AFDC

وزارة البيئة
Ministry of Environment

COOPERAZIONE ITALIANA

Forest Tree Nurseries

Assessment: Lebanon - 2008

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[1] Project coordinator of the Italian cooperation funded project: “Emergency reforestation intervention”
[2] Focal point of the Italian cooperation funded project: “Emergency reforestation intervention”

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List of abbreviations:

AFDC	Association for Forests, Development and Conservation
Ha	Hectares
MoA	Ministry of Agriculture
MoE	Ministry of Environment

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Preface

During the last two years, forested areas in Lebanon suffered from major decline. Main causes of this loss were the multiple adverse impacts of July 2006 war compounded by the disastrous fires of 2007 and 2008.

As a result, many of the forests destroyed by the flames were lost forever. With thousands hectares of lands being burned in the last three years, a severe shortage of native trees seedlings used for serving different reforestation activities throughout the country was sensed.

Consequently, a detailed assessment of existing tree nurseries in Lebanon was needed in order to plan the restoration and upgrading of old nurseries and the establishment of new nurseries. According to MoE's previous experience in national reforestation activities and to AFDC's experience in managing tree nurseries, the establishment of needed and well sustainably managed tree nurseries in Lebanon will play a major role in the different reforestation and plantation activities throughout different Lebanese regions.

MoE and AFDC signed together in 2007 a Memorandum of Understanding to develop and put into action a short and long term plan for the prevention and control of forest fires in addition to rehabilitation of burnt and damaged Lebanon's forests and noted the necessity of conducting emergency projects for reforestation. Certainly, this would require an extensive field survey to assess the current situation of the most important tree nurseries in Lebanon (mainly the publicly owned ones), including their operational status, sustainability, capacity and productivity in order to consider their future improvement modalities at the medium term.

The Italian Cooperation responded quickly to the national need of post-fire rehabilitation by funding an emergency project for reforestation and urgent establishment of tree nurseries in Lebanon. Conducting the tree nurseries assessment within the framework of this project gives a global view of the current situation of the major existing nurseries and drafts the initial recommendations towards finding an overall solution for sustainable management and capacity improvement of tree nurseries.

Ministry of Environment

Association for Forests, Development and Conservation

I. Introduction:

The severe and fast degradation in the green cover of Lebanon calls for an urgent sustainable forest management plan that includes extensive reforestation activities as part of a holistic conservation management plan at the national level. However, "it is questionable whether forests could be managed sustainably without the planting of seedlings grown in tree nurseries" (Colombo, 2001). Tree nurseries provide planting stock that helps ensure the rapid regeneration of desired tree species following disturbance (Colombo, 2001).

A scarcity in forest trees planting stock in Lebanon has been observed by all parties undertaking reforestation activities particularly after the end of the civil war when reforestation initiatives became extensive to restore what has been degraded during the long years of neglect.

However, any clear and accurate account on the quantity and quality of forest tree seedlings that is available in both private and public tree nurseries was absent.

That is why a qualitative and quantitative assessment of the existing public and private tree nurseries available in the country was needed in order to understand the current situation in terms of forest trees planting stock in Lebanon

The Association for Forests, Development and Conservation (AFDC) in collaboration with the Ministry of Environment (MoE) sensed the urgent need for such an assessment, therefore incorporating it as one of the activities of the Italian Cooperation funded project entitled: "Emergency Reforestation Intervention" project.

II. Background:

Threats to Lebanon's Forests are numerous. These threats are either of natural origins or of human ones and include forest fires, insects and diseases, urban expansion and changes in land use, quarries, and wars.

The most severe of these threats are urban expansion and forest fires. Forests in Lebanon constituted 35 % of Lebanon's area as recently as 48 years ago (1960). This figure declined to 22% by the year 1972 and further down to 13.5% by the year 2004. On average, around 1200 ha of forests are lost yearly due to forest fires.

During one year only (2006-2007), Lebanon has lost almost 3700 ha of its green cover, mainly due to severe forest fires. Currently, the forest cover stands at 13% of Lebanon's area (AFDC, 2007)

October the 2nd 2007, was a black day for the environment in Lebanon, where enormous fires spread out in several forests and led to the destruction, often irreversibly, of 1,600 ha of forests of different land cover types. The area burned in one day was much larger than that reforested and afforested during the past 17 years in the country. Additionally, on October the 23rd 2007, tremendous fires burned approximately 740 ha of forests in Northern and Southern Lebanon. As a result, many of the forests destroyed by the flames were lost forever without any possibility of natural regeneration. Forests which were previously burned within the last 10 years were not able to produce cones yet and therefore do not have the ability to naturally regenerate anymore.

In parallel to this loss of trees (1.2 million trees), a large number of tree seedlings was needed for the extensive reforestation activities that were to follow. Severe shortage of native tree seedlings used for serving the different reforestation activities throughout the country was observed. As a result, Lebanon was obliged to import forest and agricultural seedlings to cover the demand (sometimes non-native species).

Although, when planting trees it is always best to utilize native tree and shrub seedlings from a locally adapted seed source because:

- They are better adapted to Lebanon's extremes in weather and to regional planting sites.
- They are less likely to be stressed than non-native plants.
- They are more resistant to insect and disease attacks.

III. Objectives:

This assessment aimed at identifying the current capacity and management trends of tree nurseries in Lebanon as well as determining the needs to upgrade the nurseries to be able to supply the needed trees to restore all the forest areas burned at the long term.

IV. Means of Implementation:

This assessment was conducted as part of the "Emergency Reforestation Intervention" project, which is implemented by AFDC in collaboration with MoE, and funded by the Italian Cooperation. This project is part of the National Campaign for forest fire management that was launched after the severe fires of October 2007.

AFDC experts conducted an extensive evaluation assessment of tree nurseries in Lebanon during 2 months. More than 60 publicly and privately owned tree nurseries in Lebanon were surveyed.

A questionnaire that covers both the quantitative and qualitative aspects of tree nurseries was designed and developed (Annex 1). The questionnaire included inquiries about the nurseries management practices through questions related to the type of soil used, fertilizers, pesticides, herbicides application, and irrigation. AFDC experts also included their own observations and comments on the conditions of the nursery and any needs of renovation.

AFDC collaborated with the Ministry of Agriculture (MoA) to collect similar data in addition to renovation needs on the publicly owned tree nurseries that are managed by the MoA.

V. Results:

A. Private Tree Nurseries:

1. Total Production:

The conducted survey comprised a total number of 55 private forests and olive tree nurseries (Annex 2). A larger number of nurseries were visited; however, they were not included in the study because of gaps and unavailability of requested data. This lack in data was due to several reasons, mainly the refusal of the owners to share information, and the nurseries' workers or managers' lack of knowledge concerning the requested details on the nursery.

Table 1: Tree nurseries across Lebanon

Mohafaza	# of Tree Nurseries	Total Production/year	Maximum Capacity
Nabatiyeh	14	50,805	207,250
Mount Lebanon	16	147,290	271,6000
North	5	119,250	495,000
South	5	62,230	125,000
Bekaa	11	240,290	570,000
Akkar	4	23,310	118,000
Grand Total	**55**	**643,175**	**4, 231,250**

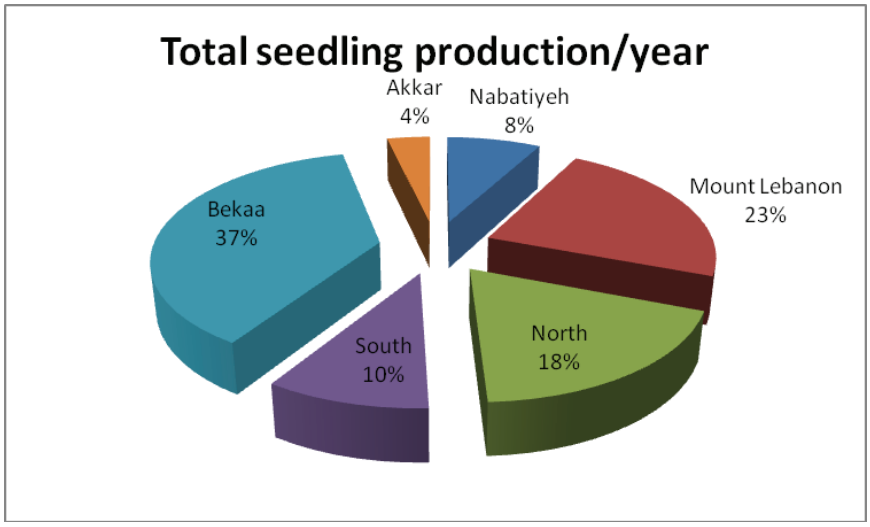

FIGURE 1.PERCENTAGE OF ANNUAL PRODUCTION OF NURSERIES PER MOUHAFAZA

The total production per year of the totally assessed tree nurseries was found to equal 643,175 seedlings. However, this production has a possibility of increasing to 4,231,250 seedlings per year. Most of the private tree nurseries were not, at the time of this assessment, producing at maximum capacity mainly due to the unstable economic, political and security situation in the country.

This assessment highlights the problem of shortage in seedlings previously encountered during all the reforestation endeavours undertaken in the recent years and even more after the 2007 Forest fires. During 2007 alone, more than 3700 ha of forests were lost in wide spread fires.

If we consider that for every hectare of land an average of 400 seedlings (according to AFDC reforestation standards), depending on the species, is required for reforestation, then the available seedlings produced (643,175) are only enough for reforesting approximately 1608 ha. Furthermore, to restore the 3700 hectares burned during 2007 more than 1.5 million seedlings are needed; that is, with the current rate of production it will take more than two years for reforestation, and only if all produced seedlings are the appropriate species needed.

If the productivity is increased to maximum capacity (4,231,250) then seedlings will be enough to reforest an approximate 10578 hectares of land in one year.

Following is a distribution of assessed private and public forest tree nursery mapped over the forest cover:

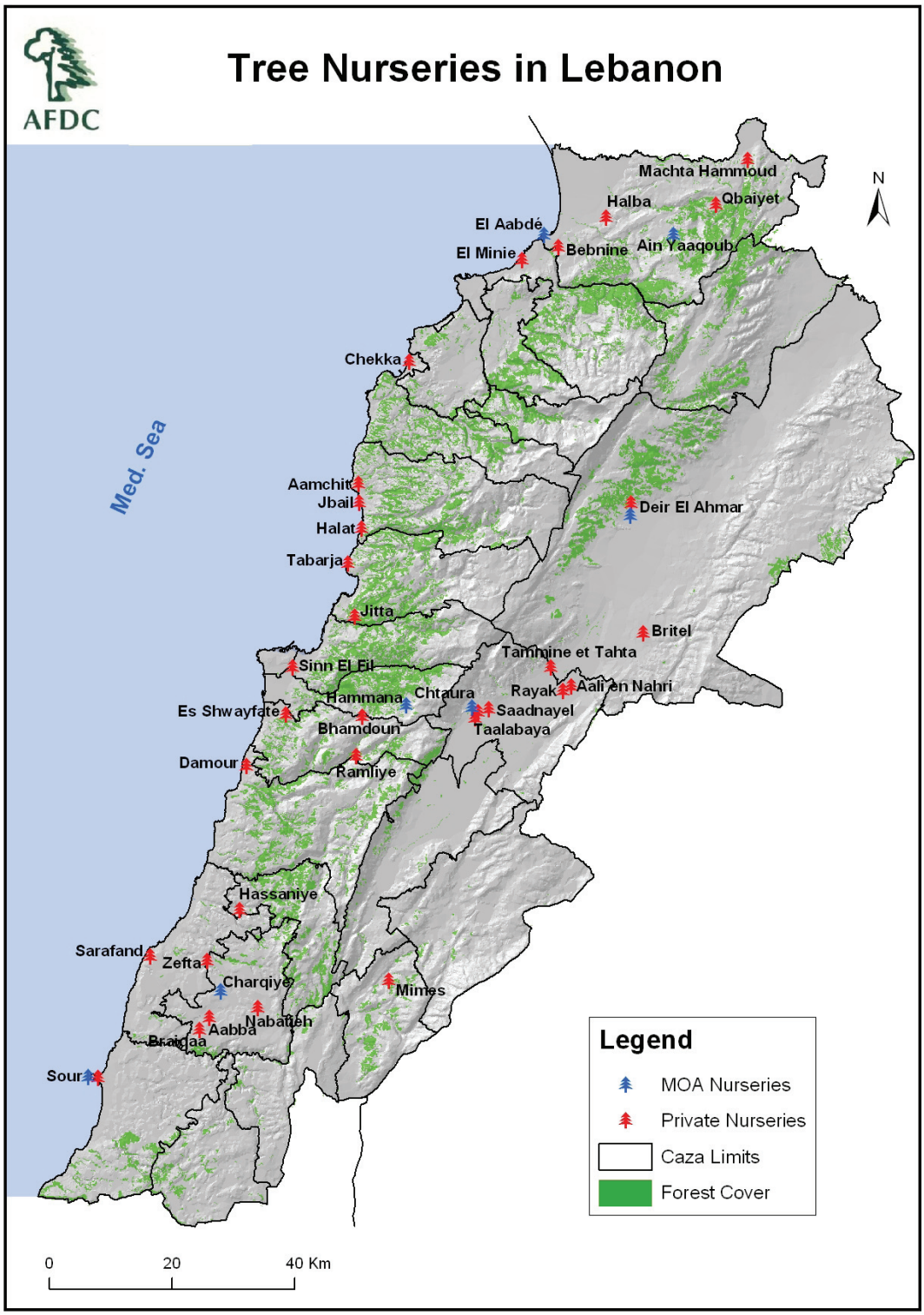

FIGURE 2.DISTRIBUTION OF ASSESSED PRIVATE AND PUBLIC FOREST TREE NURSERIES MAPPED OVER THE FOREST COVER OF LEBANON

2. Produced species:

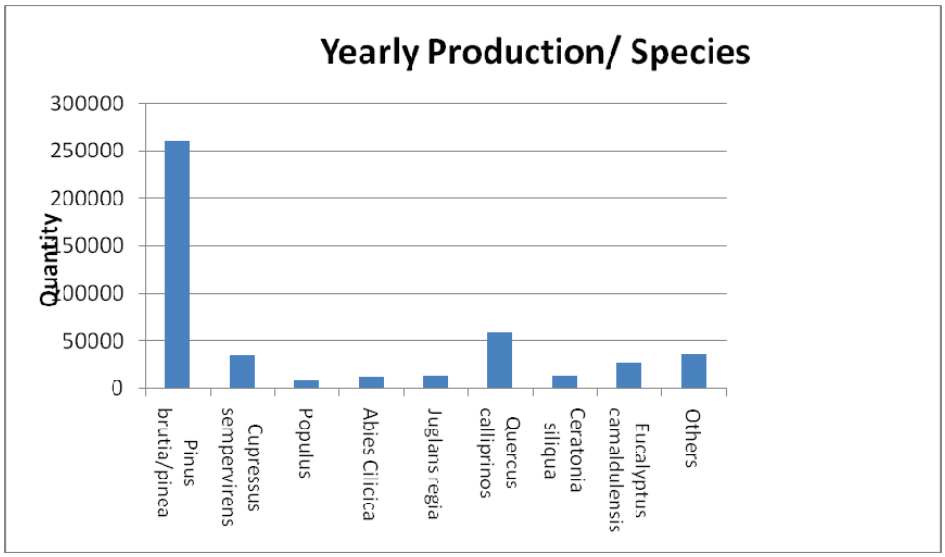

FIGURE 3.YEARLY PRODUCTION PER SPECIES

Among the assessed private tree nurseries, *Pinus pinea* and *Pinus brutia* was predominantly produced, with a total yearly production of 260, 970 seedlings followed by *Quercus calliprinos* with a total yearly production of 58,590 seedlings.

It is noticeable that the majority of the currently available seedlings are found to be between the age of 1 and 3 years which is the most suitable age for reforestation ensuring highest survival rate. Nevertheless, the results of the assessment indicate that the shortage in seedlings is going to be compounded during the coming years since the current available seedlings under 1 year of age are merely 60,000 seedlings of all species.

Table 2. Age of produced species

		Age /years			
Species	**Yearly Production**	**0-1**	**1-3**	**3-5**	**> 5**
Pinus pinea and *Pinus brutia*	260970	50300	137820	37775	34775
Cupressus sempervirens	34780	2000	28100	4330	250
Populus	8910	0	6810	2000	0
Abies Cilicica	12370	0	900	8600	2570
Juglans regia	12880	360	10970	1500	50
Quercus calliprinos	58590	200	54730	3475	185
Ceratonia siliqua	12880	360	10970	1500	50
Eucalyptus camaldulensis	26115	2300	22260	1125	430

Cedrus libani was the third most commonly produced species in assessed private tree nurseries around Lebanon, with a total yearly production of 47,205 seedlings, the majority of which are between the ages of 1 to 5 years.

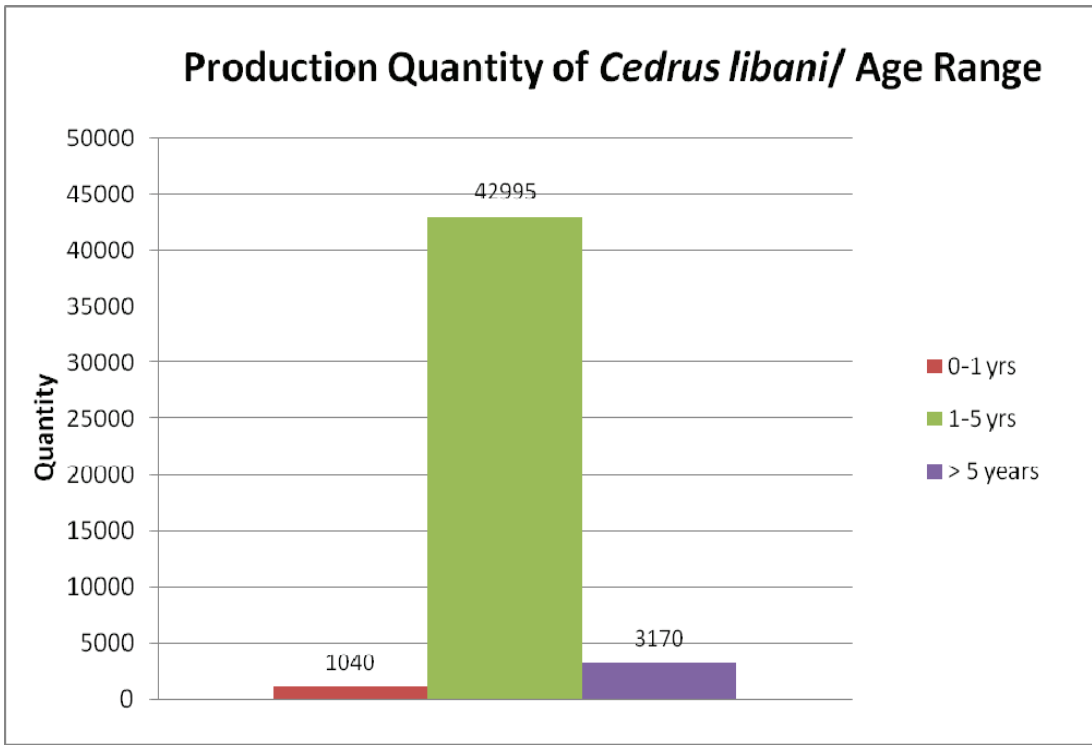

FIGURE 4:PRODUCTION QUANTITY OF *CEDRUS LIBANI*

The olive trees planting stock (*Olea europea*) was also appraised on the margin of this assessment, since olive trees are considered as a major element of the Mediterranean ecosystem. Olive trees are highly demanded in replanting activities in Lebanon because Olive groves constitute a somewhat stable agri-ecosystems; thus qualifying as a transition between natural and agricultural ecosystems.

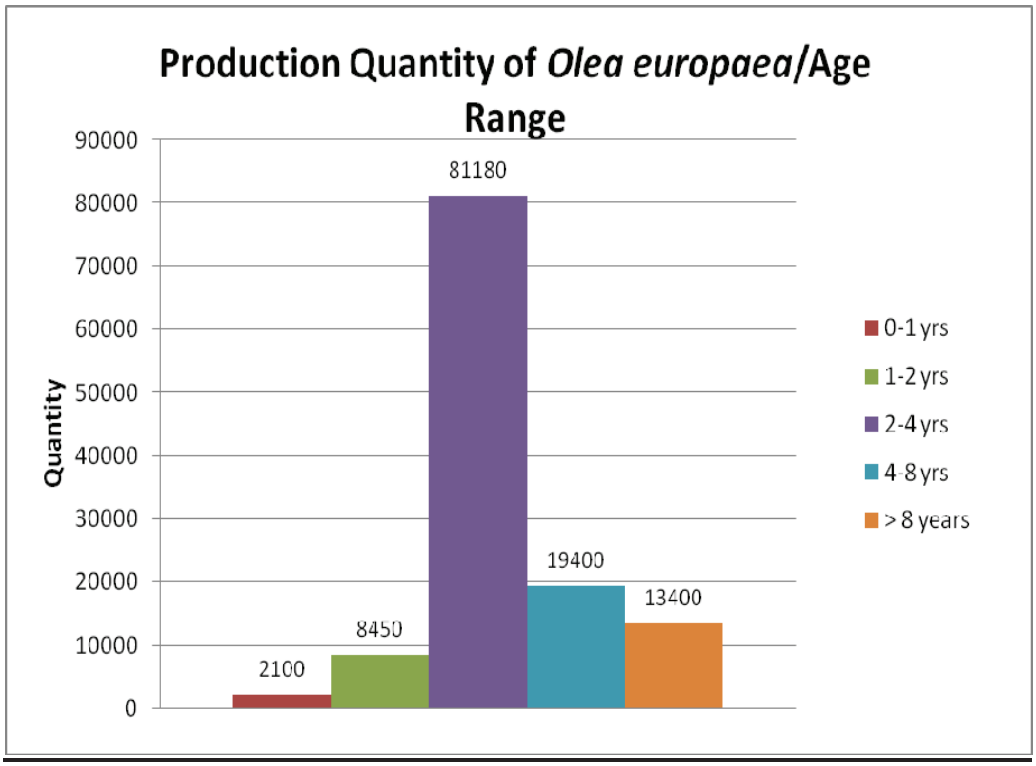

FIGURE 5.PRODUCTION QUANTITY OF OLIVE TREES

Throughout this work, the tree nurseries were found to produce more than 125,000 olive seedlings, the highest majority of which are between the age of two and four years.

3. Origin of seedlings:

The origin of forest species and olive seedlings was noted in the assessment. The results indicated that out of the 55 assessed private tree nurseries, 39 nurseries grow their seedlings and trees from seeds. However, it was found that merely 11 nurseries out of the 39 produce only by growing from seeds without additionally importing or purchasing locally. The total production of seedlings by the mentioned nurseries exclusively growing from seeds amounts to 376,635 seedlings.

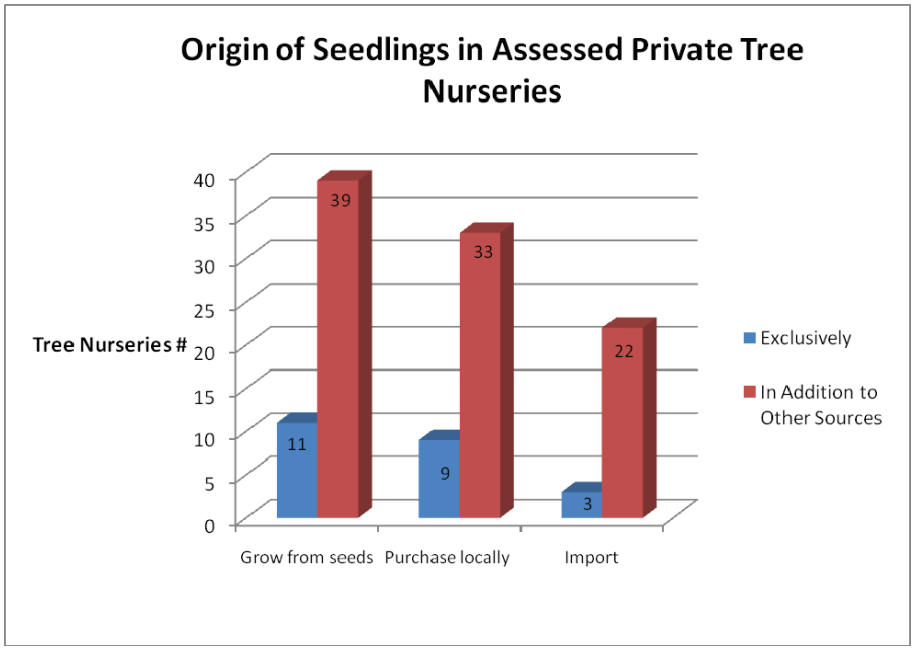

FIGURE 6.ORIGIN OF SEEDLINGS IN ASSESSED PRIVATE TREE NURSERIES

On the other hand, it was found that 33 nurseries purchase seedlings from the local market, out of which a total of 24 nurseries grow from seeds or import in addition to purchasing locally. On the other hand, the total production in 9 nurseries depends on purchase from local market. The total production in the previously mentioned 9 nurseries amounts to 25,880 seedlings.

The majority of the 22 tree nurseries that import seedlings from other countries, also depend on other origins for their productivity particularly growing from seeds or/and purchasing from other local major tree nurseries. The countries, which forest trees and olive seedlings are imported from, include Syria, Italy, Morocco and Egypt. Italy was found to be the major contributor of imported seedlings by the assessed private tree nurseries followed by Syria.

4. Soil Mixture:

"One of the important factors that have direct influence on the quality of the planting stock is the nature and component of potting mixture used in the nursery for their production" (Fagbenro, 2001). The ideal soil mixture for growing forest trees' seedlings in plastic bags or containers in a tree nursery is that composed of almost 30 percent of organic fertilizers (Compost or Manure).

All assessed tree nurseries mix their growing soils with at least one source of organic fertilizers or matter such as compost, unprocessed animal manure, terreau and peat moss. The dominant form of organic matter used in the majority of the tree nurseries is animal manure. This is due to many reasons, mainly its availability in the different regions. According to AFDC's experience the best source of organic fertilizers for tree nurseries' soil is animal manure.

Table 3. Source of organic fertilizers

Source of organic fertilizers	Manure	Peat Moss	Terreau	Compost
# of tree nurseries	41	17	13	3

Note: Numbers do not sum up to 55 since some tree nurseries use more than one form.

5. Irrigation system:

Water is the major and foremost condition for the establishment and success of a tree nursery. Growth and every related function (physiological and metabolic) are the first process to be hindered when sufficient water is lacking. Two factors are studied when considering the water element of a tree nursery, namely, quantity and quality. Fo r that reason both the source of irrigation and the system itself are important.

Source of irrigation water:

The 55 private tree nurseries of this study employ water for irrigation from several different types of water sources. The sources include underground water (artesian wells), surface water (water canals, rivers, springs), rainwater collection, or purchased water (water meters, water trucks…).

The majority of the nurseries (21) use water for irrigation from surface water systems mainly water canals such as the Damour water canal. Some nurseries exploit river water for use. The main rivers mentioned through the assessment included the Litani and Nahr Ibrahim Rivers.

On the other hand, 17 nurseries extract water from artesian wells for irrigation purposes while, 10 nurseries purchase their water mainly through the government's pay as (you) go system (water meters).

Irrigation Systems:

Irrigation systems need to be carefully designed to ensure optimum water regulation in forest tree nurseries. The greatest majority of the nurseries assessed (50 in total) were found to use hoses for irrigation without any previous planning, while 7 nurseries only have a previously designed irrigation

system constituted of sprinklers and the remaining use other systems such as furrows and drip irrigation.

It was noted during this study that morning frost (Mallah) is a common physical injury that seedlings are exposed to in tree nurseries. Seedlings must be protected from damaging effects of frost and heat; overhead irrigation sprinkling is the most common, effective method for accomplishing both (McDonald, 1984).

6. Inorganic fertilizers:

The majority of the private tree nurseries of this assessment apply inorganic fertilizers to compliment the organic fertilizers originally mixed with the soil. The most common forms of fertilizer used are the different grades of N-P-Ks. This inorganic fertilizer is formulated in different concentrations and combinations to supply three macronutrients: Nitrogen, Phosphorus and Potassium. Almost 40 private tree nurseries use one or more grade of NPK fertilizer with 17-17-17 and 20-20-20 grades being the most common. Nitrophoska ^{R}, an NPK compound fertilizer, is another commonly used source of Nitrogen, Phosphorus and Potassium macronutrients in the private tree nurseries.

Iron (Fe) was also commonly applied in more than 20 of the tree nurseries, often in combination with other application of Nitrogen source. Other Nitrogen sources used include: Nitrate, Urea, Ammoniac, and Foliaire^{R}.

Only a couple of the tree nurseries find the yearly reapplication of organic fertilizers a self sufficient source of nutrients for the seedlings.

B. Public tree nurseries:

The current shortage of tree seedlings could be contributed to the fact that seven out of nine public tree nurseries, which are managed by the Ministry of Agriculture (MoA), are not operational for many years due to several reasons including administrative, political, financial and technical.

During the year 2008, all seven of these public tree nurseries became partially operational. Attempts to plant new seedlings were undertaken. However, the germination rate of most species particularly the *Cedrus libani* in all the public tree nurseries was very minimal. The seeds used in planting were from local origin. For example, *Cedrus* species seeds originated from Tannourine and Pine species originated from Ras el Maten region. The genus planted this year included Pinus, Abies, Ceratonia, Eucalyptus, Rhus, Cedrus, and Quercus.

The following table indicates the public tree nurseries that are managed by MoA, with their locations and areas.

Table 4. Tree nurseries managed by the Ministry of Agriculture

Nursery	Location	Area (m^2)
Al Abda	North	12000
Ain Yaccoub	North	1000
Hamana	Mount Lebanon	8000
Debbieh	Mount Lebanon	4000
Shtoura	Bekaa	10000
Deir Al Ahmar	Bekaa	16000
Al Sharqiya	Nabatiyeh	20000
Rmeich	Nabatiyeh	6000
Sour	South	20000

The tree nursery in Dibbiyeh, Mount-Lebanon has remained operational during the years, and it is in a very good condition. Its estimated maximum capacity is 250000 seedlings. Currently, it produces Cedar seedlings with annual production of 20000 seedlings, and pine seedlings with annual production of 30000 seedlings. The tree nursery in Rmeich produces a total of 220000 seedlings of Pine, fir, carob, Eucalyptus, sumag, and oak.

The following table shows an approximate range of maximum production capacity by the public nurseries. Assumptions used are that 35% of the total area is used for infrastructure and passageways, seeds are planted in polyester bags, and each m^2 can encompass 90-100 planted seedlings.

Table 5. Maximum production capacity range of public tree nurseries

Nursery	Maximum Production Capacity Range
Al Abda	702,000-780,000
Ain Yaccoub	58,500- 65,000
Hamana	468,000- 520,000
Shtoura	585,000- 650,000
Deir Al Ahmar	936,000- 1,040,000
Al Sharqiya	1,170,000- 1,300,000
Sour	1,170,000- 1,300,000
Grand Total	**5,089,500-5,655,000**

It is very important to note that almost all public tree nurseries are in desperate need of renovation not to mention an improved management and an increase in the number of personnel. Other major problems that are present in these nurseries are the absence of a water source with sufficient quantities for irrigation, the poor quality of the water available, and an outdated irrigation system.

Hamana Nursery: This nursery uses water for irrigation from the Shaghour River. It requires a lot of work and renovation; including shades, fences, and a new irrigation system. Pine species could grow very well in this region and altitude (800m).

Deir Al Ahmar Nursery: The water source is an artesian well that needs a turbine and a cable to become functional. Currently, irrigation water is being imported from the Yammouneh River. However, after the month of July the water level of this river is too low leaving the nursery with no water source for irrigation. *Abies cilicica*, *Cedrus libani* and pine species could be very well grown in this nursery.

Shtoura Nursery: The irrigation water source is Shtoura spring; however, the water of this spring is distributed to all farmers of the region in a rotative manner ;thus, rendering it an irregular source of irrigation to the nursery.

Al Sharqiya Nursery: The water source for irrigation is also an artesian well that needs a new 300 m cable after the existing one was destroyed during the hostilities of the July 2006 War.

Both Sour and Al Abda Nurseries: A water source for irrigation is available in both nurseries; nevertheless, the irrigation system itself like the rest of the tree nurseries is in a bad state or is outdated. In addition, these two nurseries lack fences and gates thus rendering vulnerable for intrusion by animals and humans. Eucalyptus and pine species were commonly planted in the Al Abda

tree nursery especially since Eucalyptus wood is highly demanded by the local community of the North for construction of boats.

Rmeich nursery: The water source for irrigation is from the drinking water of the village, however this water is not continuous and additional source of water is needed.

Following is a table that indicates the renovation expenses needed for the infrastructure and irrigation systems of the seven public tree nurseries:

Table 6. Estimated renovation cost of public tree nurseries

	Estimated Renovation Cost in L.L		
Nursery	**Infrastructure**	**Irrigation system**	**Total**
Al Abda	36,920,000	65,000,000	101,920,000
Ain Yaccoub	34,200,000	11,000,000	45,200,000
Hamana	28,050,000	12,400,000	40,450,000
Shtoura	55,450,000	20,000,000	75,450,000
Deir Al Ahmar	16,400,000	70,000,000	86,400,000
Al Sharqiya	53,950,000	18,000,000	71,950,000
Sour	111,900,000	90,000,000	201,900,000
Grand Total			**623,270,000**

Source: Ministry of Agriculture

A common and major problem faced by these public tree nurseries is the poor management. The allocated employees in each nursery are commonly too few with short working hours.

VI. Conclusions and Recommendations:

The total production per year of the totally assessed private tree nurseries was found to equal 643,175 seedlings with the possibility of increasing production to 4,231,250 seedlings per year in order to cover a significant part of the national need of seedlings for reforestation.

Most of public tree nurseries are in desperate need of renovation. Recommendations and future prospects regarding the actions to be undertaken to upgrade most of the previously mentioned MOA nurseries fall under two main categories:

A- Management:

- Human resources: personnel available in the forest tree nurseries that are managed by the MoA are too few to ensure proper management of the nurseries. In the majority of the public tree nurseries only two employees are present. These personnel have very short working hours which are not sufficient for good management of the nurseries. As such, it is necessary for the MoA to reopen the recruitment of new personnel at all management levels.
- Planting techniques: capacity building on improved planting techniques and management skills needs to be given to all MoA nursery workers.

B- Infrastructure:

- All MoA managed tree nurseries are in need of renovation of the infrastructure and irrigation system. However, in the short term it is recommended that only the tree nurseries with the highest chance of successfully producing seedlings be renovated. That is, nurseries that have available water source for irrigation, sufficient personnel with minimal management skills.
- It is recommended that three nurseries one in the Bekaa (Shtoura), another in Maten (Hammana), and a third in North (Abda) be renovated.
- The Shtoura tree nursery could be specialized in Abies and Cedar production, while the Hamana tree nursery could be specialized in Pine production and the Abda tree nursery could be specialized in Eucalyptus production.
- The estimated renovation costs of both the infrastructure and irrigation systems of the Shtoura, Hamana and Al Abda tree nurseries is 75, 450, 000 L.L ; 40,450,000 L.L ; and 101,920,000 L.L respectively.

Finally, this report was produced in order to give a first impression about the situation of forest tree nurseries in Lebanon. A continuous work is needed in order to keep the report more comprehensive and up to date.

Annexes

Annex 1: Tree nursery assessment questionnaire

1- Name and Location of Nursery:
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2- Total Production/year:
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3- Maximum Capacity:
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4- Present Species: (Forest Trees/ Productive Agricultural Trees)

Species 1	
Species 2	
Species 3	
Species 4	
Species 5	
Other (specify)	

Comments:
……
……
……
……

5- Yearly Production/Species:

Species	Yearly Production
1	
2	
3	
4	
5	
Other (Specify)	

Comments:

……
……
……
……

6- Origin of Seedlings:

☐Grown from Seeds ☐Imported……..…… ☐Purchased locally

7- Soil Type Used:

……
……
……
……

8- Age Ranges Available:

Age Range	Species 1	Species 2	Species 3	Species 4	Species 5
1					
2					
3					
4					
5					
Other (specify)					

Comments:

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9- Quantity/Age Range/ Species:

Quantity	Species 1	Species 2	Species 3	Species 4	Species 5
Age Range 1					
Age Range 2					
Age Range 3					
Age Range 4					
Age Range 5					

Comments:

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10-Management practices:

Irrigation

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Fertilizers

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Pesticides

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Herbicides

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11- Status of Seedlings:

☐Tall ☐ Short
☐Green ☐ Yellowish
☐Sturdy ☐ Lanky

Comments and Apparent Diseases
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12-Comments on Current Condition of Nursery:
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13- Restoration Needs:
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General Comments:
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Annex 2: List of assessed private tree nurseries

Name	Location
Amiflora	Tabarja
Green Opium	Zefta(Nabatiyeh)
Youssef Omeys	Ibba
Yassin Tarhini	Ibba
Al hajj Bou Khalil Nasr	Ibba
Mashtal Al Amal	Ibba
Al hajj Ali Wehbi	Ibba
Kassem Tarhini	Ibba
Mostapha Almoallem	Ibba
Mohammad Daoud Tarhini	Ibba
Verdure	Halat
Cosa Nostra	Jbeil
Jardin du Boulevard	Sin el Fil
Saint Jack	Jbeil
Mashtal amchit al Ziraii	Amchit
Mahstel Al shamal	Chikka
Mar Elias	Jeita
Green Meadows	Chouwefat
Jasmin	Tabarja
Green Garden	Damour
Zohoor Lobnan	Damour
Green Space	Damour
Alaa Issam Al Qarii	Damour
Mashatel Abou Rjeily	Damour
Mashatel Al Jana	Breyqii
Al Mashatel	Sarafand
Mashatel Nora	Hissaniyeh
Mashtal Al Nabatiyeh	Nabatiyeh
Mashtal Farah	Nabatiyeh
Al hajj Ahmad Nassour	Ibba
Ahmad Abbas Moussa	Sour
Kassem Moallem & sons	Ibba
Elie Hanna Samaha	Saednayel
Mashatel Sleiman Samaha	Taalabaya

Mashatel Issam and Mirii Mirii	Shtoura
Mashatel Farah	Shtoura
Mamdouh Abou Dargham	Bhamdoun
Mashtal Al Bekaa	Brital
Mashtal Al Zahraa	Ali al Nahri
Kamel Zein El Deen	Riyaq
Mashtal Zahrat Al Bekaa	Timneen
Khodor Obeid	Minyeh
Mashatel Lobnan AL Akhdar	Al abdeh
Adnan Dandal	Mashta Hammoud
Youssef Tannous	Qbayet
Mashtal Akkar	Halba
Mashatel Green Life	Halba
Mashtal Al sahel Al Akhdar	Minyeh
Mashatel Al shamal	Minyeh
Mashatel Jabal Amel	Ibba
Mashatel AL Borji	Ali al Nahri
Mashtal Al Bekaa	Taanayel
Mashtal Al Koroum	Deir Al Ahmar
Mimiss AFDC center	Mimiss
MFDCL	Ramlieh

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