

## **Effect of forest exposure on nutrient balance in oak (*Qurecus aegilops*)**

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### **Abstract**

This study was conducted on 10, March. 2003 for comparing between Nitrogen, Phosphorus and Potassium balance at east and west exposures of Hijran forest which located at north of Erbil governorate, the diagnosis recommendation integrated system (DRIS chart) results indicated to better nutrient balance and availability at east exposure in comparing with west exposure.

### **Introduction**

The altitude and exposure have great effect on the following points as mentioned by wild (1995) and young (1997).

1. Light tendency.
2. Temperature.
3. Humidity.
4. Plant growth.
5. Activity of soil micro organisms.
6. Nutrient cycling.
7. Nutrient availability.
8. Evaporation.
9. Opening and closing of stomata.
10. Morphological characteristics of plant.
11. Anatomical characters of plant.
12. Leaf areas index.
13. Soil erosion.

Since most of the mentioned point are affecting by forest exposure, the forest exposure plays an important role in plant growth for this reason, the nutrient balance may differ from exposure to other, on the other hand numerous of researchers like, (Beanfils, 1973; Al- Khafaji, 2001 and Darwish , 2007) indicated to the importance of nutrient balance in plant growth depending on diagnosis recommendation integrated system (DRIS) the forest exposure plays an important role in soil environment therefore it is necessary to combine between nutrient balance of forest trees and

exposure. Since there is no study in our country about the role of forest exposure in nutrient balance in forest trees using DRIS methodology, for this reason this study aims to compare between nutrient balance in oat trees at east and west exposure using DRIS chart, if the ratio between nutrient located in the first circle (small circle) it indicating to nutrient balance, while if the ratio between nutrients located in the second circle (large circle) it indicates to balance – slightly imbalance but if the ratio between the nutrient located outside of the circle it indicates to imbalance between nutrient in plant (Darwish, 2007).

### **Materials and Methods**

The methodology of this study included the following steps:

**Step 1:-** Visiting to different forests in Erbil governorate for selecting the suitable location for this study; at the end the Hujran forest was selected on (10 March 2003).

**Step 2:-** After the first visiting the representative soil samples were taken at depth (0 – 60 cm) at (20 sites) from each exposure then air dried, grounded and sieved using (2mm) sieve after that some physical and chemical properties were of the soil were determined according to (Richards, 1954; Hesse, 1972 and Black, 1982) as show in (table: 1).

**Table (1): Shows the mean of some chemical and physical properties of the studied soil at both north and west exposure during the study:**

Soil properties	Exposure	
	East	West
CEC cmolec/1000gm soil	3.20	31.20
Organic matter mg.Kg <sup>-1</sup> soil	2.20	1.20
CaCO <sub>3</sub>	25.00	26.11
ECcdS.m <sup>-1</sup>	0.50	0.48
pH soluble cations (mmole.L <sup>-1</sup> )	7.60	7.70
- Ca <sup>++</sup>	3.30	2.98
- Mg <sup>++</sup>	0.80	0.70
- Na <sup>++</sup>	0.57	0.40
- K <sup>+</sup>	0.40	0.38
Total nitrogen mg.Kg <sup>-1</sup>	3.20	2.30
Total phosphorus mg.Kg <sup>-1</sup>	1.00	0.60
% S.P	57.00	56.10
% F.C.	27.10	26.30
% W.P.	14.00	13.50
P.S.D. mg.Kg <sup>-1</sup> soil		
Clay	292	291
Silt	488	480
Sand	488	499
Textural name	Clay loam	Clay loam

**Step 3:-** Plant samples were taken four times during the study (25, March. 2003, 25, May. 2003, 25, July. 2003 and 30, September, 2003).The plant samples were digested for determining nitrogen, phosphorus and potassium using international methods mentioned by (Jaiswal, 2003).

**Step 4:-** Depending on the mean of nutrient content of oak trees (table: 2) the DRIS chart was used for limiting the nutrient balance of plant at both exposures.

**Table (2): Shows the mean of N., P. and K. content of oat and their ratio at east and west exposure**

East			West		
% N	% P	% K	% N	% P	% K
4.00	0.38	3.00	4.20	0.30	2.95
N/P	N/K	K/P	N/P	N/K	K/P
10.53	1.33	7.89	14.00	1.42	9.80

**Step 5:-** The climatological data were recorded from (FAO) metrological station as show in table (3).

**Table (3): Shows some climatologically data of the studied area.**

Months	Temperature			Rainfall (mm)
	Mean	Maximum	Minimum	
11/ 2003	5.6	13.5	1	17
12/ 2003	12	14	1.5	110
1/ 2004	4.8	11	1	3.3
2/ 2004	6.7	16	3	169
3/ 2004	8.9	23	5	40
4/ 2004	16	29.5	3	50
5/ 2004	20.9	31.3	10	22.6
6/ 2004	25.3	36.2	12.1	-
7/ 2004	31.8	41	19.2	-
8/ 2004	29.4	40	25.1	-
9/ 2004	26	38.6	20	-
10/ 2004	13.5	32	15.5	-
11/ 2004	5.9	13	3	25
12/ 2004	5.3	12	2.3	40

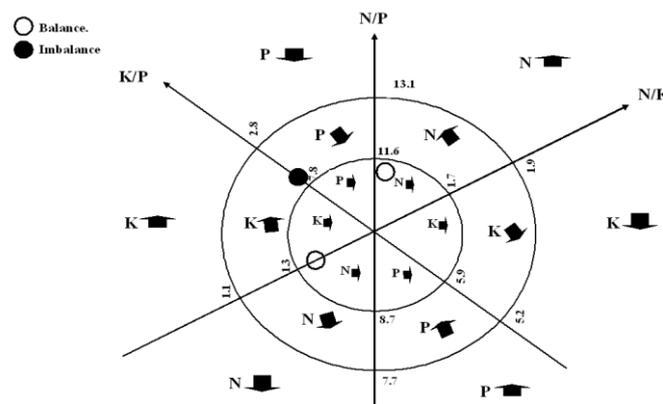
## **Result and Discussion**

Figure: (1) indicated to nutrient ratio and their balance at east exposure, it is appear from this figure that the nutrient content of oak plants are at balance condition depending on DRIS chart methodology, plant nutrient status was located within the inner circle would be considered to

be balanced and is denoted by a horizontal arrow ( $\rightarrow$ ). As one moves axis the degree of imbalance between two elements increases. At east exposure the ratio between N/P, N/K and K/P were (10.53, 1.33 and 7.89) respectively, for this reason the nutrient's status is at balance condition expect K/P which located between balance and slight imbalance which denoted by an arrow at 45 to horizontal ( $\searrow$ ) ( $\nearrow$ ) as shows that nutrient status at west exposure are not at balance condition the ratio between N/P, N/K and K/P were (14.00, 1.42 and 9.83) respectively. It is appear from (figure: 2) that only N/K is at balance condition while the N/P and N/K were at imbalance condition (9.10).

In comparing (figure: 1) with (figure: 2) the results were concluded that the exposure had great effect on nutrient balance and their availability for plants and the east exposure is better than west exposure for plant growth, since we obtained the best nutrient balance at east exposure therefore exposure can be regard as a limiting factors (FAO, 2002). For the above reason the growth and density of forest at east exposure is more extensive than west exposure. For certifying the suitability of the mentioned DRIS chart, the modified DRIS chart which obtained by Sultan (2005) was used and the same results obtained.

Since the DRIS chart of tree plant is not available, for this reason the general DRIS chart was used in this study because it used for tree at both exposure it means any different in nutrient balance is due to difference in exposure which is the purpose for this study.



**Figure (1): Shows plant nutrient balance at east exposure.**



## تأثير واجهة الغابات في التوازن الغذائي لشجرة البلوط (*Qurecus aegilops*)

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### الخلاصة

أجريت هذه الدراسة في ١٠، آذار ٢٠٠٣ بهدف مقارنة بين توازن العناصر الغذائية (النتروجين، الفسفور و البوتاسيوم) في واجهتي الشرقية والغربية لغابة حجران التي تقع في شمال أربيل وذلك باستخدام نظام تشخيص و التوصيات المتكاملة (DRIS chart). أشارت النتائج الى أحسن توازن غذائي في الواجهة الشرقية مقارنة بالواجهة الغربية.