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# A Sanctuary of Orchids

A protected area on Holcim  
Land, Lebanon  
A biodiversity assessment

2014

The International Union for Conservation of Nature - Regional Office for West Asia



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# PROTECTED AREA FOR ORCHIDS ON HOLCIM LAND, KFARHAZIR – NORTH LEBANON

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## I- BIODIVERSITY ASSESSMENT OF 2014 – INFUENTIAL CONDITIONS

The biodiversity assessment was carried out over a one-year basis spanning from September 2013-September 2014. It provides full recording of the variety of basically floral species that inhabit the land, in addition to whatever could have been recorded of the animal world.

Site survey was intensively conducted from autumn to spring and was more relaxed during the dry season. Apart from the listing of species, the following remarks are integral to appreciate the significance and limitations of the current assessment.

1- Zoologically, the Holcim land is relatively small and topographically open to the extensive neighboring landscape; thus at the level of the zoological diversity, the species are not limited to this land but are shared with all the surrounding. The species could be visitors as transient on their search for food, or on their movement seeking protection, as well as temporary to long-term residents.

2- At the level of the floral diversity, it is very important to realize that the year that this assessment was undertaken was itself characterized with the lowest rainfall level in recent decades. This was also associated with high temperatures that inflicted dryness early in the year.

3- Climatically, the first rain, which came in September 2013, had no effect on floral growth because it was insufficient to initiate the latter. The dry summer of 2013 extended its conditions deeper into autumn to subside with more valuable rainfall starting in November. Similarly, the end of the growth year came early with the cessation of rainfall in February, thus April started revealing signs of the halting of the growth season for 2014 particularly for the flora that demands humidity and allowed for the flora of dry conditions to take hold.

The paucity of rainfall and humidity could have reflected in lack of growth or lack of flowering of some taxa that might exist in the green cover or the soil bank. Shorter growth seasons were evidenced for some flora, for example grasses were short lived and dried sooner than expected.

4- On the range of threats, grazing was active all year round, which could have exacerbated the negative impact of climatic conditions on the vegetation cover.

## II- ECOLOGICAL OVERVIEW OF HOLCIM LAND

### 1- TOPOGRAPHY

The Holcim land comprises of one hill about 40 m high (N 34° 18' 13.9"; E 35° 45' 48.8"). The hill is open on three sides (north, east, south) and interconnected to the west to a series of hills of similar nature and height.

The slopes present gentle inclinations of about 45 degrees; but in limited areas to the northwest the slopes are steeper of about 60 degrees. As the land was used for agricultural purposes, the slopes are almost all leveled into 9 terraces with the exception of the steeper slants.

The northern and western slopes lead to flat plains that are used for annual crop production mainly wheat. The southern slope is marked at base with a series of small undulations leading into a deeper closed valley. A winter watercourse is found on the southwestern face feeding into the closed valley.

Cut roads circulate the base of the hill with two unpaved roads climbing over the southern slopes to the top subjecting an early disturbance to the system.

### 2- AGRICULTURAL USE

The current vegetation of the terraces indicates that agricultural use was installed for a relatively short period, which did not preclude the natural system from reinvading the terraces.

However, the southern terraces were more heavily utilized most probably in the planting of wheat. Considering their more stringent ecological conditions, the degradation of the vegetation cover is more pronounced. In spite, this does not forbid these terraces from hosting particular floral diversity.

### 3- SOIL TYPE AND HUMIDITY

The soil type is a characteristic soft calcareous white soil produced from marl dolomitic bedrock. One of the properties of such soil is its low capacity of water infiltration. Thus under heavy rain, inundation is a frequent incident; water requires longer time to percolate through depending on its



The Southern Slopes

amount. This feature is mostly experienced in winter and early spring under proper conditions of rainfall. Due to the same soil characteristics, the lower rainfall of autumn and spring allows humidity to be maintained in the soil to longer period, which makes these seasons very important to further vegetation growth. In summer, when the soil humidity dries up, this soil type hardly absorbs humidity from the atmosphere and remains very dry throughout this period, so the slopes wear their brown cover for a long period in the year, easily influenced by not only the level of direct rainfall, but also its annual distribution.

Due to intensive grazing and soil type, the organic matter is very low as seen in the above photo. This reflects in lower soil moisture and nourishment as well as higher exposure to sunlight.

#### 4- ORIENTATION

Orientation also plays a significant role at prolonging soil humidity and respectively plant growth. It is easily observed that the southern slope is drier as it is more exposed to sunlight. In comparison, the northern slope is less exposed to direct sunlight and maintains more humidity for longer period. This is reflected in the abundance of more extensive communities of mosses on the northern slope. Similarly, the southern slope is observed to initiate vegetation growth earlier. Plants start flowering earlier on the southern slopes while they bloom later and longer on the northern slopes; they are marked to fall in the range of 15 days of difference for the same species members on both slopes. This is again complemented with earlier die out on the southern slope.

#### 5- PLANT BASE

The vegetation cover is denser on the northern slopes, whereas the southern slopes were burnt several times reducing their cover to ground flora. It is assumed that herdsmen set these fires to allow for more green in the following season.

The arborescent flora is basically composed of shrubs about 2m in height. The ground flora witness variation with the seasons, starting with the soft green growing from autumn to spring, to be later invaded with a grassy layer to finally end in a dry cover of basically thorny species.

Some of the higher arborescent species are represented in few samples that have been heavily degraded to small bushes.



The Southern Slopes

### III- DIVERSITY OF ORCHID SPECIES ON HOLCIM LAND

Lebanon has 86 taxa in the family Orchidaceae. The Holcim land provides habitat to 14 species equivalent to 16% of the orchid diversity, which makes this habitat a site of high significance.

The 14 species are hereby listed according to their flowering succession on this site.

- 1- *Spiranthes spiralis* (L.) Chevall.
- 2- *Ophrys israelitica* H.Baumann & Künkele
- 3- *Ophrys flavomarginata* (Renz) H.Baumann & Künkele
- 4- *Ophrys umbilicata* Desf. subsp. *umbilicata*
- 5- *Ophrys sicula* Tineo
- 6- *Ophrys speculum* Link
- 7- *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase subsp. *champagneuxii* (Barnéoud) H.Kreutzschmar, Eccarius & H.Dietr.
- 8- *Orchis italica* Poir.
- 9- *Ophrys transhyrcana* Cziernak
- 10- *Anacamptis fragrans* (Pollini) R.M.Bateman
- 11- *Neotinea tridentata* (Scop.) R.M.Bateman, Pridgeon & M.W.Chase
- 12- *Serapias levantina* H.Baumann & Künkele
- 13- *Ophrys apifera* Huds.
- 14- *Anacamptis sancta* (L.) R.M.Bateman, Pridgeon & M.W.Chase

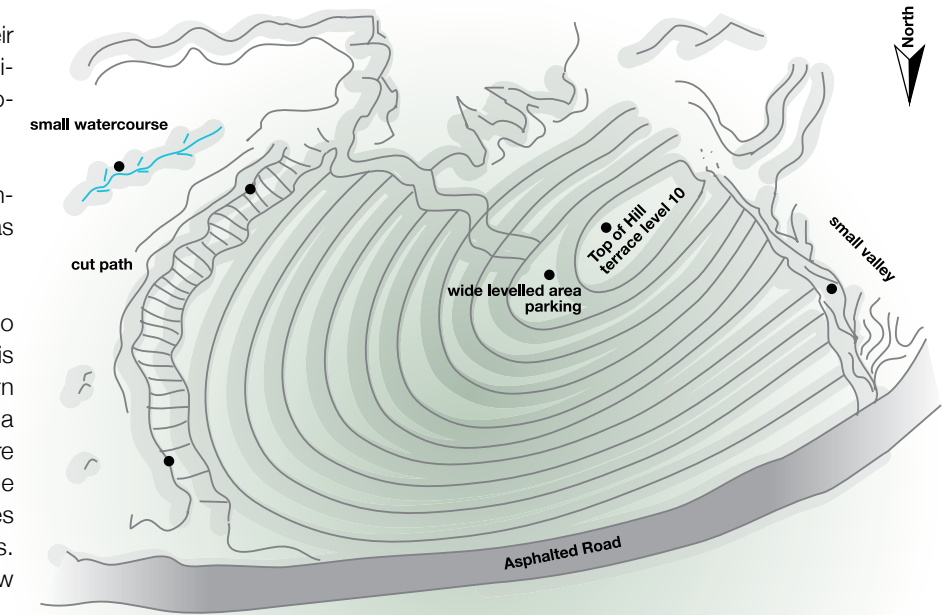
### IV- FIELD ASSESSMENT PER ORCHID SPECIES

The field assessment included survey of the orchid species, their flowering period, their distribution on the allocated land, and initiatives for future research toward monitoring of flowering, reproduction and seeding capacity.

Monitoring was facilitated by the placing of markers. The conclusion of this part faced some difficulties with the herdsmen, as is explained below.

The distribution of orchids on the Holcim land was recorded to judge the topographic value at influencing distribution. The hill is exposed from the north, south and east sides, while the western side is connected to the neighboring hill. The hill was used at a point for agriculture, so it was terraced into 10 terraces that are incomplete particularly on the northern side. The southern side seem to be more intensively subject to anthropogenic pressures partly by agriculture and partly by grazing and deliberate fires. Fires are sometimes set by herdsmen to clear the land and allow more green growth in spring.

Following is a representation of the topographic features of th Holcim land.



**Topografy Site plan**

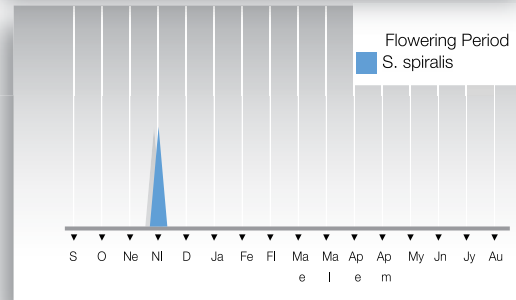
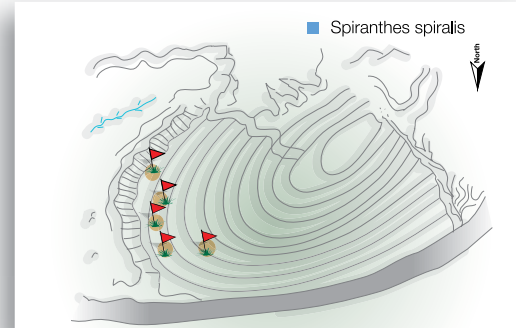
## *Spiranthes spiralis* (L.) Chevall.

Autumn Lady's Tresses  
Spiranthe d'automne



The species is recorded from 5 samples that attempted flowering this season; three lost their inflorescences when still in bud. The two that reached flowering could put on flowers, but the flowering heads were later lost either to grazing or to a dry heat wave.

*S. spiralis* is the early season orchid that grows after the first rain, which usually comes in September. This past season, it flowered in October at other sites in Lebanon, while at Kfarhazir site it was marked in mid November. This could owe to the dry climatic conditions experienced this season in combination with the type of soil and lack of shade.



Thus, this species is of remarkable value to the site and is worthy of long-term monitoring.

## *Ophrys israelitica* H.Baumann & Künkele

Israel Bee Orchid  
Ophrys d'Israel

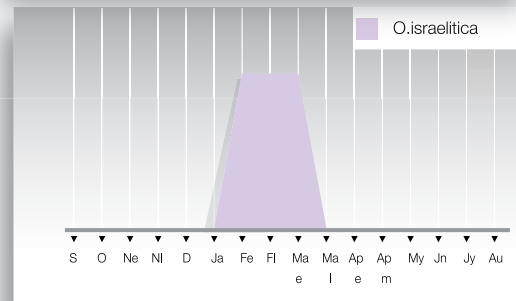
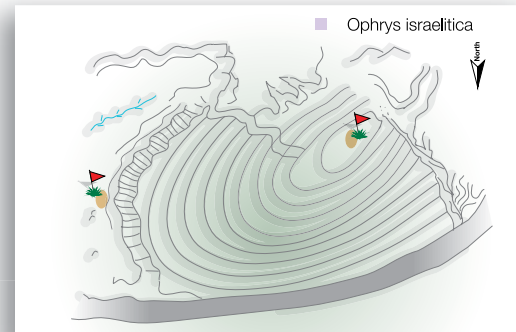


This species is represented in two population clusters of 6-7 individuals each.

One population is found on the eastern side and it bloomed earlier around February 1<sup>st</sup>.

The second population is found on terrace level 10 toward the middle of the hilltop, It was marked for monitoring.

- o The second population of 5 members bloomed toward mid February to early March.
- o One inflorescence carried an inflated ovary.
- o All flowers were grazed off by March 20.





## *Ophrys flavomarginata* (Renz) H.Baumann & Künkele

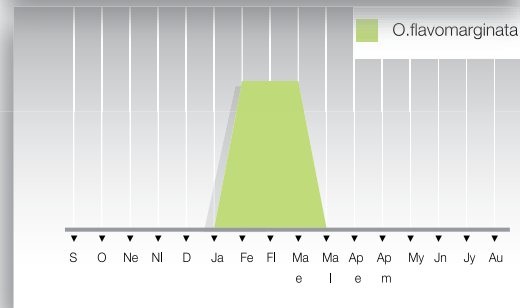
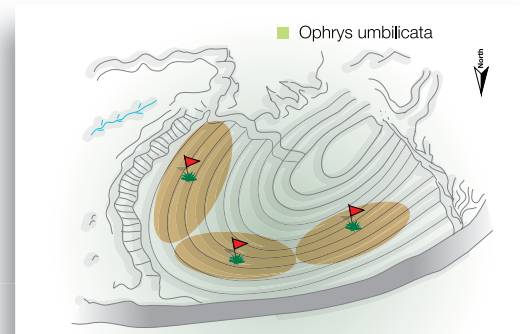
Yellow Margined Orchid  
Ophrys à marge jaune



This species is mostly spread on the lower terraces though it makes an appearance on the higher levels particularly to the northern side. The first flowering sample was spotted on the southern side of the hill, which is sunnier; however on this side of the hill the samples were noticed to be shorter and frailer. The large exemplary samples are found on the northern side of the hill.

The population structure of this species is a random dispersed distribution of individual plants. At some locations, 2-3 stems are observed together.

The zone of distribution depicted in the following figure defines the densest zone of occurrence, but does not preclude the occurrence of specimens on other levels.

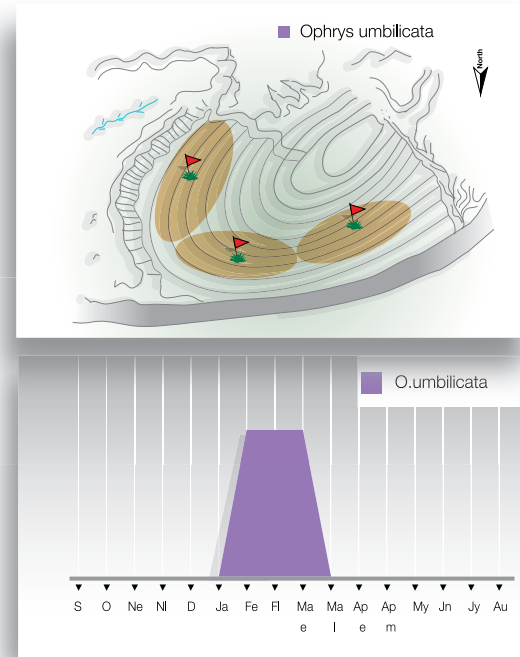


## *Ophrys umbilicata* Desf. subsp. *umbilicata*

Carmel Orchid  
Ophrys de Carmel



*O. umbilicata* is similar to the above species, differing significantly by the white sepals and petals. The first of its flowering samples were recorded later than the above. They share the same habit and range of distribution. The succession of their flowering is scientifically interesting to monitor closely.

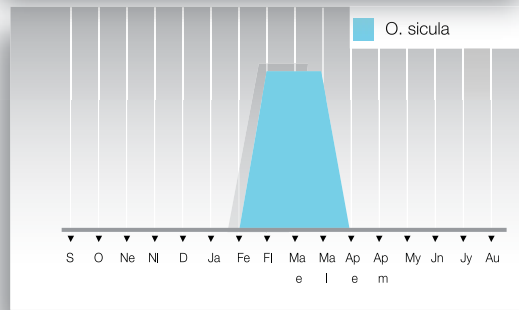
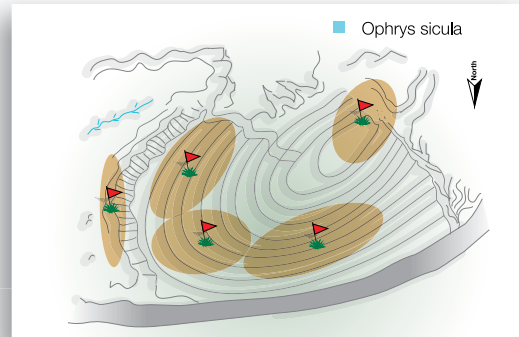


# *Ophrys sicula* Tineo

Lesser Yellow Bee Orchid  
 Petite Ophrys jaune



*O. sicula* observes a dispersed distribution in the form of individual specimens. It is mostly concentrated on the lower terraces, but can be spotted all over the terrain. On the southern side of the hill, its stature is quite reduced, obviously due to more heat and lower humidity. In shaded locations, it grows taller and of hardier stature. The first flower was spotted on 14 February, and the last bloom was seen no later than March 20.



*Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase  
*subsp. champagneuxii* (Barnéoud) H.Kreutzschmar, Eccarius & H.Dietr.

Champagne Orchid  
 Orchis de Champagneux



This species is abundantly distributed all over the hill with high frequency of occurrence. It is found in groups of high density, less likely as individual specimens.

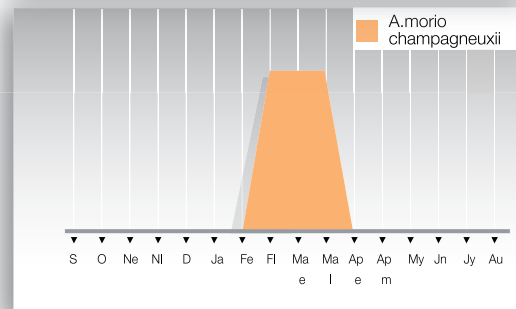
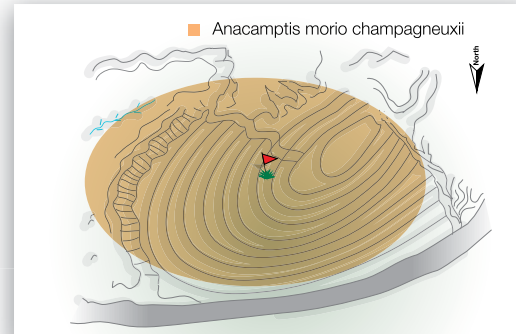
The first flowers were seen around February 15. It is strongly pollinated; most the heads would be fertilized in a season.

**Threat**

In spite of its abundance and high fecundity, it would be rare to find a head that would reach the stage of seed setting. The inflorescence is bulky especially when developing seeds which makes a good meal for grazing goats.

On March 20, the flowering inflorescences were eaten, but other members of the species were putting new blooms.

By April 1<sup>st</sup>, none of the inflorescences could be seen on site, they were all consumed.



# *Ophrys speculum* Link

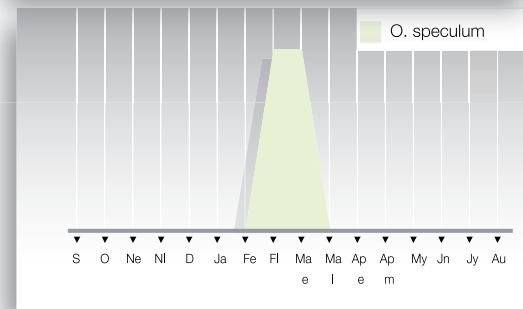
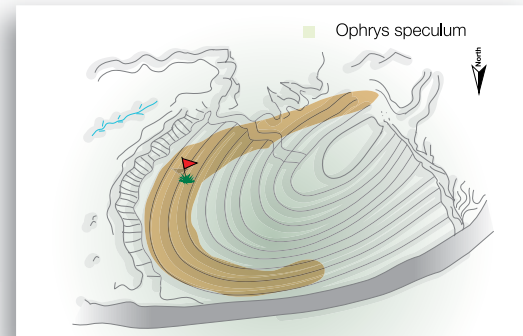
Mirror Bee Orchid  
*Ophrys miroir*



This species is densely distributed in a fraction of the terrain, It occurs mostly in clumps that can reach up to 30 individuals.

The level of flower fertilization could not be predicted, which constitutes a question for future research.

It is observed that a good number of the specimens hide in bushes of *Sarcopoterium*, It is not obvious whether more of the species was stressed out of open areas by grazing and whether more would flower under preservation from threats, or the current distribution pattern is final. There is also the question of humidity versus shade; however, at other sites the species is found to survive well in open areas.

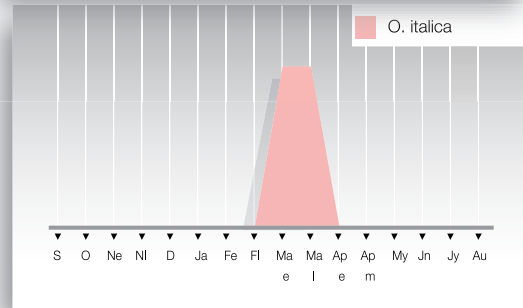
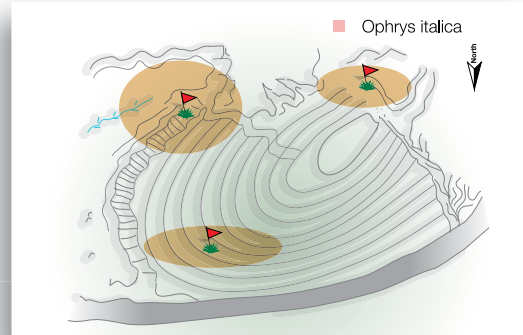


# *Orchis italica* Poir.

Naked Man Orchid  
Orchis d'Italie



It cannot be denied that the level of rainfall this season was not as favorable for orchid growth as in previous years, and in particular on this site. Usually, *O. italica* on this terrain would form considerable flowering heads of large flowers; this year, they were clearly much reduced. The first flowers came out around March 1. The flowering period phased out by April 1<sup>st</sup>.



## *Ophrys transhyrcana* Cziernak

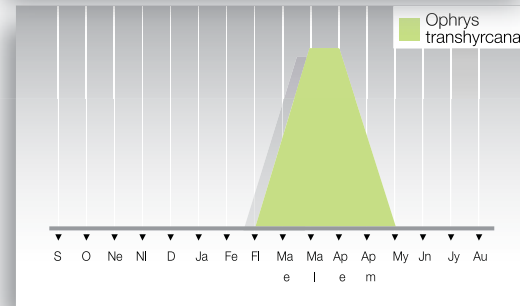
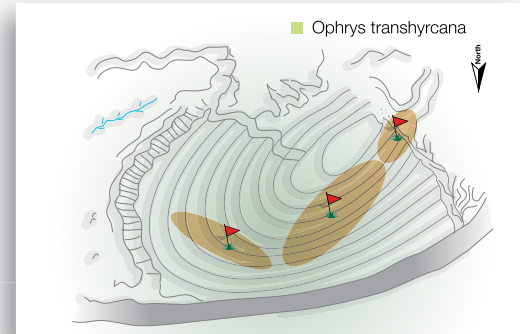
Hyrcanian Orchid  
Ophrys de l'Hyrcanie



### Monitoring

*O. transhyrcana* was one of the species selected for flowering monitoring on this assessment survey.

- The first bloom was recorded in March 10.
- Location A was later marked
  - On March 20, three clustering stems were found to start flowering.
  - By March 25, one stem had 3 flowers open, the two other stems had four flowers on but the stems were broken possibly by trampling.
  - On April 1, the standing stem put on the fourth flower.
  - On April 8, the stem had 5 flowers open with the 4<sup>th</sup> and 5<sup>th</sup> eaten by insects. The 6<sup>th</sup> flower was near opening.
  - On April 15, this last stem was found broken carrying one maturing ovary.



- Two New locations were marked on April 1.
- Location B with three stems
  - o On April 1, Stem 1 and 2 with 4<sup>th</sup> and 5<sup>th</sup> flower on
  - o On April 1, Stem 3 with 4<sup>th</sup> flower on
  - o On April 8, stems 1 and 2 were carrying their 6<sup>th</sup> and 7<sup>th</sup> flowers to full bloom.
  - o By April 15, all heads were consumed.
- Location C with one stem
  - o On April 1, its 1<sup>st</sup> flower to fade in a week, the 2<sup>nd</sup> flower in glory.
  - o On April 8, the 2<sup>nd</sup> flower still on.
  - o By April 15, all heads were consumed.
- No reliable information on fecundity and seeding could be established.



MARKER 1



MARKER 2



MARKER 3





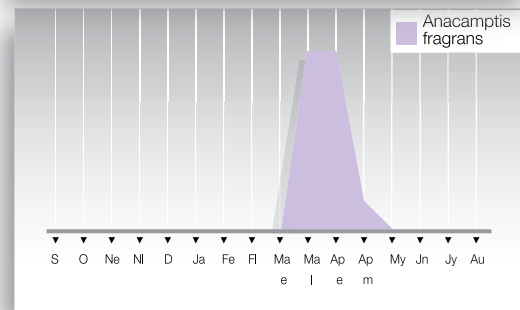
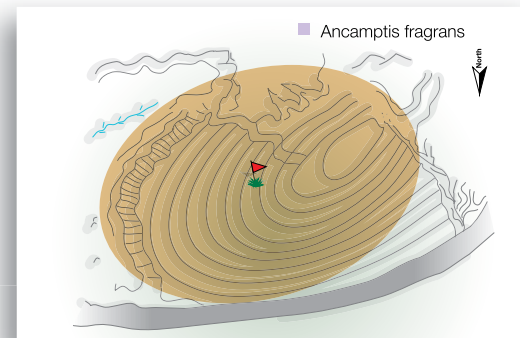
## *Anacamptis fragrans* (Pollini) R.M.Bateman

Fragrant Bug Orchid  
Orchis parfumé



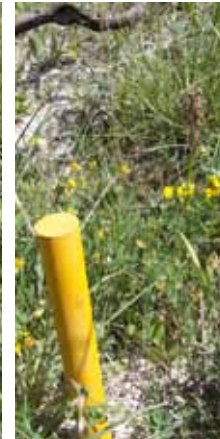
*A. fragrans* joins *A. morio* in the widespread distribution on this terrain. It grows individually and in small clumps, but the high density shows more close distribution.

Flower fertilization rate is high; many heads are observed to develop seeds. Whether seed maturity and dispersal is achieved is not clear due to grazing.



**Monitoring**

- o The first flower was observed on March 10.
- o One site of *A. fragrans* was then marked for monitoring.
  - o On March 20, the three stems were marked.
    - Stem 1 and 2 had their inflorescence newly showing out of leaf with all flowers in bud.
    - Stem 3 was developed to the stage of having the first bottom flower ready to open its lip.
  - o On April 1, all the stems were in complete bloom, all the flower buds were open.
  - o On April 8, two stems had been eaten away. The remaining stem was fully in bloom with all the flowers fertilized.

**STAGE 1****STAGE 2****STAGE 3****STAGE 4**

## *Neotinea tridentata* (Scop.) R.M.Bateman, Pridgeon & M.W.Chase

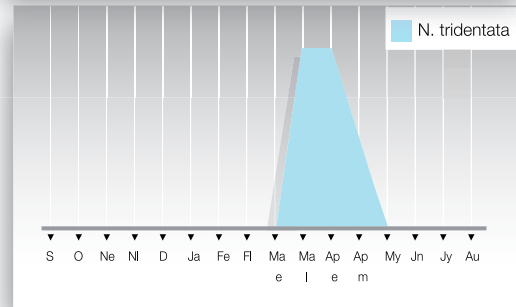
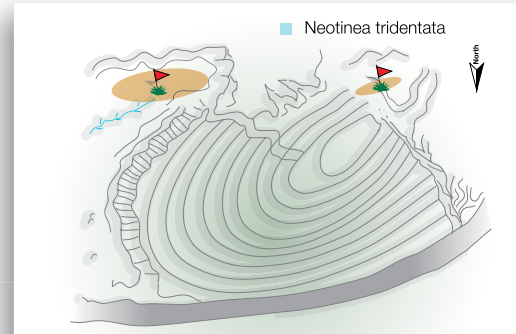
Three-toothed Orchid  
Orchis dentelé



Generally, the heads of *N. tridentata* this year were much smaller and less showy than usual. The flowering season was highly contracted; it was reduced down to nearly 20 days.

### Monitoring

- o The first flower was recorded on March 20 on the eastern side.
- o One location of *N. tridentata* was used for monitoring of flowering season.
  - o On April 1, 10 samples was marked, 5 samples surrounded the marking pole and another 5 in the vicinity. They were all in flower with few buds to open still.
  - o On April 8, all the inflorescences turned to fertilized flowers and the flowers were wilted.
- o Rarely plants were coming to bloom after April 8.

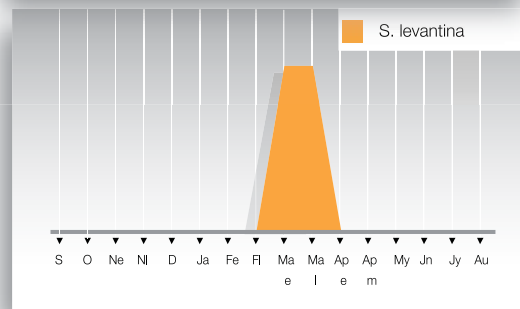
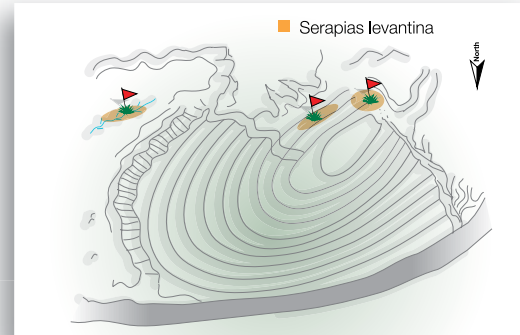


# Serapias levantina H.Baumann & Künkele

Levantine Tongue Orchid  
Sérapias du Levant



*Serapias* is found in three spots, very well clustered in high density. One of the sites is particular; it is located in a dry watercourse, where the depth possibly offers more humidity in the soil. Here, longer hardier stems are observed and is consistent of all stems in comparison with more stunt and thin stems at the other locations on this terrain.



**Monitoring**

*Serapias* was monitored at the population found in the watercourse.

- o On April 1, the marking pole was placed by a near-flowering stem.
  - o Stem one had two of its bottom flowers bulged enough to unfold the labellum, which was still curved upward inside its bud.
- o On April 8, most of the population members that sum up to 35 members had their flowers on.
  - o The same stem had now 4 flowers fully open and the last two about to revert their labella.
- o By April 15, all the populations were eaten away.

**MARKED SAMPLES**

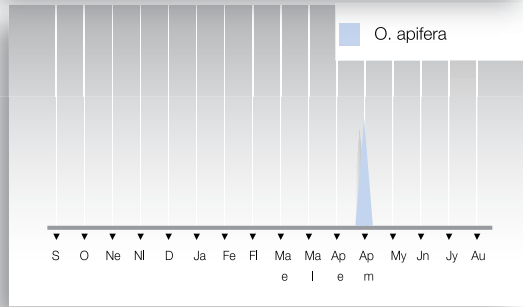
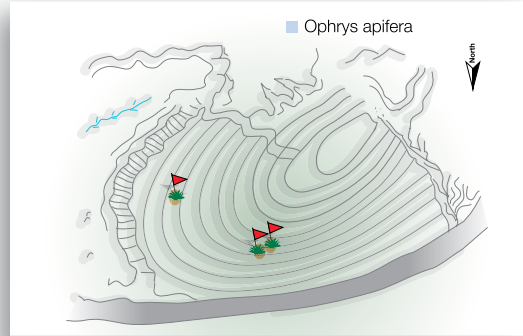
# *Ophrys apifera* Huds.

Bee Orchid  
*Ophrys abeille*



This species is the representative of the bee orchids as its name conveys.

Its occurrence on this site is very shy; three samples were in bloom this year. All three of them were hiding inside underbrush, which is not necessarily their habit.



**Monitoring**

- o The first bloom was seen on April 8.
- o On April 15,
  - o The lone sample had two flowers on
  - o Of the two closely located samples, one had two flowers in all and they were in bloom.
  - o The second had three flowers, one wilted, one old and the third in full bloom.
- o On April 24,
  - o The two stems were lost to grazing.
  - o The solely standing sample had three maturing ovaries indicating fertilization and seed development. This was later lost to grazing.

**The two marked stems lost to grazing****Fertilized ovaries**

## *Anacamptis sancta* (L.) R.M.Bateman, Pridgeon & M.W.Chase

Holy Orchid  
Orchis sacré

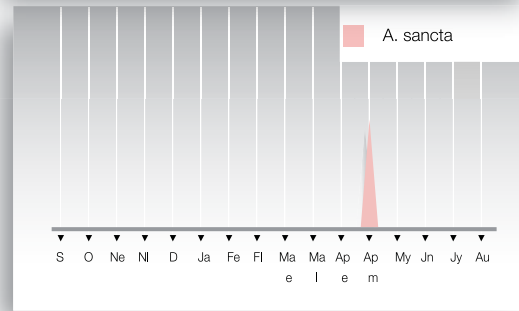
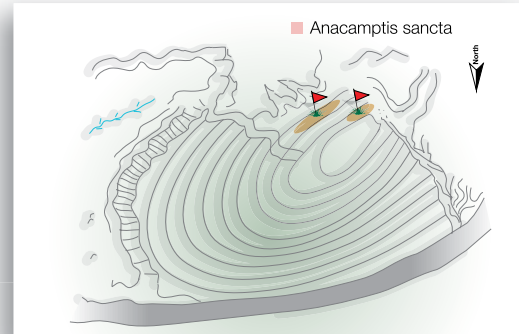


The orchid season on the Kfarhazir hill ends with the Holy Orchid. Two populations are found on this site, both are highly dense comprising about 35 members each.

### Monitoring

One population was marked.

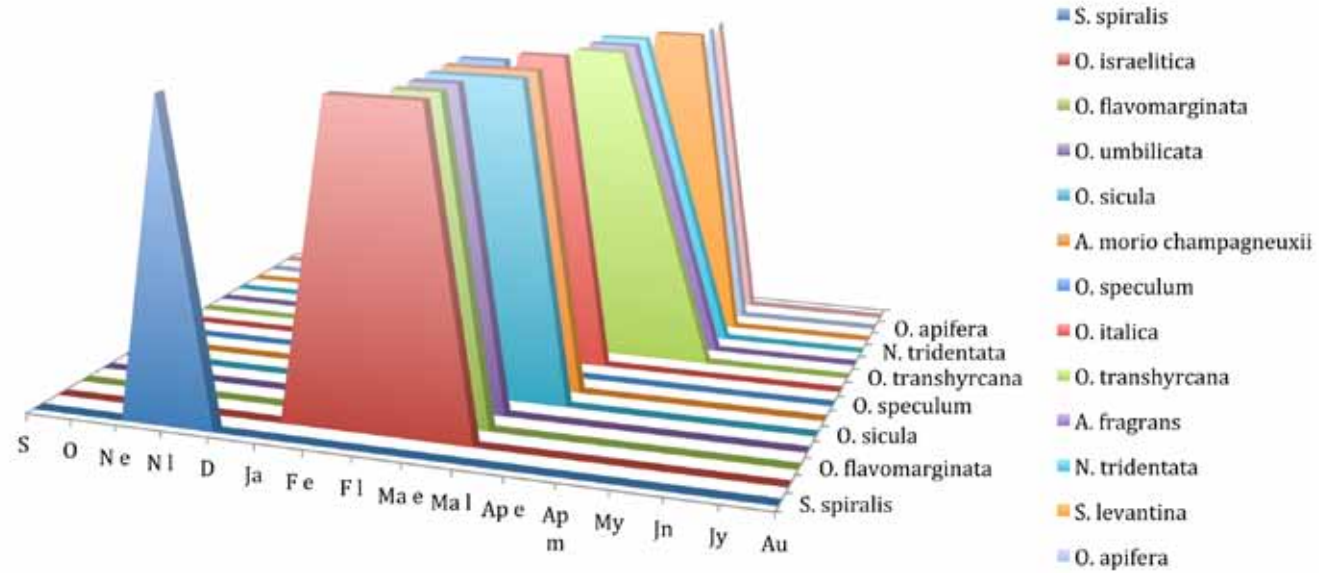
- o The first flower was observed on April 8.
- o On April 15, the whole population put on flowers with 6-7 (10) flowers open per inflorescence.
- o On April 24, all the inflorescence was found eaten by goats.
- o No record could be established for potential pollination and fertility.





## V- ORCHID FLOWER DISTRIBUTION IN THE FLOWERING SEASON

The distribution of the 14 orchid species reveals two peak times where the highest number of different species could be viewed. One peak falls between early to mid March where 7 species would be seen in flowering. The second peak arrives around mid April (8-15 April) with a second set of 6 species to be observed on site. Though a set of species would be viewed at each time, some would be in their best flowering conditions, However, others would be nearing their end. The results are significant for any future plans for most rewarding visitation periods.



## VI- NON-ORCHID FLORA ON THE HOLCIM LAND

### A- NON-ORCHID FLORA BY FLOWERING SEASON ON-SITE

#### NOVEMBER 2013



*Reichardia intermedia*



*Bellis sylvestris*

#### FEBRUARY 2014



*Anemone coronaria*



*Anemone coronaria*



*Asphodelus aestivus*

MARCH 2014

*Mushrooms**Alkanna maleolens**Cyclamen persicum**Astragalus palaestinus**Ajuga chamaepitys**Valantia hispida**Onobrychis cornuta**Asperula arvensis**Galium tricorutum**Gynandriris sisyrinchium**Anagallis arvensis caerulea**Tordylium aegyptiacum*

MARCH 2014



*Moss capsules*



*Calicotome villosa*



*Brassica tournefortii*



*Briza minor*



*Salvia viridis*



*Onosma frutescens*

APRIL 2014



*Papaver rhoeas L.*



*Arum palaestinum*



*Vicia peregrina*



*Campanula stricta*



*Geranium molle*



*Phalaris aquatica*

APRIL 2014

*Salvia hierosolymitana**Micromeria graeca**Polypogon monspeliensis**Andropogon distachyus**Cistus creticus**Linum pubescens**Centaurium erythraea**Lotus longisiliquosus**Lotus edulis**Trifolium clypeatum**Halimium umbellatum**Hymenocarpus circinatus*

## APRIL 2014

*Trifolium campestre**Helichrysum sanguineum**Filago eriocephala**Reseda lutea**Trifolium pilulare**Briza maxima**Alopecurus arundinaceus**Stipa bromoides**Bromus lanceolatus*

## MAY 2014

*Bromus rigidus**Pallenis spinosa**Teucrium divaricatum*

**MAY 2014**



*Teucrium polium*



*Avena sterilis*



*Eryngium creticum*



*Notobasis syriaca*



*Dianthus strictus*



*Echinops viscosus*

**JUNE 2014**



*Anthemis tinctoria discoidea*



*Origanum syriacum*



*Inula viscosa*

**JULY - AUGUST 2014**



*Cirsium lappaceum*



*Eryngium glomeratum*



*Ononis vaginalis*

**JULY - AUGUST 2014**



*Carlina involucreta libanotica*

**SEPTEMBER 2014**



*Capparis spinosa*



*Ephedra foeminea*



*Urginea maritima*

## B- DEGRADED ARBORESCENT FLORA

These species naturally make small trees 2-3 m high even more that would depend on the support of soil type and moisture. On Holcim land, they are reduced to bushes at ground level or less than 1m high.



*Crataegus monogyna*



*Cerasus sp.*



*Prunus sp.*



*Pistacia terebinthus*

## C- NON-ORCHID FLORA BY FAMILIES

The non-orchid flora is represented in 71 species from 25 families. Four families are most prevalent with 7-10 members in each. They are mostly Mediterranean species. 8 taxa are of limited distribution and can be considered endemic to the region of East Mediterranean. Only one species is endemic to Lebanon, namely *Halimium umbellatum*.

Family	Species	Distribution
1 ANACARDIACEAE	<i>Pistacia terebinthus</i> L.	EuMed
2 APIACEAE E	<i>Eryngium creticum</i> Lam.	Levant
3 APIACEAE	<i>Eryngium glomeratum</i> Lam.	Levant
4 APIACEAE	<i>Tordylium aegyptiacum</i> (L.) Lam.	Levant
5 ARACEAE	<i>Arum palaestinum</i> Boiss.	LSP
6 ASTERACEAE	<i>Reichardia intermedia</i> (Schultz Bip.) Hayek	Mediterranean
7 ASTERACEAE	<i>Echinops viscosus</i> DC.	Levant and Aegian
8 ASTERACEAE	<i>Cirsium lappaceum</i> (M. Bieb.) Fisch.	East Mediterranean
9 ASTERACEAE	<i>Notobasis syriaca</i> (L.) Cass.	Mediterranean
10 ASTERACEAE	<i>Pallenis spinosa</i> (L.) Cass.	Mediterranean
11 ASTERACEAE	<i>Anthemis tinctoria</i> L. discoidea (All.) Vahl	Levant and Aegian
12 ASTERACEAE	<i>Helichrysum sanguineum</i> (L.) Kostel.	Levant
13 ASTERACEAE	<i>Filago eriocephala</i> Guss.	Mediterranean
14 ASTERACEAE	<i>Bellis sylvestris</i> Cirillo	Mediterranean
15 ASTERACEAE	<i>Inula viscosa</i> (L.) Aiton	Mediterranean
16 ASTERACEAE	<i>Carlina involuocrata</i> Poir. <i>libanotica</i> (Boiss.) Meusel	LST
17 BORAGINACEAE	& Kästner	LP
18 BORAGINACEAE	<i>Alkanna maleolens</i> Bornm.	Levant
19 BRASSICACEAE	<i>Onosma frutescens</i> Lam.	Mediterranean

20 CAMPANULACEAE	<i>Brassica tournefortii</i> Gouan	LT
21 CAPPARACEAE	<i>Campanula stricta</i> L.	Levant
22 CARYOPHYLLACEAE	<i>Capparis spinosa</i> L.	LST
23 CISTACEAE	<i>Dianthus strictus</i> Banks & Sol.	L
24 CISTACEAE	<i>Halimium umbellatum</i> (L.) Spach	EuMed
25 EPHEDRACEAE	<i>Cistus creticus</i> L.	Levant
26 FABACEAE	<i>Ephedra foeminea</i> Forssk.	Mediterranean
27 FABACEAE	<i>Calicotome villosa</i> (Poir.) Link	Mediterranean
28 FABACEAE	<i>Vicia peregrina</i> L.	EuMed
29 FABACEAE	<i>Lotus edulis</i> L.	Levant
30 FABACEAE	<i>Onobrychis cornuta</i> (L.) Desv.	Mediterranean
31 FABACEAE	<i>Hymenocarpus circinatus</i> (L.) Savi	LSJ
32 FABACEAE	<i>Astragalus palaestinus</i> Eig	EurAsia
33 FABACEAE	<i>Trifolium campestre</i> Schreb.	Levant
34 FABACEAE	<i>Trifolium pilulare</i> Boiss.	Mediterranean
35 FABACEAE	<i>Lotus longisiliquosus</i> R.Roem.	Levant
36 FABACEAE	<i>Trifolium clypeatum</i> L.	Levant
37 GENTIANACEAE	<i>Ononis vaginalis</i> Vahl	Mediterranean
38 GERANIACEAE	<i>Centaurium erythraea</i> Rafn	EurAsia
39 IRIDACEAE	<i>Geranium molle</i> L.	Mediterranean
40 LAMIACEAE	<i>Gynandris sisyriuchium</i> (L.) Parl.	Levant and Aegian
41 LAMIACEAE	<i>Teucrium divaricatum</i> Heldr.	Mediterranean
42 LAMIACEAE	<i>Teucrium polium</i> L.	Mediterranean
43 LAMIACEAE	<i>Salvia viridis</i> L.	Mediterranean
44 LAMIACEAE	<i>Micromeria graeca</i> (L.) Rchb.	Levant
45 LAMIACEAE	<i>Ajuga chamaepitys</i> (L.) Schreb.	LSPJ
46 LAMIACEAE	<i>Origanum syriacum</i> L.	East Mediterranean



47	LILIACEAE	<i>Salvia hierosolymitana</i> Boiss.	Mediterranean
48	LILIACEAE	<i>Asphodelus ramosus</i> L.	Mediterranean
49	LINACEAE	<i>Urginea maritima</i> (L.) Baker	Levant and Aegian
50	PAPAVERACEAE	<i>Linum pubescens</i> Banks & Sol.	EurAsia
51	POACEAE	<i>Papaver rhoeas</i> L.	Med & Levant
52	POACEAE	<i>Briza minor</i> L.	Subcosmic
53	POACEAE	<i>Briza maxima</i> L.	Mediterranean
54	POACEAE	<i>Stipa bromoides</i> (L.) Dörf.	Mediterranean
55	POACEAE	<i>Avena sterilis</i> L.	Mediterranean
56	POACEAE	<i>Andropogon distachyus</i> L.	EurAsia
57	POACEAE	<i>Polypogon monspeliensis</i> (L.) Desf.	EuMed
58	POACEAE	<i>Phalaris aquatica</i> L.	EuroSiberian
59	POACEAE	<i>Alopecurus arundinaceus</i> Poir.	EurAsia
60	POACEAE	<i>Bromus rigidus</i> Roth	EurAsia
61	PRIMULACEAE	<i>Bromus lanceolatus</i> Roth	EurAsia
62	PRIMULACEAE	<i>Anagalis arvensis</i> L. var. <i>caerulea</i> (L.) Gouan	Levant and Aegian
63	RANUNCULACEAE	<i>Cyclamen persicum</i> Mill.	Mediterranean
64	RESEDACEAE	<i>Anemone coronaria</i> L.	EurAsia
65	ROSACEAE	<i>Reseda lutea</i> L.	Levant
66	ROSACEAE	<i>Prunus</i> sp.	Mediterranean
67	ROSACEAE	<i>Cerasus</i> sp.	EurAsia
68	ROSACEAE	<i>Crataegus monogyna</i> Jacq.	Mediterranean
69	RUBIACEAE	<i>Sarcopoterium spinosum</i> (L.) Spach	EurAsia
70	RUBIACEAE	<i>Galium tricornutum</i> Dandy	Mediterranean
71	RUBIACEAE	<i>Valantia hispida</i> L.	Mediterranean
*		<i>Asperula arvensis</i> L.	

J = Jordan  
L = Lebanon  
P = Palestine

S = Syria  
T = Turkey

## VII- VIEW ON SOME OF THE ANIMAL WORLD

### NOVEMBER 2013



Fox droppings

A predator, most probably a fox, left a sign on his passage in furry material most probably belonging to the rodent family that could have been captured from the investigated land or the surrounding.

### FEBRUARY 2014



Millipede predation

Two millipedes of different species were noticed with the brown holding the black tightly and sucking up its body juices.



Frog

A sign of fresh water in the vicinity.

Numerously dispersed, this one observed on an orchid rosette.

**MARCH 2014**



Caterpillar



Beetle



Beetle



Lizard



Green Flies



Dung Beetle

**MARCH 2014**



Yellow spider



Bird migration

**APRIL 2014**



Invisible brown Praying Mantis



Grass Hopper



Six Spot Burnet Moth, *Zygaena filipendulae*



Mating insects



Caterpillar



Caterpillar

## VIII- LANDSCAPE VARIATION OVER THE SEASONS



### NOVEMBER TO DECEMBER



the landscape remained clothed in brown for lack of sufficient rainfall.

### MARCH



### APRIL



### JANUARY TO FEBRUARY



the vegetation started to establish its elements with the coming of rain.



we witnessed the beginning of the flowering season with about third of the recorded flora growing into bloom.



**APRIL**

exhibited the highest diversity of flowers with nearly half of the recorded species starting their flowering period. It is important to realize that species that had bloomed earlier in March and other months would be still carrying flowers adding to the charm of the site.

**IN MAY**

the dry season would start taking its toll on the vegetation and general characteristics of the landscape.

The brown color would reinvade the scenery. All the grass family would have dried up by now.

**FROM JUNE ONWARDS,**

the site enters the least flowering period until the coming of the first rains. The new flowers would be mostly of thorny plants that established their green structures earlier in the season.

## IX- THREATS TO BIODIVERSITY ON THE HOLCIM LAND

### Goat grazing

It is the prime threat to floral diversity on the site. Orchid growth and progress are jeopardized by this activity; as research and monitoring are seriously obstructed. The grazing is continuous all year round.



### MARCH 2014



### Goat grazing

Orchid leaves as recorded in February, barely any escapes a goat bite.



### Bird hunting

It is not a direct threat to the site, but as viewed from the density of cartridges, it is a rampant activity. The municipality might be imposing some regulations; this should be investigated.



### Campfire

Some people visit the site to picnic on one terrace where they can park. They leave garbage around and apparently make campfire. The spread of a fire, especially in the dry season, would consume the bushy vegetation. Orchids would not be affected.

## X- STORY OF THE HERDSMEN FOR FUTURE INTEGRATION AND STAKEHOLDER ENGAGEMENT



The facing hill

### A – Building Confidence

The first interaction with the herdsmen was on site, I met one of them in November while grazing the herd on the hill. I explained my work and requested that they avoid grazing the hill for the year. He seemed convinced and agreed to spare the lot, as well as to communicate this to his family. But the grazing did not stop.

On 20 February, I placed 120cm-long marking poles at different locations on the terraces of Holcim land, they would be used for reference for the mapping of orchids. Two weeks later, the poles were all pulled out and dropped away. I placed them back; they were again broken and thrown away. Approaching the herdsmen, they confessed that they believed that Holcim company is marking the land for excavation and they would not want to lose the hill. I reassured them of the nature of my work, of the need for yearlong study thus the markings and of the potential to help

them maintain greenery in the region for the grazing herds.

Thus the markings and of the potential to help them maintain greenery in the region for the grazing herds.

I then resorted to using small poles that would be hidden in the vegetation to mark the locations of some investigated orchids. These were also tossed away. Referring to the herdsmen to comfort them again did not carry weight. I still had to drive the goats away from the site and call for the young shepherd who denied knowing of our agreement. Meanwhile, the marked orchids were being eaten away one by one.

The long process of building confidence with the herdsmen continued. Several visits were made to the herdsmen's home to talk with them, practically with one of the shepherds. Last we reached a level of understanding that would be of better assistance for the future.

### B- Provision for Local community Engagement

Three families of herders live on the hill facing the Holcim land. They occupy a farm that was put under their service by a butcher from Kfarhazir called George Jiha for exchange of grazing his herd; their collaboration dates back to 1974.

The herdsmen are originally from 'Tal Ma'ayan' in Akkar area. Their father and the elder brother came to Kfarhazir decades ago to graze their herds. This migration was forced by the increased agriculture in Akkar, which drove them out of the grazing land especially in winter. In summer, the left overs of crops would be sufficient to support the herds; however, the winter crops obliged them to keep their herds on a grange and be fed fodder which was more expensive than open grazing. The father found the salvation in Kfarhazir where they used in the beginning to either lease land or graze in the land owned by the cement companies



The herdsman abode and enclosure

Currently, three of the five brothers still keep herds. They graze them in the open lands of Kfarhazir all year round with the help of two of their children. However, the herds do not all belong to them. The largest sum of 500 heads belong to the butcher and are cared for by one brother, another brother - Jamil Bahsheek - owns 40 heads, and the third brother keeps 100 heads. The brothers are employed by the butcher to graze his stock along with theirs. In return, he pays them monthly salaries, avails the farm for their needs and that of the livestock, and pays all expenses of electricity and water. Jamil is paid 600,000 L.L. monthly, his son makes 400,000 L.L., and the other brother is also paid 600,000 L.L. Partnering with a person from Kfarhazir permits the family to graze for free unquestioned by the municipality, which refers to the butcher for any implications.

The herders rarely need to supply water for the livestock in the shortage season; they rely on the series of springs in the vicinity. The butcher takes his share of the milk, which he processes and sells at his shop. In case of higher demand, he would buy milk from the brothers. Otherwise, the herders have to find ways to sell their milk. At the moment, a salesman collects their milk for processing; they have to send it for him to the village.

Jamil for example has seven children, 3 boys and 4 girls; one of the sons resented school and engaged in shepherding. Jamil's children and those of his brothers go to a public school in the nearing town Amioun. His income is derived from his salary and that of his son, in addition to selling his milk and some of his livestock for meat

## XI- RECOMMENDATIONS

- 1- In recommendation due to the extensive drought witnessed in 2014, it is highly advisable that biodiversity assessments be undertaken over a succession of years in order to build a database of the inhabitants of the land under varying conditions. The data could then become scientifically valuable to determine the influence of climatic factors on floral propagation and growth in this area.
- 2- Preliminary scientific observations were undertaken with focus on the orchid species. The progress of scientific evaluation was constantly interrupted by the herdsman as well as by the grazing herds. Should scientific evaluations be conducted in the future, it is imperative that a mutually honored understanding be established with the herders, in order to better capitalize on scientific efforts. The current assessment paved the ground for such understanding or agreement to be pursued as is emphasized in the last section of this study.
- 3- Campfires and setting fire to the slopes are not rampant but took place; these events should be put under control. Again, the engagement of the herdsman would minimize these pressures, so would be the handling of side roads.
- 4- The side roads cut on the southern slopes are of no value except for future excavations. If the hill is to be preserved to its natural state, these roads are recommended to be covered back in soil and might become zones of introduction of orchids from other sites subject to excavations.
- 5- There is a substantial amount of leftovers and garbage remains thrown on the hill. They do not pose much of a threat but more of a nuisance. It is recommended that effort be made to remove them but outside the growth season in order not to jeopardize or infringe on biodiversity.
6. This biodiversity assessment will be delivered to CBD focal point to integrate the results in the Flora section in the coming country report.

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