

# Effect of Good Agriculture Management Practices and Constraints on Grape Farming: A Case Study in Mirbachakot, Kalakan and Shakardara Districts Kabul, Afghanistan

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**Abstract**—Skillful management is one of the most important success factors for today's farms. When a farm is well managed, it can generate funds for its sustainability. Grape is one of the most diffused fruits in the world and one of the most important cash crops with high potential of production in Afghanistan as well. While there are several organizations intervening for improvement of this cash crop, the quality and quantity are still not satisfactory for producers and external markets. The situation has not changed over the years. Therefore, a survey was conducted in 2017 with 60 grape growers, supported by questionnaires in Mirbachakot, Kalakan and Shakardara districts of Kabul province. The purpose was to get an understanding of the current socio-demographic characteristics of farmers, management methods, constraints, farm size, yield and contribution of grape farming to household income. Findings indicate that grape farming was predominant 83.3% male, 16.6% female and small-scale farmers were the main grape producers, 60% < 1 ha of land under grape production. Likewise, 50% had more than > 10 years and 33.3% between 1-5 years' experience in grape farming. The high level of illiteracy and diseases had significant digit effect on growth, yield and quality of grapes. The results showed that vineyard management operations to protect grapes from mechanical damage are very poor or completely absent. Comparing developed countries, table grape is one of the fruits with the highest input of technology, while in developing countries the cost of labor is low but the purchase of the equipment is very high due to financial situation. Hence the low quality and quantity of grape are influenced by poor management methods, such as non-availability of experts and lack of technical guidance in the study site. Thereby, the study suggested that improved agricultural extension services and managerial skills could contribute to addressing the problems.

**Keywords**—Efficient resources use, management skills, constraints factors, Kabul.

## I. INTRODUCTION

MOST production economists refer to the production factors as land, labor, and capital while the decisions on how to use the production inputs and resources, and implementation of the plans, are the responsibility of this fourth factor, management. The quality of the decisions enhances the success of farm operation and management skill is the key to efficiently use resources [1]. Farms like other small businesses require sound management to survive and prosper. Land, labor, and capital do not automatically produce

fruit or any other products, these resources must be organized into a proper combination, the proper amount and at the correct time for the desired production to occur. The continual development of new agriculture technologies means that farm managers must stay informed of the latest advances [2]. Farmers are requiring upgrading of skills and capabilities in farm management and marketing to more efficiently run their farm business [3]. Good management is a crucial factor in the success of any business, especially farms. When a farm is well managed it can generate funds to be sustainable. To be successful, farm managers need to spend more time making management decisions and developing management skills [4]. A manager, regardless of position, must use the ideas of scientific management carefully generated by Frederick Taylor during early 20<sup>th</sup> century. The best management is a real science, which shows that the basic principles of scientific management are applicable for all types of human activities from the simplest of our individual actions to the work of our large companies [5]. This is due to production agriculture in Afghanistan and other countries is changing as following; more mechanization, increasing farm size, continued adoption of new production technologies, new marketing alternatives and price fluctuation, and increased business risk [6]. These factors create new management problems, but also present new opportunities for managers with the right skills. Moreover, farm managers and economists have always been interested in the reasons why some farms have higher net incomes than others and the reasons of these differences were identified in 19<sup>th</sup> century; that is, managerial skills [7]. Historically, farm management researchers and writers have commented on the importance of managerial skill [8], [9]. But this aspect of production efficiency and constraints associated with production are seldom highlighted, and the level of research funds devoted to the areas is quite minimal. This situation should be changed as any manager is clearly the key to combining resources appropriately to achieve the farm goals. Thus, it would be worthwhile to study the problems associated with pre and postharvest operations by grape growers in Shakardara, Mirbachakot and Kalakan districts of Kabul province.

## II. METHODOLOGY

A survey of 60 randomly selected grape growers was

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conducted in Shakardara, Mirbachakot and Kalakan districts of Kabul province, Afghanistan, as shown in Fig. 1. A face-to-face interview was used, supported by a structured and semi-structured questionnaire. The questionnaire covered several areas to obtain the objectives of the research. The main aspects covered in the questionnaire were questions on the socio-demographic characteristics of farmers, management methods, farm size under grape and yield, identification of main problems, and constraints, while the last part of the questionnaire covered the contribution of grapevine farming to household income, as experienced by grapevine farmers. The data were analyzed using average rank formula and descriptive tools such as the frequency and percentage in Excel.

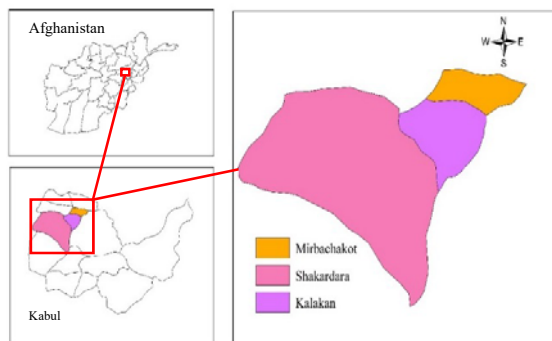


Fig. 1 Map of study sites in Kabul, Afghanistan

### III. RESULTS AND DISCUSSION

According to Table I, the majority of grape growers (66.0%) were aged 35-64 years and 33.3% were less than 35 years for trellised grape farmers. While 58.3% of bush grape farmers were less than 35 years old and 41.6% were 35-64 years old. Grape farming was a predominantly male activity (83.3% male, 16.6% female), followed by married individuals who constituted 66.6%, large family size of 5 members and above were characteristics observed from 66.6% of the trellised system compared to 33.3% of the bush system. The majority of the respondents (66.0%) were illiterate, while 21.6% had primary school and 16.6% had secondary school education backgrounds.

In Australia, grape growers are highly skilled, constantly updating their knowledge of the cultivating, and are interested in adopting new technologies and practices. There is a comprehensive education program at all levels. Several universities are active in the field of practical skills of grape cultivators, and government agricultural agencies properly introduce education in new ways and technology arising from research centers [10]. Hence it proved that research and extension are the core factors for coping agriculture challenges and sustainable agriculture development.

#### Comparing Traditional and Trellised Grape Farming

To attain quality goals, one should learn both traditional and modern practices. According to Fig. 2, in the traditional vineyard system, improper vine training, poor canopy

management and weak postharvest vineyard management were the core factors for incidence of pest and diseases (45%) which had a negative effect on grape production. Research findings indicated that trellised vineyard method has many benefits such as sunlight penetrating all parts of the grapevine, it reduces incidence of disease 20% by promoting good air circulation and a vine free from disease has a direct effect on sustainability, yield and quality of fruits. All of them affect profitability and insure the long-term sustainability and success of the vineyard. Proper planting and training of young grapevines are essential for the establishment of a productive vineyard. The objective is to achieve a uniform planting of strong, healthy, well-shaped vines.

TABLE I  
SOCIO-DEMOGRAPHIC CHARACTERISTICS OF GRAPE FARMERS

| Variable       | Trellised grape farmers n=30 | Bush grape farmers n=30 | All N= 60 |
|----------------|------------------------------|-------------------------|-----------|
| Age            |                              |                         |           |
| < 35           | 10 (33.3)                    | 20 (58.3)               | 30 (50)   |
| 35-64          | 20 (66.0)                    | 10 (41.6)               | 30 (50)   |
| Sex            |                              |                         |           |
| Male           | 25 (83.3)                    | 23 (76.0)               | 48 (80)   |
| Female         | 5 (16.60)                    | 7 (24.0)                | 12 (20)   |
| Marital status |                              |                         |           |
| Married        | 20 (66.6)                    | 20 (66.6)               | 40 (66.6) |
| Single         | 10 (33.3)                    | 10 (33.3)               | 20 (33.3) |
| Education      |                              |                         |           |
| None           | 18 (60.0)                    | 19 (63.3)               | 37 (61.6) |
| Primary        | 6 (20.00)                    | 7 (23.3)                | 13 (21.6) |
| Secondary      | 6 (20.00)                    | 4 (13.3)                | 10 (16.6) |
| Household size |                              |                         |           |
| Less than 5    | 10 (33.3)                    | 20 (66.6)               | 30 (50)   |
| 5 and above    | 20 (66.6)                    | 10 (33.3)               | 30 (50)   |

Note: Parentheses indicate the percentages

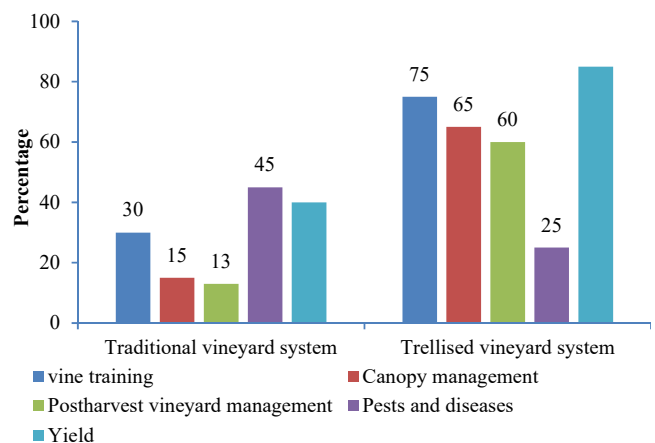


Fig. 2 Comparing traditional and trellised vineyard management system

According to Table II, the qualified majority of respondents, 50.0%, were engaged in grape farming more than 10 years, 33.3% between 5-10 years, while only 16.6% engaged less than < 5 years in grape farming. On the other hand, 58.3% of grape farmers had less than < 1 hectare, 25% between 1-5 hectares and 16.6% more than > 5 hectares of

land under grape production. The average yield per hectare is 12.5 tons which is lower compared with neighboring countries such as India, which produces 30-50 tons per hectare, due to use of improved varieties, technologies, and moreover very good grapevine management practices.

TABLE II  
ENGAGE YEARS, FARM SIZE AND GRAPE YIELD

| Variable                                   | Frequency | Percent |
|--|-----------|---------|
| Number of years engage in grape farming    |           |         |
| < 5  | 10        | 16.6    |
| 5-10                                       | 20        | 33.3    |
| > 10                                       | 30        | 50.0    |
| Farm size under grape production (hectare) |           |         |
| < 1  | 35        | 58.3    |
| 1-5  | 15        | 25.0    |
| > 5  | 10        | 16.6    |
| Total yield last year ton/ha               |           |         |
| < 10                                       | 30        | 50.0    |
| 10-15                                      | 20        | 33.3    |
| > 15                                       | 10        | 16.6    |

#### Average Rank Formula

Descriptive statistics, particularly tabulation, was used to summarize the data. To determine the constraints and factors that influenced the decline in agricultural production, average ranking for each of the ranked causes was used to determine the most influential factors using the formula;

$$\text{Averagerank } P_a = \frac{X_1P_1 + X_2P_2 + X_3P_3 + \dots + X_nP_n}{\text{Total response count}}$$

where  $X_i$  is the response count for each choice and  $P_i$  is the ranked position.

TABLE III  
CONSTRAINTS OF GRAPE FARMING AS EXPERIENCED BY FARMERS

| Constraints   | Rank      |     |     |     | Average Rank |
|---|-----------|-----|-----|-----|--------------|
|   | 1st       | 2nd | 3rd | 4th |              |
| Low price of grape  | 30 (50.0) | 20  | 7   | 3   | 1.7          |
| High cost of input  | 23 (38.3) | 20  | 12  | 5   | 1.9          |
| Limited access to market  | 35 (58.3) | 15  | 7   | 3   | 1.6          |
| Unavailability of cold storage facilities                             | 40 (66.6) | 10  | 5   | 5   | 1.5          |
| Pests and diseases  | 35 (58.3) | 10  | 6   | 9   | 1.7          |
| Water shortage  | 38 (63.3) | 12  | 5   | 5   | 1.6          |
| Limited access to quality seedlings                                   | 30 (50.0) | 10  | 8   | 12  | 2.0          |
| Limited access to financial services                                  | 20 (33.3) | 11  | 18  | 11  | 2.1          |
| High initial investment   | 45 (75.0) | 6   | 4   | 5   | 1.4          |
| Less response of dealers and distributors in repay the amount in time | 28 (46.6) | 9   | 12  | 11  | 2.1          |

Note: Parentheses indicate the percentages

Based on Table III, the results reveal that high initial investment average rank was 1.4, and the severest problem which was expressed by 75% of grape producers followed by lack of storage facilities, limited access to market, and pest and disease average ranked were 1.5, 1.6, and 1.7, respectively. This is linked to the market which is mainly

domestic and grapes are sold as fresh as having no value – adding activities. The market linkages for grapes are therefore weak and undermine the overall growth of the grape-subsector in the area. Important pests were leafhopper and spider mites while major diseases were powdery mildew and downy mildew. These diseases had significant digit effects on growth, yield and quality of grapes. Although data for grape losses due to pests and diseases are not available, discussion with farmers and based on previous research [11] clearly revealed that pests and diseases cause considerable damage to grapevines.

TABLE IV  
FARMER'S PREFERENCE ON GRAPE CHARACTERISTICS FOR IMPROVEMENT

| Characteristic of grape varieties       | Score of farmers' preferences |     |     | Average rank |
|---|-------------------------------|-----|-----|--------------|
|   | 1st                           | 2nd | 3rd |              |
| High yielding                           | 70                            | 35  | 15  | 1.2          |
| Demand for domestic and foreign markets | 86                            | 22  | 12  | 1.3          |
| Good quality of grape                   | 80                            | 25  | 15  | 1.4          |
| Resistance to pests and diseases        | 85                            | 15  | 20  | 1.4          |
| High price                              | 87                            | 14  | 19  | 1.4          |
| Need less fertilizer                    | 80                            | 17  | 23  | 1.5          |
| Early maturity                          | 75                            | 30  | 15  | 1.5          |
| Resistance to drought                   | 60                            | 35  | 25  | 1.7          |

According to Table IV, the average rank reveals that varieties with 'high yielding 1.2, more demand for domestic and foreign market characteristics 1.3' were the most preferred by grape growers since they assure an abundant harvest for family consumption, and extra income to support household expenditure; followed by good quality, resistance to pest and diseases, high price, early maturity, less fertilizer and resistance to drought. In the study site, some farmers grew more than one grape variety in their grape farm, but lack of manual labor at peak of harvesting season was one of the problems faced by the farmers. So, planting a number of early maturing varieties would facilitate better scheduling of labor during harvesting season. Farmers could harvest first the short duration (early maturity) varieties, then medium and late duration varieties. Since grape growers usually do not have access to refrigeration for storage at the peak of harvesting season, the short duration varieties were very important for them. Uniformity of color, taste, shape and medium size were also preferred, as the farmers' perceptions were that these are indicators of good grape quality as a third preference.

Based on Table V, net income from farm produce was derived by production value minus production cost. The average annual net income per household from grape farming was 159.666 AFN, which is equivalent to 70% of the total income while livestock and livestock products and other agricultural activities contributed only 30% to household income. Moreover, the average coefficient for the analyzed period from 2014 to 2016 was 2.2; similarly, the coefficient in 2016 was slightly higher 2.6, which was the result of high-value production and high selling price of grape 25 AFN/kg. The result indicated that the grape farming had the highest contribution to household income, despite observed 'low productivity and low price, poor pre- and post-harvest

management practices'. This reveals that there is high potential of household welfare and reducing poverty levels through grape farming, especially when grape productivity is improved.

TABLE V  
CONTRIBUTION OF GRAPE FARMING TO HOUSEHOLD INCOME

| Year                          | Labor cost*         | Material cost<br>AFN** | General expenses | Total cost    |
|-------------------------------|---------------------|------------------------|------------------|---------------|
| 2014                          | 75,000 (65.2)       | 25,000 (21.7)          | 15,000 (13)      | 115,000       |
| 2015                          | 85,000 (66.9)       | 27,000 (21.2)          | 13,000 (10.2)    | 125,000       |
| 2016                          | 87,500 (70.0)       | 30,000 (24.0)          | 11,000 (8.8)     | 128,500       |
| Value of Grape Production     |                     |                        |                  |               |
|                               | Yield               | Price/ kg              | Production value |               |
| 2014                          | 14,000              | 20.0                   | 280,000          |               |
| 2015                          | 10,000              | 23.0                   | 230,000          |               |
| 2016                          | 13,500              | 25.0                   | 337,500          |               |
| Average                       | 12,500              | 22.6                   | 282,333          |               |
| Economics of Grape Production |                     |                        |                  |               |
|                               | Production<br>value | Production<br>cost     | Coefficient      | Net<br>income |
| 2014                          | 280,000             | 115,000                | 2.4              | 165,000       |
| 2015                          | 230,000             | 125,000                | 1.8              | 105,000       |
| 2016                          | 337,000             | 128,500                | 2.6              | 209,000       |
| Average                       | 282,333             | 122,333                | 2.2              | 159,666       |

\*Family labor is accounted and \*\* Afghani currency

#### IV. CONCLUSION

This study indicates that management is a critical factor for success of any business, especially agriculture. Land, labor and capital cannot automatically produce fruits. Resources must be organized in the right combination for the desired production. Findings revealed that grape farming is predominantly a male activity (83%) and the main source of annual income (70%) for small-scale farmers in Afghanistan. In the trellised vineyard system, the incidents of diseases drastically reduced 20% and grape production considerably increased 40%, due to the proper management of vineyards in light of advice of agriculture experts. Despite this advantage, adoption of the trellised system remains low in the research site. The results indicated that high initial investment in grape farming (75%), unavailability of cold storage facilities (66.6%), limited access to market that fully derives benefit of grape production (58.3%), scarcity of water (63.3%), and pest and diseases (58.3%) were found to be the core constraining factors identified for the adoption of the trellised system. If these issues are not considered, the long-term viability of grape production will be at risk. In addition, the poor quality and quantity of grape is affected by weak management practices such as non-availability of experts and lack of access to technical guidance. Thereby, the study recommended that there is a great need for investment and an effective extension program to improve viticulture knowledge and managerial skills of producers.

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