Morocco

Kenny L.

in

Al Bitar L. (ed.).
Report on organic agriculture in the Mediterranean area

Bari : CIHEAM
Options Méditerranéennes : Série B. Etudes et Recherches; n. 40

2002
pages 125-138

MOROCCO

Lahcen KENNY
Institut Agronomique et Vétérinaire Hassan II - Agadir

Introduction

In Morocco, there are two main sectors in Agriculture: a traditional one for rainfed crops, mainly cereals and legumes, and a relatively modern one for irrigated crops mainly those oriented to export. Irrigated crops include vegetables, ornamental plants, flowers and fruit trees.

Traditional farming systems with low external inputs and no or few chemicals are widespread in all parts of the kingdom. In the northern part of the country, the main commodities are cereals, legumes and non-wood forest products (i.e. mushrooms). In the central part, medicinal plants, temperate fruit trees (apple, pear and cherry) and subtropical species (fig and pomegrenade) are the dominant crops. The eastern, southern and south-eastern parts are characterized by an arid and semi-arid climate with very few rainfed crops. In these areas vegetables and fruits are mostly under irrigation using surface water in some remote areas and dam or underground water in modern farms. The agricultural scene in south of Morocco is also famous for its endemic species such as argan, date palm and caper.

1. General aspects

In Morocco Organic agriculture was launched in 1986 in Marrakech area by citrus growers with the help of some French farmers. Today, the concept of organic farming and production has gained more regions. Farmers in Agadir, Marrakech, Azemour and Benimellal regions are currently involved in one aspect or an other of organic production.

Organic commodities come from both cultivated and wild plantations. The latter is so far predominant in terms of surface. Organic production from cultivated crops was first initiated by a French and some Moroccan growers in Marrakech area (South of Morocco) and concerned only citrus. From 1986 to 1992, the progress was very slow, but in 1993 a larger experience was launched by few citrus and vegetable growers first in Marrakech and later in Agadir.

Today, there are around 1000 ha of organically cultivated crops and 7000 ha of natural forest such as argan and some medicinal plants.

2. Regulatory framework

Two ministerial laws concerning organic agriculture were promulgated in 1992:

- law no. 02/92 was promulgated by the EACCE (Etablissement Autonome de Controle et de Certification des Exportations) and it concerns the technical control of organic labelled export-oriented products
- law no. 1434 of 3 August 1992 promulgated by the DPVCTRF (Direction de la Protection des Végétaux et de la Répression des Fraudes), the competent authority normally in charge of certification and inspection in the field of Agriculture. This law was just a summary of the European legislation on organic farming and was not recognized by the EU authorities.

Even though the activity of organic farming in Morocco is 14 years old, the country has issued a national regulation only in 2002. This regulation is now published in French under the title: "Norme Marocaine de la Production Biologique".

Due to the absence of regulation and because neither DPVCTRF nor EACCE have so far developed the competence and prerogatives needed for the control, certification and inspection are carried out all over Morocco by foreign companies. Four multinational companies share the Moroccan market: ECOCERT, Qualité-France, Biosuisse and GfRS (Gesellschaft fur Ressourcenschutz mbH). The latter is acting as a co-certifier with an Austrian company. The personnel involved is Moroccan in the case of the French companies and German in the case of GfRS. Addresses of the inspection boards are given bellow:

- Gesellschaft fur Ressourcenschultz mbH

  PrinznstraBe 4
  37073 Gottingen
  Germany
  Phone 0551-586-57
  Fax 05 51-587 74

- Ecocert

  BP 47 32600
  L'Isle jourdain
  France
  Tel 0562073424
  Fax 0562071167

- Qualité- France

  18, rue Volney – 75002
  Paris, France
  Phone: 01.42.61.58.23
  Fax: 01.4260.51.61

- Biosuisse

Margarethenstr, 87
CH-4053 Basel
Tel 00 41 061 385 N96 10
Fax 00 41 061 385 96 11
website: www.bio-suisse.ch
e-mail: bio@bio-suisse.ch

3. Structural aspects

3.1 Number of farmers

According to internal documents of national NGOs and certification bodies, 61 persons take part in the organic production movement in Morocco. These are producers, exporters, processors or traders. This figure is, however, far under-estimated because many producers working with wild plantations (argan and medicinal plants) are not included. According to our proper investigation another 500 men and women are involved in collecting organic products from wild plantations. Therefore, the total number of persons involved in organic production is about 555 (table 1).

Table 1. Number of organic farmers in Morocco according to their production

Type of crops	Number of farmers	Area of production
Wild plantations		
argan	500	Agadir, Essaouira and Aoulouz
medicinal plants	3	Tafrouat and Azrou
Cultivated plants		
citrus	10	Agadir, Marrakech, Benimellal and Taroudant
olive	10	Meknes, Taza, Taroudant and Guercif
peach	1	Ouled Berhil and Taroudant
apple	-	-
plum	1	Marrakech
grape	1	Marrakech and Meknes
walnut	2	Marrakech
vegetables	15	Agadir, Marrakech, Azemour, Rabat and Casa
strawberry	1	Azemmour
caper	1	Fes
safran	1	Taliouine
medicinal and aromatic plants	9	Skhirat, Agadir and Marrakech
Total	**555**	

3.2 Overall surface

The overall cultivated and wild certified organic area is about 11 956 ha of which 35% is under conversion. The main production comes

from wild plantations particularly argan. Except for some medicinal plants collected in the Atlas forest under temperate climate, all the other products are collected or grown in the central and southern part of the country characterized by a semi-arid and arid climate. Details on the surface according to areas and commodities are given in table 2.

Table 2. Surface of organic production according to geographical areas and commodities

Types of production	Surface (ha)	Area of production
Non-cultivated crops		
➢ Argan	5000	Essaouira and Agadir
➢ Medicinal plants	2000	Taroudant and Azrou
Cultivated crops		
➢ Citrus	455	Marrakech, Taroudant,and Benimellal
➢ Vegetables	200	Azemmour, Agadir and Marrakech
➢ Olive	100	Meknes, Taroudant and Taza
➢ Other fruit crops	-	Marrakech
➢ Strawberry	-	Azemmour
➢ Caper	-	Fes
➢ Saffron	25	Taliouine
➢ Medicinal and aromatic plants	-	Agadir, Rabat and Marrakech
Subtotal	**7756**	
In conversion		
➢ non cultivated crops	4000	Agadir, Essaouira and Azrou
➢ cultivated crops	200	Agadir, El jadida and Taounate
Subtotal	**4200**	
Total	**11 956**	

3.3 Production

In Morocco non-cultivated crops represent 75% of the total organic production (table 2). Cultivated crops including citrus, olive, vegetables, medicinal and aromatic plants (MAP) are destinated to the European and American markets.

3.3.1 Citrus

Organic production of citrus commodities initiated in 1986 by some growers in Marrakech area. The main areas of production are currently Marrakech (150 ha) and Agadir (100 ha). The main varieties are Clementine, Washington Navel, Lemon, Washington sanguine and Salustiana. The whole production is oriented toward export.

According to some commercial agents, Moroccan products are well appreciated in Europe and are sold at prices varying from 6-7 FF/kg which is 20 to 30 % more than what is offered for products coming from other countries.

The main period of export goes from December to May. Exceptionally, the period can be extended to June-July if storage is ensured for late products. According to ProNatura, a french company specialized in marketing of organic products, in Morocco there is a prospect to export more organic oranges in winter and late spring, even though a strong competition of other Mediterranean countries has taken place on the European market. This assumption is based on two considerations: (i) in winter time, there is a gap of one month (February) during which organic fruits are not available on the European market; (ii) since late producing varieties are not available in Europe, in summer time demand is met by South American products.

3.3.2 Olive

Attempts to export organic olive oil and fruits have been done since the eightees, but the activity is still limited to two regions (Taza and Taroudant). According to the certifying companies (Ecocert and Qualité-France) the total certified organic surface has reached 120 hectares representing 0.02% of the total olive surface in Morocco (455 000 ha).

3.3.3 Vegetables

Organic production of vegetables was launched in 1994 with few species. By 2000, around 1500 tons of eight commodities were produced in three different areas: Agadir, Taroudant and El jadida. The production is mainly oriented toward export (table 2). Tomato represents 43% of the production, cucumber and carrot 37%. Organic vegetables are grown under plastic houses during winter season in order to meet the European off-season demand. Most of the farmers use drip irrigation, soil mulching and biological tools to control pests and diseases. Over the last five years, production of organic vegetables has become popular in Agadir where the biggest community of vegetable growers is located. From 1997 to 1998 the total surface allocated to these crops trepled and the trend seems to steadily increase (Table 3).

Table 3. Organic commodities produced in Morocco

Type of products	Surface (Ha)	
	1996/97	1998/99
➢ Citrus	87	455
➢ Vegetables*	81	42
➢ Olive	24	100
➢ Aromatic & Medicinal plants	8	16.4
Total	200	613.4

*Vegetables are mainly off-season productions

3.3.4 Medicinal and aromatic plants (MAP)

Cultivated MAP represent 16% of the total organic production. About 20 species are cultivated in certified farms in four areas: Rabat, Marrakech, Taroudant and Agadir (figure 1). These are: rosemary, menthe, thymus, verbena, salvia, cumin, oregano, coriander, common oleander, eucalyptus, fennel, lavender, marjoram, basil, pine, strawberry, chamomile, peppermint, citronella, aneth, violet, absinthe, mugwort, mayweed, savory, angelica and hyssop. Saffron is produced solely in Taliouine, a remote area in the Southwest of Morocco.

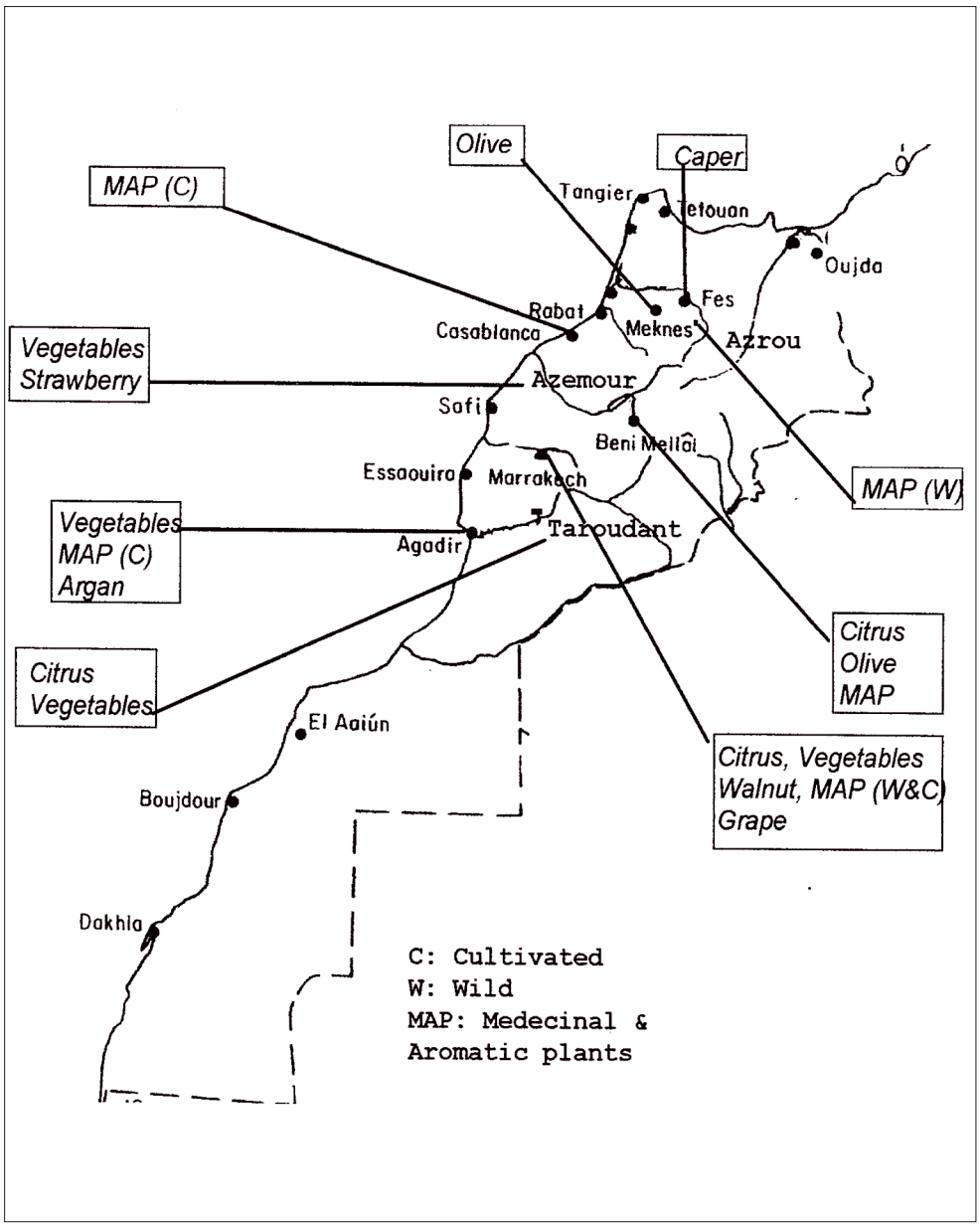

Fig. 1. Geographical distribution of organic productions in Morocco.

3.4 Collection of wild products

3.4.1 Argan

Argan is an endemic tree to Morocco covering a total area of 830 000 ha of which 4000 ha are organically certified by French and German agencies. The main areas of production are indicated in figure 1. Argan fruits are traditionally collected by the local population and are used for the extraction of a valuable oil from the seeds. Three main companies are working in this sector: a private company based in Casablanca and covering Aoulouz area, a local association of women covering Agadir and Essaouira areas and a third company based also in Casablanca and covering parts of the forest in Essaouira.

Argan oil is extracted in a five - step process: (i) nuts extraction; (ii) heat treatment; (iii) grounding; (iv) paste pressure and (v) oil purification.

Two types of oils (or oil quality) are produced: (i) a regular oil extracted in a traditional way exclusively used for consumption and (ii) a highly purified oil extracted without heating (cold extraction) reserved for cosmetic uses.

The German government, through its international agency (GTZ), launched in 1994 a project for the development of organic production of argan in the Southwest of Morocco. The main objectives of this project were to establish a network of rural cooperatives of women specialized in organic production of argan oil. Thirteen cooperatives with 376 women are involved in this network. A similar approach was undertaken by a Canadian NGO which contributed to the creation of another women cooperative in Tamanar area (SouthWest of Morocco).

3.4.2 Medicinal plants

More than 25 000 Kg of medicinal plants and plant extracts (conventional and organic) were exported in 1998, 70 % of which are certified. The Atlas forests (Ourika and Azrou) are the main sites where most of the wild medicinal plants are collected. The main species are: thymus, eucalyptus, rosemary, salvia, matricaire and absinthe. Other species are collected from arid and semi-arid land such as Ourazazate and Errachidia (East of Morocco, figure 1).

3.4.3 Processed products

There are three types of organically certified processed products: green bean, caper and olive oil. Green bean and olive oil are processed by private companies based in Casablanca and Taza Area, respectively; caper is processed by both farmers and industrial units in Fes and Meknes.

3.4.4 Foreign investments

European businessmen and farmers have been involved in the organic sector in Morroco for many years at several levels: (i) production: Belgium and Italian growers owe and manage production units specialized in medicinal plants and citrus; (ii) certification: four European companies act as certifiers (see regulatory aspects) and (iii) market: a French company (Pronatura, see Marketing aspects) is involved in exporting and marketing Moroccan products.

3.5 Producers' associations

There are two professional associations: Maghrebio and APFB (Association des Professionnels de la Filière Biologique) . The latter is the largest one with 44 members including 19 producers, nine industrials (packaging and canning), 12 salesmen and nine administrators and certifiers. Maghrebbio is based in Marrakech and has 17 members including six producers; the rest are either industrials or certifiers.

- Association des Professionnels de la Filière Biologique (APFB)
  30 Rue Abou Ishak El Marouni
  Maarif, Casablanca
  Tel: +212 2 25 21 18 / 99 40 29 / 23 05 81
  Fax: +212 2 23 07 61
- Maghrebio
  Immeuble Gidel, 127 Av. Mohammed V, Marrakech
  Tel: +212 44 43 97 26
  Fax: +212 44 43 97 26
  E-mail: maghrebio@iam.net.ma

3.6 Research and training

All initiatives (education, training and extension activities) are mostly carried out by public institutions, farmers and some international bodies. Until 1997, very few activities were undertaken by governmental institutions to promote organic agriculture in the country. In 1995 the CMPE (Centre Marocain de Promotion des Exportations) organized some seminars in Agadir and Rabat to promote export of organic products to the European market.

In 1997, the "Institut Agronomique et Vétérinaire Hassan II" (IAV) has launched a program on research and training on organic farming. IAV is the largest Institute for research and higher education in the field of agriculture in Morocco. It has 1200 students and 330 faculty members with two campuses, the main one in Rabat and a second one in Agadir.

Since 1997, the Department of Horticulture in Agadir has integrated a course on organic agriculture in the fifth year of the Master program.

Research thesis on organic production of medicinal plants and biological control of insects have also been ldeveloped in the departments of Horticulture and Plant Protection. Since 2000, some IAV's students have been participating each year to a post-graduate and Master program launched by the Mediterranean Agronomic Institute of Bari (IAMB).

4. Agronomic aspects

4.1 Management of soil fertility

In olive orchards, the common practice used for soil management consists in leaving the soil without ploughing. Weeds are left on site and are used as organic matter. Few farmers practice cereal intercropping in olive orchards.

In citrus growing, soil is ploughed twice a year: at the beginning of the rainy season (October) and later in February. Intercropping with legumes in heavy soil and Medicago species (Alfalfa) in sandy soil are common practices applied in Marrakech. Manure is the main source of fertilizers. Up to 30 tons per hectare are spread in-between the rows at the end of winter, right after harvest. Organic fertilizers are not commonly used neither with citrus nor with olive.

In general, fruit producers are facing various problems in the management of soil fertility. The total amount of nutrients available in organic orchards is far from the optimum, and this is due to: (i) the low amount of manure added annually; (ii) the lack of organic fertilizers added to the soil or applied as foliar treatment and (iii) the absence of legumes intercropping. Consequently, the yield is far from the optimum.

Vegetables are grown under plastic house and most of organic growers have more than 10 years of experience in this field. Therefore, they are generally well acquainted with technical constraints and crop requirements. Soil fertility is managed through three types of actions: (i) manuring, (ii) the use of non synthetic fertilizers and (iii) foliar application of some amino-acids and organic compounds.

The amount of manure applied vary from 15 to 60 tons per hectare according to the crop requirements. For most vegetables, well decomposed bovine manure is applied directly to the soil around the plant. For tomato, a special practice is undertaken by some farmers: it consists of mixing manure with water (1:1 volume) and releasing it in a soluble form with irrigation. Other organic fertilizers are also used at different concentration rates according to the crop requirements and to the stage of growth (table 4).

Table 4. List of fertilizers used in organic farming in Morocco

Product	Nature	Use
Patenkali 'fin'	K_2O (30%) $MgSO_4$ (10%) SO_3 (42%)	Particularly recommended for crops sensitive to chloride
Ferticompost	OM (63-65%) N, P, K, Mg, Ca, B, Cu, Zn, Mn, Fe) PH 6.5 –7	
AminD'OR BIO	OM (40%) Amino acids (7%) N	Can be mixed with all fertilizers (in fertigation) and other products except cupric products
BIOMAX	OM (15.49%) Humic and fluvic acids (3.27%) Carbohydtrates (2.49%) Nitrogen (2.9%) Amino acids (3.7%) Vitamins	For root growth and activation of soil microfauna

4.2 Disease, pest and weed management

The main pests and diseases of citrus are California Red scale, Mediterranean fruit fly (Ceratitis capitata Weid) and aphids. To control California Red scale and aphids, a commercial product (Neemix) mixed with mineral oils is used. Fly traps are the only mean to biologically control the Mediterranean fruit fly.

For vegetables, several pests and diseases are reported. The main pesticides used are presented in table 5. Biological control of insects is also quite common. More than 70 biological agents are authorized by the Moroccan legislation, law no. 2548 of April 1, 1998 (annex 2). However, the most frequently used biological agents are those reported in table 6.

Table 5. List of insecticides used in organic farming in Morocco

Product	Nature	Use
Neemix 4.5	Azadirachtin (45 g/l)	Pests
Dipel P.M	Bacillus Thuringiensis (16 000 ul/mg)	Tomato moth, noctuids, totrix moth, moth,
Bordeaux Mixture	Cupric sulfate (80%) , ph 7	Fungi and bacteria
Tracer		
Agree		
Bactosprim		
Tiovit		
Biomax		
Xentari		
Soproxyde FLO		Alternaria wilt, downy mildew, bacterial disease, phytophtora, apple scab, Monilia wilt, peacock's eye
Ecobio		

Table 6. Biological agents used for pest control in vegetables and citrus

Agents	Types	Against
Trichogramma brassicae	Hymenopterae	Noctuids
Bacillus thuringiensis	Bacteria	
Podisus mascullventris	Bug anthocoride	
Phytoseiulus persimilis	Aphids	Aphids
Amblyselus californicus	Aphids	
Peltiolla acarisuga	Cecidomyle (predator)	
Amblyseius cucumeris	Aphids	Thrips
Ambleseius degenerans	Aphids	
Orius lavigatus	Bug	
Orius majusculus	Idem	
Verticilium lecanii	Fungus	
Aphidius colemani	Hymenopterae	Aphids
Aphidoletes aphidimyza	Cecidomylea	
Aohydius ervi	Hemynopterae	
Hippocamia convergens	Coccinelle	
Chrysopera carnea	Neuropterae	
Encarsia Formosa	Hymenopterae	Whitefly
Macrolophus caliginosus	Bug	
Eretmocerus californicus	Hymenopterae	
Verticillium lecanii	Fungus	
Dacnusa sibirica	Hymenopterae	Miner
Diglyphus isaea	Idem	
Hypoaspis spp.	Aphids	Fly
Steinermena feltiae	Nematode	
Anagyrus pseudococci	Hymenopterae	Scale
Leptomastix dactylopii	Idem	
Cryptolaemus montrouzieri	Scale	
Hétérorhabditis megidis	NEmatode	Weevils

4.3 Propagation material

Seed vegetables are imported from Holland, Spain and sometimes from Israel. Varieties used in organic production are often the same of conventional; therefore, seeds are produced solely by international companies. However, many sale companies are now offering non-treated seeds for organic production.

In olive and citrus growing, propagating material is the same used in conventional. The main producers are specialized nurseries located in Meknes and Marrakech areas. Plants of the main varieties cultivated in Morocco are produced by semi-herbaceous cuttings in spring and summer in the case of olive and by budding in the case of citrus. Certified virus-free material is available for citrus but not for olive.

4.4 Constraints

The management of soil fertility is a serious problem in most organic farms, particularly in remote areas where farmers with no basic training in organic farming are not well acquainted with agronomic and microbiological benefits of organic fertilizers.

Few organic fertilizers and pesticides are available on the market with high prices compared to conventional. According to commercial agents the problem is related to the homologation system adopted in the country: a new product imported from abroad needs two to three years to be homologated.

For technical advices, some producers are collaborating with foreign consultants from France, Holland and Italy. The cost is, however, very high.

5. Market aspects

All organic products are oriented toward export (tables 7 and 8). Vegetables and citrus represent 95% of the total quantity exported to Europe. France, UK and Germany are the primary destination for Moroccan products. The national market of organic commodities is still so far absent.

In Morrocco export is done through two types of channels: (i) through dealers operating on the foreign markets (mainly for vegetales) and (ii) through a specialized French company (Pronatura) based in Marrakech. According to Pronatura agents, prices offered for organic products are 20 to 30% higher than thoses of conventional products. The demand is particularly high in winter. Pronatura recommends its clients a late production for which the European demand is not yet satisfied. The market for vegetables and citrus, as shown in table 7, has increased during the last three years. According to APFB's president, tomato export alone will reach 9000 tons in 2001.

Table 7. Organic commodities exported to foreign markets (tons) (General figures)

Crop	95/96	96/97	97/98	98/99	99/2000
Citrus	234	391	551	609	773.1
Olive	-	0.6	0.6	0.6	0.6
Vegetables	217	1028	635	1138	1238.6
MAP	5	12	12	12	12
Canned bean	4	7	7	98	98
Total	**243**	**1438.6**	**1205.6**	**1857**	**2122.3**

Table 8. Organic commodities of citrus and vegetables exported to Europe in 1999/2000 (Details by varieties)

Commodity	Quantity (tons)	Commodity	Quantity (tons)
Citrus		**Vegetables**	
lemon	46.6	melon	53.3
pomelo	2.0	eggplant	10.7
maroc late	350.8	carrot	21.8
navel	283.5	cucumber	126.1
sanguine	34.3	cucurbit	339.6
clementine	55.9	bean	54.1
		pepper	91.1
		tomato	541.9
Total	**773.1**	**Total**	**1238.6**

Annex 1 Source of collection of data and information

Information source	Contact Person	Type of information source		
		Technical	Market	Legislative
APFB	Mohamed Khajji 30 Rue Abou Ishak El Marouni Phone 21248994029	X	X	
Maghrebio	Jalil Belkamel Nectarome, Pintale, Douar El Haddad Bp 142 Tnine Ourika Haouz Marrakech Phone 0613400749	X		X
CTCRF	Zin El Alami		X	X
DPVCTRF	Mohammed Akchati DPA, Tetouan Phone 21239965003			X
ECOCERT	Daoud Moha B.P. 959, Aïn Asserdoun, Beni Mellal. Tel: 23.42.43.30. Fax: 23.42.43.30. Mobile: 61.43.12.24.	X		
Qualità-France	Meskouf	X		
Tissaliwine Coop	Amina	X	X	
PRONATURA	J.P. Payan 993, Rue Errachidia Hay Azli Marrakech Phone 212 48 49 20 03 Fax 212 48 49 20 34	X	X	

Annex 2 List of biological agents authorized in Morocco (Law no 4548 01/01/1998)

Adoxophyes orana granulosis virus
Amblyeius barkeri
Amblyseius degenerans
Amblyseius (Metaseiulus) occidentalis
Ampulex compressa
Anagrus atomus
Anthocoris nemorum
Anagyrus fuseiventris
Aphelinus abdominalis
Aphelinus mali
Aphidius matricariae
Aphidius colemani
Aphidius ervi
Aphidius urticae
Aphiduletes aphidmy
Aphytis melinus
Aphytis holoxanihus
Aprostocetus hagenowii
Chrysoperla carnea
Brucon hebetor
Dacnusa sibirica
Chilocorus baileyi
Chilocorus nigrita
Chrysoperla carnea
Coccophagus rusa
Coccophagus scutellaris
Comperiella bitasciata
Cryptolaemus montron
Cydia pomonella granulosis virus
Eneyitus intelix
Delphastus posillus
Diglyphus isaca
Encarsia tormosa
Eretmocerus californiens
eremicus
Franklinothrips vespiformis
Harmonia axynd
Hippodanna convergens
Hungariella peregnna
Hypoaspis aculeder
Hypoaspis miles
Leptomastix abnormis
Leptomastix dactylopii
Lysiphlebus testaceipes
Macrolophus catiginosus
Metaphyeus bantletti
Metaphyeus helvolus
Metasemlus m'ententalus
Neoseiulus (Amblyeius), californicus
Neoseiulus (Amblyseius) cucumeris
Nephus reuniom
Ophyia
Optius pallipes
Onus albudipemus
Onus msid
Onus laevigatus
Onus majusculus
Onus tristicolor
Preromerus biden
Phytoseiulus hongipes
Phytosiulus persmilis
Rhyzobius lophanthae
Rodolia candmalis
Rununa decollada
Scolothrips
Scutellista caerulea
Spodoptera NPV-virus
Stemernema carpocapsae
Steinernema fehiae
Thripolunus semiluteus