

## **Agricultural practices of apple and apple nursery production according to Turkish IAS 41 accounting standard in an agricultural enterprise**

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### **Abstract**

In this study, an agricultural enterprises that produce apple in Turkey commercially, Agricultural practices Standard according to IAS 41 Agriculture has been the subject of this study. Calculation of direct labor and direct costs of variable and fixed cost was carried out on the basis of the production process in an agricultural enterprises. Market values of agricultural products obtained after harvest were tableted on financial statement tables with two different approaches, namely "fair value" and "income". Bearer plants fair value was calculated using two methods; cost and present value approaches. Among these methods, the "fair value method" which is achieved by subtracting the estimated sales costs from the sales value of the agricultural products obtained after harvest and the second is the "income method" that is determined by lowering the estimated sales costs and production costs from the production value of the harvested agricultural products. In this context, the agricultural activities in an enterprise have benefited from both methods in transferring the resulting agricultural products to the Profit or Loss Statement. The output obtained from the study of accounting in the process of agribusiness in the sector of nurseries and cultivation of fruit, which is expressed in these aspects, can contribute positively to the investment decision.

**Keywords:** Farm Accounting. IAS 41. Agriculture. Bearer Plants.

### **1. Introduction**

Agriculture, one of the main areas of national economic development and as one of the sources that feed the industry; with raw materials, plant and animal production activities (Tufan, 1997). From past to present; there is rapid population growth, hunger, employment, poverty, malnutrition, unconscious consumption of food, environmental pollution, climate change, limited availability of arable land, inadequacy of irrigation facilities, GMO (Genetically Modified Organism), the effect of urbanization and the problems such as food safety which required standardization in agricultural production. Standardization in agricultural production practices, objective and the studies on the criteria setting, which

started from the Middle Ages of Europe, it contains a long process that continues until the present day. In this context, certain bases have been established for the comparative analysis of the performances of different agricultural enterprises. The establishment of these bases necessitated the registration of activities in agricultural enterprises and hence the need for agricultural accounting begun (Jack, 2009). There are various approaches to agricultural accounting in the world. The most important of them are, Introduced by the Swiss "Ernst Laur" towards the end of the 19th century and it is still in use by the economists, performance of agricultural enterprises and it is the "Laur Accounting System" approach that which is use in determining efficiency.

Like in all sectors, in the agricultural sector accounting system can be used to ensure that the results of the operations of the enterprises are successfully determined, the documents and accounting system used in this process must be carried out in accordance with international standards. In this scope, agricultural enterprises practice in different countries, IAS 41 requires the standardization of accounting data in order to ensure that managerial decisions can be taken correctly. (Standard of Agricultural Activities) Implementation and the stock exchanges registered agricultural holdings in Turkey began to be implemented in fiscal periods, which begin after 31.12.2005.

In order to achieve the necessary harmonization as a result of the changes in International Financial Reporting Standards (IFRS), the IAS 41 Agricultural Practices Standard has been updated up to seven times.

With the seventh amendment (applicable for the fiscal periods after 31.12.2015), "bearer plants" within the scope of the Agricultural Activities Standard started to be valued according to IAS 16 Tangible Assets Standard and this change was the starting point of the work.

When evaluated in Turkey for the Standard Type Agriculture: although the agricultural sector is in a strategic position on the World, it can be argued that IAS 41 is an area that is not considered much by agricultural researchers and practitioners (Killı and Hatunoğlu, 2016). The development of agricultural accounting in vegetable production has been rather weak especially since the IAS-41 studies, which are made from the field of fruit farming (Deran, 2013: 165). Studies conducted in Turkey with regards to IAS-41 shows that the work done is evaluated in terms of subject focuses only on cattle (Özkan, 2002; Ertaş, 2017). There is only one doctorate thesis related to apple production enterprises in the field of crop production

(Deran, 2005) and one article (Aksoylu, 2013) and no studies can be found on fruit nor nursery production. In this case, it can be said this work is original.

## 2. Literature Review

Elad and Herbohn (2011) have developed a survey concerning biological assets in three countries, Australia, the United Kingdom and France. They have concluded that, as main lessons, the costs of measuring, reporting biological assets at fair value outweigh the benefits, and that the fair value accounting model prescribed by the IAS 41 increases the volatility of earnings. In addition, there is a lack of comparability of disclosure practices, in which French firms incline not to disclose complete information on biological assets. They argue that there is a need for the IASB to revisit the IAS 41. (Elad and Herbohn, 2011:107). In fact, in some cases, auditors and managers collide in disagreement. In addition, this study has developed a checklist of disclosures prescribed by the IAS 41 and each firm was assigned a score based on the percentage of disclosed items. Silva, Figueira, Pereira, and Ribeiro (2012) have developed a disclosure index concerning the information related to the agricultural sector of 45 Brazilian firms regarding the 2010 annual report. Scherch, Nogueira, Olak, and Cruz (2013) have concluded that, on average, there was 57% of conformity with CPC 29 - Pronunciamento técnico CPC 29 - Ativo Biológico e Produto Agrícola (standard equivalent to the IAS 41 in Brazil). Bearing in mind that the IAS 41 is a new pronouncement, this study highlighted that measuring fair value may imply several constraints to the stakeholders, including preparers and researchers. A large disclosure about biological assets would tend to reduce the uncertainty associated with biological assets reporting. In this respect, firms interested in improving the quality of their reporting shall increase the amount of informative disclosure since a “good quality score cannot be obtained with a limited number of sentences” (Hooks and Staden, 2011:211). IAS 41 requires recognition at fair value less the estimated point-of-sale costs. In comparison with other IFRS standard the changes in fair value are immediately recognized in the profit or loss account, with an immediate influence on the result. Recognizing in the income statement the changes in value due to the transformation process this will lead to a higher volatility of the annual statements and in this direction at a higher prognosis risk for the users of the financial statements (Beatrice, 2013). Valuation concept in accounting is very important thing because it can provide useful information to the concerned parties. Unfortunately, valuation concept also has some potential in dragging accounting into

logocentrism and “single-ization” of the materialism and monetary aspect as the valuation indicator. Valuation concept also has the potential to weaken agricultural entity by using of fair value valuation method based on market price as used in IAS 41 (Renda Kurniawan and Kamayanti, 2014). The IAS 41 Agriculture follows the process of agricultural activities only to the point of harvest, so it deals with the regulation of biological assets and agricultural output at the time of harvest. IAS 2 Inventories regulates the processing of produce gained after the harvesting that is the reason why in this case IAS 41 cannot be applied (Tamás Dékán and Kiss, 2015).

Unlike the majority of the other standards, IAS 41 contains detailed regulations about determining the fair value. From the fair value of the biological asset or of the agricultural product will be deducted the estimated point-of-sale costs at the point of harvest (Lefter and Roman, 2007).

IAS 41 prescribes the treatment for standing timber during its growth period, degeneration, production, and procreation and as regards the initial measurement as agricultural produce, i.e. harvested timber. There is a presumption that the fair value of standing timber can be reliably measured. IAS 41 does not prescribe a valuation method; each preparer must determine the valuation approach, which is most representative for its standing timber applying IFRS 13. If market-determined prices or values are available, it may be reasonable to expect preparers to apply these to estimate the value of their own standing volume. However, almost all preparers claim that in most circumstances no such active markets are available to provide prices or values for standing timber. Without access to reliable market prices, a preparer is required to apply valuation techniques, typically discounted cash flows to achieve a net present value, requiring that management make judgments about, amongst other things, selling prices, costs and discount rates (PWC, 2017).

### **3. Material and Method**

Isparta is the first province in Turkey for apple and apple nursery production study to take place and is by Büyükarikan and Büyükarikan, 2014).

An agricultural enterprise in the production of apples with commercial prescription was studied within the scope of the research. A hired agricultural enterprise of 250 square meters area; M 9 varieties of full-grown apple (Golden Delicious, Starking Delicious, Granny Smith, Fuji, Red Chief, and Pink Lady) are produced. However, the operation of 45 decares apple

nursery 5,000-m<sup>2</sup> area (hired) with 13 rooms and 3,000 tone capacity of controlled cold atmosphere stroge.

Bearer plants have a planting period (investment period) that extends to the beginning of the production period. Planting period expenses (investment period) are the monetary value of the transactions made in various years until the production process starts (Gül, 2005a). The planting period is briefly referred to as the period until the apple orchard has passed its production phase. In this period, investments in the gardens/orchards have not yet been completed and yielding fruit from the trees are yet to start (either fruits can not be obtained from the trees, or fruits obtained are far below the maturity years).

Due to the fact that, the values of the bearer plants are recorded over cost basis and there is no active market for the bearer plants, it can be evaluated with the "cost approach" according to TFRS 13 Appropriate Value Measurement Standard. Valuations are carried out regularly at the end of reporting period (balance sheet/financial statement).

The income approach has also been applied because it is necessary to be consistent with one or more of the approaches used to measure fair value in the Appropriate Value Measurement Standard.

Therefore, the Net Present Value (NPV) of apple fruit was calculated using the Present Value (PV) method. Since the bearer plants are located in the Class of Tangible Fixed Assets, planting period costs should be capitalized using a certain depreciation method during production periods. The determination of the production period for which the apple orchard is expected to be used is based on the time period for which an entity is expected to benefit from an asset as stated in IAS 16.

It is not appropriate to use the production amount depreciation method in agricultural enterprises since the products obtained from bearer plants can not be determined exactly (Kıymetli Şen and Karagül, 2014: 38). For this reason, straight-line depreciation has been applied to the depreciation of tangible fixed assets in agricultural holdings (Gökgöz and Temelli, 2016).

In production enterprises, it is a logical approach to make the necessary calculations on an acceptable basis in order to base the operations on the production costs. From this point, direct labor and direct variable and fixed cost for production which make up the apple and apple nursery farm can be calculated.

The distributions of the general production costs on the products are found using the simple distribution method.

Labor force, which is a cost in production operation and machine power demand, input usage levels, production quantity, product, and input prices are taken into consideration.

Production costs in agricultural enterprises may vary due to adverse conditions of production process and product yield. For this reason, the actual costs are taken as basis in the study due to possible risks and uncertainties. In addition, taxes and other charges have been ignored.

Income in agricultural enterprises comes from the harvesting of agricultural products. For this reason, the estimated sales cost of agricultural products is deducted from the selling price of agricultural products on the basis of the fair value approach in valuation of agricultural products (Akdoğan and Aydın, 1987). Therefore, irrespective of whether agricultural products were sold or not, the financial statements are reflected at fair value (Elad, 2004).

Costs of agricultural products are recognized as expense when production and harvesting costs are realized. In other words, when the production process is completed and agricultural products are harvested, income comes out.

The basic philosophy of the standard is that it can be transferred to the financial statement using one of the two alternative methods since the income is generated when the agricultural activities are completed. Among these methods are the "fair value method" which achieves the fair value by subtracting the estimated sales costs from the sales value of the agricultural products obtained after harvesting and the "income method" is obtained by decreasing the estimated selling expenses and production costs from the production value of the harvested agricultural products.

Accordingly, the products obtained after the harvest in the agricultural operation are reflected to the financial statements in two alternative ways by using the fair value method and income method according to IAS 41 Agricultural Activities Standard.

## **4. Findings**

### **4.1. Establishment expenses of apple production in an agricultural enterprise**

In an apple farm, the production activities are divided into two namely establishment period and the production period.

Since the establishment period (investment period) and apple production period are different from each other, each should be considered separately. For this reason, in order to determine

the expenses of the establishment period, the apple farm account should be opened and all the expenses must be monitored in the related account. The fair value is the cost approach used in calculations in apple orchards right from plating.

In order to be able to use this approach, it is necessary to determine the net cash flows of the apple farm (establishing period is usually 3 years and the economic of the production period is 13 years) (Bohušová and Svoboda, 2016).

The establishment period represents the total cost of the investments expected to be realized within three years at 250 decares of apple orchard.

The depreciation cost is calculated by dividing net establishment over production period of apple enterprise (Gül, 2005a, Gül, 2005b; Kıymetli Şen and Karagül, 2014).

The net apple production cost in an agricultural enterprise was calculated as TL 2,622,797 (Table 1).

**Table 1: Establishment period expenses in the apple orchard**

Items Expenses	First Year	Second Year	Third Year	Total
	Value (TL)			
<b>Direct Labor Expenses</b>	<b>256,705</b>	<b>50,158</b>	<b>92,120</b>	<b>398,983</b>
Seedlings	15,300	272	0	15,572
Watering	754	116	0	870
Tillage Work	10,654	5,873	5,873	22,400
Root and stem cleaning work	14,500	14,500	14,500	43,500
Fruit thinning	0	0	0	0
Irrigation System	22,825	22,825	22,825	68,475
Irrigation cost	2,900	2,900	2,900	8,700
Finishing System	189,500	0	0	189,500
Pruning	0	0	20,750	20,750
Plant protection	272	3,672	3,672	7,616
Harvesting	0	0	21,600	21,600
<b>Direct Inputs and Input Expenses</b>	<b>1,645,520</b>	<b>737,447</b>	<b>770,847</b>	<b>3,153,814</b>
Hollow/Deep offtake	4,787	0	0	4,787
Billing	3,830	0	0	3,830
Accrual	2,872	0	0	2,872
Hoing	11,489	11,489	11,489	34,467
Sapling	333,330	5,000	0	338,330
Irrigation system	417,895	0	0	417,895
Irrigation cost	64,873	64,873	64,873	194,619
Costs of finishing system	737,600	0	0	737,600
Plant protection costs	18,419	605,660	605,660	1,229,739
Fertilizer application	47,925	47,925	47,925	143,775
Harvest	0	0	38,400	38,400
Other Variable Cost	2,500	2,500	2,500	7,500
<b>General Production Cost</b>	<b>100,000</b>	<b>100,000</b>	<b>100,000</b>	<b>300,000</b>
land hire	100,000	100,000	100,000	300,000
<b>Total Expenses</b>	<b>2,002,225</b>	<b>887,605</b>	<b>962,967</b>	<b>3,852,797</b>
<b>Total Income</b>	<b>0</b>	<b>0</b>	<b>1,230,000</b>	<b>1,230,000</b>

<b>Net Establishment Expenses</b>	2,622,797
TL 1 = \$ 0.28 in 31.12.2016	

In this study, an apple production enterprise, which was established in 2004 and matured for the period of three (3) years, was considered. The apple seedlings used in the apple orchard for the period (2004-2013) was bought due to absence of sapling production for that past period.

Accordingly, the accounting records required for the expenses incurred during the establishment period;

<b>01.01.2004</b>		
150 INPUTS 102. BANKS Purchase of apple seedlings	333,330	333,330
<b>03.01.2004</b>		
710 DIRECT INPUTS AND INPUT COSTS 150 INPUTS Planting of apple seedlings	333,330	333,330
<b>31.12.2004</b>		
710 DIRECT INPUTS AND INPUT COSTS. 720 DIRECT LABOR. 730 TOTAL PRODUCTION COST (TPC) LIABILITIES 2004 apple orchard establishment/planting period expenses	1,312,190 256,705 100,000	1,668,895
<b>31.12.2004</b>		
25X LIVED ASSETS 25X.10 Apple Orchard 25X.10.001 Establishment Period for Apple Orchard 711 DIRECT INPUTS AND INPUT COSTS PROJECTION 721 DIRECT LABOR PROJECTION 731 TOTAL PRODUCTION COST PROJECTION 2004 end of year operations	2,002,225	1,645,520 256,705 100,000

Second year expenditure records;

<b>01.01.2005</b>		
150 DIRECT INPUTS AND INPUT EXPENSES (DIIE) 102. BANKS Purchase of apple seedlings	5,000	5,000
<b>03.01.2005</b>		
710 DIRECT INPUTS AND INPUT COSTS PROJECTION 150 INPUTS. New planting of dried apple seedlings	5,000	5,000
<b>31.12.2005</b>		
710 DIRECT INPUTS AND INPUT COSTS PROJECTION 720 DIRECT LABOR (DL) 730 TOTAL PRODUCTION COST LIABILITIES Expenditures for the 2005 planting period of apple orchard	732,447 50,158 100,000	887,605
<b>31.12.2005</b>		
25X LIVED ASSETS	887,605	



25X.10. Apple orchard 25X.10.001 Establishment Period for Apple Orchard 711 DIRECT INPUTS AND INPUT COSTS PROJECTION. 721 DIRECT LABOR PROJECTION. 731 TOTAL PRODUCTION COST PROJECTION. 2005 end of year operations		737,447 50,158 100,000
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Third year expenditure records;

<b>31.12.2006</b>		
710 DIRECT INPUTS AND INPUT COSTS PROJECTION	770,847	
720 DIRECT LABOR	92,120	
730 TOTAL PRODUCTION COST	100,000	
LIABILITIES		887,605
Expenditures for the 2006 planting period of apple orchard		
<b>31.12.2006</b>		
25X LIVED ASSETS	887,605	
25X.10 Apple orchard		
25X.10.001 Establishment Period for Apple Orchard		
711. DIRECT INPUTS AND INPUT COSTS PROJECTION		770,847
721 DIRECT LABOR PROJECTION		92,120
731 TOTAL PRODUCTION COST PROJECTION		100,000
2006 end of year operations		

In the third year of planting period, a total of 500 tons of apples were harvested from 250 decares (1 Decare 0.1 Hectare) of the apple orchard and the total production value of the harvested apples (market value) was TL 1,230,000.00. The apple fair value is calculated as the estimated sales costs that can be incurred for sales from the production value ( $500 \times 450 = 225,000$ ), ( $1,230,000 - 225,000 = 1,005,000$ ). The apples obtained after harvest in the apple enterprise can be accounted in two different ways according to IAS 41 Agricultural Practices Standard. The first is the fair value method and the second is the income method. Accounting records made after harvest according to the fair value method;

<b>31.12.2006</b>		
152 FINISHED ACCOUNT	1,005,000	
151 SEMI - FINISHED ACCOUNT		962,967
60X FAIR VALUE DIFFERENT ACCOUNT		42,033
TPC recording of harvested apple according to the Fair Value method		

The expenditure records of the apples produced in agricultural enterprise, which should be done after harvest according to the income method;

<b>31.12.2006</b>		
152 FINISHED ACCOUNT	1,230,000	

151 SEMI - FINISHED ACCOUNT		1,005,000
60X FAIR VALUE DIFFERENT ACCOUNT		225,000
Recording of harvested apples according to income method		

Since the harvest of apples in the last year of the planting period originated from the production value thus main production activity then  $(3,852,797 - 1,230,000 = 2,622,797)$  and the net plant period expenses is calculated (market value). As a result of completing the apple plant expenses made for the apple orchard, the net plant expenses was included according to IAS 41 "25X LIVED ASSETS" (within the Tangible Fixed Assets group).

<b>01.01.2007</b>		
25X LIVED ASSETS		
25X.10 Apple Orchard		2,622,797
25X.10.001 Apple Orchard at Production		
258 INVESTMENTS THAT HAVE BEEN MADE		2,622,797
Completion of plant period expenses in apple farm		

Investments made in the apple garden need to be distributed systematically throughout the production period. For this, a certain depreciation method and amortization rate should be used. Since the expected production period of the apple farm is 14 years then linear amortization method is used  $(2,622,797 \div 14 = 187,343)$  and plant depreciation shares for production periods is calculated and transferred to account "257 ACCUMULATED DEPRECIATION".

<b>31.12.2016</b>		
730 GENERAL PRODUCTION EXPENDITURES		
257 ACCUMULATED DEPRECIATION		187,343
Transfer of apple plant expenses in apple farm production enterprise over a period		

#### 4.2. Calculation of present value of apple farm by net cash flows

The measurement of the bearer's true value (according to TFRS 13) can also be made according to Present Value. Income approach was taken as the basis for estimating the Net Present Value for years in this study. Since the apple garden has been used for many years in production, changes in the value of assets is considered. For this reason, the investments made in order to reflect the changes in the value of the apple garden correctly on the financial statements can be evaluated on the basis of the Present Value (PV) method of income that can be obtained for these investments. Income and expenses that is obtained at the harvest is

calculated according to the estimated years so that the net cash flows of the apple farm can also be calculated according to the yield obtained. Accordingly, the Net Present Value of the investments in the apple farm (value used) was TL10,404,638 (Table 2).

**Table 2: Present Value of Apple Plant According to Expected Net Cash Flows**

Years	Expense	Income	Income-Expense (Net cash flow)	Present Value Factor *	NPV
					Value (TL)
1. year	2,002,225	0	-2,002,225	0,83	-1,668,521
2. year	887,605	0	-887,605	0,69	-616,392
3. year	962,967	1,230,000	267,033	0,58	154,533
4. year	1,152,124	2,460,000	1,307,876	0,48	630,727
5. year	1,212,124	3,690,000	2,477,876	0,40	995,803
6. year	1,302,124	5,535,000	4,232,876	0,33	1,417,582
7. year	1,452,124	8,610,000	7,157,876	0,28	1,997,632
8. year	1,452,124	8,610,000	7,157,876	0,23	1,664,693
9. year	1,452,124	8,610,000	7,157,876	0,19	1,387,244
10. year	1,452,124	8,610,000	7,157,876	0,16	1,156,037
11. year	1,452,124	8,610,000	7,157,876	0,13	963,364
12. year	1,452,124	8,610,000	7,157,876	0,11	802,803
13. year	1,452,124	8,610,000	7,157,876	0,09	669,003
14. year	1,302,124	5,535,000	4,232,876	0,08	329,684
15. year	1,302,124	5,535,000	4,232,876	0,06	274,737
16. year	1,212,124	3,690,000	2,477,876	0,05	134,023
17. year	1,212,124	3,690,000	2,477,876	0,05	111,686
<b>Total</b>	<b>22,712,536</b>	<b>91,635,000</b>	<b>68,922,464</b>		<b>10,404,638</b>

\* Present Value Factor:  $1/(1+i)^n$ ; discount rate is taken as 20%.

The Net cash provided by operating activities, using the discounted Refund Time (RT) method, how long the investment value can be reimbursed can be calculated (Yalçın and Aksoy, 2011).

Investments made in the apple garden were associated with cash inflows (Nuthall, 2011), and the time to recover the investment was estimated to be 3 years and 130 days. In addition, the Internal Revenue Ratio (IRR) was calculated as 31% and the Utility Cost Ratio (UCR) as 4.03 (Table 3).

**Table 3: Expected Net Cash Flows based on Discounted Apple Net Assets**

Years	NCF	Discounted NCF	Total NCF			
1	-2,002,225	-1,668,521	-1,668,521			
2	-887,605	-616,392	-2,284,913			
3	267,033	154,533	-2,130,380	I. Year		
4	1,307,876	630,727	-1,499,653	II. Year	Total	Discounted Value
5	2,477,876	995,803	-503,850	III. Year	-503,850	1,417,582
						Refund period rate
						0.36

6	4,232,876	1,417,582
7	7,157,876	1,997,632
8	7,157,876	1,664,693
9	7,157,876	1,387,244
10	7,157,876	1,156,037
11	7,157,876	963,364
12	7,157,876	802,803
13	4,232,876	395,621
14	4,232,876	329,684
15	4,232,876	274,737
16	2,477,876	134,023
17	2,477,876	111,686
<b>Refund period 3 Years 130 days</b>		
<b>Internal Rate of Return 31%</b>		
<b>Benefit Cost Ratio 4.03</b>		

\* The weighted average cost of capital is 20%.

### 4.3. Direct inputs and direct labor costs in apple and apple sapling production

The Input Costs of the agricultural operation is directly put into the Main Production and Expenditure. Accordingly, the total expenditure of Direct Input and Input Cost (DIIC) during the production period was calculated as TL 1,397,006 (Table 4).

**Table 4: Direct Input Cost**

DIIC	Apple	Sapling MPEL	Total
Soil Processing Costs	11,489	2,068	13,557
Watering Costs	64,873	23,354	88,227
Watering System Costs	66,907	84,511	151,418
Plant protection costs	605,660	26,030	631,690
Fertilizer/Nutrients Cost	47,925	11,250	59,175
Other various material costs	2,500	500	3,000
Branching expenses	-	13,500	13,500
Mulching costs	-	6,750	6,750
Vaccination costs	-	226,710	226,710
Harvest	201,600	1,379	202,979
<b>Total</b>	<b>1,000,954</b>	<b>396,052</b>	<b>1,397,006</b>

Direct Labor Costs (DLC) of apple and apple sapling production activities in agricultural operation is directly based on the Main Production and Expenditure Areas (MPEA) (Table 5).

**Table 5: Direct Labor Costs**

Direct Labor Costs	Apple MPEA	Nursery MPEA	Total
Soil processing costs	5,873	1,224	7,097
Root and body cleaning cost	14,500	0	14,500
Fruit dilution	62,250	0	62,250
Irrigation system cost	22,825	14,580	37,405
Irrigation cost	2,900	5,800	8,700
Pruning cost	20,750	0	20,750

<b>Plant protection cost</b>	3,672	6,256	9,928
<b>Branching cost</b>	0	4,500	4,500
<b>Vaccination cost</b>	0	89,120	89,120
<b>Planting labor</b>	0	5,400	5,400
<b>Mulching cost</b>	0	5,220	5,220
<b>Harvest</b>	218,400	9,000	227,400
<b>Total</b>	<b>351,170</b>	<b>141,100</b>	<b>492,270</b>

#### 4.4. The distribution of general production expenditure in an agricultural enterprise

Annual expenses incurred in the apple and apple nursery production activities in agricultural enterprise, inputs were categorized into direct and indirect. The distribution of the inputs that cannot be directly linked to the main production expenses of the general production expenses of the operation which is indirect expenses using the distribution key (simple distribution). Table 6 shows the distribution table of expenses incurred in the expenditure centers.

**Table 6: Expense Distribution Table**

Expense Locations  Expense Types	Main Production Expense Locations		Assistive Production Expense Locations		Total
	Apple	Nursery	Tools and Machinery	operation	
<b>DIIE</b>	1,000,954	396,052			1,397,006
<b>DL</b>	351,170	141,100			492,270
<b>Direct Costs Total</b>	<b>1,352,124</b>	<b>537,152</b>			<b>1,889,276</b>
<b>Indirect Inputs and Input Expenses</b>				25,200	25,200
<b>Indirect labor cost</b>			104,546	294,752	399,297
<b>Externally Benefits / Services and Miscellaneous Expenses</b>	100,000	36,000	2,014	201	138,215
<b>Depreciation cost</b>	637,343	520	35,210	1,819	674,892
<b>Total Indirect Costs</b>	<b>737,343</b>	<b>36,520</b>	<b>141,770</b>	<b>321,971</b>	<b>1,237,604</b>
<b>Tools and Machinery operation</b>	120,144	21,626			141,770
<b>Total Post-Distribution</b>	283,350	38,621			321,971
<b>Total Post-Distribution</b>	1,140,837	96,767			1,237,604
<b>Grand total</b>	<b>2,492,961</b>	<b>633,919</b>			<b>3,126,880</b>

The unit cost can be calculated from the Main Production Expenditure Areas/Locations in an agricultural enterprise. The unit cost is the total production cost divided by the total quantity of produce (apple) produced in the enterprise.

$$\text{Apple (Ton)} = 2,492,961 \div 3,890 = \text{TL/ton } 640.86$$

The total expenses (633,919) incurred in the production of seedlings during production is divided by the production quantity (250 thousand units) and the unit costs is calculated.

$$\text{Loading Rate} = 633,919 \div 250,000 = \text{TL/number } 2.54$$

As a result of the production activities, the unit cost of 1 ton of apple produced in the is TL / ton 640.86 and the unit cost of 1 apple sapling is calculated as TL / number 2.54.

#### 4.5. Calculation of fair value according to IAS 41 scope

Determining of fair value is important in all assets as well as in apple production enterprises, the location where the asset (apples or saplings) is located refers to the point of sale of the product along with the market distance. Indeed, the calculation of fair value in apple production is calculated by deducting the expenses incurred during production from the income that is the sales of apples. Therefore, the agricultural products obtained will be reflected to the financial statements at fair value.

According to the basic philosophy of the Standard; the sum of expense incurred for production is recorded in "Profit or Loss Statement" (comprehensive income table) as "Production Expense", gross value of agricultural products at harvest point as "Production Value", the Fair Value will be displayed as "Production Revenue" in the Profit or Loss Statement (Özkan and Aksoylu, 2012a; Özkan and Aksoylu, 2012b; Aksoylu, 2013; Okutmuş and Kural, 2015).

From the 250 apple production enterprises, 1,800 ton was Golden Delicious, 1,000 ton was Starking Delicious, 400 ton was Granny Smith, 90 ton was Fuji, Red Chief and Pink Lady had 500 ton and 100 ton respectively. The harvested apples is being transferred to the air cold store. When the expense incurred for sales (transportation, packaging, selection etc.) is subtracted from the production value of the harvested apple, the Fair Value is calculated as 7 million 53 thousand 500 TL. The fair value of the entity's profit or loss in the expenditure statement of apples "Production revenues" is shown in (Table 7).

**Table 7: Determination of Fair Value by Apple Varieties**

Apple varieties	Total product Ton	Production Value	Estimated selling expenses Value (TL)	Fair Value
Golden Delicious	1,800	4,250,000	810,000	3,440,000
Starking Delicious	1,000	2,190,000	450,000	1,740,000
Granny Smith	400	950,000	180,000	770,000
Fuji	90	174,000	40,500	133,500
Red Chief	500	1,025,000	225,000	800,000
Pink Lady	100	215,000	45,000	170,000
<b>Total</b>	<b>3,890</b>	<b>8,804,000</b>	<b>1,750,500</b>	<b>7,053,500</b>

According to standard IAS 41 Agriculture, the apples harvested in an enterprise can be categorized into two different ways.

The first is the fair value method and the second is the income method.

The fair value method is the accounting records that have to be made after the harvest of the apples production in agricultural enterprise;

<b>31.12.2016</b>		
152 FINISHED ACCOUNT	7,053,500	
151 SEMI - FINISHED ACCOUNT		2,678,657
60X FAIR VALUE DIFFERENT ACCOUNT		4,374,843
Recorded harvest apples according to Fair Value		

According to the income method, the accounting records of the apples produced in agricultural enterprise is done after harvest;

<b>31.12.2016</b>		
152 FINISHED ACCOUNT	8,804,000	
151 SEMI - FINISHED ACCOUNT		7,053,500
60X FAIR VALUE DIFFERENT ACCOUNT		1,750,500
Recorded of harvest apples according to income method		

The production value of apple saplings obtained after harvest in apple enterprise is TL 1,200,000, the fair value of the saplings was calculated as TL 1,098,921 when deducting from estimated sale expenses (transportation, packaging etc.) (TL 101,079) (Table 8). Since the basic philosophy of the standard is that the agricultural activities are carried out when the income production is completed, the financial statement can be transferred using one of two alternative methods. The fair value based on the fair value of agricultural products after harvest (sales expenses deducted), the second is income method based on production value.

**Table 8: Determination of Fair Value of apple saplings**

Apple saplings	Production Value	Estimated selling expenses Value(TL)	FV
<b>Total</b>	<b>1,200,000</b>	<b>101,079</b>	<b>1,098,921</b>

According to the fair value method; the actual value of the harvested saplings is debated to 152 FINISHED ACCOUNT, the total nursery production expenses is to 151 SEMI-FINISHED ACCOUNT and the difference between the fair value and the production costs is credited to the 60X FAIR VALUE DIFFERENT ACCOUNT.

The accounting records should be made after harvest according to the fair value method of the saplings produced in agricultural activity according to IAS 41;

<b>31.12.2016</b>		
152 FINISHED ACCOUNT	1,098,921	
151 SEMI - FINISHED ACCOUNT		633,919
60X FAIR VALUE DIFFERENT ACCOUNT		465,002
Record apples saplings according to Fair Value		

The difference between the "production value" and the "fair value" of the products obtained after the harvest according to the income method is shown using the 60X FAIR VALUE DIFFERENT ACCOUNT. According to the income method, the accounting records of the apples produced in agricultural operation is done after harvest;

<b>31.12.2016</b>		
152 FINISHED ACCOUNT	1,200,000	
151 SEMI - FINISHED ACCOUNT		1,098,921
60X FAIR VALUE DIFFERENT ACCOUNT		101,079
Record of matured apples saplings according to income method		

According to the standard of agricultural activities, the values of the products obtained after harvest can be written onto the financial statement using one of two alternative methods. In these methods, the "fair value method", which is obtained by deducting estimated selling expenses from the sales value of agricultural products after harvest and the second is the "income method" that is determined by lowering the estimated sales costs and production costs from the production value of the harvested agricultural products. In this context, both methods have benefited by transferring the resulting of the agricultural products to the Profit and Loss Statement of agricultural activities in an enterprise. The "Production Revenue" of the enterprise is the sum of the fair values of apple and apple saplings produced ( $7,053,500 + 1,098,921 = 8,152,421$ ). The production overhead is calculated based on the total production expenditures of both apples and saplings ( $2,492,961 + 633,919 = 3,126,880$ ). The average General Production Cost is calculated to be TL 210,768 and can be termed as "General Administration Expenses", while the costs related to cold storage are provided under "Marketing Expenses". Within the scope of supporting the good farming practices, the support premium for the apple production amounting to TL 12,500 "Other Income from Operating Activities " (Table 9).



**Table 9: Profit or Loss Statement dated 31.12.2016 according to the fair value approach**

	Footnote Reference	Current Period 2016	Previous Period 20 ..
<b>Production Revenue</b>		8,152,421	
<b>Production Expense (-)</b>		3,126,880	
<b>Gross Profit / Loss</b>		5,025,541	
<b>General and administrative expenses (-)</b>		183,634	
<b>Marketing Expenses (-)</b>		318,791	
<b>Research &amp; Development (-)</b>		-	
<b>Other income from main operations</b>		12,500	
<b>Other Expenses from Main Activities (-)</b>		-	
<b>Operating Profit / Loss</b>		4,535,616	

According to income approach; from the Production Value that occurs after the production cost has obtained, both Production Value and Fair Value Differences in agricultural operations can be depict in a profit or loss statement.

According to this, the summation of "Production Value" of apples and apple saplings produced in the apple enterprise (8,804,000 + 1,200,000 = TL 10,004,000) "Production Value" (3,126,880) and Fair Value Differences in agricultural operations (1,750,500 + 101,079 = 1,851,579) and also it is possible to reach Gross Profit / Loss (Table 10).

**Table 10: Profit or Loss Statement Dated 31.12.2016 According to Income Approach**

	Footnote Reference	Current Period 2016	Previous Period 20 ..
<b>Production Value</b>		10,004,000	
<b>Production Expense(-)</b>		3,126,880	
<b>Fair Value Differences in Agricultural Operations (-)</b>		1,851,579	
<b>Gross Profit / Loss</b>		5,025,541	
<b>General Administrative Expenses (-)</b>		183,634	
<b>Marketing Expenses (-)</b>		318,791	
<b>Research &amp; Development (-)</b>		-	
<b>Other Income From Main Operations</b>		12,500	
<b>Other Expenses from Main Activities (-)</b>		-	
<b>Operating Profit / Loss</b>		4,535,616	

## 5. Conclusion and Recommendations

The main task of the agricultural account is to record the production activities that take place in agricultural enterprises as required. Especially in multiple agricultural production activities of enterprises with complex structure which makes it difficult for cost accounting practices. The first problem encountered in cost calculations is the production activity and production process that are directly related to labor costs. The second one is how to record direct inputs and inputs expenses in details according to the agricultural products that are

produced. Generally, agricultural enterprises do not have a detailed agricultural accounting system records. For this reason, the cost element is generally used in the product cost studies in the sector. Cost calculations using the cost element also require relevant expertise.

There is a need for an effective agricultural accounting system in enterprises to overcome the difficulties associated with agricultural production activities and to determine the acceptable level of product costs.

This system will enable detailed monitoring of the physical input and labor usage of the production processes and can increase the accuracy of the production costs. The fact that production costs have a high degree of accuracy will ensure that productivity in production can be increased, production planning can be done correctly, and the selling prices of products can be easily determined.

In agricultural enterprises, it is logical to assume that the calculations that make up the production costs are based on the acceptable calculations. In this context, the calculation of product cost in agricultural enterprises engaged in production can be based on direct labor and direct inputs and input expenses according to unit area or production quantity.

Calculation of the costs of agricultural products in the study was made based on the production processes required. This method facilitates the calculations of direct labor and the direct inputs and input costs and the separation of the production costs in the agricultural enterprises engaged in production. On the other hand, it is possible that the calculations used is acceptable for the requirements of input and the labor related to the production. For this, it is necessary to obtain detailed information from specialists related to production activities. In addition, as in the case of the study, it is possible to carry out an accurate calculation of the production costs by closely monitoring the operations of the processes constituting the production process in agricultural enterprises.

Establishing an agricultural enterprise, cultivating trees and maintaining the enterprise activities in an apple production operation requires a high cost investment. For this reason, an investor who wish to invest in the production of apples should know the estimated income and expenses that can be made before making the investment. For this reason, the investment profitability analysis of the apple orchard was made different from the studies related to IAS 41 in this study. According to Net Cash Flows (NCF), the investments made in the apple enterprise have a discounted Refund Period (3 years 130 days), the Internal Profitability Ratio (31%) and Utility Cost Ratio (4.03) were calculated as such. It is expected that the results will be useful for investing in apple investment.

Income in agricultural production comes from the harvesting of agricultural products. The main difference from the other studies in the local type of study; The basic philosophy of IAS 41 Agricultural Activities Standard is to transfer the post-harvest market value of agricultural products to the financial statements in two different approaches, at fair value, irrespective of whether the agricultural products are sold or not. According to the standard of agricultural activities, the values of the products obtained after harvest can be transferred to the financial statement using one of two alternative methods.

Among these methods, the "fair value method" which is achieved by subtracting the estimated sales costs from the sales value of the agricultural products obtained after harvest and the second is the "income method" that is determined by lowering the estimated sales costs and production costs from the production value of the harvested agricultural products. In this context, the agricultural activities in an enterprise have benefited from both methods in transferring the resulting agricultural products to the Profit or Loss Statement.

The cost calculation for plant production differs according to the product for being annual or perennial plant. Apple farm is in the category of fruit bearer plants (perennial plants). After planting of apple saplings it is necessary to wait a few years until the apples are matured. The process that continues until the apple trees are matured is called planting period. Planting period in apple farms; product, product type, root and stem (rootstock) varies according to the structure. In other words, this process can be called the period of infancy of trees. According to the life cycle of the trees, when the infancy period ends (the establishment period), the childhood period will start (production period) and this process will continue in the form of youth, maturity and old age respectively.

In the apple production enterprises, the apple production activities are divided into two as the establishment period and the production period. Since the costs of apple, planting (investment period) and apple production period are different from each other, each should be considered separately. For this reason, in order to determine the expenses of the plant period, the plant account of the apple garden should be opened and the plant expenses must be monitored in the related account.

Establishment expenditures represent the period until the beginning of the production period in the bearer plants and are covered within the scope of investment expenditures in terms of agriculture accounting. Bearer plants need to be considered as a featured asset since the start of the production process requires a long investment period. Therefore, borrowing

costs that can be directly attributed to the establishment period of the bearer plants should be added to the cost of the asset.

It is recommended that researchers should research more in the field of IAS 41 in the plant production so that sufficient and technical knowledge on IAS 41 can be accessed. However, it is recommended that the technical experts or researcher in the area of IAS 41 should make sufficient information available for different agricultural production activities and other enterprises.

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