makes olive trees suitable and economic for utilizing sandy and rocky soils. Therefore, olive has a great role in the re-vegetation process of severe ecosystems and should be included in any program of renewing the Kurdistan region forest and developing green area which encourage the tourism in the Region and helping in beautifying and purifying the atmosphere from the poisonous gases.

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Introduction

Olive is a species of small tree in the familyOleaceae, native to the coastal areas of the eastern Mediterranean Basin as well as northern Iraq, and northern Iran at the south of the Caspian Sea. Its fruit, also called the olive, is of major agricultural importance in the Mediterranean region as the source of olive oil. The tree and its fruit give its name to the plant family, which also includes species such as lilacs, jasmine, *Forsythia* and the true ash trees (*Fraxinus*). The olive tree is an evergreen tree or shrub native to the Mediterranean, Asia and Africa. It is short and squat, and rarely exceeds 8–15 meters (Agha and Daoud, 1991; FAO, 2012).

The olive is traditionally grown in areas having a Mediterranean type of climate to which it is ideally adapted. Such regions are typified by relatively cool winters where frost seldom occurs, hot dry summers and an average annual rainfall of around 800 mm. The olive will also thrive under irrigation in drier areas. In summer, rainfall regions experiencing high humidity and temperatures, pests and diseases are problematical (FAO, 2009).

The olive requires sufficient winter chilling to enter rest and so initiate flower development otherwise the tree remains vegetative. Maximum day temperatures in June and July should not exceed 21°C otherwise no fruit will be borne. On the other hand, frost can seriously damage olive trees, especially young trees, young shoots and inflorescences, resulting in serious losses. Entire trees can die when exposed to temperatures of minus 7°C. Olive trees are less sensitive to wind damage than other types of fruits. (Goldhamer and Ferguson, 1993).

Subtropical climates experience the heaviest periods of rainfall in winter rather than summer. Although the trees normally tolerate dry summers, they grow and produce best in the portions of subtropical areas that receive the most rain annually. Olives need no additional irrigation in subtropical areas that average 15 to 23 inches of rainfall yearly, but produce best in areas that get up to 31 inches. When a subtropical area becomes too dry due to months-long drought or lack of moisture due to cultivation problems, supply the trees with supplemental irrigation., *University of Arizona Extension; Olea uropaea*; March 2006.

Olive has good root system, which extends to a 2 horizontally and deep in the soil up to 6m, however it can provide most of the needed moisture in around 1m deep. The optimum soil for growing olive trees are non-compacted, loamy soil with rich calcium and good drainage. Soils rich with Montmorillonite are not suitable for growing olive trees because the soil cracks during the summer when it is dry, which causes cuts and injury to the roots (Agha and Hamid, 1999).

Olive trees, *Olea europaea*, show a marked preference for calcareous soils, flourishing best on limestone slopes and crags, and coastal climate conditions. They grow in any light soil, even on clay if well drained, but in rich soils they are predisposed to disease and produce poorer oil than in poorer soil. (This was noted by Pliny the Elder.) Olives like hot weather, and temperatures below −10 °C (14 °F) may injure even a mature tree. They tolerate drought well, thanks to their sturdy and extensive root system (FAO, 2009; Agha and Daoud, 1991).

The olive requires a well-drained, well-aerated soil, which has been prepared according to recommended guidelines to a depth of at least 80 cm before planting. Production on shallower soils will be disappointing, while trees on wet or waterlogged soils are susceptible to asphyxia and root diseases. Very sandy soils have poor water retention capacity that requires intensive management in terms of irrigation and nutrition. Heavy clay soils (above 35% clay) are unsuitable, whereas stony soils, especially with high gravel content, are ideal. Soil pH (measured in KCl) should be above 5.5, and preferably near 6.5. Irrigation usually by means of drippers or microsprinklers is a prerequisite for the regular production of high quality fruit. Olive (***Olea europaea*** L.) considered as drought tolerant and trees can survive on shallow soils with little supplemental water beyond winter rainfall. However, olive fruit

production and the economic survival of the orchard operation do not depend solely on tree survival (Hartmann and Panetsos, 1961).

Olive is among the rare trees that can be grown successfully in rocky and sandy soils with low rainfall. Such ecosystem has formed 20 precept of Kurdistan area. On other, hand the topography of the Kurdistan region provides mountain slops which can be used for rain fed orchard including rather than for growing field crops. The agricultural area should be allocated for utilizing strategic crops such as cereals and legumes.

Olive tree cultivation has been recently introduced to the Kurdistan region. Therefore, there is no available literature on this topic. This paper is a primary study in this area.

The aim of this study is to evaluate the current olive growing area and the prevalent environmental condition in the regions and encouraging farmers to exploit marginal areas rather than utilizing fertile agricultural lands.

Materials and methods

In this study, both theoretical and practical methods were used for collecting data on olive growing area from scientific references in order to understand the current situations of growing Olive and its development in Sulaymaniyah governorate. Data were collected from Agricultural offices in Sulaymaniyah Governorate about the nature of the soil and possibilities of utilizing rocky and sandy soil in the region which comprising more than 20% of the total area of the region, (Karim and Mohamed Ali, 2000).

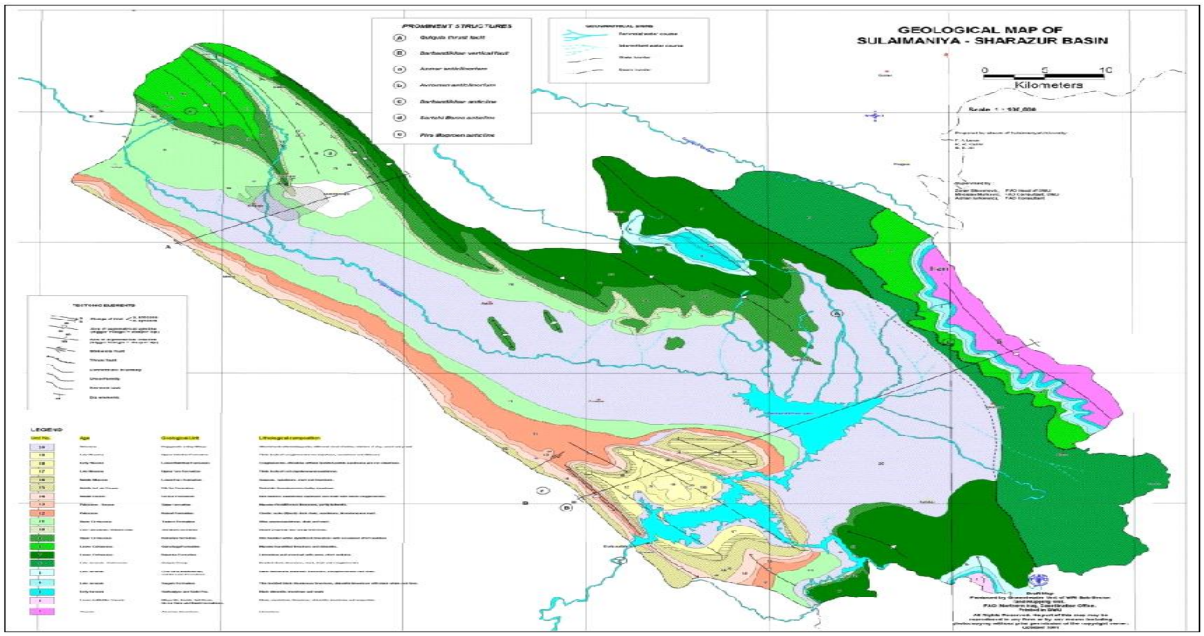

Fig. 1. Geological formation of Sulaymaniyah region.

The study area located in Sulaymaniyah governorate which is located within the latitude (35.04–36.30) South and longitude (44.50–46.86) East. Fig. (1) illustrates the geological map of Sulaymaniyah governorate (FAO, 2003) which show that the rocky lands and shallow soil areas are rich with calcium carbonate with the percentage of 20-60% especially in areas with gravely soils. The gravely soil is the main reason for rising calcium carbonate concentrations due to non exposing to leaching processes while in silty and sandy soils, in which the contents of calcium carbonate are much less due to leaching by rainfall (Karim, 2013). Calcium content of the soil tend to increase yield and oil percent in olive, while many other trees are sensitive to increasing calcium carbonate in the soil (Agha and Daoud, 1991).

Results and discussions

In 1947, the total area of natural forests in Kurdistan was 538400 hectares as it is shown in Table 1. While in 2002 the natural forest area decreased to 31388 Ha due to many factors, such as population explosion, fire, grazing, rainfall shortage, deforestation and cutting (Mohammed Ali, 2008).

Table 1. Natural forest area in Sulaymaniyah Governorate in 1947.

District	Population	%	Forest area ha	%	Density Forest Capita ha-1	Forest Capita ha-1
Sulaymaniyah	77595	31.21	99000	18.39	0.78	1.27
Rania	26872	10.81	116900	21.71	0.23	4.35
Halabja	71110	28.60	129000	23.96	0.55	1.81
Sharbazer	37402	15.04	142500	26.47	0.26	3.81
Pisdar	35625	14.33	51000	9.47	0.70	1.43
total	248604	100	538400		0.50	2.16

Table 2. The current grown areas with olive in Sulaymaniyah Governorate in 2012.

Currently growning area /donum	*Locations*
276	*Bakrajo*
155	*Halabja*
50	*Qaradagh*
60	*Tanjaro*
35	*Said Sadiq*
11	*Sharbazher*
45	*Bazian*
70	*Ranya*
45	*Khormal*
8	*Byara*
55	*Dukan*
28	*Peramagron*
20	*Qaladzy*
120	*Goizha Foothill*
858	*Total*
978	*Grand Total*

Olive has not included in any program for renewing or afforestation of Kurdistan forests (Amin,2003). Although, olive is among the native plants which grow naturally in Iraqi – Kurdistan region especially near Iraqi Syrian Turkish border line and in Shangal region, where the minimum temperature has not been decline below -7°C and maximum around 45°C for several weeks with minimum rainfall requirements 300-500 mm (Agha and Daoud, 1991).

Concerning the prevailed average and maximum temperature in different sites of Sulaymaniyah governorate(Figs. 2, 3, 4) show that the average of minimum temperature in mountains areas of Penjwin which represent also the same series of Tawela, Sharbazher and similar areas which decline below -7°C in cold months such as January and February in some years. Whereas, the average of maximum temperature is relatively high between 40° to 44°C for several weeks in hot months of July and August, and, for the rest period of the year is within the acceptable range (Agha and Daoud, 1991; Hamid and Alesa, 1999).

Therefore, olive can grow successfully growing in Kurdistan region in areas of up 1000 m above sea level except in high mountains area of Tawela, Penjwin and Sharbazher, where the minimum temperature decline below -7°C. In addition to that olive gives fruits, evergreens plant and help in developing green area (FAO, 2011; Amin, 2000 and Mohammed Ali, 2013). Thus, olive should be included in any program of renewing or afforestation of Kurdistan forest. Consequently encourage tourism and helps in purifying the atmosphere from harmful gases.

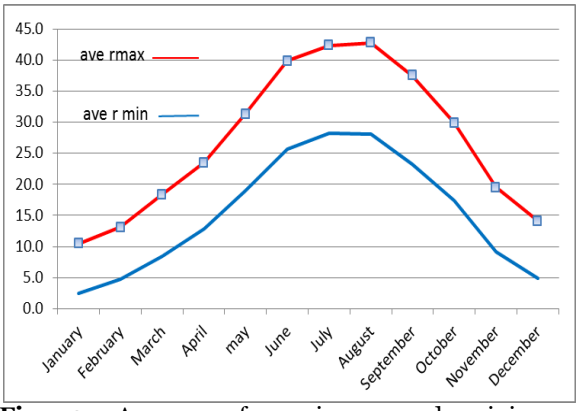

Fig. 2. Average of maximum and minimum temperature in Metrological station of Sulaymaniyah during 1973 – 2012.

Data presented in Table 2 shows the currently growing area with olive up to 2012 in Sulaymaniyah governorate, which is very low, and less than 250 ha. Whereas, the olive growing area in the world is more than 9 million heaters and olive is grown in more than 100 countries among them 16 developed countries as it is shown in Table 3, and play an important role in their economics (FAO, 2011). All grown areas of olive is currently grown under irrigation system except an area of 30 ha which depend on rainfall (Agricultural Dept. in Bakrajo, 2012). Meanwhile, 90% of olive growing area in the world depends entirely on rainfall and only 10% of its growing area is under irrigation, while, olive is among the most resistant trees to drought conditions and give satisfactory yield with the total annual rainfall of 300 – 500 mm (Agha and Daoud, 1991; Amin, 2003 and Mohammed Ali, 2012).

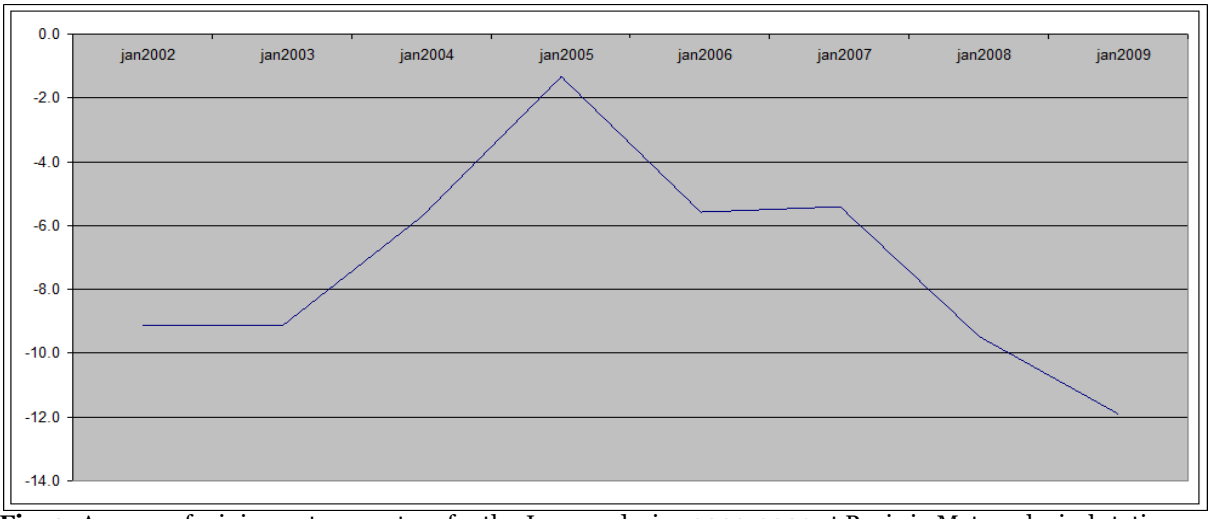

Fig. 3. Average of minimum temperature for the January during 2002-2009 at Penjwin Meteorological station.

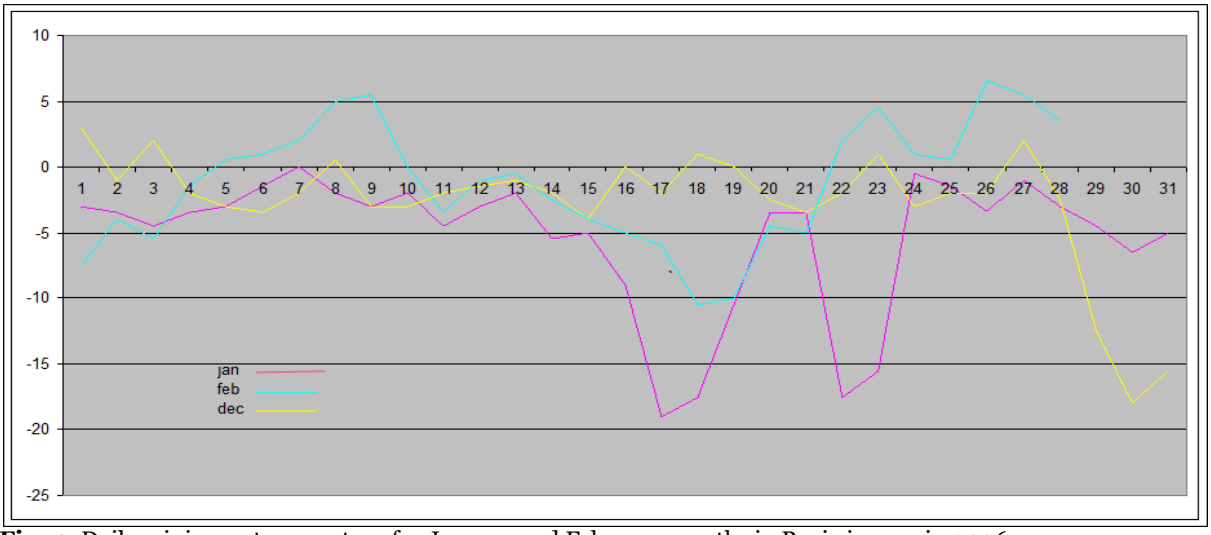

Fig. 4. Daily minimum temperature for January and February months in Penjwin area in 2006.

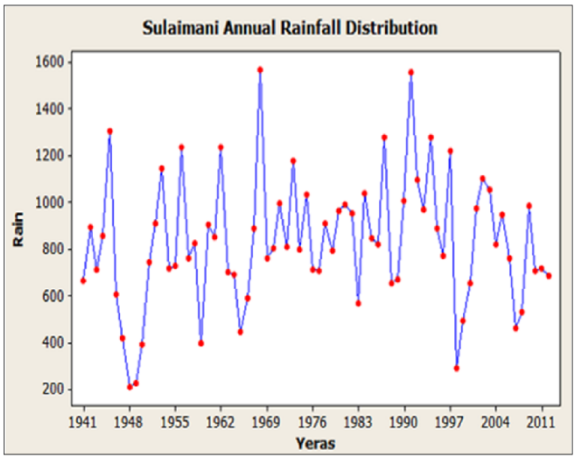

Fig. 5. Annual rainfall distribution in Sulaymaniyah Governorate during 1941 – 2013.

In term of rainfall, Figures 5 and 6 show rainfall distribution recorded in Sulaymaniyah meteorological station from 1941 -2013 with high fluctuations from year to year with the possibility of rainfall shortage from 1-3 years every 5 years in comparison to prevailed normal rainfall in the region which was around 700 mm up to 1975. This makes most of agriculture production under rainfall mercy (Figs. 5, 6). Whereas, rainfall distribution meets Olive requirements which is ranged from 300 as minimum to 500 mm rainfall (Agha and Daoud,1991 , Amin, 2000 and Mohammed Ali, 2012).

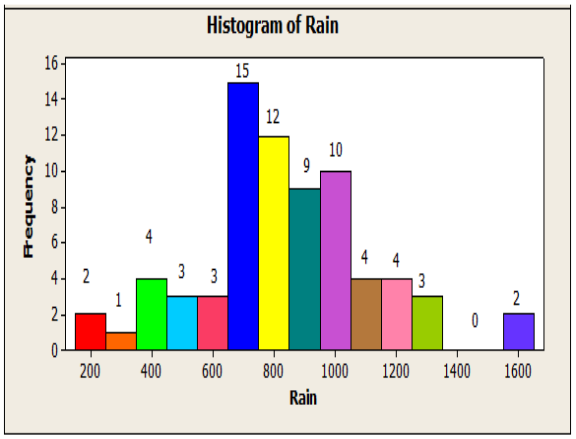

Fig. 6. Frequency of rainfall distribution in Sulaymaniyah governorate during 1941- 2013.

Therefore, Kurdistan Region in general and Sulaymaniyah Governorate in particular is suitable for growing olive in term of the amount of rainfall. Regarding nature of the land in foothills area of Kurdistan region which is mostly shallow and rocky soils with high calcite is considered suitable for Olive growing with soil depth of more than 80 cm (Hamid, 1999; FAO, 2009).

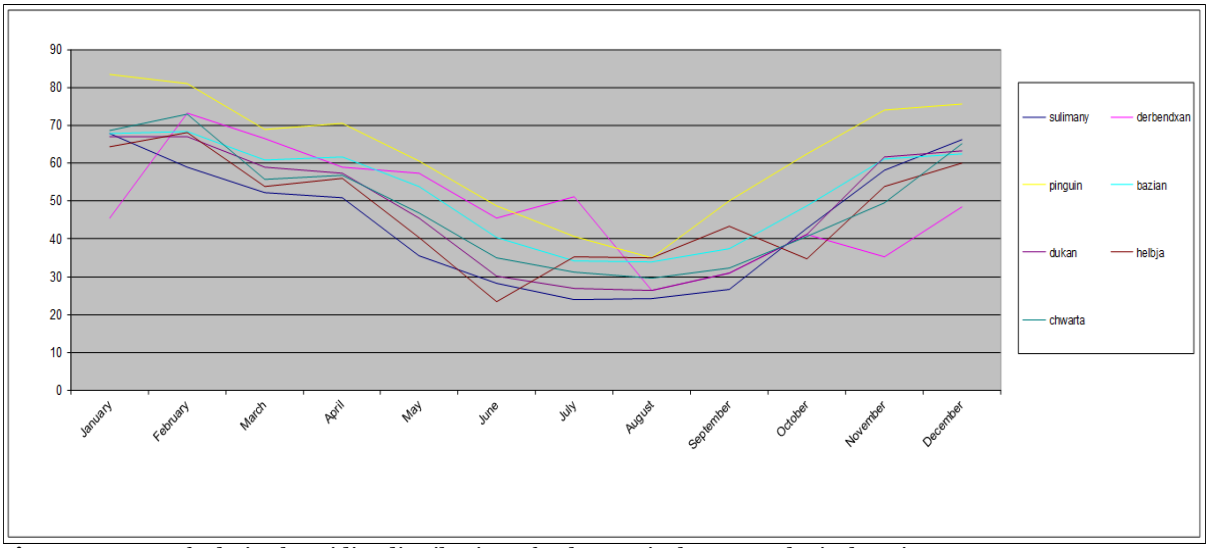

Fig. 7. Average of relative humidity distribution of Sulaymaniyah Meteorological station.

Photos (1) and (2) show that olive is currently growing in agricultural lands under drip irrigation. However, fertile agricultural lands must be allocated for strategic crops such as wheat, Mize, Rice, Chickpea rather than Olive. Olive is one of rare plants, which can grow under sever ecosystem including rocky and shallow soils. Whereas, supplementary irrigations is necessary for good establishment of Olive plants in initial years of growing .Therefore

Olive cultivation play a great role in agricultural production, reforestation of Kurdistan and help in development of vegetation area in rocky and shallow soils which is more than 400 000 ha in Sulaymaniyah region.

Fig. 8. Olive field established in Peramagron plain near Sulaymaniyah city.

Concerning relative humidity, it has satisfactory effect on flower set specially flowering stage .Fig 7 shows, that relative humidity percent, was within the acceptable range during the active growing period from 1973 to 2013 in Sulaymaniyah governorate, which is suits well for growing olive.

Fig. 9. Olive field established in the Pareamagron's plain near Sulaymaniyah city.

Results show that it should be concluded from the results of this study show that Olive is grown currently in Sulaymaniyah governorate in the best agricultural lands while, such lands must be allocated for strategic crops like wheat , Rice .Mize and Chickpea. Moreover olive is grown under drip irrigation, meanwhile 90% of growing area with olive is entirely depends on rainfall. In addition to that, most of the agricultural plains in Kurdistan rich with Montmorillonite, in which soil swell upon

moistening and crack when it dry. Thus, resulting in cutting and damage of the olive roots in advanced ages. Furthermore, olive tree which is one of rare plants for utilizing rocky and shallow soil have not grown yet in sever ecosystem of shallow and rocky soil which form more than 20% of Sulaymaniyah governorate area. Most the areas of Sulaymaniyah governorate is suitable for olive growing in term of nature of the lands; rainfall; relative humidity and temperature requirements except high mountains area where minimum temperature descends to below -7c such as Penjwin, Tawela, Sharbazher and Qopy Qaradagh and other mountainous areas with elevation above 1000 m above sea level. Finally the author suggest planting new improved variety which resist cold temperature and give yields in earlier.

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