

Deliverables

D 1.1, M 1.1 and D 1.2

(Partner 7, IAV Hassan II)

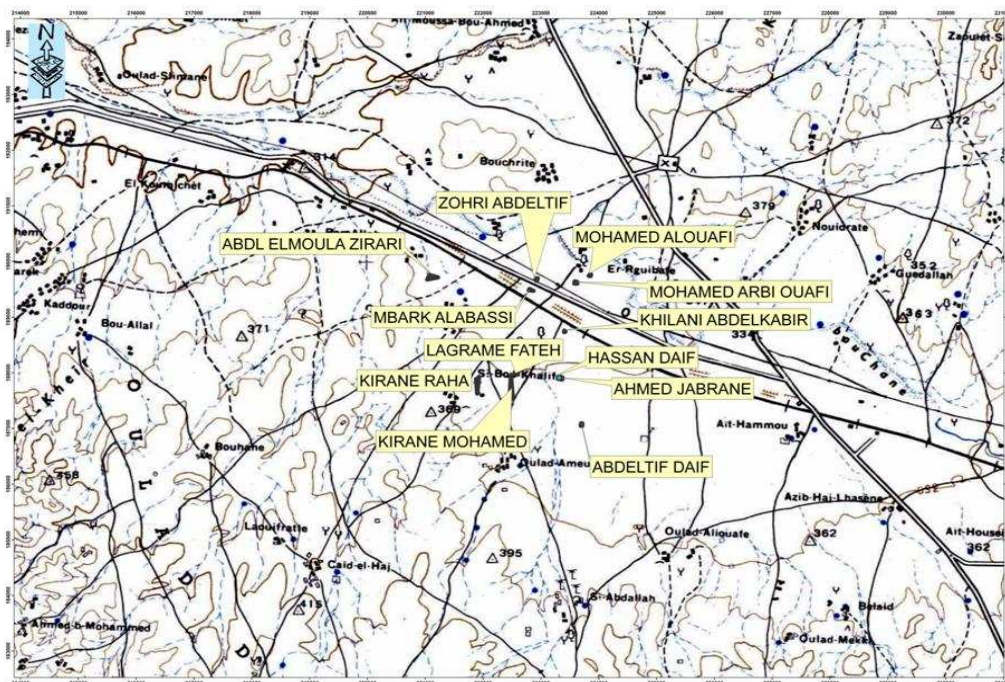
D1.1. Selected farming systems

Two sites were selected at the arid semi arid regions:

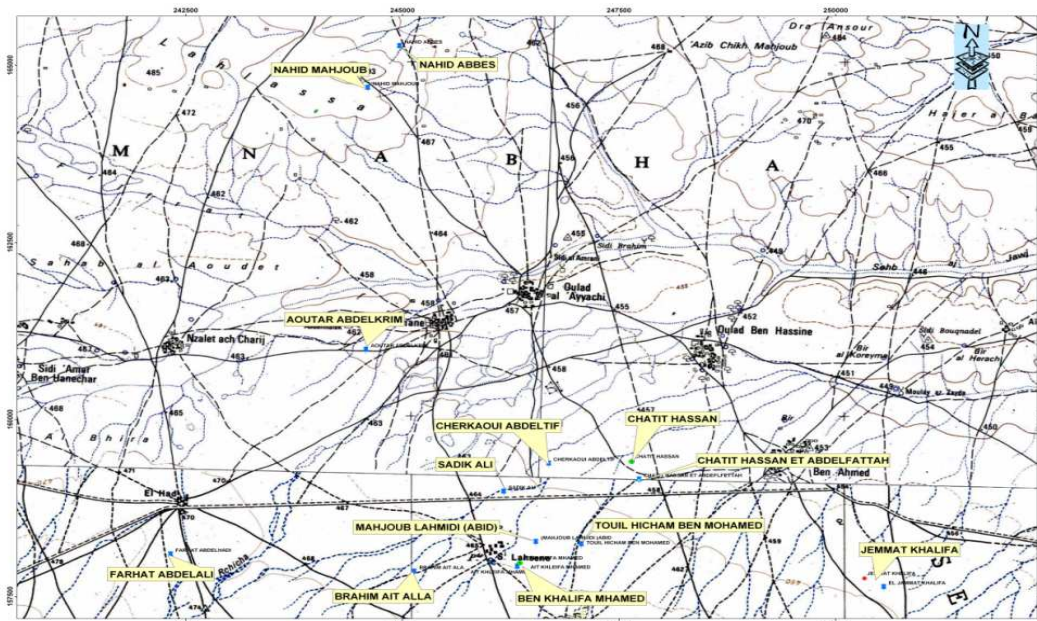
Site 1 is the community of M'khalif at Bouchane, Ben Guerir, located at 40 km from Ben Guerir

Site 2 is the community of M'nabha at ouled D'lim, Marrakech, located at 40 km from Marrakech.

Localization of the trails at Site 1: Bouchane, Ben Guerir



Localization of the trails at Site 2: Ouled Dlim, Marrakech



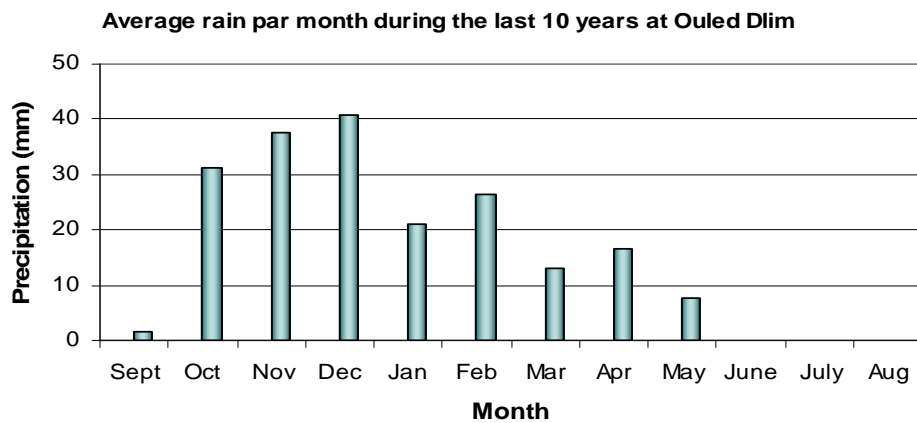
1) Climate

Both experimental sites were selected for their arid-semi arid climate. Temperatures data (average, maxima, minima per months) over 30 years (1961-1990) are presented in table 3, the same as the precipitation over the same period and over 10 last years (1997-2008). Raining season is generally between October through March-April (table 1). Winter is cold and wet and summer is dry and hot.

Table 1: Precipitations per month (mm)

Period	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	
1961/1990	5,9	23,9	40,6	31,4	32,2	37,9	37,8	38,8	23,7	4,5	1,2	3,4	281.30
1998/2008	1,75	31,14	37,73	40,81	20,91	26,53	13,15	16,51	7,71	0	0	0	196.23

The first rains start usually in late fall early winter, the precipitation is concentrated between the months of October and February (70% of the total annual) and dry period is prolonged starting from February (Presentation Zone Ouled D'lim DPA Marrakech, 2009).



There is large variation between one year to another, annual precipitation can be as low as 100 (mm) a year to over 250 mm (table 2).

Table 2: Annual precipitation (mm)

Cropping year	97/98	98/99	99/00	00/01	01/20	02/03	03/04	04/05	05/06	06/07	07/08
Precipitation (mm)	228,5	138,0	236,5	208,9	160,1	236,0	282,5	102,5	213,2	241,8	110,5

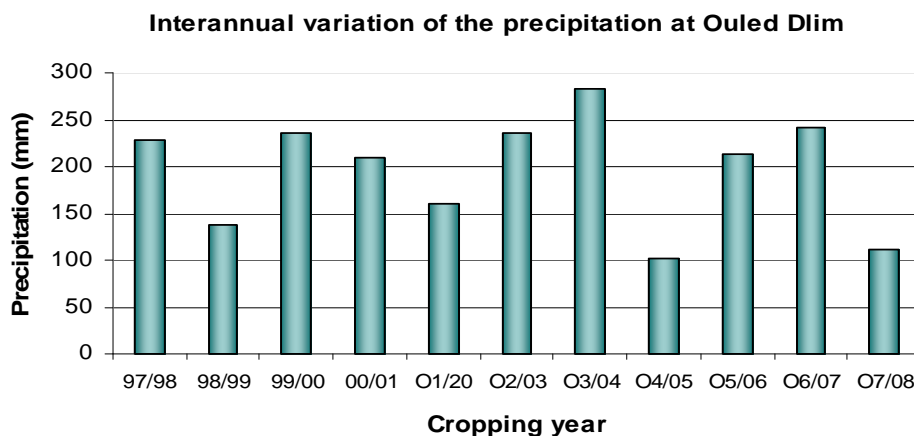


Table 3: Average temperatures per month (1961-1990)

Month	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maxima	18.4	19.9	22.3	23.7	27.5	31.3	36.8	36.5	32.5	27.5	22.2	18.7
Average	12.2	13.8	15.8	17.3	20.6	23.8	28.3	28.3	25.3	21.1	16.3	12.6
Minimal	5.9	7.6	9.4	11.0	13.8	16.3	19.9	20.1	18.2	14.7	10.4	6.5

The area of Ouled lim is characterized by high temperature and big thermal amplitudes daily and between months, like the rest of the regions where the climate is distinctly related to the continental pre desert. According to nearest climate station, the average temperature is 19.9 ° C. Absolute maximum and minimum temperatures are respectively 48 ° C and 3 ° C. The average temperature of the warmest month (August) is 39.8 ° C and that of the coldest month (December-January) is 5.5 ° C. The thermal amplitude is very important.

The average relative humidity is low due to low precipitation and high evaporative demand. It is lowest in August (43.5%), highest in January (70.2) and 51.2% in September.

The evapo-transpiration is very high. The average increased from 50 mm in December to 258 mm in July with an annual total of 1712 mm, which indicates a strong demand for water from May to October. Thus, during this period, crops suffer from an increased need for water.

Prevailing winds in both sites are west to northwest. However, the climate is significantly influenced by a hot dry wind called Chergui (Sirocco) coming from the east and south west, blowing from May to September for an annual average duration of 39 days. This wind can cause steady damage to crops and livestock especially if it coincides with periods of drought.

2) Farming systems

A farming system is defined as a set of individual production systems which have similar basic resources, operational modes, the livelihoods of households and constraints, and for which appropriate development strategies and interventions are similar. Depending on the scale of the analysis, a farming system can include a few dozen to thousands of households (John Dixon et al., 2001).

The classification of farming systems is based on the following criteria:

- The availability of basic natural resources, water, land, rangelands and forests, the climate for which the altitude is a factor, the topography, including slope; farm size, land tenure and the organization.
- The dominant model of agricultural activities and household livelihoods, including field crops, livestock, trees, aquaculture, fishing and gathering, processing and off-farm, and taking into account the main technologies used to determine the intensity of production and integration of crops, livestock and other activities (John Dixon et al., 2001).

According to these criteria, four main types of farming systems exist in Morocco.

- Irrigated farming system: whose main crops are cereals and crops like sugar beet, cotton, oilseeds. Households usually manage a small number of animals that are fed from a combination of pasture, crop residues and fodder crops grown in the small sub-irrigation systems.

- Mountain farming system, where annual rainfall is 200-800 mm, it covers small areas.
- Oasis farming system: that is concentrated along the valleys of the south.
- Rainfed (pluvial) farming system that has an annual rainfall between 300 and 1000 mm, it covering arid, semi-arid and wetland ecosystems. Most small farmers are dependent on rainfed agriculture. The farm can be divided into several fields of different sizes and quality of soil. Most farmers grow winter cereals in monoculture (Kinlath, 2008).

The regions of the Haouz and Rhamna are in an area of rainfed agriculture. The farming system is based on the production of cereals in monoculture and breeding sheep which are both the mainstay of economic activity in the area. Thus, speculation thereon, occupy almost the entire working population.

Agricultural incomes are generally not sufficient, either in cash or in terms of varieties, so farmers produce primarily cereals and practice cereals-fallow and cereal-grain legumes rotations. Irrigated area exceeds rarely 1ha.

M1.1 Farmers and farmer's communities are identified

Fifteen farmers per site were selected for the rotation trails.

Through local farmer organisation at Bouchane and the agricultural agent at Ouled D'lim, we have primary to inform about the project objectives in a first visit to both sites (July 2008).

At a second visit, we organized at both sites a meeting with farmers that were potentially candidate to get involved with the SWUP-Med program. A list of 15 farmers was prepared by the local representative (table 4); then, the program started by informing the participants about the collaborative exchange and the duties of each side. They agree to keep a plot for the rotation trail of about 600 to 700 m² during 4 years, to grow the crop and to follow the technical actions that the project will suggested to them. They were informed that they will benefit from soil and water analysis and will received seeds and fertilizer needed for the trails.

Table 4: list of the farmers per site

Site 1 : Bouchane		Site 2 : Ouled D'lim	
1	Kirane Mhamed	1	Khalifa Jammal
2	Daif Hassane	2	Touil Hicham Med
3	Khilani Abdelkadir	3	Chotite Feteh
4	Zohri Abdelkebir	4	Chotite Hassan
5	Zirari Abdelmoula	5	El Aoutar abdelkrim
6	Arbi Ewafi Mohamed	6	Sadik Ali
7	Daif Abdelkader	7	Ouaraki Mehdi
8	Ewafi Mohamed	8	Elali Med
9	Lgrame Fathe	9	Cherkaoui Abdelatif
10	Kirane Rahal	10	Farhat Abdelhadi
11	Kirane Radoine	11	Nahid Abes
12	Kirane Mostafa	12	Nahid Mahjoub
13	Jabrane Ahmed	13	Ait Alla Brahim
14	Alaabassi Mbarek	14	Abid Lahmide
15	Lahrache Mhamed	15	Khalifa M'hamed

D1.2 Database is established for the selected farming systems

A diagnosis is done through farmer surveys. The survey was conducted in both sites to make out the predominant type of holdings and identify the dominant farming systems. The survey document consists of five independent sections:

- Identification of the farmer family (family size, age, education level, occupation, income outside agriculture, ...) and infrastructure;
- Identification of the farm: total acreage, cultivated land, irrigated land, farm equipment and facilities ...
- crop production (cropping system, species, varieties, trees, livestock, ...);
- Livestock production: (species, races, products destination, activities associated with farming,).
- Other activities: projects, farmer organisation, NGO ect...

After collecting the data, the analysis was performed using descriptive statistics. The results of the examination of the data are reported below.

1. Identification of the farmer family

The size of the family is highly variable from one folk to another in both sites (table 5, 6). It varies between 2 and 14 individuals at Bouchane and between 3 and 6 individuals at Ouled D'lim. At Bouchane, 50% of the families are composed of 5 to 7 persons and 40% have over 10 individuals. As for Ouled D'lim, families usually consist of 4 to 5 individuals.

Table 5: Family size and infrastructure at Bouchane

Bouchane farms	Nbr individual	Male labour	Female labour	Electricity	Livestock building	Water	Water
Khilani abdelkebir	13	8	3	Yes	3	yes	I
Zohri abdelkebir	5	2	1	Yes	1	1km	C
Lahrache Mhamed	14	4	4	No	1	Yes	I
Jabrane Ahmed	2	1	1	No	0	Yes	I
Arbi Elwafiabdelkabar	6	2	3	No	2	2 km	C
Daif Abdelkader	7	4	2	solar eg	1	Yes	C
Elwafi Mohamed	6	2	4	solar eg	2	1km	C
Alaabassi Mbarek	6	2	1	Yes	1	0,5km	C
Lgrame Fateh	13	2	6	solar eg	1	Yes	I
Kirane Rahal	11	5	3	yes	1	yes	I

I=individual. C=collective. Solar eg = solar energy

Table 6: Family size and infrastructure at Ouled D'lim

Ouled D'lim farms	Nbr individual	Male labour	Female labour	Electricity	Livestock building	Water	Water
Chotite Fateh	3	0	1	Yes	1	Yes	C
Chotite Hassan	4	2	1	Yes	1	yes	C
Aoutat abdelkrim	5	2	2	Yes	1	yes	C
Farhat abdelhadi	5	2	1	-	1	-	I
Nahid Abbas	3	2	1	Yes	0	yes	-
Nahid Mahjoub	6	3	2	Yes	0	yes	C
Ait Alla Brahim	5	0	2	Yes	1	yes	I

I=individual. C=collective. Solar eg = solar energy

The masculine and feminine labours are similar to that of the family size. The masculine labour at Bouchane ranges from 1 to 8 individuals and 70% of families has between 2 and 4 active males. At Ouled D'lim most families consist of 1 to 3 working males. Regarding the feminine labour, it is usually composed of 1 to 2 women per household at Ouled D'lim, and 1 to 6 women per household at Bouchane.

The men handle most agricultural and livestock activities. The women take care of everyday household and help with the work of crop production.

As elsewhere in rural Morocco, kids exceed rarely the primary school. The main cause of this is the schools location that is often at no less than 2 km from the habitats.

2. Facilities and infrastructure:

Water resources: Access to water for domestic purposes does not constitute a constraint in the two sites. All homes at Ouled D'lim and 60% of households at Bouchane have a well at home. For the others, collective wells are close to the groups of habitats. Water for domestic use and livestock usually does not undergo disinfection treatment.

Electricity: Because of the dispersion of the houses, the connection to government electrical reseau is not yet total. The degree of electrification at Bouchane has barely reached 40% of homes. It is 85% at Ouled D'lim. The remaining houses are either not electrified or have recourse to the use of solar energy.

All farms have at least one building for livestock at Bouchane and only 71% at Ouled D'lim this because of the presence of specialized farms in crop production.

Land ownership: At both sites, the farm size is different from one farmer to another. It varies from 1 to 63 ha at Bouchane and 9 to 60 ha at Ouled D'lim (table 7, 8). The irrigated superficies varies from 1 to 8 ha at Bouchane and 3 to 30 ha at Ouled D'lim. A Bouchane, 81% of farmers have irrigated land equal to less than 3 ha. At Ouled D'lim, 55% of farmers have less than 4 ha and 44% from 15 to 30 ha of irrigated land.

Table 7: Equipment and farming at Bouchane

	TAC (ha)		Crops	Trees		Sowing		Irrigation Type	Farm equipment		
	Total	Irrigated		Species	Cultivar	Period	Seed kg/ha		Pomp	Sprayer	Tractor
Kirane Mhamed	10	2	W; B	-	-	AR	100	G	-	-	1
Kilani abdelkadir	3,2	3,2	W; B	O; G	P	BR	120	G	1	2	-
Zohri abdelkadir	7,5	1,5	W; B	O	P	AR	100	?	1	1	-
Mhrach Mhamed	60	8	W; B; N; C	O	L	AR	200	G	1	1	-
Jabrane Ahmed	20	3	W; B	O	P	AR	120	?	-	-	-
Elwafi Arbi Mmed	1	1	W; B	O	P	AR	120	G	-	1	-
Daif Abdelkader	6	2	W; B, C	O; P	P	AR	100	G	1	2	-
Elwafi Mohamed	22,5	2,5	W; B	O	P	AR	150	-	2	1	1
Alaabassi Mbarek	3	3	N, C	O	P	AR	0	G	1	1	-
Lgrame Fateh	63	3	W; B	O	L	AR	?	G	1	1	-
Kirane Rahal	20	3	W; B, M, C	-	-	AR	150	G	1	1	-
Moy	19.65	2.93	-	-	-	-	130	-	1.16	-	-
Min	1	1	-	-	-	-	100	-	0.8	-	-
Max	63	8	-	-	-	-	200	-	2	-	-

TAC= total acreage cultivated, W = wheat, B= barley, N= turnip, C= carrot, M= melon

O = olives, G= Grape, P= Pomegranate,

P= Picholine marocaine, L= local,

AR= after first rain, BR= before first rain

Table 8: Equipment and farming at Ouled D'lim

	TAC (ha)		Crops	Trees		Sowing			irrigation	Farm equipment		
	Total	irrigated		Olives	Cultivar	Period	Seeds kg/ha	Origin	Type	pomp	Sprayer	Tractor
Ait Lhaj Nouredine	20	3	W; B	-	-	BR	80	L	G	1	-	-
Chotite Hassan	17,5	2,5	W; B	-	-	AR	70	L	G	1	-	1
El Aoutar Abdelkrim	10	4	W; B; M; A	-	-	AR	100	L	G	1	-	-
Sadik Ali	45	25	W; M; T	1000	P	AR	-	C	L	2	1	1
Ouaraki Mehdi	60	30	W; M	2000	H	BR	100	C	L	2	1	1
Farhat Abdelhadi	15	2	-	-	-	-	-	-	G	1	-	-
Nahid Abbas	40	15	W; B	-	-	AR	100	L	G	-	-	-
Nahid Mahjoub	50	17	W; B	200	P	AR	100	C	G	1	-	1
Ait Alla Brahim	9	3	W; B; M; L	-	-	AR	80	L	G	1	-	-
Moy	28.5	11.28	-	-	-	-	90	-	-	1.25	-	-
Min	9	2.5	-	-	-	-	70	-	-	1	-	-
Max	60	30	-	-	-	-	100	-	-	2	-	-

TAC= total acreage cultivated, W = wheat, B= barley, A= alfalfa, M= melon, T= tomatoes
P= Picholine marocaine, H= Haouzia, AR= after first rain, BR= before first rain
G= flogging, L= localized

Origin L= local, C= certified

Agricultural machinery: Concerning agricultural equipment used, 72% of farmers in both sites have at least one tractor (table 7, 8). Also, 63% of farmers at Bouchane and 18% of farmers Ouled D'lim have at least one sprayer. As for heavy equipment, more farmers in Ouled D'lim (45%) have motopump for irrigation water than in Bouchane (18%), (Table 7, 8).

3. Crop production:

Farming and cropping: Cereal is the main agricultural crop in both sites. Nearly 90% of Bouchane farmers and 88% at Ouled D'lim practice cereal cropping. These farmers practice cereal-cereal or cereal-fallow rotations.

Alfalfa, tomatoes, melons are grown on irrigated plots. Irrigated crops are more important at Ouled D'lim than Bouchane where they are cultivated on small areas (Table 7, 8). Trees cropping is not common to all farmers. The olive tree is the main species planted. The size of the plantation is variable and more important at Ouled D'lim (2000 trees) than Bouchane (200 trees). The dominant variety is the Moroccan Picholine. The Haouzia is also common at Ouled D'lim (table 7, 8).

Tillage is 100% mechanized. The ploughing is mainly done by the cover crop. Such material does not plow deep. The ploughing is usually done after the first rains. Two reasons for that, On one hand, it is difficult to work the soil at dry state, the second, farmers do not want to waste the seed if the rainfall is late. The seeding rate used for cereals at Bouchane varies from 1 to 2 qx / ha and almost 90% of farmers use a dose of 1 to 1.5 qx/ha (table 7, 9). At Ouled D'lim, the amount of seeds is lower and is generally between 0.7 to 1 qx / ha. Seeds are usually of locally produced on the farm.

Crop maintenance: The majority of farmers of both sites say they do not put any fertilizer, manure or chemical treatments, but they clean their land from rocks and practice manual weeding of their crops.

Yield: The grain yield in both sites is highly dependent on rainfall and its distribution. In good years, yields may reach 25qx/ha. In bad years, average yields are below 3qx/ha and sometimes zero.

4. Animal production

Livestock is an important activity in both sites. It is practiced on almost all farms. The main dominating species is the ovine with 25 to 80 sheep per farm at Bouchane and 23 to 90 sheep per farm at Ouled lim. As for cattle, the herd does not generally exceed 4 cows per farm.

The race Sardi is the most dominant among the sheep and the local breed of cattle. The practice of other farms is low or rare. Only one farm arise poultry at Bouchane with a workforce of 5,000 chickens. Another farm has some 8 goats. The products livestock are mainly lambs for slaughter and sale and milk for family consumption and sometimes for sale to a dairy farmer organisation.

The investigations at Ben Guerrir and Marrakech sites have helped in setting parameters that characterize the type of farms. As specific to the region, the following conclusions:

The family labor is more important at Bouchane than Ouled D'lim. Some Ouled D'lim farms are specialized in crop production and hire employees.

The agricultural investment (land, farm equipment and infrastructure) is less in Bouchane than Ouled D'lim (farm size, irrigated surface, wells, tractors, moto pumps,...). The more the equipment is, the better is the crop production and higher is the farm income. Livestock production in the both sites is dominated by sheep farming. Thus, at Bouchane, farms are generally family-type. At Ouled D'lim, there are two types of farms: those of family and some specialize in vegetable production (melon, carrot, ...).

Selection of experimental sites:

Two experimental sites were identified at first, one at the IAV horticultural complex of Agadir by Dr. Redouane Choukrallah, and the second at Menara station, Marrakech by Dr. Said Wahbi. The latter plot has proved inadequate this first year for the project purpose and will be replace by three on site plots where all parameters needed for the SALMED model (soil humidity, plant potential and climatic data) will be scored.

VISITS, MEETINGS AND WORKING DAYS ORGANIZED:

Field visits

July xx, 2008
October xx, 2008
November xx, 2008
December xx, 2008
28-30 January 2009
11-12 February 2009
26-28 March 2009

28 April 2009
16-18 May 2009
24-25 May 2009

Purpose

first contact with the local coordinator
first meeting with both sites farmers
visit to the farmers, cereal seeds, fertilizers ordering and delivery
visit to farmer field and coordination with local partner
Visit to the farmer's field
Visit to the farmers trails, reporting soil analysis
Visit trail and meeting at Marrakech University
Project coordinator visit
Visit to farmer trail (yield components)
Field visit, quinoa sowing, Preparation of quinoa day
Quinoa workshop

Meetings

1st May 2007
1st to 6 July 2008
27 march 2009
3-10 May 2009
25 May 2009

Object

Meeting at Agadir, Moroccan partners consortium signature
Click of Aleppo meeting
Marrakech coordination meeting
Adana annual meeting
Quinoa workshop

Working days:

Soil analysis restitution: interpretation of the results and recommendation to farmers of both sites, (11-12 February 2009).

Quinoa information day: cropping, nutritional value, adaptation and market, (25 June 2009).