

PN-ABU-295

SAN DIEGO STATE UNIVERSITY FOUNDATION

**MOROCCAN COOPERATIVE
AGRICULTURAL DEVELOPMENT PROJECT**

Economic and Marketing Evaluation

July 1994

PN-ABU-295
1-1-83

SAN DIEGO STATE UNIVERSITY FOUNDATION

**MOROCCAN COOPERATIVE
AGRICULTURAL DEVELOPMENT PROJECT**

Economic and Marketing Evaluation

July 1994

Table of Contents

	<u>Page</u>
PREFACE.....	1
ECONOMIC AND MARKETING EVALUATION	2
1. Development Strategy, Investment Environment and Agribusiness Climate	2
2. Modalities and Mutations of Moroccan Agriculture Sector in Export Adjustment.....	8
3 The Dynamics of Moroccan and Israel Links with European Economic Community	11
3.1 Morocco.....	11
3.2 Israel.....	15
4. Market Prospects for Agricultural Products.....	18
5. The Arab Maghred Union and its Influence.....	28
6. Penetration to Markets: Vegetables, Fruits and Flowers.....	29
6.1 Fresh Vegetables.....	29
7. Trilateral Development Considerations	35
8. The Ouldja de Chtukas Azemmour Project (OCA). Projections and Beneficiaries.....	37
8.1 The Speedling Nursery.....	37
8.2 The Pot-Plant Nursery.....	38
8.3 The Micropropagation (Tissue Culture) Laboratory.....	40
8.4 Production of Open-Field Ornamentals.....	41
8.5 Open-Field Production.....	42
8.6 The Project's Influence Radius.....	42
8.7 Beneficiaries of the Project.....	45
9. Project's Feasibility Evaluation. First Estimations	46
9.1 General Remarks	46
9.2 Internal Rate of Return.....	47
9.3 The Long Term Economic Pact.....	65

List of Tables

	<u>Page</u>
1 Arable and Irrigated Land and Population for Morocco, California and Israel, 1992.....	2
2 Data Indicative of Moroccan Agricultural Production.....	5
3 Morocco, Agricultural Exports.....	6
4 Morocco, Agricultural Imports.....	7
5 Main Target Markets to Absorb Growing Production from Moroccan Agribusiness.....	18
6 Income and Price Elasticities for Selected Commodities.....	19
7 Top Individual Trade Partners of EEC.....	20
8 Export Opportunities by Crop and Window.....	21
9 Off-Season Vegetable Exports - 1992/93.....	25
10 Exports of Open Field Produced Vegetables.....	26
11 Exports of Winter Vegetables Produced in Greenhouses (tons).....	27
12 Vegetable Crop Production: Areas, 1988/89.....	31
13 Vegetable Crop Production in Morocco, 1991/92.....	31
14 Area, Yield, and Production of Vegetable Crops, 1991/92.....	32
15 Fresh Produce Exports, 1984-1992.....	33
16 Production of Tomatoes in Morocco, Israel and the U.S. - 1990.....	35
17 Vegetable Crops for Local Market in Casablanca and El-Jadida Regions.....	43
18 Off-Season Vegetable Crops in Casablanca and El-Jadida Regions in 1990/1991.....	44
19 Flower Production in Casablanca and El-Jadida Regions in 1990/91.....	44
0-27A Internal Rate of Return.....	48-63

List of Diagrams

	<u>Page</u>
1 Export Opportunities by Crops and "Windows".....	22
2 Production and Export Schedule for Vegetables, 1991/92.....	23
3 Production and Export Schedule for 1991/92.....	24

List of Attachments

Spring 1994 Newsletter

PREFACE

The (Ouldja de Chtoukas Azemmour) Project is unique in its features and targets. This is not a classic export promotion project with pure aggressive market purposes.

The Chtoukas Project constitutes a R & D (Research and Development) umbrella, based on a flexible nurseries system, adaptable to various crops modalities and various markets.

In the quantitative context of the Project and dissemination specific of the R & D nurseries system, its market environment is unlimited and its multiplier diffusion effect highly extended.

Economic and Marketing Evaluation

1. **DEVELOPMENT STRATEGY, INVESTMENT ENVIRONMENT AND AGRIBUSINESS CLIMATE**

Morocco's agricultural sector is the largest in the Maghreb region, in terms of arable and irrigated lands. Numerous temperate and semiarid microclimates allow it to produce a wide variety of crop and livestock products. In climate geography, agricultural potential, and types of irrigated crops that can be produced, it is similar to the State of California in the United States and to the Israeli ecosystem. One of the big differences is that more 30 percent of California's crops are produced on irrigated land and that more than 50 percent of cultivated land in Israel is under irrigation.

Over the last 20 years Morocco's economy has been affected strongly by a number of exogenous developments, including the sharp rise in oil prices, which began in the mid-1970s; the rapid expansion and subsequent contraction of the international phosphate market in the 1970s and 1980s; a tightening of Morocco's traditional export markets; and persistent droughts severely reducing agricultural output.

With immediate financial and economic disequilibrium mitigated somewhat by the stabilization program, the government directed its attention to longer-term structural reforms to be undertaken in a number of priority sectors. Industry and agriculture were the first sectors to receive heavy scrutiny. In agriculture, the sector adjustment program, which has been underway since 1985, covers a number of subsectors, including inputs, sugar, oilseeds, livestock, and cereals. Changes in these sectors, and administrative and legal reforms, have contributed to strengthening the potential for Moroccan exports, as is detailed below in Table 1.

TABLE 1
ARABLE AND IRRIGATED LAND AND POPULATION FOR
MOROCCO, CALIFORNIA AND ISRAEL
1992

Country or Area	Land (in '000 Hectares)				
	Arable	Irrigated	Population (in Millions)	Arable Land per capita (ha)	Irrigated Land per capita (ha)
Morocco	8,275	900	23	0.36	0.039
California	11,300	3,200	28	0.40	0.115
Israel	430	230	5	0.09	0.046

Morocco's agriculture production has two important parts: dry land and irrigated farming. Dry land farming occupies over 80 percent of the arable land and is dominated by the production of cereals (mostly barley, soft wheat, and hard wheat) and legumes. Given the semiarid environment of most producing zones, aggregate production is largely determined by levels and distribution of rainfall.

The second part of Moroccan agriculture, modern irrigated production, has expanded rapidly over the past 30 years and is clearly the most dynamic part of the country's agriculture. From the initial larger-scale schemes of the 1930s, irrigated perimeters have seen the introduction of new crops and some of Morocco's greatest agricultural successes: first, the rapid development of citrus (Morocco today is the world's number-two exporter of oranges and tangerines after Spain); then, the large-scale production of sugar beet and cane (which has raised domestic supply from 10 percent total to approximately 60 percent). These are often felt to represent the beginnings of modern Moroccan agriculture. They have been followed by the widespread development of early vegetables for export (primeurs), such as tomatoes, potatoes and onions, which have led to the recent introduction of more exotic vegetables and cut flowers as promising crops for the export market.

The dimensions and responsiveness of the agricultural system are important in judging how Morocco will respond to innovation in agribusiness. A number of generalizations are possible:

- Morocco has substantial agricultural resources and is still a predominantly agricultural country. Its stock of both dry land and irrigated land should allow its substantial leeway to divert land resources to higher value opportunities as those present themselves in the future;
- The relatively low cost of Moroccan agricultural and industrial unskilled or semiskilled labor is clearly a large part of the country's actual and potential comparative advantage in the Mediterranean basin;
- From the days of the Protectorate, the central government (as in all countries with strong agricultural sectors) has played a major role in the provision of infrastructure, the reorganization of land holdings, and the provision of a variety of price and protectionist incentives to increase the production of certain crops. In some areas, cropping patterns were dictated by the State. In the development of new agricultural industries (such as citrus, sugar and oil seeds), the state in the past has played a dominant role in assuring vertical coordination in marketing channels;

- In critical contrast to the agricultural sectors of many less developed economies, Moroccan agriculture has shown its capacity to respond to positive incentives. This is clearly demonstrated by success in the production of sugar, oil seeds, citrus, and bananas. The key questions are: what signals are to be given to farmers and processors, by whom, and at what cost to the State?

Although there are still many opportunities to produce and market bulk products (cereals, legumes, fresh citrus, primeurs, and so on) efficiently, the brightest future markets are those for the production of more specialized, differentiated products that will require even more vertical coordination than the bulkier products of yesterday's agricultural growth. This can most likely only be done by allowing for this organization to be done by larger private firms or by new groupings of associated firms that can respond to rapidly evolving markets. In this new environment, there will still be important tasks for the state, but these will be largely the more classical roles of the provision of infrastructure, regulation of health and safety standards, legal enforcement of contracts, and the facilitation of transfer of productive resources from owner to private owner.

Some trends demand caution, however. One involves patterns of exploitation of promotional programs and government subsidies by early adopters of new technologies for production and processing. This often leads to excess profit going to a smaller number of producers, excess costs for the State, and a real net loss to the economy. Great caution should be taken in the use of extensive subsidies to promote new products or technologies.

In this context the attention should be focused on the importance of the agriculture sector and agroindustries to the health and future development of the economy and to the development of market, for the products of Moroccan agribusiness specifically the domestic market, and those in the European Economic Community (EEC), the Maghreb Arab Union (UMA) and others.

The country's geographical location near Europe is a crucial factor for the Moroccan agribusiness. The governmental stabilization and structural adjustment programs and the trade liberalization program supported by the World Bank helped to increase exports in value and volume and set Morocco back on the road to agricultural international competitiveness.

Basic (macroeconomic) data on agricultural production, exports and imports is presented in the following Tables 2, 3, and 4.

TABLE 2
DATA INDICATIVE OF MOROCCAN AGRICULTURAL PRODUCTION

	1987	1988	1989	1990	1991	1992
<u>Selected Key Crops. 000 Metric Ton</u>						
All Grain	4,291	7,901	7,383	6,266	8,633	2,719
Soft Wheat	1,302	2,253	2,160	1,997	2,723	545
Hard Wheat	1,126	1,766	1,767	1,617	2,216	841
Barley	1,543	3,454	2,999	2,138	3,253	961
Corn	240	358	403	436	335	372
Pulses	314	450	347	337	449	na
Broad Beans	127	232	166	134	204	na
Garbanzos	61	56	43.7	59	67	na
Lentils	36	51	22.3	33	51	na
Oilseeds	109	175	118	173	177	150
Sugar Beet	2,750	2,990	2,877	2,984	3,036	2,500
Sugar Cane	848	1,094	985	1,019	1,028	1,032
Vegetables	3,245	3,195	3,325	3,673	na	na
Tomatoes	593	694	722	666	na	na
Potatoes	733	771	916	880	na	na
Citrus	960	1,233	1,444	1,050	1,469	1,128
Olives	450	347	470	577	390	500
<u>Livestock. Oct.-Nov., numbers. 000 head</u>						
All Cattle	3,178	3,137	3,325	3,346	3,500	na
Sheep	16,136	12,733	13,761	13,515	16,700*	na
Goats	5,807	5,030	5,281	5,335	5,800	na
<u>Animal Products. 000 Metric Ton</u>						
Red Meat	222	198	216	216	230	na
Poultry Meat	129	125	na	140	140	na

*Estimate for October/September compared to May/April in other years

Source: Ministry of Agriculture

TABLE 3
MOROCCO, AGRICULTURAL EXPORTS
(Qty: 000 Metric Tons, Value: Million US Dollars)

CALENDAR YEAR 1990					CALENDAR YEAR 1991			
	QTY	VALUE	US SHARE		QTY	VALUE	US SHARE	
			SHARE	VALUE			QTY	SHARE
FISH	180.9	508.4	1.6	7.2	206.5	606.6	2.2	11.3
Fresh	126.5	370.6	0.2	0.5	149.1	451.9	*	0.1
Processed	54.4	137.7	1.4	6.7	57.3	154.7	2.2	11.2
FRESH FRUIT	476.2	167.8	-	-	685.0	218.0	20.7	5.9
Citrus	472.9	164.5	-	-	678.2	208.9	20.7	5.9
FRESH VEGETABLES	191.4	72.9	*	*	273.3	106.7	*	
Tomatoes	120.0	45.9	-	-	133.7	53.7	-	-
Potatoes	59.9	18.4	-	-	126.3	40.6	-	-
PROCESSED VEGETABLE	21.1	42.4	0.4	1.0	25.5	49.0	0.6	1.3
In brine	4.7	15.8	0.1	0.5	4.5	14.0	0.2	0.6
Frozen	9.6	14.5	-	-	9.5	14.9	-	-
Dehydrated	6.8	12.1	0.2	0.5	11.5	20.2	0.5	0.7
CANNED FRUIT & VEGETABLE	120.2	165.1	4.9	9.3	119.8	157.5	5.9	10.7
Citrus juice	34.5	48.5	*	*	32.0	32.6	-	-
Olives	47.2	54.3	2.5	3.6	50.4	59.5	4.5	5.7
Pickles	11.2	18.4	*	0.1	9.9	15.1	0.1	0.3
Apricots	14.4	19.0	-	-	16.9	20.1	-	-
Tomatoes	6.2	14.3	2.3	5.6	4.3	12.3	1.4	4.7
Green beans	6.6	10.6	2.3	5.6	4.3	12.3	1.4	4.7
PAPER PULP	7.3	18.8	0.2	0.1	9.9	15.1	0.1	0.3
MISC. PLANTS & SEEDS	37.2	41.0	0.4	0.7	36.7	51.4	1.0	3.0
COTTON	2.4	5.3	-	-	3.8	7.9	-	-
PULSES	21.6	12.9	*	*	16.1	13.2	*	*
AGAR-AGAR	0.6	11.9	0.2	4.8	1.0	12.6	0.2	5.5
SPICES, FLAVORING	14.7	13.9	1.7	1.6	16.7	16.7	1.6	1.5
ESSENTIAL OILS	0.5	5.8	*	*	0.4	4.9	*	*
ALMONDS	1.3	4.6	0.1	0.1	1.2	3.7	-	-
MOLASSES	59.7	3.7	-	-	52.9	3.3	-	-
OLIVE OIL	29.7	40.3	0.1	0.1	3.2	4.8	0.9	1.6
OTHER		47.8		0.4		36.1		0.4
TOTAL AGRIC. EXPORTS		1162.7		25.3		1325.6		41.2
EXCH RATES (Dh/US Dol.)				8.242				8.707

*Quantities less than 50 Tons. Values less than 50,000 \$US.

Source: Official Trade Data, AGATT

TABLE 4
MOROCCO, AGRICULTURAL IMPORTS
(000 Metric Ton, Millions Dirhams)

CALENDAR YEAR	1990				CALENDAR YEAR	1991		
	US SHARE				US SHARE			
	QTY	VALUE	QTY	VALUE	QTY	VALUE	QTY	SHARE
CEREALS	1,548.2	201.6	746.3	101.3	1,934.2	204.9	684.5	84.7
Soft Wheat	1,356.6	171.0	566.5	72.4	1,533.7	150.9	473.5	50.2
Corn	144.5	19.6	144.5	19.6	180.5	23.3	180.5	23.3
Barley	19.5	1.9	9.5	0.9	183.2	17.2	-	-
Sorghum	-	-	-	-	-	-	-	-
Rice	27.6	9.1	25.8	8.4	36.8	13.6	30.5	11.1
WOOD	605.0	182.5	4.2	1.7	518.5	154.2	2.6	
PRODUCTS								
Raw logs	327.7	57.6	-	-	227.7	43.3	-	-
Sawn lumber	277.3	124.9	4.2	1.7	289.9	1105	2.6	0.8
EDIBLE OIL	153.1	75.9	58.9	33.4	189.8	85.3	71.9	34.1
Soybean oil	94.9	50.3	58.9	33.4	81.1	38.3	71.9	34.1
Rapeseed oil	58.1	25.7	-	-	108.7	47.0	-	-
TEA	29.2	70.9	-	-	24.3	60.4	-	-
TOBACCO	-	43.7	-	28.9	-	77.4	-	43.9
Raw leaves	7.4	13.2	-	-	12.0	31.6	-	-
Cigarette, Mil.	1620	29.9	1564	28.0	2294	44.7	2230	43.5
SUGAR	249.9	80.9	-	-	280.0	68.1	-	-
COFFEE	20.9	22.7	-	-	19.5	21.0	-	-
HIDES & SKINS	3.4	32.6	*	0.1	21.7	35.6	*	*
COTTON	36.2	67.4	7.5	14.2	42.2	76.8	5.0	9.5
DIARY	39.2	75.6	-	-	40.8	60.9	-	-
PRODUCTS								
Butter	21.0	36.4	-	-	25.2	36.7	-	-
Powder Milk	16.8	36.0	-	-	15.6	23.8	-	-
Cheese	1.4	3.1	-	-	1.1	2.3	-	-
WOOL	2.4	19.7	-	-	3.0	10.0	-	-
LIVE ANIMALS		7.7	-	0.3		12.9	-	1.3
(000)								
Day old chicks	1015	1.8	137	0.3	1392	2.2	60	0.2
Dairy cattle	4881	5.7	-	-	9446	9.7	495	1.1
SEEDS	48.7	19.1	0.8	1.4	36.0	31.9	1.8	2.2
OILSEEDS	0.1	0.1	-	-	27.9	7.3	13.5	3.3
Soybean	-	-	-	-	13.5	3.3	13.5	3.3
Rapeseed	-	-	-	-	0.2	0.3	-	-
TALLOW	9.9	3.8	6.9	2.8	12.5	5.0	10.8	4.3
CTHER		82.2		3.0		157.6		6.3
TOTAL AGRIC. IMPORTS:		967.3		185.7		1096.0		198.8

EXCHANGE RATES (Dirhams/1 \$US): 8.242 8.707 (DH/\$US)

*Quantities less than 50 Tons, Values less than 50,000 dollars

Source: Official Trade Data, AGATT

2. MODALITIES AND MUTATIONS OF MOROCCAN AGRICULTURE SECTOR IN EXPORT ADJUSTMENT

Almost one-third of the value of Morocco's exports in 1987 were from products that can be grouped under the category of agribusiness. This category includes fine tops export items such as fish, edible fruits, edible vegetables, processing of fish and meat and processing of fruits and vegetables.

If we reduce the subjects to fruits and vegetables only, the share of these exports varies about 13 percent of the total Moroccan export of about US dollars 2.8 billion or US dollars 364 million.

A very important factor of readjustment of Moroccan agriculture towards export has been the sectoral reform, undertaken since mid-1980 supported by two IBRD agricultural sector adjustment loans (Asal 1 and 2). In addition to liberalization of prices of cereals, oils and sugar and opening a variety of opportunities for private agribusiness development in seeds and fertilizers, important trade regulations were modified. The following changes are probably the most important for the future of agribusiness in several and export - oriented agribusiness in particular:

- Elimination of the monopoly of OCE (Office de Commercialization et d'Exportation) on the export of most horticultural products, became effective in 1987-1988;
- Elimination of import licensing requirements for agricultural inputs and the elimination of the "B list" of dutiable inputs as of the end of July 1990; and
- Development of an official program to liberalize trade in all agricultural products over the 1989 - 1992 periods.

(See Kingdom of Morocco: Agribusiness Sector Assessment Dai-Development Alternatives Inc., August 1990)

The readjustment stabilization and restructuring programs, supported by IMF standby arrangements, devaluation of the Dirham, reduction of tariff levels and subsidies, reduction of import, and trade liberalization supported by IBRD—all this helped to increase exports in value and volume and set Morocco on the road of international competitiveness and created a favorable background for agribusiness projects.

Among the early reforms affecting the agribusiness sector were the following:

- Reduced protection for domestic industries through reduction of import tariffs on competing goods and simplification of import procedures;
- Currency devaluation;
- Decontrol of domestic prices on many final and intermediate goods;
- Tax reform aimed at encouraging investment in export industries;
- A series of investment codes for various sectors that provide for tax advantages to foreign investors in the form of exoneration of taxes and import duties; and
- Special credit facilities available to exporters.

According to a World Bank study in 1989, the rate of private investment in Morocco declined in the 1980s after correcting for inflation. The Moroccan cost of capital was relatively high due to government borrowing to finance a very large public sector debt. This debt burden gave rise to uncertainty about future government policies and discouraged investment. Credit ceilings imposed on banks led to credit rationing. Finally, high interest rates (which were still as high as 12 percent on time deposits and 14 percent on government bonds in 1990) encouraged saving rather than investment.

As a result of this situation, investment in the 1980s tended to be oriented toward the domestic market, where external factors would have less impact, and into construction rather than manufacturing, where tax benefits were available and the pay-out appeared to be faster. However, by 1987, the picture had begun to change as the cumulative effects of structural adjustment measures increased investor confidence in the economy, and government liberalization actions, together with favorable rainfall and improved prices for Moroccan commodities, led to increased private investment in agribusiness. The termination of the export marketing monopoly of the OCE in fruit, vegetables, and wine had a positive effect. Transformation of government regulation and control is extremely relevant to the agribusiness sector.

Controls on foreign ownership: With the repeal of measures implementing the 1973 "Moroccanization" law, there are no controls on foreign ownership of enterprises in Morocco. Foreigners may hold up to 100 percent of the value of plant and equipment, but may not own land. Land

may, however be leased for terms of up to 30 years. (The latter policy is under review and may be further liberalized.)

Foreign exchanges controls: The role of the Office de Change in regulating foreign exchange transaction has been abolished. Commercial banks now handle all such matters. A foreign investor does not need prior authorization to bring in foreign exchange. Invested capital may also be repatriated without restrictions, as may dividends. Funds to repay hard-currency loans from abroad may also be transferred up to the value of the equity investment (including interest to a maximum of 17.5 percent). At dissolution of an enterprise, the original invested capital may be repatriated, along with a bonus amount for goodwill value.

Formalities to establish a business: Formerly these took as long as six months. As a result of a Royal letter in 1990, a new procedure requires the government offices involved to respond within 60 days and, if not, the application is considered approved. In practice, most applications are being processed in six to 10 weeks, including time to correct deficiencies in submissions.

Tax regime: Corporate income taxes were reduced from 50 to 44 percent in 1989. In addition, there is a value-added tax (TVA) of 19 percent applied to agribusiness. There are no taxes on profits from agricultural operations. There are some inequities in the application of the TVA, which have hurt certain industries (i.e. the feed industry, since on-farm feed manufacturing is not subject to the TVA), but these are well known to the GOM and could be easily changed.

Import duties on industrial inputs: Many items have been transferred in recent years from the "B list" (dutiabale) to the "A list" (duty free) of the "Programme General d'importations." As of July 1990, the "B list" has been eliminated entirely.

Price controls: Administered prices remain on only a small number of staple products—those produced by state enterprises or under state pricing and marketing supervision, i.e., sugar, soft wheat flour and bread, and edible oils.

Morocco offers a wide variety of services to facilitate investment in agribusiness by local and foreign investors in investment promotions, export promotion, export insurance, financial services and educational and research assistance.

The liberalization of seeds and fertilizer industry, closing of state fertilizer outlets, privatization of many companies—in addition to production and export pluralism, will undoubtedly, influence positively the Ouldja de Chtoukas Azemmour (OCA) Project.

Later in this report, markets for program products will be verified, internal and external target markets will be identified for crops and other marketing materials and post harvest activities relevant for the Development Project and its unique private agribusiness implications.

3. THE DYNAMICS OF MOROCCAN AND ISRAEL LINKS WITH EUROPEAN ECONOMIC COMMUNITY (EEC)

3.1 MOROCCO

With progress in European economic integration, trade agreements with the EEC are becoming more important than the older bilateral trade agreements with France. The 1986 Cooperation Agreement, which initiated the so-called EEC Mediterranean Policy, covers trade and aid and was signed for an indeterminate period. Trade concessions are non-reciprocal. Moroccan industrial products have free access to the EEC except for agricultural (raw or processed) products, which are covered by the Common Agricultural Policy (CAP), and textile products for which so-called "voluntary quotas" were negotiated.

Concerning agricultural products, the 1986 agreement includes preferential access to the community for most, but not all, Moroccan products with export potential. Provisions are made, however, which limit this preferential access. These include quotas for annual imports, export periods or "windows", the necessity to respect marketing regulations, and safeguard clauses to protect European products. Tariff concessions range from 20 to 100 percent and cover most Moroccan agricultural exports:

- Products that are not produced by the community, such as dates, can enter free of duty;
- Fruits and vegetables, such as citrus and tomatoes, which are also produced by the community, are subject to a number of restrictions. Flows of traditional Moroccan exports can enter free of duty provided they do not exceed quantitative limits. Products that enter in direct competition with EEC products and are sold in season are subject to the fruits and vegetables reference price system, by which a countervailing duty is imposed, equal to the difference between the entry price and the reference price (supposed to reflect "typical" EEC production and distribution costs).
- Preferential treatment is also granted to fresh vegetables when they are sold on community markets off-season.

- The reference price system applies also to table wines (with an overall quota of 200,000 hectoliters) and duty-free entry granted for quality wines within a limit of 50,000 hl.

Independently of the agreement with EEC, Morocco benefits from a specific trade agreement with France that gives duty free access to the French market for specific products such as potatoes, fruits, vegetables, and wines within quotas. As will be discussed below, some of these bilateral agreements will disappear with the ascent of Single Market standardization.

Impact of EEC Enlargement

The entry of Greece and, more recently, of Spain and Portugal has weakened Morocco's position in trade negotiations with the EEC. With Spain and Portugal, EEC self-sufficiency has increased considerably for Mediterranean crops: self-sufficiency rose from 88 to 109 percent for olive oil, from 51 to 98 percent for citrus, from 94 to 99 percent for tomatoes, and from 98 to 104 for wines. Imports from third countries will, hence, go against the principle of "Community Preference" underlying the CAP.

The full impact of EEC enlargement has not materialized yet, as a 10-year transition period was included as part of the entry agreement with Spain and Portugal. During this period, EEC duties on Spanish and Portuguese exports are progressively reduced. Following the EEC enlargement, Morocco obtained several trade concessions in the 1988 additional trade agreement:

- For selected Moroccan agricultural exports, such as fresh and processed fruits and vegetables, EEC tariffs are removed progressively under the same schedule as that for Spanish and Portuguese exports. When different tariff levels apply to imports from Spain and Portugal, Portugal has decreased to the Moroccan level. These reductions are limited to certain quantities of agricultural products:

	<u>Tons per Year</u>
Potatoes.....	39,000
Onions and Garlic.....	4,200
Tomatoes.....	86,000
Oranges.....	265,000
Small Citrus.....	110,000
Green Peas and Beans.....	8,700
Orange Juice.....	15,000
Flowers.....	300
Kiwis.....	100

Tariffs on ordinary wine are removed within the limit of 85,000 hl. Quality wines can enter the EEC free of duty within a 50,000 hl limit.

In the mid-1960s and continuing through the 1970s and 1980s, Morocco has become an important supplier of fresh vegetables to the EC, taking advantage of the EC market windows for primeur varieties. Primeur exports from Morocco to the EC have oscillated between 200-240,000 tons annually, reaching 275,000 tons between 1972/73. The lack of growth of primeur exports is due in part to competition from other countries and also Spain. Another negative factor is the EC imposed quota system on non EC suppliers starting in November and extended by a system of increased reference prices until EEC production begins in late spring.

As a result of World Banks Project Primeurs tomato acreage in covered production farms increased from 45 ha in 1978/79 to 1445 ha in 1988/89 and tomato exports from greenhouses grew from 2,130 tons in 1979 to 48,000 tons in 1989.

In the last years the volume of primeurs from open field production represented 67% of all export. Export shipments from greenhouses for tomatoes to EC will increase in the future, caused, interalia, by higher labor costs in Spain after harmonization of Spanish labor laws with EC future changes in Europe.

Approaching the year 2000, the EEC faces two major challenges:

- Reinforcing the community especially in relation to the free movement of goods, services, and people between member countries (the so-called Single Market), and monetary cooperation (the Single Currency); and
- Assisting the Eastern Europe countries during their transition to fuller use of market economies.

The Single Market (1992) has had little direct impact on Morocco's trade position with the EEC. It was expected that the main consequences started in 1993 with:

- A tighter enforcement of grades and standards, with harmonization "from the top" (the most constraining standards would likely be extended to all member countries) as goods are allowed to move freely within the EEC:

- A partial loss of French bilateral quotas for some off-seasons fruits and vegetables. The recent Renovated Mediterranean Policy provides a framework which should guarantee that these changes do not significantly affect Moroccan exports, as maintenance of traditional export flows by Mediterranean countries to Europe is considered as a legitimate objective for both parties.

Despite or because of new development in Eastern Europe, the EEC Council decided in November 1989 to implement a "Renovated Mediterranean Policy" whose aims are to:

- Contribute significantly to the development of Mediterranean Third Countries (MTC);
- Support the economic and political liberalization occurring in these MTC;
- Contribute to the conservation of the environment around the Mediterranean sea; and
- Maintain "balance" between the EEC and major groups of neighboring countries: the EFTA, Eastern Europe, and the MTC.

The necessity for the EEC to maintain a politically stable Mediterranean rim is certainly the decisive factor which resulted in this Renovated Mediterranean Policy. A key question is how likely is this policy to lead to significant real trade concessions in favor of Maghreb countries, and Morocco in particular.

Undoubtedly, business opportunities for European firms are far superior, in the short term, in Eastern Europe. Most European firms currently are shopping for enterprises Poland, Czechoslovakia, Hungary, and to a lesser extent the other East countries. Capital may not be the main limiting factor. In fact, European firms may be more limited by their capacity to explore all strategic investment opportunities and correctly manage recent acquisition. Western European economies have been restructuring at a very fast pace in recent years and this acquisition and merger activity has already been occupying a substantial portion of all top management capacity.

Eastern Europe, receives top priority and Mediterranean projects come second, but higher on the scale than sub-Saharan African ventures. This has resulted in a general impression by the Maghreb countries of a western "lack of interest" in direct investment and economic cooperation. The above considerations, however, appear to offer strong arguments for increased support for the Renovated Mediterranean Policy by Western Europe governments.

Public financial transfers to Mediterranean countries should increase significantly for basin countries judged to be most worthy. Morocco, whose efforts at liberalizing its economy are very positively viewed and which has always expressed its eagerness to collaborate with the EEC, is in a good position to benefit from these policies.

It should be remembered that Morocco has applied to join the EEC; this candidacy has not been formally reviewed by the EEC but it shows Morocco's determination to link its economy more closely to Europe. Although democratization is far from complete in Morocco, some limited multiparty activity is tolerated, which make the present regime politically "acceptable" in European eyes. In summary then, Morocco, along with Tunisia, is very likely to be one of the main beneficiaries of the Renovated Mediterranean Policy.

Southern EEC countries such as Spain, France and Italy, which have favorable political and trade position in MTC's and which are concerned, in the light of political developments in Eastern Europe, with a shift in the EEC center of gravity towards Northern and Eastern Europe, will be the main supporters of aggressive use of the Renovated Mediterranean policy. It should also be noted that the northern Mediterranean rim (again Spain, France and Italy) is the fastest growing region in Europe, especially in industries and services related to new technologies.

3.2 ISRAEL

Agricultural Links

The European community is by far Israel's largest trading partner for agricultural products. Israel's largest trading partner for agricultural products. Israel's export to the Community of 832 million dollars of fresh and processed agricultural product in 1991 represented 76% of total agricultural exports. Because of the geographical proximity and Israel's ability to supply high-quality fresh produce while European supplies are lower, western Europe will continue to be the leading overseas consumer for Israeli producers.

Roughly two-thirds of Israel's agricultural exports to the Community are fresh horticultural products: citrus and semi-tropical fruit, vegetables, and cut flowers and plants. Poultry products, seeds, cotton, and groundnuts are also supplied fresh, while processed citrus products and a wide range of prepared foodstuffs round out the total exports.

The terms of trade of Israel's agricultural exports to the EC are determined by the Agreement of Cooperation of 1975, and the 4th Additional Protocol of 1988. These agreements provide zero-duty entry to the EC for many products, generally under limited tariff quotas applicable during specified periods of the year.

Since 1988, the demands of the market have rendered many of these periods and tariff quotas unrealistic. Certain quota levels are too high (oranges), some are too low (easy peeler citrus), some do not cover the appropriate marketing period (grapes, potatoes). Further, several important new export products such as live plants, fish, tomatoes, and poultry are not covered at all. Overall, some 30% of Israel's 832 million dollar agricultural export to the Community remains outside of the existing agreements, while considerable trade under the agreement receives in practice only marginal benefits.

In the past year, Israel has suggested to the EC to open negotiations for improvements in the existing agreements. The improvements should include inclusion of new products in the preferential scheme, revision of tariff quota levels and adjustment of the applicable periods of preference. Further, Israel seeks to review the conditions under which the tariff quota for cut flowers is applicable. Israel has expressed its willingness to consider appropriate reciprocity in any new agreements.

In the spring of 1992, the Community responded negatively to Israel's request for new agricultural negotiations, citing the Community's effort to win approval for the New Mediterranean Policy, its internal reform of the CAP, and the delay in the conclusion of the Uruguay round of GATT. Furthermore, Community officials did not conceal the lack of political will to move forward on Israeli concerns at that time.

In July of 1992 the Community Council finally adopted its New Mediterranean Policy. This initiative, which had been proposed since 1990, recognized that the existing agreements with the Mediterranean countries were inadequate, but the new policy will make only a small improvement in overall terms of trade. It allows for an increase of 3% to 5% in existing tariff quota levels for the next four years, and phases in the duty abolition by 1993, to correspond to the abolition of duties for Spain and Portugal in the Community.

Yet in recent months the Community has been re-assessing its relations with the Mediterranean, and with the Maghreb in particular. Israel welcomes increased Community economic ties with the region as a whole, and recalls that historically Israel has been the first of the Mediterranean countries to begin each new generation of trade agreements with the Community. Israel is eager to amplify this tradition

and seeks, in agriculture as in other economic areas, to begin new discussions with the EC before the end of 1992 for reciprocal improvements in the agricultural trade agreements.

The Single Market in 1993 and its Impact:

Parallel to the desire to seek improvements in the trade agreements, Israel is actively preparing itself for integration (as a third country) into the new Community agricultural framework with regard to the Single Market. This work includes adapting and seeking recognition for Israeli exports in light of new veterinary inspection systems, plant health requirements, quality control inspections, plant pesticide residue regulations, organic production of fruits and vegetables, etc. This work is proceeding ahead on a professional basis, and yet will demand consideration on all fronts in order to meet the approaching deadlines and during the transition periods.

Regional Mediterranean Cooperation:

Cooperative programs in basic and applied agricultural research, in food product development, in extension programs, in inspection service programs and in agricultural education, have been and can continue to be an important avenue to advance the subjects themselves and to create deeper relations between the agricultural sectors of Israel and the EC.

The additional protocol of 1978 provides an important institutional and funding framework for specific EC-Israel cooperation programs in applied agriculture and in research. But this framework should be supplemented by Israel's integration into the broader community programs. Until 1992, Israel participated as a developing country in the Science and Technology for Development and Life - Science for Development programs. But this year the Community "graduated" Israel from the developing country programs without providing an alternative. Israel now will seek to be accepted into the AIR structures and other programs for agricultural research.

Of particular interest is the new orientation toward regional Mediterranean cooperation programs. Many areas of mutual interest are available for joint effort: irrigation for field crops and hothouse systems, integrated pest control, action against desertification, regional agricultural services management, non-food uses for agricultural crops, pond and ocean fish farming among others.

4. MARKET PROSPECTS FOR AGRICULTURAL PRODUCTS

There are three major markets for output of Moroccan agribusiness that will be reviewed here:

- The domestic market;
- The EEC market and its potential expansion to incorporate all or portions of Eastern Europe;
- The UMA or Maghrebian; and

As a first cut, it is useful to group the agribusiness product categories examined by this report into those whose growth will be primarily for export markets, for the domestic market, or for some combination of the two. This rough grouping is contained in Table 5.

TABLE 5
MAIN TARGET MARKETS TO ABSORB GROWING PRODUCTION
FROM MOROCCAN AGRIBUSINESS

Primarily Export	Combination of Both	Primarily Domestic
Cut Flowers	Food Legumes	Cereals
Citrus Fruit	Seeds (as inputs)	Oil Seeds
Orange Juice	Olives	Sugar
"Fancy" Processes	Fresh Temperate Fruit	Bananas
Fruit and Vegetables	Basic Processed Fruit and Vegetables	Dairy
Wine	Small Ruminants	Beef
Fish	Leather	Poultry
Cork	Wool Rugs	Apiculture
Medicinal and Aromatic Plants spices	Spices	Animal Feeds
Guns and Waxes		
Essential Oils		
Algae/Seaweed		

Source: *Kingdom of Morocco: Agribusiness Sector Assessment, p. 15.*

Uncertainties About Domestic Demand:

There are uncertainties about the potential Moroccan market for agribusiness products for two reasons: (1) poor data on actual demand in forms usable to companies considering the production or marketing of specific products, and (2) uncertainties about the direction of shifts in Moroccan consumer preferences and to what extent existing estimates of income elasticities of demand would hold up today for specific retail products.

Recent econometric analyses based on data called during the 1985 household survey* has concluded that income elasticities are significantly positive and price elasticities are significantly negative for main agricultural and food products as shown in Table 6.

TABLE 6
INCOME AND PRICE ELASTICITIES FOR SELECTED COMMODITIES

Product	Income Elasticity	Price Elasticity
Bread	0.49	0.26
Hard Wheat	0.47	-1.53
Olive Oils	0.83	-0.16
Beef	0.79	-1.41
Sugar	0.51	-0.51
Milk	0.95	-0.75

*MAE/Direction de Prix/1990

It is clear that Morocco's growing populations will increase the domestic demand for many basic agribusiness products. Population is increasing at 2.5 percent per year and the GDP rate growth is 4.5 percent per year.

The domestic market will offer important opportunities that may divert some producers from export-oriented production. This implies that exports to sophisticated markets such as EEC and North America will develop only if strong vertical coordination or outright integration is insured. Foreign partners, who are attempting to secure reliable supply, may be the best insurance against diversion of production to the local market at certain key periods, if the export strategy for the agricultural sector is maintained.

The Top Market: The European Economic Community

At little more than 10 kilometers from Morocco's northern tip, the newly enlarged and rapidly evolving EEC is Morocco's most important trade partner. Over the 1984-1988 period, about 56 percent of Morocco's exports were directed to the EEC and 46 percent of its imports originated there. Trade is quite concentrated within the EEC, particularly with France. The top four individual trade partners in the EEC are shown on Table 7.

TABLE 7
TOP INDIVIDUAL TRADE PARTNERS OF EEC

Trade Partner	Percent Moroccan Exports	Percent Moroccan Imports
France	26	22
Spain	7	8
West Germany	6	6
Italy	6	5
Total	45	41

Moroccan exports enjoy the same tariff conditions as the least favored of Spain or Portugal, although this applies only to selected products and within restricted periods when no or little European production is on the market.

Conclusions on Export Potential to the EEC

As a consequence of the above trade agreements with the EEC, export opportunities for Morocco can be summarized by crop and "window" as shown in Table 8 and Diagrams 1, 2, and 3. Moroccan exports of vegetables are shown in Tables 9, 10, and 11.

TABLE 8
EXPORT OPPORTUNITIES BY CROP AND WINDOW

<p>(1) <u>Off-season Vegetables</u> Potatoes Fresh peas Beans Onions and Garlic Artichokes Eggplant Squash</p> <p>(2) <u>Off-season Fruits</u> Table grapes Strawberries Melons Watermelons</p> <p>(3) <u>Olives, Avocados and Capers</u></p> <p>(4) <u>Oranges, Mandarins and Clementines</u></p> <p>(5) <u>Dates</u></p> <p>(6) <u>Orange juices; concentrate, fresh and mixes</u></p> <p>(7) <u>Canned fish, including tuna</u></p>	<p>January 1 to March 31 October 1 to April 30 November 1 to April 30 February 15 to May 15 October 1 to December 31 December 1 to April 30 September 1 to March 15</p> <p>November 15 to April 30 November 1 to March 31 November 1 to May 31 April 1 to June 15</p>
---	--

**DIAGRAM 1
EXPORT OPPORTUNITIES BY CROPS AND "WINDOWS"**

OFF-SEASON VEGETABLES

MONTH	1	2	3	4	5	6	7	8	9	10	11	12
COMMODITY												
Potatoes												
Fresh Peas												
Beans												
Onion & Garlic												
Artichokes												
Eggplant												
Squash												

OFF-SEASON FRESH FRUITS

MONTH	1	2	3	4	5	6	7	8	9	10	11	12
COMMODITY												
Table Grapes												
Strawberries												
Melons												
Watermelons												

DIAGRAM 2
PRODUCTION AND EXPORT SCHEDULE FOR VEGETABLES, 1991/92

PRODUCTS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Tomatoes												
Potatoes												
Onion												
Leeks												
Pepper												
Pimento												
Green Beans												
Mixed Greens												
Squash												
Eggplant												
Cucumbers												
Carrots												
Turnip												
Artichokes												
Garlic												
Asparagus												
Endive												


 Early Season
 In Season
 Early and In Season

**DIAGRAM 3
PRODUCTION AND EXPORT SCHEDULE FOR 1991/92**

PRODUCTS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Cabbage												
Brussel Sprouts												
Chinese Cabbage												
Cauliflower												
Broccoli												
Lettuce												
Fennel												
Beans												
Raddish												
Celery												
Parsley												
Coriander												
Mint												
Gerkins												



Season

In Season

TABLE 9
OFF-SEASON VEGETABLE EXPORTS - 1992/93

	1992-93	1991-92	% of Variation
Tomatoes - Open Field	46,924	52,648	-10.87
North Zone	30,691	35,779	-14.22
South Zone	16,233	16,869	-3.17
Tomatoes - Greenhouses	121,006	99,426	+21.
North Zone	38,750	36,607	+.
South Zone	82,256	62,819	+31
Tomatoes - Cherry	285	40	-
North Zone	155	36	-
South Zone	130	4	-
Tomatoes - Total	168,215	152,114	+10.
Potatoes	61,454	105,663	-42
North Zone	54,413	91,848	-41
South Zone	7,041	13,815	-49
Other Vegetables	24,521	14,439	+70
Zucchini	1,279	555	+130
Hot Peppers	3,707	2,788	+33
Green beans	3,188	3,414	-6.6
Peas	105	560	+88
Sweet Peppers	2,037	1,919	+6
Cucumbers	627	-	-
Strawberries	5,124	-	-
Other Vegetables	7,507	5,203	+44
Total	254,190	272,216	-6.6

Source: Ministry of Agriculture

TABLE 10
EXPORTS OF OPEN FIELD-PRODUCED VEGETABLES

CROPS	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1991/92	1992/93
Open Field	133640	142115	107638	99922	87207	109700	96642	112920	97955	96300		
Tomatoes	95850	91594	75642	75938	45507	55864	45268	39660	39930	41880	52648	46924
Fall	19480	36957	33015	37072	22494	24530	25750	27400	30480	30400		
Winter	26250	21362	19191	11476	9673	16138	10124	8200	6850	10354		
Spring	50120	34290	23436	27390	13360	15196	9394	4060	2600	1126		
Potatoes	31690	42910	27690	20890	38966	50112	49255	69300	52590	47050	105663	61454
Other Vegetables	6100	7611	4306	3095	2734	3724	2119	3960	5435	7370	8013	
Squash	2800	2026	1640	1308	650	277	478	720	523	1245		
Bell Pepper	--	303	430	53	--	--	114	-	-	-		
Hot Pepper	900	578	703	503	612	703	552	560	909	1446		
Eggplant	200	105	246	31	2	4	13	-	100	48		
Snow Peas	100	345	324	373	130	533	632	800	842	1116		
Snap Beans	1700	1671	872	454	795	373	300	850	1648	1815		
Miscellaneous	400	2583	91	372	545	2844	-	1030	1413	1700		

TABLE 11
EXPORTS OF WINTER VEGETABLES PRODUCED IN GREENHOUSES (TONS)

CROPS	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1991/92	1992/93
Greenhouse Production	4500	7526	10999	15244	19294	33166	48650	60580	55760	47715	-	-
Tomatoes	2130	4974	9156	14484	18732	32843	48367	60150	54895	46815	99426	121060
Bell Peppers	2370	2552	1823	760	562	323	284	430	865	900	1919	2037
Other Vegetables	-	-	20	-	-	-	-	-	-	-	-	-

5. THE ARAB MAGHREB UNION AND ITS INFLUENCE

Trade between Morocco and Arab Maghreb countries (Algeria, Libya, Mauritania, Morocco, and Tunisia) is relatively marginal. Over the 1984-1988 period, exports and imports from the UMA countries accounted for only four percent of Moroccan exports, and imports from the UMA only one percent of the total. Trade within the UMA is fully duty-free. In the case of Tunisia and Algeria, the fiscal levy is also waived. Sectoral negotiations to solve problems with "sensitive products" have been initiative among UMA members.

In 1987, Morocco and Tunisia signed a bilateral agreement by which all "originating" goods can be imported free of import duties except for local production taxes. In 1988, Morocco and Algeria established a program to improve economic relations that includes formulas for parallel trade exchanges within the framework of a financial volume of US\$ 100 million.

Trade between Morocco and UMA countries could increase substantially, especially if Algeria could solve the problem of its currency overvaluation and reduce the portion of its oil revenues devoted to serving interior debt. Morocco has strong potential trade complementarities with Algeria:

- Algeria is a major oil and gas producer and could become Morocco's main supplier of energy. Moroccan petroleum imports averaged PH 7.3 billion per year over the 1984-1988 period;
- Algeria has massively invested in industry over the last 20 years. Modern plants are being used significantly below their capacity because the domestic market for industrial goods was vastly overestimated. Morocco, in some cases, could find an adequate supply of industrial components in Algeria (for example, electric motors and iron products); and
- Algeria is a large importer of agricultural products. It is estimated that about 60 percent of overall food consumption comes from imports. Algeria imports large quantities of products for which Morocco has no excess to export: cereals, milk powder, oil and oil seeds, sugar, and meat. However, fresh products—some of which Morocco could export (fruits and vegetables, eggs and dairy products)—are in very short supply in Algeria, and prices are extremely high because of limited imports. Demand is thus severely restricted by usually high prices. Algerian agriculture has been devastated by 30 years of collectivization and anti-private-sector agricultural policies. Hence, despite recent policy changes, agricultural production will not recover in the near future. Because of high population growth, food deficits will increase for all products, including basic staples, and others that have become luxury goods (oranges, for example).

The Algerian market offers nearly unlimited export potential for Morocco if bilateral political relations continue toward normalization and if Algerian monetary policy is liberalized. Overvaluation of the Algerian Dinar and the low average levels of disposable consumer income are the major obstacles to the development of expanded trade between the two countries.

If the opening of the Algerian market provides very favorable prospects to Moroccan agricultural and food product exports, it also could have negative effects. Presently, the Algerian market is a very undemanding one: the consumer has been used to poor quality products, especially in fresh markets. Hence, exporting to Algeria would be less demanding in terms of quality and sanitary standards, packaging, technology, and seasonal timing than exporting to the North American or European markets. The opening of the Algerian market could result in the short run in reduced interest in the European market and slow the present trend of improvement in Moroccan technology and marketing practices to meet the demands of the European market, which may be more important to Morocco in the longer run.

6. PENETRATION TO MARKETS: VEGETABLES, FRUITS AND FLOWERS

6.1 FRESH VEGETABLES

Morocco's subtropical climate allows for a wide variety of high quality vegetable crop production for export and domestic consumption. Morocco has a varied climate but typically it is semi-arid with distinct seasons. The Atlantic coastal region from Tarfaya/Agadir in the south to Casablanca/Rabat in the north rarely experience damaging frost. January is the coldest month with an average minimum temperature of 7c.

Morocco's latitude gives it a natural climatic advantage over northern EEC countries for vegetable production. In some years, as in 1989/90 season, killing frosts in Europe and a long, cold winter made Moroccan produce extremely valuable in European markets. Even European greenhouse producers could not compete economically last year because they could not afford to heat their greenhouses. However, winter vegetables in Morocco also face risks of frosts, which can occur from the northern zones in the Loukkos area to those of the Souss Valley inland from Agadir.

Winter growing temperatures in Morocco are suitable for open-field production of cool season vegetable crops and for warm season crops grown under protective coverage and greenhouses. Vegetable production under plastic including plastic houses, row covers, floating covers, and plastic mulch is increasing. Most plastic greenhouses are 3-4 meters high, 9-10 meters wide and 50-60 meters long. Two

types of plastic greenhouse structures are used: (1) the hemi-cylindrical with aluminum pipe structural support and (2) the block-type with wood supporting structures. Vegetable greenhouse production is concentrated in two areas: the Atlantic coast from Casablanca to Oualidia (1200 ha) and the Souss and Massa valleys of Agadir (370 ha).

The southern coastal region from Tarfaya north to Agadir, in which frost may occur only once every four years, offers a climatic advantage over other regions for growing winter vegetables for export markets. Production requires irrigation in which ground water from wells and surface water from dams and weirs are used. New irrigation technology has been introduced. The most common system used is furrow irrigation. However other water distribution systems such as trickle, microjet and sprinkler have been introduced and are expanding rapidly. In the case of greenhouse and plastic row cover cultivation, trickle is very common. In open field production, live windbreaks of Cypress and Acacia trees as well as bamboo fences are used for wind protection.

Morocco's soils vary greatly from extremely productive to very poor with an alkaline PH from 7 to 9. Salinity is not a constraint in the Souss and Massa valleys which benefit from very fertile loamy-sandy soils. However salinity is becoming a problem in some of Casablanca's production regions, where wells may have 2-3 grams of salt per liter. Water remains the most limiting factor in most production regions. Recent construction of dams and reservoirs has allowed production areas to expand.

Morocco produces approximately 3 million tons of fresh vegetables on about 190,000 hectares. Of the total area approximately 22,000 hectares are produced during the winter season. The major greenhouse vegetable crop is tomato. Production of vegetables for domestic markets and for processing comes from open-field production and include traditional crops of tomatoes, potatoes, carrots, eggplant, beans, peas, zucchini and onions. Seasonal vegetables for local consumption are produced in all agricultural zones. Table 12 shows the production areas for vegetables in Morocco; Table 13 provides additional details on vegetable production and exports in Morocco; Table 13 provides information on vegetable

TABLE 12
VEGETABLE CROP PRODUCTION AREAS, 1988/89

CROP	AREA (Hectares)
Potato	42,000
Melon	28,000
Watermelon	25,000
Tomato	20,000
Onion	17,000
Peas	5,000
Zucchini	5,000
Sweet Pepper	2,500
Others*	41,000

* Artichokes, beets, broccoli, cabbage, carrots, cucumber, cauliflower, Chinese cabbage, eggplant, fennel, lettuce, okra, pumpkin, squash, sweet potato, turnips, parsley

Source: Lasheen, 1989

TABLE 13
VEGETABLE CROP PRODUCTION IN MOROCCO, 1991/1992

Crop	Area (ha)			Production (T)			Exportation (T) ⁽¹⁾	
	Off-season	Season	Total	Off-Season	Season	Total	Qty. (T)	Value (x1000 Dh)
Potato	11,700	48,950	60,650	55,400	763,000	918,400	26,308	353,290
Melon	343	26,000	26,343	1,700	313,000	324,700	1,515	9,125
Watermelon	-	12,500	12,500	-	237,600	237,600	57	164
Tomato	6,340	14,270	20,610	325,200	373,900	699,100	133,735	467,650
Onion	-	18,000	18,000	-	351,250	351,250	164	69
Peas	-	6,780	6,780	-	24,300	24,300	-	-
Zucchini	270	6,550	6,820	6,750	113,500	120,250	1,498	7,245
Sweet Pepper	470	4,450	4,920	24,600	69,800	94,400	2,255	11,850
Others	2,077	48,800	50,877	31,850	586,650	618,500	8,013	77,981
Total	21,200	196,300	207,500	555,500	2,833,000	3,388,500	273,545	928,000

⁽¹⁾ Ministry of Agriculture 1991: 1st January through 31 Dec. 1991

TABLE 14
AREA, YIELD, AND PRODUCTION OF VEGETABLE CROPS, 1991/92

Crop	Area hectares	Yield. tons/ha	Production tons
Tomatoes	20,610	33.9	699,100
Potatoes	60,650	15.1	918,400
Onions	18,000	19.5	321,250

Source: Ministry of Agriculture 1993

The Moroccan vegetable export industry is based on "primeurs" (winter or early vegetables) produced from November to April, especially fresh tomatoes, cucumbers, peppers, eggplant, melons and potatoes. Tomatoes and potatoes are the major export crops. In the 1989/90 season, Morocco exported 90,000 tons of fresh tomatoes, 65,000 tons of potatoes, and 9,000 tons of miscellaneous fresh vegetables. Fresh lettuce, asparagus, green onions, beans, and peas are also produced in limited quantities and represent good expansion opportunities for diversification.

Potato production both for winter export and local markets is increased. Currently most virus-free seed potatoes as well as most vegetable hybrid seeds are imported. Research on true potato seed is currently underway at the LAV Complexe Horticole in Agadir. There exists a good opportunity to produce certified potato seed using new tissue culture and biotechnology techniques developed at the center. Growing potatoes from seed has the advantage of avoiding potato viruses which commonly affect seed potatoes.

Marketing

Morocco's vegetables export industry is based on primeurs (winter crops) shipped from November to April. Exports volumes vary greatly according to weather conditions, especially the availability of water. The value of vegetable exports shown in Table 15, show substantial year-to-year variations. Comparable data on prices reported by GATT, indicate a general upward trend for tomatoes and other fresh vegetables over this period, though potato prices dropped substantially in 1988 compared to previous years.

TABLE 15
FRESH PRODUCE EXPORTS, 1984-1992
(Millions of Dirhams)

	1984	1985	1986	1987	1988	1990	1991	1992
Fresh Tomatoes	291	323	389	457	391	387	470	
Fresh Vegetables	100	146	215	238	290	na	na	
Potatoes	127	136	193	172	98	157	357	

Source: GATT, 1989, Report MO 9224A 1992

During the 1960s and 1970s Morocco was a major supplier of both winter and summer vegetables, primarily tomato and potatoes to France, Germany and a few other EEC countries. In the mid-70s, Morocco's vegetable production and export declined dramatically due mainly to competition from Spain, lower producer prices, and EEC restrictions on vegetable exports from May to October. The EEC is the largest regional importer of fresh vegetables with Germany, France and UK as the largest importers. Although the EEC countries are largely self-sufficient in production of fresh vegetables on an annual basis, climatic factors restrict the range and timing of their EEC production, which then permits off-season entry of Moroccan imports.

Morocco is anxious to develop joint venture opportunities, to develop markets and increase production for export. However a more aggressive marketing policy must be initiated to expand exports, especially in the areas of introduction of new high value crops, and improvements in post-harvest handling. Quality control must also be strengthened.

Opportunities and Constraints

The Moroccan government's export liberalization program and the elimination of the OCE monopoly on vegetable export has created new optimism in the vegetable industry. The private sector is beginning to respond to new opportunities. However, as noted above, a more aggressive marketing policy must be initiated. Increased export of fresh vegetables and high value crops has a good potential in Morocco because of its favorable climatic conditions and good fertile soils. Water is a limiting factor but increased dam construction should expand irrigation and recharge aquifers. Morocco's irrigation potential is not utilized to its maximum capacity. Salinity is becoming a serious problem in some vegetable

production areas but is not a constraint in the Souss-Massa Valley area which is one of the major production areas with good soils, adequate water resources and relatively frost-free environment.

Nematode infestation has become a serious problem in several greenhouses and production areas especially in the coastal sandy soils. Resistant plant varieties that are adopted to Morocco should be introduced, tested and evaluated. Soil fumigation is an expensive input but has been successfully introduced in several production areas for control of nematodes and soil-borne diseases.

Vegetable crop yields are generally low and this is one of the main reasons for high production costs. Farm labor is readily available at comparably low cost, however lack of technical knowledge of improved production practices, irrigation technology, quality and grade standards and post harvest handling are constraints at the farm level. There is growing interest in "fertigation"—the application of fertilizer through drip irrigation systems, which was introduced first in greenhouse cultivation of bananas and other crops.

Transport to local and export markets is also serious constraints. Morocco does benefit from a good road system but post harvest handling, refrigeration, packaging, and preparation for market does not, in some cases, meet EEC standards. Overland trucking to Europe has not yet been adequately developed. Air and sea transport is available but is hampered by high cost structure resulting from cartel control by government-owned companies.

Morocco's climate and lower labor costs provide opportunities for increased export of fresh vegetables. In time, production of some crops may shift to Morocco from higher-cost areas in Europe.

Fresh vegetables are cultivated along the coastal strip from Agadir to the Ghard (Vicinity of Kenitra), and in pockets along the Mediterranean coast. Potatoes and tomatoes account for over 95 percent of total fresh vegetables exports. Exports of vegetables are overwhelmingly concentrated on the EC market.

During 1991, vegetable exports increased about 43 percent owing mostly to a two fold increase in potatoes compared to the low level of 1990.

Exports of vegetables in 1992 were similar to the same level as in 1991 owing to a strong demand particularly for tomatoes.

The Souss area (vicinity of Agadir and Tiznit) is by far the leading area for tomato production and exports. It is expected that Souss will account for about one-half of the volume of tomatoes exported

with the balance coming from Kenitra and Oualidia (vicinity of Safi). Several European companies have established joint-ventures with Moroccan partners to produce vegetables for export to Europe.

7. **TRILATERAL DEVELOPMENTAL CONSIDERATIONS**

The Moroccan Cooperative Agricultural Development Project will focus its research component on the following subjects:

- Production of high quality field tomatoes for fresh consumption;
- Production of high quality hybrid onions for fresh consumption and for processing;
- Development of out-of-doors woody ornamentals for export;
- Development of a pot plant industry for export;
- Domestication of truffles - a lucrative export item;
- Tissue culture propagation;

The production of fresh tomatoes for local consumption and for export to Europe is an important agricultural undertaking in both Morocco and Israel.

Table 16 provides production data for both Morocco, Israel and the U.S.

TABLE 16
PRODUCTION OF TOMATOES IN MOROCCO, ISRAEL AND THE U.S., 1990
(in 1,000 metric tons)

Country	Fresh Tomato Production	Processed Tomato Production
Morocco	400	60
Israel	236	310
US	8,900	8,603

Source: "Tomato News" Jan/Feb 1991

Total fresh tomato production in Morocco in 1990 was 400,000 tons and in Israel 236,000 tons. The average yield of open field tomatoes in Morocco was 33.0 tons/ha, whereas in Israel it was about 80.0 tons/ha. Exports of fresh tomatoes from both Israel and Morocco increased during the late 1960s and early 1970s, but leveled off in the late 1970s and have been steadily declining since. The reasons for this decline are competition from Spain and the Netherlands, quota restriction by the EEC, and low produce quality (Market Research Unit, Ministry of Agriculture, Israel).

The proposed program target is to increase fresh tomato yield in Morocco from its average 33 tons/ha to about 60 tons/ha. This will be done through genetic improvement and better agromanagement. The increased yield should result in the reduction of production costs per ton of tomatoes produced. Emphasis will also be given to quality improvement for both Morocco and Israel. The higher yields and better quality should help both Morocco and Israel to become more competitive with other countries in the off-season European market.

Present studies clearly demonstrate that the US is a major producer and exporter of processed tomatoes. Statistics further show that production of processed tomatoes in Israel is declining rapidly due to higher water prices and overall water shortages. Furthermore, there is a glut in the world production of processed tomatoes which reduces the profitability of this product.

Based on these considerations, and in keeping with the spirit of PD-15, the proposed research will concentrate on the improvement of fresh tomato production and quality items which will be of importance for local markets.

The largest markets for export products are the European Common Market countries and the Maghreb states and other Arab countries.

The research on tissue culture should complement the research on woody ornamentals and should also allow the mass production of tissue culture-propagated bananas and carnations. Presently, all banana production in Morocco is for local consumption. Morocco cannot compete in the export market for bananas due to the relative high cost of production of this crop in Morocco. Carnations will be exported to Europe.

The research on commercial truffles production is at a very early stage.

The main emphasis in onion research is to increase yields and improve the quality of onions. Morocco is growing onions over an area of 21,000 hectares with an annual production of 300,000 metric tons. Yields per hectare are very low 14.3 tons/ha in comparison, yields in Israel are 40-50 tons/ha. We

expect the new cultivars and agromanagement techniques to bring onion yields in Morocco to about 30 tons/ha. Total annual production in Israel is about 63,000 metric tons of which Israel exports 1,300 tons to Europe during the early spring months. Fresh onion exports from Morocco are negligible. It is expected that the introduction of high quality onion cultivars will boost exports from Israel and will initiate export from Morocco. It is very difficult at this time to evaluate the size and volume of this new export.

8. THE OULDJA DE CHTOUKAS AZEMMOUR PROJECT (OCA) PROJECTIONS AND BENEFICIARIES

Activities in Morocco are concentrated at Ouldja de Chtoukas Azemmour (OCA). This site is located some 60 kilometers south of Casablanca near the coast and in the heart of an irrigated agricultural zone. The soil is sandy-limestone in origin, is heavy in texture with a high PH, and generally poor in organic matter, where it is not farmed. The project area has already a permanently installed pressurized irrigation system. It is connected to the national electricity grid. Modern infrastructure links this site with Casablanca and Rabat. The site is owned by the Society d'Etudes de Travaux de Realisations et de Representations Agricoles. This company is donating an area of at least 25 ha to the program at no cost for the length of the project. It is expected that the activities generated at the site will continue after the project will end. Actually, these activities are being designed to ensure maximum longevity of the project. The involvement of the private sector in this project is the best guarantee for this longevity.

8.1. THE SPEEDLING NURSERY

"Speedling" is the name given to seedlings of annual crops grown normally in conically-shaped cups molded in polystyrene trays. The most important attribute of a "speedling" in relation to other seedling production methods is the high root/shoot ratio achieved through the method called "air pruning". Air pruning is achieved through the placement of the trays on bottomless frames. The seedlings tap root, which extrudes from opening at the tray is "pruned" by the dry ambient air. This results in the development of an auxiliary root system inside each individual cup. Through proper management (appropriate growth mixture, irrigation and fertilization regimes, etc.) one receives sturdy, healthy and uniform seedlings. These seedlings when planted in the field do not undergo the strong stress observed where bare-rooted seedlings are used (as is the case today in Morocco). The result is uniform and full field stand. (Uniformity is also achieved through the application of drip irrigation to the field which ensures equal distribution of water to each individual plant in the field. Field uniformity is the principal determinant of high crop yields [other conditions being at optimal level]. Thus, speedlings are a

prerequisite for optimal utilization of a drip system, and vice versa a drip system is a prerequisite for obtaining maximum results from speedling technology.)

To the best of our knowledge, there are no commercial "speedling" nurseries in Morocco. Thus, the introduction of this technology should result in significant yield gains to the entire vegetable industry.

The speedling nursery is being erected in phases. Originally, a production area of 1,000 m² was built. The already existing nursery had a production capacity of about one million speedlings per year. 2,000 m² were added in 1994 and are already operational; thus a total of 3000 m² were operational by the end of 1994 with sufficient capacity to supply speedlings to farms in the target region.

The nursery will specialize in the production of tomatoes, peppers, cucumbers, melons and watermelon seedlings, as well as seedlings of miscellaneous crops as needed.

Nursery activities will be directly linked to those of protected and open-field crops and will disseminate cultivars and crops which have excelled in the field trials. Experimentation in the nursery will be directed towards the evaluation of locally produced growing media, utilization of fertilizers from various sources and refinement of irrigation and management procedures. It is expected that this particular nursery will influence the construction of similar nurseries in the region and elsewhere in Morocco.

8.2 THE POT-PLANT NURSERY

As mentioned previously in this section, the sales of pot-plants of various kinds amount to more than 30% of total ornamental sales in Europe. Production of pot-plants for export is almost nonexistent in Morocco. The main reasons for this are: a) A pot-plant industry, particularly in a semi-arid region, requires specific skills. Our project through its training component will be able to teach local growers these skills; b) The floral export industry in Morocco is a relatively new enterprise starting from flower production and advancing slowly towards the production of pot-plants; c) The markets in Europe for pot-plants are dominated by large producers and wholesale companies (belonging to these producers), so that if Morocco wishes to export such products it must establish close business ties with these major producers and wholesalers in Europe. At a certain stage the program will take the responsibility to develop these ties with selected growers and distributors of pot-plants in Europe. In this context it will be advantageous to have a private company involved in the project management in Morocco. The private sector participant (SETREP) in this project has ample experience in international trade and business connections throughout Europe.

Much of the production of pot-plants in Europe today is concentrated in the Netherlands and in Denmark. These countries have the advantages of proximity to the market, the skills needed for an effective pot-plant production and, as stated before, the control of the market. The advantage of Morocco lies in its milder winter temperatures and higher level of radiation, particularly in the winter, which result in lower production costs. Another advantage is the availability and the low cost of agricultural labor.

The pot-plant nursery consists of two types of products: 1) rooted seedlings; and 2) finished pot-plants. The rooted seedlings will be shipped to nurseries in Europe which will plant them and grow them to finished product. The program's nursery will also sell high quality seedlings to local pot-plants producers. The finished pot-plant produced at the site will be geared mostly to the local market. However, efforts will be made to develop particular lines for export to Europe and to neighboring countries with advantageous marketing ties with Morocco.

From the onset, the project's nursery will develop linkages with leading European nurseries and produce those ornamental lines ordered by the European nurseries.

Production for the local market will concentrate on a line of easy to produce plants such as *Ficus* spp. (*benjamina*, *elastica*, *robusta*, *abidjan*). *Dracaena* spp. (*marginata*, *massengeana*, *wahekii*, *Janet Craig*, *compacta*) members of the *Araceae* (*Philodendron*, *aglaonema* spp. *Alocasia* spp., *Photos* spp.) Members of *liliaceae* (*dracaena* spp., *Cordyline* spp., *Yucca* spp.). Members of the *Euphorbiaceae* (*croton* spp., *Euphorbia* spp.). Members of the *Araliaceae* (*Schefflera* spp., *Aralia* spp., *Hedera* spp).

The nursery will be divided into two major sections: 1) the mother plantation; and 2) the production unit. The mother plantation will provide propagation material for the production unit. "Mother plants" will be purchased from the highest quality species available in the market which garner the highest prices in this market. Mother plants will also be supplied by the European nurseries which will be attached to the project through business agreements.

The production nursery will be divided into two sections: the rooting section and the pot-plant production section.

The pot-plant nursery will cover an area of 2000 m²; 1,000 m² already exists and 1,000 m² will be constructed by the end of 1994. Both sections will have good control of air and bottom temperatures, air humidity and light intensity.

The nursery will also be used for "on-the-job" training of a large number of young farmers in the art of pot-plant production. It will also assist Moroccan farmers who wish to start their own nurseries.

It is planned to gradually increase the size of the pot-plant nursery to a maximum area of 6,000 m², depending on the ability of the nursery to develop markets in Morocco and abroad for its products.

8.3 THE MICROPROPAGATION (TISSUE CULTURE) LABORATORY

Micropropagation is a novel method of plant propagation which is developing quickly. (In Israel there are at least seven commercial micropropagation laboratories.)

The advantages of micropropagation are numerous. The main ones are:

- Vegetative propagation of plants that cannot be propagated through rooted cuttings;
- Propagation of disease (fungi, bacteria and most important, virus) free material;
- Quick multiplication of selected clones and cultivars; and
- A most convenient method of shipping disease-free vegetative material from country to country.

In Morocco there are no commercial micropropagation laboratories of significant size. The construction of a laboratory in the coastal area of the Atlantic Ocean is of great importance to Morocco. This area produces most of the banana fruit in Morocco (an area of 1,612 ha in 1990 with a total production of 61,567 metric tons) and most of the carnations (in an area of 39 ha of greenhouses in 1990 - more than double the area in 1989) are grown there.

Commercial cultivars of bananas and carnations can be multiplied only by means of vegetative propagation with conventional vegetative propagation diseases, particularly virus diseases, are carried out from the mother plants to the new seedlings. In many cases these diseases are not visually expressed but infection can reduce yields by as much as 50% and, not less important (especially for carnations) seriously affect product quality.

Banana and carnation growers in Morocco are fully aware of the advantages of micropropagated plant material and are importing expensive micropropagules from abroad. It is economically significant for these growing industries to have a local supply of high quality plants. Micropropagation is also

intensively used in the pot-plant industry. Since it is the intention of this program to introduce this industry to Morocco, it is important that from the onset there will be a local nursery that will produce micropropagules from a diverse variety of foliage and other pot-plants. The international market to tissue culture floriculture crops is expanding rapidly and in 1990 was valued at \$4.6 billion.

The introduction of a micropropagation laboratory to Morocco will offer an excellent opportunity for cooperation.

8.4 PRODUCTION OF OPEN-FIELD ORNAMENTALS

Open-field ornamentals can be divided into two main categories: annual flowers such as asters, chrysanthemums, dahlias, gypsophila, various bulb flowers, etc., and perennial woody ornamentals. These latter can be subdivided according to "greens" for floral decoration, flowering, greens for floral decoration, and flowering branches.

Out-of-doors production of ornamentals is particularly attractive to small farmers since it requires only a portion of the investment needed to other ornamental production systems. Emphasis will be given to the production of hardy woody ornamentals since this section of the industry is little known in Morocco. Species to be tried are:

- *Melaleuca* spp. (*lanceolata*, *diosmipholia*, *bisapsularis*, etc.)
- *Eucalyptus* spp. (*kruseana*, *cinerea*, *gunnii*, etc.)
- *Leptospermum* spp.
- *Leucodendron* spp. (using a lime tolerant rootstock developed in Israel)
- Wax Flower (*Chamaemelon uncinatum*)

Seedlings of normal cultivars will be purchased in California, Australia, New Zealand and Israel. Trails will be devised to produce optimal irrigation and fertilization regimes and post-harvest treatment. The out-of-doors ornamental production program will occupy an area of 20 ha.

8.5 OPEN-FIELD PRODUCTION

The objectives of this part of the project are:

- Experimentation, demonstration and application of modern methodologies and technologies of open-field crop production.
- Experimentation, demonstration and application of superior cultivars of salad tomatoes and tomatoes for the canning industry; and
- Introduction of a range of species and cultivars of vegetables for the processing industry.

Open field crop production incorporates: crop rotation, soil preparation, manuring and basic fertilization, seed-bed preparation, pre-irrigation, herbicide application, planting, fertigation, insect and disease prevention, insect disease control, optimization of pollination, harvest timing and post-harvest treatment. When all of those activities are accurately and precisely conducted in the proper sequence, maximum yields are obtained which means optimum utilization of inputs and maximum net returns to the growers.

Other practices of fertigation, irrigation, scheduling, pest monitoring, etc., will also be introduced. Weather is most important determinant of yields. Perennial trials will be carried out in order to determine relationship between crop yield and planting dates for each particular crop.

The main crop to be tested, improved and disseminated are tomatoes, onions, cucumbers, and artichokes for the processing industry and open-field salad tomatoes. Work with all these crops will involve the activities mentioned above. In addition a thorough and appropriate varietal test will be carried out for each particular crop under study.

8.6 THE PROJECT'S INFLUENCE RADIUS

The project's influence radius is Casablanca and El-Jadida areas.

The following three tables express the existing vegetables production for the local market, the off-season vegetables crops and the flowers production. The present production area in this radius will consist in the future the indirect beneficiaries which will absorb the new technology, know how and management systems of OCA Project. Table 17 describes the vegetables local market production.

TABLE 17
VEGETABLE CROPS FOR LOCAL MARKET IN
CASABLANCA AND EL-JADIDA REGIONS, 1990/1991

Crop	CASABLANCA		EL-JADIDA	
	AREA hectares	PRODUCTION tons	AREA hectares	PRODUCTION tons
Tomato	90	2,700	500	18,000
Potato	1,810	57,900	700	11,200
Onion			240	2,900
Carrot	150	4,000	250	2,700
Pepper			250	3,000
Melon			300	9,000
Watermelon			600	19,500
Squash	215	2,200	400	4,200
Cucumber			150	1,700
Eggplants			80	600
Cauliflower	390	11,800	50	500
Turnip			350	3,500
Other				
Vegetables	345	5,400	130	1,200
Total	3,000	84,000	4,000	78,000

The off-season vegetable production is shown in Table 18.

**TABLE 18
OFF-SEASON VEGETABLE CROPS IN
CASABLANCA AND EL-JADIDA REGIONS IN 1990/1991**

Crop	Protected Agriculture		Open Field		Total	
	Area hectares	Production tons	Area hectares	Production tons	Area hectares	Production tons
Tomatoes						
Casablanca	145	8,700	380	11,400	525	20,100
El-Jadida	350	24,500	1,100	37,200	1,450	61,700
Total	495	33,200	1,480	48,600	1,975	81,800
Potatoes						
Casablanca			3,800	55,000	3,800	55,000
El-Jadida			2,200	32,000	2,200	32,000
Total			6,000	87,000	6,000	87,000
Beans						
El-Jadida			120	1,100	120	1,100
Total			120	1,100	120	1,100
Squash						
El-Jadida			30	240	30	240
Total			30	240	30	240
Grand Total	495	33,200	7,630	136,940	8,125	170,140

And finally, Table 19 provides data on flower production in radius area:

**TABLE 19
FLOWER PRODUCTION
CASABLANCA AND EL-JADIDA REGIONS IN 1990/1991**

Crop	Area (ha)	Varieties in Greenhouses with Drip Irrigation
Roses	34.5	Visa, Omega, Sonia, Samantha, Madelon, Marylse
Carnation	22	White Friendship, Tracer Horm, Friendship
Gladioli	2	Etalon, Orange Etalon, Continent

Roses - 3 growers, Carnation and Gladioli - 1 grower

8.7 BENEFICIARIES OF THE PROJECT

The first stage immediate beneficiaries are the workers and technicians involved directly in establishment of the project.

The average employment is of 70 workers and technicians, heads of families. The average family is 7 persons. This means that about 500 persons are linked economically to the project and will directly enjoy its results. The employment multiplier, estimated for the region is 0.7, which means that an additional 350 persons will enjoy various possibilities of derived employment and the total direct employment income impact will be for 850 persons.

The second stage beneficiaries are the farmers of the region which will have the possibility to absorb knowledge in tomatoes, onions, peas, beans, bananas, flowers and tissue culture growing.

The number of such potential beneficiaries is 300 large scale farms of 40 ha, 300 farmers of 5-30 ha and 1000 small farmers of about 4 ha. This phenomenon includes consultations, observations, information on new varieties and methods of cultivation. This indirect impact is for 1600 farmers or a population of 11,200 persons.

The total number of beneficiaries, direct and indirect, will be of a population of about 12,000 persons.

In addition it is important to mention an additional circle of beneficiaries within a radius of 600 km: farmers, producers of inputs, suppliers and scientists.

The project could be a crucial nucleus for the privatization process of the government of Morocco. The process of privatization requires extension services, advice in crop selection and private farm management.

All these new farmers will have a possibility to get proper training as well as the services of the project's Propagation Center and this will save the farmers about 25% of their annual investment for planting materials. New technologies, plant materials, cultivars, management procedures and methods will be transferred to the farmers and disseminated in the region, increasing in the future the radius of influence and the number of direct and indirect beneficiaries.

9. PROJECT'S FEASIBILITY EVALUATION

9.1 GENERAL REMARKS:

The basic data for this analysis were collected in the first period of the Project, including data concerning inputs and outputs of the different crops, planned and recommended by the Technical Committee.

A significant technological change in the greenhouses should be emphasized. The former greenhouses of Canary Type with unsuitable technical characteristics, inadequate correlation between dimensions crops features caused a low productivity. This was a result of energy losses, high frequency of components replacement, expensive maintenance, and low production capacity. The new greenhouses of Arava type are solid, resist to 140 km/h wind speed. The experience is accumulated in Israel, Texas and Arizona and found adequate for semi-arid and arid zones.

All parameters are calculated in local currency (Dirham=DH) and converted into US\$. Value for 1 US\$ = 9.6 DH.

Each activity was calculated separately. The activities are as follows: tomatoes in greenhouses, melons in greenhouses, pepper in open field for industry, green beans in open field for industry and three types of nurseries: Pot plant nursery, seedlings nursery for vegetables crops and banana hardening nursery.

The evaluation for melons and tomatoes was calculated for one hectare volume, the green beans and pepper for ten hectare volume.

The calculation for the vegetable crops is for a five year period and the nurseries for ten years because of the type and character of investment.

For each crop or activity Internal Rate of Return (IRR) and economic measures of the Project's worth were quantified for a period of 10 years. The calculated IRR served as a value to measure the profitability of the project as well as to rank different projects.

All parameters are real and based on inputs and outputs recorded at private firms.

Since it is estimated that during the project life the produce will be exported the income of each crop for export is based on prices which exporters offers today to farmers.

The crop yield used for the analysis was higher than the yield received at present time on private farms, assuming increase in yields based on a higher level of management.

Basic data for input and output for each crop under investigation has been collected.

The computation of Internal Rate of Return was based on models presented by J. Price Gittinger, in *Economic Analysis of Agricultural Projects, Second Edition, Fourth printing, December 1992*. In addition, an integrated Internal Rate of Return for the total project was calculated.

Data collected, computerized and quantified by Mr. Itzhak Ayalon, technical adviser to the project.

The data on costs and revenues obtained by daily collection during the past season from the Ministry of Agriculture.

9.2 INTERNAL RATE OF RETURN

Internal rates of return and economic measures of project worth were calculated for:

	<u>Table No.</u>		<u>Table No.</u>
• Greenhouse Tomatoes	20, 20A	• Speedling Nursery	24, 24A
• Greenhouse Melons	21, 21A	• Pot Plant Nursery	25, 25A
• Open Field Peppers	22, 22A	• Banana Hardening Nursery	26, 26A
• Open Field Green Beans	23, 23A	• Mixed Project	27, 27A

Based on the analysis of intense rates of return. The economic viability of the project was clearly demonstrated.

**TABLE 20
GREENHOUSE TOMATOES**

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, TOMATO greenhouse - one hectare (Thousands of Dirhams)										
Year	Capital Item	Operation and maintanance	Production	Gross	Value of incremental production (gross benefit)	Incremental net bennefit (cash flow)	Discount factor 25%	Present worth 25%	Discount factor 26%	Present worth 26%
1	419	480	172.1	1051.1	700	-351.1	0.80	-280.88	0.79	-278.77
2		480	110.7	570.7	700	129.3	0.64	82.75	0.63	81.46
3		480	172.1	632.1	700	67.9	0.51	34.76	0.50	33.95
4		480	110.7	570.7	700	129.3	0.41	53.01	0.40	51.33
5		480	172.1	632.1	700	67.9	0.33	22.27	0.32	21.39
6		480	110.7	570.7	700	129.3	0.26	33.88	0.25	32.33
7		480	172.1	632.1	700	67.9	0.21	14.26	0.20	13.44
8		480	110.7	570.7	700	129.3	0.17	21.72	0.16	20.30
9		480	172.1	632.1	700	67.9	0.13	9.10	0.13	8.49
10		480	110.7	570.7	700	129.3	0.11	13.84	0.10	12.80
Total	419	4800	1414	6433	7000	587	3.571	4.7127	3.465	-3.2863
IRR	Internal Rate of Return (economic rate of return) = $25 + 1(4.7127 / (4.7127 + 3.2823)) = 25.58946 = 25.6\%$									
	25.58946									

TABLE 20A
GREENHOUSE TOMATOES

Economic Measures of Project Worth										
Green House TOMATO										
Production of one hectar = 150 ton (100 ton export + 50 ton local market)					Exchange rate 1 US\$ = 9.6 DH (dirham)					
Item	Year 1	Year 2	Year3	Year4	Year5	Year6	Year 7	Year 8	Year 9	Year 10
Outflow										
Labor	27500	25500	27500	25500	27500	25500	27500	25500	27500	25500
Machinery	400	400	400	400	400	400	400	400	400	400
Chemicals	6223	6223	6223	6223	6223	6223	6223	6223	6223	6223
seeds	13200	13200	13200	13200	13200	13200	13200	13200	13200	13200
supplies	81500	22100	81500	22100	81500	22100	81500	22100	81500	22100
Pes Control	40750	40750	40750	40750	40750	40750	40750	40750	40750	40750
Water	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Packaging and Export handling	440000	440000	440000	440000	440000	440000	440000	440000	440000	440000
Overheads	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Sub Total	632173	570773	632173	570773	632173	570773	632173	570773	632173	570773
Irrigation System	24000									
Greenhouse construction	380000									
On Farm Equipment	15000									
Sub Total	419000									
Total Outflow	1051173	570773	632173	570773	632173	570773	632173	570773	632173	570773
Inflow										
Export	550000	550000	550000	550000	550000	550000	550000	550000	550000	550000
Local market sales	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
Total Inflow	700000	700000	700000	700000	700000	700000	700000	700000	700000	700000
Total incremental net Benefit	-351173	129227	67827	129227	67827	129227	67827	129227	67827	129227

GREENHOUSE MELONS

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, MELON greenhouse - one hectare (Thousands of Dirhams)										
Year	Capital Item	Operation and maintanance	Production	Gross	Value of Incremental production (gross benefit)	Incremental net bonnefit (cash flow)	Discount factor 22%	Present worth 22%	Discount factor 24%	Present worth 24%
1	419	350	170	939	580	-359	0.82	-284.38	0.806	-289.354
2		350	108.8	458.8	580	121.4	0.672	81.5808	0.65	78.91
3		350	170	520	580	60	0.551	33.06	0.524	31.44
4		350	108.8	458.8	580	121.4	0.451	54.7514	0.423	51.3522
5		350	170	520	580	60	0.37	22.2	0.341	20.46
6		350	108.8	458.8	580	121.4	0.303	38.7842	0.275	33.385
7		350	170	520	580	60	0.249	14.94	0.222	13.32
8		350	108.8	458.8	580	121.4	0.204	24.7658	0.179	21.7306
9		350	170	520	580	60	0.167	10.02	0.144	8.84
10		350	108.8	458.8	580	121.4	0.137	16.8318	0.116	14.0824
Total	419	3500	1393	5312	5800	488	3.924	0.3538	3.68	-16.0338
IRR	Internal Rate of Return (economic rate of return) = $22 + 2(0.3538 / (0.3538 + 16.0338)) = 22.04318 = 22\%$									
	22.04318									

GREENHOUSE MELONS

Economic Measures of Project Worth										
Melons Greenhouse										
Production of one hecclar = 100 ton (60 ton export + 40 ton local market)						Exchange rate 1 US\$ = 9.60 DH (dirham0)				
Item	Year 1	Year 2	Year3	Year4	Year5	Year6	Year 7	Year 8	Year 9	Year 10
Outflow										
Labor	28000	28000	28000	28000	28000	28000	28000	28000	28000	28000
Machinery	400	400	400	400	400	400	400	400	400	400
Chemicals	8008	8008	8008	8008	8008	8008	8008	8008	8008	8008
seeds	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000
supplies	81500	22100	81500	22100	81500	22100	81500	22100	81500	22100
Pes Control	40675	40675	40675	40675	40675	40675	40675	40675	40675	40675
Water	2453	2453	2453	2453	2453	2453	2453	2453	2453	2453
Packaging and Export handlings	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000
Overheads	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Sub Total	520034	458634	520034	458634	520034	458634	520034	458634	520034	458634
Irrigation System	24000									
Greenhouse construction	380000									
On Farm Equipment	15000									
Sub Total	418000									
Total Outflow	938034	458634	520034	458634	520034	458634	520034	458634	520034	458634
Inflow										
Export	520000	520000	520000	520000	520000	520000	520000	520000	520000	520000
Local market sales	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000
Total Inflow	580000	580000	580000	580000	580000	580000	580000	580000	580000	580000
Total Incremental net benefit	-359034	121368	59966	121368	59966	121368	59966	121368	59966	121368

OPEN FIELD PEPPERS

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, PEPPER Open Fields - 10 hectares (Thousands of Dirhams)											
Year	Capital Item	Operation and maintanance	Production	Gross	Value of incremental production (gross benefit)	Incremental net bennefit (cash flow)	Discount		Present		
							factor	45%	worth	50%	worth
1	940	20	31.5	991.5	381.2	-830.3	0.69	-434.907	0.667	-420.41	
2		20	31.5	51.5	381.2	309.7	0.476	147.4172	0.444	137.5068	
3		20	31.5	51.5	381.2	309.7	0.328	101.5816	0.296	91.8712	
4		20	31.5	51.5	381.2	309.7	0.226	69.9922	0.198	61.3208	
5		20	31.5	51.5	381.2	309.7	0.156	48.3132	0.132	40.8804	
6		20	31.5	51.5	381.2	309.7	0.108	33.4476	0.088	27.2538	
7		20	31.5	51.5	381.2	309.7	0.074	22.9178	0.059	18.2723	
8		20	31.5	51.5	381.2	309.7	0.051	15.7947	0.039	12.0783	
9		20	31.5	51.5	381.2	309.7	0.035	10.8395	0.028	8.0522	
10		20	31.5	51.5	381.2	309.7	0.024	7.4328	0.017	5.2649	
Total	940	200	315	1455	3812	2157	2.168	22.8296	1.966	-18.1098	
IRR	Internal Rate of Return (economic rate of return) = $45 + 5(22.8296 / (22.8296 + 18.1098)) = 47.788 = 47.8\%$										

OPEN FIELD PEPPERS

Economic Measures Of Project Worth										
Open Field Pepper for Industrial Process										
Production of 10 hectares = 400 tons for the industry					Exchange rate 1 US\$ = 9.60 DH(dirhams)					
Item	Year 1	Year 2	Year3	Year4	Year5	Year6	Year 7	Year 8	Year 9	Year 10
Outflow										
Labor	10500	10500	10500	10500	10500	10500	10500	10500	10500	10500
Machinery	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Chemicals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
seeds	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
supplies	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Pes Control	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Sub Total	51500	51500	51500	51500	51500	51500	51500	51500	51500	51500
Irrigation System	240000									
On Farm Equipment	700000									
Sub Total	940000									
Total Outflow	991500	51500	51500	51500	51500	51500	51500	51500	51500	51500
Inflow										
Industry	311200	311200	311200	311200	311200	311200	311200	311200	311200	311200
Local market sales	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
Total Inflow	361200	361200	361200	361200	361200	361200	361200	361200	361200	361200
Total Incremental net benefit	-630300	309700	309700	309700	309700	309700	309700	309700	309700	309700

OPEN FIELD GREEN BEANS

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, GREEN BEANS Open Fields - 10 hectares (Thousands of Dirhams)										
Year	Capital Item	Operation and maintanance	Production	Gross	Value of Incremental production (gross benefit)	Incremental net bennefit (cash flow)	Discount factor 30%	Present worth 30%	Discount factor 35%	Present worth 35%
1	440	20	130	590	280	-330	0.789	-253.77	0.741	-244.53
2		20	130	150	280	110	0.592	65.12	0.549	60.39
3		20	130	150	280	110	0.455	50.05	0.408	44.66
4		20	130	150	280	110	0.35	38.5	0.301	33.11
5		20	130	150	280	110	0.269	29.59	0.223	24.53
6		20	130	150	280	110	0.207	22.77	0.165	18.15
7		20	130	150	280	110	0.159	17.49	0.122	13.42
8		20	130	150	280	110	0.123	13.53	0.091	10.01
9		20	130	150	280	110	0.094	10.34	0.067	7.37
10		20	130	150	280	110	0.073	8.03	0.05	5.5
Total	440	200	1300	1940	2800	660	3.091	1.65	2.715	-27.39
IRR	Internal Rate of Return (economic rate of return) = $30 + 5(1.65 / (1.65 + 27.39)) = 30.28 = 30.28\%$									

SPEEDLING NURSERY

Computation of Internal Rate of Return Morocco Cooperative Agricultural Project, NURSERY SPEEDLING (Thousands of Dirhams)										
Year	Capital Item	Operation and maintanance	Production	Gross	Value of Incremental production (gross benefit)	Incremental net benefit (cash flow)	Discount factor 25%	Present worth 25%	Discount factor 26%	Present worth 26%
1	1571.1	10.8	738.5	2320.4	950	-1370.4	0.8	-1098.32	0.794	-1088.1
2	507.3	10.8	1485.1	2003.2	1900	-103.2	0.64	-66.048	0.63	-65.016
3	1166.8	10.8	2954.2	4131.8	3800	-331.8	0.512	-169.882	0.5	-165.9
4		10.8	2954.2	2965	3800	835	0.41	342.35	0.397	331.495
5		10.8	2954.2	2965	3800	835	0.328	273.88	0.315	263.025
6		10.8	2954.2	2965	3800	835	0.262	218.77	0.25	208.75
7		10.8	2954.2	2965	3800	835	0.21	175.35	0.198	165.33
8		10.8	2954.2	2965	3800	835	0.168	140.28	0.157	131.095
9		10.8	2954.2	2965	3800	835	0.134	111.89	0.125	104.375
10		10.8	2954.2	2965	3800	835	0.107	89.345	0.099	82.665
Total	3245.2	108	25857.2	29210.4	33250	4039.8	3.571	19.6154	3.465	-32.2786
IRR	Internal Rate of Return (economic rate of return) = $25 + 1(19.6154 / (19.6154 + 32.2786)) = 25.3779 = 25.4\%$									

SPEEDLING NURSERY

Economic Measures Of Project Worth										
Speedling Nursery										
					Exchange rate 1 US\$ = 0.60 DH(dirhams)					
Production area	1000m2	2000m2	4000m2	4000m2	4000m2	4000m2	4000m2	4000m2	4000m2	4000m2
Item	Year 1	Year 2	Year3	Year4	Year5	Year6	Year 7	Year 8	Year 9	Year 10
Speedling Outflow										
Substrates	45024	98048	180096	180096	180096	180096	180096	180096	180096	180096
Labor	7200	14,400	28,800	28,800	28,800	28,800	28,800	28,800	28,800	28,800
Tray's	55040	110080	220160	220160	220160	220160	220160	220160	220160	220160
seeds	558156	1112312	2224624	2224624	2224624	2224624	2224624	2224624	2224624	2224624
Fertilizers	2500	5000	10000	10000	10000	10000	10000	10000	10000	10000
Pes Control	18750	33500	67000	67000	67000	67000	67000	67000	67000	67000
Water & Electricity	4030	8060	16120	16120	16120	16120	16120	16120	16120	16120
Fuel for Heating	51840	103680	207360	207360	207360	207360	207360	207360	207360	207360
Maintanance	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800
Sub Total	749340	1495880	2964960	2964960	2964960	2964960	2964960	2964960	2964960	2964960
Construction	196512	196512	393024							
Sowing Machine	257952									
Mixing Machine	303648									
Tables	177331	177331	354662							
Heating System	152160		152160							
Preparation Area	350000									
Accessories	37500	37500	75000							
Irrigation System	96000	96000	192000							
Sub Total	1571103	507343	1168846							
Total Outflow	2320443	2003223	4131806	2964960	2964960	2964960	2964960	2964960	2964960	2964960
Inflow										
Local Market	950000	1900000	3800000	3800000	3800000	3800000	3800000	3800000	3800000	3800000
Total Inflow	950000	1900000	3800000	3800000	3800000	3800000	3800000	3800000	3800000	3800000
Total ncremental net benefit	-1370443	-1032223	-331806	835040	835040	835040	835040	835040	835040	835040

POT PLANT NURSERY

-58-

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, POT PLANTS NURSERY (Thousands of Dirhams)										
Year	Capital Item	Operation and maintanance	Production	Gross	Value of Incremental production (gross benefit)	Incremental net bennefit (cash flow)	Discount factor 20%	Present worth 20%	Discount factor 22%	Present worth 22%
1	483.8	10.8	322.6	817.2	430	-387.2	0.833	-322.538	0.82	-317.504
2		10.8	322.6	333.4	430	96.6	0.684	67.0404	0.672	64.9152
3		10.8	322.6	333.4	430	96.6	0.579	55.9314	0.551	53.2266
4		10.8	322.6	333.4	430	96.6	0.482	46.5612	0.451	43.5666
5		10.8	322.6	333.4	430	96.6	0.402	38.8332	0.37	35.742
6		10.8	322.6	333.4	430	96.6	0.335	32.361	0.303	29.2666
7		10.8	322.6	333.4	430	96.6	0.279	26.9514	0.249	24.0534
8		10.8	322.6	333.4	430	96.6	0.233	22.5078	0.204	19.7064
9		10.8	322.6	333.4	430	96.6	0.194	18.7404	0.167	16.1322
10		10.8	322.6	333.4	430	96.6	0.162	15.6492	0.137	13.2342
Total	483.8	108	3226	3817.8	4300	482.2	4.193	2.0384	3.924	-17.6576
IRR	Internal Rate of Return (economic rate of return) = $20 + 2(2.0384 / (2.0384 + 17.6576)) = 20.00 = 20\%$									
					20.00002309					

POT PLANT NURSERY

Economic Measures Of Project Worth											
Pot Plant Nursery											
Exchange rate 1 US\$ = 9.60 DH(dirhams)											
Production area		1000m2									
Item	Year 1	Year 2	Year3	Year4	Year5	Year6	Year 7	Year 8	Year 9	Year 10	
Pot plant	Outflow										
Substrates	24500	24500	24500	24500	24500	24500	24500	24500	24500	24500	24500
Labor	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800
Pots	96096	96096	96096	96096	96096	96096	96096	96096	96096	96096	96096
Genetic Material	168000	168000	168000	168000	168000	168000	168000	168000	168000	168000	168000
Fertilizers	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
Pes Control	16750	16750	16750	16750	16750	16750	16750	16750	16750	16750	16750
Water & Electricity	4030	4030	4030	4030	4030	4030	4030	4030	4030	4030	4030
Maintanance	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800
Sub Total	333476	333476	333476	333476	333476	333476	333476	333476	333476	333476	333476
Greenhouse Construction	196512										
Rooting Tables	29568										
Heating System	152160										
Accessories	38400										
Irrigation System	67200										
Sub Total	483840										
Total Outflow	817316	333476									
Inflow											
Local Market	430000	430000	430000	430000	430000	430000	430000	430000	430000	430000	430000
Total Inflow	430000	430000	430000	430000	430000	430000	430000	430000	430000	430000	430000
Total ncremental net benefit	-387316	95524	96524								

BANANA HARDENING NURSERY

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, BANANA HARDENING NURSERY (Thousands of Dirhams)										
Year	Capital Item	Operation and maintanance	Production	Gross	Value of	Incremental	Discount	Present	Discount	Present
					incremental production (gross benefit)					
1	1951.8	10.8	263.7	2228.1	760	-1468.1	0.781	-1145.02	0.769	-1127.43
2		10.8	263.7	274.5	760	485.5	0.61	298.155	0.592	287.416
3		10.8	263.7	274.5	760	485.5	0.477	231.5835	0.455	220.9025
4		10.8	263.7	274.5	760	485.5	0.373	181.0915	0.35	169.925
5		10.8	263.7	274.5	760	485.5	0.291	141.2805	0.269	130.5995
6		10.8	263.7	274.5	760	485.5	0.227	110.2085	0.207	100.4985
7		10.8	263.7	274.5	760	485.5	0.178	88.419	0.159	77.1945
8		10.8	263.7	274.5	760	485.5	0.139	67.4845	0.123	59.7165
9		10.8	263.7	274.5	760	485.5	0.108	52.434	0.094	45.637
10		10.8	263.7	274.5	760	485.5	0.085	41.2875	0.073	35.4415
Total	1951.8	108	2637	4696.6	7600	2903.4	3.269	62.8999	3.091	-0.0999
IRR	Internal Rate of Return (economic rate of return) = $28 + 2(62.8999 / (62.8999 + 0.0999)) = 29.9968 = 29.9\%$									
						29.99682856				

BANANA HARDENING NURSERY

Economic Measures Of Project Worth											
Banana Hardening Nursery											
Exchange rate 1 US\$ = 9.60 DH(dirhams)											
Production area		1000m2									
Item	Year 1	Year 2	Year3	Year4	Year5	Year6	Year 7	Year 8	Year 9	Year 10	
Pot plant	Outflow										
Substrates	159600	159600	159600	159600	159600	159600	159600	159600	159600	159600	159600
Labor	43200	43200	43200	43200	43200	43200	43200	43200	43200	43200	43200
Pots	36096	36096	36096	36096	36096	36096	36096	36096	36096	36096	36096
Fertilizers	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
Pes Control	14240	14240	14240	14240	14240	14240	14240	14240	14240	14240	14240
Water & Electricity	8060	8060	8060	8060	8060	8060	8060	8060	8060	8060	8060
Maintanance	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800	10800
Sub Total	274496	274496	274496	274496	274496	274496	274496	274496	274496	274496	274496
MicroPropagation Laboratory	1536000										
Greenhouse Construction	196512										
Shed Construction	70000										
Rooting Tables	29568										
Heating System	19968										
Accessories	32400										
Irrigation System	67200										
Sub Total	1951648										
Total Outflow	2226144	274496									
Inflow											
Local Market	760000	760000	760000	760000	760000	760000	760000	760000	760000	760000	760000
Total Inflow	760000	760000	760000	760000	760000	760000	760000	760000	760000	760000	760000
Total ncremental net benefit	-1466144	485504									

MIXED PROJECT

Computation of Internal Rate of Return Marocco Cooperative Agricultural Project, Mix Project 2 hectare Tomato + 2 hectares Melons + 4000m2 Speedling Nursery (Thousands of Dirhams)											
Year	Capital Item	Operation and maintanance	Production	Gross	Value of	Incremental net bennefit (cash flow)	Discount factor 22%	Present worth 22%	Discount factor 24%	Present worth 24%	
					Incremental production (gross benefit)						
1	3686.9	1630.8	1372.2	6689.9	3510	-3179.9	0.82	-2607.52	0.806	-2563	
2	507.3	1630.8	1873	4011.1	4480	448.8	0.672	301.6608	0.65	291.785	
3	1166.7	1630.8	3587.9	6385.4	6360	-25.4	0.551	-13.9954	0.524	-13.3096	
4		1630.8	3342.2	4973	6360	1387	0.451	625.537	0.423	586.701	
5		1630.8	3587.9	5218.7	6360	1141.3	0.37	422.281	0.341	389.1833	
6		1630.8	3342.2	4973	6360	1387	0.303	420.261	0.275	381.425	
7		1630.8	3587.9	5218.7	6360	1141.3	0.249	284.1837	0.222	253.3686	
8		1630.8	3342.2	4973	6360	1387	0.204	282.948	0.179	248.273	
9		1630.8	3587.9	5218.7	6360	1141.3	0.167	190.5971	0.144	164.3472	
10		1630.8	3342.2	4973	6360	1387	0.137	190.019	0.116	160.892	
Total	5360.9	16308	30965.8	52634.5	58850	6215.5	3.924	95.9742	3.68	-100.334	
		22.977791									
IRR	Internal Rate of Return (economic rate of return) = $22 + 2(95.9742 / (95.9742 + 100.334)) = 22.977791 = 23\%$										

MIXED PROJECT

Economic Measures Of Project Worth																				
Mixed Project - 2 ha Greenhouse Tomato + 2 ha Greenhouse Melon + Seedling Nursery																				
Exchange rate 1 US\$ = 9.00 DH (dirhams)																				
Item	Year 1				Year 2				Year 3				Year 4				Year 5			
	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total
Pot plant																				
Outflow																				
Labor	55	56	72	118.2	51	52	14.4	117.4	55	56	25.6	136.6	51	52	26.6	131.6	55	56	26.6	131.6
Machinery	0.8	0.8		1.6	0.8	0.8		1.6	0.8	0.8		1.6	0.8	0.8		1.6	0.8	0.8		1.6
Seedlings	22	12		34	22	12		34	22	12		34	22	12		34	22	12		34
Supplies	183	183		326	44.2	44.2		88.4	183	183		326	44.2	44.2		88.4	183	183		326
Fertilizers	12.4	16	2.5	30.9	12.4	16	5	33.4	12.4	16	10	38.4	12.4	16	10	38.4	12.4	16	10	38.4
Pest Control	81.5	81.2	16.7	179.4	81.5	81.2	33.5	196.2	81.5	81.2	67	229.7	81.5	81.2	67	229.7	81.5	81.2	67	229.7
Water & Electricity	5.2	4.9	4	14.1	5.2	4.9	8	18.1	5.2	4.9	16.1	26.2	5.2	4.9	16.1	26.2	5.2	4.9	16.1	26.2
Substrate			45	45			98	98			180	180			180	180			180	180
Seeds			556.1	556.1			1112.3	1112.3			2224.6	2224.6			2224.6	2224.6			2224.6	2224.6
Tray's			55	55			110	110			220	220			220	220			220	220
Fuel For heating			51.8	51.8			103.6	103.6			207.3	207.3			207.3	207.3			207.3	207.3
Packaging and Exportation	880	680		1540	880	680		1540	880	680		1540	880	680		1540	880	680		1540
Maintenance			10.8	10.8			10.8	10.8			10.8	10.8			10.8	10.8			10.8	10.8
Overheads	40	40		80	40	40		80	40	40		80	40	40		80	40	40		80
Sub Total	1219.9	1033.9	749.1	3002.9	1097.1	911.1	1495.8	3503.8	1219.9	1033.9	2984.9	5218.7	1097.1	911.1	2984.9	4973.1	1219.9	1033.9	2984.9	5218.7
Greenhouse Construction	780	780	196.5	1716.5			196.5	196.5			393	393								
Irrigation System	48	48	98	192			98	98			192	192								
On Farm Equipments	250	250		500																
Sowing Machine			257.9	257.9																
Mixing Machine			303.6	303.6																
Tables			177.3	177.3			177.3	177.3			354.6	354.6			354.6	354.6				
Heating System			152.1	152.1							152.1	152.1								
Preparation Area			350	350																
Accessories			37.5	37.5			37.5	37.5			75	75								
Sub Total	1058	1058	1570.9	3886.9			507.3	507.3			1186.7	1186.7			0	0				0
Total Outflow	2277.9	2061.9	2320.4	6889.2	1097.1	911.1	2002.9	4011.1	1219.9	1033.9	4131.8	6385.4	1097.1	911.1	2984.9	4973.1	1219.9	1033.9	2984.9	5218.7
Inflow				0				0				0				0				0
Export	1100	1040		2140	1100	1040		2140	1100	1040		2140	1100	1040		2140	1100	1040		2140
Local Market	300	120	950	1370	300	120	1900	2320	300	120	3800	4220	300	120	3800	4220	300	120	3800	4220
Total Inflow	1400	1160	950	3510	1400	1160	1900	4460	1400	1160	3800	6580	1400	1160	3800	6580	1400	1160	3800	6580
Total incremental net benefit	-877.9	-901.9	-1370.4	-3180.2	302.9	248.9	-102.9	448.9	180.1	126.1	-331.6	-25.4	302.9	248.9	835.1	1386.9	180.1	126.1	635.1	1386.9

		Year 6				Year 7				Year 8				Year 9				Year 10			
Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	Tomato	Melon	Hrs. Spd	Total	
130 8	51	52	28 8	131 8	55	56	28 8	130 8	51	52	28 8	131 8	55	56	28 8	130 8	51	52	28 8	131 8	
1 8	0 8	0 8		1 8	0 8	0 8		1 8	0 8	0 8		1 8	0 8	0 8		1 8	0 8	0 8		1 8	
34	22	12		34	22	12		34	22	12		34	22	12		34	22	12		34	
328	44 2	44 2		88 4	183	183		328	44 2	44 2		88 4	183	183		328	44 2	44 2		88 4	
38 4	12 4	18	10	38 4	12 4	18	10	38 4	12 4	18	10	38 4	12 4	18	10	38 4	12 4	18	10	38 4	
229 7	81 5	81 5	67	229 7	81 5	81 2	67	229 7	81 5	81 2	67	229 7	81 5	81 2	67	229 7	81 5	81 2	67	229 7	
28 2	5 2	4 9	18 1	28 2	5 2	4 9	18 1	28 2	5 2	4 9	18 1	28 2	5 2	4 9	18 1	28 2	5 2	4 9	18 1	28 2	
180			180	180			180	180			180	180			180	180			180	180	
2224 6			2224 6	2224 6			2224 6	2224 6			2224 6	2224 6			2224 6	2224 6			2224 6	2224 6	
220			220	220			220	220			220	220			220	220			220	220	
207 3			207 3	207 3			207 3	207 3			207 3	207 3			207 3	207 3			207 3	207 3	
1540	880	660		1540	880	660		1540	880	660		1540	880	660		1540	880	660		1540	
10 8			10 8	10 8			10 8	10 8			10 8	10 8			10 8	10 8			10 8	10 8	
80	40	40		80	40	40		80	40	40		80	40	40		80	40	40		80	
5218 7	1087 1	911 1	2984 9	4973 1	1219 9	1033 9	2984 9	5218 7	1087 1	911 1	2984 9	4973 1	1219 9	1033 9	2984 9	5218 7	1087 1	911 1	2984 9	4973 1	
			0				0				0				0				0		
5218 7	1087 1	911 1	2984 9	4973 1	1219 9	1033 9	2984 9	5218 7	1087 1	911 1	2984 9	4973 1	1219 9	1033 9	2984 9	5218 7	1087 1	911 1	2984 9	4973 1	
0				0				0				0				0				0	
2140	1100	1040		2140	1100	1040		2140	1100	1040		2140	1100	1040		2140	1100	1040		2140	
4220	300	120	3800	4220	300	120	3800	4220	300	120	3800	4220	300	120	3800	4220	300	120	3800	4220	
6360	1400	1180	3800	6360	1400	1180	3800	6360	1400	1180	3800	6360	1400	1180	3800	6360	1400	1180	3800	6360	
0				0				0				0				0				0	
1141 3	302 9	248 9	835 1	1388 9	180 1	128 1	835 1	1141 3	302 9	248 9	835 1	1388 9	180 1	128 1	835 1	1141 3	302 9	248 9	835 1	1388 9	

BEST AVAILABLE DOCUMENT

9.3 THE LONG TERM ECONOMIC IMPACT

It is already possible to quantify some additional components of the comprehensive economic impact of the project.

The seedlings nursery will be an important "money saver" for the local farmers. In the present situation each farmer provides for himself seedlings with limited success and high cost. Buying seedlings from the Project's nursery, the farmers will save at least 25% of cost and receive a high genetic quality of seedlings. The differences are already significant.

The present cost of a tomato plant is 1.35 DH and the cost of a high genetic seedling in the Project will be 0.90 DH. The cost of a banana seedling in Morocco today is 15 DH in the Project will be 12 DH. The farmers of the area are visiting already the Project and compare qualities and production costs.

The Project will continue to emphasize operations as a demonstration farm and pilot Technology and Know-how Transfer Center, open for public visitations and training. Recently technicians from different places in Morocco (Beni-Malal, farms in the southern part of the Country as well from Rabat area) started professional training. The multiplication impact will increase, linked to Project's progress.

Attached for reference is the Spring 1994 newsletter that presents additional current information on the Project.