The olive oil sector in Syria [printed version also available in Arabic]

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The Olive Oil Sector in Syria

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SUMMARY- A summary of the Syrian olive sector is presented, by joint analyses made from statistics available and data taken during the surveys carried out by the Project of 444 farmers and 252 mills in the 8 olive oil producing regions in Syria from 2004 to 2006.

Key words: Olive oil, Syria, export, quality, olive growers, techniques

RESUME - *Un résumé du secteur de l'huile d'olive en Syrie est donné en groupant soit les analyses statistiques officielles que les données repérées pendant les enquêtes diagnostiques réalisées à partir du 2004 jusqu'au 2006 sur 444 oléiculteurs et 252 pressoirs dans les huit régions oléicoles de la Syrie.*

Mots clé: *Huile d'olive, Syrie, exportations, qualité, oléiculteurs, techniques*

Introduction

The olive tree *(Olea. europea L)* is an ancient culture in Syria. According to De Candolle (1883) Syria and Iran are the two places of origin of the culture of the olive tree. From there, it spread to all Mediterranean basin. So, olive farming became one of the most important cultivations from the socio-economic and cultural levels.

Figure 1: Origin and distribution of olive tree in Mediterranean region

Olive farming has a very important role in many sides such as: erosion resistance, utilization of marginal lands, conservation of environment and limiting rural emigration. Olive and olive oil are considered as traditional foods for its healthy and organoleptic characteristics. More of 200,000 families (around one million people) depend on olive income directly or indirectly.

During the inception and implementation phase, the project has carried out a complete survey involving 444 farmers in the 8 main oil producing regions in Syria in order to integrate those data with the official statistics, as well as for a better understanding of the problems existing at regional level, for a correct formulation of the final national strategic quality plan.

Importance of the olive sector in Syria

In Syria the olive tree occupies the first place between fruit trees with 544,000 hectares and about 80 million trees. That represents about 10% of total cultivated area, and it also forms 65 % of total cultivated area of fruit trees (fig. 2) (Ministry of Agriculture 2005)

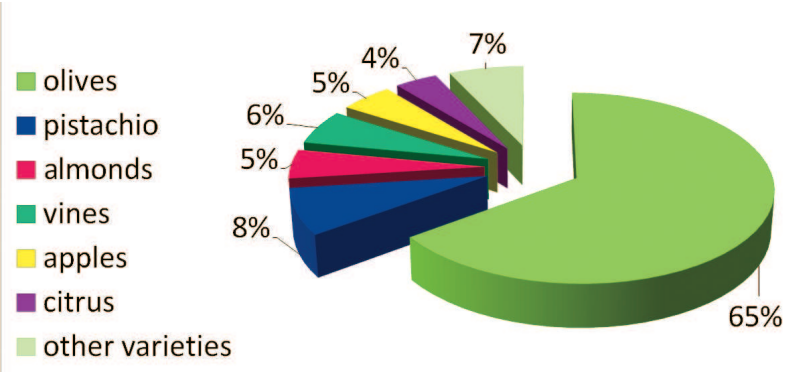
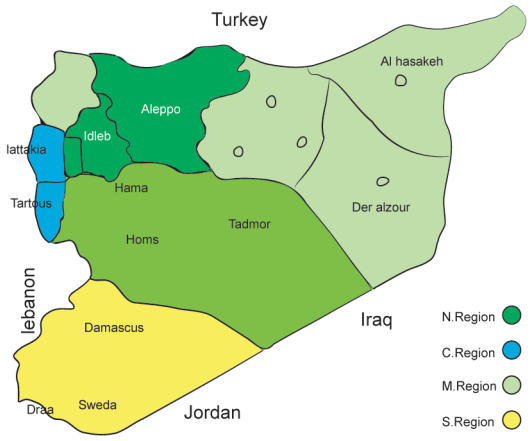


Figure 2: Percentage of olive cultivation (Source: *Ministry of the Agriculture - Syria, 2005*)

The majority of olive farming, about (72.20%) is concentrated in two main areas: in the northwest (Idleb- Aleppo), Coastal area (Lattakia – Tartous). So, the remainder (26,80%) is distributed throughout the rest of Syria (fig. 3). It is necessary to clarify that (80)% of olive holdings are less than 5 ha. (fig. 3).

More than 95% are rain-fed cultivation and the remainder is irrigated. (Damascus, Daraa and Palmyra).



REGION	% TOTAL AREA	% TOTAL PRO-DUCTION
North	52.27	57.63
Coastal area	19.93	10.60
Middle	15.52	10.45
South	10.53	19.85

Figure 3: Olive distribution in Syria (Source: *Ministry of the Agriculture - Syria*)

For the sampling methodology of the survey of Syrian farmers the following (Chart 1) has been prepared.

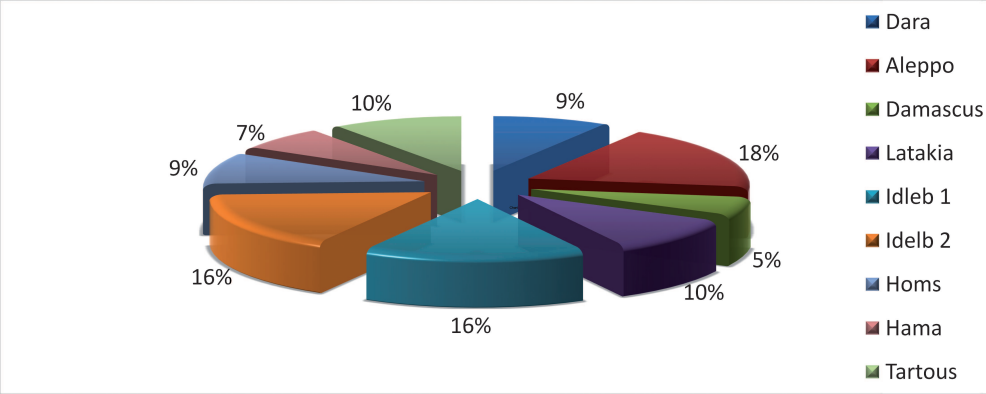


Chart 1: Syrian farmers interviewed during the project survey in 8 regions

Main agronomic issues

With regard to the density of plantation, the quoted numbers (544,000 ha for 80 million trees) show an average density of 147 trees/ha. (12-21 trees/dnum with an average of 14 trees/dnum, 140 trees/ha) - (*Project Survey 2004-6*). Densities vary according to the region, between 100-115 trees/ha in the traditional areas (north of the country) whereas in the coastal regions where complementary irrigation is possible the density can reach 210 trees/ha (*Project survey 2006*). For new cultivations with regular irrigation the density can reach 300 tree/ha. In 1949 Syria was affected by frost which caused the death of millions of trees in the Aleppo and Idleb regions (main areas of olive tree culture), and the subsequent wide-spread new plantation of young trees which are still unproductive or weakly productive is more than 45 million trees, representing 57% of the total number trees (fig. 4).

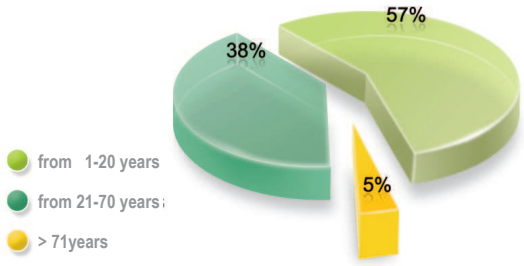


Figure 4: Distribution of olive trees according to the age of plantation

We estimate 4 million olive trees are more than 70 years old which form 5% of the total tree numbers. These old olive trees are localized in the North and West of Syria.

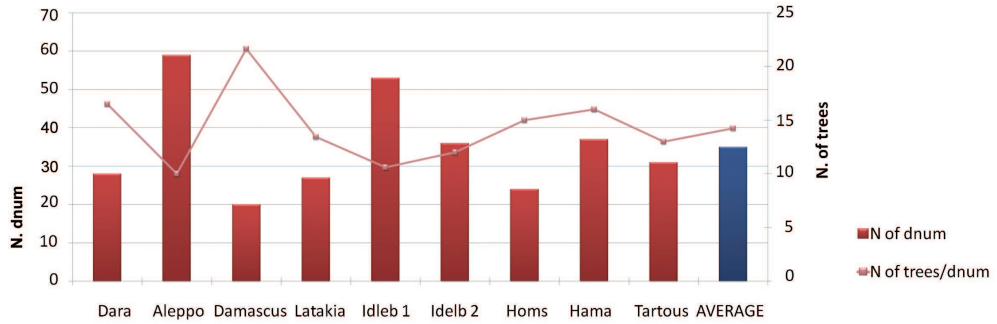


Chart 2: Number of trees and surfaces/ olive grower recorded during the project survey

Olive oil production

Syria occupies the fourth rank in the world (average 2001 - 2005), after Spain, Italy and Greece producing 4.71% of the world's olive oil. Between 1990-2005 Syrian production nearly duplicated to 96.38% of local demand (fig. 5).

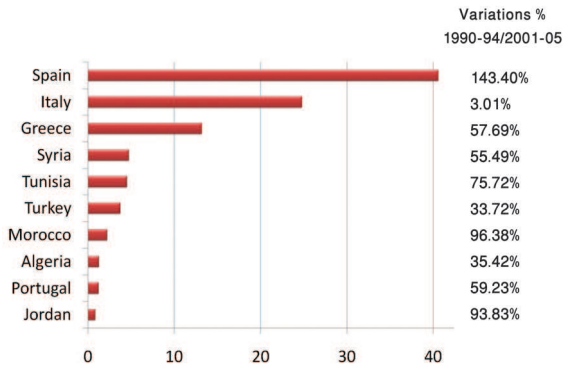


Figure 5: Main olive producer countries (average 1990-94 / 2001-2005) (Source: *I.O.C.*)

Olive sector has spread markedly during the last two decades. Where the surface area and the number of trees was 249,000 ha with 26.6 million trees (20.2 million of them in the fruiting phase) in 1980 by 2005 it had reached to 544,000 ha with 79.9 million trees (58 million of them in the fruiting phase). The production of olives increased from 390,000 tonnes (54,000 tonnes of olive oil) in crop-year 1990/1991 to 844,000 tonnes (160,000 tones of olive oil) for the crop-year 2004-2005 (fig. 6,a,b,c). 15-20% of the total production is devoted to table olives (green and black). The remainder is for oil extraction. The present situation of this sector shows that levels of production achieved are still modest and only poorly capitalise on the resources available.

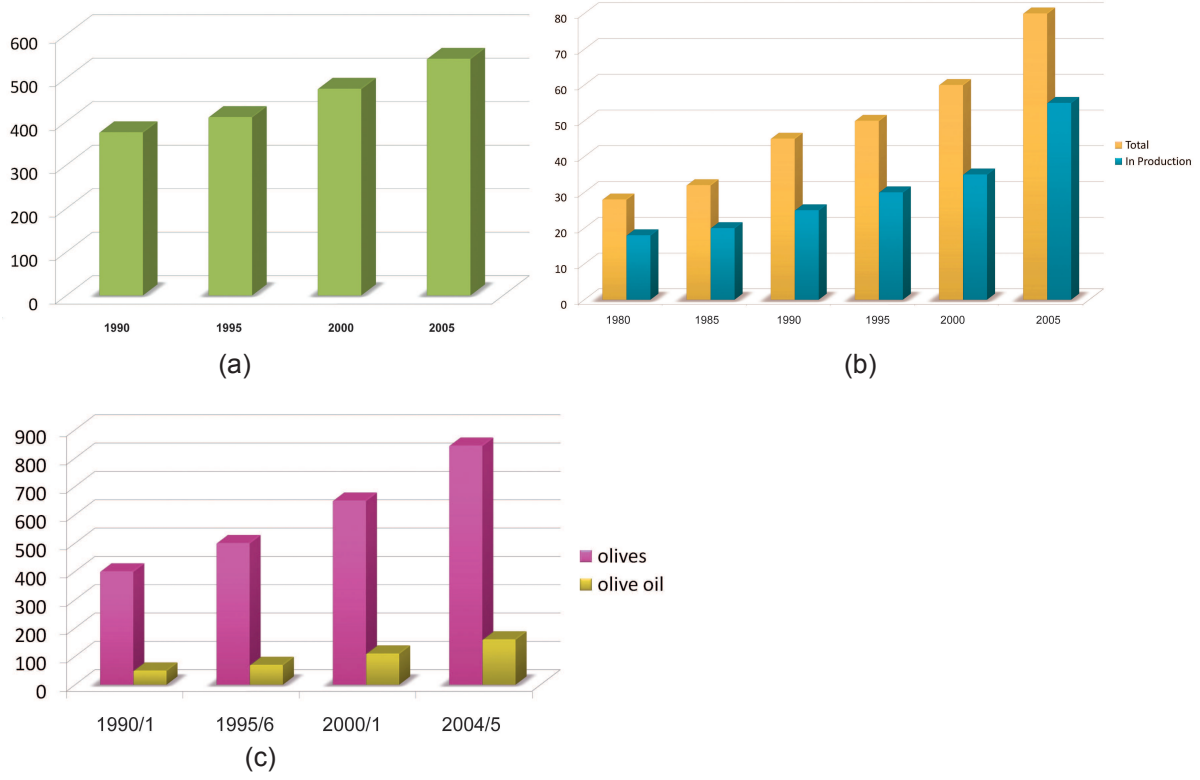


Figure 6: (a) Area in hectares of olives
(b) Total number of trees in millions, number of productive trees in millions
(c) Production of olives in tonnes and the production of olive oil in tonnes (1980-2005)
(Source: *Ministry of the Agriculture - Syria)*

Consumption and olive oil export

In spite of the fact that Syria occupies fourth rank universally in olive and olive oil production it is still weak in international export with 4.6%. Syria reached self-sufficiency in 1996. In 1997 it began to exporting with small quantities reaching about 35,000 tons in 2005 (fig. 7).

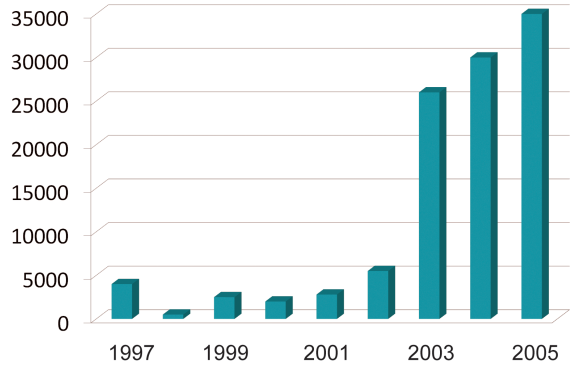


Figure 7: Exportation of olive oil during 1997-2005

So, Syria increased its exportation in the last ten years by 1880% (fig. 8).

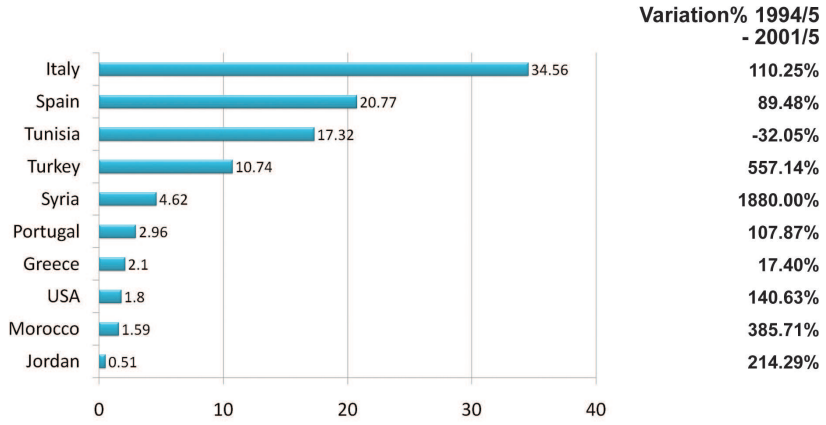


Figure 8: Main olive oil exporting countries (average 1990-1994 / 2001-2005) (Source: *I.O.C.*)

The local consumption of olive oil increased progressively, but slowly in relation to the increase of production, due to the growth of the population not to the increase of the average consumption per capita. The present local consumption (2005) is estimated at 110,000 tons per year, with an average of 5.3 kg per capita.

Syria has a lower level of export compared to other Mediterranean countries because the surplus- estimated at only about 50,000 tons. From previous records we can estimate the future value of this sector, as follows:

- increase of the cultivated area with an average of 10-12,000 hectares yearly;
- the increased number of trees in the production phase is about 2 million tree/year, consequently the increase of olive oil production is expected to be 215,000 tons in 2010, with an estimated consumption of 115,000 tons in the same year. So the surplus will be 100,000 tons (fig. 9);
- decrease of local consumption per capita.

Problems in storing will occur because the present storage capacity is not sufficient and the irregular condition of storage in the private sector level and at farmer level may result in a reduction in oil properties and quality.

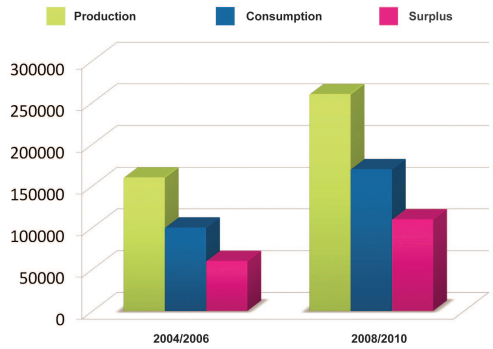


Figure 9: Estimate of the production, consumption and surplus of the olive oil/thousand tons from 2003 to 2010.

Climates and soils

The olive tree can be cultivated in all areas because of its easy adaptation to bioclimatic conditions (fig. 10).

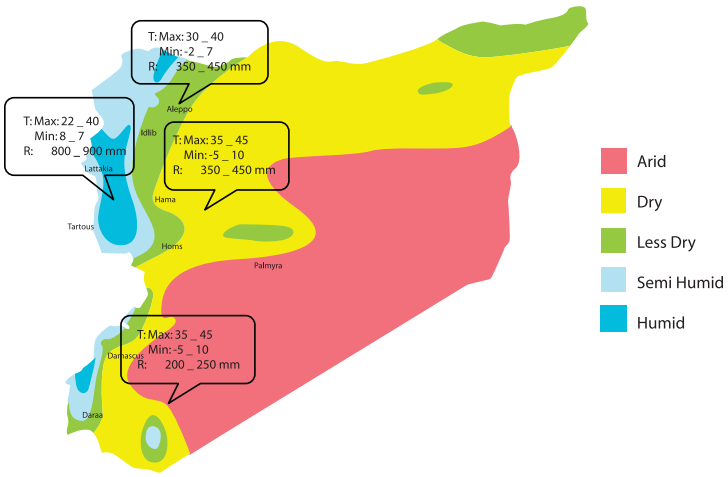


Figure 10: Bioclimatic conditions in Syria and distribution of olive cultivation areas.

The olive can be found in various environments and micro-climates which are very contrasting. It is found in the areas where precipitation reaches 900 mm in the coastal areas (humid and semi-humid) but also to southern areas (arid and semi-arid) where there is less than 250 mm. It ranges from altitudes of 10 m to more than 1,500 m.

In Syria olive orchards can be found in dissimilar kinds of soil:

- 60% of cultivated areas are hilly, limestone and between (10-40%) are less fertile. It is exposed, sometimes in winter, to heavy rain which causes soil erosion.
- 30% are stoney and newly farmed.
- 10% are heavy deep **clay** (40% -60% of soil texture).

The most widespread soil types can be classified: Aridosols, Vertisols, Inceptysols, etc.

Planting materials

Olive genetic resources in Syria are variable and very rich but they still need to be studied from the agronomic point of view. Actually few are known, (11 have been characterized from morphological, genetic, quality point of view by the project – *Characterization of the main Syrian Olive Varieties*- 2006) and the others (estimated at 75 up till now) may be of great benefit for quality and quantity production. Some varieties are selected and restricted to one region such as "Zaity" in Aleppo, "Sorani" in Idleb, "Khoderi" in Lattakia, "Doebli" in Tartous, "Dan", "Souri", "Hemplasi" and "Jlot" in Damascus.

It's worth mentioning that 5 varieties form about 89.3 % of the total cultivated area in Syria. But these planting materials contain many autochthonous and local cultivars, but up till now we do not know their characteristics and whether these are good either quantitatively or qualitatively. Clonal populations are widespread.

Table 1 clarifies the most important local varieties in Syria, their distribution, % of oil and % of total area.

Table 1: Distribution of Syrian varieties and the purpose

Variety	Purpose	% of oil (f.w.)	Distribution	% of total area
Zaity*	Oil	21.8 -31.2	Northern areas	33.13
Sorani*	Dual	22.7 -25.9	Aleppo - Idleb- Hama - Daraa	29.4
Doebli*	Dual	20.6-23.2	Coastal regions	11.71
Khoderi*	Dual	24.1-26.7	Lattakia	10.30
Kaissy*	Table	14.5-16.9	Aleppo - Idleb	4.78
Abo satl	Dual	9-11	Tadmor (Palmyra)	1.86
Mossabi	Dual	14.1-15.5	Southern region	1.18
Dan*	Dual	9-11	Damascus- Daraa	0.35
Jlot	Table	12-14	Damascus- Daraa	0.6
Others	Dual		Various areas	6.7

*Source: Project Booklet "*Characterization of main Syrian olive cultivars*"

The link between a given variety and the area is shown by:

- the adaptation of that variety to the environment
- the selection done by the local people based on preferences for many reasons. The selection being done of those varieties goes back centuries and was inherited by the present population, some varieties are maintained for their dual purposes (oil & table olive).

Actually, Identification, Characterization, Conservation and Utilization of Olive Genetic Resources is under study through a research project in cooperation with International Olive Oil Council. Primary characterization of 75 local varieties is already completed. The purpose is to define the morphological characteristics, pedologic and environmental conditions under which each grows and the oil qualities of each for further use in different regions appropriate to each, and its use: oil, table olive or both.

A dedicated chapter in this national plan is dedicated to the characterization done by the project for the main Syrian cultivars.

The geo-climatic distribution of those varieties is summarised in fig.11.

Of significant historical interest and potential importance is the discovery among the 75 identified varieties, of 20 cultivars of table olives whose biodiversity has not yet been exploited. These were found in the region of Palmyra (Tadmor) where some of the trees are more than 700 years old.

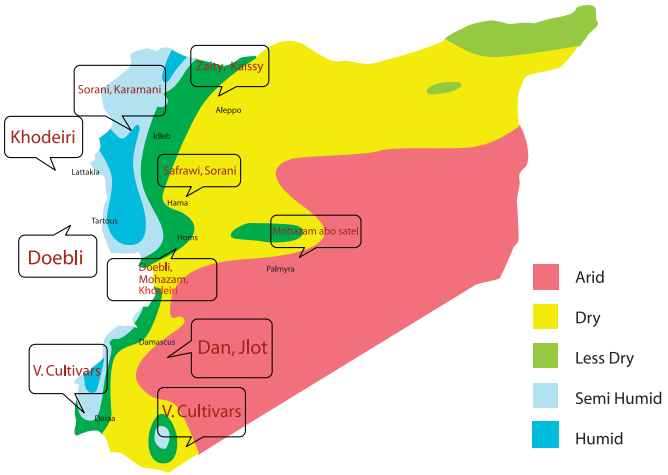


Figure 11: Distribution of cultivated varieties in relation to the Bioclimatic conditions

Photo 1: Olive fruit of ancient cultivar in Palmyra

Propagation techniques

The olive tree in Syria is propagated by two methods:

- The traditional methods: that are used by farmers and non-professional nurseries. These methods use stumps and bursts of stumps, and grafting of wild olive.
- The intensive methods by the use of semi-wooden cuttings from genetic collections in different regions with hormonal treatment of cuttings, then raising them in greenhouses equipped with fog irrigation and hardening them in a greenhouse for adaptation. This technique proceeds in the modern nurseries to get a large number of plants in a short time.

It is necessary to underline, on the one hand, that the yearly young plant production (about 4-6 million of which 60% is produced in state nurseries) is sold at very low prices; on the other hand, phytosanitary controls are not strict, which may cause serious problems as the case of *Verticillium*.

Growing techniques

The preparatory works to the plantation including:

- Plantation of hedges.
- Soil cultivation as a deep tillage of 80 – 100 cm in summer on two opposite sides.

- In traditional culture densities of plantation are 8 x 8 or 10 x 10, i.e. 100-150 trees/ha, whereas it is 300 trees/ha in irrigated culture.
- The establishing fertilizer is composed respectively of 5 kg of manure, 100 g of super phosphate and 100 g of potash sulphate per tree. These quantities are buried by a tillage 30-40 cm depth.

Weeding and irrigation are used throughout the first year. Shaping pruning begins in the 2nd and 3rd year after plantation.

The period of plantation varies between December and April according to bioclimatic regions (early in coastal areas and late in the inland ones). Farmers in Syria are applying 3 - 4 tillages per year as follows:

- the first to a depth of 10-12 cm in autumn after the harvest (November- December) to assure the penetration of rain and to mix the organic and chemical fertilizers.
- the second to a depth of 10 - 15 cm in spring before flowering (end of March / April) to fight the harmful herbs and to mix in nitrogen fertilizers.
- the third and fourth to a depth of 5 - 7 cm in summer (June and August) to fight the harmful herbs and to limit the evaporation of water while preserving the humidity of soil.

During of the first years after plantation the soil should be maintained by the passage of a heavy tiller. It is necessary to point out that the chemical weeding is not used in Syria. The organic and mineral fertilizers to recommend for an olive orchards (200 trees/ha) are as follows:

Young trees:

10 - 20 tns/ha of manure,

20 - 50 kg/ha of urea (46%)

20 - 50 kg /ha triple super phosphate (48%)

20 - 50 kg /ha of potassium sulphate (50%)

Adult trees in production:

20-30 tns/ha of manure

50-100 kg/ha of urea (46%)

50 - 100 kg/ha triple super phosphate (48%)

50-100 kg/ha of potassium sulphate (50%)

Thanks to the project, farmers are more and more taking benefit from the “green manure” technique (60-80 Kg/ha), which consists of a mix of legumes (*Vicia spp., Lathirus spp.)* and barley in the ratio of 85% legumes to 15% barley sown during the autumn (October-November) and ploughed in in spring before the flowering of either legumes or olive trees. This technique has been enthusiastically adopted by farmers for its reasonable cost. Asked on their preferred fertilization method, the surveyed farmers responded as shown in Chart 3.

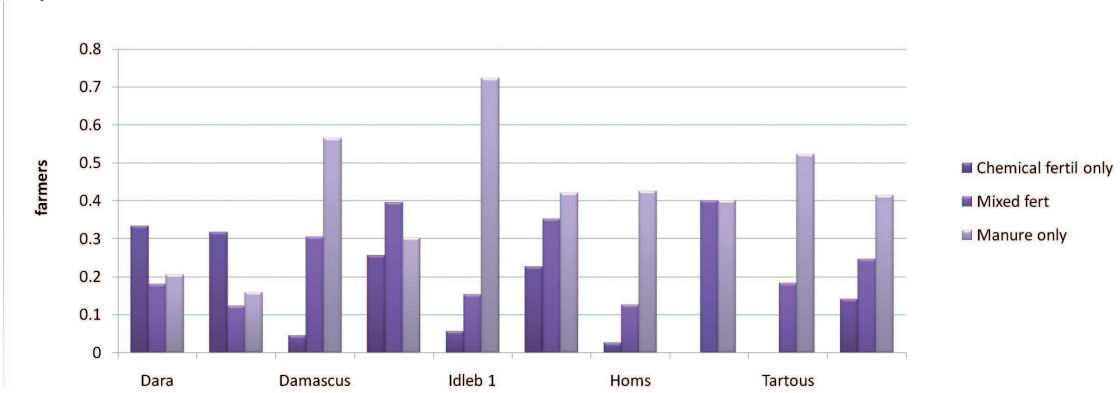


Chart 3: Use of fertilizers in Olive orchards in the 8 major Regions in Syria *(Project Survey 2004-06)*

Irrigation

In Syria, irrigation of olive orchards is not widespread, so that 97% of the total cultivated area depends on rain. Supplementary irrigation can be applied if there are water resources in summer about 2 or 3 times in the regions where the average precipitation is about 400-500 mm. Whereas, the 3% of orchards that are irrigated are located near by natural water resources or dams or irrigated by underground wells.

The methods of irrigation used are:

- Irrigation by containers (Tank 4 m^3 by hand)
- Irrigation by channels
- Irrigation by sprinklers
- Drip irrigation

Quantities of irrigation given to the trees per season vary:

- 1-2 m^3/tree as supplementary irrigation
- 4-5 m^3/tree as full irrigation

The incidence of different behaviors in recorded during the project survey on 440 olive growers in Syria is synthesised in Chart 4.

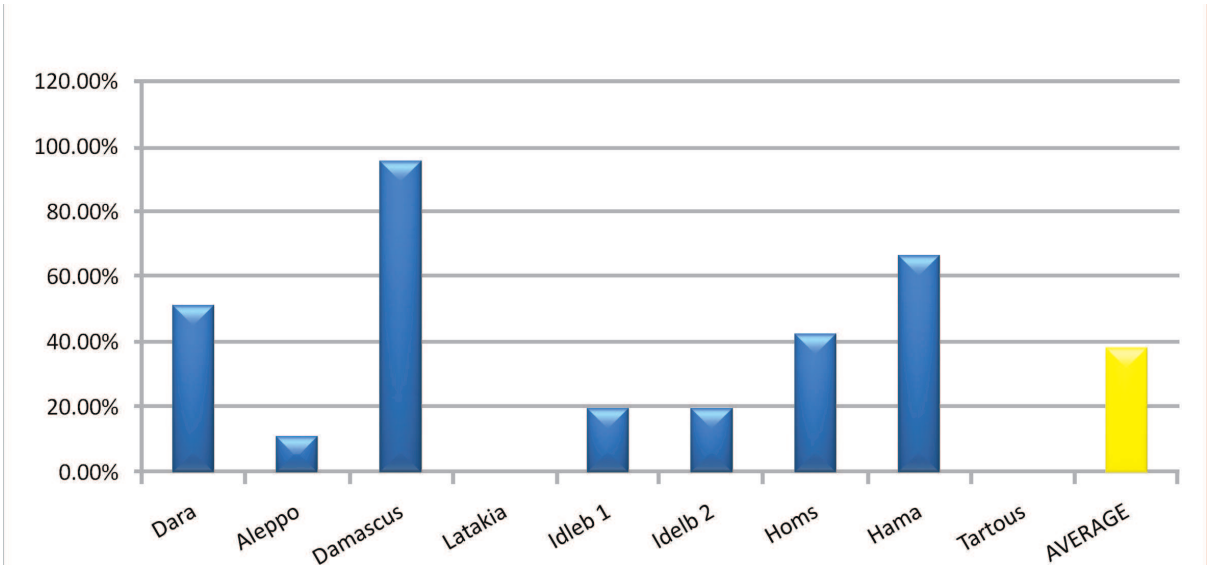


Chart 4: Farmers irrigating in Syria (Source: *Project Survey 2004-06)*

Pruning

In Syria there are three kind of pruning: shaping, fruiting and regenerating pruning.

- **Shaping pruning** applied in two phases:

(i) when the tree reaches 1.50 m of height the formation of a mono trunk by eliminating the low branches while preserving the central stem

(ii) when the tree exceeds 1.50 m of height, one selects a maximum of 5 main branches while eliminating the central branch.

- **Production pruning** aims to expose the leaves to the light while protecting the trunk and struc-

tural branches from direct sunlight, and eliminating of dried, interlaced and infested branches. At the same time reducing the number of branches in the canopy allowing the arrival of light and air to all parts of tree, the diseases decrease. Leaf/wood ratio should be high. This kind of pruning is done by hand and normally every two years.

- **Regenerating pruning** applies to the sick trees or to those that have been abandoned without pruning or care for a long period and entails a total shortening of all infrastructural branches. This will cause new branches to appear and so, new fruiting.

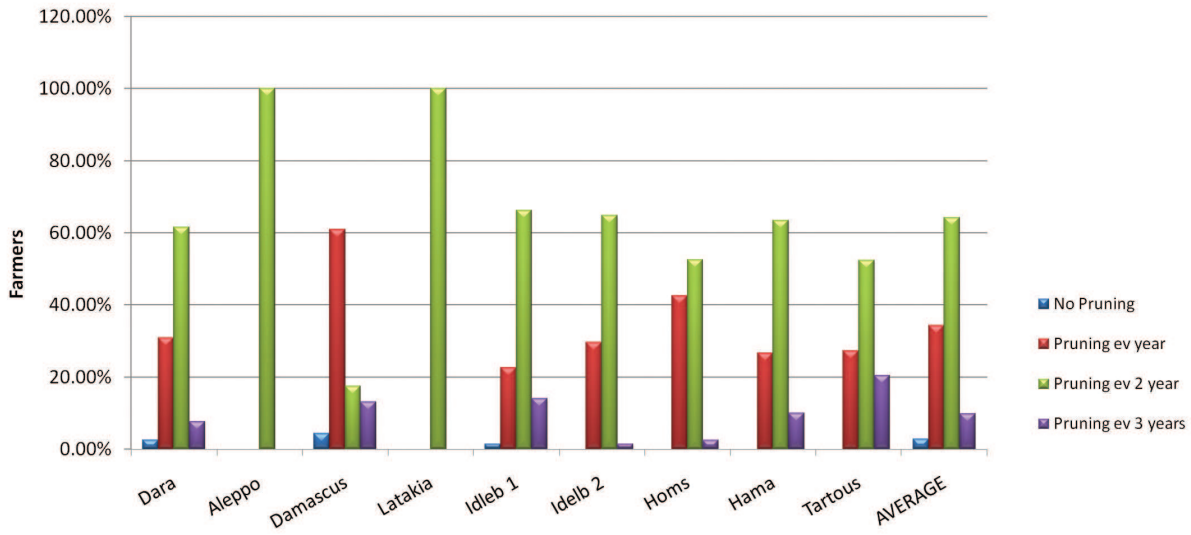


Chart 5: Olive pruning period and intensity in 8 Syrian Region (Source: *Project Survey 2004-06*)

Diseases, pests and phytosanitary protection

The most common insects in Syria are:

- olive fruit fly *(Bactrocera oleae)*

  Damage is caused by this insect found in the coastal region (Lattakia, Tartous) or where precipitation is high. The sea also influences the cycle of this fly.

  In Syria olive the fly has 6-8 generations according to years and the climatic conditions. The critical periods are generally on July (early attack) and September.

- olive moth *(Prays oleae)*

  It is the main insect farmers are unaccustomed to treating or recognizing the damage it causes. It is localized in the inland regions.

- Leopard moth *(Zeuzera Pyrina)*

  It causes severe damage in sensitive varieties such as Zaity in the north of the Country and Dan to the South. The Sorani variety seems to have a certain tolerance. The control is difficult to apply directly. Pruning represents the only indirect way it can be controlled by farmers.

- the other insects, the black cochineal of the olive tree *(Saissetia oleae),* the psylle (*Euphyllura olivina)*, Neiroun Hylesines, thrips and the *Otiorrhynque* are less widespread and more easily controlled.

The most widespread diseases in Syria are

- olive peacock eye *(Spilocaea oleagina* or *Cycloconium oleaginum)*

It especially represents a very strong threat in the coastal humid regions, because farmers do not perceive the indirect damage that this illness causes on the production while affecting the general sanitary state of the tree and its capacity to give a constant production. Copper oxychlorure is the active ingredient for treatments that is applied in spring by some farmers.

- olive wilt *(Verticillium dahliae)*

  This illness is found in all territories and is sometimes stimulated by the presence of *Solanaceae* family crops in olive orchards, phytosanitary control at the nursery represents the only efficient method of control and prevention in Syria today.

  In 1990 IPM began in Syria and a specialized lab was set up in this field. So the chemical control decreased from 14.4% of total area on 1990 to 3.4%.

11 climatic stations were built in different olive growing environmental regions to study the environmental conditions on the developmental biology and pest development, in addition to the phenology phases.

A control net of different types of traps was set up (pheromone, macfel, daco trap, light trap) distributed over 125 points in different regions for monitoring different key pests.

Four work groups have been working to localize and characterize the natural enemies and their activity in different regions. More than 20 natural enemies of major insects of olives (*Pnigalio mediterraneus* on *Prays Bactrocera*, *Eupylomus eurozonus* on *Bactrocera*, *Chylonus spp*.on *Prays oleae*, *Habrobracum spp*. on *Prays oleae*) have been described.

In Chart 6 the incidence of use of pesticides on the 444 farmers surveyed by the project.

A specific chapter of this report has been dedicated to the IPM and Organic management in olive orchards through 12 demo plots established by the project

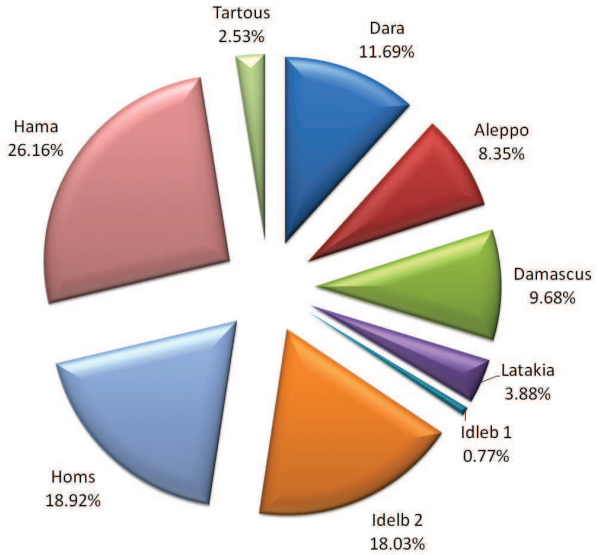


Chart 6: Incidence of pesticide use in 8 different Syrian Regions (Source: *Project Survey 2004-06*)

Time and methods of harvest

The harvest of olives may be extended for a long period that not only depends on the climate but also of the availability of workers, on the volume of production and the variety. Generally, in the coastal area, the harvest begins from the beginning of October until the end November, whereas in the inland regions, it begins at the end of October early November till the end of December. Certain varieties can be to prolonged to January.

Harvesting is done mostly by hand and in some regions (the coastal areas) sticks are commonly used. Mechanical harvesting is rarely used. Some trials have been made by the project, demonstrating the efficiency of pneumatic combs with respect to manual harvesting and electronic harvesters and gave a satisfactory output while achieving average harvests of 60-80 Kg/hours/worker (Pneumatic combs) according to varieties.

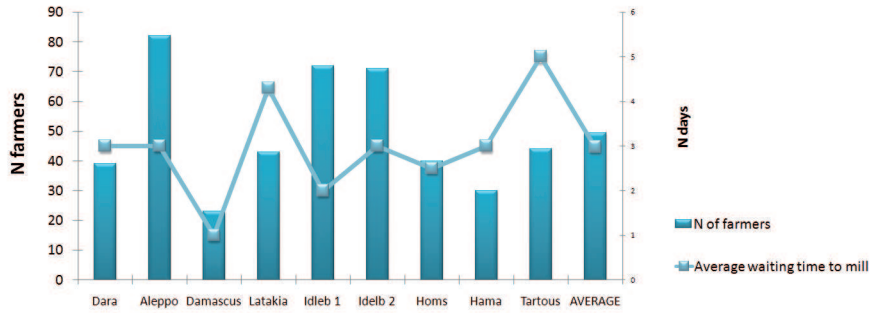


Chart 7: Average waiting time at farm before reaching mill in 8 Syrian Regions (Source: *Project Survey 2004 -06)*

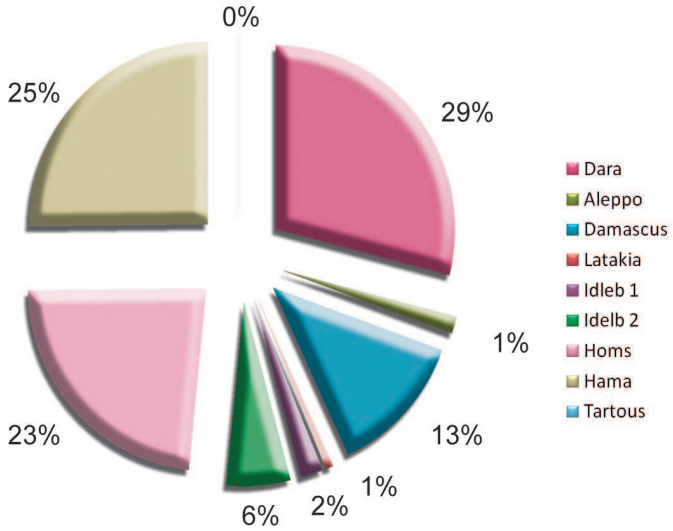


Chart 8: Syrian farmers mixing olive from tree with olives from ground. (Source: *Project Survey 2004 -06)*

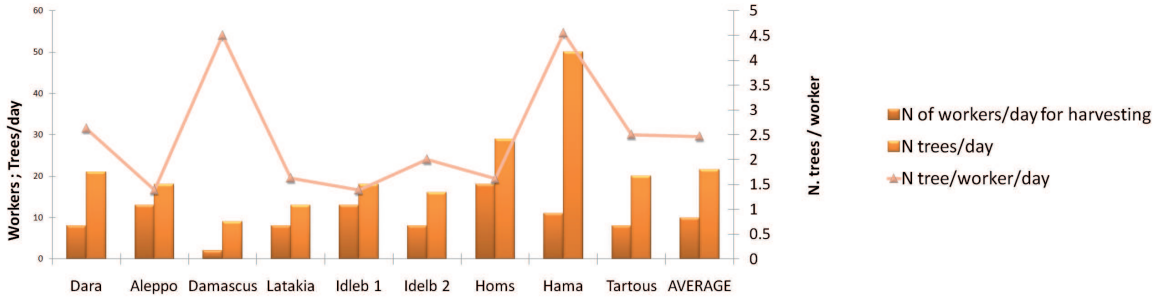


Chart 9: Workers and yield efficiency for manual harvesting in Syria (Source: *Project Survey 2004 -06)*

The highest efficiencies are related to the low average ages of the trees (Hama, Damascus especially).

Processing sector

Transportation is made in 50 kg plastic and burlap bags and some (especially in recently planted areas such as Damascus, Daraa, Hama) has started to be done in boxes and so we can store olive fruit for a longer time before taking it to the mill. In the mill, olives could be waiting up till to ten days, that is, each farmer in turn so that no one will stay for a long period (Chart 7).

In the year 2005, the processing sector in Syria was constituted of 922 mills, of which 493 were pressure ones and 477 are centrifugal (decanter). This system is continually in development, and because of that the number of mills are insufficient for pressing at the suitable time and that will cause a decrease oil quality (63,000 tree/mill).

In the high production years, olives could remain 10-15 days in unsuitable conditions, before pressing. It is necessary to underline that, very often, the operation of crushing and mixing on maximal temperature of 30ºC are not respected. Consequently, a big proportion of oil produced is deficient and this problem creates difficulties for commercialization. This oil is lampanate and requires to be refined, and this will increase the cost of production.

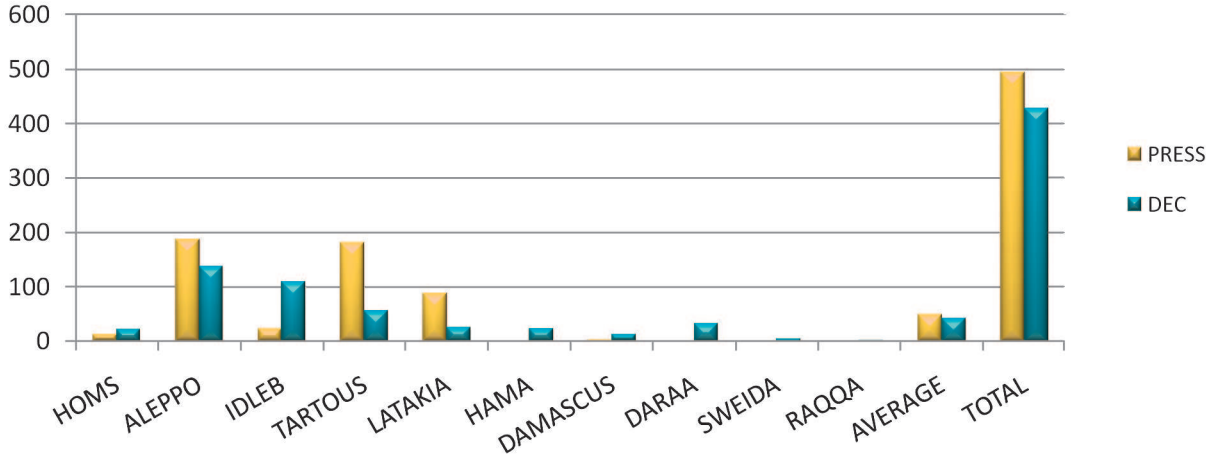


Chart 10: Mills in Syria (Source: *GCSAR and Official Agriculture Statistics: 2005)*

Chemical composition and quality of olive oil in Syria

Thanks to the project, there is now operational at the Department of Olive Research - GCSAR in Idleb a fully equipped and upgraded laboratory that analysed (according to the IOC methodology) more than 900 oil samples during the first year of activity.

In the table 2 are displayed the main chemical features of olive oil extracted from of 5 of the main cultivars distributed in Syria and analysed by our lab at the time of mid - harvest (Table 2).

Table 2: Main chemical features of some olive oil extracts of the main cultivars distributed in Syria

Variety	Absorption UV (nm)			Total polyphenols mg\kg	Total sterols mg\kg	Acid Oleic %
	270	232	ΔK			
Zaity•	0.13	1.68	0.002	332	1270	718
Sorani•	0.20	1.80	0.004	559	1363	68
Khoderi•	0.23	1.85	0.005	259	1026	71.4
Doebli•	0.17	1.63	0.004	356	1448	69.7
Dan•	0.18	1.90	0.002	536	1398	70.2

•Source: Project booklet: *"Characterization of main Syrian olive Varieties"*

In general these oils are compliant to the international standards and and they can be considered extra virgin olive oils if olives are harvested, stored and milled correctly. Some varieties have values of Δ 7 Stigmastenol slightly higher than the limit imposed by the the IOC Standards. This phenomenon on the other hand, can be found in several varieties of olives all over the Mediterranean Basin.

The estimated percentage of extra virgin olive oil produced every year is about 30% of the total production; most of this oil is exported in bulk to Europe.

From an organoleptic point of view, the panel test of the extra virgin Syrian olive oil are differently characterized according to the cultivar, the region of origin, the ripening stage of harvesting. A high intensity of fruity flavour with a strong aroma of green tomato (as for Sorani) or almond and apple (Kaissy) or green grass (Dan).

Some tests of organoleptic characterization has been carried out at three different ripening stages on the main Syrian olive varieties throughout the Project OOQ.

The promotion of the consumption of the extra virgin oil and its positive effects on the human health began some years ago thanks to the initiatives of cooperation with the government. Through the project a 60' video has been produced in order to explain the main benefits of an extra virgin olive oil.

A dedicated chapter of this report is deepening the olive oil quality and characterization issues, however, for further details on these topics please refer to the Project book titled "*Characterization of main Syrian Olive Cultivars."*

Olive by-products

The industrial extraction of olive oil gives two types of by-products. These are olive pomace and wastewater. These quantities and their composition can vary according to the system of extraction (pressing or centrifugal), and the variety and the degree of olive maturation. The estimation of this national production in the year 2004 is about 280,000 tons of olive pomace and 800,000 m^3 of wastewater.

With regard to their utilization in Syria, olive pomace is only used for extraction by means of solvents of the industrial oil (oil of pomace) that is in turn used for the manufacturing of soap. For some years extraction industries have begun to use super decanters for the mechanical extraction of the olive pomace. It is used also for energy in many processes or in a some complementary industries (traditional soap).

As for wastewater, up till now we have not had any suitable usage, and discard it without previous treatment into the urban net work and/or nature without controls, which causes environmental pollution. Some mill owners have begun the distribution of these waters on the land through cisterns.

GIS map with monitoring of quantities of produced wastewater and an experimental model of distribution of the wastewater to farmers' lands was achieved thanks to the collaboration with experts of the Project and is detailed in the specific chapter of this report.

By-products have an interesting economic value for millers according to the distance from the extraction factories, a summary of the relationships between pomace and oil prices are found in Chart 11.

From these results is clear that pomace has a certain price fluctuation depending on the extraction system and distance from the extraction factory. Fluctuation in olive oil price depends on the alternate bearing and on the reputation of the oil itself (higher consideration is given in Syria to the oil from Aleppo and Idleb).

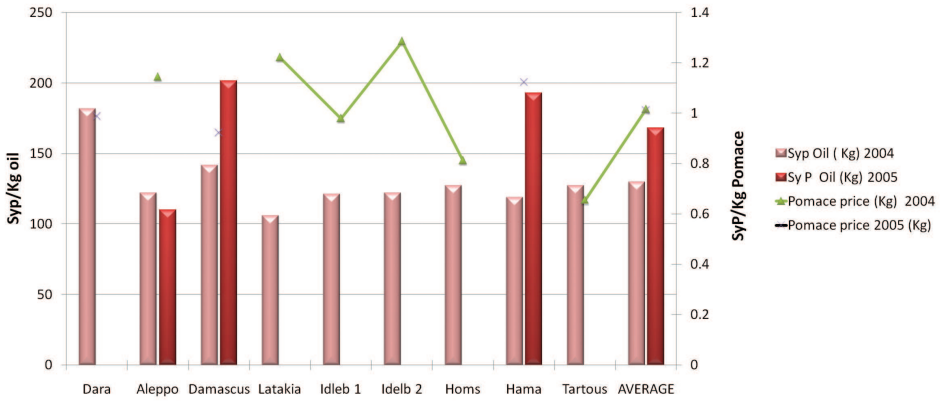


Chart 11: Oil and Pomace values in 2004 and 2005 in 8 Syrian regions (Source: *Project Survey 2004-06)*

Recycling of olive water and exhausted pomace as compost and wastewater spreading in agricultural lands (olive orchards) have been main activities of the related project components, a detailed description of those activities is available at the related chapter on by-products in this final report.

The preliminary results showed:

- Positive effects on the vegetative development of the plant.
- Positive effects on crop productivity.
- Reduction, of the use of synthetic chemical fertilizers for fertilizing the cultivated land, which are replaced efficiently by the organic and mineral matter supplied by the vegetable water and/or olive pomace compost.
- Improvement of the structure and chemical composition of the soil by increasing the organic matter and achieving a more balanced C/N ratio.
- Conservation, or enhancement, of the species and number of soil micro flora and micro fauna.

Photo 3: Olive Waste water spreading demonstration at project demo plot

Research Activities

GCSAR - Olive oil Department- Idleb, Related Activities

The main activities carried out nowadays by the GCSAR Olive Department in Idleb, concern olive trees and are focused on the following themes:

Genetic resources and clonal selection

- prospecting and characterization of the plant material (characterization and morphological, agronomic and molecular), propagation and conservation of the accepted material.
- selection of clonals of local varieties for the objective:
  - tolerance to biotic and abiotic factors
  - alternate bearing reduction
  - self-compatibility of Zaity cv

Protection

- research on the main pests (biology, geographical distribution and dynamic of population) and main diseases of the olive tree
- techniques of monitoring and the most important insects in IPM
- survey of secondary insects and the apparition of news insects *(Palpita unionalis)*

Technology for improvement of quality

- characterization of the different oils of local varieties. (physico-chemical and sensory characterization)
- proper harvesing time according to the variety and the geographical areas
- the effect of extraction system on the quality of oil and by-products
- table olives

Agricultural application

- management of soils and strategy of conservation
- nutrition and fertilization
- organic farming
- application of green manure techniques
- by-products
- the mechanical harvesting, equipment
- assessment of climatic change on the flowering of the olive tree.

Conclusions

Thus, it is clear that the olive tree plays an important role in the economy, the life and in the landscape of Syria.

It is also self understood that the production surplus envisaged is quite realistic even if the theory trend is not considering the dead trees. The Syrian Ministry of Agriculture considers the olive oil sector one of the most important priorities not only for the consequent economic feedback, but also for the social role played by this sector. To strengthen this sector then, it is necessary to explore its adaptation to the socioeconomic realities and environment by utilization of the enormous genetic resource present in Syria. For this reason, Syria together with the project has been in a condition to set up its national strategic plan for the improvement of olive oil quality. This approach adds value to the production, the transformation and the commercialization by establishing a positive synergy between the public and the private sector both involved at different levels and including a financial support for the necessary technology transfer and rehabilitation costs. Proper valorization of the quality and organoleptic characteristics of the Syrian varieties will have a remarkable influence on the final quality of olive oil and, as consequence, on the marketing potential of this important resource.

References

Loussert R, and G. Broussse 1978. *The olive tree*. Edict.

Ministry of Agriculture, 1980-2003. *Annuals Agricultural Satirical Abstract*, Syria

Project *Technical Assistance for the Improvement of Olive Oil Quality in Syria,* Survey 2004-06