

**PROFILE ON TEMPERATE FRUIT TREE  
SEEDLING MULTIPLICATION**

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## **I. SUMMARY**

This profile envisages the establishment of a farm for the production of temperate fruit tree seedlings with a capacity of 25,000 pieces per annum. Fruit seed processing is multiplication and preparation of fruit seeds with high yield potential and resistant to adverse effects of environment and disease.

The present demand for the proposed product is estimated at 20,000 pieces per annum. The demand is expected to reach at 62,769 pieces by the year 2020.

The total investment requirement is estimated at Birr 1.22 million, out of which Birr 9.90 thousand is required for farm machinery. The farm will create employment opportunities for 15 persons.

The project is financially viable with an internal rate of return (IRR) of 23.40 % and a net present value (NPV) of Birr 712.18 thousand, discounted at 8.5%.

The project creates forward linkage with the horticulture sub sector.

## **II. PROJECT DESCRIPTION AND APPLICATION**

Fruits are important in the provision of food nutrients such as vitamins and minerals and carbohydrates, income for the producers and to some extent foreign exchange for the country. Temperate fruit production is on very small scale and is limited mainly by insufficient chilling. The most important temperate fruits of this country include apple, pear, peaches and straw berry. All of these belong to the family rosaceous. Apple is the most important fruit and it is the leading table fruit served, because of its attractive appearance, easily cultivable and can be stored at normal temperature for even months. Apple requires an elevation of 1600-2700 meters. Peach in the genus prunus are drupes (stone seed) which requires warmest climate of all temperate fruits. It is generally self-fruitful and is generally propagated by budding. Peach bear fruits mostly once in a year.

Regarding plums, there are two types of cultivated plum, European plum that are cultivated at a higher altitude and the Japanese plums at lower altitude. The choice of varieties for planting should be made based on the facts mentioned above. Plum is generally propagated by budding the root stock. Generally in pome (seed fruit) group are categorized as apple and pear where as in drupe (stone seed) groups are peach and plum.

### **III. MARKET STUDY AND PROJECT CAPACITY**

#### **A. MARKET STUDY**

##### **1. Past Supply and Present Demand**

The Ethiopian Government's strategy for poverty reduction as stipulated in the "A plan for Accelerated and Sustained Development to end Poverty, PASDEP" includes production diversification in to more market oriented production from the traditional grain based agricultural production.

The agricultural strategy will revolve around a major effort to support the intensification of marketable farm products, both for domestic and export markets, and by both small and large farmers. Elements of the strategy include the shift to higher-valued crops, promoting niche high-value export crops, a focus on selected high-potential areas, facilitating the commercialization of agriculture. Accordingly, one of the market oriented products selected are temperate fruits.

Accordingly, after analyzing the world market situation and taking into consideration the country's comparative advantages, a number of fruit species, including mango, avocado, banana, pineapple and apple have been identified as prior entry areas to be focused on during the five year program.

Specific areas/corridors of specialization for commercialization of the production system for fruits have also been categorized in clusters of areas that facilitate the promotion of

post-harvest technologies, which are the major components to improve the supply chain performance and sustain product quality to be competitive in the world market. Accordingly, the development program will focus on the Eastern and Rift valley corridors, where fruits like mango and avocado and green beans will likely be dominant crops. Also certain areas from the southern part of the country are selected for the commercialization of mango, avocado, pineapple and banana production.

Besides, the introduction and expansion of highland fruits such as apples will be encouraged in pocket areas of southern Ethiopia, where relatively better experience is currently prevailing. In this regard, wide areas of the highlands in central part of the country will also be included in the program.

During the five years program the number of smallholders involved in fruit production program is expected to reach about 379,750. Together with the expansion program of new varieties and transfer of technologies, the productivity of matured fruit crops (8 years after planting) is expected to increase by 400% compared with the prevailing levels (50 Qt./hectare). The envisaged size of area to be put under fruit, total production of fruits and productivity are depicted in Tables 3.1.

**Table 3.1**  
**ANNUAL PLANS FOR CULTIVATED AREA, PRODUCTION AND**  
**PRODUCTIVITY OF FRUITS**

<b>Year of Production</b>	<b>Area (000's Hectare)</b>	<b>Productivity (Qt./ Hectare)</b>	<b>Total Product (MT)</b>
2004/05	367	42.23	1.55
2005/06	382	73.30	2.81
2006/07	413	72.40	2.98
2007/08	465	75.70	3.52
2008/09	372	66.94	2.49
2009/10	419	65.07	2.72

In order to achieve the above discussed plan the government has also estimated the resource requirement including fruit seedlings. Table 3.2 shows the annual fruit seedling requirement during the plan period.

**Table 3.2****ANNUAL FRUIT SEEDLING REQUIREMENT DURING PASDEP ( PIECES )**

<b>Year</b>	<b>Requirement</b>
2006	10,000
2007	15,000
2008	20,000
2009	25,000
2010	30,000

Accordingly, the present (2008) demand for fruit seedlings is estimated at 20,000 pieces.

**2. Projected Demand**

In its PASDEP the Ethiopia government stated that it will continue to pursue on the ADLI strategy, but with important enhancements to capture the private initiative of farmers and support the shifts to diversification and commercialization of agriculture. In view of this the demand for fruit seedlings is assumed to grow by 5% annually. (See Table 3.1)

**Table 3.1**  
**PROJECTED DEMAND(PIECES)**

<b>Year</b>	<b>Projected Demand</b>
2009	22,000
2010	24,200
2011	26,620
2012	29,282
2013	32,210
2014	35,431
2015	38,974
2016	42,872
2017	47,159
2018	51,875
2019	57,062
2020	62,769

### **3. Pricing and Distribution**

Based on current price the farm gate price for the envisaged farm is estimated at Birr 18 per pieces. The product can get its market outlet through the existing wholesale and retail network for agricultural inputs. The envisaged plant can also supply its product directly to users or appoint agents at selected locations.

## **B. NURSERY CAPACITY AND PRODUCTION PROGRAMME**

### **1. Nursery Site Capacity**

Based on the market study, the nursery will have a capacity of multiplying or propagating of about 25,000 asexually propagated seedlings of peach, apple, plum and pear at its full capacity per annum.

### **2. Production Program**

The Temperate Fruit seedlings multiplication project will begin with 60 per cent capacity in the first year and its capacity will grow to 70 per cent, 80 per cent and 100 per cent in the second, third and fourth production years, respectively.

**Table 3.3**  
**Production Program**

<b>Year</b>	<b>1</b>	<b>2</b>	<b>3 -10</b>
Capacity Utilization (%)	70	80	100
Production (no.)	20,000	22,500	25,000

## **IV. MATERIALS, INPUTS AND UTILITIES**

### **A. MATERIALS AND INPUTS**

The types of materials and the corresponding costs for temperate fruit seedlings propagation is depicted in Table 4.1. The total cost for materials and inputs is estimated at about Birr 29,750.



The compost could be purchased from local markets or prepared from house refuses. Furthermore, the scions and root stocks for mother trees establishment could be procured from farmers in North West Shoa Zone of the Oromia Regional State.

**Table 4.1**  
**MATERIALS AND INPUTS AND COSTS**

S/N	Description	Unity	Qty.	Unit Cost (Birr)	Total Cost (Birr)
1	Compost	Qt	400	100	4,000
2	Mulch	Bell	50	15	750
3	Scion Materials	No	250	50	12,500
4	Root stock	No	250	50	12,500
	<b>Total</b>				<b>29,750</b>

## B. UTILITIES

The envisaged temperate fruit seedlings multiplication nursery site requires utilities like electricity and water. The total cost for different utilities at full capacity is estimated at about Birr 16,960.4. Details on costs of utilities are shown in Table 4.2.

**Table 4.2**  
**UTILITY REQUIREMENT AND COST**

S/N	Description	Unit	Quantity	Unit cost	Total cost
1	Electricity	KWH	1,500	0.4736	710.4
2	Water (only potable)	M <sup>3</sup>	3,000	3.25	9,750
	<b>Total</b>				<b>10,460.4</b>

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Production Process**

The process of multiplication /propagation of temperate fruit seedlings are summarized as follow

##### **Nursery Site Establishment**

Nursery establishment includes fencing, land clearing, construction of stores and offices as well as irrigation canals

- **Orchard Establishment**

In order to get scion materials and root stocks for seedling propagation, orchard should be established well ahead of time. The scions and the rootstocks could be purchased from farmers in North West Shoa of the Oromia Regional State.

- **Seedbed Preparation**

The rootstock seedlings from mother tree orchard are required to be transplanted to nursery beds. Hence, standard seedbeds should be prepared prior to transplanting.

- **Managing Seedlings**

After transplanting, the rootstock seedlings should be handled carefully in order to get strong root stocks required for asexual propagation.

- **Grafting**

The process of bringing the scion materials and the rootstock together in the nursery beds is known as grafting. Grafting is the asexual propagation technique of fruit tree

seedlings after the rootstock seedlings attain their developmental stage for propagation.

- **Post graft seedling Handling**

As a whole, checking the graft age union between the scion and rootstock, desuckering, height regulation, cultivation, plant protection, irrigation are among the most important post graft handling cares to be carried out timely and periodically.

A nursery to be established for fruit trees seedlings will have no negative environmental impacts.

## **2. Source of Technology**

Usually, temperate fruit seedlings propagation does not require high technologies rather it could be carried out with simple equipment that could be supplied by local trading companies operating in Addis Ababa.

## **B. ENGINEERING**

### **1. Machinery and Equipment**

The types of machineries and equipment required for the project are described in Table 5.1. The total cost of the items is estimated at about Birr 9,900, out of which Birr 5,000 is required in foreign currency

**Table 5.1**  
**DESCRIPTION OF MACHINERY AND EQUIPMENT AND COST**

S/N	Description	Unit	Qty.	Total cost (Birr)	Cost	
					Local	Foreign
1	Hand tools					
	-Wheel barrow	No	3	1200.00	1200.00	
	-Watering can	„	5	220.00	220.00	
	-Hoe	„	20	400.00	400.00	
	-Spade	„	20	400.00	400.00	
	-Rake	„	20	400.00	400.00	
	-Measuring tape	„	1	300.00	300.00	
	-String	Roll	1	50.00	50.00	
	-Plastic buckets	No	20	800.00	800.00	
	- pruning sheer	„	1	130.00	130.00	
2	Sprayer	No	2	1000	1000	
3	Czarina		1	5,000		5,000
	<b>Total</b>			<b>9,900</b>	<b>4,900</b>	<b>5,000</b>

## 2. Land, Building and Civil Works

The total area for the envisaged project is estimated 1,500 square meters. This will be utilized for orchard establishment (750 m<sup>2</sup>), rootstock seedlings preparation ( 500 m<sup>2</sup>) and construction of stores (50 m<sup>2</sup>), offices and toilet (60m<sup>2</sup>) as well as water harvesting structure. The construction cost for stores, offices and toilet at an overage unity cost of birr 2000 per m<sup>2</sup> is estimated at about birr 220,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) in principle, urban land permit by lease is on auction or negotiation basis,

however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

In Addis Ababa the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. Regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

However, the project under consideration is an urban agriculture project. Therefore, it is assumed that the project will be located outside the industrial zones. Accordingly, the initial land lease rate in Addis Ababa set by the City's Land Administration and Development Authority based on the location of land is as shown in Table 5.1.

**Table 5.1**  
**INITIAL LAND LEASE RATE IN ADDIS ABABA**

<b>Sr. No</b>	<b>Location of the land</b>	<b>Land Grade</b>	<b>Initial Price in m<sup>2</sup></b>
1	Central Business zones	1	1167.3
		2	1062.9
		3	916.2
		4	751.5
		5	619.2
2	Places That are Under Transit	1	716.4
		2	647.1
		3	559.8
		4	472.5
		5	384.3
3	Expansion Zones	1	245.7
		2	207
		3	150.3
		4	132.3

**Source;** Addis Ababa City Land Administration Authority

As can be seen from Table 5.2 the initial land lease rate ranges from Birr 1,167.3 to 132.3 per m<sup>2</sup>.

Considering the nature of the project the expansion zones of the city are recommended as the best locations. Accordingly, the highest land lease rates in the expansion zones of the city which is Birr 245.7/ m<sup>2</sup> is adopted.

The Federal Legislation on the Lease Holding of Urban Land legislation has also set the maximum on lease period and the payment of lease prices (See Table 5.2 and Table 5.3.)

**Table 5.2**

**LEASE PERIOD**

<b>Type of Service</b>	<b>Lease Period ( Years)</b>
Residential area	99
Industry	80
Education, cultural research health, sport, NGO and religious	99
Trade	70
Urban Agriculture	15
Other service	70

**Table 5.3**

**LEASE PAYMENT PERIOD**

<b>Sr. No.</b>	<b>Service Type</b>	<b>Period of Payment According to the Grade of Towns</b>
1	Private residential are obtained through tender or negotiation	50 - 60 years
2	Trade	40 - 50 years
3	Industry	40 - 50 years
4	Real estate	40 -50 years
5	Urban Agriculture	8 - 10 years
6	Trade and social service	40 - 50 years
7	Others	40 – 50 years

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided. The lease price is payable after the grace period annually.

Regarding, the terms and conditions of land lease the Addis Ababa City Government have adopted Article 6 of the Federal Legislation with very minimal changes. Therefore, for the purpose of this project profile since the project is urban agriculture , 15 years lease period, 10 years lease payment completion period, 10% down payment and two years grace period is used.

Accordingly, the land lease cost of the project, at rate of Birr 245.7 per m<sup>2</sup> for 15 years of holding is estimated at Birr 5.53 million. Assuming 10% of the total cost ( Birr 552,825 ) will be paid in advance as down payment and the remaining Birr 4.98 million will be paid in equal installments with in 10 years, the annual lease payment is estimated at Birr 497,543.

### **3. Location, Site and Environment**

In general, the land for nursery site is expected to be gentle slope and it should be situated near to reliable water sources. It should also be far from buildings that could have shading effects on the seedlings. It should also be accessible for transporting raw materials to the site and seedlings to planting sites of the clients or to markets.

## VI. MANPOWER REQUIREMENT AND TRAINING

### A. MANPOWER REQUIREMENT

The permanent workers and simple casual laborers required by the temperate fruit seedlings multiplication nursery site are given in Table 6.1.

**Table 6.1**  
**MANPOWER REQUIREMENT AND LABOUR COST**

<b>Sr. No.</b>	<b>Position</b>	<b>Req. No.</b>	<b>Monthly Salary (Birr)</b>	<b>Annual Salary (Birr)</b>
1	Manager	1	2,500	30,000
2	Technicians	2	2,000	24,000
3	Laborers	-	-	54,000
4	Salesman	1	1,200	14,400
5	Secretary /Accountant	1	700	8400
6	Cashier	1	700	8400
6	Guard	2	1,000	12,000
	<b>Sub Total</b>	<b>15</b>		<b>151,200</b>
	Employees benefit(25% of BS)			37,800
	<b>Total</b>			<b>189,000</b>

### B. TRAINING REQUIREMENT

Temperate fruit seedlings propagation/ multiplication requires skilled manpower to undertake grafting and manipulate and manage the seedlings before they are transplanted to the production field. Hence, training should be arranged for all technicians to train them about the techniques of asexual grafting and post grafting handling of temperate



fruit seedlings as well. The total training cost for training technicians for 20 days is estimated to be Birr 20,000.

## **VII. FINANCIAL ANALYSIS**

The financial analysis of the temperate fruit tree seedling multiplication project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	8.5%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Work in progress	30 days
Finished products	5 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

### **A. TOTAL INITIAL INVESTMENT COST**

The total investment cost of the project including working capital is estimated at Birr 1.22 million, of which 0.41 per cent will be required in foreign currency. The major breakdown of the total initial investment cost is shown in Table 7.1.

**Table 7.1**  
**INITIAL INVESTMENT COST ( '000 Birr)**

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Local Cost</b>	<b>Foreign Cost</b>	<b>Total Cost</b>
1	Land lease value	552.82	-	552.82
2	Building and Civil Work	220.00	-	220.00
3	Plant Machinery and Equipment	4.9	5.00	9.90
4	Office Furniture and Equipment	50.00	-	50.00
5	Vehicle	275.00	-	275.00
6	Pre-production Expenditure*	103.57	-	103.57
7	Working Capital	10.12	-	10.12
	<b>Total Investment cost</b>	<b>1,216.41</b>	<b>5.00</b>	<b>1,221.41</b>

\* *N.B Pre-production expenditure includes interest during construction ( Birr 53.37 thousand), Training ( Birr 20 thousand), and Birr 30 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

## **B. PRODUCTION COST**

The annual production cost at full operation capacity is estimated at Birr 851.98 thousand (see Table 7.2). The major components of the production cost are land lease, direct labour and depreciation which account for 58.40%, 10.65% and 9.62% respectively. The remaining 17.84 % is the share of raw material, utility, repair and maintenance, financial cost and other administration cost.

**Table 7.2****ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

<b>Items</b>	<b>Cost</b>	<b>%</b>
Raw Material and Inputs	29.75	3.49
Utilities	10.46	1.23
Maintenance and repair	0.50	0.06
Labour direct	90.72	10.65
Labour overheads	37.80	4.44
Administration Costs	60.48	7.10
Land lease cost	497.54	58.40
<b>Total Operating Costs</b>	<b>727.25</b>	<b>85.36</b>
Depreciation	81.99	9.62
Cost of Finance	42.74	5.02
<b>Total Production Cost</b>	<b>851.98</b>	<b>100</b>

**C. FINANCIAL EVALUATION****1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 337.26 thousand to Birr 441.79 thousand during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 1.04 million.

**2. Ratios**

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other

relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets ( operating income divided by assets), return on equity ( net profit divided by equity) and return on total investment ( net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

### **3. Break-even Analysis**

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point of the project including cost of finance when it starts to operate at full capacity ( year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 55 \%$$

### **4. Payback Period**

The pay back period, also called pay – off period is defined as the period required to recover the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 3 years.

### **5. Internal Rate of Return**

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money

in a bank account. Accordingly, the IRR of this project is computed to be 23.40 % indicating the viability of the project.

## **6. Net Present Value**

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project into a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 8.5% discount rate is found to be Birr 712.18 thousand which is acceptable.

## **D. ECONOMIC BENEFITS**

The project can create employment for 15 persons. The project will generate Birr 1.43 million in terms of tax revenue. The project creates forward linkage with the horticulture sub sector.