STUDY ON THE PAYBACK OF VINEYARD PLANTATION

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Abstract

The vineyard area was 7.5 million hectares around the world - due to the International Organisation of Vine and Wine (OIV)- showing a downward trend in 2021. The vine production of Hungary has had a centuries-old history and the wine- and grape sectors are still significant today. The Hungarian wine- and grape sector represent about 1% of the world's wine production. The Hungary wine sector is still focusing on the Hungarian market. The size of the vineyard considerably declined after EU accession. However, it seems to have stabilized in the

last couple of years, it is currently about 63 thousand hectares. A clear trend is recognized as the slow increase in the production of blue grapes (30% in 2019) and the growth of fragrant white and resistant varieties (HNT, 2021). Hungary is a small wine producing country with a great diversity of terroirs. European Union strictly regulates wine-grape growing therefore one percent area expansion is allowed per year for member states. There is a chance to increase their production potential to a limited extent for member states thanks to the new vineyard licensing regulation of the European Union. We carried out economic calculations for one hectare of vineyard within the scope of our study. We have been trying to find out the costs of planting one hectare of 'Cserszegi fűszeres' grape, the revenue that can be realized over a 10-year period and the payback period of the plantation.

Keywords: grape, planting, return, vineyards

Összefoglalás

A Nemzetközi Szőlészeti és Borászati Hivatal (OIV) adatai szerint a világ szőlőterülete 7,5 millió hektár volt 2021-ben, mely csökkenő tendenciát mutat. Magyarország szőlőtermesztése több évszázados múltra tekint vissza és a szőlő-borágazat még napjainkban is jelentős. A magyarországi szőlő-bor ágazat a világ bortermelésének töredékét, mintegy 1%-át adja. Magyarország borágazatának középpontjában továbbra is a magyarországi piac áll. A szőlőterület nagysága az EU-csatlakozást követően jelentősen csökkent, ez az elmúlt pár évben azonban stabilizálódni látszik, jelenleg mintegy 63 ezer hektár. Egyértelmű tendencia a kékszőlők arányának (2014-ben: 30%) lassú növekedése, valamint az illatos fehér és a rezisztens fajták előretörése (HNT, 2019). Magyarország tehát egy kis bortermelő ország, igen nagy termőhelyi változatossággal. Az Európai Unió területén komoly szabályozás alá esik a borszőlő termesztése, a tagállamok számára csupán évi egy százaléknyi területbővítést

engedélyeznek. Az Európai Unió új szőlőtelepítési engedélyezési szabályozásának köszönhetően ugyan korlátozott mértékben, de alkalom nyílik a tagállamok számára a termelési potenciál növelésére. Munkánk során 1 hektár nagyságú szőlőültetvényre vonatkozóan végeztünk gazdasági számításokat. Választ kerestünk arra, a kérdésre, hogy 1 hektár cserszegi fűszeres szőlő telepítése milyen költségekkel jár, illetve milyen bevételeket lehet realizálni 10 év távlatában, továbbá az ültetvény megtérülési idejét is vizsgáltuk.

Kulcsszavak: szőlő, telepítés, megtérülés, szőlőültetvény

Introduction

The vineyard area was 7.5 million hectares around the world in 2015 - due to the International Organisation of Vine and Wine (OIV) - showing a downward trend. It is obvious that the negative trend is primarily borne by the Old World wine countries, while the New World shows a slow development. According to the OIV data, the distribution of European countries ranged from 62.5% to 55% between 2000 and 2013. This was primarily caused by 13-17% drop in the three largest wine producing countries (France, Spain and Italy).

The Hungarian wine and grape sector represent about 1% of the world's wine production. The Hungarian wine sector is still focusing on the Hungarian market. The size of the vineyard considerably declined after EU accession. However it seems to have stabilized in the last couple of years, it is currently about 63 thousand hectares. A clear trend is recognized as the slow increase in the production of blue grapes (30% in 2014) and the growth of fragrant white and resistant varieties (HNT, 2016). Hungary is a small wine producing country with a great diversity of terroirs. The global warming makes wine production more and more challenging thanks to extreme weather conditions (like temperature) and rainfall distribution (Kispál, 2014).

Wine-grape growing is seriously regulated within the European Union as it allows only one percent area expansion per year for member states. On the contrary of this, Hungary would need much more growth.

It was possible to increase the Hungarian vineyard by 1% in 2016, but this alternative was not known amongst the majority of farmers. EU subsidies have not been available for producers for many years, but the Hungarian Government has been trying to provide adequate resources through replanting and restructuring aid and other tenders for the sector. An EC Council Regulation (Council Regulation, 2008) was issued on the grubbing-up premiums and the National Envelope system. From the first axis of the New Hungary Rural Development Programme (NHRDP), the subsidy for the modernization of horticulture was 78.6 million HUF and the aid for the modernization of the plantations amounted to 27.9 million HUF (Bíró et al., 2014).

There is a chance for member states to increase their production potential to a limited extent due to the new vineyard licensing regulation of the European Union. The Hungarian Government – making use of the opportunity – has transferred about 4 billion HUF providing the installation of new wine grape vineyards within the framework of the Rural Development Programme. The Hungarian Government announced a tender for the installation of wine-growing plantations in the framework of the Rural Development Programme in January.

In 2017, plantation plans were indicated for a total of 642 hectares – that is 1% of the area of the previous year. The call for proposals of the Enclosed Garden Program was launched in Hungary in the beginning of 2018 where the local governments can apply for 2 billion HUF. The program supports the agricultural utilization of areas already farmed, including the planting of vines.

The farmers plan to use a much larger number of stock per hectare, the yields are higher, the new plantation method using metal columns facilitates mechanization, so the producers are more willing to modernize with regard to the new plantings.

The crop land of Hungary has decreased by 15.1% since 2003. The decline mainly occurs in the area of white grape varieties, which decreased by 18.6%, but the crop land of blue grapes has also fallen by 5.8%.

The vineyard area of Hungary has dramatically dropped over the last twenty years, and a high proportion of the plantations has been aging so it is important to incite the planting of vines. The use of modern technologies is required if we wish to increase the competitiveness of agriculture- including grape and wine production- which is hampered by the low wages of labor force, black and gray employment and the shortage of capital (Harangi-Rákos – Szabó, 2012; Popp, 2014). Decision-makers have fortunately recognized this and they are trying to support grape planting with different incentives.

We carried out economic calculations for one hectare of vineyard -considering the facts mentioned above - in our study. We have been trying to find out the costs of planting one hectare of 'Cserszegi fűszeres' grape, the revenue that can be realized over a 10 year period and the payback period of the plantation. Overall, our aim was to provide an economic overview for a prospective producer regarding grape planting.

Our research focuses on the wine region with the biggest crop land - the Kunság wine region ¬- in Hungary. The Kunság wine region is unique in Europe because rooty European grape cuttings can be planted there due to filoxeric immunity owing to the high, more than 80% quartz content of the soil.

The Kunság wine region has the most diverse grape variety structure. The planting of resistant vine varieties is also significant in the Kunság wine region- being unique amongst Hungarian wine regions- the leading varieties include Bianca and Aletta. The 'Cserszegi fűszeres'- the variety in our study- is also worth mentioning here as it gains the second place of the country in terms of its production area.

Material and method

In the course of our study, the costs of the investment were calculated divided into three groups. The first group included the costs of preparation. The soil preparation process includes organic and artificial fertilization, also ploughing and rotating are included in this group. The second group of costs contains the expenses of the stake system, the material of the stakes, the sticks and wires. We included the plantation costs in the third group. We separately calculated the annual cost of cultivation, which was considered to be the same in the first four years. The first crop was calculated for the fourth year. We only calculated with the costs of cultivation for 2-4 years after the plantation. We also counted yields from the third year, the revenue of which reduced the costs of the investment (Sutus, 2002, Sutus, 2011). The discounted cost of the conversion was calculated using a 10% expected profitability rate. The future value of the actual amount was calculated using a compound interest rate formula of B*(1+2)n, where B is the annual amount of the investment, r is the annual interest rate or expected profitability rate, and n is the number of years (Birher et al., 2006). The operation of the investment takes place after fruit-bearing starts in the fifth year (Sabján; Sutus, 2003; Helgertné, 2003), we calculated with the same costs and yield after fruit-bearing – 100 quintal yield and HUF 120 purchase price. In accordance with Annex 2 to Act LXXXI of 1996 on Corporate Tax and Dividend Tax, which states that depreciation is to be calculated from the investment costs including the stake system,

we calculated with 6% depreciation. The payback period was determined in two ways based on the cash flow of the operation, on the discounted and non-discounted value of the investment.

Results or Result and Discussion

Almost 90% of the investment costs arose in the first year of the investment (Table 1). After that, the costs of cultivation were decreasing, they amounted to 8% and then to 5%. In the year preceding fruit-bearing, the value of the harvested yield exceeded the cost of cultivation. The value of the yield harvested before fruit-bearing reduced the costs of the investment. In the last year, the value of the yield exceeded the costs of cultivation, so that year we calculated with 'negative' costs, the investment costs did not increase further, but rather declined.

Table 1: Costs of investment (€)

Apellation	**1. year**	**2. year**	**3. year**	**4. year**	**Cost of investment**
Costs of preparation	1492				1492
Costs of training system	6943				6943
Costs of planting	4223				4223
Costs of cultivation	1681	1.681	1681	1681	6724
Value of harvested grape during the			501	1670	2171

investment period					
Altogether	14.339	1681	1180	11	17.211
Amount of Harvested Grape (q)	-	-	15	50	
The discounted cost of conversion	20.994	2238	1428	-	24.660

Source: own calculations

The discounted cost of the conversion is significantly increased by the fact that the major part of the investment costs are realized in the first year, thus our investment is tied up for a longer period (3 years) without producing an income.

Looking at the composition of investment costs, it can be said that the highest proportion, 37% of the amount is spent on the stake system. The cost ratio of plantation and cultivation is 27-28%, while the costs of preparation are under 10%. In our model, we presumed the start of fruit-bearing in the fifth year, then we calculated with the same yield and the same revenue. The price income includes the revenue from the grapes sold, in the model we assumed that the whole crop was sold. We took into account the subsidies paid to cover costs among other revenues (Act C of 2000). As our starting point, we took the average data of the test system of the Research Institute of Agricultural Economics (AKI) in case of determining the production costs. We kept track of the provisions of the Personal Income Tax Act with regard to tax calculation and we counted 15% personal income tax (Act CXVII of 1995). Calculating net cash flow, we determined the after-tax profit and we took into account depreciation – the primary purpose of

which is to replace worn out tangible assets – as internal resource formation in accordance with the corporate tax law. The basis for calculating depreciation is the cost of the investment for the plantation, which was registered among the fixed assets with the start of fruit-bearing.

Table 2. The itemised costs of investment (€)

Organic fertilizer	223
Organic fertilizer+scattering+transportation	320
Fertilizer + scattering	103
Soil disinfection	139
Plowing	50
Rotation	445
Soil preparation	45
Laying out	167
Total costs of preparation	**1492**
Material of training system	4576
Holding rod	1236
Wire	1097
End fixing	33
Total costs of training system	**6943**
Plantation	501

Cost of graft	3958
Wages	19
Tractor-running	97
Plantation drilling	223
Water	39
Binding	111
Total costs of planting	**4949**

Source: own calculations

Nutriment supply accounts for more than 40% of preparation costs (Table 2). Soil preparation is another 40% of the total expenditure of preparation. The material of the stakes amounts to almost 70% of the total investment of the stake system, that is 4576€.The purchase of the graft accounts for almost 80% of the plantation costs. In our model, we calculated the costs with 4,300 pieces of graft – 2.3-metre-long rows and 1 metre distance between vines in an one-hectare area – and with the price of € 0,75 per graft.

Table 3. Itemised costs of cultivation (€)

Pesticide	557
Manual cultivation	665
Mechanised cultivation	181
Nutrition supplement	278

Total costs of cultivation	**1681**

Source: own calculations

We listed the factors (Table 3) which must be included in the summary of the costs of cultivation. The costs of cultivation incur every year, this amount is calculated in our model as 1681€ starting from the first year. The cost of plant protection products was estimated at 557€ and this amount included the costs of plant protection products necessarily to be used during the year. We can conclude that the amount spent on manual labour is significant regarding the total costs of cultivation. The total costs of cultivation represents 10% of the total investment.

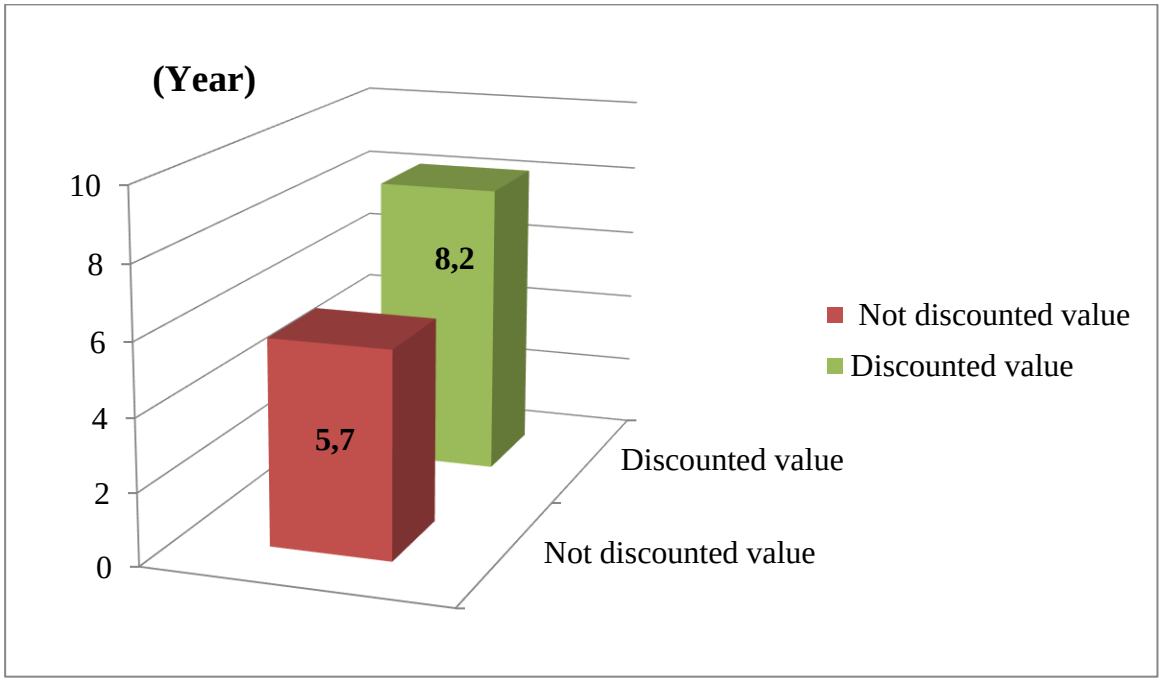
Table 4. Cash flows after the turnaround (€)

Apellation	**1. year**	**2. year**	**3. year**	**4. year**
Revenue	3340	3340	3340	3340
Other revenue	724	724	724	724
Revenue total	4064	4064	4064	4064
Production costs	1729	1729	1729	1729
Outcome	2336	2336	2336	2336
Tax (15%)	350	350	350	350
Outcome after tax	1985	1985	1985	1985

Depriciation	1033	1033	1033	1033
Operating cash flows	3018	3018	3018	3018
Cost price (Ft/q)	17	17	17	17

Source: own calculation

The table below (Table 4) shows that the price income was calculated to be 3340€. This amount was determined with 100 quintal/hectare yield and 33 € /quintal purchase price. Subsidies were also taken into consideration production, which were indicated as other income. According to our calculations, this amount is 724€ it consists of 195€ per hectare from the joint funds of SAPS area payment and greening support, as well as the amount of 529€ per hectare from the successful Agri-environment Management Scheme. The production cost seems to be 17 €/quintal according to our calculations described in Table 4. A clearly positive result can be concluded based on the relationship between price income and production cost. The price income is incidated in the first line, the production cost of € 1729 is much lower in comparison with it. The amount of the production cost includes the material cost which amount to € 278. Labor-related costs are 418€ and the amount of depreciation is € 1033 in our calculations. These itemized costs add up to the amount of the production cost in our calculations.



Figureure 1. Recovery time from the operating cash flow

Source: Based on calculations own editing

The payback period is calculated from the operating cash flows shown in the first column (Figureure 1), the discounted and non-discounted value are both taken into consideration. The model also shows that the cost of investment for one hectare of vine-stock planting is refunded in 8.2 years, while its discounted value can be recovered in 5.7 years based on net cash flows. Given that the product lifetime of the plantation is 10 years, it can be said that payback is guaranteed over this time.

Discussion

Grape production is a really time-consuming and capital-intensive investment. Based on our calculations, the payback period calculated from the operating cash flow at a discounted value is 8.2 years, while this period is 5.7 years at a non-discounted value. This is due to the fact that in the first two years no yield is expected, we calculate the yield to be 15% in the third year, we raise our estimates to 50% in the fourth year, and we expect full yield from the fifth year.

According to our calculations, the price income was € 3340 while the production cost was € 1729. Knowing these factors, we can conclude that our investment is profitable in the long run.

Subsidies play a major role in the payback period. In our model, we calculated with the area payment funds of greening support and SAPS, as well as with the amount provided by the Agri-environment Management Scheme. Therefore, we can conclude that the subsidies do not only facilitate the production, but farming would almost be impossible without them. Some of the agricultural subsidies are provided by the State, and some are provided by the European Union.

We can expect a longer payback period compared with field crops. The payback period of the plantation is greatly influenced by the plantation factors. The purchase of the grafts and the building of the stake system greatly affect this period. The amount spent in the initial phase also play a major role in the payback later, therefore, expenses have to be looked after in this period.

We can find many different product prices and quality on the market with regard to plant protection and nutrient supply. Proper selection of these products is really important. Appropriate amount and quality of the yield can only be expected with proper nutrient supply and correct plant protection product.

Conclusion

Agriculture and grape production are sectors with extremely high capital requirement and risk.

Grape production is a truly unpredictable income source. The greatest risk factor is the weather during agricultural production. Due to external factors, it is difficult to predict the annual price income. The purchase price of the grape is unfortunately very unpredictable varying year by year.

On the whole, we believe that we can be successful grape growers with the choice of a good variety and the right production technology, and with some luck.

In our way of thinking, viticulture cannot be neglected from the perspective of rural development, since it can positively contribute to the employment structure of the rural population. Furthermore, it promotes wine tourism in the towns and villages in the region, which can result in a multiplier effect in order to stimulate the economy in the future.

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