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## Ecological study on *Aeluropus lagopoides* & *Juncus acutus* in different regions within babylon province/Iraq.

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### Abstract:

Three sites within Babylon Province were chosen to study the Ecology of both *Aeluropus lagopoides* & *Juncus acutus* during period from Feb.2012 to Jan 2013. Environmental factors including air and soil temperatures, wind speed, dew point, sun light intensity, pH, and EC of the soil were recorded seasonally. Biochemical response of both halophytes to the environmental factors were studied, which included total chlorophyll, total sugar, total protein, total content of humidity and proline. Results showed that both studied halophytes can tolerate threat environmental factors biochemically.

**Keywords:** halophytes, environmental factors, biochemical responses

### Introduction

Soil salinity is one of the most global problems now days, due to its damage in agriculture soils<sup>(1)</sup>. In Iraq 672000 hectares which about 25% of its area is saline soil, most of them in middle and south parts<sup>(2)</sup>. Halophytes are alone among plants can

live in saline environment, thus understanding their ability to tolerant high salinity conditions where they live, which will give good new ways to improve plant productivity in same environment by change them from glycophytes to halophytes<sup>(3,4)</sup>.

The study of environmental factors on vegetation in any region is need to both local and global management of environment<sup>(5)</sup>. Temperature, light intensity, wend speed, relative humidity and dew point all are main climatic factor effecting plant growth<sup>(6)</sup>. The chemical characters of soil including cataions and anions which give special pH& EC values<sup>(7)</sup>can determine which plants can grow in soil rather than others. In this work both *Aeluropus lagopoides* & *Juncus acutus* studied as domenant halophytes in Babylon Province/ Iraq, to understand the effect of sever conditions(high soil salinity and wide temperatures range) on halophytes.

**Material and Methods**

Three sites within Babylon Province were chosen as show in table 1 to collect halophytes and to study environmental factors monthly during period form Feb.2012 to Jan.2013. Temperature, light intensity, wend speed, relative humidity and dew point were recorded in sites by environmental factor recorder that manufactured by Davis, USA. pH& EC of soil recorded by malty meter type HANA. Total chlorophyll stymied by extracting with acetone<sup>(8)</sup>, proline determined according to Bates and his team<sup>(9)</sup>. Total sugar concentration were matured after their extracted with phenol<sup>(10)</sup>. Bradford method was depended to estimate total protein. Relative humidity of studied halophytes calculated after read fresh and dried Wight<sup>(11)</sup>.

Table 1 sites of study

site	E	N
1	44 26	32 33
2	44 33	32 18
3	44 24	32 22

**Results and Discussion**

A-Environmental factor:

Table 2 shows the recorded values of air and soil temperatures, relative humidity, dew point, wend speed and sun light intensity. Air temperatures were ranged from 7.2 in Jan. 2013 in site 3 and 43 in July 2012 in site 1, soil temperatures related closely with air temp. and ranged from 9 to 49 as shown in table 2. Static analysis explained high related between temperatures and light intensity (r=7.83) and both of them were significantly among months. The elevated temperature lead to loss stability of tissues and membrane, and reduce respiration rate<sup>(12)</sup>. The elevated intensity of sun light reduce halophytes density specially where relative humidity reduced which lead to increase salt stress on plant because increase both wend speed and light intensity reduce water content in plant<sup>(13)</sup>. The relationship between light intensity and temperature and relative humidity was revers as showed and the same was between them and dew point due to reduce water content in plant. pHof soil is major factor that control plants growth and density<sup>(14,15)</sup> because its control the solubility of ion in soil<sup>(16,17)</sup>. Results showed significant variation among both sites and months. The soils were saline alkaloids because pH was less than 8.5 with high EC<sup>(18)</sup>.EC used as good indicator to soil salinity do to its easy measures and its refers to all ions in soil<sup>(19)</sup>.

**Table 2 environmental factors during period of study.**

Parameter	site	Months											
		2	3	4	5	6	7	8	9	10	11	12	1
Air Temperature C°	1	21	28	35	35	41.9	43	38.4	40.2	32.1	15.7	16.2	13.7
	2	22	23	33	26	24	32	38	34.7	30.2	18.8	17.1	15.8
	3	22	25	34	33	39.5	41.4	39	34.6	29.3	14.3	15.3	7.2
Soil Temperature C°	1	15.6	28.8	38.9	36.7	46.7	48.9	34.4	37.8	40	19	19	11
	2	33.3	31.1	33.3	37.7	30	37.7	41	40	34.4	25	20	19
	3	25.6	32.2	34	38.8	48.8	51.1	34.3	36.6	33.3	19	19	9
Relative Humidity %	1	37	34	13	15	13	24	21	24	29	81	63	34
	2	28	38	18	34	52	49	45	27	32	70	65	31
	3	32	39	14	21	16	20	20	24	31	83	67	58
Dew point C°	1	6	11	3	7	8	18	12	12	12	12	9	-2
	2	3	8	6	9	14	19	14	13	11	13	10	-2
	3	4	10	3	8	8	14	10	9	11	11	9	-1
Wind speed Km/h	1	11	3	8	8	13	8	6	4	5	5	8.5	11
	2	14	6	2.9	5	6	5	6	2	8	6	11	10
	3	14	32	6.5	9.5	16	9	5	3	8	6	15.5	14.5
Light intensity W/m <sup>2</sup>	1	571	652	788	570	951	810	875	738	564	633	376	531
	2	773	816	751	553	920	729	900	716	547	406	113	441
	3	729	710	821	777	900	703	921	534	487	429	360	425
pH	1	8.74	8.12	7.75	9.08	8.72	8.65	9.02	8.7	7.76	8.18	8.64	8.33
	2	7.74	7.93	7.98	9.12	8.41	8.12	8.64	8.75	8.83	8.4	8.58	8.59
	3	8.05	7.82	7.47	9.27	8.58	8.45	8.93	8.95	7.61	8.18	8.89	8.38
EC(mmoH/cm)	1	84.9	89.7	91.2	78.9	70.2	120.7	113	85.7	64.6	129.9	86.6	29.7
	2	44.3	74.5	76.3	107.1	113.8	112.2	158.4	130.3	142.7	104.9	69	37.2
	3	87.7	76	140.5	78.8	75.2	120.7	35.1	125.2	157.5	123.5	71.1	65

b-biochemical parameters

Many of research were done focused on physiology of halophytes laboratory, but that studied them in their environment are very little<sup>(20)</sup>. The recorded data about biochemical parameters of both species were vary from site to site during period of study as explain in table 3.

The lower content of chlorophyll was in *Juncus acutus* in site 2 which was 0.0194 mg/g, while higher was in *Aeluropus lagopoides* about 1.08 mg/g.

The stactical analysis showed significant differences in chlorophyll content between species and among sites which due to un likeness in temperature that it was decrease when temperature elevated in summer months due decrease amount of water that plant can use it in chlorophyll synthesis<sup>(21)</sup>; in these condition plant will increase synthesis of same proline compound to control cells osmosis<sup>(22,23)</sup>.

Halophytes tolerant salinity by forming some dissolved materials in their cells like proline and sugars<sup>(24)</sup>. The recorded proline of *Juncus acutus* than that recorded in laboratory study on other halophytes<sup>(25)</sup>, and other helophytes species in these studied sites in same month<sup>(26)</sup>. The content of total sugars was vary according to environmental factor specially EC of soil that higher content was recorded to higher EC value and higher concentration was 1666.7 μ mol /g in site 2 in *Aeluropus lagopoides*. Proline is main content in cell because its role that its forming enzymes, cell membrane, plasma membrane, so any change in its concentration will lead to loosed water from it which will cause precipitate it<sup>(26)</sup>. The fluctuated in temperature lead to fluctuated protein content in in studied halophytes by fluctuated K content (essential element in protein synthesis) which itself related to humidity of soil<sup>(27)</sup>.

**Table 3 biochemical responses of studied halophytes in different studied sits (first line is range , second line is average ± standard division)**

parameter	Unite	Species	Sites		
			1	2	3
Total chlorophyll	mg/g	<i>Aeluropus lagopoides</i>	(0.102-1.08) 0.328±0.341	(0.248-0.75) 0.414±0.287	(0.255-0.82) 0.328±0.341
Proline	$\mu$ mol/g		(3.658-24.89) 9.558±7.813	(2.207-26.46) 7.886±8.046	(1.809-14.45) 4.1524±.635
Total sugar	$\mu$ mol/g		(182.00-1254.70) 534.761+417.795	(277.3-1666.7) 526.1+501.439	(178.700-473.30) 191.991±181.883
Total protein	mg/g		(0.372-3.58) 1.519±0.922	(1.18-14.73) 2.8093±.956	(1.127-9.88) 1.98±2.740
Humidity content	%		(10.99+30.19) 15.971±9.65	(11.64-38.84) 18.563±12.9	(8.94-36.18) 13.481±13.28
Total chlorophyll	mg/g		<i>Juncus acutus</i>	(0.059-0.22) 0.123±0.088	(0.019-0.39) 0.154+0.108
Proline	$\mu$ mol/g	(3.141-41.67) 13.6781±4.475		(2.763-49.70) 12.9131±2.913	(2.7-49.7) 16.6361±2.721
Total sugar	$\mu$ mol/g	(480.00-1436.00) 464.5±5439.214		(220.00-1268.00) 686.29228±7.389	(350.0-1331.300) 813.0333±68.729
Total protein	mg/g	(0.297-2.77) 1.127+0.933		(0.373-10.02) 2.571+2.795	(0.21-4.15) 1.78±1.071
Humidity content	%	(15.5-30.14) 16.5611±0.699		(18.08-62.33) 33.9161±4.593	(22.3±13-10.484) 5.17±39.12

**Conclusions**

Biochemical response of both halophytes to the environmental factors included total chlorophyll, total sugar, total protein , total content of humidity and proline.

Both studied halophytes can tolerant threat environmental factors biochemically.

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