# An Explorative Study on Sustainable Grape Farming Practices in Karnataka: A Case Study of Vijayapur District

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**Abstract:** Grape is one of the vital fruit crops in tropical Karnataka. Over 13400 hectares of grape plantation exist across the Vijayapur district, where no others districts in the Karnataka and it has unique taste and deliciousness. The Karnataka has high potential to produce varieties of grapes in Vijayapur district proved highest grapes production under continuous irrigation condition and the average yield also. Sustainable grape growing is the journey of continually improving one's ability to reduce threats to environmental and social footprints. The farmers switched to sustainable grape production that doubled the production in terms income. Improved variety of grapes production adopted by new method of farming by farmers. This paper analyzes the farmers' adoption of sustainable grape farming practices in Vijayapur District, Karnataka based on farm household survey conducted in 2020. The study has adopted Multiple Regression Analysis technique to identify sustainable grape farming practices in Vijayapur. Hence, the present study aims to understand the determinants of sustainable grape producers in research area. The present study stressed on sustainable grape manufacturing and its proper utilization.

**Keywords**: Grapes movements, Farming Activities, Sustainable Agricultural

## INTRODUCTION:

The Grape is the most important commercial crop grown in India. It was estimated that 40,000 ha land area under the grape cultivation in Maharashtra, Undivided Andhra Pradesh and Karnataka. Grape is one of the vital fruit crops in tropical Karnataka. Over 13400 hectares of grape plantation exist across the Vijayapur district, where no others districts in the Karnataka and it has unique taste and deliciousness. Currently, Grape framing activity got an economic importance for table purpose, export purpose and production of wine. Government of Karnataka is offering wide range policies for horticulture development including grape framing. In the last fifty years agriculture development policies made successful use inorganic fertilizers, pesticides, and machine technology to increase production for higher revenue. Now, farmers gradually shifted to inorganic to organic farming practices for sustainable development in agricultural activities. The Farmers decision to adopt a new agricultural technology depends on factors. The most important factor is farmers' perception is the compatibility of sustainable practices. Hence, there is a need to find out what farmers perceptions are with regarded to applying selected sustainable agricultural technologies.

Grape bunches are also to be protected against hot sun, cold wave, dry air spell, dew and storm. Vijayapur is a famous for growing grape because grape generally requires a hot and dry climate. The study has selected Vijayapur district because of Agro-climatic condition is fit for grapes production. Majority of the farmers in Vijayapur District are produced grapes and very nearest places to Maharastra and Goa for export and import of the grapes also it is successfully grown in area because where the temperature range is high between 20-42 DS. Sustainability is particularly relevant to the field of viticulture. Protecting the health of the vineyard's soil and surrounding environment can be seen as intrinsic to enhancing terroir. Other benefits of growing wine grapes under sustainable practices include building consumer interest, encouraging natural vine hardiness, and the foundation for a healthy place to live and work.

## REVIEW OF LITERATURE:

Sustainability is playing a key role in the grape wine industry as shown by the attention paid at several levels by the academia, institution and associations. Nevertheless, the principle itself of sustainability opens a wide debate and it significantly affects firms in all their activities **(Cristina Santiniet. Al. 2013)**[1]**.** Role of remote sensing on vineyard distribution, discrimination by various techniques, deriving both biophysical and biochemical variables from satellite image and monitoring of vine at various growth stages has been reviewed extensively. **(V. E. Nethaji Mariappan, et. Al., 2017)**[2].Horticulture (Grapes) is emerged as an important sector of Jammu and Kashmir, it is known as back bone of State economy. Its contribution in the state gross domestic product is estimated to about 21.89% for year 2016-2017. The present status of grapes both area and production wise is 2 hectare and 5 hectare, 9 MT and 5 MT in District Leh and Kargil respectively **(Tsering Dolkar, Mansoor Ali and Divya Slathia, 2018)**[3]**.** The study focused on flavor food and grapes, as a source of nutrition, as medicines. Over the years, natural products have contributed to the development of important therapeutic drugs used currently in modern medicine **(Vallikanagala, et. Al.)**[4]**.**Grapevine is adapted to a wide range of climates; the best growing of grapevine are performed in regions, which meet certain specific climate requirements. Grape growing is also extensively carried out in the latitudes between the tropics of cancer and Capricorn called as tropical regions. Viticulture activities has increased significantly in the tropical regions and qualified table grapes, win, grape juice and raisin are obtained from countries such as brazil, India and Thailand

[1]*Santini et al.***,** *Sustainability in the wine industry: Key Questions and Research Trends, Agricultural and Food Economics, pp-1-9, 2013.*

[2]*V. E. NethajiMariappan, Et. Al.,Grape Cultivation and Management Approaches by Geospatial Tools - A Review***,** *J Adv Res GeoSci Rem Sens, ISSN: 2455-3190, Vol-4(1&2), pp-17-28, 2017.*

[3]*TseringDolkar, Mansoor Ali and DivyaSlathia, Status of area and production of grapes (Vitisvinifera) in Cold Arid Ladakh, E-ISSN-2278-4136, Vol-7(3), pp-3569-3571, 2018.*

[4]*Vallikanagarla, I. J. Kuppast, T. Veerashekar and C. L. Reddy, A Review on Benefits and uses of Vitisvinifera (Grape), ISSN-0974–7532, Vol- 7(5).*

located in tropical and subtropical regions**(Demir, 2014)**[5].Grapevinebrings about the perspective of a great expansion for the tropical viticulture, be it for the continuous market supply with table grapes, be it for the possibility to produce large volumes of wine and juice in small industrial plants **(Umberto A. Et. Al, 2012)**[6]**.**The study framed sustainable framing practice as yield impact on income of grape faming. The farmers education influence on awareness of sustainable farming into improve cultivation practices that enhancing soil carbon sequestration and biodynamic farming activity as a chance. Farmers promoting energy efficiency in farming operations in the form of Drip irrigation facility, Land development activities, Farm ponds for percolation of rain water and Growth promoters of grape farm **(Kirschenmann, 1991).**

## NEED FOR THE STUDY:

Vijayapur is known for horticulture crops, and tourism. With a major portion of grapes produced in the state being cultivated in the district, most of the farmers are unhappy with the successive govt. for not proving feasibilities to support them carry their sustainable grapes farming practices throughout the Vijayapur district. This paper analyzes the farmers' adoption of sustainable grape farming practices in Vijayapur District, Karnataka based on farm household survey. Thus, there is need to study about sustainable grape farming practices and its determinants in Vijayapur district.

## OBJECTIVES OF THE STUDY:

- To study the sustainable grape forming practices in select district of Karnataka
- To analysis the determinants of sustainable grape forming practices in the study area.

## METHODOLOGY:

The present study is an explorative study in nature. The relevant sources of information has been collected from primary and secondary data. The primary data has been collected through the set questionnaire from 300 sample size and secondary data have been collected from research papers, magazine, books, journals and authorized websites.

## DATA MEASUREMENT:

Field research was conducted by utilizing an interviewer-administered questionnaire; by adopting relative literatures (Gujarati, 1988, Wooldridge, 2008).The study adopted multiple regression method to identify the relationship between quantitative variables. The data given by $y_i$and $x_{i1} \dots \dots \dots x_{ip}$. The study collect the covariates and the unknown

[5]*Demir, A Review on Grape Growing in Tropical Regions, Turkish Journal of Agricultural and Natural Sciences, Vol- 1, 2014.*

[6]*U. A. Camargo, Et. Al., Grapevine Performance and Production Strategies in Tropical Climates, As. J. Food Ag-Ind., Vol-5(04), ISSN-1906-3040, pp-257-269, 2012.*

parameters in the $(p+1)$- dimensional vectors $X_i = (1, x_{i1}, \dots \dots x_{ip})^T$and $\beta = (\beta_0, \dots \dots \beta_p)^T$. Hence, for each observation we get the following equation (Baltagi, 2007);

$$y_i = \beta_0 + \beta_1 x_1 + \cdots \cdots \beta_p x_{ip} + \varepsilon_i = X_i^T \beta, \qquad i = 1 \cdots \cdots \cdots, n. \quad \ldots\ldots\ldots\ldots \quad (1)$$

By observing suitable vectors and matrices study got a compact form of research model is matrix notation. With

$$\boldsymbol{y} = \begin{bmatrix} \boldsymbol{y_i} \\ \vdots \\ \boldsymbol{y_n} \end{bmatrix}, \begin{bmatrix} \boldsymbol{1} & \boldsymbol{x_{11}} & \dots \boldsymbol{x_{1p}} \\ \vdots & \vdots & \vdots \ \vdots \\ \boldsymbol{1} & \boldsymbol{x_{n1}} & \dots \boldsymbol{x_{np}} \end{bmatrix}, \boldsymbol{\beta} = \begin{bmatrix} \boldsymbol{\beta_0} \\ \boldsymbol{\beta_1} \\ \vdots \\ \boldsymbol{\beta_p} \end{bmatrix}, \boldsymbol{\varepsilon} = \begin{bmatrix} \boldsymbol{\varepsilon_1} \\ \vdots \\ \boldsymbol{\varepsilon_n} \end{bmatrix}$$

It can be written the model (1) in the simple form $y = X\beta + \varepsilon$.

Where, the simplest case to examine is one in which a variable Y, referred to as the dependent (target) or response variable, X design matrix related to explanatory variable, or simply a regress or, ε referred error term and β belongs to unknown vector of regression parameters. Study data set having the assumptions that ε ~ (**0, $\sigma^2$ $I_n$**), i.e. no systematic error, the error terms are uncorrelated and all have the same variance (homoscedasticity) and X deterministic. In this paper, primary data were taken from Vijayapura district who are practicing grape farming practices by farmers consist of *n=300*observations as random sample. This research is focusing on the sustainable grape farming as response variable *Y* and explanatory variables, $X_1, X_2, \dots\dots, X_p$ *explained* in Table 1.

In this research, the hypotheses that used which says that;

$H_0$*:* None of the variable $x_1$, $x_2$,$x_3$ and $x_n$is not significantly related to Y

$H_1$: None of the variable $x_1$, $x_2$,$x_3$ and $x_n$is significantly related to Y

All data was analyzed using Statistical Package for the Social Science 17.0 (SPSS 17.0) and Minitab version 15 (Minitab 15).

**Table 1Determinants of Sustainable Grape Farming Practices in Vijayapur district**

| Variables | Definitions | Variables | Definitions |
|---|---|---|---|
| y | Farmers income out of sustainable grape faming | $\beta_6 x_6$ | Bio intensive Integrated Pest Management |
| $\beta_0$ | Intercept | $\beta_7 x_7$ | Promoting energy efficiency in farming operations |
| $\beta_1 x_1$ | Farmer Education Level | $\beta_8 x_8$ | Enhancing soil carbon sequestration |
| $\beta_2 x_2$ | Awareness of sustainable farming | $\beta_9 x_9$ | Land development activities |
| $\beta_3 x_3$ | Improved cultivation practices | $\beta_{10} x_{10}$ | Farm ponds for percolation of rain water |
| $\beta_4 x_4$ | Drip irrigation facility | $\beta_{11} x_{11}$ | Growth promoters |
| $\beta_5 x_5$ | Biodynamic farming practice | $\varepsilon$ | Error |

Source: Field Survey.

## RESULTS AND DISCUSSION

The current situation in sustainable grape farming practice in agricultural activity significantly affects sustainable indicators as income source.

**Table 2Determinants of Sustainable Grape Farming Practices in Vijayapur district Coefficients[a]**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| $\beta_0$ | 0.930 | 0.137 | - | 6.773 | .000 |
| $\beta_1 x_1$ | 0.159 | 0.061 | 0.276 | 2.598 | .010 |
| $\beta_2 x_2$ | 0.200 | 0.064 | 0.282 | 3.145 | .002 |
| $\beta_3 x_3$ | 0.151 | 0.049 | 0.352 | 3.081 | .002 |
| $\beta_4 x_4$ | 0.295 | 0.044 | 0.454 | 6.732 | .000 |
| $\beta_5 x_5$ | -0.393 | 0.081 | -0.231 | -4.873 | .000 |
| $\beta_6 x_6$ | 0.241 | 0.051 | 0.283 | 4.756 | .000 |
| $\beta_7 x_7$ | -0.419 | 0.063 | -0.488 | -6.624 | .000 |
| $\beta_8 x_8$ | 0.047 | 0.093 | 0.021 | .501 | .617 |
| $\beta_9 x_9$ | 0.027 | 0.016 | 0.082 | 1.714 | .088 |
| $\beta_{10} x_{10}$ | 0.061 | 0.018 | 0.182 | 3.392 | .001 |
| $\beta_{11} x_{11}$ | -0.057 | 0.054 | -0.089 | -1.072 | .285 |

a. Dependent Variable: Income

According to Table 2, it shows coefficients. From that coefficients study developed multiple regression model. The unstandardized coefficients in the regression equation were each statistically significant as these result shows. Study based on Sustainable Grape Farming Practices of the Multiple Regression Model used the standardized coefficients for Farmer Education Level ($\beta_1 x_1 . 0.276, p < .010$), Awareness of sustainable farming ($\beta_2 x_2 . 0.282, p < .005$), Improved cultivation practices ($\beta_3 x_3 . 0.352, p < .005$), Drip irrigation facility ($\beta_4 x_4 . 0.454, p < .001$), Biodynamic farming practice ($\beta_4 x_4 . 0.454, p < .001$), Biodynamic farming practice ($\beta_5 x_5 . -0.231, p < .001$), Bio intensive Integrated Pest Management ($\beta_6 x_6 . 0.283, p < .001$), Promoting energy efficiency in farming operations ($\beta_7 x_7 . -0.488, p < .001$), Land development activities ($\beta_9 x_9 . 0.082, p < .010$), Farm ponds for percolation of rain water and ($\beta_{10} x_{10} . 0.182, p < .001$). Therefore, $x_1$, $x_2$, $x_3$, $x_4$, $x_5$, $x_6$, $x_7$, $x_9$ and $x_{10}$ variables are statistically significant because calculated $|t|$ is greater than table 't' value at 1%, 5% and 10% . Hence, these factors influencing on sustainable farming. Another, Enhancing soil carbon sequestration ($\beta_8 x_8 . 0.021, p > .001$) and Growth promoters ($\beta_{11} x_{11} . -0.089, p > .001$)variables are statistically not significant because calculated $|t|$ is less than the table 't' value at 1%, 5% and 10% .

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.908[a] | 0.825 | 0.818 | 0.294 |

a. Predictors: (Constant), $x_1$, $x_2$, $x_3$, $x_4$, $x_5$, $x_6$, $x_7$,$x_8$,$x_9$,$x_{10}$,$x_{11}$

The model summary$R^2$provides the proportion of variation in the dependent variable that is explained by the independent variables in the model. It observed that 81.8% of the variance in sustainable grape farming practices is explained by the variance in the variables.

**ANOVA[a]**

| Model | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 117.108 | 11 | 10.646 | 123.575 | .000[b] |
| Residual | 24.812 | 288 | .086 | | |
| Total | 141.920 | 299 | | | |

a. Dependent Variable: Income; b. Predictors: (Constant), $x_1$, $x_2$, $x_3$, $x_4$, $x_5$, $x_6$, $x_7$,$x_8$,$x_9$,$x_{10}$,$x_{11}$

ANOVA results observed sustainable agriculture practice significantly predicted farmer's income generation. The results of the regression indicated the eleven predictors explained 90.80% of the variance ($R^2$=0.825, F(11,288)=123.575, p<.01). It was found that sustainable agriculture practice significantly predicted farmers' income generation.

## CONCLUSION:

Sustainable Grape farming practice consist of three basic approaches to grow variety of grapes such as conventional, organic, and biodynamic. The key to sustainable agriculture is finding the right balance between the need for food production and the preservation of environmental ecosystems. The multiple aspects of sustainable farming system and applied it to practice based sustainability mentioned determinants with stakeholder participation in income generation through grape farming production with transformation sustainable development at a regional scale. Sustainable agriculture also promotes economic stability for farms and helps farmers to better their quality of life.

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