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ASAP Economic Impact Study

Grape Trellising Technology: An Economic Impact Study in Parwan, Kapisa and Kabul of Afghanistan

Grape Production under Trellising Technology, Badam Bagh Farm Kabul

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AFGHANISTAN STANDARD MAP

ASAP
Mission Statement

ASAP's main objective is to accelerate broad-based, market-led agriculture development capable of responding and adapting to market forces in ways that provide new economic opportunities for rural Afghans. To accomplish this objective, ASAP is focused on accelerating sales of high-value commodities and improving the capacity of the Government of Afghanistan, specifically the Ministry of Agriculture, Irrigation and Livestock (MAIL), to formulate agriculture sector policies and strategies, and to carry-out the administrative and financial functions needed to support more competitive, market-led agricultural production.

DISCLAIMER

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Executive Summary

Afghanistan is an important producer of grape and raisin; however grape production in most regions is done as bush vines, without any trellis support, resulting in low yields and grapes of poor quality.

ASAP since 2007 has supported 211 hectares to transform traditional vineyards to trellising technology. At least 1,000 farmers received help from ASAP and made investments to adopt trellising technology.

This study has two objectives: the first objective is to describe the grape production in Afghanistan, using trellising technology versus the traditional technology. The second objective is to measure the differences between the production - income from trellised vineyards and the traditional bush vine system.

Grape vine has a natural climbing growth habit and the cropping potential increases with increased surface area for the vine to grow. Grapevine potential yield depends on good sunlight exposure of the leaves, shoots and buds during the spring and early summer; the trellis system provides an enlarged area for the vine plot grow. Trellising significantly increases the growing surface of the plant so it has a larger potential for higher yields compared to traditional bush vine cultivation.

The Methodology used was a sampling of farmers with vineyard plots to measure the area and harvest trees to measure the production per tree. In the first stage the sampling was done to farmers who received help from ASAP; the beneficiaries were from three provinces (Kabul, Kapisa and Parwan). The second stage of random sampling was done with plots of farmers selected; the surveyors visited a total of 24 wine yard plots in the three provinces of Afghanistan.

As main part of this study; 58 trees (at least two trees per plot) of vine were harvested and their production was measured. The production of fresh grape, at same time the numbers of trees were counted for a given area, resulted as below: Farmers using trellising technology had higher production in quantity and quality. Trellising technology yielded an average of 22.5 kg/tree, on other hand the production of trees with traditional method results an average of 13.6 kg/tree. The average net increase in production between the trellised and the non-trellised tree was 65.4 %.

Farmers who adopt the trellising technology could have a net increase in their income by US$ 10,000/hectare. At the same time he had to invest US$ 3,300, to adopt a hectare of grapes with trellising technology.

The ASAP impact results in US$ 2,110,000 per year of farmers incremental income; who invested and adopted the grape trellising technology. ASAP was able to transform 211 hectares from traditional to grape trellising technology; benefiting directly 1,100 farmers. Besides, ASAP has trained many thousands of farmers in grape production.

1. Introduction

The production of fresh grapes and raisins has been an important agricultural crop for Afghanistan's population for centuries. Afghanistan used to be the 4th largest producer of raisins in the world prior to the Soviet invasion of 1979. Grape production in most regions is done as bush vines, in other words without any trellis support, and as a result yields are fairly low.

The ASAP project since 2007 is in the process of training, transferring subsidies to farmers to pass from traditional technology to grape trellising technology. The subsidy is in trellising posts and wire, which has been distributed by ASAP via AgDepots.

In this context ASAP is contributing to increase farmer's income by increasing, quality and yield of grapes.

ASAP since 2007 funded it's Subcontractor, Roots of Peace (ROP) to install grape trellises in Kabul, Kapisa and Parwan provinces.

In 2008 the Bagram Agribusiness Development Team provided fund to CERP to expand the ASAP trellising project. ASAP through AgDepots provided to farmers with trellis posts, wire, wire grabbers and augers; ASAP established 25 demo plots to interest and diffuse trellising technologies.

In March 2010, subcontracted Roots of Peace to trellis vineyards and established demo plots. Starting April 2010, ASAP supports farmers directly to adopt grape trellising, these activities will continue up to March 2011.

In summary ASAP supported 211 hectares to vineyards using trellising technology, the number of farmers who made investments to adopt trellising technology sums to more than 1,000 farmers. See table 1.

Table 1: ASAP Trellising Projects in from Program Start in November 2007 to Date 2010

Time Period	Organizations Involved	Families Benefitted	Hectares
May 9, 2007 to May 1, 2008	ASAP and ROP	203	40.55
May 20, 2008 to July31, 2009	ASAP and CERP(PRT)	449	100
March 1, 2010 to April 15, 2010	ASAP and ROP	55	11
April 16, 2010 to Present	ASAP	300	60
Total		**1007**	**211.55**

2. The Objectives of the Study

The objective of this study is twofold: the first is to describe the grape production in Afghanistan, using trellising technology versus the traditional technology. The second objective is to compare the production and income from trellised vineyards versus the traditional bush vine system.

Farm income from vineyard plots was estimated to measure the economic impact of this technology in terms of net income.

3. Traditional technology (bush vine cultivation)

The vast majority of grape production in Afghanistan is still done in the traditional way without trellising. This is known as bush vine production. The main reasons for the use of this "old style" production technique are the following:

- Tradition: Bush vine production is a very traditional method of grape cultivation and is still used in many parts of the world, but for different reasons.

- Limited or no exposure to grape production areas outside Afghanistan mostly due to continuous wars over the last 30 years.

- Cost: Installation of a trellis system entails certain capital expenditure for posts, wires and anchors. The average size of a vineyard plot is between 0.2 and 0.4 hectares and therefore the farmer has limited economic means for the purchasing of the trellis materials.

There are many modern grape growing countries in the world where bush vines are still used for cultivation of grapes. There are however reasons for this situation of which the most important are:

- Moderate to low soil potential that induces medium vigor in the plants. Medium vigor will result in medium to low yield that can be easily accommodated by the vine without the need for trellising. High natural vine vigor will require a trellis system that can accommodate the shoot growth and increased yield associated with it.
- No or very low availability of irrigation water during the summer months. Without irrigation the vines will not grow very vigorously.
- No availability of money for the installation of trellising.

The main disadvantages of bush vine cultivation are the following:

- Low yield potential because a bush vine does not provide support for the shoots on which the clusters are produced. The lack of a trellis system onto which the shoots can grow for exposure to sunlight limits the fruitfulness of bush vines.
- Difficult control of diseases due to ineffective penetration of fungicides and pesticides into a bush vine canopy.

- Weed control is very demanding and has to be done by hand during the growing season.
- Lower quality of grape clusters. The grape clusters are very close to the soil surface and are therefore exposed to higher temperatures, physical damage and a lot of dust, all factors that lower the quality and quantity of the crop.
- All labor activities are more difficult and less productive because it has to be done manually in a bent body position. These include pruning, shoot thinning, leaf removal and harvesting. No activities can be mechanized.

Figures 1 and 2 show examples of the traditional bush vine cultivation system that are currently used by most grape growers in the provinces of Kabul, Parwan and Kapisa.

Figure1: Traditional bush vines in Kabul province during winter (dormant season)

Figure2: Traditional bush vine in Parwan province during spring

4. The trellising technology

Grape vine has a natural climbing growth habit and the cropping potential increases with increased surface area for the vine to grow. Long term grapevine fruitfulness (potential to yield a crop of grapes) depends on good sunlight exposure of the leaves, shoots and buds during the spring and early summer. A trellis system provides an enlarged area for the vine to grow because the tendrils can latch onto the wires and therefore maintain its active growth towards sunlight. Trellising significantly increases the growing surface and therefore has a larger potential for higher yields compared to traditional bush vine cultivation.

The first trellis systems that were installed in Kabul, Parwan and Kapisa provinces consisted of a locally manufactured concrete post strengthened with steel rebars and 2-3 wires (bottom wire is called the fruiting wire; upper 2 wires are called foliage wires for support of the green shoots during summer) (see Figure 3). This vertical shoot positioning (VSP) design, also called the I-trellis, had a great impact on yield because the vine now has more space to grow. Average yield increases were almost double than with traditional bush vine production (see the I-trellis at harvest in Figure 4).

Figure3: Basic I-trellis design consisting of concrete post and 3 horizontal wires

Figure4: Yield of White Kishmishi at harvest time on an I-trellis

New T-trellis systems have been in use at Badam Bagh experimental farm since 2008 and will be introduced to Kabul, Parwan and Kapisa provinces in 2010. The T-trellis has been compared with the I-trellis at Badam Bagh farm because it can further increase the yield potential of the growers. The main advantage of the T-trellis is that it provides an even greater surface area for the vine to grow and with it cropping potential. Shoot orientation is horizontal on a T-trellis compared to vertical on the I-trellis, thereby increasing the exposure of the leaves, shoots and buds to sunlight. Further advantages of the T-trellis system are the following:

- Clusters hang freely below the grape canopy and are therefore well protected against sunburn damage in the period leading up to harvest.
- Clusters are not at risk of physical damage from leaves and shoots and are therefore of a higher quality than on the I-trellis.
- The height of the clusters from the soil surface is at least 1.5 meters and is therefore much less exposed to dust as well.
- The clusters are well protected from bird damage as well due to the fact they hang below the canopy where birds cannot easily spot them.
- Labour activities are at eye level for workers and therefore much more productive.

T-trellis design consists also of the same concrete post as for the I-trellis, but it has a 100 cm wide T-piece made from angle iron at the top with 4 wires spaced evenly across it length. Figure 5 shows the basic design of the T-trellis and Figure 6 the yield potential. The T-trellis has 4 fruiting wires compared to the 1 of the I-trellis (bottom wire is the fruiting wire; upper 2 wires are called foliage wires because they are only for the vertical support of the shoots during summer). The availability of 4 fruiting wires on the T-trellis greatly improve the yield potential as can be seen from the picture in Figure 6.

Figure5: Grape Production under Traditional Technology.

Figure6: Basic T-trellis design at Badam Bagh Farm (vines in dormant phase)

Figure7: Grape production on T-trellis

5. Economic Impact of using trellising technology

5.1 Methodology

Sample Selection: Sampling was done in the three provinces (Kabul, Parwan and Kapisa) with a total of 24 wine yard plots visited and randomly selected. In total 24 plots were visited from which, 14 used trellised technology versus 10 plot where traditional technology was used. See table 2.

Table 2: Number of farm plots visited; with Trellised technology versus Traditional Technology

Province	With Trellising Technology	Traditional Method
Kabul	11	6
Parwan	2	2
Kapisa	1	2
TOTAL	**14**	**10**

Figure8: Measurement of production under trellised versus traditionally grown-grapes.

- The steps to recollect data were:
- Filling out the questionnaires
- Land measurement
- Plant counting
- Taking of two samples randomly from both with trellising and without trellising
- Harvesting of the selected samples
- Measurement of the samples weight and comparing samples weight

The numbers of sample in terms of trees At least two tree were harvested per family. These trees were harvested and weighted sums to 58 trees. The cost of harvesting these trees was paid to each farmer participating in this study.

Table 3: Sample size: number of trees harvested and weighted; with Trellised technology versus traditional Technology

Variety	Number of trees harvested		Total
	With trellising	Without Trellsing	
Kishmish	10	8	18
Taifi	24	10	34
Sundulkhani	4	2	6
Total	**38**	**20**	**58**

Figure9: Grape harvesting for economic impact study of the grape trellising program OD ASAP with USAID support.

5.2 Results

Production per tree

The result showed that farmers using trellising technology had higher production in quantity and quality. With trellising technology were 22.5 kg/tree, on average; without trellising or the traditional method, the production per three was 13.6 kg/tree. The average net increase in production between the trellised and the non-trellised tree amounted to 65.4 %. See table 4.

Table 4: Comparative production between Trellised and Non-Trellised Grapes (Per one tree)

Variety	Production per tree/ kg		Percentage Difference In production
	With trellising	Without Trellising	
Kishmish	29.0	18.6	64.7
Taifi	21.2	11.2	89.3
Sundulkhani	14.0	5.5	154.5
Average	**22.5**	**13.6**	**65.4**

Gross income per tree and incremental value

Growers attain the best gross income from fresh grape production under trellising technology, since these are better quality, obtaining better prices in local market; besides it can be exported to Pakistan or India.

To estimate gross income is necessary information about: price per kilo, yield or production in kilos and density of number of plants per hectare.

Price used for one kilo of fresh grape per variety is presented in table 5. The average price in the moment of the survey was US$ 0.70-0.76.

The Value of production per tree is presented in table 6. Farmers using grape trellising technology present a value US$ 15.32 per tree versus US$ 7.36 per tree for farmers using the traditional technology. (The gross income per tree is: the amount of number of kilos of grape produced in one tree multiplied by its respective price of fresh grape in the market).

Density The average density found in this study, measuring the area and counting the number of plants was 1,670 plants per hectare.

Production or yield per hectare

The estimates average yield per hectare will depend on the density of trees per hectare. This study reports 1,670 vines or plants per hectare. The average vineyard plot was 0.2 – 0.4 hectares.

Table 5: Prices declared by variety (US kg)

Variety	Price US $/kg	
	With trellising	Without Trellising
Kishmish	0.35	0.36
Taifi	0.76	0.70
Sundulkhani	0.63	0.48
Average	**0.66**	**0.54**

Table 6: Comparative value per tree

Variety	Value $/ tree		Incremental Value ($ tree)	Percentage Increase
	With trellising	Without Trellising		
Kishmish	10.20	6.64	3.56	54
Taifi	16.08	7.86	8.2	105
Sundulkhani	8.89	2.62	6.27	239
Average	**15.32**	**7.36**	**7.96**	**108**

Gross income per ha

The gross income is the value of one tree is multiplied by its density per one hectare. The results are presented in table 7. The gross income per hectare is higher for farmers using trellising technology US$ 25,584 versus without trellising technology US$ 12,291. This is a net increase in in gross income in 108 per cent.

Table 7: gross income per hectare

Variety	Gross income / Ha in US$		Incremental Gross income ($/Ha)	Percentage Increase
	With trellising	Without Trellising		
Kishmish	17,034	11,089	5.9	54
Taifi	26,854	13,126	13.7	105
Sundulkhani	14,846	4,375	10.4	239
Average	**25,584**	**12,291**	**13,293**	**108**

Net Income per ha

In summary a farmer who adopted a grape trellising technology made an additional income of US$ 10,000 per hectare.

To estimate the net income, we take the gross income per hectare minus the cost of adopting trellising technology (25,584 – 3,300 = 22,284). The net income of farmer without trellising technology is US $12,291.

The value of the estimated cost is US$ 3,300, this amount was calculated by Roots of Peace 2007-2008, this is to transform one hectare of traditional vineyard to one using trellising technology.

The incremental in net income is the difference of agriculture with and without trellising technology this amount to US$ 10,000.

5.3 Conclusion

Farmers who adopt the trellising technology can have a net increase in his income by US$ 10,000. At the same time he has to invest at least US$ 3,300, to transform a hectare of traditional vineyard to one using with trellising technology.

The ASAP impact per year is US $ 2,110,000 of incremental income of farmers who invested and adopted the grape trellising technology. ASAP was able to transform 211 hectares from traditional to grape trellising technology; benefiting directly at least 1,100 farmers; this is not counting of the families trained in grape production.

This value of ASAP's impact comes form: the number of hectares under ASAP direct help multiple by US$ 10,000, (this amount comes from US$ 22,284 – 12,209 = US$ 9,993).

Figure10: Trellised grapes yield an average of 65.4% more than the traditionally grown grapes.

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