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# GRAPE PRODUCTION CRITICAL REVIEW IN THE WORLD

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## ABSTRACT

Grapes are a non-Climatic type of fruit, generally occurring in clusters. The cultivation of the domesticated grape began 6,000–8,000 years ago in the Near East. Yeast is one of the earliest domesticated microorganisms, occurs naturally on the skins of grapes, leading to the discovery of alcoholic drinks such as wine. It is very important fruits and give more income to farmers than the other crops. Seeing to its importance, the present study was carried out since May, 2020. The universe of the study was the world. The major objective was to review the grape production in the world. Secondary day was used and total 31 articles were downloaded from the net and critically reviewed in depth and result was concluded. The result indicated that grapes are grown over the whole world. China, France, United America, South Africa, Italy, Chile, Iran, Turkey, Spain and Argentina are top ten countries in the world. In 2017 the China production was 13,083,000 tones and the South Africa was 2,032,582. The China production was on the top while the South Africa Production was at the 10<sup>th</sup> number in the world. Similarly the world top ten varieties are Cabernet Sauvignon which is grown on 840,000 acres area in the world while Merlot area is 657,300 acres. Similarly the Tempranillo area is 570,800 acres Airén, 538 700 acres, Chardonnay 518,900 acres, Syrah, 470 000 acres. The Grenache Noir area is 402,780 acres, Sauvignon Blanc, 299 000 acres, Pinot Noir, 285,000 acres , Trebbiano Toscano / Ugni Blanc, 274,300 acres. Airén is a white grape used a lot in Spain, often for quite unpretentious wines. Tempranillo is also Spanish but more famous, especially if you are a fan of Rioja. Tempranillo and Airén are very dominant in Spain. They are planted on almost 45% of the Spanish Vineland. Rrebbiano in Italy is the same as Ugni Blanc in France. In Italy, it is responsible for many white wines of rather a bland character. In France, it is used for Cognac and the producers there like it precisely for its blandness. But it does make a good Cognac. Grapes are grown in all countries of the world and give more money than the other crops to farmers. In Pakistan in the Area of Shekhpura one farmer told that it give 14 times more income than the wheat. In Pakistan it is mostly grown in Baluchistan while in Sind area some projects are working for grape production enhancement. Similarly grape has some essential elements which play great role in health problems. From grapes wines are prepared which give more income to European countries. It needs very less water till maturity. It has two types namely table grapes and non table grapes in the world. It also help in diabetes and blood pressures while play great role in heart problems. In France more people use grapes so there the problems of heart is very less than the other countries. Resvratrol also present in the grape which has anti-cancer properties and is very healthy for the glands and large intestine. “It is also beneficial to combat heart diseases, diseases of the nervous system, Alzheimer’s disease, viral infections and fungal infections. Resveratrol reduces the risk of paralysis by improving the molecular mechanism in the veins. So the discussion shows that grape is very important fruit of the world while sometime it is called king of the fruit. .According to the Food and Agriculture Organization (FAO), 75,866

square kilometers of the world are dedicated to grapes. Approximately 71% of world grape production is used for wine, 27% as fresh fruit, and 2% as dried fruit. Raw grapes are 81% water, 18% carbohydrates, 1% protein, and have negligible fat. The farmers of the world are very poor and have no access to credit, so it is requested of the world bank to give proper loan to the world farmer for grapes grown, to in time purchase the inputs and in time marketed to the consumers in the world to earn money for their farming uplifting. Some pest also attacked on the grape and decreases the production of the farmer. The grape leaf hopper is the common insect pest feed on the vines from the time leaves appear in the spring until they drop in the fall. They remove the green chlorophyll, and the whole leaf may become pale, die and turn brown. Powdery mildew is a fungal disease prevalent on grapes. Any portion of plant such as leaves, blossom, fruit and young shoots may be affected. A white patch appearance may be noted on leaves young shoots; blossom fails to set fruit. Young berries attacked by this fungus may drop, or become hardened, discolored and cracked. To control powdery mildew apply fungicides before symptoms appear. Root knot caused by a gall-forming nematode may become a problem in sandy and sandy loam soil, resulting in a decline in vine vigor and reduction in yields. Resistant rootstocks should be used for grape production. Through fumigation the disease of the grapes should be controlled. So it is the duty of the government to controls the mentioned problems in their countries for enhancing of grape production. Every government should focus on this fruit and arrange propagation program in their countries because it give more benefit to the farmers instead of Wheat. Through this way industries will be developed and employment will be generated which play great role in the solution of unemployment problem in the country. In European countries the government mostly focuses on this fruit while in developing countries the program for grape is very slow, so it is the duty of every government in the world to spend more money on grape for enhancing grape industries in the developing countries. They are very poor and they have no access to credit and because of less money they did not start the grape program on their farm.

Key Words:- Review, Grape, Production, World

## 1. INTRODUCTION

A grape is a fruit, botanically a berry, of the deciduous woody vines of the flowering plant genus *Vitis*. Grapes can be eaten fresh as table grapes or they can be used for making wine, jam, grape juice, jelly, grape seed extract, raisins, vinegar, and grape seed oil. Grapes are a non-climatic type of fruit, generally occurring in clusters. The cultivation of the domesticated grape began 6,000–8,000 years ago in the Near East. Yeast, one of the earliest domesticated microorganisms, occurs naturally on the skins of grapes, leading to the discovery of alcoholic drinks such as wine. The earliest archeological evidence for a dominant position of wine-making in human culture dates from 8,000 years ago in Georgia. The oldest known winery was found in Armenia, dating to around 4000 BC. By the 9th century AD the city of Shiraz was known to produce some of the finest wines in the Middle East. Thus it has been proposed that Syrah red wine is named after Shiraz, a city in Persia where the grape was used to make Shirazi wine. Ancient Egyptian hieroglyphics record the cultivation of purple grapes, and history attests to the ancient Greeks, Phoenicians, and Romans growing purple grapes both for eating and wine production. The growing of grapes would later spread to other regions in Europe, as well as North Africa, and eventually in North America. In North America, native grapes belonging to various species of the genus *Vitis* proliferate in the wild across the continent, and were a part of the diet of many Native Americans, but were considered by

early European colonists to be unsuitable for wine. In the 19th century, Ephraim Bull of Concord, Massachusetts, cultivated seeds from wild *Vitis labrusca* vines to create the Concord grape which would become an important agricultural crop in the United States. Grapes are a type of fruit that grow in clusters of 15 to 300, and can be crimson, black, dark blue, yellow, green, orange, and pink. "White" grapes are actually green in color, and are evolutionarily derived from the purple grape. Mutations in two regulatory genes of white grapes turn off production of anthocyanins, which are responsible for the color of purple grapes. Anthocyanins and other pigment chemicals of the larger family of polyphenols in purple grapes are responsible for the varying shades of purple in red wines. Grapes are typically an ellipsoid shape resembling a prolate spheroid. Raw grapes are 81% water, 18% carbohydrates, 1% protein, and have negligible fat. A 100 gram reference amount of raw grapes supplies 69 calories and a moderate amount of vitamin K (14% of the Daily Value), with no other micronutrients in significant content. Most grapes come from cultivars of *Vitis vinifera*, the European grapevine native to the Mediterranean and Central Asia. Minor amounts of fruit and wine come from American and Asian species such as: *Vitis amurensis*, the most important Asian species.; *Vitis labrusca*, the North American table and grape juice grapevines (including the Concord cultivar), sometimes used for wine, are native to the Eastern United States and Canada; *Vitis mustangensis* (the mustang grape), found in Mississippi, Alabama, Louisiana, Texas, and Oklahoma; *Vitis riparia*, a wild vine of North America, is sometimes used for winemaking and for jam. It is native to the entire Eastern United States and north to Quebec; *Vitis rotundifolia* (the muscadine), used for jams and wine, is native to the Southeastern United States from Delaware to the Gulf of Mexico. According to the Food and Agriculture Organization (FAO), 75,866 square kilometers of the world are dedicated to grapes. Approximately 71% of world grape production is used for wine, 27% as fresh fruit, and 2% as dried fruit. A portion of grape production goes to producing grape juice to be reconstituted for fruits canned "with no added sugar" and "100% natural". The area dedicated to vineyards is increasing by about 2% per year. There are no reliable statistics that break down grape production by variety. It is believed that the most widely planted variety is Sultana, also known as Thompson Seedless, with at least 3,600 km<sup>2</sup> (880,000 acres) dedicated to it. The second most common variety is Airén. Other popular varieties include Cabernet Sauvignon, Sauvignon blanc, Cabernet Franc, Merlot, Grenache, Tempranillo, Riesling, and Chardonnay. Commercially cultivated grapes can usually be classified as either table or wine grapes, based on their intended method of consumption: eaten raw (table grapes) or used to make wine (wine grapes). While almost all of them belong to the same species, *Vitis vinifera*, table and wine grapes have significant differences, brought about through selective breeding. Table grape cultivars tend to have large, seedless fruit with relatively thin skin. Wine grapes are smaller, usually seeded, and have relatively thick skins (a desirable characteristic in winemaking, since much of the aroma in wine comes from the skin). Wine grapes also tend

to be very sweet: they are harvested at the time when their juice is approximately 24% sugar by weight. By comparison, commercially produced "100% grape juice", made from table grapes, is usually around 15% sugar by weight. Seedless cultivars now make up the overwhelming majority of table grape plantings. Because grapevines are vegetatively propagated by cuttings, the lack of seeds does not present a problem for reproduction. It is an issue for breeders, who must either use a seeded variety as the female parent or rescue embryos early in development using tissue culture techniques. There are several sources of the seed lessness trait, and essentially all commercial cultivators get it from one of three sources: Thompson Seedless, Russian Seedless, and Black Monukka, all being cultivars of *Vitis vinifera*. There are currently more than a dozen varieties of seedless grapes. Several, such as Einset Seedless, Benjamin Gunnels's Prime seedless grapes, Reliance, and Venus, have been specifically cultivated for hardiness and quality in the relatively cold climates of northeastern United States and southern Ontario. An offset to the improved eating quality of seedlessness is the loss of potential health benefits provided by the enriched phytochemical content of grape seeds. In most of Europe and North America, dried grapes are referred to as "raisins" or the local equivalent. In the UK, three different varieties are recognized, forcing the EU to use the term "dried vine fruit" in official documents. A *raisin* is any dried grape. While *raisin* is a French loanword, the word in French refers to the fresh fruit; *grappe* (from which the English *grape* is derived) refers to the bunch (as in *une grappe de raisins*). A *currant* is a dried Zante Black Corinth grape, the name being a corruption of the French *raisin de Corinthe* (Corinth grape). *Currant* has also come to refer to the blackcurrant and redcurrant, two berries unrelated to grapes. A *sultana* was originally a raisin made from Sultana grapes of Turkish origin (known as Thompson Seedless in the United States), but the word is now applied to raisins made from either white grapes or red grapes that are bleached to resemble the traditional sultana. Grape juice is obtained from crushing and blending grapes into a liquid. The juice is often sold in stores or fermented and made into wine, brandy, or vinegar. Grape juice that has been pasteurized, removing any naturally occurring yeast, will not ferment if kept sterile, and thus contains no alcohol. In the wine industry, grape juice that contains 7–23% of pulp, skins, stems and seeds is often referred to as "must". In North America, the most common grape juice is purple and made from Concord grapes, while white grape juice is commonly made from Niagara grapes, both of which are varieties of native American grapes, a different species from European wine grapes. In California, Sultana (known there as Thompson Seedless) grapes are sometimes diverted from the raisin or table market to produce white juice. Winemaking from red and white grape flesh and skins produces substantial quantities of organic residues, collectively called pomace (also "marc"), which includes crushed skins, seeds, stems, and leaves generally used as compost. Grape pomace – some 10–30% of the total mass of grapes crushed – contains various phytochemicals, such as unfermented sugars, alcohol, polyphenols, tannins, anthocyanins, and numerous other compounds, some of which are harvested

and extracted for commercial applications (a process sometimes called "valorization" of the pomace) Anthocyanins tend to be the main polyphenolics in purple grapes, whereas flavan-3-ols (i.e. catechins) are the more abundant class of polyphenols in white varieties. Total phenolic content is higher in purple varieties due almost entirely to anthocyanin density in purple grape skin compared to absence of anthocyanins in white grape skin. Phenolic content of grape skin varies with cultivar, soil composition, climate, geographic origin, and cultivation practices or exposure to diseases, such as fungal infections. Muscadine grapes contain a relatively high phenolic content among dark grapes. In muscadine skins, ellagic acid, myricetin, quercetin, kaempferol, and trans-resveratrol are major phenolics. The flavonols syringetin, syringetin 3-O-galactoside, laricitrin and laricitrin 3-O-galactoside are also found in purple grape but absent in white grape. Muscadine grape seeds contain about twice the total polyphenol content of skins. Grape seed oil from crushed seeds is used in cosmeceuticals and skincare products. Grape seed oil, including tocopherols (vitamin E and high contents of phytosterols and polyunsaturated fatty acids such as linoleic acid, oleic acid, and alpha-linolenic acid. Resveratrol, a stilbene compound, is found in widely varying amounts among grape varieties, primarily in their skins and seeds. Muscadine grapes have about one hundred times higher concentration of stilbenes than pulp. Fresh grape skin contains about 50 to 100 micrograms of resveratrol per gram. Comparing diets among Western countries, researchers have discovered that although French people tend to eat higher levels of animal fat, the incidence of heart disease remains low in France. This phenomenon has been termed the French paradox, and is thought to occur from protective benefits of regularly consuming red wine, among other dietary practices. Alcohol consumption in moderation may be cardioprotective by its minor anticoagulant effect and vasodilation. Using grape leaves in cuisine (Dolma). Although adoption of wine consumption is generally not recommended by health authorities, some research indicates moderate consumption, such as one glass of red wine a day for women and two for men, may confer health benefits. Alcohol itself may have protective effects on the cardiovascular system. The consumption of grapes and raisins presents a potential health threat to dogs. Their toxicity to dogs can cause the animal to develop acute kidney failure (the sudden development of kidney failure) with anuria (a lack of urine production) and may be fatal. Christians have traditionally used wine during worship services as a means of remembering the blood of Jesus Christ which was shed for the remission of sins. Christians who oppose the partaking of alcoholic beverages sometimes use grape juice or water as the "cup" or "wine" in the Lord's Supper. The Catholic Church continues to use wine in the celebration of the Eucharist because it is part of the tradition passed down through the ages starting with Jesus Christ at the Last Supper, where Catholics believe the consecrated bread and wine *literally* become the body and blood of Jesus Christ, a dogma known as transubstantiation. Wine is used (not grape juice) both due to its strong Scriptural roots, and also to follow the tradition set by the early Christian Church. The Code of Canon Law of the Catholic

Church (1983), Canon 924 says that the wine used must be natural, made from grapes of the vine, and not corrupt. In some circumstances, a priest may obtain special permission to use grape juice for the consecration; however, this is extremely rare and typically requires sufficient impetus to warrant such a dispensation, such as personal health of the priest. Although alcohol is permitted in Judaism, grape juice is sometimes used as an alternative for kiddush on Shabbat and Jewish holidays, and has the same blessing as wine. Many authorities maintain that grape juice must be capable of turning into wine naturally in order to be used for kiddush. Common practice, however, is to use any kosher grape juice for kiddush. <https://en.wikipedia.org/wiki/Grape>. Seeing to its importance the present study was arranged to critically review the production of the grape fruit in the world.

## **1. MATERIAL AND METHODS**

Grapes play great role in the development of a world. The cost of per acre is very less while its production value is more than the other crops of the world per acre. First of all it was initiated in Europe but latter on it spread to other countries of the world. The universe of the study was the world. Total 31 articles were downloaded from the net and no changes were taken place in the downloaded literature and critically reviewed many times and concluded the result.

## **2. PAST LITERATURE OF GRAPE PRODUCTION IN THE WORLD**

- i. Khan(July 16, 2019) told that grapes are an important fruit and play a good role in the healthy development of the human body. Often referred to as the ‘Queen of Fruits’, grapes have no parallel in taste and flavour. Botanically a berry, this sweet, and sometimes sour, fruit was exclusively cultivated in colder areas of the country before it was grown in the warmer plains of Punjab last year. This year, it was successfully grown in Sheikhpura. Farmers in Sheikhpura said that growing local grapes is a profitable business where one can earn millions of rupees from just one acre of land due to a good crop turnover. They owe it to the taste, which allows local gardeners to make decent returns on the crop. The Sheikhpura Agriculture Department has imported many types of grape seeds from overseas and gave it to landlords who are interested in gardening. The department also guided them so that maximum production can be achieved in the province. Sheikhpura Agriculture Department Assistant Director Arif Siddiqui said that the production of grapes in warmer areas has paid off thanks to the efforts of the research wing of the agriculture department. He added that the plant of grape starts bearing fruit three years after planting and it continues to do so for around 50 years. “It is amazing that one plant produces grapes for 50 years. This proves that it is profitable for business.” A landlord from Sheikhpura named Allah Data, who takes interest in gardening, planted grape saplings on around 12 acres of land. He also hired

employees for taking care of the plants. He said, “Despite the high cost of planting, I am expecting good rewards for my efforts.” Pakistan’s grapes are cultivated on a 15,302 hectare area, where annual productivity is 64,317 tonnes. Balochistan grows most of the grapes. However, with the efforts of local agriculture institutes, the province grew grapes at a larger scale last year in the warmer areas of Multan, Bahawalpur and Rahim Yar Khan. Grapes were then grown in Sheikhpura this year. Just a few years ago, the prospect of cultivating grapes in northern parts of Punjab was unimaginable, but environmental changes were made after the World Bank and the provincial government joined hands to improve farming standards and usher in new farming technologies. The Punjab Irrigated Agriculture Improvement Programme selected a few lucky farmers who became part of the first phase of implementation of grape farming in the province. The initiative was funded by the World Bank with a loan of \$250 million. The provincial government then offered 60% subsidy to farmers for introducing new techniques. In order to qualify, the farmer had to contribute 40% to the cost, which alone made most farmers ineligible due to very high equipment charges upfront. However, the programme was meant to offer an opportunity to small farmers to adopt modern technologies to cope with the growing water crisis, besides increasing agriculture yield. Grape cultivation through drip irrigation benefits the farmer, as well as the country, as the technique saves about 50% of water and about 45% of fertiliser costs. There is also a near 100% increase in per acre yield. This year, the agriculture department has initially introduced five types of grapes including King Ruby, Sugarone, Flame Seedless, Vitro Black and Thompson Seedless and the experiment of cultivating these five types of seed in the region has been successful so far. The department provided complete guidance to the farmers. Sheikhpura Khadija Polyclinic CEO and Physician Dr Tariq said that a substance called resveratrol found in grapes is an extremely powerful anti-oxidant. He added that resveratrol also has anti-cancer properties and is very healthy for the glands and large intestine. “It is also beneficial to combat heart diseases, diseases of the nervous system, Alzheimer’s disease, viral infections and fungal infections. Resveratrol reduces the risk of paralysis by improving the molecular mechanism in the veins.” <https://tribune.com.pk/story/2014100/1-grape-cultivation-gains-momentum-sheikhupura/>

- ii. Aujla et al (2007). analyzed that there are many constraints hindering the true potential of the country’s fruit production and exports. This study was specifically designed to examine the trends in fruit production, consumption and trade; describe existing fruit marketing system; identify constraints in fruit marketing systems and promoting exports; and propose measures for improving and enhancing their international competitiveness. Market information received by producers are always partial and sketchy. Resource poor farmers under-invest in farming inputs like pesticides and



fertilizers that leads to lower yields and poor quality products. Advance sales are also a root cause of financial constraints amongst farmers. Scarcity in storage and transportation infrastructure resulted in 25-40 percent postharvest losses that shrinks supply and put pressure on prices. The prevention of such losses would further improve exportable surplus and their international competitiveness. Farmers just receive one-fourth of consumers' price, whereas lion's share goes to other market traders. In order to lower the shares of middlemen in consumer's rupee, access to credit and market information, control over the output losses, improvements in market infrastructure and cheaper availability of transport and packing material is needed. Fruit markets are not perfectly competitive. There is a need to improve efficiency and effectiveness to promote export of fruits. A product-specific market development strategy needs to be initiated with the active participation from the production and marketing systems.

- iii. Khan et al (2011) told that seven grape varieties ('Black Prince', 'Gold', 'Dehkani', 'Cardinal', 'Shamas Guru', 'King's Early' & 'Anab-e-Shahi') were evaluated for their pheno-physiological characteristics grown under the agro-climatic conditions of Faisalabad. 'Anab-e-Shahi', 'King's Early', 'Dehkani' and 'Cardinal' were observed as late maturing varieties and thus become un-suitable for cultivation in Punjab due to early occurrence of monsoon rains. The varieties 'Black Prince', 'Dehkani' and 'Shamas Guru' exhibited early fruit maturity and ripening. The vines of 'Black Prince' acquired minimum days from bud sprout to ripening (77 days) as compared to all other varieties. Berries of variety 'Shamas Guru' exhibited highest weight (4.5 g) followed by 'Black Prince' (2.86 g) and 'Gold' (2.5 g). 'Anab-e-Shahi' produced highest bunch weight (490.12 g) and yield (14.9 kg per vine) as compared to all other varieties. Maximum number of bunches per vine were exhibited by 'Gold' (41) and minimum in 'Cardinal' (24). The berries of 'Black Prince' exhibited highest soluble solids concentration (SSC) (23.5%), SSC: titratable acidity (TA) ratio (99.3) and lowest TA (0.24%) as compared to all other varieties. The varieties 'Cardinal' and 'Shamas Guru' produced berries with maximum amount of ascorbic acid (23.3 mg 100 g<sup>-1</sup>) and total sugars (13.83%), respectively. 'Black Prince' being early maturing variety with large berry size, loose bunch and better SSC: TA ratio is a potential table-grape variety to be cultivated under the agro-climatic conditions of Faisalabad.
- iv. INP , (LAST UPDATED AUGUST 14, 2013) noted that Officer Harvest Tradings Chief Executive Ahmad Jawad said Balochistan produces nearly one million ton of fruits annually with 90 per cent of grapes, cherry, almonds; 60 per cent of peach, pomegranate, apricot; 34 per cent of apples, and 403,584 ton dates. Talking to Quetta Women Chamber of Commerce Founder President Fehmida Jamali, Jawad said Balochistan had tremendous potential for developing fruit farms. He said serious efforts should be made towards bringing about a shift from traditional to technology-based farming as

various studies reveal that a large quantity of fruits was lost due to various reasons beginning from their production points till they reach the costumer. On the occasion, Fehmida Jamali said that local farmers were faced with a plethora of problems from planting to the marketing of their products as they lack essential facilities and infrastructure to market their products and earn profits. Moreover, the absence of cold storages and air-conditioned transportation facilities for fruits like grapes also increase the risks of damage to fruits. Soil test also needs to be conducted on regular basis at the time of planting a fruit crop. For instance, planting season for apple crop in Northern Balochistan commences from February 15 to March 15. There is also a need to ensure supply of fertilisers to the fruit growers at subsidized rates.” “What is direly needed is to enable the farmers to sell their produce directly eliminating the role of middlemen in the marketing channel,” Jawad said. Jawad further suggested that the government should provide relief to the local growers; All efforts were needed to be directed for bringing about a shift from traditional to a technology-based farming system, he added. Fehmida Jamali requested the government that they should extend credit to small farmers especially women for horticulture and empowering the women development sector as lack of finance does not enable the cash-starved small farmers to harvest and market their fruit crop.

- v. Zahor (2007) analyzed the present Country Report reviews the current status of Plant Genetic Resources in Pakistan, focusing on (i) State of diversity, (ii) In situ management, (iii) Ex situ management, (iv) State of use, (v) National programs, trainings and legislation, (vi) Regional and International collaboration, (vii) Access to genetic resources, sharing of benefits arising out of their use and farmers’ rights, and (viii) Contribution of Plant Genetic Resources management to food security and sustainable development. Pakistan is endowed with rich resource base of plant genetic resources due to wide variations in soil and climate, its location in proximity to three of the major centers of diversity described by Vavilov (China, Indian subcontinent and Central Asia) and centre of diversity itself of many crop species. The country possesses many species of wild relatives of domestic crops, particularly of cereals and chickpea. There has been a catastrophic loss in agricultural biodiversity during the last three decades due to introduction of improved varieties in major crops like wheat, rice, cotton, chickpea and maize. Due to little varietal improvement work in minor or under utilized crops, there still exists a lot of diversity in mung bean (*Vigna radiata*), mash (*Vigna mungo*), brassicas complex, sorghum, millet and horticultural crops. The awareness created by various public and private organizations about the importance of plant genetic resources has attracted the attention of researchers, planners and NGOs for in situ and ex situ conservation and sustainable utilization of these resources. For ex situ conservation, the national program on collection, conservation and evaluation are underway but more needs to be done to fill in the gaps in collection

from various areas of the country particularly for the wild relatives of crop plants. An important step in ex situ conservation of plant genetic resources is the establishment of National Program on Conservation of Plant Genetic Resources at National Agricultural Research Centre, Islamabad which has been able to conserve more than 23 000 accessions of various crops including major, minor and medicinal plants. The national program on PGR has a Genebank along with six laboratories for (i) exploration and collection, (ii) seed conservation, (iii) in vitro conservation, (iv) germplasm evaluation & characterization, (v) plant introduction and seed health and (vi) data management. The PGRP has the national mandate on conservation, evaluation and distribution of germplasm. This national program is supported by six Crop Advisory Committees which help to identify the priority areas of collection and germplasm needs for specific purposes. Another step recently taken is the establishment of botanical gardens at Islamabad, Lahore and Peshawar. But unfortunately little has been done so far on on-farm management of plant genetic resources. Regarding the utilization of these resources, a number of new varieties of wheat, rice, cotton, maize, sorghum, millet and horticultural crops have been developed which have contributed significantly in food security and sustainable development. Besides high yields, the introduction of these varieties has considerably supported the sustainable management of diseases like the rust in wheat, Aschochyta blight in chickpea, cotton leaf curl virus in cotton and mungbean yellow mosaic virus in mung and mash, as well as better quality in basmati rice. Approximately 2 000 to 3 000 accessions are distributed annually from the collections of the national Plant Genetic Resources Program to scientific community. The information collected from stakeholders during the implementation of the National Information Sharing Mechanism has revealed that the breeders need the germplasm mainly to address a range of biotic and abiotic stresses. In particular, tolerance to drought and salinity are the most demanded characters. Various universities have included courses on Biodiversity Conservation in their syllabi for graduate and post graduate students. Regarding legislation on access to genetic resources, benefit sharing, farmers' rights, much has to be done yet as few national workshops have been held during the last 4-5 years. A draft on access and benefit sharing has been developed and is being considered at the appropriate fora. The National Information Sharing Mechanism on Plant Genetic Resources for Food & Agriculture has been developed and available on PARC website ([www.parc.gov.pk](http://www.parc.gov.pk)). For international collaborations, Pakistan has signed a memorandum of understanding on germplasm exchange with many countries. COUNTRY REPORT ON THE STATE OF PLANT GENETIC RESOURCES FOR FOOD. <http://www.fao.org/3/i1500e/Pakistan.pdf>

- vi. Farzan Penhawar (August, 23, 2007) reported that Sindh has Sub-tropical climate , which is extremely suitable for large number of crops, but the farmers of Sindh are illiterate and they raise

crops just by copying each other and do not take a risk with their investment. Due to this practice the local market is full with conventional fruits and vegetable raised here namely : mangoes, guava, grapefruit, lemon, lime, sapodilla, cherimoya, dates, lychee, papaya, melons and zizyphus mauritania. The net result is a few varieties of each fruit growing over short season and a glut of one or another fruit crops, throughout the year, and consequently low prices. Due to mono-culture all diseases, infection , and viral attacks are frequent, due to cover large area under same crop, and its control become difficult. The solution lies in diversification of crops, with extension of harvest season and new cultivars, especially evolved by breeding , tissue culture , genetic engineering and biotechnology . These would be extremely beneficial, to bring sustainability locally and globally. Agriculture is the backbone of our economy as well as of our foreign trade. To strengthen the economy of Pakistan, one should first of all take necessary steps to reform the agricultural system of the country. This can only be done by educating the farmers in the latest method of cultivation , new developments in agricultural inputs and day to day changes in Agricultural Research arena. If we improve the agricultural sector in Sindh, and improve its economic growth and conditions, this alone can bring the sustainability locally and globally.

- vii. Kakar et al (2015) told that in the globally changing scenario, the importance of agriculture is becoming more and more important to feed the over increasing population of the world. Pakistan is also facing the same problem particularly in the province of Balochistan. The PACCD (Pakistan Agriculture Cold Chain Development) project is working on innovative and updated horticulture interventions to boost the agriculture sector in the province of Balochistan. The finding of PACCD suggested that cultivation of high density, early bearing, innovative and dwarf apple and grapes varieties along with efficient irrigation system could increase profitability and productivity on sustainable basis in the Balochistan province of Pakistan.
- viii. The province of Balochistan, endowed with a unique environment for the production of a great variety of quality fruits, alone has the potential of exporting fruits worth 500 million dollar annually. The province, with diverse climates ranging from temperate to subtropical and tropical, produces nearly one million tonnes of different variety of fruits annually i.e. 90 percent grapes, cherry, and almonds; 60 percent peach, pomegranate, and apricot; 34 percent apples, and is the fifth largest producer of dates with an estimated production volume of 583,000 tonnes. Talking to Business Recorder member export, CEO Harvest Trading, Ahmad Jawad said that Baluchistan had tremendous potential for developing fruit farms. Serious efforts should be made towards bringing about a shift from traditional to technology-based farming. Various studies revealed that a large number of fruits were lost due to various reasons beginning from their production points till they reached the

customer, he said. Local farmers are faced with a plethora of problems from planting to marketing of their products as they lack essential facilities and infrastructure to market their products and earn profits. Baluchistan has the poorest communication and infrastructure system which results in higher post-harvest and transportation losses. Further, long distances and time involved affect the profits made by the farmer which discourages him greatly, he said. Moreover, the absence of cold storages and air-conditioned transportation facilities for fruits like grapes also increase the risk of damage to fruits. Soil test also needs to be conducted on regular basis at the time of planting a fruit crop. For instance, planting season for apple crop in Northern Baluchistan commences from February 15 to March 15. There is also a need to ensure supply of fertilizers to the fruit growers at subsidized rates. Jawad said what is urgently needed is to enable the farmers to sell their produce directly eliminating the role of middlemen in the marketing channel. He suggested that the government should provide relief to the local growers of fruit crops by providing them essential infrastructure facilities like farm to market road, cold-storage houses, and regular and sustainable supply of electricity to enhance production and export of quality fruits through Pakistan Horticulture Development and Export Company (PHDEC) who had the mandate to promote horticulture export sector and provincial government. All efforts are needed to be directed for bringing about a shift from traditional to a technology-based farming system, he said. He urged that government should extend credit to small farmers for horticulture development with the help of ZTBL. "Lack of finance restricts the cash-starved small farmers to harvest and market their fruit crop. Small farmers' access to loan facility should be ensured to attractions and incentives for the foreign investors. Chinese companies also were successfully working in different sectors there."

- ix. Ahmad (26, july, 2015) told that Sardar Karam Khan, a farmer of village Lund in tehsil Fatehjang, Attock district saw his profits rise to Rs1.3 million this year by growing grapes. harvesting the fruit on his nine acres of land where he once harvested 200 maunds of wheat valued at Rs250,000, he says. "Growing grapes is way more profitable than harvesting wheat." In Pakistan, grapes usually hit the market slightly ahead of the winter season. However, the Potohar plateau has now emerged as the largest producer of grapes during peak-summer season. This year, grapes hit the markets at the beginning of Ramazan in June. Liaquat Ali, another farmer of village Teen Meela in Attock district, has grown grapes in his vineyard spreading over three acres of land. These grapes have been grown for raisins, table grapes and non-alcoholic grape juice. In the 1980s, Italians in collaboration with the National Agricultural Research Centre (NARC) surveyed various ecological zones in Pakistan with respect to grape production. Potohar region was one of the selected regions where scientists recommended varieties like 'flame seedless', King's Ruby', Perlett and NARC black. In 2012,

USAID Agribusiness project evaluated the activity and decided to support the sector through establishment of vineyards over an area of 90 acres. Since 2014, the project supported growers in terms of material and technical trainings. Explaining about the types of grapes produced in the Potohar region, Project Manager USAID Agribusiness Ghani Khan told Dawn, “The grape plants were of American origin, and were researched at NARC and developed to suit the climatic conditions of Potohar region.” “Grapes orchards are being developed on large scale in 291 acres of land in Talagang, Chakwal, Fatehjang, Hazro, Attock and Rewat,” Khan said. Under the project, USAID also provided exotic varieties of ‘vitro black’ and ‘sugar one’ to 50 farmers. He added that the project has now entered into the third year and the response of farmers is very encouraging since they earn more from grapes than from growing wheat. Scott Hocklander, USAID’s Director of Economic Growth and Agriculture, noted that grape growing provides a special advantage for farmers in the Potohar region. “The grape farming in this region enjoys a competitive advantage, since Potohar grapes are harvested before the monsoon season, when grapes from other parts of the country are not yet available,” Hocklander said. According to Sardar Karam, the grape plants start bearing fruits in March, and by June harvesting begins. Last year, grape production was low but this year it is in full bloom. Sardar Karam says he is not familiar with marketing and sold the entire crop to a contractor at a total value of Rs1.3m. He hopes to develop marketing system himself for the next year’s crop. The USAID agribusiness project claims that beneficiaries have enjoyed income up to Rs700,000 per acre which is 14 times more than the average income from wheat crop per acre. As the harvesting of grapes crop was about to close last week, USAID hosted a training session for the farmers that introduced new techniques to produce grapes and ways to connect with merchants, processors, and exporters to better prepare their crops for market. <https://www.dawn.com/news/1196401>

- x. The grape belongs to genus *Vitis* which comprises about sixty species. However, the principal species from which the cultivated grape has been derived is *Vitis vinifera*. There are three broad division of grapes: Dessert grapes, wine grapes and Raisin grapes. Grapes are rapidly becoming a popular home grown fruit. They are consumed fresh, as juices and wine, as raisins, jam and jelly and as frozen products. In Pakistan only european grapes are cultivated for eating. Over 70% of grapes are grown in Balochistan, while there are some acreage in NWFP. Varities: Seedless: Sunda Khani, Sra Kishmish, Askari, Flame seedles and King’s Ruby. Seeded: Haita, Black Prince, Sahihi, Hussaini, and Tando Soil And climate: A deep fertile well drained loamy soil with a moderate amount of organic matter is best. A pH range from 5.5 to 7.0 is satisfactory. On soil low in fertility grapes grow slowly and produce low yield. Heavy clay soil should be avoided. Grapes are grown in mild sub-tropical conditions. They require a winter which is cold enough to fulfill their

chilling requirements. European grapes grow and bear well under a long, warm to hot, dry summer. In Punjab onset of monsoon weather during the ripening period cause the failure of grapes. Propagation: Generally propagated by cuttings. Ripe wood cutting. 12-18 inches long with 5-8 nodes taken from last year's canes of medium thickness are best to ensure their proper rooting. To ensure their proper rooting they may be tied in small bundles and heeled inverted in earth with their bases up lightly covered with soil for a week. Irrigation: Immediately after plantation the grape vines require irrigation. After every 10 days in the first summer. Afterwards they should be irrigated after an interval of 20-25 days in summer and once a month during winter. Fertilizer: Grapes are slow to show the effects of fertilizer deficiencies but lack of fertilizer over a period of years results in a gradual decline in growth and yield. Nitrogen, Phosphorous and Potassium fertilizer should be applied during winter or early spring to maintain the plants. Pruning: Training and pruning depend upon the system you select. Initially your plants should prune to develop a single strong shoot with several well placed laterals. Most common pruning systems in grapes are Head, Cordon and Cane systems. Head system does not need any support, but good results can be achieved in those varieties which bear on the lowest second or third bud. Cordon system requires a two-wire trellis. Select the laterals and train them along the wires. These form the permanent arms of the cordon. Each spring, prune the canes that grow from the cordon back to one or two buds each and thin the upright branches to four or five on each permanent arm. Cane system is similar to cordon system with little changes. Insects Pest And Diseases: The grape leaf hopper: It is the common insect pest feed on the vines from the time leaves appear in the spring until they drop in the fall. They remove the green chlorophyll, and the whole leaf may become pale, die and turn brown. Powdery mildew is a fungal disease prevalent on grapes. Any portion of plant such as leaves, blossom, fruit and young shoots may be affected. White patches appearance may be noted on leaves young shoots; blossom fail to set fruit. Young berries attacked by this fungus may drop, or become hardened, discolored and cracked. To control powdery mildew apply fungicides before symptoms appear. Root knot caused by a gall-forming nematode may become a problem in sandy and sandy loam soil, resulting in a decline in vine vigor and reduction in yields. To control it use resistant rootstocks and fumigate <https://www.pakissan.com/english/allabout/orchards/grap.shtml>

- xi. The compounds resveratrol which are found in grape skins and seeds, could also eventually lead to treatments to help prevent colon cancer, said Jairam K.P. Vanamala, associate professor of food sciences, Penn State. Colorectal cancer is the second leading cause of cancer-related deaths in the U.S., according to the American Cancer Society."The combination of resveratrol and grape seed extract is very effective at killing colon cancer cells," said Vanamala, who is also a faculty member at

the Penn State Hershey Cancer Institute. "And what we're learning is the combination of these compounds is not toxic to healthy cells."The researchers, who reported their findings in a recent issue of BMC Complementary and Alternative Medicine, suggest that the findings could pave the way for clinical testing of the compounds on human colon cancer, which is the second most common cancer in women and the third in men. If successful, the compounds could then be used in a pill to help prevent colon cancer and lessen the recurrence of the disease in colon cancer survivors."We are particularly interested in targeting stem cells because, according to cancer stem-cell theory, cancerous tumors are driven by cancer stem cells," said Vanamala. "Cancer stem cells are capable of self-renewal, cellular differentiation and maintain their stem cell-like characteristics even after invasion and metastasis."When taken separately in low doses, resveratrol and grape seed extract are not as effective against cancer stem-cell suppression as when they are combined together, according to the researchers. The combined effect of grape seed extract and resveratrol may offer clues as to why cultures with a plant-based diet tend to have lower colon cancer rates, said Vanamala. These diets may naturally be providing a shotgun approach to cancer prevention by using a wide variety of beneficial compounds to target multiple pathways that cancer stem cells use to survive."This also connects well with a plant-based diet that is structured so that the person is getting a little bit of different types of plants, of different parts of the plant and different colors of the plant," said Vanamala. "This seems to be beneficial for not only promoting bacterial diversity, but also preventing chronic diseases and eliminating the colon cancer stem cells."If successful in human trials, the compounds could be taken in low doses using currently available supplements for grape seed extract and resveratrol, which are also found in wine. However, he added that there is still more work to do to understand the mechanism behind the anti-cancer properties of the grape extract, as well as other colorful fruits and vegetables. Further research would be aimed at finding specific anti-cancer compounds and better understanding how those compounds work synergistically to create more effective colon-cancer prevention and treatment strategies. For the animal study, the researchers separated 52 mice with colon cancer tumors into three groups, including a control group and groups that were fed either the grape compounds or sulindac, an anti-inflammatory drug, which was chosen because a previous study showed it significantly reduced the number of tumors in humans. The incidence of tumors was suppressed in the mice consuming the grape compounds alone by 50 percent, similar to the rate in the group consuming the diet with sulindac.

<https://www.sciencedaily.com/releases/2017/06/170619101829.htm>

- xii. Rehman et al. (2018) conducted study at Agriculture Research Institute Tarnab under the Annual Developmental Program (ADP) of KP. There were seven grape varieties under the characterization



study, i.e. Kings Ruby, Abasin-2000, Fazil Shah, NARC, Babar House, Attock Collection, Cardinal Italia. He was involved as internship student in this study. The data concerning the berry morphology of grape varieties indicated that oval shape berries were observed in kings Ruby, round shape in Babar House, NARC, and Abasin-2000, elongate shape in Cardinal Italia, while oblong shape in Fazil Shah. Fruit skin color was observed red in kings Ruby, Babar, NARC, and Abasin-2000, golden in Italia, whitish green in Fazil Shah. Whitish flesh color was observed in Kings Ruby, cardinal. Soft flesh was observed in Kings Ruby while firm flesh was noted in Italia, Fazil Shah. Kings Ruby and Fazil Shah had very sweet taste, Babar, NARC, Attock, and Abasin-2000 had sweet taste, whereas Italia had less sweet taste. Kings Ruby had excellent eating quality followed by Fazil Shah. Loose bunch were observed in Italia, Fazil Shah. Semi compact bunch were observed in Kings Ruby, attock, Abasin-2000. Very compact bunch were observed in Babar. Kings Ruby, Abasin-2000, Fazil Shah, Attock are seedless. NARC was less seedy. Babar and Italia are seeded. Red fruit colors were observed in Kings Ruby, NARC, and Attock. Kings Ruby and Abasin are early maturity. Maximum bunch weight (1329 gm) was recorded in Abasin-2000. Minimum bunch weight (165gm) was noted in Italia.

xiii. It is very popular crop in the world and commercially grown in most countries. It is a perennial and deciduous woody climbing vine. It is a good source of vitamin B and minerals such as calcium, phosphorus, and iron. Grapes are used for raw eating and are used for making various products such as jelly, jam, raisins, vinegar, juice, seed oil and grape seed extracts. Grape farming is mainly done in France, USA, Turkey, South Africa, China, Portugal, Argentina, Iran, Italy, and Chile. Among these China is the largest country doing grape farming. It also has health benefits such as it is used to control diabetes, relieves from asthma, heart issues, constipation, bone health etc. It is also useful for skin and hair health related issues. Thrips Flea, Beetle leaf, Roller Yellow, red Wasp Wild, Boar termites, caterpillar and the grape leaf hopper are the popular while fungal diseases are powdery mildew, mildew anthracnose Downy and Mildew Root knot. Similarly bacterial disease is Crown Call and weed also affect the grape production. Grapes varieties and per acre plants is given in the Appendix table-1 [https://www.zarat.kp.gov.pk/crops/view\\_crop/35](https://www.zarat.kp.gov.pk/crops/view_crop/35)

xiv. Earliest evidence of grape vine cultivation and winemaking dates back 7,000 years. The genus of grapes is *Vitis* which contains about 60 species, but the *Vitis vinifera* is the principal species from the cultivated grapes which has been derived. Dessert grapes, wine grapes and Raisin grapes are three broad divisions of grapes. Grapes are swiftly becoming a popular home grown fruit. They are consumed fresh, as juices and wine, as jam, raisins and jelly and as frozen products. European grapes are cultivated for eating in Pakistan. Over 70 per cent of grapes are grown in Baluchistan and

some districts of Khyber Pakhtunkhwa with annual production of 122,000 tons having average yield of 19 tons/ha against the potential of 25 tons/ ha. Balochistan shares 30 and 14 per cent of the total fruit area and production of Pakistan, respectively during 2000-10. The market value of these fruits produced during 2009-10 is estimated at about 97 billion rupees which is roughly 8 per cent of agriculture value added in the year. Worldwide post-harvest fruit and vegetables losses are as high as 30 to 40 per cent and even much higher in some developing countries. If we have suitable cultivar and weather, then grapes can also be grown in central Punjab. But monsoon rains at the time of berry ripening is the main barrier in successful cultivation of grapes in central Punjab. But grapes can be cultivated absolutely everywhere in Pakistan as a result of localized climatic and soil conditions. In Pakistan main varieties of grapes which are seedless and they are worldwide famous for their taste and quality these are Sunda Khani, Sra Kishmish, Askari, Flame seedles and Kings Ruby, but some grapes varieties are seeded and these are classified on their growth pattern and the area of cultivation Haita, Black Prince, Sahihi, Hussaini, and Tando these are grown in Pakistan. Grape vines flourish in most soil conditions because their roots never waterlogged: Stony soil, sandy soil, even clay soil as long as drainage is good, are all ideal for viticulture as grape vine cultivation is correctly known. A deep fertile well drained loamy soil with a moderate amount of organic matter is best for the grapes. On soil low in fertility grapes grow slowly and produce low yield. Heavy clayey soil should be avoided. A pH range from 5.5 to 7.0 is satisfactory. Grape vines need approximately 1300-1500 hours of sunshine during the growing season. The optimum temperature is 22 °C during the growing season, summer that allows the grapes to ripen fully and to develop a balance between the levels of acids and sugars in the grape. Hot and sunny climates have a frost-free growing season of 200 days or more which help the grapes to grow properly. Generally growing of grape vines were done by propagation and mostly by cutting methods. Take sections of the canes from healthy, moderately vigorous vines while they are dormant. This can be either in late fall or in early spring before growth starts; early spring is preferred because once the cuttings have leafed out and formed roots they can be placed outside, first in the shade, and then planted out in the vineyard. Cut the sections directly from the vine or from brush that has recently been pruned off. Make cuttings three nodes long with the bottom cut (the portion that will form roots) just below the bud or node and the upper cut at an angle of about 45 degrees,  $\frac{3}{4}$  to 1 inch above the bud or node. Place the cuttings with the second bud from the top at soil level and cover with loose soil. After the cuttings have adjusted to the outside environment, they can be planted in the vineyard. It is important not to let the cuttings dry out during this process. Select a location in full sun, or place pots/containers where they get maximum sunshine. Irrigate the vineyard after 10 days intervals during the first summer and 20-25 days after the summer.

Fertilizer like N: P: K is very important for the growth of vineyard of grapes early in the winter to maintain the plants. Pruning, which is done in the late winter, is the most important operation in grapes culture. Training and pruning depend upon the system you select. Initially your plants should prune to develop a single strong shoot with several well placed laterals. Most common pruning systems in grapes are Head (main stem is trained straight upward), Cordon (main trunk is 2.5 – 3.5 meters long and trained horizontally) and Cane systems (4-6 fruit trunks are raised. These methods were used for pruning of grapes vineyard. Grapes will only ripen on the vine. As they ripen, the sugar content rises to about 20 per cent. Harvest table grapes when the flavor is right; harvest wine grapes when they reach the appropriate sugar content. Factors responsible for pre-harvest and post-harvest losses Both biotic and abiotic factors are liable for the quality of grapes. The climatic variations in grape-growing regions accounts for the diversity of grapes germplasm. Berries quality and other viticulture products. Effect of climatic conditions on the chemical characteristics and nutritional quality of grapes. Environmental components such as temperature, sunshine, rain, soil and combinations of chemical composition effect on the grapes juice. Climate plays an important role for berry maturity, ripening, development of physical, as well as chemical characteristics of the berry quality such as size, colour, aroma, accumulation of anthocyanin. Diseases of grapes downy mildew (*Plasmopara viticola*), powdery mildew (*Uncinula necator*), grey mold (*Botrytis cinerea*), anthracnose (*Elsinoe ampelina*), black rot (*Guignardia bidwelli*) and crown gall (*Agrobacterium vitis*) are the major grape diseases which is the main hurdle of grapes vineyard and its production. Improper management techniques for grapes vineyards. Integrated pest management. Post-harvest losses. Primary factors responsible for post-harvest produce losses are: poor pre-harvest measures-adoption of poor production techniques. Environmental conditions. Mechanical damage during harvesting and handling. Improper post-harvest sanitation. Physiological decay. Poor cooling and environmental control in storage houses. Non-availability of suitable post-harvest technologies and infrastructure. Moisture condensation causing pathogen infestation, packaging in bulk without sorting and grading of grapes. Fresh grapes after harvest are either dipped in chemicals or are sprayed with them to kill fungus. It is estimated that 9 to 16 per cent of the product is lost due to post-harvest problems during shipment and handling. These losses occur not only in developing countries. It is estimated that postharvest losses in developed countries are an average of 12 per cent from production to retail warehouses, and an estimated 20 per cent at retail stores and food service sites. Solution of these problems. Selection of varieties for better shelf life. Modeling cultivating conditions for high quality and long life. Pre-Harvest application of fungicides. Pre-harvest application of growth Harmon. Pruning and training in time. Scouting of the field for the inspection of diseases. Uses of integrated

pest management techniques. Use sterilized material during all method of handling. Propagation, Pruning. Training and packing. Objective determination of suitable harvesting date. Post-harvest application of calcium chloride. Post-harvest application of chemical increase the shelf life. Improves the sanitation, refrigerating and cooling in store house. Use fumigate in store house before storing the fruits. Fundamental research on senescence, ripening, respiration, ethylene effect, chilling, fermentation, superficial browning <https://www.technologytimes.pk/2013/09/19/grapes-harvest-problems-and-solutions/>

xv. MULTAN: In order to highlight the importance of grapes and their role in the healthy development of body, a workshop was held at Muhammad Nawaz Sharif University of Agriculture on Sunday. While addressing the participants, Muhammad Nawaz Sharif University of Agriculture Vice-Chancellor Dr Asif Ali emphasized the importance of grapes. He said the basic purpose of the workshop was to share the knowledge between growers and researchers for resolving the problems regarding production, protection and postharvest handling of grapes. Dr Ishtiaq Ahmad Rajhwana briefed the participants about general issues of future prospects of grapes. He maintained, "Post harvest losses are high so value addition is the need of the hour to introduce a stable market for growers." He said the food and nutrition department officials were trying to develop a technology for grape juice extraction as industries in Pakistan import grape concentrate for making nectar rather than using fresh grapes from local markets. <https://tribune.com.pk/story/1246311/workshop-importance-grapes-highlighted/>

xvi. Italy and France, the world's two largest grape producers, have cultivated the fruit for centuries on end. Grapes are a popular agricultural crop all over the world. There are more than 10,000 different varieties of grapes worldwide, which are consumed in a variety of forms. Whole grapes intended for fresh consumption are called "table grapes." Grapes can also be dried to make raisins, preserved in jams and jellies, or crushed to make juice. Global grape production currently amounts to more than 75 million metric tons per year. Today there are well over 18 million acres of cultivated vineyards worldwide. [Italy](#) produces the majority of the world's grapes, with an annual grape production of 8,307,514 metric tons. [France](#) and the [United States](#) aren't far behind, with annual productions of 6,740,004 and 6,206,228 metric tons, respectively. [Spain](#) and China each produce well over 5 million metric tons each year. [Turkey](#) produces 3,763,544 metric tons annually. [Argentina](#), [Iran](#), and Chile have an annual output of more than 2 million metric tons, and South Africa produces a solid 1,587,913 metric tons each year. Much of the world's grape cultivation is intended for the production of wine, and nearly all of the countries on this list are among the world's top wine producers. Over 60% of the world's wine is consumed within Europe, with Italy, Spain, and France dominating the

world's wine export market. Over half of the world's wine is exported from these three countries. Italy is home to more than one million vineyards located in almost every region of the country, and wine has been produced here for thousands of years. Starting in the second century BC, the Romans pioneered techniques of large-scale wine production and developed innovative storage solutions for barrel making and bottling. France. Nearly all of the world's most popular wine grapes are French varieties, having either originated in France or become famous through French winemaking. Many of these grape varieties are household names to wine consumers, including Cabernet Sauvignon, Chardonnay, Merlot, Sauvignon Blanc, Pinot Noir, and Syrah. The French are prolific wine consumers as well as producers, drinking nearly 74,000 gallons of wine in 2014. Spain, due to its ideal Mediterranean climate, is also one of the top grape-producing countries in the world. Table grape production amounts to between 120,000 and 140,000 metric tons annually. The United States is the third largest grape producing country in the world, after France. Nearly a million metric tons of US grapes are produced for eating, around one-seventh of the country's output. Argentina is an emerging player on the international wine market. It is also the seventh largest grape producing country in the world. Vine cuttings were introduced to Santiago del Estero in 1557, and grape cultivation quickly spread to neighboring regions and, later, to other parts of the country. Although [Chile](#) ranks ninth in grape production, the country is a world leader in table grape exports. Over 800,000 metric tons are exported each year, primarily to North American and European markets. Chile and many common French grape varieties such as Cabernet Sauvignon, Merlot, Carmenère, and Franc were introduced to the region in the mid-19th century. Asia, Africa, And The Middle East. [China](#) has recently become one of the world's biggest grape producers. The country is home to world's second largest wine growing area, comprised of nearly two million acres of vines. Wine production is second to table grapes, which are consumed in the country or shipped to Southeast Asia. [South Africa](#) has been producing wine since the mid-17th century. Most vineyards and are concentrated around Cape Town. Iran and Turkey Iran and Turkey are two countries with high levels of grape production despite the fact that very little of Turkey's population consumes wine, and wine consumption is illegal in Iran. But both countries have an ideal climate for grape cultivation and produce massive amounts of table grapes and raisins. Which Country Grows the Most Grapes? Italy grows the most grapes out of any country in the world, followed by France and the United States. Apendex Table 2.

- xvii. Shinde (2016) analyzed that grape is important fruit in India. The Grape (*Vitis vinifera*) is basically a sub- tropical crop but in India, grapes are cultivated for their excellence also under tropical conditions. The project studied the traditional and modern technologies used in Grapes

Horticulture .Modern technologies includes Drip Irrigation, Organic Farming, Water Management i.e. Rain Water Harvesting, Temperature Inform System, Labour Training etc. It is concluded that Modern technology is highly beneficial for Horticulturists.

<https://www.rsisinternational.org/Issue24/69-71.pdf>

xviii. Maria (2018) wanted to discover the influence of grape production and consumption on the market price. In the analysis, reference was made to both table grapes and wine grapes. The first part of the paper analyzed the grape offer, analyzing the cultivated areas and the production obtained from them. Both grape and wine grape varieties oscillated during the analyzed period, generally having a slight downward trend, even though the total cultivated area increased during the study period. Also in this first part of the analysis, besides the offer, the demand for grapes on the market was also assessed as the average annual consumption. It has seen an increasing trend over the period under review with an average growth rate of 4.17%. The average of this consumption was 6.4 kilograms of grapes per capita. In the second part of the study, grape prices for both table and wine were analyzed, even if the table was much higher than the latter, the price of grapes recorded a high volatility, and this has to be considered and analyzed, given that the grapes for wine have a share of over 95% in the total surface area and production. Analyzing the components of demand and supply, ie consumption and cultivated area or production, which one of them influences most the price of grapes on the market, the correlation coefficient was calculated, as it was expected, the price of grapes was influenced more of the market offer differently depending on the category of grapes, so for table grapes representing about 5% of the offer on the grape market, there was a coefficient of -0.51, but it was significant, as the increase of the offer the price decreases, and vice versa, and for the price of grape wine, which represents the majority of the grape market offer, the correlation coefficient was - 0.85, which is a close correlation between the grape price and the market offer, but an inversely proportional relationship as was economically natural.

<https://www.econstor.eu/bitstream/10419/205100/1/ICEADR-2018-p151.pdf>

xix. Linda et al (2017) told that in recent decades grape production has been developing in some municipalities in Northeastern Brazil as a well-organized, competitive and high value industry. Although so far a few municipalities are involved, the Northeastern viticulture industry has become a model for the whole Brazil and has been identified as a production district. Given the importance of agriculture in the economy of the region our study aims at analyzing whether the grape producing activity affects some socio-economic indicators, namely the Theil index, the Human Development Index (HDI) and the unemployment rate over the period 2000-2010. The study is focused on the Northeastern states of Bahia and Pernambuco, two of the poorest and with the highest income

inequality among Brazilian States and combines the Difference-in-Differences with the Propensity Score matching method at the municipality level. Results seems to indicate that grape growing plays an important role to guarantee a fairer income distribution. Indeed, the municipalities that grow grape experience a decrease in the level of Theil index by 11.7% compared to the level they would have if they had not participate in grape production. No effect has been found on the HDI and on the unemployment rate. Results are robust to the potential presence of an hidden bias according to the Rosenbaum sensitivity analysis. <https://ideas.repec.org/p/ags/aiea17/261264.html>

- xx. Wine may represent the most expensive and creative use of grapes, but it is not the only use. Eaten fresh as table grapes, dried as raisins or processed into jams, jellies and juices, grapes are thought to have been first cultivated more than 7,000 years ago near present-day Iran. Grape leaves are also used in a variety of cuisines. Spanish friars are credited with bringing European varieties to the United States to serve at the missions they settled across California and the southwest beginning in the 1700s. California's climate provided ideal grape-growing conditions, and consequently it became the leading grape-growing state. During 2017, more than 7.36 million tons of grapes were grown commercially in the United States. California accounted for nearly 6.48 million tons, or 88%, of these grapes. Other top grape-growing states include Washington and New York (NASS). The USDA, National Agricultural Statistics Service (NASS) collects grape production data from 13 states: Arkansas, California, Georgia, Michigan, Missouri, New York, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Virginia and Washington. Most other states produce grapes but their production data is not collected by NASS. The annual Noncitrus Fruits and Nuts report contains the NASS Grape production data. NASS reports the U.S. had 1,000,700 million bearing acres producing an average of 7.36 tons/acre, valued at 6.46 million in 2017. Major Grape Uses Values: Canned: 16,000 tons, Juices: 451,900 tons, Wine: 4,665,250 tons, Dried: 1,464,100 tons. Most of these grapes produced on a large scale are marketed to supermarkets or exported. However, other marketing opportunities are available to small-scale producers of varieties that do not travel well, such as Reliance or Marquis, at local farmers' markets, small artisanal food stores, white table cloth restaurants and direct sales through u-pick and the Internet. While grapes will grow in most climate zones in the United States, the types of grapes grown for wine, eating or juices are have a much more limited growing area. Before planting any commercial vineyard, consult an expert in viticulture in your area. Even in areas where the desired grape will grow, it is important to place the vineyard on the correct type of soil, with proper wind and water drainage, fertility, sub-soil make-up, facing the sun. Selection of the types of grapes to produce will depend on what the market wants to buy. Market research is the most important step in starting a new vineyard. Wine makers buy only the types of grapes needed to make their wine.



Develop a strong relationship with any buyers before planting. A mistake now will take 10 years to fix later. Grapes are the fruit of a vine plant and grown in a field called a vineyard. The vines planted in rows evenly spaced six to 10 feet apart with 6 to 10 feet between each row. A wire trellis supports the vines above the ground for ease of caring for the vines and harvesting of the grapes. A vineyard can easily cost \$15,000 an acre to establish before the first harvested in the third or fourth year after planting plus the cost of the land. Vineyards produce a very high value crop. Timely applications of fertilizers, herbicides, insecticides, fungicides and pruning activities are a must to protect the crop. Other risks come from birds and deer attacking the crop at the pike of value that must be controlled. A vineyard manager will inspect orchards or fields to determine crop maturity or condition or to detect disease or insect infestation. Direct crop production operations, such as planning, tilling, planting, fertilizing, cultivating, spraying, or harvesting. Monitor activities such as irrigation, chemical application, harvesting, milking, breeding, or grading to ensure adherence to safety regulations or standards. Plan crop activities based on factors such as crop maturity or weather conditions. Maintain financial, operational, production, or employment records for farms or ranches. See more occupations related to this task. Obtain financing necessary for purchases of machinery, land, supplies, or livestock. Inspect farm or ranch equipment to ensure proper functioning. Negotiate with buyers for the sale, storage, or shipment of grapes. Analyze soil to determine types or quantities of fertilizer required for maximum crop production. Evaluate marketing or sales alternatives for products. Prepare budgets or financial reports for farm or ranch operations. A vineyard is a very labor-intensive farming business. Much of the work is by hand and in all kinds of weather, mostly hot and humid. Vineyards are springing up in every state of the nation. Talk to other vineyards about the availability of vineyard workers. While grapes will grow in most climate zones in the United States, the types of grapes grown for wine, eating or juices are have a much more limited growing area. Before planting any commercial vineyard, consult an expert in viticulture in your area. Even in areas where the desired grape will grow, it is important to place the vineyard on the correct type of soil, with proper wind and water drainage, fertility, sub-soil make-up, facing the sun. <https://www.agmrc.org/commodities-products/fruits/grapes>

xxi. Seccia et al (June, 2015) reported that international trade in table grapes has expanded tremendously over the last few decades, with out-of-season fresh produce now being traded and consumed globally. Trade intensification has been driven by emerging traders who have changed the economic geography of table grape production. Improving competitiveness in global markets is a driving objective for entrepreneurs and policy makers. However, while the global trade in table grapes has become very important, empirical papers on the topic are limited. In this study, the authors



investigate the global dynamics in the trade of table grapes between 1961 and 2011 and characterize the time series properties of the market shares for leading table grape-exporting countries. The analysis shows how trends in the market shares of historical exporters and emerging countries have changed over the past few decades. The paper provides new and useful insights for forecasting the prospects for the international fresh food trade. Traditionally grown in just a few countries, table grapes are now cultivated globally. Driven by the need for year round consumption, they are now a seasonally adjusted product. During the past few decades, new players have entered the global market, with China now the main world producer accounting for almost 12% of global production, while Chile is the main exporter, accounting for over one-fifth of the world's exported grapes. Our results show that market shares have changed considerably over the last decades and that the dynamics substantially differed along the decades. In particular, European countries, the main players during the 1960s, have considerably reduced their market shares, with a sharp decline starting in the late 1980s. On the other hand, the increasing process of trade liberalization has fostered the competitiveness of emerging countries, which have made improvements in the quality of production, in their supply chain techniques and in shipping and transportation logistics. As a result, the market shares of European producers have been eroded by new competitors; the USA is the only producer which has managed to maintain its market share over time. In the northern hemisphere, new competitors are China, Egypt, India, Mexico and Turkey, while in the southern hemisphere, along with the two main competitors Chile and South Africa, emerging players are Argentina, Brazil and Peru. This study has some limitations. First, our dataset included annual data collected over a 50-year period for more than 20 countries. Although we rely on a long time series and account for more than 80% of global trade, our results may not capture intra-seasonal dynamics that might reveal heterogeneous comparative competitiveness during.

[file:///C:/Users/ok/Downloads/Secciaetal\\_OOAJune2015.pdf](file:///C:/Users/ok/Downloads/Secciaetal_OOAJune2015.pdf)

- xxii. Milić et al (2016) told that wine production in Serbia has a long tradition. Serbia has great potentials for the production of grape and wine, but they are at a low level of utilization. Grape production in Serbia takes place on only 25,000 ha with an average annual production of 285,571 tons of grapes with variations according to year. The vineyards and wine production are in a significant decline, while the main bearers of production are small family households or individual producers. The research presented in this paper is the economic characteristics of grapes production in the region of South Banat, Vršac wine-growing region, which occupies 81.2% of the total vineyard area in this part of AP Vojvodina. Grape production in Serbia takes place at only 25,000 ha with an average annual production of 285,571 t of grapes with year to year variations. In the total production

of grapes in Europe, Serbia participates with two per cent and is in 12th place when it comes to production. Despite very favorable conditions for grape growing, production and consumption of grapes and wine in Serbia is not satisfactory. Area under vineyards in Serbia, as well as wine production is significantly decreasing, while individual producers are in a rather unfavorable position. Wine growing is a highly intensive branch of agriculture, which requires significant investment capital as well as extensive labor work per unit of product. Despite that fact, studies show that Serbia needs less investment per hectare of vineyards than in other EU countries. The poor state of viticulture in Serbia is influenced by old age of vineyards and high vineyard amortization, abandonment of sloping terrain and plants unsuitable for the application of machinery, lack of favorable agricultural loans for establishing new plantations and for the purchase of modern machinery for vineyards, unfavorable varietal structure, and the lack of funds improving viticulture and ecology at the individual sector.

xxiii. Analyzing the grape production for “Nedin” winery in the period from 2012 to 2014 shows that the yields ranged from 6,500 kg/ha to 8,000 kg/ha with the highest total yield achieved in 2013. The yield varies from year to year as a result of specific conditions in agriculture. In the reporting period an average yield was 7,167 kg/ha and the average selling price was 66.54 din/kg. Average annual value of production was 469,530 dinars/ha, while the average cost of production for the reporting period amounted to 330,420.00 din/ha. Grape is a profitable product, as evidenced by the average income earned per hectare – 139,110 dinars/ha. The largest annual profit in grape production was achieved in 2014 - 185,042.00 dinars/ha. Production costs are high, material and labor costs have a dominant share in total costs up to 85%. In the analyzed period, the largest share was accounted by material costs with an average of 34%, most of which is the usage of NPK fertilizer, costs of plant protection (herbicides, insecticides and fungicides) and then other material costs. Average cost of wages was 30%, due to high labor requirements, especially in matters of pruning and harvesting. In addition to these, costs of services accounted for 19% of total costs. Average coefficient of economy for the analyzed period from 2012 to 2014 was 1.42. In 2014, coefficient of economy was highest (1.55), which was a result of high production value (high selling price of grapes). Bearing in mind the fact that analyzed winery can be used as a representative farm household for South Banat region, results of the analysis can conditionally be applied to the entire region. A study conducted by the Lake Erie Concord Grape Belt Heritage Association, with assistance from Cornell University and Pennsylvania State University, confirms that grapes are an important foundation of the economies of Chautauqua County, New York, and Erie County, Pennsylvania. Each year, about 800 growers produce 150,000 tons or more of grapes on 30,000 acres of vineyards. Value added products like

juices, jellies, and dozens of other products, are processed locally and sold across the United States and exported around the world. In addition, the local wine industry, including both growers and vintners, is undergoing rapid expansion and creating opportunities for increased destination-based tourism in the region. This value-added chain has a substantial impact on the region's economy. Based on survey and secondary data collected and processed using IMPLAN economic impact software, the researchers estimated that grape-related production activities (i.e., growing, processing and wineries) supported 1,923 jobs and contributed \$340 million in total economic impact to the two-county economy in 2004. They estimated that total fruit and vegetable processing annually support 5,281 jobs and contributes over \$1 billion to the two-county region by processors who became established here largely because of the grape industry. Supported by some of the largest grape-juice and winery operations in the world and dozens of allied support businesses, the Lake Erie Concord Grape Belt is home to one of the largest fruit processing industry clusters in the eastern United States. The industry is the economic backbone of the towns and villages in the region, and contributes substantially to the economies of the two counties and states of the region. The Lake Erie Concord Grape Belt has faced many challenges over its more than 200 year history. The industry has been and continues to be successful because of its strong infrastructure and ability to adapt to change. Cooperation among industry producers and processors, the development of leading edge technologies by Cornell and Penn State Universities, and the adoption of these technologies by producers, have all been major factors in the success of the industry. An example is the recent commitment of over \$5 million by the state of New York to build a new research and extension education facility in the region. *SUMMARY TABLE explain that* Jobs Supported was 1,923 while Total Economic Impact was \$340 million [ Total Economic Impact is the total value of sales generated by juice processors, growers and other businesses from whom they purchase}; similarly Wages paid was \$54 million; Number of Producers was 800; Bearing Acres was 30,000 ;Retail Value of Juice Sales was \$208 million; Retail Value of Wine Sales was \$17.5 million; Wine-related Tourist Visits was 35,000. <https://www.grapediscoverycenter.com/economic-impact-study>.

xxiv. Grape is one of the most important fruit crops of the world and it contains many of the most valuable elements necessary for life. The crop has a wide adaptability, and grapes can be grown under temperate, sub-tropical and tropical climatic conditions and varied agro-ecological settings. The food, nutrition, medicinal and economic values of the crop could be of significant importance for the population of the Region. Therefore, the Consultation recommended that every effort should be made to realize the full agricultural potential of the crop. Remarkable success has been achieved in grape production and productivity levels in certain countries of the Region (such as India and

Australia), while in other countries the progress is very limited. The opportunities for further development of the grape industry appear to be very good. However, at the same time the problems to be addressed are many and serious. There is, therefore, a need for the various countries to consider taking appropriate action to address the existing problems to the extent possible. The number of grape cultivars throughout the world is very large but in many countries in the tropical zone only a relatively small number of cultivars are present and have been evaluated for suitability to local climatic conditions. The introduction of many cultivars (table, wine and raisin) for field evaluation under local conditions was considered an important objective for the advancement of grape industries throughout the Region, in producing fresh and processed grape products of a quality which meets the requirements of specific markets. The opportunity exists for the field evaluation to occur through a collaborative effort involving interested countries, to address common problems whilst also addressing the individual needs of each country's industry. Some countries in the Region have many grape cultivars and could become a germplasm resource for other countries. Also developing linkages with cultivar-rich countries outside the Region would provide an additional supply of cultivars for evaluation of their suitability to local growing conditions. Several countries in the Region have grape breeding programmes notably Japan, the Republic of Korea, Viet Nam, China and Australia. Currently each breeding programme is operating in isolation to achieve objectives specific to the industry in that country. There exists the opportunity for communication and information sharing between grapevine plant breeders in the Region as well as exchange of genetic material to enhance both the individual breeding programmes and quality of cultivars grown by the industry. However, the need to recognize breeder protection rights over their genetic material must be recognized and may make access to new grape cultivars too expensive for some countries. In both breeding and the evaluation of existing cultivars the attributes sought are high bud fruitfulness under tropical conditions, disease resistance, and productivity, despite increased vine vigor (e.g. Marroo Seedless). All grape producing countries in the Region have one or more soil derived problems, notably phylloxera, nematodes, salinity, drought and adverse soil chemistry, which impinge upon successful grape production. Some countries in the Region have experience in the ability of rootstocks to tolerate adverse soil conditions and the positive impact of rootstocks on fruit quality and vine fruit yield. These countries also have a large number of rootstocks whereas most countries in the Region have only a few. The introduction of many rootstocks into countries throughout the Region and their evaluation for suitability under local conditions to fulfill industry requirements was considered an important objective. Initially this could be achieved through collaboration between those countries with the diversity of grapevine rootstocks and those countries with production

problems that potentially can be overcome through the use of appropriate rootstocks. Grapevine plant material used in countries throughout the Region was either of unknown health status or known to be infected with specific micro-organisms (viruses, mycoplasmas, bacteria) which are detrimental to vine performance. A supply of grapevine plant material free of debilitating organisms is critical for the development of a successful grape industry. Techniques for determining the virus status (Elisa, PCR) and controlling debilitating organisms (hot water treatment) are available in several countries throughout the Region. It is feasible for these techniques to be transferred to other countries in the Region for further dissemination by local staff. In addition, grapevine material of a higher health status available in some countries could be introduced to those countries in the Region requiring improved plant material. Several production issues were highlighted as constraints to grape production in the Region. These were understanding and managing vine nutrition in the tropics, efficient irrigation management, manipulation of bud burst, optimizing crop load, maximizing bud fruitfulness, managing flowering, fruit set and berry growth and effective practices for grape production under protected (temporary and permanent) systems. The need to determine the nutrient requirements of vines under tropical conditions and petiole interpretation standards for the accurate monitoring of vine nutrients status was identified as important for effective and efficient vine nutrition management. This has implications for fruit quality, cost of production and environmental preservation. Water resources in many countries are limited and water quality is often declining (salinity), hence the need to increase water use efficiency. Firstly, it is necessary to quantify the amount of water required under each local growing condition for optimum yield and fruit quality. Subsequently, an efficient irrigation programme will have to be developed and the grape grower trained in the use of irrigation scheduling. Some countries are experienced in irrigation scheduling and sharing of their knowledge could expedite achieving greater water use efficiency and sustained grape production. The factors affecting bud break under tropical conditions are not well understood yet poor bud break has a huge impact on vine productivity and hence profitability of the grape grower. This is a major problem affecting all countries in the Region with grape production in hot environments. A collaborative effort to understand the physiology involved and subsequently the development of management practices to optimize bud break would have a considerable impact upon industry viability. Under tropical conditions efforts to increase vine yield often lead to other problems of fruit quality (water berry, low sugar concentration). To increase yield but still achieve desired fruit quality and harvest time it is necessary to determine maximum crop load in relation to leaf area index (LAI). Many of the table grape industries throughout the Region have a narrow market window, outside of which competition from other fruits or adverse weather conditions affects price and fruit

quality. Knowledge of the factors contributing to floral initiation in the tropics is poor and in many countries there is a lack of vineyard management practices that enhance floral initiation. To increase vine yield it is important for grape growers to be able to successfully manipulate floral initiation. Several problems were identified with flowering, berry set and berry growth, all of which impinged upon fruit quality and yield. It was considered important to develop labour saving practices (chemical treatments and other techniques) for cluster elongation, flower thinning and berry sizing. Some countries have progressed in developing chemical treatments (GA, BA, and CPPU) and a large amount of work has also been undertaken in the temperate zones. However, it was noted much higher rates of GA are usually required under hot and humid conditions common in the Region, compared to levels used in temperate climates. Several countries have developed protected culture of table grape, both permanent and temporary coverings, to improve fruit quality, reduce pesticide applications and prevent rain damage to fruit. Yet the production techniques need further refinement to overcome several problems associated with protected culture. This in turn will improve the viability of grape production and enable the grower to meet the additional cost of the protective cover. For each of the previously mentioned vineyard management problems limiting grape production, research is being conducted in one or more of the countries in the Region. The forum concluded that there were opportunities for collaboration between countries to maximize the outcomes from individual efforts and that this would enhance development of the grape industries in the Region. The high use of chemical pesticides, current spray practices and the spray equipment used has led to chemical residues on the fruit and a reluctance of consumers to purchase grapes, as well as poor control of pests and diseases and increased pressure on the environment. Many advancements in grape production will result from improved grower knowledge of the weather conditions conducive for disease and pest outbreaks, the critical times to apply sprays for effective control, and selection of the appropriate chemical for each disease/pest. Training of grape growers in the safe handling of chemical pesticides is required to reduce the risk of contamination, both to the environment and vineyard workers. Improving the knowledge of grape growers in the critical factors in preparing spray solutions (water quality, solution pH) will increase the efficacy of pesticides applied in controlling the target disease or pest. The reluctance of grape growers in several countries to adhere to the chemical registration and safe use of chemicals was considered to be a major contributing factor to high residues on fruit in the market. The forum recognized a change in grower attitude was necessary and that this could be facilitated both through grower training and greater implementation by governments of residue testing of fruit. Several countries in the Region have strengths in training of growers in pesticide application. The forum concluded that improvements in pesticide use were

vital for the success of the grape industries in the Region. Several examples in the Region of successful biological control of pests were noted. The forum agreed it was important to identify locally occurring parasites and predators for the biological control of pests. Further, the greater adoption of integrated pest management (IPM) by growers was seen as important for minimizing chemical use and residues on fruit, which in turn will reduce the cost of production and increase consumption. To achieve this will require a change in attitude of growers. Disease forecasting models currently being used in several countries should be further refined for accuracy under local conditions and made available to countries in the Region. However, for maximum grower adoption such models must be simple to use and affordable. The forum recognized that developing and encouraging organic grape production would be important for future viability of regional grape industries. The quality of table grapes in several countries is adversely affected by the lack of cool storage infrastructure, lack of a continuous cool chain from vineyard to consumer and inadequate sulphur dioxide technology. If these issues are not addressed, the long-term viability of regional grape industries will be at risk. Imported table grapes of superior quality have already eroded the market share of the local industry in some countries in the Region. The forum recognized the need to establish cool storage infrastructure close to vineyards as well as cooling facilities throughout the supply chain to provide optimum post-harvest temperature for grapes. It was noted that in some countries most problems with sulphur dioxide (SO<sub>2</sub>) damage was caused by breaks in the cool chain. Training of growers and packers in the correct use of SO<sub>2</sub> releasing pads and cool handling of grapes could minimize the loss in fruit quality. It was noted that developments in SO<sub>2</sub> technology and packaging have been made in other countries, and concluded that to evaluate and modify these technologies for local conditions would be the most cost effective strategy for countries in the Region. The health benefits of moderate wine consumption were noted. However, this benefit is not widely known within the populations of many countries and could be promoted to enhance wine consumption. Well developed wine industries are present in some countries but are absent or relatively small in others. For successful wine industries to develop in these countries the winemaking skills of winemakers must be improved. The opportunity exists for countries aiming to develop a wine industry to utilize the experience and training programmes in winemaking available in other countries with well developed wine industries. In some countries, a change in government policy is needed in order to promote the health benefits of wine over other alcoholic beverages for the development of the wine grape industry. Juice production was not common in the Region and is the smallest of the viticulture industries. The quality of grape juice is often variable and inferior which results in reduced consumption and consumer acceptance of the product. Modern equipment and

training to improve juice-making skills of operators was considered vital for the production of nutritious, good quality grape juice. There is also the opportunity for other value-added grape products to be developed. Export trade in grape products (wine, table grapes, raisins) by countries in the Region was relatively small, with many countries requiring imports to satisfy local demand. However, exports are an important means of increasing the wealth of a country and consequently should be encouraged and assisted wherever possible. A major impediment to growth in exports of table grapes was the lack of market intelligence and local contacts, as well as understanding of local business and cultural practices. The forum considered that those countries whose objective is to increase grape exports should develop the necessary market intelligence. It was noted that locally produced wine, table grapes and raisins sold in the domestic market now face strong competition from high quality imported products. Hence, for the long-term viability and survival of grape industries in the Region it is necessary for grape growers and winemakers, to produce a product that is both cost and quality competitive. This will require the development of cost effective production practices and technologies adapted to regional conditions. Over-supply of table grapes, particularly in short supply seasons, seriously reduces price and grower income. Development of production practices to spread the supply season was considered important for sustaining the income of grape growers and industry viability. Forum recognized that there was considerable potential for the development and long-term viability of the viticulture industries in most countries throughout the Region. To achieve this goal it is important to identify in each country the districts with the climate and soils suitable for successful grape growing. It was noted that these optimum growing conditions will vary for grape type (wine, table, raisin). Once identified it is necessary to encourage grape growers to establish vineyards in the preferred districts, where production costs are least and high fruit quality can be achieved. The identification of locally suited multipurpose varieties which can be used for table, wine and raisin production is desirable, as this would improve the economic stability of grape growers and hence industry viability. The development and expansion of wine grape industries in most countries of the Region is highly promising because of the anticipated large increase in local wine consumption. Currently wine imports are required to satisfy this increasing demand. In several countries consumers prefer imported wines as locally produced wine is more expensive and of inferior quality. The forum strongly advised that in countries with developing wine industries, cost effective production practices should be developed and training undertaken to improve the skills of winemakers. This will enable industries to achieve the potential for growth and increase the value of the local economy. Collaboration between countries in the Region was encouraged instead of individual efforts. The limited experience and viticulture knowledge of



scientists and advisors working in the grape industries was recognized as a constraint to growth of the industry in several countries. Training of scientists and production viticulturists is vital if growth and development of the grape industries is to be achieved. Several countries in the Region have well developed grape industries and viticulture education programmes. Staff and grower exchanges for training in viticulture was considered an effective way of improving the knowledge of grape specialists and ultimately promote development of the industry. It was proposed that the information presented at the Consultation be collated and published in the form of proceedings, which can subsequently be distributed to the grape growing countries of the Region. It was noted that despite the efforts of most countries to upgrade aspects of grape production, there are still many constraints hindering further development. Most of the problems appear to be common to all countries. The Consultation therefore recommended that assistance should be sought for the formulation, funding and implementation of a Regional Project to address the existing problems. The possibility of setting up a Network for Research and Development of the Grape Industry in Asia was discussed during the meeting. It was felt that such a Network may facilitate pooling and sharing of resources for the development of viticulture. The Consultation endorsed this approach for Regional Cooperation and recommended the establishment of such a Network. It is expected that if a Regional Project on Viticulture is implemented it will eventually lead to the establishment of a Regional Network.

<http://www.fao.org/3/x6897E/x6897e0c.htm>

- xxv. Delay et al (2015) told that a certain degree of variation in grape composition and wine flavour is normal. For example, the vintage effect describes the differences in quality and typicity between years of the wine from a certain vineyard, whereas the terrier effect describes the variation in flavour between different vineyards, areas or regions. However, long lasting climatic changes have the potential to completely change the characteristics of famous wines. Lack of water or high temperatures will challenge the process of growing wine in Southern areas. The potential of the plants to cope with heat and drought will be highly affected by the soil they grow in. Moderate water stress can be beneficial to make a good wine, which is why in some areas of Southern Europe vines have been planted on comparatively dry and unproductive soils. However, the effects of high temperatures and lack of water will be exacerbated in such poor soils. Environmental factors will cause stress on the plant, which can affect the grapes, ultimately resulting in changes in the wine they produce. These include: Elevated sugar content. To make wine, grapes are fermented by the aid of yeasts, which turn sugar into alcohol. Higher temperatures will activate or accelerate the elaboration of sugar in the grape, leading to a higher sugar content and therefore a higher alcohol content. Reduction in acidity. High temperatures favour a degradation of malic acid in the grapes and the

uptake of potassium in the vines, both resulting in less acidic wines. Acidity adds to the flavour of the wine and helps to preserve it. Modification of the entire taste profile of the wine. Climatic changes also influence the synthesis of aromatic components in the grape (eg polyphenols) which can result in a different flavour of a wine. Loss of color intensity in red wine. High temperatures also affect anthocyanins, the pigments which give red wine its color, resulting in less colourful red wines. The impact of climate change on the amount of grapes the vine produces is difficult to predict due to the large number of variables involved in growing grapes. For example, plant growth in general could benefit from raised levels of CO<sub>2</sub> in our atmosphere, but at the same time heat, drought and solar radiation can have negative effects on plants. Lower yields can be expected in areas that are getting hotter and drier, while yields are likely to increase in regions that are currently below the comfort zone for vines to grow. This is the case in Northern regions such as Champagne in France. Climatic changes not only affect yield and quality, they can also alter the phenology of the vine (the whole cycle of growing grapes). Higher temperatures will result in all phenological states of the plants happening earlier: budding, flowering, grape set, and maturing of the grapes, which can result in changes in the whole management schedule of a vineyard. For example, if a warm winter which causes earlier budding is followed by a warm spring and summer, all phenological stages are earlier. With warmer temperatures resulting in a shift in phenology, the direct impact of climate change is amplified. The increased temperatures due to climate change (eg+ 2°C) encourage the ripening period to occur during a warmer time of the year (eg+ 2°C, resulting in an overall increase of +4°C during the ripening of the grapes). Currently, with an increase in the mean temperature, grapes are harvested about two weeks earlier than compared to the period from 1960-1980. According to current climate models there could be a rise in temperature as high as 3 to 8°C during the period of fruit ripening in France and this continuous rise in temperature may result in an even earlier harvest. Climatic changes could also influence the impact of pests and diseases, such as parasites and fungi (eg mildew), on plants. Not only would certain areas suffer from climates that are more favourable for pests, climate change could also result in a geographical shift in the distribution of insects or fungi, which may cause problems in regions they have so far been absent from. A higher infestation with parasites and diseases could not only be directly be influenced by environmental conditions, but also by an increased susceptibility of the plant to infections as climatic stressors could result in a reduction of the immune response of the plant. This could lead to a higher intensity in labour on the vineyard or an increased use of pesticides. Problems with pests and parasites are more likely to affect Northern areas, where higher temperatures will likely be associated with considerable rainfall, creating a wet

and warm climate favorable for fungi and other pests. <https://www.futurelearn.com/courses/climate-smart-agriculture/0/steps/26593>

xxvi. Factors like climate, weather and soil affect the quantity and quality of the fruit. Heat is essential: the plant uses sunlight and chlorophyll to produce the glucose it needs for growth and vigor by combining CO<sub>2</sub> and water. In simple terms, the goal of viticulture practices is to concentrate the glucose in the fruit, not just in the vine. Left to its own devices, the plant will use all available resources to grow stronger and bigger. It is important to differentiate climate and weather: Climate refers to the average weather characteristics over a period of several years. The changes produced in these characteristics constitute the weather. Types of climate: Continental: Areas located away from large bodies of water. Significant difference in temperature between the hottest and coldest months of the year. Short, warm and dry summers. Cold, severe winters. Maritime: Very little difference in temperature between the warmer and colder months of the year. Rainfall is distributed throughout the year, which has a moderating effect on temperature. Mediterranean: the characteristics of the Mediterranean climate are very similar to those of maritime climates, except that summers are hotter and drier. During its growth cycle, the vine needs an average temperature of 16 to 22°C to undergo photosynthesis. In addition, different varieties need different amounts of heat to reach optimal ripeness. In the wine world, the temperature scale is categorized as follows: Cool: Regions with an average temperature equal to or below 17°C during the plant's growth cycle. Ideal for short-cycle varieties. Mild: Regions with an average temperature of 17 to 18.5°C. Warm: Average temperature of 18.5 to 21°C. Ideal for long-cycle varieties. Hot: Temperatures above 21°C. These regions are not the most suitable for winegrowing. As previously mentioned, light is essential to the vine's development: without light there is no photosynthesis, and the plant dies. The amount of light absorbed by the plant determines the rate of photosynthesis. In other words, the more light there is, the more glucose the plant produces. Excessive sunlight exposure, however, can also be harmful: the skin of the grapes can burn, resulting in a bitter flavor that affects the quality of the wine. The vine grows in soil that consists of differently sized rock particles, humus (decomposing organic matter) and nutrients. The ideal winegrowing soil is nutrient poor, well drained and capable of storing the amount of water the plant needs to grow. Good soil should have the capacity to store sufficient amounts of water at the beginning of the plant's growth cycle to make sure it gets a strong start. In the summer, the plants are subjected to slight levels of water stress after veraison to encourage ripening. The soil should contain small quantities of certain basic nutrients: nitrogen, phosphorus and potassium. If the nutrient levels are very high, the plant grows too vigorously, resulting in an excessively dense canopy. This would prevent sunlight from reaching the grapes and impede their ripening. Did you know that there are

more than sixty different species of grapevine? *Vitis Vinifera*, however, is the only one used for winemaking. Other species (*Vitis Riparia*, *V. Rupestris*, *V. Berlandieri*) originating from North America are used as rootstocks, because they are immune to phylloxera. Although now under control, the pest is still a concern to this day. From a layperson's point of view, the way grapevines are grown and reproduce is quite odd. For example, if we planted a seed—a Cabernet Sauvignon pip—the resulting plant would NOT be Cabernet. In order to propagate a variety, we have to take cuttings from an existing plant which, in turn, derives from a single “mother” plant. The varieties that have managed to thrive in different parts of the world are known as international varieties: Cabernet, Merlot, Syrah, Pinot Noir, Chardonnay, Sauvignon Blanc. As previously mentioned, if the winegrower did not intervene, the plant would direct all of its resources to growing freely. The resulting fruit would be sufficiently ripe to attract birds, but not to make wine. In order to control the plant, a few musts should be kept in mind: These systems determine the direction in which the shoots will grow. The positioning of the vines follows the selected trellising system. This refers to the system of posts and wires that we see in vineyards, which support the vine shoots. Pruning is designed to limit the size of the vine and control yields by eliminating canes and leaves. The goal is to set the number of buds that will subsequently grow out and produce fruit. This involves limiting canopy growth by removing leaves and vine shoots to direct glucose production toward the fruit. It also allows us to increase and improve the fruit's sunlight exposure. The harvest begins when the winegrower and the enologist decide that the grapes have reached the perfect balance between sugar levels and physiological maturity. Sometimes the harvest has to be brought forward to avoid threatening weather conditions. Hail can damage the grapes whereas excessive rainfall fills the berries with water, thus diluting the sugar and affecting the quality of the subsequent wine. Speed is the main advantage of mechanical harvesting. This is particularly advantageous under bad weather conditions in order to avoid oxidation and premature fermentation. In addition, it allows for night time harvesting, which delivers the grapes to the winery at a lower temperature. This means wineries save energy, because the grapes don't have to be chilled prior to fermentation. Mechanical harvesting, however, does not allow for selective grape-picking and collects undesirable grapes, insects, leaves and more along the way. Manual harvesting is slower and demands a bigger workforce, but allows pickers to select the grapes. In addition, whole-cluster harvesting reduces the risk of damage to the fruit. Manual harvests can be performed in all kinds of terrain. In fact, in vineyards located on steep hillsides, manual harvesting is the only option (Mosel, Douro, Northern Rhône.) Oxygen management, sulfur dioxide use and oak influence are common elements in the processes of vinification and aging. Oxygen is a highly reactive gas, which means that when it combines with

other molecules, it alters their properties. Keeping in mind that oxygen oxidizes wine, its proper management is crucial during vinification and aging in order to obtain the desired result. If we're looking to preserve varietal aromas then oxygen should be avoided at all cost. Remember: as wine oxidizes, it loses its fruit aromas. In order to avoid this, the grapes are kept cool until reaching the winery, because low temperatures slow down the chemical reactions; in addition, winemakers use antioxidants like sulfur dioxide, which also acts as an antiseptic. An absolute must in a winery. During aging, it is important to control the amount of oxygen that enters through the oak, which is permeable. The level of oxidation depends on the size of the barrel, the length of time the wine remains in the barrel and whether it is full or not. In these types of wine, oxidation develops and adds aromatic complexity. As a result, the wines become more flavorful and earthy. In red wines, it softens the tannins and stabilizes color. <https://www.torres.es/en/blog/how-wine-made/4-factors-determine-wine-quality#>

xxvii. [Zhang](#) et al (2015) told that rotundone is a sesquiterpene that gives grapes and wine a desirable 'peppery' aroma. Previous research has reported that growing grapevines in a cool climate is an important factor that drives rotundone accumulation in grape berries and wine. This study used historical data sets to investigate which weather parameters are mostly influencing rotundone concentration in grape berries and wine. For this purpose, wines produced from 15 vintages from the same Shiraz vineyard (The Old Block, Mount Langi Ghiran, Victoria, Australia) were analyzed for rotundone concentration and compared to comprehensive weather data and minimal temperature information. Degree hours were obtained by interpolating available temperature information from the vineyard site using a simple piecewise cubic hermit interpolating polynomial method (PCHIP). Results showed that the highest concentrations of rotundone were consistently found in wines from cool and wet seasons. The Principal Component Analysis (PCA) showed that the concentration of rotundone in wine was negatively correlated with daily solar exposure and grape bunch zone temperature, and positively correlated with vineyard water balance. Finally, models were constructed based on the Gompertz function to describe the dynamics of rotundone concentration in berries through the ripening process according to phenological and thermal times. This characterization is an important step forward to potentially predict the final quality of the resultant wines based on the evolution of specific compounds in berries according to critical environmental and micrometeorological variables. The modeling techniques described in this paper were able to describe the behaviour of rotundone concentration based on seasonal weather conditions and grapevine phenological stages, and could be potentially used to predict the final rotundone concentration early in future growing seasons. This could enable the adoption of precision irrigation and canopy

management strategies to effectively mitigate adverse impacts related to climate change and microclimatic variability, such as heat waves, within a vineyard on wine quality

xxviii. **Per and Britt Karlsson**(Jan 24, 2018,02:16pm EST) told that Would you be surprised if I told you that the most grown grape variety in the world is Kyoho? Probably. That is because all grapes are not grown for winemaking. Some are destined to be table grapes or to be dried or to be turned into grape juice. For these purposes, entirely different varieties are used. Most common are Kyoho in China and Sultanina in the US. Some rare ones are used for both wine and for eating, such as Muscat and Chasselas.If we disregard the table grapes, the most grown grape variety for wine is Cabernet Sauvignon. Maybe not such a big surprise. It is grown on 840,000 acres (340,000 hectares). The total acreage of the world vineyards destined for wine production is roughly 16 million acres (6.5 million hectares). The grapes that are popular tend to be very popular. The 13 most popular varieties are planted on a third of the vine area of the world, according to OIV, The International Organisation of Vine and Wine. This is not due to lack of grapes to choose from. There are around 10 000 varieties out there. But there are many good reasons to stick to the well-known and famous. One being that it is easier to sell the wine.However, there is a trend, among certain producers and certain wine geeks at least, to search for old, forgotten grape varieties on the verge of extinction. The reason could be that they are tired of drinking the same thing as everybody else. But sometimes the reason is more serious. Miguel Torres in Spain, for instance, has for many years been experimenting with old forgotten varieties to see if some of them are less prone to diseases and better at adjusting to climate change. Growing these then would be a way to reduce spraying. Some countries have a richer diversity than others, such as Italy. Its most planted variety Sangiovese does not exceed 8 % of the country's total vine area. On the other end of the scale, there is New Zealand where one variety, Sauvignon Blanc, represents 60% of the country's vine area. In France the most planted variety is Merlot and it covers 14% of the vine area. In the USA the two most planted are Chardonnay and Cabernet Sauvignon and they cover 10% and 9% respectively of the US vineyards.Among the top ten grape varieties of the world, there are many so-called international varieties. These are French but are grown in so many countries that people tend to call them international instead. But also some less known varieties make it into the top ten list.Cabernet Sauvignon, 840,000 acres (340,000 hectares);Merlot, 657,300 acres (266,000 hectares);Tempranillo, 570,800 acres (231,000 hectares);Airén, 538 700 acres (218 000 hectares);Chardonnay, 518,900 acres (211,000 hectares);Syrah, 470 000 acres (190,000 hectares);Grenache Noir, 402,780 acres (163,000 hectares);Sauvignon Blanc, 299 000 acres (121,000 hectares);Pinot Noir, 285,000 acres (115,000 hectares); Trebbiano Toscano / Ugni Blanc, 274,300 acres (111,000 hectares)Airén is a white grape used a lot in Spain, often for quite unpretentious

wines. Tempranillo is also Spanish but more famous, especially if you are a fan of Rioja. Tempranillo and Airén are very dominant in Spain. They are planted on almost 45% of the Spanish vineland. rebbiano in Italy is the same as Ugni Blanc in France. In Italy, it is responsible for many white wines of rather a bland character. In France, it is used for Cognac and the producers there like it precisely for its blandness. But it does make a good Cognac.

<https://www.forbes.com/sites/karlsson/2018/01/24/the-top-ten-grape-varieties-in-the-world/#c92284510083>

#### 4. CONCLUSION AND RECOMMENDATIONS

The study concludes that grapes play a great role in the development of a world. Its consumption solve some problems of the health while also play great role in income generation of the farmers of the world. Similarly it generates the wine industries which generate employment in the world which play great role in socioeconomic condition improvement of the world. Grape grow everywhere in the world and it needs less water than the other crops. Every one like grape in the world and similarly use in different food of the world and grape is considered the king of all fruits. It has also medical advantages and use as anticancer in the world. The governments mostly in developing countries not focus on this crop due to financial problems. The study concluded that grape advantages is more than the other crops in the world which give more income per acre than the other crop but in the start the cost per acre is more than the other crops. According to the Food and Agriculture Organization (FAO), 75,866 square kilometers of the world are dedicated to grapes. Approximately 71% of world grape production is used for wine, 27% as fresh fruit, and 2% as dried fruit. Raw grapes are 81% water, 18% carbohydrates, 1% protein, and have negligible fat. The farmers of the world are very poor and have no access to credit , so it is requested of the world bank to give proper loan to the world farmer for grapes grown, to in time purchase the inputs and in time marketed to the consumers in the world to earn money for their farming uplifting. Some pest also attacked on the grape and decreases the production of the farmer. The grape leaf hopper is the common insect pest feed on the vines from the time leaves appear in the spring until they drop in the fall. They remove the green chlorophyll, and the whole leaf may become pale, die and turn brown. Powdery mildew is a fungal disease prevalent on grapes. Any portion of plant such as leaves, blossom, fruit and young shoots may be affected. A white patch appearance may be noted on leaves young shoots; blossom fails to set fruit. Young berries attacked by this fungus may drop, or become hardened, discolored and cracked. To control powdery mildew apply fungicides before symptoms appear. Root knot caused by a gall-forming nematode may become a problem in sandy and sandy loam soil, resulting in a decline in



vine vigor and reduction in yields. The study recommends that resistant rootstocks should be used for grape production. Through fumigation the disease of the grapes should be controlled. So it is the duty of the government to controls the mentioned problems in their countries for enhancing of grape production. Every government should focus on this fruit and arrange propagation program in their countries because it give more benefit to the farmers instead of Wheat. Through this program employment will be generated which play great role in the solution of unemployment problem in the country. In European countries the government mostly focuses on this fruit while in developing countries the program for grape is very slow, so it is the duty of every government to spend more money on grape for enhancing grape industries in the developing countries. They are very poor and they have no access to credit and because of less money they did not start the grape program on their farm, so money provision on low interest should be required by government to farming community in the world. Those crops should be produced in the country whose cost per acre is less and the return is high. Farm record should be kept by farmers for comparison of different crops return. So in future those crops should be grow which give more return to world farmers.

## 5. AUTHORS CONTRIBUTION

Dr.Nausahd Khan created the idea and downloaded the articles from the net and give review paper structure while Mahnoor Naushad help in data analysis and proof reading. Similarly Shah Fahad play role in proofreading and typing of the paper.

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## 7. APENDIX

Table 1. Different Varieties of Grapes and Number of Plants Per Acre in the World

Sundar Khani	No of plant per acre = 260 to 435
King’s Ruby Seedless	No of plant per acre = 260 to 435
Askari	No of plant per acre = 260 to 435

Hussaini	No of plant per acre = 260 to 435
Black Prince	No of plant per acre = 260 to 435
White seedless	No of plant per acre = 260 to 435
Early White	No of plant per acre = 260 to 435
NARC Black Seedless	No of plant per acre = 260 to 435
Cardinal Seedless	No of plant per acre = 260 to 435
Thompson seedless	No of plant per acre = 260 to 435
Autumn royal grapes	No of plant per acre = 260 to 435
Perlette Seedless	No of plant per acre = 260 to 435
Vitro black	No of plant per acre = 260 to 435
Sultania C Seedless	No of plant per acre = 260 to 435
Flame Seedless	No of plant per acre = 260 to 435
Red Globe Seedless	No of plant per acre = 260 to 435
Muscatil	No of plant per acre = 260 to 435
Crimson seedless	No of plant per acre = 260 to 435

Table 2. Top Grape Growing Countries in the World

Rank	Country	Annual Grape Production in Metric Tons
1	Italy	8,307,514
2	France	6,740,004
3	United States	6,206,228
4	Spain	5,676,985
5	China	5,212,090
6	Turkey	3,763,544
7	Argentina	2,519,678
8	Iran	2,297,414
9	Chile	2,122,775
10	South Africa	1,587,913

<https://www.worldatlas.com/articles/top-grape-growing-countries.html>

Table-3 Grape Production Ranking in the World (2016-2017)

Rank	Country/Region	2017	2016
1	 <a href="#">China</a>	13,083,000	12,629,000
2	 <a href="#">Italy</a>	7,169,745	8,201,914
3	 <a href="#">United States</a>	6,679,211	7,225,636
4	 <a href="#">France</a>	5,915,882	6,247,034
5	 <a href="#">Spain</a>	5,387,379	5,950,719
6	 <a href="#">Turkey</a>	4,200,000	4,000,000
7	 <a href="#">India</a>	2,922,000	2,590,000
8	 <a href="#">South Africa</a>	2,032,582	1,966,291
9	 <a href="#">Chile</a>	2,000,000	2,200,000
10	 <a href="#">Argentina</a>	1,965,206	1,758,418
11	 <a href="#">Brazil</a>	1,912,034	985,074
12	 <a href="#">Iran</a>	1,866,340	2,275,830
13	 <a href="#">Australia</a>	1,824,431	1,772,911
14	 <a href="#">Egypt</a>	1,703,394	1,691,194

Rank	Country/Region	2017	2016
15	 <a href="#">Uzbekistan</a>	1,625,511	1,569,739
16	 <a href="#">Romania</a>	1,063,340	736,892
17	 <a href="#">Germany</a>	1,014,235	1,225,570
18	 <a href="#">Greece</a>	1,012,600	1,083,000

100,000–1,000,000 tonnes

Rank	Country/Region	2017	2016
19	 <a href="#">Afghanistan</a>	954,845	874,541
20	 <a href="#">Portugal</a>	868,635	773,904
21	 <a href="#">Peru</a>	645,012	689,957
22	 <a href="#">Moldova</a>	576,507	615,739
23	 <a href="#">Algeria</a>	566,579	571,351
24	 <a href="#">Russia</a>	536,851	551,733
25	 <a href="#">Mexico</a>	415,889	351,310
26	 <a href="#">Ukraine</a>	409,610	377,780
27	 <a href="#">Hungary</a>	404,900	476,491

Rank	Country/Region	2017	2016
28	 <a href="#">New Zealand</a>	396,000	436,000
29	 <a href="#">Morocco</a>	378,128	364,866
30	 <a href="#">Austria</a>	331,428	260,337
31	 <a href="#">Turkmenistan</a>	292,110	288,190
32	 <a href="#">Syria</a>	259,083	264,348
33	 <a href="#">South Korea</a>	237,588	248,925
34	 <a href="#">Tajikistan</a>	228,303	214,775
35	 <a href="#">Armenia</a>	209,954	178,752
36	 <a href="#">Albania</a>	202,948	205,001
37	 <a href="#">Bulgaria</a>	201,529	211,083
38	 <a href="#">Georgia</a>	180,800	159,200
39	 <a href="#">Macedonia</a>	180,349	333,319
40	 <a href="#">Japan</a>	176,100	179,200
41	 <a href="#">Serbia</a>	165,568	145,829

Rank	Country/Region	2017	2016
42	 <a href="#">Azerbaijan</a>	152,843	136,499
43	 <a href="#">Tunisia</a>	152,000	134,000
44	 <a href="#">Yemen</a>	135,357	130,234
45	 <a href="#">Croatia</a>	116,307	123,651
46	 <a href="#">Switzerland</a>	100,364	136,352

10,000–100,000 tonnes[[edit](#)]

Rank	Country/Region	2017	2016
47	 <a href="#">Iraq</a>	99,444	94,103
48	 <a href="#">Uruguay</a>	95,691	104,506
49	 <a href="#">Canada</a>	89,443	105,802
50	 <a href="#">Slovenia</a>	89,416	94,780
51	 <a href="#">Thailand</a>	86,328	80,454
52	 <a href="#">Kazakhstan</a>	81,223	75,041
53	 <a href="#">Czech Republic</a>	79,774	75,905
54	 <a href="#">Taiwan</a>	77,788	79,680



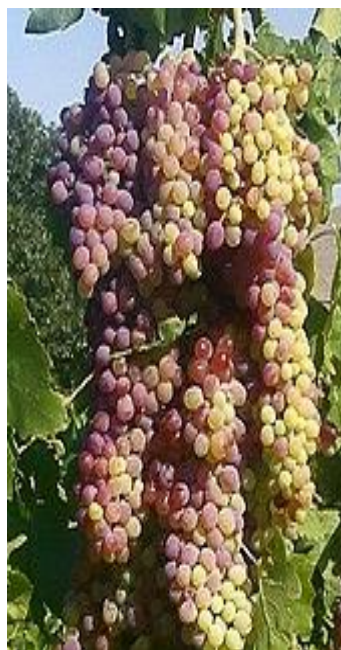
Rank	Country/Region	2017	2016
55	 <a href="#">Lebanon</a>	74,140	74,140
56	 <a href="#">Israel</a>	68,503	66,002
57	 <a href="#">Pakistan</a>	57,920	64,071
58	 <a href="#">Jordan</a>	53,366	62,328
59	 <a href="#">Slovakia</a>	45,859	37,832
60	 <a href="#">Saudi Arabia</a>	44,505	41,413
61	 <a href="#">Palestine</a>	39,124	39,900
62	 <a href="#">Libya</a>	32,097	32,183
63	 <a href="#">Colombia</a>	30,718	29,152
64	 <a href="#">Bosnia and Herzegovina</a>	28,013	36,904
65	 <a href="#">Namibia</a>	27,203	26,510
66	 <a href="#">Vietnam</a>	26,255	26,774
67	 <a href="#">Bolivia</a>	22,550	21,167
68	 <a href="#">Montenegro</a>	22,200	28,930

Rank	Country/Region	2017	2016
69	 <a href="#">Cuba</a>	21,940	21,569
70	 <a href="#">Guatemala</a>	19,611	19,307
71	 <a href="#">Venezuela</a>	19,420	18,885
72	 <a href="#">Belarus</a>	17,169	17,382
73	 <a href="#">Cyprus</a>	17,021	17,583
74	 <a href="#">Madagascar</a>	13,648	13,446
75	 <a href="#">Luxembourg</a>	10,806	11,032

<10,000 tonnes

Rank	Country/Region	2017	2016
76	 <a href="#">Kyrgyzstan</a>	8,607	8,586
77	 <a href="#">Ethiopia</a>	5,277	5,270
78	 <a href="#">Tanzania</a>	4,990	5,192
79	 <a href="#">Malta</a>	3,628	3,707
80	 <a href="#">Zimbabwe</a>	3,363	3,327
81	 <a href="#">Belgium</a>	2,400	2,251

Rank	Country/Region	2017	2016
82	 <a href="#">Paraguay</a>	1,930	1,920
83	 <a href="#">Ecuador</a>	517	509
84	 <a href="#">United Kingdom</a>	441	469
85	 <a href="#">Netherlands</a>	400	350
86	 <a href="#">Malawi</a>	226	N/A
87	 <a href="#">Liechtenstein</a>	218	215
88	 <a href="#">Philippines</a>	213	190
89	 <a href="#">Réunion</a>	212	211
90	 <a href="#">Honduras</a>	178	177
91	 <a href="#">Bahrain</a>	149	149
92	 <a href="#">Kuwait</a>	144	119
93	 <a href="#">United Arab Emirates</a>	30	32
94	 <a href="#">Qatar</a>	8	5

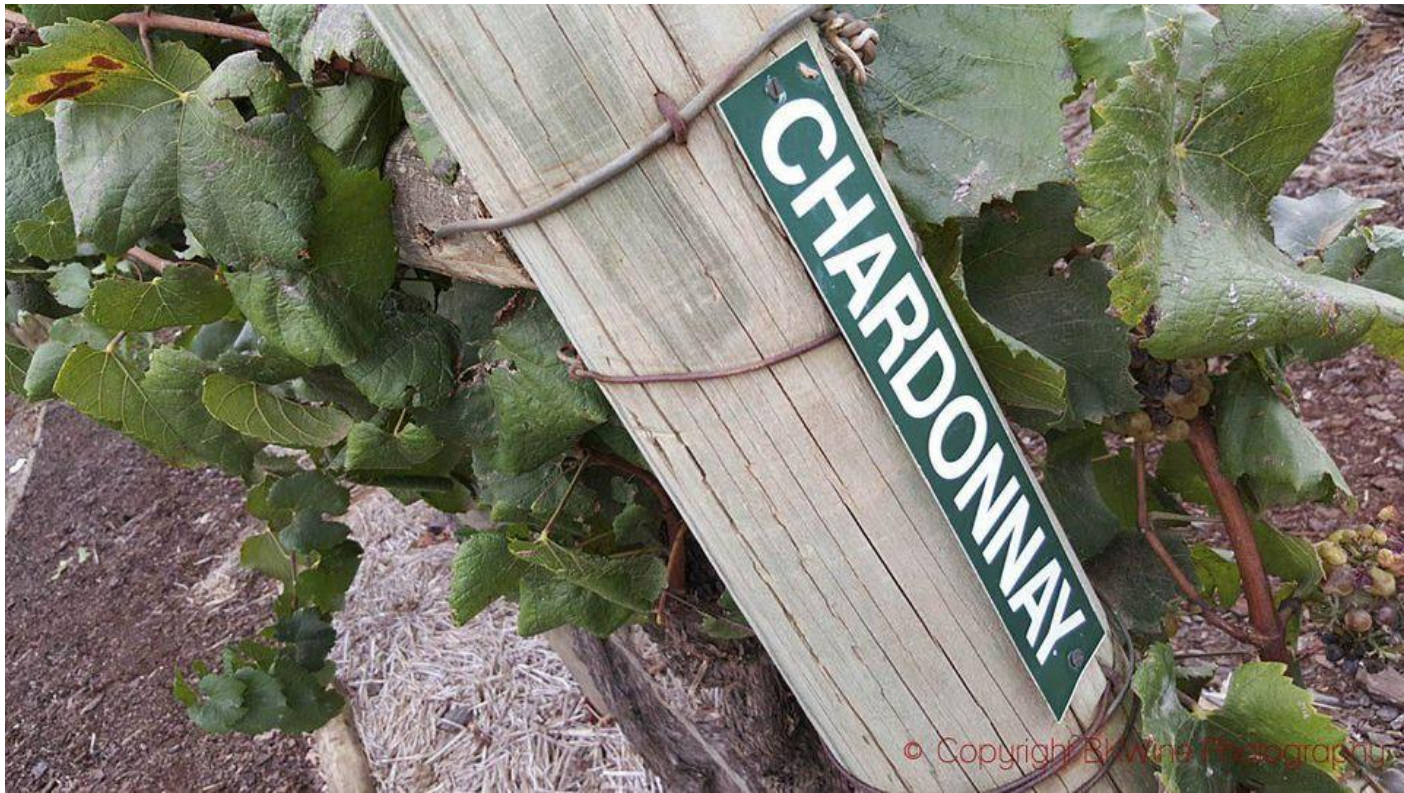












Per and Britt Karlsson (Jan 24, 2018,02:16pm EST )“The Top Ten Grape Varieties In The World”



<https://www.forbes.com/sites/karlsson/2018/01/24/the-top-ten-grape-varieties-in-the-world/#c92284510083>