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ORIGINAL ARTICLE

Evaluation of Quantitative and Qualitative Natural *Juglans regia L.* Stands in Northern Zagros (Case study: Piranshahr - West Azerbaijan)

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ABSTRACT

Many tree species in Zagros produce fruits that local residents use them as fruit. In the Zagros forests Juglans regia, Pyrus sp., Crataegus sp., etc. can be mentioned that nowadays are widely used. Among that mentioned species Juglans regia, this is found naturally abundance in these forests. The Juglans regia species has high quality wood and is an excellent fruit that are both economically high value. Therefore, this forest tree species from the past until today have been heavily exploited. In Piranshahr forests many natural stand of Juglans regia are exist that was their products irregular and unplanned with degradation by various people including local residents and residents of other areas (tourists) utilized. This Study was done in five natural stands of Juglans regia located in Piranshahr forests, due to being far away from the villages, this stands and other parts of the forests, almost as dense and natural forests remain. The results showed that a total of five stands utilizable product was about 2000 kg walnut, and totally average of trees per hectare for total species, Juglans regia and other species were 118.9, 66.96 and 51.93 corresponding. Although the percentage of canopy was vary in different slops but average of canopy was 85% in the total stand. Generally, due to massively dense stand of these treesand becauseJuglans regia is a light demander species, total production and mean production was fewer than naturally and it was 400 kilograms per stand.

Keywords: Juglans regia, Piranshahr, yields (product), quantitative and qualitative properties

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INTRODUCTION

Iran's forest only could produce wood productions in northern forestsand other forestshaven't power to generate wood production. Among the Iran forests, Zagros forests may be cited as the vastest areas of forest. One characteristicof Mediterranean forests in the world and the Iranian Zagros forests are somewhat distinct from other forests, edible fruit of the trees in that forests. This means that many tree species in these forests, which produce fruits that usable for humans as fruits, such species In the Zagros forests like Juglans regia, Pyrus sp., Crataegus sp. etc. can be mentioned that nowadays are widely used, among that mentioned species Juglans regia, which is found naturally in abundance in these forests. This species has high quality wood and is an excellent fruit that are both economically high value. Therefore, forest tree species from the past until today have been heavily exploited [7]. It causes to the stand of some species in danger of extinction in many parts of the Zagros, therefore, the law of conservation of forests and grasslands have been introduced such as protected species. Juglans regia, one of the trees that are grown in the valleys of freshwater in Zagros region, Prdanan valley is one of the valleys around Oabr-E-Hossein village (at a distance of 28 km from the Piranshahr road connecting Piranshahr to Sardasht) located, due to the permanent springs on the slopes of the valley around the river, in the valley and surrounding springs, Juglans regia tree has growth in single trees and stands. Juglans regia tree economically is very important, it has an edible, medicinal, industrial characteristic and this makes it a

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product that comes in the form of an economic good, the wood of *Juglans regia* is a precious product in the world scale that usable for of fine and very delicate and precious wood applications [3]. Product of the *Juglans regia* stand in this area every year utilized by local and non-residency people, but their utilization is non-licensed and non-operating principles that they break the branches, and even regeneration and young trees have been destroyed. Also, local and other people have the opportunity at any time to the stand of trees to sell the wood of *Juglans regia* trees have been cut. These two factors caused the annual level of *Juglans regia* stand will be reduced. So firstly planning a predetermined plan and program is need and secondly operation for the conservation and restoration of *Juglans regia* trees in this stand seems necessary. So the main aim of this study was to investigate and study the natural stands of *Juglans regia* in Piranshahr.

MATERIALS AND METHODS

Study area:

There are many natural stands of *Juglans regia* that distributed naturally in Piranshahr Forest, for this study, 5 stand in the forest belongs to the Qabr-E-Hossein village, located at 28 km. south Piranshahr road Piranshahr to Sardasht inside Prdanan Valley of (the village of Qabr-E-Hossein starts and continues until the Qandil mountains range) were selected.

In order to study, forests were surveyed with local guides, then stands position recorded by using GPS receiver. The stand area once was taken by a GPS device, and once was calculated by AutoCAD software, the mean of these two area was intended as area of the stand. Figure 1 shows Location of the stand in the country, province and city.



The annual rainfall in the study area from June to early September, rainfall is almost zero, so the months of June and July and August and September are dry. The average elevation of 1550 meters above sea level in this region.

Stand characteristics:

Stands name were Kanidze, Seko, Khwedawe, Nelehasl and Nelemala that respectively slopes of North, West, South, North and South, and the average percent slope on the stand, respectively, 70, 75, 35, 80 and 90% in the table (1) is obtained.

Table 1 stand names and their characteristics							
No	namestands Area		Domain aspect				
(square meter)							
1	Kanidze	12555	North				
2	Khwedawe	2359	South				
3	Seko	7061	Western and southwestern				
4	Nelehasl	8281	North				
5	Nelemala	22309	South				

Method:

All standsinventoried by 100% method,the DBH, height, trunk height, canopy height, and two perpendicular diameter of canopy and yield rate was measured and recorded. DBH of each tree using a diameter tape accurately measured and recorded in centimeters,then height, trunk height, canopy height using in Suunto clinometer are calculated and recorded.

To Measuring the diameter canopy, In two directions perpendicular to each other in any direction from the point where canopy begins end up on the other side of the tree canopy so that the meter pass next to stump Measured and recorded. Thus the diameter canopy is measured in two directions perpendicular, the mean diameter as the diameter canopy will be recorded in the form.

Measuring annual yield

In order to measure the annual yield (product) per tree is as follows:

The basic rate for each tree product (yield) according to the diameter canopy and trunk and position in stand by observing trees completely was measured. To estimate the product (yield), firstly using expertise and common operator's experts are used simultaneously, secondly average stand yield of three years before that recorded ago divided to all trees and average annual yield (product) of each tree was calculated. Finally average of estimated annual yield (described above) and average yields (product) of the three years before estimated (two above described average) as the product of the tree yield (product) in this year has been considered.

RESULTS

The highest average altitude was Nelemala stand and the lowest was Kanidze stand.

Quantitative data on the number and product amount per stand:

Statistics relating to the status of a number of trees and amount of product(yield) in stands showed overall product yields more than other stands was the Nelemala stand and average yields was 411.8 kilograms per year, Maximum number of tree species was in Kanidze stand (224).

Quantity stand	Total product in stand(kilograms)	Mean product per tree (kilograms)	Total number of Juglans regia	Total number of Other species	Total trees	stand Area (hectare)	number of <i>juglansregia</i> per Hectare	number of other species per Hectare	number of total trees per Hectare
Seko	183	3.73	49	41	90	0.7061	69.39	58.06	127.46
Kanidze	490.5	5.01	98	126	224	1.2555	78.06	100.35	178.41
Nelehasl	430	7.05	61	34	95	0.8281	73.66	41.05	114.72
Nelemala	670.5	5.99	112	53	165	2.2309	50.20	23.75	73.96
Khewdawe	285	8.91	32	19	51	0.2359	135.65	80.54	216.20
Total in stand	2059		352	273	625	5.2565	66.96	51.93	118.9
Average instand	411.8	6.14	70.4	54.6	125	1.0513	66.96	51.93	118.9

Table 2 statistics related to	o the product and the	number of tree in stand
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The composition and number of species in the stand:

Statistics relating to the composition and number of species in the stand showed the highest and lowest number in *Juglans regia* trees in stands, respectively were Nelemala and Khewdawe. The maximum and minimum numbers of other species in Nelemala stand (45 Quercus libani) and Nelehasl stand (Fraxinus sp.), respectively.

Table (3) statistics relate	d to the nu	umber and	l composi [.]	tion of diff	erent species	s in stands
Stand						

Stand Species	Seko	Kanidze	Nelehasl	Nelemala	Khewdawe
Juglans regia	49	98	61	112	32
Quercus libani	22	19	26	35	8
.Fraxinus sp	14	73	3	4	4
.Crataegus sp	5	32	5	19	7
.Malus sp		2			
total	90	224	95	165	51
Total except Juglans regia	41	126	34	58	19

Characteristics of trees:

Characteristics of trees showed that the biggest tree had 103 cm in diameter (Nelehasl), and the tallest trees, 17.5 m height (Kanidze).

stand	Quantity Amount	perimeter	D.B.H.	Trunk height	Canopy height	Total height	North- South canopy diameter	West-East canopy diameter	Average of Canopy diameter
	maximum	190	60.47888	5.5	7	11.5	12	12	
Seko	minimum	26	8.276057	0.3	0	1.2	1.1	1	3.136869
	Average	61.78788	19.66769	2.086869	3.436364	5.523232	3.146465	3.727273	
	maximum	371	118.093	10	15	17	11	14	
Nelemala	minimum	35	11.14085	0.5	2	3.5	1	1	5.45
	Average	110.8421	35.28214	4.372632	6.515789	10.88842	5.384211	5.515789	
	maximum	353	112.3634	10	17	17.5	14	14	
Kanidze	minimum	31	9.867606	0.4	1	2.3	1	1	5.587662
	Average	101.5758	32.33257	3.987013	7.299567	11.28658	5.318182	5.857143	
	maximum	325	103.4507	10	14	1+	10	14	
Nelehasl	minimum	35	11.14085	0.4	1	2.3	1	1	5.048193
	Average	98.16867	31.24806	4.044578	6.222892	10.26747	4.813253	5.283133	
Khewdawe	maximum	220	70.02817	10	14	16	10	14	
	minimum	31	9.867606	0.4	1	2.3	1	1	5.15
	Average	74.36923	23.67246	4.147692	6.592308	10.74	5.1	5.2	

Table (4) Statistics relating to the characteristics of a stand of trees

Average of D.B.H. (cm) of trees in the stands:

Compare of D.B.H. in trees showed that the highest and lowest values respectively for Nelemala (35.74 centimeters) and Seko (19.67 centimeters).



Figure 2: Histogram of mean of D.B.H. in stands

Average height (meters) of trees in the stands:

The mean height of the trees in stand showed the highest and lowest values respectively stand for Kanidze (11.29 meters) and Seko (5.52 meters).

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Figure 3 Histogram of Average height (meters)

Average diameter of canopy (meters) of the stand:

The mean diameter of canopy at the stands showed the highest and lowest values respectively for Nelemala stand (7.67 meters) and Seko stand (3.44 meters).



Figure 4 Histogram of Average diameter of canopy

Average yield (kilograms) of individual trees in the stands:

The mean values of Average yield (product) of individual trees showed that the highest and lowest values respectively for Khewdawe stand (8.91 kilograms) and Seko stand (3.73 kilograms).



Figure (5) Histogram comparing Average yield of individual trees

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Average of total yield (kilograms) of the stand:

The mean values of total product in stands showed the highest and lowest values respectively for Nelemala stand (670.5 kilograms) and Seko stand (183 kilograms).

C	comparison o	of the stand	ls product	
			670.5	
700			444	
650				
600	1407 (21107)			
550	490.5			
500-		430.0	XX	
450		AHA	XX	
400-			——————————————————————————————————————	
350				285.0
300-				ATTA
250 183				
200-				
150				
100				
50				
~~ XXX				
Seko	Kanidze	Nelehasi	Nelemala	Khwedawe

Figure 6 histogram of compares the entire product stand

Qualitative characteristics of the product and amount trees in stand:

Results showed the average product, average product per tree, number of *Juglans regia* and number of other species, respectively, 411.8, 6.14, 70.4, and 54.6 it has been stated in Table 5.

Quantity Stand	Total product (K.g)	average product per tree (K.g)	Total number of Juglans regia	Total number of Other species	
Seko	183	3.73	49	41	
Kanidze	490.5	5.01	98	126	
Nelehasl	430	7.05	61	34	
Nelemala	670.5	5.99	112	53	
Khwedawe	285	8.91	32	19	
sum	2059				
Average	411.8	6.14	70.4	54.6	

Table (5) table of the product and amount trees in stand

DISCUSSION AND CONCLUSION

Increasing populationcaused to more need, so the number of cattle grazing in forests across the area pushing more and more. In addition, the population increase was caused to people use more and more of forest especially "By Products" or NWFP (Non Wood Forest Products) products such as the utilization of *Juglans regia* and turpentine gum trees was cut with greater intensity. This study belongs to the Qabr-E-Hossein village forests located in 28 km south Piranshahr road Piranshahr to Sardasht is provided. After the Islamic revolution and the start of war and lack of adequate security in the region lead to lack of adequate supervision on forests, also fuel problems in rural areas, unfortunately, trees for cooking and heating homes and other uses of rural were cut.So severe was the destruction of forests, standard and thick trees intensively were cut for rural purposes and fuel, so the forests became coppice forest and in some areas near the villages forests became agricultural lands.

In this study, five natural stands of *Juglans regia* with an irregular and unplanned degradation by various people including local residents and residents of other areas (tourists) are utilize and destroy were inventoried and analyzed. In total, five stands product was about 2000 kg usable walnut. Each year, as continuous operation of the stand should be. Due to the remoteness of the reach by local residents, this forests approximately remained naturally, totally the average of total trees, *Juglans regia* and other species number per hectare were 118.9, 66.96 and 51.93 respectively. Although the percentage of canopy in different slopes was vary, but average canopy of the total stand was 85%. Generally, because of massively dense stand of these trees, and at the other hand *Juglans regia* is a kind light demand species, so total production of this stands were fewer than normal and stand product average was 400 kg.

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