AN ECONOMIC ANALYSIS OF EXPORT POTENTIAL OF GRAPES FROM NORTHERN KARNATAKA

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1. INTRODUCTION

The growing importance of horticulture in strengthening the Indian economy has been realized of late. The contribution of agriculture towards national income was about 14.2 per cent (Economic survey 2010-11). Horticulture from an area of just 8.5 per cent of the gross cropped area of the country is estimated to have contributed over 24.5 per cent to the agriculture GDP of India. It is potential source of employment especially for the youth and women in the rural area where 72.2 per cent of the Indian population resides. The income generation through effective horticulture farming is higher as compared to agriculture farming. Horticultural farming has also increased the sustainability of the small land holding, helping the small and medium farmers who form the majority of farmers in India, to increase their per capita income. This in turn has increased the disposal income of the rural population and helped the overall economic development of the country.

The process of globalization initiated in the early nineties has resulted in free flow of goods including agriculture goods across international borders. The Indian farmer is being exposed to numerous challenges because of the growing phenomenon. However if the challenges are overcome which opens up a great opportunity for horticulture exports from India since the country grows a variety of fruits of excellent quality. The Indian peasants need support from all the concerned stake holders to harness the growing opportunities for horticulture exports to different global markets.

1.1. World Fruit scenario

Total estimated area under fruit crops in the World is 55.08 million hectare during 2010-11 (Appendix -I), with China accounting for 11.40 million hectares (20.4 %) and was the largest fruit producer (122.18million tonnes) in the World. India ranked second in both area and production of fruits with 6.38 million hectares and 74.8 million tonnes respectively during 2010-11, while Brazil and USA were ranked 3rd and 4th with respect to fruits production. Highest productivity of fruits was in Indonesia (22.4 tonnes/hectare), while India stood 8th (11.7 tonnes/ hectare). The other major fruit producing countries were Italy, Philippines, Mexico, Spain, Indonesia and turkey.

Grape is one of the most delicious refreshing and nourishing fruit. It is universally consumed as table fruit and ripen grapes are easily digestible. They are rich in energy giving sugars and some useful minerals like phosphorous, iron and vitamins like B_1 and B_2. More than 70 per cent of the World grape production is used for wine making. Grapes are also processed into products like raisins, juice and jellies. Grape juice is a refreshing drink, a stimulant to kidneys and also acts as a laxative.

World production of grapes is 673.22 lakh tonnes from 72.27 lakh hectares in 2010-11(Appendix -II). The major producers are china, Italy, USA, Spain, France, Turkey, Chile, Argentina, Iran and India. India produces 12.35 lakh tonnes of grapes from 1.11 lakh hectares and accounts for 1.8 per cent and 1.5 per cent of the World's production and area respectively.

The major exporters are Chile, USA, Turkey, South Africa, Italy, Mexico Spain, Peru, Brazil and Greece. The contribution of Chile accounts for 24.57 percent, USA (11.43%), Turkey (9.33%), and South Africa (9.31%).These four countries contributes more than half (54.64%) of the world's fresh Grapes export. India stood at 15th place and contributes 1.46 percent in world's fresh Grapes export (Appendix -III).

1.2. The Scenario of Fruits in India

India is renowned for its diverse soil and climatic conditions there by rendering it as one of the few countries in the World where almost all types and ranges of tropical, subtropical and temperate fruits are grown throughout the year, in one or the other parts of the country. Area under fruit crops has increased from 2.83 million hectares during 1987-88 to 6.38 million hectares during 2010-11 with an increase of 68 per cent. There was a remarkable increase in productivity as well from 9.8 tonnes per hectares to 11.7 tonnes per hectares, and as a result, production increased by 59.16 per cent from 295.49 lakh tonnes to 748.78 lakh tonnes during the same period (Anon, 2011). Consequently India has emerged as the second largest producer of fruits in the World with a production of 74.8 million tonnes of fruits during 2010-11, which accounted for 12.30 per cent of the total World production of fruits.

The major fruit crops of India based on their output are Banana (297.80 lakh tonnes), Mango (151.88 lakh tonnes), Citrus (74.64 lakh tonnes), Papaya (41.96 lakh tones), Apple (28.91 lakh tonnes), and Grapes (12.35 lakh tonnes) (Appendix -IV). India Exports 4.1 lakh tonnes of fruits valued at Rs 1064.51 crores during 2010-11. Fresh Grapes was the major fruit exported accounting for more than 24.13 per cent of the quantity of fruits exported and mango (14.4%), banana (13.70 %) and apple (11.4%) are the next highest fruits exported from India. However, grapes though accounted for about 24.13 per cent of the quantity and accounted for nearly 38.70 per cent of the value of fruits exported from the country (Appendix-V). In addition, other fruits such as Guava, Pomegranate, Pineapple, Sapota, Litchi etc., are also cultivated.

1.3. Grapes cultivation in India

Grapes (*Vitis vinifera L.*) belong to family vitacea and its cultivation is widely spread in the tropics and subtropics ranging even to the temperate regions. Evidence has been found about the cultivation of grapes in Egypt during 4000 to 3000 BC and its origin is believed to be in Egypt. Grape was introduced into India in 1300 AD by the Moghul invaders. It is called as oval Kishmish in the Eastern Mediterranean regions and Sultans in Australia and South Africa.

Cultivation of grapes is more cumbersome and risky compared to other perennial horticultural fruit crops. The higher initial investment on the support structure coupled with high annual maintenance cost makes its cultivation an exclusive domain of an affluent few. However, its high economic value in terms of quick and high net returns attracts many enthusiastic growers towards this enterprise. With good investment and managerial capacity, viticulture can be one of the most profitable enterprises in agriculture. The grape vine is usually propagated by hard woodcuttings and transplanted in October after rooting in nursery. It requires a deep, loamy soil with good structure and should be well drained and aerated. A P^H of 6.0 is preferred and the soil must be salt free. Important varieties cultivated in India are Thomson Seedless, and its mutants like Tas-A-Ganesh, Sonaka, Bangalore blue and Sharad Seedless *etc*.

Grapes occupies the 9th position among all fruits production in the country accounting only 1.6 per cent of total fruit production (Appendix -IV). It is next only to Apple, Pineapple and Sapota in terms of production. The current area and production under grapes in India is estimated at 1.11 lakh ha with an annual production of 12.35 lakh tonnes. While 78 percent of grapes produced is used for table purpose, nearly 20 percent is dried for raisin production and 2 percent is used for manufacturing of juice and wine.

Maharastra is the largest grapes producing State with 774 thousand tonnes (Appendix -VI) which accounts for 62.7 per cent of the total production in India. Karnataka ranks second in area and production with 18100 hectares (16.2%) and 330.30 thousand tonnes (26.7%) respectively during 2010-11. The other important grapes growing States are Tamil Nadu and Andra Pradesh. These above mentioned four States account for 96 per cent of the total grapes production in India.

Bijapur is the leading district in Karnataka with respect to both area and production of grapes. The total area and production of grapes in Bijapur was 5388 hectares and 185261 tonnes (Appendix -VII), accounting for nearly 39.1 and 43.2 per cent of area and production of grapes in Karnataka respectively during 2009-10. Belgaum (15.5%), Bangalore rural (12.9%) and Bagalkot (8.9%) are the other major grapes growing districts of Karnataka. The average productivity of grapes in the State was 31.18 tonnes per hectare during 2009-10 (Appendix -VII).

1.4. Indian grapes exports

Grapes exports from India started during 1970 with an export of only 3 tonnes to Asian countries. Higher remunerative prices offered by these countries led to an increase in grapes export, while import market for Indian grapes widened to European countries during 1990-91.

Total export of grapes during 2010-11 was 99,270 tonnes worth 411.98 crores, which amounts for 80 per cent of the total production of grapes and as against 24 per cent of all fruits grown in India (appendix-V). The major importers of Indian grapes are UK, Netherlands, Germany, Bangladesh, UAE, Russia, Saudi Arabia, Belgium, Thailand, Sweden, Norway, Oman, Bahrain, Sri Lanka, Mauritius, USA, Singapore and Hong Kong etc. Around 30 different varieties of grapes are being cultivated In India, but only Thompson Seedless and its mutant verities like Tas-A-Ganesh, Sonaka and Sharad Seedless *etc*., are exported, because of their higher acceptance throughout the World on account of high quality and constitute around 80 per cent of country's grapes export (Patil, 2000).

Indian fresh grapes are highly competitive in the International market because of cultivation of Thompson Seedless a highly preferred variety with higher productivity, and also lower cost of production (being a very labour intensive crop and the labour input being comparatively cheaper than other major grape producing countries). Also, grapes cultivation being largely in the hands of progressive and well-to-do farmers with better managerial abilities has made Indian grapes highly competitive. However, there are very few systemic studies on the potential and prospects of grapes export from India. An analysis of grapes exports, the direction of trade and constraints would facilitate policy makers to harness the comparative advantage of Indian grapes in the International market.

Hence, the present study has been taken up with the following objectives

1.5. Specific objectives:

1. To assess the growth and instability in area, production, productivity and export of Grapes.
2. To estimate the extent of export potentiality of grapes in the study area.
3. To study the trade competitiveness and direction of trade in grapes.
4. To study the role of grape grower association in production and export of grapes
5. To document the constraints in the export of grapes in the study area and suggest the suitable policy measures.

The Hypotheses framed for the above-mentioned objectives are

1. There is a positive growth in area, production, productivity and export of grapes with lower variability.
2. There is a greater export potentiality of grape.
3. Indian grapes are competitive in the international market.
4. There are considerable constraints in the export of grapes from the study area

1.6. Organization of the thesis

The entire study has been presented in seven chapters. The first chapter deals with the importance and the current status of the present study. The specific objectives of the study as well as limitations of the study have been indicated.

Chapter II deals with the reviews of the relevant research studies connected with the objectives.

Chapter III provides the main features of the study area and the study out lines. The nature and sources from which relevant data have been collected and the various statistical tools and techniques employed in the study for evaluating the objectives have been discussed.

Chapter IV is devoted to results of the analysis of the data through a variety of tables into which relevant details have been compressed and summarized under appropriate heads and presented in the tables.

Chapter V provides the discussion on casual relationship between certain variables and the outcome which they produced.

Chapter VI briefs the summary of the main findings along with the policy implications that emerged from the findings of the study.

Chapter VII, the final chapter lists the references cited while undertaking the research.

1.7. Scope of the study

Grapes is emerging as the most prominent fruit crop in India from the point of view of export and foreign exchange earnings. Farmers in many parts of the country have been showing a specific interest towards cultivation of grapes exclusively for export. The export earnings from unit area of grapes was much higher when compared to that from the unit area of mangoes and other crops. Some of the European and Asian countries were having a greater demand for Indian Grapes, resulting in a greater potentiality for export of grapes. The systematic economic study by taking into consideration some necessary aspects like identifying potential International markets and constraints as well as analysis of growth rate in area, production and productivity will help in generating useful information for improving competitiveness and stability in export of grapes. Farmers, financial institutions, and marketing agencies can utilize the information. Hence, the present study is an attempt to analyze the export potentiality of grapes in a holistic manner. The findings will also help policy makers in formulating the commodity specific policy on production and export strategies.

1.8. Limitations of the study

The limitations are mostly related to the availability of information for taking up a systematic study.

Absence of record, for over a period of year, on farming data on quantity of grapes produced, marketed, exported and value received by the farmers, thus the primary data suffers the estimation of export potentiality at the farm level in the study region so secondary data was used to work out export potentiality.

2. REVIEW OF LITERATURE

A review of past research helps in identifying the conceptual and methodological issues relevant to the study. This will enable the researcher to collect relevant data and subject them to sound reasoning and meaningful interpretation. This chapter attempts a brief review of the relevant research literature related to the present study. Keeping in view, the objectives of the study, reviews are presented under the following headings.

2.1 Growth rate analysis

2.2 Instability analysis

2.3 Direction of trade

2.4 Export competitiveness

2.5 Export potentiality

2.6 Constraints in production, marketing and exports

2.1 Growth rate analysis

Growth rate is a measure of past performance of an economic variable. It is commonly used as a summary of a trend in time series data. It is not developed to predict but to describe the trend in a variable over time. Productivity indices, price indices and output series are usually discussed in terms of the changing growth rates over a period of time. Policy decisions are often based on such growth rates which depend on the nature and structure of the data.

Sharma and Gandhi (1990) examined the annual compound growth rates of food grain production in India for the period 1950 to 1984. It was found that growth rate of production had declined during 1949-50 to 1975-76, while it modestly accelerated in 1975-76 to 1983-84. However, the overall growth rate per annum was 2.6 per cent which indicated a sustained recovery. Area led growth rate had shown declining potential while yield based growth rate had shown increasing potential during 1975-76 to 1983-84. This necessitated for sustaining yield and technology based growth for the future.

Gemtessa (1991) compared the performance of Ethiopian coffee exports during the pre-revolution and post-revolution periods. The exponential growth model of the form $Y_t = ab^t$ was employed. The results showed that export growth in the pre-revolution period was lower (1.51 %) when compared to the post-revolution period (1.77 %).

Choudhary and Aziz (1992) examined the feasibility of rice exports in trade with wheat import in Bangladesh. It indicated that the need for such a trade arises from the likely surplus of rice that might be generated in the future due to a higher growth rate of production of the rice than its consumption. Further, it also arises due to the deficit of wheat from the stagnation of production against a higher growth rate of its consumption.

Pal (1992) in his analysis on the agricultural exports from India during the period 1970 to 1989 observed that the compound growth rates of export earnings from all agricultural products comprising food and animal products, beverages and tobacco, vegetable oils, etc. was estimated at 6.67 per cent per annum. The growth of export earnings from fish and fishery products was at an average annual rate of 12.26 per cent, while the export earnings from forest products was found to be stagnant during the last two decades. The export earnings from agricultural products increased because of the rise in unit value

Veena (1992) analysed the growth of Indian coffee exports for the period 1965-1990 using exponential function of the form $y = ab^t$. She found that exports of plantation type coffee exhibited a compound growth of 3.6 per cent per annum, while Arabica grew at 3.0 per cent. Robusta exports registered a compound growth of 10 per cent.

Jeromi and Ramanathan (1993) examined the growth of world pepper market for the period from 1975 to 1990. Among the exporting countries, Sri Lanka recorded the highest annual compound growth rate of 24.59 per cent. This was mainly due to its low base in the initial years. Positive and statistically significant growth rate was recorded in the case of India. In contrast, the growth rate in total exports from the other producing countries was statistically non-significant. The growth rates of pepper imports ranged from a negative level of -2.56 per cent for Argentina to a high and positive level of 11.64 per cent for Saudi Arabia.

Laxminarayana (1993) analysed the growth performance of silk goods export such as sarees, dress materials, readymade garments, carpet and other silk exports apart from total silk exports for the period 1970-71 to 1989-90. The exponential form of the function was employed to estimate the growth rates. He found that there has been a significant increase in the growth rates of export of all silk variety both in terms of quantity and value during the study period. This growth rate was attributed to tremendous increase in the production of silk under the influence of intensive production and efforts such as increasing the area under the mulberry cultivation, improving the productivity and also by improving the technology in silk reeling and weaving.

Singh (1993) analysed the growth rate in total Indian food grain production during the last 40 years. Total food grain production has increased by 236 per cent with an annual growth rate of 2.74 per cent during the period 1950-51 to 1989-90. Average production increased by 72 per cent between the period 1950-51 to 1965-66 (pre-green revolution) and 1966-67 to 1989-90 (post-green revolution period).

Tripathy and Gowda (1993) computed the growth in groundnut production in Orissa during the post green revolution period (1970-71 to 1989-90) using the linear growth model, 1n Y = 1n a + t 1n b + u. The study showed that area was the dominant source of growth in output during the post green revolution period and per hectare yield was almost stagnant.

Jalajakshi (1994) analysed the growth of shrimp exports from India for the period 1966 to 1991. Exponential model of the type $Y = ab^t$ was used to work out the growth rates. Foreign shrimp exports recorded a positive growth rate due to high demand in the importing countries. The negative growth rate observed for dried and canned shrimps were attributed to declining demand in the importing countries and increased cost of production in India.

Mamatha (1995) estimated the growth rates of production and export of selected spices for the period 1970-71 to 1991-92. The spices considered were pepper, chillies, turmeric and ginger. She found that positive growth rate in respect of production and export of the selected spices was due to the increased domestic production and demand for these species in the international market. The increased domestic production and exports were attributed to the several measures taken by the spice board such as improved methods of production, assistance for the export of spices by setting up facilities for upgrading quality and technical advice on scientific post-harvest operation and processing.

Veena *et al.* (1995) studied the growth in coffee production and exports from India for the period 1965 to 1990 using an exponential function of the form $Y = ab^t$. Arabica, Robusta and instant coffee were considered for the analysis. The results revealed that all types of coffee have experienced increase in unit price and in growth rates. Instant coffee, due to a bilateral agreement experienced a slower growth rate.

Nagaraja (1997) studied the growth in export of mango from India during the year 1970-71 to 1992-93. He reported that the export of fresh mangoes exhibited a compound growth rate of 27.5 per cent per annum while the value registered a compound growth rate (CGR) of 16 per cent per annum. The unit value in rupees registered a growth of 11.5 per cent per annum and while in dollars it was 3.5 per cent per annum.

Ananthi (2000) analysed the growth of area production, productivity and export of Indian Non-basmati and basmati rice. The growth rates were calculated by sub-dividing the study period into 1949-50 to 1969-70 as first period and 1970-71 to 1997-98 as second period. The area, production and productivity showed positive trend. For the export, the study period considered was 1980-81 to 1998-99 for Basmati and non-basmati rice. The growth rate was also positive and significant.

Ashalatha (2000) analysed the growth rate in cashew in two periods; period-I, from 1956-57 to 1970-71 and period-II, from 1971-72 to 1998-99. It was observed that the growth rate of area, production, productivity, kernel export, raw cashew import, cashew nut shell liquid value and cashew nut shell liquid - unit value of export were showing positive trend but the cashew nut shell liquid quantity exported showed non-significant negative growth.

Angles (2001) studied the production and export of turmeric in south India. He found that all the states registered significant growth in area, production and productivity, except in the case of area in Tamil Nadu and Kerala, production in Tamil Nadu and productivity in Karnataka. The analysis of price trend in important markets of south India revealed an increasing trend in all the markets.

Jayesh (2001) studied the production and export performance of pepper and cardamom in south India. He found that all the south Indian states except Karnataka (-0.47 %) and Tamil Nadu (-1.62 %) recorded significant growth in area and production of pepper and in the case of cardamom, all the states recorded a negative growth in area, while the productivity and production showed significant growth. A positive growth was found in the export quantity, value and unit value of pepper. But a negative growth was recorded in the export of cardamom.

Mamale Desai (2002) analyzed the export growth of mangoes from India to different countries using the exponential model of the form $y=ab^t$. He observed that the Hong-Kong depicted negative growth, but it was not significant. The possible reason that could be attributed for this phenomenon was firstly the increased imports from Pakistan and Sri Lanka. The second reason would be the changing political scenario i.e., from capitalized to communist governed economy led to the changes in the import policies. But export value growing at positive rate, the possible reason could be the inflation over the years which have resulted in to a positive growth in value terms inspite of negative growth in quantity of mango exports.

Rajesh *et al.* (2002) studied the trend in export of major spices in India for the period 1970-71 to 1990-00 and found that black pepper registered a positive annual growth rate of 2.38 per cent in quantity and 12.78 per cent in value. While large cardamom registered 12.76 per cent of export quantity and 21.4 per cent export value, ginger registered 4.05 per cent growth in quantity and 10, 15 per cent in value. Turmeric export registered 4.14 per cent in quantity and 13.08 per cent in volume during the period under study.

Phuke *et al.* (2004) analyzed the export potential of banana in India for the period of 1991-92 to 2001-02. Linear growth model, $\hat{Y} = a + b x$ and log linear equation, log Y^= log a + log b were used to work out growth rates. At All India level, the highest area and production was recorded in the year 2001-2002, whereas, productivity was the highest in 2000-2001. The compound growth rate increase in area of the country was 2.19 per cent per annum during study period.

Prajneshu and Chandran (2005) computed the growth rate of total food grain production in India during the period 1980 to 2001 by comparing monomolecular, logistic and gompertz growth models. They suggested that the compound growth rates should be computed by first identifying the model that describes satisfactorily the path followed by the response variable over time. Hence, the exponential model which was proposed in 1964 may be replaced by more realistic growth models like monomolecular, logistic and Gompertz models because they were "mechanistic models" in which parameters have specific biological interpretation unlike "empirical models" like polynomial or regression models. They found that monomolecular model was inappropriate for describing the data set because the standard errors of estimates were very high, where as logistic model had performed slightly better than Gompertz model. Compound growth rates were respectively obtained as 2.36 per cent and 2.38 per cent. They concluded that during the past four decades, not only non linear estimation procedures have been developed but even software packages like SPSS, SAS, SPLUS and GENSTAT are also readily available to accomplish the task. Therefore, there is hardly any justification for not using more realistic nonlinear growth models for computation of compound growth rates.

Smita and Patil (2006) studied the trends in export of grapes from India. The compound growth rate for quantity of grapes exported was 12.05 per cent per annum. With respect to value obtained from export of grapes, the corresponding compound growth rate indicated an increase of 22 per cent per annum.

Thanuja (2006) analyzed the export performance and competitiveness of ginger from India for the period of 1985-86 to 2003-04. The study period was divided in to Pre-WTO period (1985-86) and Post-WTO period (1994-95).The findings indicated that area under ginger was increased at 0.73 per cent per annum and production increased at 2.07 per cent during pre-WTO (1985-86 to 1994-95) period. Whereas, during the post-WTO period the growth rate for area and production were increased at the rate of 1.356 per cent and 1.859 per cent respectively.

Jose and Jayasekhar (2008) studied the growth trends in area, production and productivity of Arecanut in India during the period 1971 to 2004. It revealed that the area and production of Arecanut in India increased tremendously at the rate of 2.2 per cent and 3.2 per cent respectively. The rate of increase in both area and production was mainly due to favourable price prevailed during the period.

Sharad and Shekhar (2008) studied the status of silk production in India during the period 1980-81 to 2004-05. It revealed that the pattern of growth in area under mulberry cultivation has increased with significant rate of 0.25 per cent. The production and productivity of raw silk showed high significant growth of 5.06 per cent and 4.80 per cent respectively. The production of raw silk has increased mainly due to high yielding mulberry varieties and silk worm breed.

Veeranagouda *et al.,* (2011) studied the growth rate scenario of chilli in northern Karnataka. The study revealed that northern Karnataka as a whole registered positive compound growth rate for area (13.76 per cent), production (13.88) and productivity (12.20). These registered values were non significant at both ten and five per cent level of significance.

The above reviews revealed that most of the researchers had investigated various aspects of the growth of area, production, export and related aspects in various crops by computing the compound growth rate. Exponential growth function of the form $Y = ab^t$ was used and found different results based on the time series data which they had used for the specific crop and crop groups. Alternatively different modules were also tried to workout growth rate.

2.2 Instability analysis

Hazell (1984) assessed the sources of increased instability in cereal production in India and USA. The results revealed that the recent growth of cereal production in India and US was being accompanied by more than proportionate increase in the standard deviation of production. This study applied variance decomposition procedure using state wise data on crop production to analyse the sources of increased instability. It was found that the covariance in production between states and crops was high in view of increased yield variability and a loss in off-setting patterns of variability between crop yields in different states. These changes were associated with variable prices, high yield technologies and narrowing genetic base.

Pal and Sirohi (1989) identified the sources of instability in crop production and yield in different states in India between two periods, 1960-1965 and 1966-1984. The results revealed that yield variation contributed largely to the variance in production of pulses and oil seeds and the same being increased over time. After adoption of HYV, the absolute variance increased on account of increased sensitivity of HYV to inputs and weather, especially rainfall. The intensive use of irrigation led to comparatively stable production of food grains.

Gemtessa (1991) compared the variability in export earnings of Ethiopian coffee over pre-green revolution and post- green revolution periods. The price variation contributed for a larger share of variance of export earnings. This accounted for 137.5 per cent increase in the variance of total earning from coffee.

Singh (1993) applied variance decomposition procedure to time series data on food grains to analyse the sources of instability over the period from 1950-51 to 1989-90. The increase in total food grain production and average production for two sub-periods had been accompanied by higher instability and risk in production of certain crops. The coefficient of variation of food grain production increased by 6.97 per cent and 39.65 per cent respectively between the periods.

Jalajakshi (1994) studied the instability in the export of shrimps from India for the period 1966-91. The shrimp exports to Japan and USA were found to be stable but dried and canned shrimp exports to Japan, USA, UK and EEC showed a high variability. This was due to the decreased demand in the importing countries and high cost of production in India.

Singh and Mathur (1994) assessed instability in production of potato in India using coefficient of variation. It was found that area and production were unstable because of the response of potato production to prices of competing crops and the adoption of modern technology respectively. The production of potato increased and decreased with the increase and decrease in the prices of competing crops respectively.

Ananthi (2000) studied the instability in export value and export unit value of basmati and non-basmati rice for the period from 1990-91 to 1997 -98. The coefficient of variation was 90.76 per cent for export quantity, 55.77 per cent for export value and 24.35 per cent for export unit value. She concluded that the instability was relatively high in the case of export quantity value of basmati rice.

Mahadevaiah (2001) studied the export trade performance of Indian Cotton. He found that the stability in export earnings from total cotton export, exports to major importing countries and others indicated that change in price variance, change in mean price and change in the interaction term were the major sources which contributed to the variability in cotton exports. He found that the change in price variance (19.72 %) together with change in mean price (13.72 %) increased the instability in total cotton export earnings. About 66 per cent of variance in export earnings was due to interaction between change in mean quantity and mean price. The change in price variance has contributed less than one per cent to the instability of export earnings from most of the major importing countries except in case of Japan, where it has stabilized the export earnings. The study also found that the increase in mean price has mainly contributed to the increase in total cotton export earnings.

Girma (2002) studied the instability and its sources in cotton production in Karnataka. The results showed that the instability increased from 14.8 % to 27.8% in the second period, the coefficient of variation was 40.66 %. All the study districts except Belgaum and Gulbarga showed maximum instability in cotton production.

Jeyanthi and Alagumani (2003) estimated the growth and variability in pulses production. They have estimated compound growth rates and Copock's instability and Cuddy & Della instability indices using the secondary data related to area, production and yield of pulses for pre revolution (1950-51 to 1966-67), green revolution (1967-68 to 1975-76) and post green revolution (1976-77 to 1985-86) periods. They found that the growth rate in production reduced from 0.43 per cent during pre green revolution era to -0.47 per cent during green revolution era and increased to 1.1 per cent during post green revolution. The Copock's and Cuddy & Della instability indices estimated revealed higher instability in all three periods.

Anjani Kumar *et al.,* (2003) studied the growth instability in export and imports of livestock and concluded that India had a high growth rate of 11.15 per cent for livestock export during 1974 to 1994. Among different livestock products, exports of meat and meat preparations showed most stable and promising performance.

Sham Bhat and Nirmala (2003) have used spearman's rank correlation method to examine the nature of association between agricultural exports and economic growth. They have concluded that the export earning instability indices of coffee, tobacco and fruits and vegetables were low and their respective association with economic growth emerged positive and statistically significant.

Sharma and Kalita (2008) studied the variation and instability in area, production and productivity of major fruit crops in Jammu and Kashmir for the period from 1974-75 to 1999-2000. It revealed that growing of pear, cherry and almond were more risky compared to other fruit crops in the state as revealed by higher coefficient of variation. The coefficient of area production and productivity of these were more than 78 per cent. The raising of apple in the state was less risky, which had a coefficient of variation of less than 35 per cent.

Deshmukh (2011) studied on performance and growth of pomegranate production and export in India. The study revealed that the coefficient of variation of Maharashtra's pomegranate area under cultivation and production was 65.20 per cent and 49.48 per cent respectively during 1991-92 to 2008-09.

The above researchers had studied the instability of the area, production, export and related aspects in various crops by using coefficient of variation or Hazell's model and found different result based on the time series data.

2.3 Direction of trade of exports

Direction of trade refers to the particular countries and kinds of countries towards which a country's exports are sent, and from which its imports are brought, in contrast to the commodity composition of its exports and imports, thus the pattern of its bilateral trade. This analysis does not only help the exporting country to know the trend in sustaining its existing markets but also to know the shift in market shares from one country to another over time.

Gemtessa (1991) analysed the direction of trade using the Markov chain model. The share of Ethiopian coffee exports to USA had drastically declined during the period from 1979 to 1989. The loss in the export shares of Ethiopian coffee to USA, France, USSR and other countries were directed to erstwhile West Germany. The study revealed that the Ethiopian coffee exports to Japan, France and Italy had moderately increased. But the share of Saudi Arabia remained stagnant. It was predicted that the market share of Ethiopian coffee exports to West Germany would increase to 32 per cent by 2000 AD mainly because of their preference for Ethiopian mild coffee.

Jeromi and Ramanathan (1993) reported that there were significant changes in the direction of pepper exports from India during the period from 1975 to 1990. It was observed that nearly 44 per cent of India’s pepper exports were directed to former USSR which constituted about 82 per cent of the total pepper import of that country. On the other hand, India not only failed to increase its exports to USA in tandem with increased consumption in that country, but also could not sustain the quantity exported in the past years. Instability of exports was lower in case of former USSR, Italy and Canda and higher for Poland, USA and Czechoslovakia.

Laxminarayana (1993) studied the direction of Indian silk exports by first order Markov process. The major importing countries considered for the analysis were USA, West Germany, United Kingdom, France, Italy and Japan. The exports to USA were stable and would remain highly loyal to Indian silk. The probability of export to the United Kingdom, West Germany and Japan switching over to USA was unity which implied that entire quantity of exports to these countries would drift to USA over a period of time.

Jalajakshi (1994) analysed the changing pattern of shrimp export between two periods, Period I from 1970 to 1980 and period II from 1980 to 1990. The study revealed that during period I, India could not retain its previous market share in European Economic Community (EEC) countries. Nearly 90 per cent of India’s share was diverted to Japan and seven per cent to the UK. However, in period II, India could retain its previous market share in EEC countries due to the gradual acceptance of tropical shrimps in these countries.

Veena *et al.* (1994) examined the changing directions of Indian coffee exports in terms of importing country shares over the period from 1965 to 1990 using Markov chain analysis. It was observed that India could not retain its previous market share to USA, Netherlands, Yugoslavia and other importers. However, the actual quantities exported to all these countries have increased which was due to increased quantity of Indian coffee exports. India retained its market share to former West Germany, erstwhile USSR and Italy. The increased market share of the USSR in the seventies and eighties was then threatened by the economic and political upheaval in the region.

Diana (1997) used non-stationary Markov chain analysis to explore the linkages between sector specific policy and sector employment in Oregon, USA. Application of the technique to Oregon’s forestry sector and national forest policy demonstrates that macroeconomic forces had statistically important effects on employment while national forest policy, measured as timber sold or timber cut does not. These results raises question about forest policy impact analysis and assumptions inherent in national forest policy implementation.

Sreenivasa Murthy and Subrahmanyam (1999) measured the dynamics of changes in the exports of onion from India to different countries with the help of a Markov chain model. From one step transitional probabilities, the model is extended to n-step for future forecasting. The results have shown that Malaysia, United Arab Emirates (UAE) and Singapore were having high probability of retention and will continue to be the major importers in future also.

As revealed by the low values of probability of retention, Saudi Arabia and others were unstable importers of Indian onion. In the next decade, Sri Lanka and Bangladesh would increase their imports from India though it may come at the cost of UAE. The exports of onion from India would increase to 5.06 lakh tones by 2004-05 AD.

Ananthi (2000) analysed the direction of trade of Basmati and non-basmati rice in India using Markov chain analysis. The study period was 1987 -88 to 1998-99. The results indicated that in the countries such as Saudi Arabia, UAE and UK showed the probability of getting more share of import at the cost of countries such as Bahrain, Kuwait and USA. In the case of non-basmati rice all the major countries which import Indian rice will lose their share and the probability of the minor countries importing at present may be dominant over the other countries.

Balappa Shivaraya (2000) studied the changes in trade directions of export of selected vegetables using Markov chain analysis. The results revealed that UAE and Malaysia were the loyal markets for Indian onion. In case of potato, Sri Lanka and Nepal were found to be the most loyal markets, whereas Bangladesh and Nepal were the most stable importers of Indian fresh tomatoes.

Hugar (2002) studied the changes in the share of exports of onion from India to different countries. He has used the Markov model with first order finite Markov chain property to analyze the export shares by countries and forecast the export of onion, which follows stochastic process. The share of export of onion to a particular country at time t was considered as a random variable. Minimum absolute deviations estimation procedure was used to estimate the transition probabilities P_{ij} *i.e.* probability of share of export to j^{lh} country from i^{lh} country. Using this one step transition probability, shares of major importers of onion from India were compared with observed export shares. One step and five step transition probabilities were also found to predict the export shares of countries for one year and five years after the base year. His results indicated that Malaysia and UAE were loyal markets of onion export from India.

Rajesh *et al.* (2002) studied the direction of trade of major spices from India during pre liberalization period (1981-82 to 1990-91) and post liberalization period (1991-92 to 2000-01). The results showed that USA had a high retention power (*i.e.* 0.8083) in pre liberalization period for pepper compared to post liberalization period (0.3188). Japan and Saudi Arabia had high transition probability values of 0.5500 and 0.4921 respectively in retaining cardamom export from India during pre liberalization period. Pakistan, Bangladesh and Saudi Arabia had a retention power in ginger trade during post liberalization period with transition probability values of 0.6387, 0.5032 and 0.548'8, respectively.

Nisha (2004) studied the export potential and direction of exports of Indian groundnut. The results of Markov chain indicated that exports are likely to be concentrated in Indonesia and Malaysia. She also studied the size, composition and direction of exports in addition to sanitary and phytosanitary measures stipulated by different countries.

Mahadevaiah *et al.* (2005) studied the changing pattern of raw cotton exports from India during pre reforms period (1981-82 to 1990-91) and post reforms period (1991-92 to 1998~99) using Markov Chain model. The transition probability matrix estimated for both the periods showed that China was the only stable importer of Indian Cotton with retention probability values of 0.0832 and 0.3155 during pre and post reforms periods, respectively .The other traditional importing countries such as Bangladesh, Germany, Indonesia, UK, Japan and Korea.

Bhattacharyya and Banerjee (2006) examined the direction of trade of Indian imports and exports Using the gravity model considering panel data of *1950* - 2000. They observed that the number of export destinations more than doubled between 1950 and 2000. The top 5 countries continued to account for around fifty per cent of exports throughout the period. By the end of the century about 86 per cent of countries were smalltime export partners absorbing less than 1 per cent of total exports. USA was a very important trading partner of India during that period both in exports and imports while the importance of UK, which was very important in the first two decades since 1950, waned over the years. USSR Was important during the I970s and the 1980s

Savadatti (2006) studied the export behaviour of basmati rice using annual time series data covering the period from 1980-81 to 2000-01. The direction of trade and the changes in exports were analysed using Markov Chain Model. She reported that the five major countries importing Indian basmati rice and that the exports would be concentrated in Saudi Arabia and Kuwait in future. Saudi Arabia was one of the stable importers as it reflected high probability of retention at 0.9044.

Pramod *et al.* (2007) analyzed the changing direction of Indian mango exports using Markov chain. It revealed that the USA, UAE and Bangladesh were stable markets for Indian mango while, UK and Saudi Arabia were unstable markets. The increasing share of other countries showed the need to explore and exploit the market potential of other countries.

Yeladhalli and Vilas (2009) studied on Direction of trade and export competitiveness of onion. Markov chain analysis has been employed to ascertain the direction of trade through transitional probability matrix. The study revealed that Malaysia has shown the increasing trend while UAE has shown a declining trend. UAE and Sri Lanka have been very loyal markets for Indian onion market.

Markov chain analysis is the most commonly used technique to find out the trade direction of export of a commodity. In this study, the same technique was made use of to find out the trade directions of major spices exports.

2.4 Export competitiveness

A market share approach is considered to assess the degree of competitiveness between a country's product and foreign competitors' product in an importing market. Such an approach appears especially favorable where varieties of the product exist and are identifiable with the country of origin in the minds of purchasers of an importing country.

Gulati *et al*. (1994) concluded that the commodities like rice, banana, grapes, sapota, leeches, onion, tomato and mushroom were highly competitive with NPC less than 0.75, while wheat, mango, potato and tomato paste were moderately competitive with NPC ranging between 0.75 to 1.00.

Mamatha (1996) calculated the Nominal Protection Coefficient's (NPC) for Indian coffee by taking United States coffee price as the reference price. The NPC of coffee types namely plantation, Arabica and Robusta under the exportable hypothesis were 1.3, 1.3, and 1.85 respectively in1995, indicating that Indian coffee exports were not competitive and it was not efficient exportable commodity.

Datta (1996) calculated NPC, EPC and DRC for Indian basmati and non-basmati rice. The results revealed that India had very slender competitive strength in export of basmati rice. However the DRC analysis revealed that Indian exporters had some amount of buffer, because India requires spending of only Rs 0.89 on non-tradable inputs in order to earn one rupee of foreign exchange in case of non-basmati rice also these three ratios were below one indicating that the Indian rice is competitive in International markets.

Maji (1998) estimated NPC, EPC and DRC of Indian rice. The results showed that NPC was less than unity i.e. the country can potentially benefit from export and obtain higher International price. The EPC was also less than one indicating that rice producers were not protected through policy incentives. DRC ratios were also less than one, which means that a domestic resource cost can earn a much higher value on foreign exchange through exports.

Reddy *et al.* (1998) analyzed the export competitiveness of groundnut with particular reference to Karnataka using nominal protection coefficient technique under importable and exportable hypotheses. Results of the study showed that groundnut had been receiving significant protection by the then existing policies as indicated by coefficients greater than unity. Thus, groundnut was neither an efficient import substitute nor an exportable commodity, which should be a cause for concern as it is widely grown in dry land areas, where alternative profitable crops are few.

Ravi and Reddy (1998) examined the export competitiveness of selected agricultural commodities with particular reference to Karnataka using nominal protection coefficient technique. Among the six commodities studied, Karnataka lacked comparative advantage in most of the crops except cotton. The exports potential of Jowar, maize, groundnut and sunflower were significantly low. Even though, Karnataka was the leading coffee exporting State, domestic market was found to be more favorable compared to the export market. Unlike cereals and oilseeds, Karnataka had an absolute advantage in case of cotton exports.

Mahesh (2000) indicated that under importable hypothesis, the NPC and DRC were 0.71 and 0.66, respectively and under exportable hypothesis, the NPC and DRC were 0.98 and 0.93 respectively, implying that Indian tea exports were competitive and also good import substitute.

Sudha (2000) worked out the DRC for rose cultivated in 38 Hi-Tech rose units located in Bangalore urban and Bangalore rural districts of Karnataka and adjoining Dharmapuri district of Tamil Nadu during 1997-98. The results revealed that the DRC for the industry as a whole was 0.52, which reveals a high export competitiveness of Hi-Tech rose in the study area. The DRC ratio suggested the efficient use of resources by the rose cultivating Hi-Tech units. It was inferred that as long as the price of output and the proportion of the traded components of inputs remain at the present level, it is highly competitive to produce rose for export purposes.

Jayesh (2001) used the nominal protection coefficient technique for the export competitiveness of Indian pepper. Under the exportable hypothesis, the nominal protection coefficient value were found to be lesser than unity (0.849) in Calicut and (0.817) in Sirsi markets, indicating that the Indian pepper is competitive in the international market and which is an efficient export oriented commodity.

Desai and Hiremath (2001) examined the export potentialities of mango from India by using nominal protection coefficients for the period 1990-1998, which is the ratio of domestic price to the border price. The findings of the study indicated that on an average, the nominal protection coefficients value in fresh mango (0.89), and mango slices (0.45) were lower than one indicating their competitiveness in international market.

Phuke *et al.* (2004) analyzed the export potential of banana in India for period of 1991-92 to 2001-02. Nominal Protection Coefficient (NPC), NPC = $\frac{DP}{BP}$ used to measure the export competitiveness of banana. India did not enjoy comparative advantage in the total banana export in 1991-92 as NPC is more than unity. India enjoyed comparative advantage in export of banana in the new world trade order (after LPG) to all the countries expect Nepal.

Raghavendra (2004) analyzed global competitiveness of exports of important crops from Karnataka State (India) for 1992-93 to 2000-01 (post· liberalization period), using the .Policy Analysis Matrix, which was decomposed into Effective Protection Coefficient (EPC), NPC and ORC. Crops considered for analysis included rice, maize, groundnut, redgram and cotton. DRC for rice was less than 1 (0.68) during the study period, this implied that the value of domestic resources used up in producing a unit of rice was less than what it could cost to import, therefore India has comparative advantage in producing rice. EPe for rice was less than unity (0.80), an indication that rice production was protected by Government. NPC for rice was less than 1 (0.47), implying that Karnataka had price Competitiveness in rice.

Savadatti (2007) analyzed export competitiveness of Basmati rice with the help of Nominal Protection Coefficient (NPC) for the period 1980-81 to 1989-99. Although Basmati rice trend is positive, it is not smooth and steady. Around 60 to 70 per cent of the entire basmati rice exports are going to Saudi Arabia, Kuwait and UAE. The study reveals that there is ample scope for USA, one of the important importers of Basmati rice. The estimated NPC of the basmati rice with respect to USA with an average of 0.82 reveals that basmati rice export is competitive and enjoys advantages in exports. Basmati rice is a good exportable product. There is ample scope to export basmati rice to USA. But there is stiff competition from Pakistan.

Yeladhalli and Vilas (2009) studied on Direction of trade and export competitiveness of onion. The study showed that NPC for onion was 0.947 during 2000-2001 under exportable hypothesis while under the importable hypothesis it was 0.311. This implied that domestic prices received by farmers were below the international prices in India. The DRC ratio worked out to be less than unity (0.23) indicating high export competitiveness of onion. The policy implications in the form of subsidies, simplified export licensing procedures may be directed in view of potential exports for onion from India.

Kumar (2010) assessed the export competitiveness of different lives and analyzed the factors affecting the growth of livestock India after liberalization. The liberalization policy initiated in 1991 appeared to have improved the performance of livestock exports. The study revealed that India was competitive in export of meat products, except poultry. The export of buffalo meat has been increasing consistently poor domestic demand has further fuelled its export of mutton did not seem to have much prospects in the short-run, as even the domestic demand was not met by domestic production.

Siddaya and Atteri (2010) examined the export competitiveness under the cost compliance horticultural commodities. The NPC, Effective Protection Coefficient (EPC), DRC and Effective Subsidy Co-efficient (ESC) were computed under cost compliance as well as without cost compliance. Except for grapes, NPC, ESC and ORCs were found to be less than unity for fresh and processed fruits and vegetables, implying that the Indian horticultural sector has a comparative advantage in the selected fruits and vegetables. The EPC was more than unity for various fresh and processed fruits and vegetables because the relation between domestic and international input and output prices were not uniform.

Nominal protection coefficient is the most commonly used technique to find out the trade competitiveness of export of a commodity. In this study, the same technique was made use of to find out the trade directions of major spices exports.

2.5 Export potentiality

Singh (1995) studied on Export potential of dairy products in the new economic environment. The study analyses the India's milk product export status in order to assess policy strategies for strengthening export share. Indian production of milk and milk commodities has been increasing at an annual growth rate of 5%-6% since 1970-71, mainly as a result of the Operation Flood Programme. Cream, sweet products, butter and ghee were the major export commodities from India. Milk products produced in India have primarily been used to meet domestic demand. There is a need to develop technology in order to supply world markets. Milk production, collection and transportation as well as manufacturing and packaging processes of indigenous products should be improved.

Sawat (1997) studied on Silk export potential. The study showed that imports of Indian natural silk goods in 1993-94 by region are shown together with trends in total export earnings from the Indian sericulture industry over the period 1971 to 1993. The Western European region is the major market for Indian silk goods (44%) followed by the American region (36%). The compound growth rate for sericulture export earnings (24%) was quite high compared to total export earnings over the period 1971 to 1993. Forecasts for 1998-99 suggest that India can continue to increase its natural silk good exports.

Ashok (2003) studied on Extent and export potential of major flowers grown in Haryana and other parts of India. The study analysed the trend and growth rate of floricultural exports from India (and Haryana in particular) during the period 1991-92 to 1999-2000. It is revealed that India's floricultural exports have achieved a credible performance. Haryana, in particular, has achieved a significant growth on the export front and has a tremendous export potential.

Kumar (2004) studied on exploring the agricultural export potential of Andhra Pradesh - a SWOT analysis. A SWOT analysis (strengths, weaknesses, opportunities and threats) of Andhra Pradesh agriculture is presented in the context of agricultural export potential. The analysis indicates that farmers should concentrate more on profitability rather than on productivity. This implies that farmers should produce and market their produce through cost-effective technologies.

Chauhan (2005) studied on pattern of domestic milk marketing and export potential of milk and milk products in India. The study revealed that Indian dairy market is currently growing at 4% per year. The milk surplus states include Uttar Pradesh, Punjab, Haryana, Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. Among the different products exported from India, skim milk powder had the largest share, the lowest was observed for milk cream. Milk product exports from India between 2000-01 and 2001-02 almost doubled.

Khunt (2008) conducted a study on export potential and barrier in export of onion from Gujarat. The study revealed that the area, production, productivity was growing positively at compound growth rate, indicating the assurance of onion supply for export as well as for sustaining fast growing onion dehydration industries of the state.

Naidu and Naidu (2009) studied on marketing strategies for exporting mangoes and mango products from India. The study revealed that India's full mango export potential has not been realized because less than 2 percent of its production was exported. Other major mango producing countries, like Mexico, Brazil, and Pakistan, export much higher percentages of their production contributing to their international trade. The majority of India's mango gardens are owned by small farmers, and some 72 percent of the farms are less than three hectares. For the majority of farmers in India, mangoes are an important cash crop besides being a popular fruit. India's mangoes are unique in taste and aroma as they represent more than one thousand varieties, a diversity unmatched by any other national production. It is estimated that nearly 15 percent of India's mango production is wasted due to lack of adequate infrastructure facilities. This manuscript examines the weaknesses of India's infrastructure and supply chain management and suggests viable marketing strategies to penetrate European and North American markets where India's performance was anemic at best. By changes in orchard management, improvements in infrastructure, use of advanced technologies, and meeting the food quality standards, India has the potential to become the number one exporter consistent with its first rank in the production of mangoes.

Tabular analysis by using percentage and compound growth rate is the most commonly used technique to find out the export potentiality of a commodity. In this study, the same technique was made use of to find out the trade directions of major spices exports.

2.6 Constraints in Production, Marketing and Exports

Islam Nural (1990) mentioned that the entry of horticultural produce in to export market was constrained due to the lack of specialized nature of export–related infrastructure, including strict quality and sanitation standards as well as established consumer preferences for specific products in particular markets. The author concluded that organization of an effective system of packing, processing, storage, transportation and distribution, both nationally and internationally, was crucial to success in horticultural exports.

Vyas (1994) suggested the following preconditions in order to increase exports of fruits, vegetables, flowers, etc., (a) vertical integration of small holdings with appropriate secondary and tertiary organizations for input supply, quality control, marketing and processing (b) the infrastructure support in terms of communication, transport, cold storage, etc., (c) development of economic and social infrastructure.

Chakrapani (1994) reported that no attention had been paid to develop the export of fruits and vegetables in India. Fruits and vegetables worth Rs 203 crores were exported from India mainly to UAE and UK during 1992-93. However, these products being perishable needed proper attention at all stages right from marketing. But, unfortunately sufficient attention had not been paid in this direction.

Thakur *et al.* (1994) identified the problems encountered by the farmers in marketing of the vegetables. They were (1) unorganized market and low prices paid to farmers, (2) lack of mechanical grading, packing and proper storage facilities, (3) malpractice, high and undue marketing margins, (4) lack of sufficient and low cost transportation facilities, (5) lack of market information and market news, and (6) lack of processing units and co operative societies.

Sharanesh (1994) reported that non availability of labour was the major problem in the cultivation of grapes in Bijapur districts of Karnataka. This problem is still more in vineyards with narrow spacing where more labours are required for each farm operation. About 32.25 per cent of farmers stated problem of heavy initial investment and also problem of high incidence of pest and diseases which affect whole vineyard if not controlled in time.

Singh (1995) studied the post-harvest technology of mangoes and observed that, in order to export fresh mangoes there was an urgent need to adapt a host of modern innovations in post-harvest technology measures such as harvesting at optimum maturity, washing, clearing, waxing, fungicidal treatment, size and colour grading, sorting of fruits according to their varietals characteristics, removal of damaged, defective, diseased and pest-attacked fruits, packing in ventilated CFIS cartons, pre-cooling and cold storage at the prescribed temperatures and relative humilities, transportation in well aerated and cooled wagons/trucks (for domestic market) and in refrigerated containers for distant export markets by ship and air cargo, delivery within the time schedule at contracted price and quality and strict adherence to phytosanitory standards.

Srivastava *et al.* (1996) reported that, although India was a major producer of a number of delicious varieties of mangoes, it exported only one or two varieties, mainly Alphanso from Maharastra on a large scale. They observed that the incidence of spongy tissue in Alphanso and fruit fly and stone weevil in Amrapali and Dashehari varieties acted as constraints in the export of fresh mangoes. Lack of uniform size and colour among mango fruits also impeded their export. Indian mangoes could not be exported to USA and Japan, as the required vapor treatment of the fruits and air freight were costly.

Gopal Rao (1998) studied the export of horticultural crops from Andhra Pradesh and observed that, mangoes and onions were exported in large quantities to foreign countries. The major constraint in the way of increasing export of fruits and vegetables to the International markets were poor quality, premature harvesting of the fruits leading to reduced shelf life and low sugar content, lack of adequate knowledge of the quality standards in International market by both farmers as well as the merchants, poor storage and transport facilities, carelessness in handlings of fruits and vegetables at various stages of picking, packing and transportation. Thus, the author opinioned that the promotion of export of fruits and vegetables in the State needs dissemination of knowledge on International standards of quality, export policies, duties, subsidies and taxes, freight, etc., to all stake-holders form growers to exporters as well as strict supervision and control on quality for export.

Praduman Kumar and Subarthi (1998) stated that, despite nurturing a wide variety of fruits, which enjoyed comparative advantages in their production and export, India had not been able to do well on the horticulture export front. The main reasons which hampered the field from growing according to the author were high cost of raw materials, in adequate and expensive refrigeration facilities during storage, transportation and distribution, poor availability and high cost of quality packaging and related machinery and inefficient existing technologies and high residual effects. To strengthen these activities, the study suggested to diversify and expand the export basket giving due emphasis to the development of domestic market simultaneously and infrastructure facilities.

Anthura (1998) studied the distribution process as a major bottleneck in selling anthurium flowers in the American market. The growers run certain risk. They send their flowers on consignment to their importers sell their flowers to wholesalers in large cities on the east coast of USA, taking the commission of around 15 per cent.

Gajanana and Subramanyam (1999) studied the main constraints in the production and marketing of anthurium in Karnataka and Kerala the non-availability of required quantity and quality of planting materials, high cost of seedling, incidence of pest and diseases were the major constraints in the production of the flowers. As regards to marketing absence of organized market was the major problems fallowed by non-availability and high cost of transportation. Besides, exploitation by the floweriest in the form of delayed payment and purchases of only quality flowers were the other constraints faced by the growers in marketing of anthodium's.

Karpagam (2000) conducted a study on turmeric growers of Tamil Nadu state and reported the problems such as price fluctuation, high cost of inputs and scarcity of labour, very few respondents expressed the problem of non-availability of credit.

Govinda Gowda (2002) in his study on sustainable grape cultivation reported the important constraints in grape marketing as, no fixed price, low price, lack of regulated markets, exploitation by middle men, lack of cold storage facility, no guidance on marketing aspects and lack of transportation facilities. Further, constraints perceived by them in availing credit were non availability of credit in time and inadequate quantity of credit.

Hymajyoti *et al.* (2003) conducted a study on export performance of onion and potato from India. The study was conducted with the objective of assessing the constraints associated with exports. The study revealed that most of the exporters expressed phyto-sanitory problem, lack of demand from importing countries, lack of export promotion measures and lack of infrastructure facility as a major obstacles which impede export of vegetables.

Smitha (2004) studied the major problems in production by anthurium growers in Coorg districts if Karnataka. High cost of the planting materials and the huge initial investment required for the cultivation of anthurium, the problem of pests and disease attack and also the low light intensity during winter season were considered to be important problems which reduced the productivity of crop drastically during winter.

Velavan (2004) observed the major production constraints were poor yield of cashew nuts, because of the age old plantation, necessity of financial support. Lack of irrigation facilities and farmers were not able to adopt proper pest control measures due to the high cost of pesticides. Further, he reported that cashew nut in India face severe competition from other surrogate nuts like almonds, pistachios, hazelnuts, Brazil nuts and macadamia etc. In addition to this, India was facing severe competition from the exporting countries like Brazil and Vietnam in exports of cashew nuts, because of devaluation of their currencies, non availability of value added kernels in consumer packets for exports, non-availability of the packing materials in the international standards, inconsistency and the non-uniformity in the quality of kernels for individual brands and the markets. Value added products from the cashew were not available in the exports from India.

Nagesh (2006) in his study on pomegranate reported the constraints faced by pomegranate growers as; lack of storage facility, high incidence of pest and diseases, non availability of skilled labour for pruning, expensiveness of pruning operations, costly chemicals and fertilizers and lack of processing units were the major constraints.

Khunt *et al*. (2008) studied on Export potential and Barrier in export of onion from Gujarat. The study showed that the non-tariff barrier faced by exporters were irregular and inadequate onion supply of required quality, infrastructure bottlenecks like debts, lack of quick and cheap transport facility, lack of quality testing labs and phytosanitory problems, lack of export promotion as well as tariff barriers like debt subsidy in transportation and protection tariff imposed by EU against export of India.

Suresh Kumar and Singh (2008) studied on WTO and export competitiveness of apple in Himachal Pradesh. The study revealed that the Himachal Pradesh apple was not competitive with China consequently import from China was increasing rapidly. Although the apple of Himachal Pradesh was competitive with USA apple during pre and post WTO but USA apple export was increasing despite competitive advantage to Himachal Pradesh.

Vinod Anavrat (2010) studied on marketing constraints and technology needs of Nagapur Mandarin growers. The study revealed that farmers were not getting remunerative prices was the major constraints as expressed by 82.28 percent respondents, financial constraints compels 68.57 percent orchardists for preferential selling to the pre-harvest contractors. The lack of refrigerated storage facility in the market for the storage of Nagapur Mandarin fruits was also a major constraints expressed by 62.85 percent farmers.

Tabular analysis by using of statistical tools like averages, percentages etc. to obtain the meaningful results in analysis of problem faced by farmers. This is the most commonly used technique to analyse the opinion of farmers regarding the problems in production, marketing and export. In this study, the same technique was made use of to find out the status and extent of constraints in production, marketing and export.

3. METHODOLOGY

The nature and source of data for the study and the analytical tools employed in the study have been presented in this chapter.

3.1 Description of the study area

3.2 Database and sampling procedure

3.3 Analytical tools used

3.3.1 Tabular presentation

3.3.2 Exponential growth model

3.3.3 Markov chain analysis

3.3.4 Instability analysis

3.3.5 Export competitiveness

3.1 Description of the study area

Peninsular India has a land mass of 32, 00,483 sq km with 15,200 km land frontier. India lies to the north of equator between 8.5^0 to 37.6^0 north latitude and 68.7 to 97.25 east longitudes. India has a varied temperature ranging between 15.7^0 C and 35.5^0 C. It receives rainfall ranging from 20 to 80 inches. India gets rainfall from both southwest and northeast monsoon. India’s huge agricultural potential is embodied in its size and in its abundance and diverse nature resources, unlike most part of the World which have a cold and hostile winter and a relatively a small proportion of arable land, India is blessed with bounteous nature across vast fertile river plains. Indian cereal and horticultural crops provide another demonstration of her abundance, diversity and opportunity.

One among World’s largest fruit producer, India is already making its presence felt in World markets with its typically diverse portfolio of fruits. India is 9^{th} largest grapes producing country. Grapes is cultivated in an area of 1.11 lakh hectares with the productivity of 11.1 tonnes per hectare in the World. (Appendix-II)

The geographical area of Karnataka is 190.50 lakh ha., of which, an area of 126.02 lakh ha., comes under the cultivable area, constituting 66.15% of the geographical area for the year 2009-10 Out of the total cultivable area, 18.99 lakh hectares are covered under horticulture. Horticultural area in the State, accounts about 15.07% of the total cultivable area. Out of 18.99 lakh ha., of the total horticultural cropped area, 8.05 lakh ha., (42.39 %) come under Plantation Crops; 4.37 lakh ha., (23.01%) under Vegetables; 3.60 lakh ha., (18.96%) under Fruits; 2.66 lakh ha., (14.01%) under Spices and 0.31 lakh ha., (1.64%) under Commercial Flowers, including the area under the Medicinal & Aromatic plants.

In India, Karnataka is second largest grapes growing state next to Maharastra. Total area under grapes in Karnataka is 18100 hectare and produces 3, 30,300 tonnes (26.7% of total). The medium rainfall, dry and healthy weather are considered to be the ideal condition for grapes cultivation. Bijapur, Belgaum and Bagalkot districts of Northern Karnataka have these ideal conditions for successful grapes cultivation, which are the major grape growing districts and accounts for 71% of total Karnataka’s production. Hence these districts were selected to collect primary information required for the study.

Bijapur, Belgaum and Bagalkot districts of Karnataka are well situated in interior of the Deccan peninsular of the Karnataka. Bijapur lies between North latitude 15^0 20^1 and East longitude 74^0 28^1. It bounded on the north by Solapur district of Maharastra and northeast by Gulbarga and southwest by Bagalkot (Bijapur District at a Glance, 2009-10). Bagalkot lies between North latitude 16.12˚ and East longitude of 75.45˚. The District is bounded by Bijapur district towards north, Gadag district towards south, Raichur district towards east, Koppal district towards south east and Belgaum district towards west (Bagalkot District at a Glance, 2009-10). Belguam lies between North latitude 150-23' to 160-58' and East longitude of 740-05' and 750-28'. The District is bounded on the west and north by Maharashtra state, on the northeast by Bijapur District, on the east by Belguam District, on the southeast by Gadag District, on the south by Dharawad District and Uttara Kannada districts, and on the southwest by the state of Goa (Belguam District at a Glance, 2009-10).

The climate of these districts is generally dry, large variation in the rainfall, from year to year both in amount and in its distribution throughout the season made, these districts prone to drought and famine. The average rainfall of these districts is 668.2 mm and temperature ranges from 14.8^0 C to 43^0 C. There are two main type of soils namely black and red soil. The average water holding capacity is medium to high. A major portion of these districts is covered by deep black soils which has a greater moisture retentive capacity. These soils are slightly alkaline and are poor in organic matter constituents. The main food crops are Jowar, Bajra and grams. Among the commercial crops ground nut, sesamum, linseed, cotton, safflower and sunflower are more popular.

3.2 Sampling procedure and Database

Multistage sampling technique was employed for selection of sample districts, taluks, villages and respondents. Primary data were collected from Bijapur, Belgaum and Bagalkot districts of Northern Karnataka. The study area was also presented in figure-1.

3.2.1 Selection of the sample districts

Bijapur, Belgaum and Bagalkot districts were selected since these have got highest area and production under grape cultivation in Norhtern Karnataka (Table 3.1)

3.2.2 Selection of the sample taluks

Grapes cultivation is practiced throughout these districts. However, the large scale cultivation of grapes is concentrated in Bijapur, Athani and Jamakandi taluks of Bijapur, Belgaum and Bagalkot districts respectively. One taluk from each district which have got highest area in grapes was selected.

3.2.3 Selection of the sample villages

A list of villages cultivating grapes was prepared in consultation with the Taluk Department of Horticulture and Karnataka grapes growers association. The villages were selected mainly on the basis of relative importance of cultivation of grapes in the villages. The villages so selected includes Tikota and Babanagar villages of Bijapur taluk, Telsang and Sankonatti villages of Athani taluk and Chikkalaki and Todalbagi villages of Jamakandi taluk.

Grapes growers were selected randomly from the list of grapes growers obtained from the revenue records of the selected villages. Primary data required in the present study were collected by personally interviewing 20 grapes growers from each village using the structural schedules, thus making sample size 120 (Table 3.3). The data collected from the farmers included socio economic characters of the farmers, their land characters, cropping pattern, details of grape cultivation including area, production as well as productivity and marketing constraints.

Secondary data for the study were collected from various published sources. Time series secondary data on area, yield, production, export quantity and value of grapes for a period of 26 years from 1985-86 to 2010-11 were obtained from the publications of FAO, APEDA, NHB. Data on destination wise exports were obtained from "APEDA, Monthly Statistics of Foreign Trade of India", published by Directorate General of Commercial Intelligence and Statistics, Kolkata (DGCIS). The freight rates for grapes were obtained from Mahagrapes, Maharastra. The total production and exports of different countries were also obtained from FAO trade yearbook. Information on domestic prices of the grapes and other agricultural statistics were compiled from various issues of "Karnataka at a Glance", and "Karnataka's Economy in Brief" published by Directorate of Economics and Statistics, Bangalore. Study period was selected based on the availability of data and primary data represented the period 2010-11.

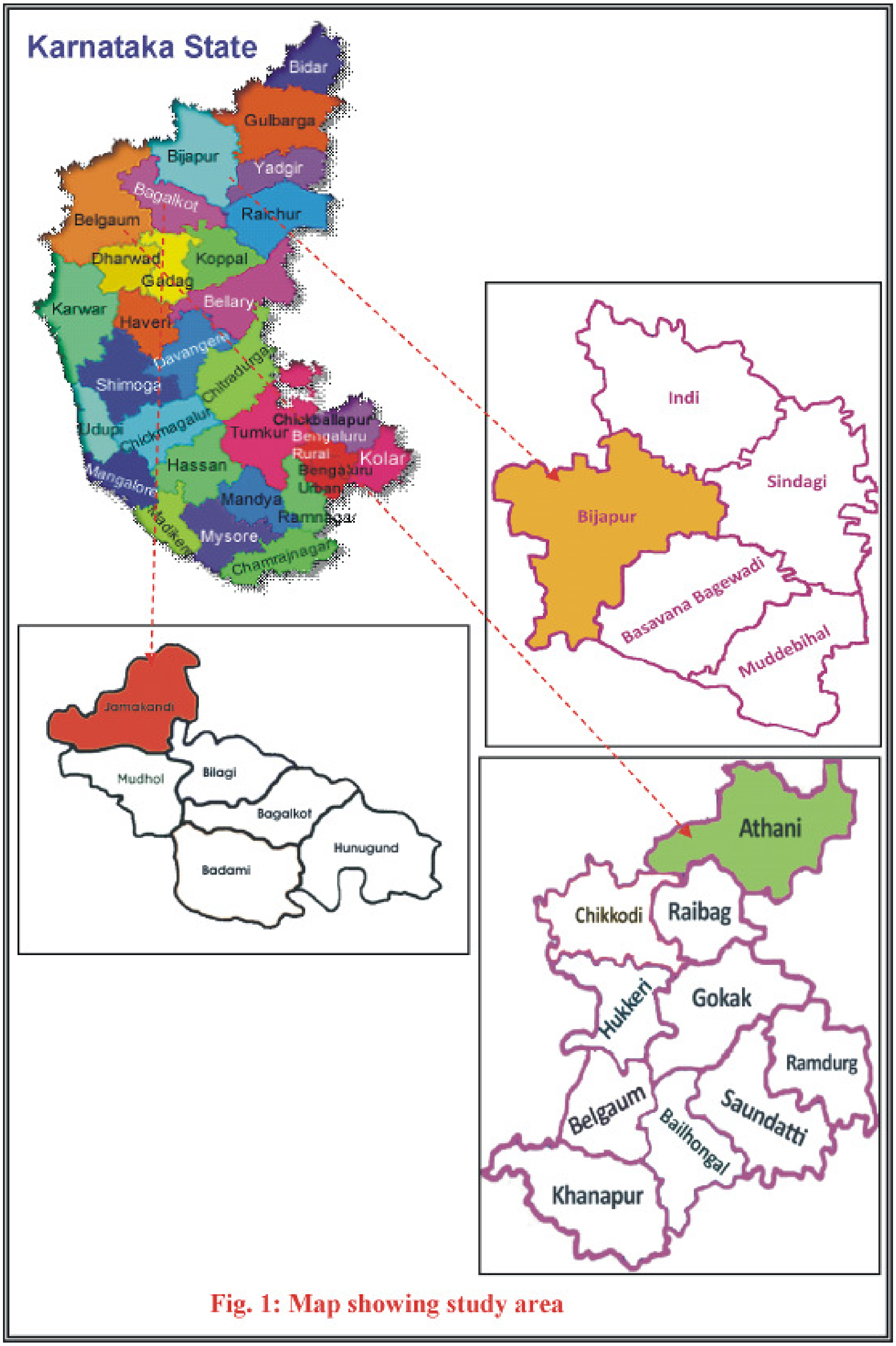

Fig. 1: Map showing study area

Table 3.1: Area, Production and Productivity of Grapes in Karnataka

Districts	Area (ha)	Production (tonnes)	Productivity (tonnes/ha)
Bagalkot	1221	57878	47.4
Bangalore(Urban)	849	18023	21.2
Bangalore (Rural)	1787	55451	31.0
Belgaum	2147	64837	30.1
Bellary	240	3897	16.2
Bidar	161	5011	31.1
Bijapur	5388	185261	34.3
Chikkaballapur	1236	23699	19.1
Chikkmagalur	14	436	31.1
Chitradurga	2	62	31.1
Dharwad	4	125	31.1
Gadag	72	2241	31.1
Gulbarga	246	3359	13.6
Hassan	6	187	31.1
Kolar	105	1861	17.7
Koppala	268	5581	20.8
Mysore	15	467	31.1
Ramnagar	2	62	31.1
Tumkur	13	405	31.1
Total	13777	428843	31.1

Source: Directorate of Economics and Statistics (2009-10), Karnataka

Table 3.2: Taluk-wise Area, Production and Productivity of Grapes during 2009-10

District	Taluk	Area (Ha)	Production (tons)	Productivity (tons/ha)
Bijapur	Basavan Bagewadi	166	2620	15.78
	Bijapur	6320	99884	15.80
	Indi	398	6164	15.49
	Muddebihal	56	852	15.21
	Sindagi	268	4140	15.45
Total		7208	113660	15.77
Belgaum	Athani	1093	19327	17.68
	Bailhongal	0	0	0
	Belgaum	0	0	0
	Chikkodi	123	1845	15.00
	Gokak	45	743	16.51
	Hukkeri	4	60	15.00
	Khanapur	0	0	0
	Raibhag	197	2955	15.00
	Ramdurg	64	413	6.45
	Soundatti	23	345	15.00
Total		1549	25688	16.58
Bagalkot	Badami	72	1187	16.49
	Bagalkot	182	3504	19.25
	Bilagi	85	1529	17.99
	Hungund	2	-	-
	Jamakandi	474	7375	15.56
	Mudhol	344	6505	18.91
Total		1159	20100	17.34

Source: Directorate of Horticulture, GOK. Lalbagh, Bangalore

3.3 Analytical Tools and Techniques

The analytical tools employed in the present study were elaborated under the following headings.

3.3.1 Tabular presentation technique

Tabular analysis was adopted to compile the general characteristics of the sample farmers, determine the extent and share of quantity exported to know export potentiality and opinion of farmers regarding the problems in production, marketing and export.

The data were summarized with the aid of statistical tools like averages, percentages *etc.* to obtain the meaningful results.

3.3.2 Exponential growth Model

Growth rate on area, production, yield and exports of grapes were computed for a period of 26 years from 1985-86 to 2010-11. This period is separated by phased manner such as pre-WTO (1985-86 to 1995-96) and post- WTO (1996-97 to 2010-11) and overall (1985-86 to 2010-11).

The linear, log-linear, exponential and power functions were some of the important functional forms employed to study the growth rates. Different functional forms were tried in the past for working out growth rates in area, yield and production. Some of the important forms tried were the linear growth model (Y = a+ bt), exponential function ($Y = ab^t$) and quadratic function (Y = a+bt+ct2). However, it was found that the exponential form of the function $Yt = ab^t$ was the better and most frequently used one.

Growth rates in area, production and productivity of grapes as well as quantity and value of export of grapes were computed for a period of 26 years from 1985-86 to 2010-11. Growth rates were computed using the exponential growth function of the form (Angles, 2001).

Table 3.3: Sampling procedure for selecting sample farmers

District	Taluk	Village	Sample
Bijapur	Bijapur	Tikota	20
		Babanagar	20
Belgaum	Athani	Sankonatti	20
		Telasang	20
Bagalkot	Jamakandi	Todalabagi	20
		Chikkalaki	20
Total			120

$$Y = a\,b^t\,e \ldots\ldots\ldots (1)$$

Where,

- Y= Dependent variable for which the growth rate is estimated i.e., Area, Production, Productivity and Exports
- a= Intercept
- b= Regression coefficient
- t= Time variable
- e= Error term

The compound growth rate was obtained from the logarithmic form of the equation (1) as below

$$\ln y = \ln a + t \ln b$$

The per cent compound growth rate (g) was derived using the relationship

$$g = (\text{Anti log of } b - 1) \times 100$$

3.3.3 Instability Analysis

The coefficient of variation was used as measure to study the variability in production and export of grapes from India. The coefficient of variation or index of instability were computed by using the following formula

$$CV = \frac{\text{Standard Deviation } (\sigma)}{\text{Mean } (X)} \times 100$$

Linear trend was fitted to the original data of area, production, productivity and export trade of grapes, for the time series data of 26 years period from 1985-86 to 2010-11. This period was separated by phased manner such as Pre-WTO (1985-86 to 1995-96) and Post-WTO (1996-97 to 2010-11) and overall (1985-86 to 2010-11). The trend coefficients were tested for their significance. Whenever the trend of series found to significant; the variation around the trend rather than the variation around mean was used as an index of instability. The formula suggested by Cuddy and Della (1978) was used to compute the degree of variation around the trend. That is Coefficient of variation was multiplied by the square root of the difference between the unity and coefficient of multiple determinations (r^2) in the cases where r^2 was significant to obtain the Instability Index.

$$\text{Instability Index} = \frac{\text{Standard Deviation } (\sigma)}{\text{Mean } (X)} \times 100 \times \sqrt{1 - r^2}$$

r^2 = RSS/TSS = Goodness of fit

RSS = Regression Sum of Square

TSS = Total Sum of Square

3.3.4 Markov Chain analysis

Annual export data for period 2000-01 to 2010-11 was used to analyze the direction of trade and changing pattern of Indian grapes export. The major Indian grapes importing countries considered were UK, Bangladesh, Netherlands, Germany, Sri Lanka, Saudi Arabia, and UAE. Estimation of the exports was done for the study period using Markov chain analysis.

Markov chain analysis was employed to analyze the structural change in any system whose progress through time can be measured in terms of single outcome variable. In the present study, the dynamic nature of trade patterns that is the gains and losses in export of Indian grapes in major importing countries was examined using the Markov chain model. Markov chain analysis involves developing a transitional probability matrix 'P', whose elements, P_{ij} indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element P_{ij} where I=j, measures the probability of a country retaining its market share or in other words, the loyalty of an importing country to a particular country's exports.

In the context of current application, structural change was treated as a random process with seven importing countries for grapes the assumption was that the average export of grapes from India amongst importing countries in any period depends only on the export in the previous period and this dependence was same among all the periods. This was algebraically expressed as.

$$E_{jt} = \sum_{i=1}^{n} [E_{it} - 1] P_{ij} + e_{jt}$$

Where,

E_{jt} = exports from India to the j^{th} country in the year t

E_{it} -1 = exports of i^{th} country during the year t-1

P_{ij} = the probability that exports will shift from i^{th} country to j^{th} country

e_{jt} = the error term which is statistically independent of E_{it-1}

n = the number of importing countries

The transitional probabilities P_{ij}, which can be arranged in a (c x n) matrix, have the following properties.

$$\sum_{i=1}^{n} P_{Ij} = 1 \quad \text{And } 0 \le P_{Ij} \le 1$$

Thus, the expected export share of each country during period't' is obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. The probability matrix was estimated for the period 2000-01 to 2010-11.

Thus transitional probability matrix (T) was estimated using linear programming (LP) framework by a method referred to as minimization of Mean Absolute Deviation (MAD).

Min, OP* + I e

Subject to

X P* + V = Y

GP* = 1

P* ≥ 0

Where,

P^* is a vector of the probabilities P_{ij}

O is the vector of zeros

I is an appropriately dimensional vectors of areas

e is the vector of absolute errors

Y is the proportion of exports to each country.

X is a block diagonal matrix of lagged values of Y

V is the vector of errors

G is a grouping matrix to add the row elements of P arranged in P^* to unity.

Prediction of quantity of fresh grapes export was made by using the Transitional Probability Matrix

$B_t = B_0 * T$

$B_{t+i} = B_{t+i-1} * T$

Where,

B_0 = Quantity exported in Base years

B_t = Quantity in next year (prediction)

T = Transitional probability matrix

3.3.5 Export competitiveness (Nominal Protection Coefficient-NPC)

Nominal Protection Coefficient (NPC) of Indian grapes was estimated for the period (1992-93 to 2010-11) in order to examine its export competitiveness in the World market. Nominal Protection Coefficient is a straightforward measure of competitiveness. It is calculated as a ratio between the domestic prices to the International price of a comparable grades of commodity, adjusted for all the transfer costs such as freight, insurance, handling costs, margins, losses etc. If NPC is less than one, the commodity is competitive (under importable hypothesis it is considered a good import substitute and under exportable hypothesis it is worth exporting). If NPC is greater than one, the commodity is not competitive (not a good import substitute or not worth exporting).

NPC can be estimated under two main hypotheses i.e., under importable hypothesis and exportable hypothesis. Under importable hypothesis the commodity in question i.e. grapes is regarded as an import substitute and it is imported and it competes with domestically produced commodity in domestic market. The transfer cost i.e. the International and domestic transportation costs extend a sort of protection to the domestic commodity.

Under exportable hypothesis, the commodity in question is treated as exportable commodity and thus competes with internationally produced commodity at a foreign port. Therefore, the domestic commodity has to be extra efficient to the tune of International transportation costs at least.

In the present study nominal protection coefficient (NPC) was estimated under the exportable hypothesis, as India imports very less volume of grape varieties specially for wine making and for table purpose in off season. Under exportable hypothesis, Indian grapes are assumed to compete with Chile and South African grapes at European port. NPC calculated by using the formula,

$$NPC = \frac{P^D}{P^I}$$

P^D and P^I are domestic price of grapes and International price respectively.

Nominal protection coefficient, International reference price in case of exportable hypothesis was calculated as shown in Table 3.4.

Table 3.4: Calculation of Nominal Protection Coefficient (NPC) Under Exportable Hypothesis

Sl. No	variable	Particulars	Place	Values (Rs/Qtl)
1	A1	Wholesale prices in	Karnataka	
2	A2	Transportation cost	Mumbai	
3	A3	Marketing margin @ 5 %		
4	A4	C&F Handling Charges		
5	A5	Wharfage charges		
6	A6	Service charges		
7	A7	Service tax		
8	**X**= (A1+….+A7)	Equals FOB price at	Mumbai	
9	**Y**	Plus Freight from India to	UK	
10	**Z**	Plus Insurance @1%of price		
11	P^D=(X+Y+Z)	Equals landed price		
12	P^I	FOB price	UK	
13	P^D/P^I	Nominal Protection coefficient		

4. RESULTS

Keeping in view the objectives of the study, the data collected from different sources were analysed employing appropriate techniques. The results of the analysis are presented under the following headings:

4.1. General characteristics of the sample farmers

4.2. Growth rates and instability in area, production and productivity of Indian grapes.

4.3. Growth and instability in export of Indian grapes.

4.4. Extent of export potentiality.

4.5. Direction of trade of Indian grapes.

4.6. Competitiveness of Indian grapes in International market.

4.7. Role of grape grower association in production and export of grapes.

4.8. Constraints in the production, marketing and export of grapes.

4.1 General characteristics of the sample farmers

General characteristics of sample farmers are expected to provide a bird's eye view of the general features prevailing in the study area (Table 4.1). Therefore, an attempt has been made to analyse some of the important general characteristics of the sample farmers. The table reveals that the average family size of sample farmers was similar (5 no's) in Athani, Jamkandi and Bijapur taluks of Belgaum, Bagalkot and Bijapur districts respectively. The average age of the sample farmers was higher for Jamakandi (45 years) as compared to Bijapur (43 years) and Athani (42 years).

The literacy rate of the farmers revealed that about 87 percent of them were literate in all the taluks. However, the proportion of the farmers attaining degree level of education was higher in Athani (12.13 %) as compared to jamkandi(10.32%) and Bijapur (7.76 %). Overall, the majority of the farmers attended primary (29.90%) and high school (27.22%) as compared to PUC (20.19%) and degree (10.08%). As per occupation was concerned, 90 per cent of farmers having agriculture as a main occupation in Bijapur taluk and remaining sample farmers were having agriculture as subsidiary occupation. While in Athani 92.50 per cent and in Jamakandi 87.50 per cent sample respondents were having agriculture as main occupation and rest as subsidiary. Overall, 90 per cent of the farmers were having agriculture as a main occupation and rest as subsidiary.

Average land holding of the farmers was marginally higher in the case of Jamakandi (4.20 ha) as compared to 4.10 hectares in Bijapur and 3.70 hectares in Athani. The average area under grapes was more in Bijapur (1.52 ha) as compared to athani (1.35 ha) and Jamakandi (1.28). The major source of irrigation was the bore well (1.09 ha) and open well and rivers are the other sources of irrigation.

4.2 Compound growth rates and instability in area, production and productivity of grapes

Compound growth rates were computed to comprehend the trends in the area planted, production, and productivity of grapes from the country. The study period of 1985-86 to 2010-11 was divided in to two sub periods, Viz., pre-WTO (1985-1995) and post-WTO (1996 to 2011) periods. The exponential growth functions and instability indices were employed to find the difference in growth rates and instability during the above mentioned periods.

4.2.1 Compound growth rates and instability in area, production and productivity of Indian grapes

The estimated growth rates and instability indices during pre-WTO, post-WTO and overall study period were presented in Table 4.2. Growth rate of grapes productivity during the pre-WTO period was negative (-0.53 %) and was associated with instability index of 10.99 per cent.

Table 4.1: General characteristics of sample farmers

Sl. No.	Particulars	Bijapur (Bijapur)	Belgaum (Athani)	Bagalkot (Jamakandi)	Overall
1.	Number of Sample farmers	40	40	40	120
2.	Average family size(nos)	5	5	5	5
3.	Average Age of the sample farmers (Years)	43	42	45	43
4.	Education level (%)				
a	Illiterate	12.57	10.15	15.12	12.61
b	Primary	27.35	25.10	37.26	29.90
c	High school	32.22	27.25	22.18	27.22
d	PUC	20.10	25.37	15.12	20.19
e	Degree	7.76	12.13	10.32	10.08
5.	Occupation				
a	Agriculture as a main	36 (90)	37 (92.50)	35 (87.50)	108 (90)
b	Agriculture as subsidiary	4 (10)	3 (7.50)	5 (12.50)	12 (10)
6.	Land Holding (Ha)				
a	Irrigated	1.60 (39.2)	2.00 (54.05)	1.90 (45.24)	1.83 (45.75)
b	Dry land	2.50 (60.98)	1.70 (45.95)	2.30 (54.76)	2.17 (54.25)
c	Total	4.10	3.70	4.20	4.00
7.	Average area under Grapes	1.52	1.35	1.28	1.38
8.	Source of irrigation (Area irrigated, in hectares)				
a	Open well	0.45	0.55	0.51	0.50
b	Bore well	1.15	0.72	1.39	1.09
c	River	----	0.73	---	0.24

Note: Figures in parentheses indicate percentage to total.

Table 4.2: Compound growth rates and instability index in area, production and productivity of grapes in India during 1985-86 to 2010-11

Description		Pre-WTO (1985-1995)	Post-WTO (1996-2011)	Overall Period (1985-2011)
Compound growth rate (%)	Area(000 ha)	11.46* (0.013)	7.09* (0.006)	6.92* (0.004)
	Production(000 MT)	10.86* (0.011)	2.43 (0.013)	7.28* (0.007)
	Productivity(MT/ha)	-0.53 (0.011)	-4.34 (0.017)	0.34 (0.008)
Instability index (%)	Area(000 ha)	11.63	10.72	14.00
	Production(000 MT)	14.82	20.70	21.80
	Productivity(MT/ha)	10.99	19.49	24.10
Average	Area(000 ha)	27.90	62.01	46.85
	Production(000 MT)	492.87	1327.74	956.69
	Productivity(MT/ha)	17.77	22.95	20.65

Note: Figures in the parentheses indicate 'Standard error'
*, ** denotes significance at 1 and 5 percent respectively.

But in the same period a positive growth rate of area was observed (11.46 %) with instability index of 11.63 per cent, while a positive growth rate of production (10.86 %) with instability index of 14.82 per cent was observed for production. The average of area, production and productivity of grapes during this period were 27.90 thousand hectares, 492.87 thousand MT and 17.77 MT per hectare

A negative and significant growth of -4.34 per cent was observed with the instability index of 19.49 per cent in the productivity of grapes during post-WTO period. Area and production of grapes during the period also grew at an impressive rate of 7.09 and 2.43 per cent respectively. The instability indices for area and production were 10.72 and 20.70 per cent respectively, indicating a stable growth in area as compared to production during the period in the country. The average of area, production and productivity of grapes during this period were 62.01 thousand hectares, 1327.74 thousand MT and 22.95 MT per hectare

In the overall period, total area under grapes increased from 12.50 thousand hectare during 1985-86 to 1, 11,000 hectare in 2010-11 (Appendix-VIII), at a compound growth rate of 6.92 per cent while instability index was 14.00 per cent. Production during the same period increased from 260 thousand tonnes to 1235 thousand tonnes at a compound growth rate of 7.28 per cent and the instability index was 21.80 per cent, while the productivity was almost stagnant with positive growth rate of 0.34 per cent during the same period and instability was also more 24.10 per cent. The average of area, production and productivity of grapes during this period were 46.85 thousand hectares, 956.69 thousand MT and 20.65 MT per hectare.

4.2.2 Compound growth rates and instability in area, production and productivity of Karnataka's grapes

A positive and significant growth of 7.07 per cent was observed with the instability index of 11.97 per cent in the area of grapes during pre-WTO period. Production and productivity of grapes during the period also grew at the rate of 1.48 and 5.46 per cent respectively. The instability indices for production and productivity were 16.50 and 10.86 per cent respectively, indicating a stable growth during the period in the state. The average of area, production and productivity of grapes during this period were 5.25 thousand hectares, 121.70 thousand MT and 23 MT per hectare. (Table 4.3)

Growth rate of area under grapes during the post-WTO period was positive (7.02 %) and was associated with instability index of 9.97 per cent. While in the same period, a positive and significant growth rate of production was observed (3.11%) with instability index of 20.34 per cent, and a negative and significant growth rate of productivity (-3.65 %) with instability index of 18.79 per cent was observed. The average of area, production and productivity of grapes during this were 10.83 thousand hectares, 219.94 thousand MT and 21.35 MT per hectare.

Total area under grapes increased from 4.80 thousand hectare during 1985-86 to 18.100 hectares in 2010-11 (Appendix-IX), at a compound growth rate of 5.41 per cent while instability index was 15.32 per cent for the overall period. Production during the same period increased from 90.72 thousand tonnes to 330.30 thousand tonnes at a compound growth rate of 4.58 per cent and the instability index was 18.68 per cent, while the productivity was growing negatively (-0.78 %) during the same period with instability of 22.96 per cent. The average of area, production and productivity of grapes during this period were 8.47 thousand hectares, 178.38 thousand MT and 22.05 MT per hectare.

Table 4.3: Compound growth rates and instability index in area, production and productivity of grapes in Karnataka during 1985-86 to 2010-11

Description		Pre-WTO (1985-1995)	Post-WTO (1996-2011)	Overall Period (1985-2011)
Compound growth rate (%)	Area(000 ha)	7.07* (0.012)	7.02* (0.006)	5.41* (0.004)
	Production(000 MT)	1.48* (0.017)	3.11** (0.012)	4.58* (0.005)
	Productivity(MT/ha)	5.46 (0.011)	-3.65* (0.011)	-0.78 (0.006)
Instability index (%)	Area(000 ha)	11.97	9.97	15.32
	Production(000 MT)	16.50	20.34	18.68
	Productivity(MT/ha)	10.86	18.79	22.96
Average	Area(000 ha)	5.25	10.83	8.47
	Production(000 MT)	121.70	219.94	178.38
	Productivity(MT/ha)	23.00	21.35	22.05

Note: Figures in the parentheses indicate 'Standard error'

*, ** denotes significance at 1and 5 percent respectively.

4.3 Growth and Instability in the export of Indian grapes

The details of growth and instability of export of Indian grapes has been shown under the following heads.

4.3.1 Compound growth and instability in the export of Indian fresh grapes

During pre-WTO period, export value of fresh grapes registered a higher growth of 37.83 per cent which increased from Rs 3.06 crores during 1985-86 to 55.55 crores during 1995-96 (Appendix-X), and export quantity increased from 3462 tonnes to 22,151 tonnes at the rate of 23.98 per cent over the years. A modest growth of 11.16 per cent was observed in unit value realised, with instability indices of 17.77, 15.39 and 6.81 per cent in export quantity, value and unit value realized respectively during the study period. The average quantity of export, value and unit value realized for this period were 9.38 thousand MT, Rs.19.00 Crores and Rs.16.92 per Kg.(Table 4.4)

During the post-WTO period, quantity of fresh grapes exported over the period witnessed a growth of 18.74 per cent. The value and unit value of grapes increased at the rate of 20.65 and 1.60 per cent over the years. Similarly 34.93, 24.75 and 14.26 per cent of instability was observed in the case of export quantity, value and unit value realized from export of grapes. The average of quantity export, value and unit value realized for this period were 52.81 thousand MT, Rs.192.75 Crores and Rs.36.48 per kg

Looking at the results for the overall study period, the growth rate to the tune of 15.13 per cent was observed in the case of export quantity of grapes. On the other hand export value and unit value were seen to be growing, at the rate of 21.85 and 5.84 per cent respectively. Instability indices were 36.52, 28.41 and 17.78 per cent of for export quantity, value and unit value respectively during the study period. The average of quantity export, value and unit value realized for this period were 36.35 thousand MT, Rs. 127.17 Crores and Rs.29.54 per Kg.

Table 4.4: Compound growth rates and instability of export of fresh grapes from India during 1985-86 to 2010-11

Description		**Pre-WTO (1985-1995)**	**Post-WTO (1996-2011)**	**Overall Period (1985-2011)**
Compound growth rate (%)	Quantity (000 MT)	23.98* (0.019)	18.74* (0.022)	15.13* (0.010)
	Value (Rs. Crores)	37.83* (0.018)	20.65* (0.016)	21.85* (0.009)
	Unit value (Rs. /kg.)	11.16* (0.007)	1.60 (0.009)	5.84* (0.007)
uInstability index (%)	Quantity (000 MT)	17.77	34.93	36.52
	Value (Rs. Crores)	15.39	24.75	28.41
	Unit value (Rs. /kg.)	6.81	14.26	17.78
Average	Quantity (000 MT)	9.38	52.81	36.35
	Value (Rs. Crores)	19.00	192.75	127.17
	Unit value (Rs. /kg.)	16.92	36.48	29.54

Note: Figures in the parentheses indicate 'Standard error'
*, ** denotes significance at 1and 5 percent respectively.

4.3.2 Compound growth rates and instability of fresh grapes exports to different countries

The export of fresh grapes is mainly concentrated to European countries (40 % of total export from India). Major markets for India's fresh grapes considered for the present study were Bangladesh, Germany, Netherlands, UK, UAE, and Saudi Arabia. (Appendix- XI). These countries together accounted for 87 per cent of India's total fresh grapes export and remaining countries were categorized in others. And the results were presented in Table 4.5.

Export trend analysis of fresh grapes during 1992-93 to 2010-11 showed that quantity of fresh grapes export grew at the rate of 14.09 per cent, whereas value increased at much higher rate of 18.00 per cent and unit value realized (Rs/kg) increased at the rate of 3.43 per cent. The stable markets for India's fresh grapes during the study period were UK and UAE as evidenced from lower instability index. UK is the major export destination for India's fresh grapes, quantity exported to UK increased at the rate of 7.90 per cent over the years, whereas the value realized increased at the rate of 14.03 per cent with instability indices of 33.12, 46.60 and 31.85 per cent in quantity, value and unit value respectively.

Quantity exported to Saudi Arabia registered a lower compound growth rate of 5.33 per cent compared to all other countries, but export value increased at the rate of 12.04 per cent, and 6.37 per cent growth was observed in the value received per kg of grapes. Instability indices of 102.31, 118.30, and 19.29 per cent were observed for quantity exported, value and unit value respectively. This shows that Saudi Arabia is the highly instable market for the Indian grapes.

Germany emerged as another important market during the study period. Export to this country was impressive, as export quantity augmented at the rate of 27.79 per cent. Export value also grew impressively at almost same rate of 30.34 per cent but these are associated with high instability 67.71 and 53.32 per cent respectively. On the other hand meager growth of 1.99 per cent was observed in unit value realized with instability of 26.30 per cent. High degree of instability was observed in quantity of fresh grapes exported to Bangladesh (100.80%), value received (98.93%) and (62.49%) in unit value received, which were increasing at the rate of 20.84 and 22.02 and 0.97 per cent for export quantity and value and unit value realized respectively.

Quantity exported to Netherlands grew at the rate of 33.54 per cent and 39.24, 4.27 per cent growth were observed in the case of value and unit value realized from this country during the same period with instability of 53.29 and 44.92, 19.81 per cent respectively. Export to UAE showed growth rate of 6.22 and 11.13 per cent in export quantity and value respectively, but unit value realized was growing steadily at the rate of 4.63 per cent with instability of 35.76, 30.90 and 12.24 per cent respectively in quantity exported, value and unit price realized during the study period.

India's grapes export to other countries grew at the rate of 18.28 per cent in terms of quantity and 23.93 and 4.78 per cent in value and unit value realized with moderate instability of 43.17, 44.85 and 20.45 per cent in export quantity, value and unit value realized respectively during the study period.

4.4 Extent of export potentiality in the export of Indian grapes

The export potentiality of grapes was estimated by the way of extent of grapes exported out of fruits exported, fresh grapes exported out of fresh grapes produced and destination-wise extent or share of export of grapes in respective year and also worked out compound growth rate and instability index for all. The share of Karnataka grapes in total Indian grapes export was also estimated.

The area under grapes in India as a whole was 32.40 thousand hectare with the production of 668.20 thousand MT in 1991-92 and reached 111.00 thousand hectare area and the production of 1235.00 thousand MT in 2010-11 with a compound growth rate of 5.82 and 4.91 per cent area and production respectively. Also registered instability of 12.39 and 21.27 per cent for area and production respectively. On the other hand Karnataka's grapes grew at the rate of 6.30 per cent in area and 3.36 per cent in production from 1991-92 with the area 6.5 thousand hectare and 141.70 thousand MT to the area 18.1 thousand hectare and production of 330.30 thousand hectare in 2010-11 (Table 4.6).

Table 4.5: Destination -wise growth rates and instability in export of fresh grapes from India during (1992-03 to 2010-11)

Description	Export Quantity		Export Value		Unit value	
	Compound growth rate (%)	Instability index (%)	Compound growth rate (%)	Instability index (%)	Compound growth rate (%)	Instability index (%)
Bangladesh	02.84	100.80	22.02	98.93	0.97	62.49
Germany	27.79	67.71	30.34	53.32	1.99	26.30
Netherland	33.54	53.29	39.24	44.92	4.27	19.81
UK	7.90	33.12	14.03	46.60	5.68	31.85
UAE	6.22	35.76	11.13	30.90	4.63	12.24
Saudi Arabia	5.33	102.31	12.04	118.30	6.37	19.29
Others	18.28	43.17	23.93	44.85	4.78	20.45
Total	14.09	42.74	18.00	28.11	3.43	14.78

Note: Unit value – Rs/Kg realized

The share of Karnataka's area in the total of India was 20.06 per cent with the production share of 21.21 percent in 1991-92 and now it's share in area and production is 16.31 and 26.74 percent respectively. The average share of Karnataka's area in the total was 17.18 per cent and production was 18.94 per cent. Karnataka is the second highest producer of grapes in India after Maharashtra and has greater potentiality to contribute much to the total grape basket of India with the growing trend shown in this analysis. (Table 4.6)

It could be seen from the table (table 4.7) that in 1992-93, the quantity of Rs.81241.24 MTs and value of Rs.14051.41 lakh of fresh fruits were exported from India and out of this 10801.04 MTs and value of Rs. 2178.8 lakh of fresh grapes were exported which accounts 13.30 per cent of quantity and 15.51 per cent of value of total fresh fruits exported. It has been growing since then with the compound growth rate of 11.77 per cent and the value 12.97 per cent in fresh fruits export and 14.09, 18.00 per cent in fresh grapes export from India respectively and now it has reached 936841.59 MTs and Rs. 122113.78 lakh in fresh fruits export, while 99311.83 MTs and Rs.41206.32 lakh in 2010-11, which 10.60 per cent of quantity and 33.74 per cent of values in total fresh fruits exported from India. The average share for entire period in quantity exported was 16.75 per cent and in value was 25.50 per cent. This shows the greater scope and potentiality of grapes export from India since it earns the maximum portion (33.74 %) of foreign exchange out of fresh fruits exported from India.

The export of fresh grapes of about 11143 tonnes out of 668200 tonnes of fresh grapes produced was observed in 1991-92 in India (Table 4.8). This accounted hardly to 1.67 per cent of total grapes produced in 1991-92. Thereafter the export of fresh grapes from India grew at the compound growth rate of 13.63 per cent and the share or extent of fresh grapes export out of fresh grapes produced in India also has been increasing continuously. At present (2010-11) 99,278 tonnes of fresh grapes exported from the production of 12, 35,000 tonnes, which accounts 8.04 per cent of export from total fresh grapes produced. In 2009-10, the share was the highest in all time, which was of about 14.88 per cent. The average share for whole period was 3.56 per cent.

As per the earlier table 4.5, in the destination-wise, the scope and potentiality of Indian grapes export to different countries are shown by the increase in the quantity and value of grapes export. The quantity and value export to Bangladesh is growing at the compound growth rate 20.84 and 22.02 per cent respectively with the instability index of 100.80 and 98.93 percent. The export to Germany and Netherland was growing faster than any other countries with 27.79 percent in quantity and 30.34 per cent in values in case of Germany and 33.54 per cent quantity and 39.24 per cent value in case of Netherland. For UK (7.9% and 14.03%), UAE (6.22% and 11.13%), Saudi Arabia (5.33% and 12.04%) and others (18.28% and 23.93%) in quantity of grape export and value earned from each country respectively. This shows there is a greater potentiality to export and earn a foreign exchange from Netherland, Germany and UK. When compared to these countries there is considerably lesser amount of foreign exchange from Bangladesh, UAE and Saudi Arabia. Moreover there is a greater scope and potentiality of Indian grapes to earn maximum foreign exchange from European countries.

4.5 Direction of Indian Fresh grapes exports

The Transitional Probability Matrix presented in Table 4.9 provides a broad indication of changes in the direction of export of fresh grapes from India for the study period (2000-01 to 2010-11). The major Indian fresh grapes importing countries were Bangladesh, Germany, Netherlands, UK, UAE, Saudi Arabia and all other importing countries were grouped under the category of the other countries'. The transitional probability matrix was obtained for the study period by using the actual proportion of exports to different importing countries. This matrix explained the changing direction of Indian fresh grapes trade among importing countries which was necessary for taking the proper decision in view of their expected changes.

The row elements in the transitional probability matrix provide the information on the extent of loss in trade, on account of competing countries. The columns element indicates the probability of gains in volume of trade from other competing countries and the diagonal element indicates probability of retention of the previous year's trade volume by the respective country.

Table 4.6: Total area and production of grapes in India, Karnataka and share of Karnataka grapes in India's total

Year	India		Karnataka		Karnataka's Share (%)	
	Area (000 ha)	Production (000 mt)	Area (000 ha)	Production (000 mt)	Area (000 ha)	Production (000 mt)
1991-92	32.40	668.20	6.5	141.70	20.06	21.21
1992-03	34.00	653.10	5.8	128.40	17.06	19.66
1993-04	38.80	702.50	5.8	173.60	14.95	24.71
1994-05	42.10	672.90	5.2	157.10	12.35	23.35
1995-96	35.60	603.60	5.4	162.00	15.17	26.84
1996-97	42.90	1134.60	6.5	196.00	15.15	17.27
1997-98	40.80	969.30	7.5	226.60	18.38	23.38
1998-99	42.60	1082.70	7.5	226.60	17.61	20.93
1999-00	44.30	1137.80	7.6	228.20	17.16	20.06
2000-01	45.20	1056.90	8.2	144.10	18.14	13.63
2001-02	47.50	1184.20	10.0	169.70	21.05	14.33
2002-03	52.10	1247.80	10.2	168.92	19.58	13.54
2003-04	57.80	1474.80	9.1	170.90	15.74	11.59
2004-05	60.50	1564.70	10.1	185.50	16.69	11.86
2005-06	66.00	1649.60	10.8	190.30	16.36	11.54
2006-07	65.00	1685.00	10.3	216.60	15.85	12.85
2007-08	68.00	1735.00	14.3	258.80	21.03	14.92
2008-09	80.00	1878.00	14.9	269.00	18.63	14.32
2009-10	106.40	880.70	17.4	317.60	16.35	36.06
2000-11	111.00	1235.00	18.1	330.3	16.31	26.74
Average	55.65	1160.82	9.56	203.10	17.18	18.94
Compound growth rate (%)	**5.82**	**4.91**	**6.30**	**3.36**		
Instability Index (%)	**12.39**	**21.27**	**12.56**	**18.42**		

Table 4.7: Total fruits and grapes exported from India and share of grapes in total fruits export

Year	Fresh Fruits export		Fresh Grapes export		Fresh grape export to fresh fruit export. Share (%)	
	Qty (MTS)	Value (Lakh Rs)	Qty (MTS)	Value (Lakh Rs)	Qty (MTS)	Value (Lakh Rs)
1992-93	81241.247	14051.41	10801.035	2178.8	13.30	15.51
1993-94	84832.88	17942.00	15931.57	3392.00	18.78	18.91
1994-95	94712.95	21450.00	16876.95	7084.11	17.82	33.03
1995-96	109704.15	22993.42	22414.03	5475.00	20.43	23.81
1996-97	217753.32	24117.00	20999.29	5265.00	9.64	21.83
1997-98	135197.74	26874.00	23808.12	6600.23	17.61	24.56
1998-99	107081.33	25767.21	11525.41	3789.00	10.76	14.70
1999-00	126676.39	30037.00	14082.58	5554.00	11.12	18.49
2000-01	146742.69	37703.11	20647.58	8298.45	14.07	22.01
2001-02	176967.98	40530.00	14606.00	6021.00	8.25	14.86
2002-03	161923.75	43731.00	25680.62	11015.31	15.86	25.19
2003-04	243047.39	48911.23	26783.83	10589.00	11.02	21.65
2004-05	225533.76	45445.00	35936.17	11067.00	15.93	24.35
2005-06	302728.71	72091.58	54049.87	21460.85	17.85	29.77
2006-07	347659.84	87187.59	85897.79	30192.45	24.71	34.63
2007-08	365731.44	91184.64	96963.57	31782.51	26.51	34.86
2008-09	470796.02	115143.00	124627.97	40861.28	26.47	35.49
2009-10	475363.03	146660.70	131153.61	54533.89	27.59	37.18
2010-11	936841.59	122113.78	99311.83	41206.32	10.60	33.74
Average	253186.1	54417.56	44847.25	16124.54	16.75	25.50
Compound growth rate (%)	**11.77**	**12.97**	**14.09**	**18.00**		
Instability Index (%)	**29.78**	**13.51**	**42.74**	**28.11**		

Table 4.8: Fresh Grapes Produced and the extent of its export during last 20 years in India

Year	Fresh grapes produced (tonnes)	Fresh grapes exported (tonnes)	Extent of export (%)
1991-92	668200	11143	1.67
1992-93	653100	10770	1.65
1993-94	702500	15928	2.27
1994-95	672900	16813	2.50
1995-96	603600	22151	3.67
1996-97	1134600	20958	1.85
1997-98	969300	23680	2.44
1998-99	1082700	11382	1.05
1999-00	1137800	14006	1.23
2000-01	1056900	20646	1.95
2001-02	1184200	14571	1.23
2002-03	1247800	25568	2.05
2003-04	1474800	26470	1.79
2004-05	1564700	39340	2.51
2005-06	1649600	51652	3.13
2006-07	1685000	85897	5.10
2007-08	1735000	96964	5.59
2008-09	1878000	124626	6.64
2009-10	880700	131091	14.88
2010-11	1235000	99278	8.04
Average	1160820	43147	3.56
Compound growth rate (%)	**4.91**	**13.63**	
Instability Index (%)	**21.27**	**42.90**	

Table 4.9: Transitional Probability Matrix for Fresh Grapes Export from India. (2000-01 to 2010-11)

Destination	Bangladesh	Germany	Netherlands	UK	UAE	Saudi Arabia	Others
Bangladesh	**0.68440**	0.00117	0.20506	0.00000	0.05103	0.05833	0.00000
Germany	0.65192	**0.00000**	0.34808	0.00000	0.00000	0.00000	0.00000
Netherland	0.32810	0.03273	**0.45505**	0.00000	0.00000	0.00000	0.18412
UK	0.00000	0.04865	0.00000	**0.50058**	0.45076	0.00000	0.00000
UAE	0.00000	0.00432	0.20369	0.42729	**0.30746**	0.00000	0.05725
Saudi Arabia	0.00000	0.00000	0.00000	0.00000	0.00000	**0.42743**	0.57257
Others	0.00000	0.04651	0.14981	0.00000	0.00000	0.00000	**0.80368**

It is evident from Table 4.9, that Bangladesh was one of the most stable markets among the major importers of Indian grapes as reflected by the probability of retention at 0.68440, i.e., the probability that Bangladesh retains its export share over the study period was 68 per cent. Thus, Bangladesh was the most reliable and loyal market for Indian grapes. Fresh grapes export to Bangladesh was retained to the tune of 68 per cent of its previous year's share in the current period; of the remaining 32 per cent of Bangladesh market share, 20 per cent was directed to Netherland, 5.8 per cent to Saudi Arabia, 5.10 per cent to UAE and 0.11 per cent to Germany.

United Kingdom (UK) had the probability retention of 0.50058, which retains its export share of 50 per cent. This implied that it had lost half of its share to other importing countries; of the remaining 50 per cent of UK market share, 45.07 per cent was directed to UAE and 4.86 per cent to Germany.

Netherland had moderate probability retention of 0.45505, which retains its export share of 45.50 per cent. This implied that it had lost most of its share to other importing countries; of the remaining 54.50 per cent of Netherland market share, 32.81 per cent was lost to UAE, 18.41 per cent to other countries and 3.27 per cent was to Germany.

The remaining countries such as UAE and Saudi Arabia had the retention of 42.74 per cent and 30.74 per cent of its original share. This implied that they were also the stable importers of Indian grapes, whereas those countries, which imported grapes in less quantity from India, were pooled under the 'other' countries showed high stability, which retained 80.37 per cent of its original share.

The entire share of Germany grapes market was directed to Bangladesh of 65.19 per cent and 34.81 per cent to Netherland. Totally, 100 per cent of Germany's share of grapes imports from Indian was lost to Bangladesh and Netherland. However, Germany gained 4.86 per cent of UK market share, 3.27 per cent of Netherland market share, 4.65 per cent of others countries and less 1 per cent from UAE and Bangladesh.

The major gainer among importers of Indian grapes over a period of time has been Bangladesh, which having a transfer probability of 0.65192 from Germany and 0.32810 from Netherland. The probability that Bangladesh would gain in the export share of Indian grapes over the study period at the cost of Germany and Netherland were 0.65192 and 0.32810 respectively. Therefore, Bangladesh looses about 31.56 per cent of its total imports.

Netherland could retain its original share of 45.50 per cent and gained 34.80 per cent from Germany, 20.50 per cent from Bangladesh, 20.36 per cent from UAE and 14.98 per cent from other countries. Whereas it lost its share to the tune of 32.80 per cent to Bangladesh and 18.41 per cent to other countries and 3.27 per cent to Germany.

United Kingdom sustained its original share of 50.05 per cent and gained 42.73 per cent from UAE. Whereas it lost 45.08 per cent to UAE and 4.87 per cent to Germany. Therefore, UK lost about 49.95 per cent and retained the rest.

UAE had retained its original share of 30.75 per cent and gained 45.08 per cent from UK, 5.10 per cent from Bangladesh. Whereas it lost 42.73 per cent, 20.37 per cent, 5.72 per cent and 0.43 per cent to UK, Netherland, other countries and Germany respectively.

Saudi Arabia sustained its original share of 42.74 per cent and gained 5.83 per cent from Bangladesh. Whereas it lost 57.26 per cent to only other countries group. Therefore, Saudi Arabia lost totally about 57.26 per cent and retained the rest.

Other countries retained its original share of 80.37 per cent and gained 57.26 per cent from other countries, 18.41 per cent from Netherland and 5.73 per cent from Saudi Arabia. Whereas it lost 14.98 per cent and 4.65 per cent to Netherlands and Germany respectively. Therefore, the total loss of other countries is 19.63 per cent.

4.5.1 Prediction of Indian fresh grapes export to major importing countries

The market share projections of Indian fresh grapes exports to the major importing countries were computed up to 2014-2015 using the transitional probability matrix. Table 4.10 presents the actual and estimated values of Indian grapes exports to major importers from 2000-01 to 2010-11 and also projections up to 2014-15. This was also graphically represented in Figure-2.

It was clear from the table 4.10 that the actual share of Bangladesh in fresh grapes export had shown fluctuation over the study period (2000-01 to 2010-11) but on the whole it had increased from 2.67 per cent to 38.84 per cent. Similar picture was in prediction of export share too, where the increase was from 8.73 per cent to 32.28 per cent. The estimation for 2014-15 suggested a slight decline from 32.28 per cent to 29.45 per cent. Regarding the quantum of exports of grape, the actual value increased from 550.30 tonnes to 38563.00. The estimate for 2014-15 was likely decline by 29238.73 tonnes.

Regarding Germany the actual and predicted export share showed a decreasing trend from 6.43 per cent to 0.75 per cent and 3.08 to 2.10 per cent respectively from 2000-01 to 2010-11. The actual quantum of exports shown an erratic trend during study period but predicted value was increasing. The estimation for 2014-15 also was likely to decrease from 2753.37 tonnes (2010-11) to 2392.41 tonnes (2014-15).

The actual proportion of Netherland market share of imports from India showed a rising trend from 8.26 per cent to 17.83 per cent. The predicted export share also increased from 13.67 per cent to 22.35 per cent over the study. The actual and predicted quantum of exports also fallowed a similar trend. The estimation for 2014-15 suggested a decrease from 29299.49 tonnes in 2010-11 to 22648.49 tonnes.

Regarding the UK, the actual and predicted quantum and also the proportion of exports showed an erratic trend. But on the whole the actual proportion of India's exports to UK decreased from 41.50 per cent to 7.81 per cent. The predicted proportion showed a decline from 31.11 to 9.79 per cent. With regard to quantum of exports, the actual values decreased from 8567.10 tonnes to 7749.00 tonnes and predicted value increased from 6421.98 tonnes to 12830.77 tonnes in 2010-11. But, predicted value for future was found to be decreasing and will reach 6940.96 tonnes in 2014-15

With regard to UAE, the actual market share of India's fresh grape exports decreased from 24.18 per cent to 10.46 per cent whereas the predicted share decreased from 26.28 per cent to 9.81 per cent from 2000-01 to 2010-11. But regarding the export quantum, both actual and predicted exports observed an increase. The estimation was also likely decrease from 12862.75 tonnes to 7179.79 tonnes during the study period.

The actual proportion of exports share of India's grapes exports to Saudi Arabia showed an increasing trend of 2.31 per cent to 4.09 per cent and also the prediction from 1.14 per cent 3.69 per cent. But the actual quantity of exports increased from 477.40 tonnes to 4058.00 tonnes and the prediction also increased from 236.15 tonnes to 4842.56 tonnes during 2000-01 to 2010-11. The estimation was also likely decrease from 4842.56 tonnes in 2010-11 to 3157.29 tonnes in 2014-15.

Considering the other imports, both the actual and predicted exports shares increased during the study period. The actual share increased from 14.65 per cent to 20.23 per cent and the predicted export share of India's export share to others also increased from 16.00 per cent to 19.97 per cent. The quantum of export witnessed a similar picture. The prediction for 2014-15 was expected to increase slightly from 26179.87 in 2010-11 to 27720.32 tonnes.

4.6 Competitiveness of Indian grapes in international market

Competitiveness has been analyzed for grapes in Karnataka state. Measures of trade competitiveness and methodology followed were presented in the methodology chapter and worked out data table was presented in appendix-XII.

Nominal protection coefficient (NPC) is less than unity over the study period (Table.4.11). It has increased from 0.50 in the liberalization period (1992-93) to 0.62 in 2010-11. During 1994 to 1999 the NPC for grapes was comparatively poor which varied from 0.77 to 0.72. The average NPC over the years was 0.67 and state had price competitiveness in grapes during entire study period. Results of NPC under exportable hypothesis revealed that in the recent years (2006-07 to 2010-11), the state had better competitiveness for grapes exports in the international market.

Table 4.10: Actual and Predicted Quantity of Fresh Grapes Export from India to Selected Countries

(Qty in tonnes)

Years	Bangladesh		Germany		Netherlands		UK		UAE		Saudi Arabia		Others	
	A	P	A	P	A	P	A	P	A	P	A	P	A	P
2000-01	550.30 (2.67)		1328.00 (6.43)		1705.50 (8.26)		8567.10 (41.50)		4992.90 (24.18)		477.40 (2.31)		3024.78 (14.65)	
2001-02	248.20 (1.70)	1801.94 (8.73)	280.30 (1.92)	635.50 (3.08)	1347.10 (9.23)	2821.33 (13.67)	5042.40 (34.57)	6421.98 (31.11)	4829.70 (33.11)	5424.943 (26.28)	620.80 (4.26)	236.15 (1.14)	2218.61 (15.21)	3304.14 (16.00)
2002-03	526.70 (2.06)	794.58 (5.45)	724.90 (2.84)	413.73 (2.84)	3646.80 (14.26)	2077.58 (14.24)	8887.80 (34.76)	4587.83 (31.45)	6617.10 (25.88)	3770.539 (25.85)	489.70 (1.92)	279.82 (1.92)	4675.01 (18.28)	2663.01 (18.26)
2003-04	2125.50 (7.94)	2029.56 (7.94)	2381.00 (8.89)	798.38 (3.12)	4260.10 (15.91)	4068.00 (15.91)	6618.60 (24.71)	7276.52 (28.46)	4685.30 (17.49)	6067.675 (23.73)	249.90 (0.93)	240.03 (0.94)	6463.39 (24.13)	5087.84 (19.90)
2004-05	14724.00 (37.43)	4404.65 (16.45)	1151.00 (2.93)	784.77 (2.93)	7529.00 (19.14)	5125.85 (19.14)	5889.00 (14.97)	5315.15 (19.84)	5476.00 (13.92)	4532.433 (16.92)	163.00 (0.41)	230.79 (0.86)	4408.00 (11.20)	6390.15 (23.86)
2005-06	13933.00 (26.97)	13297.77 (33.80)	2992.00 (5.79)	778.86 (1.98)	12133.00 (23.49)	8621.85 (21.92)	11319.00 (21.91)	5287.79 (13.44)	7046.00 (13.64)	5089.548 (12.94)	345.00 (0.67)	928.52 (2.36)	3884.00 (7.52)	5335.66 (13.56)
2006-07	25716.00 (29.94)	15467.15 (29.94)	6137.00 (7.14)	1175.21 (2.28)	19021.00 (22.14)	11436.80 (22.14)	13638.00 (15.88)	8676.81 (16.80)	8140.00 (9.48)	7979.549 (15.45)	1115.00 (1.30)	960.17 (1.86)	12130.00 (14.12)	5956.31 (11.53)
2007-08	37995.00 (39.18)	27841.70 (32.41)	2162.00 (2.23)	1915.54 (2.23)	24379.00 (25.14)	19540.38 (22.75)	11640.00 (12.00)	10305.12 (12.00)	9686.00 (9.99)	9962.504 (11.60)	2403.00 (2.48)	1976.59 (2.30)	8699.00 (8.97)	14355.16 (16.71)
2008-09	54509.00 (43.74)	35412.08 (36.52)	1304.00 (1.05)	1855.22 (1.91)	24341.00 (19.53)	22913.78 (23.63)	12758.00 (10.24)	9965.54 (10.28)	13064.00 (10.48)	10163.79 (10.48)	3489.00 (2.80)	3243.35 (3.34)	15161.00 (12.17)	13410.24 (13.83)
2009-10	45656.00 (34.83)	46142.51 (37.02)	2356.00 (1.80)	2242.87 (1.80)	29074.00 (22.18)	27640.42 (22.18)	14360.00 (10.95)	11968.59 (9.60)	13205.00 (10.07)	12549.03 (10.07)	5099.00 (3.89)	4670.80 (3.75)	21341.00 (16.28)	19411.79 (15.58)
2010-11	38563.00 (38.84)	42322.19 (32.28)	741.00 (0.75)	2753.37 (2.10)	17700.00 (17.83)	29299.49 (22.35)	7749.00 (7.81)	12830.77 (9.79)	10384.00 (10.46)	12862.75 (9.81)	4058.00 (4.09)	4842.56 (3.69)	20083.00 (20.23)	26179.87 (19.97)
2011-12		32683.07 (32.92)		1980.46 (1.99)		21344.00 (21.50)		8316.02 (8.38)		8653.453 (8.72)		3983.88 (4.01)		22317.12 (22.48)
2012-13		30662.45 (30.89)		2216.85 (2.23)		22210.10 (22.37)		7860.41 (7.92)		8076.93 (8.14)		3609.22 (3.64)		24642.05 (24.82)
2013-14		29717.79 (29.93)		2326.30 (2.34)		22503.02 (22.67)		7386.00 (7.44)		7591.19 (7.65)		3331.22 (3.36)		26422.48 (26.61)
2014-15		29238.73 (29.45)		2392.41 (2.41)		22648.49 (22.81)		6940.96 (6.99)		7179.79 (7.23)		3157.29 (3.18)		27720.32 (27.92)

Note: A-Actual exports in tonnes. P- Predicted exports in tonnes. Figures in parenthesis indicate exports share in percent

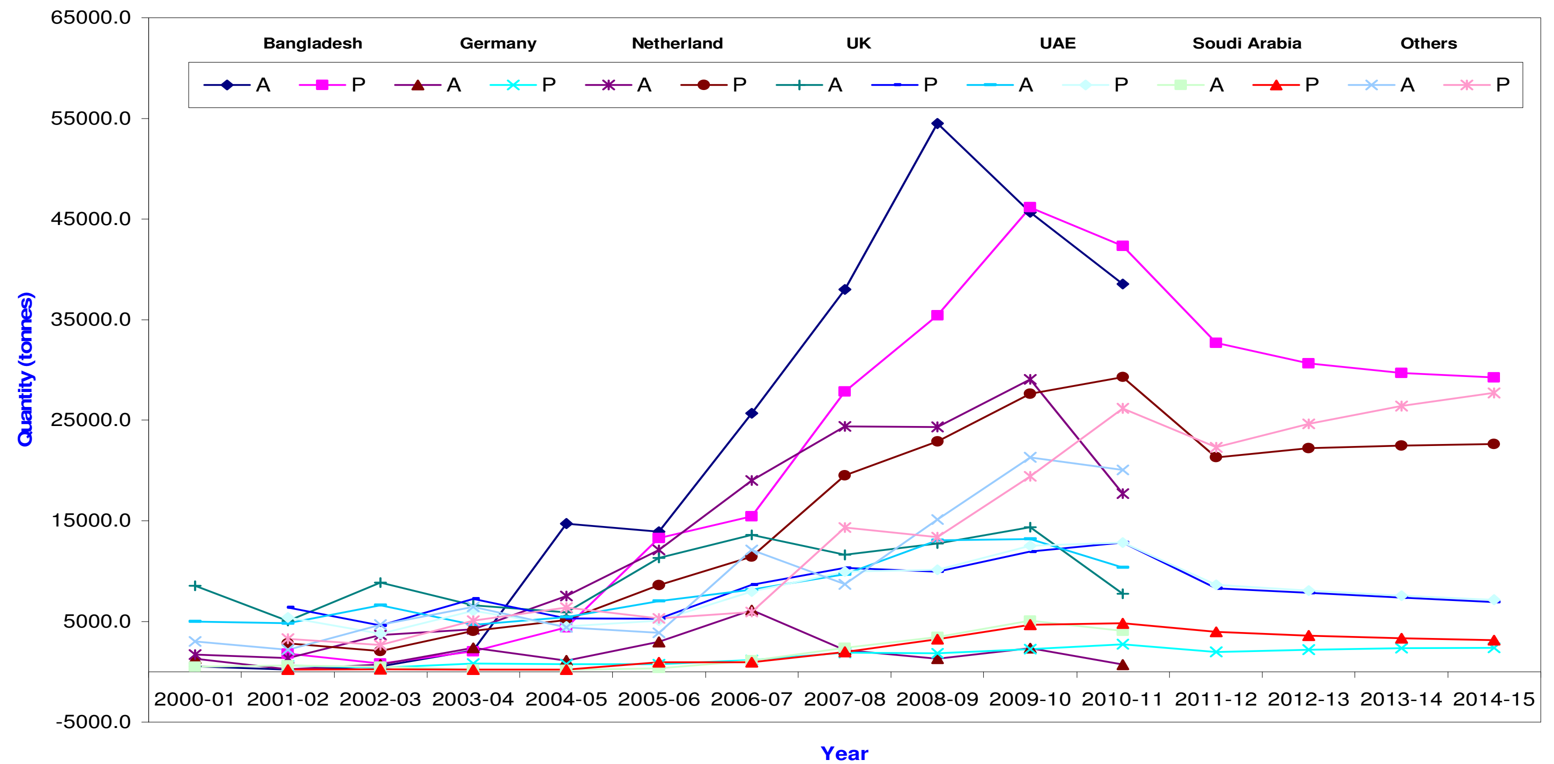

Fig. 2: Actual and Predicted Quantity of Fresh Grapes Export from India to Selected Countries (in tonnes)

Fig. 2: Actual and Predicted Quantity of Fresh Grapes Export from India to Selected Countries (in tonnes)

Table 4.11: Nominal protection coefficients for Indian grapes from 1992-1993 to 2010-2011

(Value = Rs/Qntl)

Year	Domestic Price(P^D)	International Price(P^I)	NPC=P^D/P^I
1992-93	1704.08	3407.55	0.50
1993-94	1886.14	2929.09	0.64
1994-95	2176.55	2816.84	0.77
1995-96	2229.67	2923.64	0.76
1996-97	2299.18	2839.59	0.81
1997-98	2351.04	3253.00	0.72
1998-99	3171.91	4128.08	0.77
1999-00	3336.98	4372.81	0.76
2000-01	2937.99	4416.88	0.67
2001-04	3240.09	4775.15	0.68
2002-03	3212.47	5015.57	0.64
2003-04	3374.38	5120.10	0.66
2004-05	3634.61	5557.03	0.65
2005-06	3970.64	5839.18	0.68
2006-07	4474.27	6883.49	0.65
2007-08	5150.83	8796.74	0.59
2008-09	4851.15	8237.39	0.59
2009-10	7114.95	12179.57	0.58
2010-11	6348.57	10293.54	0.62

Table 4.12: Nominal protection coefficients for Indian grapes in 2010-11

Sl. No	variable	Particulars	Place	Values (Rs./Qtl.)
1	A1	Wholesale prices	Karnataka	4031.75
2	A2	Transportation cost	Mumbai	410.00
3	A3	Marketing margin @ 5 %		201.59
4	A4	C&F Handling Charges		34.50
5	A5	Wharfage charges		8.95
6	A6	Service charges		4.45
7	A7	Service tax		0.41
8	**X**= (A1+….+A7)	Equals FOB price at	Mumbai	4691.65
9	**Y**	Plus Freight from India to	UK	1610.00
10	**Z**	Plus Insurance @1% of price		46.92
11	P^D=(X+Y+Z)	Equals landed price		6348.57
12	P^I	FOB price	UK	10293.54
13	P^D/P^I	Nominal Protection coefficients		**0.62**

The estimation of Nominal Protection Coefficient for grapes under exportable hypothesis for period 2010-11 was presented in Table 4.12. Nominal Protection Coefficient was less than unity i.e. 0.62 representing that grapes was efficient export crop and prices were competitive.

As per the procedure given in the methodology NPC for grapes was calculated. In 2010-11 the average wholesale price for grape was Rs.4031.75 per quintal in Karnataka. In order to export grape, need to send the consignment to Mumbai port so it costs Rs.410 per quintal and marketing margin was 5 per cent of the wholesale price Rs.4031.75 i.e. Rs.201.59. Clearing and forwarding handling charge was Rs.34.50, this was cost for clearing and forwarding of consignment. Wharfage charge was Rs. 8.95, that's a charge assessed by a shipping terminal or port when goods are moved through the location. Wharfage is one of the costs of transport goods within the distribution system used by a business to bring its goods to market. The service charges of about Rs.4.45 and service tax of Rs. 0.41 per quintal. All above mentioned variables are added to get free on board (FOB) price at Mumbai, which resulted Rs.4691.65. This pricing term indicates that the cost of the goods, including all transportation and insurance costs from the manufacturer to the port of departure, as well as the costs of loading the vessel are read filed in the quoted price. This means that the buyer has to bear all costs and risks of loss of or damage to the goods from that point. The FOB term requires the seller to clear the goods for export.

To free on board (FOB) price, Rs.1610 freight from India to UK and insurance at 1 percent of FOB price i.e. Rs.46.92 have been added. The sum of all above variables gave domestic price. The FOB price for grapes in UK was Rs.10293.54; this was an international price for the Indian grapes. To work out NPC, the domestic price was divided by international price and resulted value was 0.62, representing that grapes was efficient export crop and prices were competitive.

4.7 Role of grape growers association in production and export of grapes

The role of grapes growers association in the production, marketing and export of grapes in the study region was studied by collecting required information from the Karnataka State Grapes Grower Association, Regional Office, Bijapur.

The Karnataka State Grape Grower Association started its working in the year 1983 at Bangalore by the founder A. Ananthappa, to work for the welfare of grapes growers and to bring quantity and quality improvement in the grapes production. Initially it was started with 450 members in the entire state and now reached a membership of 2000. It works for the entire state and has divided working division into two *viz.*, North Karnataka, 12 districts and has a regional office at APMC Bijapur and other division is south Karnataka, rest of the districts of Karnataka and its Head office at Lalbaug, Bangalore. The regional office, Bijapur has coverage of 1000 hectares of grapes in the northern Karnataka.

The objective of the association was to educate the farmers through the technical support for the production of good quantity and quality of grapes for marketing and export. To supply the growth regulators like Giberlic acid (GA), Uracil, dipping oil (Ethyl aldehyde) and so on for the improvement of quality standards.

The organizational structure of KSGGA is headed by president and followed by Secretary and Directors. The membership fee is Rs 500 for the farmers and in turn members will get all the benefits of the association with regard to technical support in production, marketing and export of grapes. The association has the fixed assets like office building, computers, etc.

Functions of associations were to conduct seminars to educate and create awareness about quality grapes production, about export standards and export procedure, supply of required inputs for the member farmers, participate in the policy making decisions with the government with regard to grapes industry and also launching new schemes required for the farmers from time to time by association.

The association has been working in collaboration with UAS, IIHR, APEDA, NHM, NHB, ARS etc for technical and marketing knowledge support.

Table 4.13: Role played by grape growers association in production, marketing and export of grapes in the study region

Sl. No.	Items	2009	2010	2011	Average
1	Seminars (Awareness programmes)				
	1. In production	2 (40)	3 (42.86)	2 (33.33)	3
	2. In marketing	2 (20)	2 (28.57)	3 (50.00)	2
	3. In export	1 (20)	2 (28.57)	1 (16.67)	1
	Total number	5	7	6	6
2	Supply of inputs (Growth regulators)				
	1. Gibberlic acid (Kg)	32	37	40	36.33
	2. Dipping oil(litres)	3700	4000	4200	3966.67
3	Quantity of dry grapes auctioned (tonnes)	28450	35700	40200	34783.33
4	Quantity of grapes exported (tonnes)	180	75	-	85

Note: Figures in the parentheses indicate percentage to total.

It could be seen from Table 4.13 that average awareness programmes of about three in production, two in marketing and one in export were conducted by the association, thus the total awareness programmes conducted by the association were six in numbers for the past three years. With respect to supply of inputs especially growth regulators, an average, of 36.33 kg of Gibberlic acid (GA) and 3966.67 litres of dipping oil have been supplied. The average quantity of dry grapes auctioned with the support of association in the study region was 34783.33 tonnes and quantity exported was decreasing over the years and in 2011 it was completely stopped and average quantity exported was only 85 tonnes.

4.8 Constraints in the production, marketing and export of grapes

The present study was more concentrated on the documentation of the constraints, faced by grape growers, in the production, marketing and export of grapes in the study area

4.8.1 Production constraints of grape in the study region

Major constraints experienced in the production of grapes by the grapes grower in the study area have been presented in Table 4.14. Farmers indicated constraints, among which high cost of establishment (100%), lack of capital (94.17%), maintenance problem of irrigation structures (91.67%), high cost of inputs (90.00%), lack of technical guidance (88.33%), non-availability of sufficient water (87.50%), and high incidence of pest and disease(84.17%), are the major constraints faced by the grape growers in the study area.

The constraints like Shortage of fertilizers and plant protection chemicals, Non-availability of skilled labour, Non -availability of quality planting materials, increased resistance in pests and diseases were the other constraints. Spurious chemicals (14.17%), has been the least opined constraints by the farmers in the study area.

Table 4.14: Production Constraints

n =120

Sl. No.	Constraints	Number	Per cent
1	High cost of establishment	120	100.00
2	Lack of capital	113	94.17
3	Maintenance problem of irrigation structures	110	91.67
4	High cost of inputs	108	90.00
5	Lack of technical guidance	106	88.33
6	Non-availability of sufficient water	105	87.50
7	High incidence of pests and diseases	101	84.17
8	Shortage of fertilizers and plant protection chemicals	86	71.67
9	Non-availability of skilled labour	76	63.33
10	Non -availability of quality planting materials	67	55.83
11	Increased resistance in pest and diseases	63	52.50
12	Spurious chemicals	17	14.17

Table 4.15: Marketing Constraints

n =120

Sl. No	Constraints	Numbers	Per cent
1	Absence of support price in the case of glut	120	100.00
2	Absence of regulated markets	120	100.00
3	Fluctuations in market prices	114	95.00
4	Lack of storage facility	111	92.50
5	Exploitation by middlemen	108	90.00
6	Lack of grading and packing	95	79.17
7	High commission charges	93	77.50
8	High cost of transportation	90	75.00
9	Delay in cash payments	87	72.50
10	Markets are far away	68	56.67
11	Lack of transport facility	62	51.67

4.8.2 Marketing constraints of grape in the study region

Major constraints experienced in the marketing of grapes by the growers in the study area were presented in the Table 4.15. Farmers indicated the constraints like absence of regulated markets (100%), absence of support price in the case of glut (100%), fluctuation in the market prices (95.00%), exploitation by middlemen (90.00%), lack of storage facility (92.50%), lack of grading and packing (79.17%), high commission charges (77.50%) and high cost of transportation (75.00%) were the major constraints faced by the grape growers in the marketing of grapes

The other constraints like delay in cash payments, markets were far away and lack of transport facility were the minor constraints faced by the farmers in the marketing of grapes.

4.8.3 Export constraints of grape in the study region

The grape growers experienced that non-availability of quality testing laboratories (100%), inadequate of C & F agents (100%), lack of adequate cold storage facilities (100%), difficulty to meet export standards (92.50%), fluctuating prices of produce in the international market (90.00%), non-availability of guidance from export organizations of government (89.17%), high residual effect (87.50), lengthy procedures and formalities for export (85.00%), lack of knowledge about packaging and grading (78.33%) and lack of knowledge about export procedures (72.50%) were the major export constraints faced by them in the study area.(Table 4.16)

The other constraints like Non-availability of updated export market information, Lack of transportation facilities, Non- availability of skilled labour and lower productivity of export variety were the other constraints experienced by the grape growers in the study area.

Table 4.16: Export Constraints

n =120

Sl. No	Constraints	Numbers	Per cent
1	Non-availability of quality testing laboratories	120	100.00
2	Inadequate of C & F agents	120	100.00
3	Lack of adequate cold storage facilities	120	100.00
4	Difficulty to meet export standards	111	92.50
5	Fluctuating prices of produce in the international market	108	90.00
6	Non-availability of guidance from export organizations of government	107	89.17
7	High residual effect	105	87.50
8	Lengthy procedures and formalities for export	102	85.00
9	Lack of knowledge about packaging and grading	94	78.33
10	Lack of knowledge about export procedures	87	72.50
11	Non-availability of updated export market information	84	70.00
12	Lack of transportation facilities	82	68.33
13	Non- availability of skilled labour	76	63.33
14	Lower productivity of export variety	52	43.33

5. DISCUSSION

Grapes production, consumption and trade are mainly concentrated in European countries like France, Germany, Greece, Italy and UK. But an Asian country, especially India has been fortunate enough to enjoy a favourable climate for the cultivation of grapes and has witnessed an increasing production in the recent years and has been able to stimulate increasing demand for grapes in both domestic and export markets. As a consequence there has been a gradual area expansion in the recent years enabling the country to achieve higher production.

The results of the study presented in the previous chapter are discussed under the following sub-headings

5.1. General characteristics of the sample farmers

5.2. Growth rates and instability in area, production and productivity of Indian grapes.

5.3. Growth and instability in export of Indian grapes.

5.4. Extent of export potentiality.

5.5. Direction of trade of Indian grapes.

5.6. Competitiveness of Indian grapes in International market.

5.7. Role of grape grower association in production and export of grapes.

5.8. Constraints in the production, marketing and export of grapes.

5.1 General characteristics of the sample farmers

It was revealed from Table 4.1 that the average age of the sample farmers was higher for Jamakandi taluk (45 years) as compared to Bijapur (43 years) and Athani (42 years). This showed that the farmers were well experienced and matured in the cultivation of grapes. High literacy rate among the farmers in the area was the resultant of their sound economic strength since farmers grow commercial crop grapes and which realized the greater returns to farmers.

Majority of the farmers (90 %) were having agriculture as a main occupation as grape cultivation was a profitable venture which yields higher returns. As per the land holding, dry land was more compared to irrigated as in the Bijapur and Jamakandi taluks except Athani taluk and in these areas bore wells were the main source of irrigation as there was no alternative like rivers except Athani (Sankonatti village) and a few open wells were also found but having a deep ground water table.

The family size was almost same (5 member) in all the selected taluks which was near to a nuclear family type. Agriculture has been the main occupation for 87 to 92 per cent of the farm families in the selected taluks. This speaks of importance of farming.

5.2 Growth rate and instability in area, productivity and production of grapes

5.2.1 Growth rate and instability in area, productivity and production of Indian grapes

The area under grapes during the pre-WTO period increased from 12.50 thousand hectares during 1985-86 to 35.60 thousand hectares during 1995-96 with growth rate of 11.46 per cent (Appendix-VIII). On the other hand an increase in production of grapes from 260.00 thousand tonnes during 1985-86 to 603.60 thousand tonnes during 1995-96 was observed resulting into a positive growth of 10.86 per cent. The productivity also found to be decreasing at the rate of -0.53 per cent (Table 4.2). This might have been caused by the climatic adversity on one hand and improper management on the other. During the post-WTO period the area increased from 42.90 thousand hectares in 1995-96 to 111.00 thousand hectares in 2010-11 leading to an increase in production of grapes from 1134.60 thousand tonnes in 1995-96 to 1235.00 thousand tonnes in 2010-11 and some time production reached to 1878.00 thousand tonnes in 2008-09. This might have been triggered by the introduction of improved grape variety especially Thompson Seedless which had a high demand in the international market and the productivity of the variety was very high in India due to favourable climatic conditions. This trend had shown even for overall period with area increasing from 12.50 thousand hectares in 1985-86 to 111.00 hectares by 2010-11 recording a growth rate of 6.92 per cent and production also increased from 260.00 thousand tonnes to 1235.00 thousand tonnes with growth rate of 7.28 per cent for the overall period.

The productivity of grapes in the mean time decreased at the rate of – 4.34 per cent during post-WTO (1996-97 to 2010-11) period while it decreased at the rate of -0.53 per cent during pre-WTO period. But for entire period it was improved at the rate of 0.34 percent. Thus even increased production of grapes in India during the study period was mainly due to expansion in the area and any further increase has to be area led as the productivity of grapes in the country seems to have peaked as indicated by the highest productivity of Indian grapes in India during 1996-97 and average productivity (20.75 t/ha) during entire study period. Similar area led increase in production of oilseeds in Assam during 1950-51 to 1988-89 have been reported by Bhowmick and Ahemed (1993), However, most of the earlier studies especially conducted during the green revolution period in India have reported productivity led increase in production as observed by Acharya (1993) in the production of different pulses in India. This was because, there existed a scope for improving their productivity while the newly introduced grape variety in India being cultivated in most favourable areas mainly by elite farmers with good managerial ability and yield levels comparable to the best and offered little scope for increment in their productivity.

The instability index for area, production and productivity over a period of pre-WTO, post-WTO and entire period indicated that there was more stability in growth of area, production and productivity in the pre-WTO period compared to post and for over all periods. The reason could be of higher variation in production and productivity of grapes in the study period (Table 4.2).

5.2.2. Growth rate and instability in area, productivity and production of grapes in Karnataka

In pre-WTO period area as significantly increased at the rate of 7.07 per cent and production as increased at the rate of 1.48 per cent due to increasing trend in productivity (Table 4.3). This increase in production was productivity lead increment even though there was area expansion. In post-WTO period area and production were increased significantly at the rate of 7.02 per cent and 3.11 per cent respectively but productivity decreased significantly at the rate of -3.65 per cent.

The area under grapes in 1985-86 was 4.80 thousand hectare in Karnataka and it reached to 18.1 thousand hectare in 2010-11 over the study period growing significantly at the rate of 5.41 percent and production was also increased significantly at the rate of 4.58 percent from 90.72 thousand tonnes in 1985-86 to 333.30 thousand tonnes in 2010-11 but productivity decreased at the rate of -0.78 for the overall study period (Appendix-IX). The possible reason for this could be inefficient use of water, nutrients and pesticides, which impaired soil and crop health. Hence, over the years soil health and fertility might be declining and another possible reason could be that the crop, which was introduced in 90's and there was a potential of crop yielding higher productivity as a newly introduced improved variety like Thomson seedless but as the year rolled over the potentiality of yielding higher could have decreased. This might be also due to decline in the genotypic factors which yield potentially higher yield in the beginning and later on lower. The same case also holds good in post WTO period in the study period

5.3 Growth rate and instability in export and direction of trade in export of Indian grapes

The compound growth rate and instability in export of grapes and destination-wise export of Indian grape has been discussed here under in the following sub head.

5.3.1 Growth and instability in export of Indian grapes

Export quantity and value of Indian grapes increased in leaps and bounds during the study period increasing from a mere 3462 tonnes with worth of Rs. 3.06 crores during 1985-86 to 99,278 tonnes worth of Rs. 411.97 crores during 2010-11(Appendix-X). The average unit price realised during the period increased from Rs 8.84 per kg to Rs 41.50 per kg during the same period. The statistics clearly indicate the reason for a large scale expansion of area under grapes in India. Patil (2000) had observed that export of Indian grapes to Middle East Asian countries began during 1980's and the first few consignments were offered a premium price of Rs 40 per kg and such an attractive price promoted more and more farmers to produce quality grapes for exports. The compound growth rates of export quantity and value of Indian grapes (Table-4.4) during pre-WTO period (23.98 and 37.83% respectively) were higher than those during post-WTO (18.74 and 20.65 % respectively). However, the increase in actual quantity and value during the post-WTO (from 20,958 to 99,278 tonnes and Rs 52.17 crores to Rs 411.97 crores respectively) were much higher than that of the pre-WTO period (from 3462 to 22,151 tonnes and Rs 3.06 crores to 55.55 crores respectively) indicating that the liberalization and WTO agreements has actually given a greater fillip to export of Indian grapes. However, the credit for such impressive growth in quantity and value during the study period (CGR of 15.13 and 21.85 % respectively) may go to various promotional activities of Central and State Government as well as the institutes established by various Government and Farmer's agencies as indicated by the study of Pradhumn (1998) which says that the entry of Mahagrapes and NAFED to develop considerable infrastructure had helped to increase exports of high quality grapes from India.

Many growers were growing grapes solely for the export market. According to Pradhumn (1998) entry of Co-operatives into grapes export and the cultivation of grapes solely for the export market were the factors that were largely responsible for the success of grapes exports from India, and the resultant increase in exports reflected in the growth of value realisation, which increased from 3.06 crores to 411.97 crores between 1985-86 and 2010-11. Even though high growth rates were observed with respect of production and export of Indian grapes, the country has to go a long way in grapes export as there was a stiff competition among the global grapes producers like Chile, South Africa and USA.

Indian fresh grapes export has shown a phenomenal growth during the past few years and has become a major export earning fruit crop in India. It promises to boost our export earnings substantially during the upcoming years with the growing global grapes markets offering us plenty of opportunities. Therefore, the government could identify grapes as, major fruit crop for export and provide necessary infrastructure and policy support to tap the potential.

5.3.2 Growth and instability in export of Indian fresh grapes to different countries

The analysis of the growth rates and instability indices relating to quantity, value as well as the unit value realised from export of fresh grapes to different markets (Table 4.5) revealed that the Netherlands, UK and UAE were the stable markets during the study period since these countries were the major export destination for India's fresh grapes accounting for 33.54, 7.90 and 6.22 per cent with instability index of 53.29, 33.12 and 35.76 per cent respectively of the total fresh grapes export from India. There seems to be an increased preference because of the premium quality of Indian grapes by these countries. Mamale Desai (2002) had argued that, eradicating the maggots in the mangoes by employing Vapor Heat Treatment had led to increase in the export of Indian mangoes, as quality of fruits has a very important bearing on its acceptability by the International consumers.

Export of Indian grapes to Bangladesh in terms of quantity, value received and unit value received, were increasing (20.84, 22.02 and 0.97 % respectively) but was also associated with high instability (100.80, 98.93 and 62.49% respectively) indicating that the Bangladesh was unstable market for Indian fresh grapes. While export to Saudi Arabia was increasing with growth rate of 5.33, 12.04 and 6.37 per cent in terms of quantity, value and unit value received respectively but was associated with high instability in quantity(102.31%) and value received (118.30 %) indicating that the Saudi Arabia also unstable market for Indian grapes export.

5.4 Extent of export potentiality

There was a growing trend in area and production of grapes in Karnataka in particular and India as whole as evident from the growth rate 5.82 per cent in area and 4.91 per cent production of grapes in India and 6.30, 3.36 percent in area and production of grapes respectively in Karnataka (Table 4.6). The share of Karnataka's grape in country's area and production of grapes also increasing over the year. This indicates that there was a greater potentiality of grapes production in Karnataka and India as there was a greater demand for this fruit in India and abroad. Same results were found in the study conducted by Khunt (2008) on export potential and barrier in export of onion from Gujarat. The study revealed that the area, production, productivity were growing positively, indicating the assurance of onion supply for export as well as for sustaining fast growing onion dehydration industries of the state.

The quantity of fresh grapes produced in India increased at the rate of 14.09 per cent and even revenue earned out of its sale also increased at the rate of 18.00 per cent (Table 4.7). The share of fresh grapes out of fresh fruits produced and revenue earned in India also growing over the years. This revealed that there was a greater demand for the grapes in the market as compared to other fruits and greater potentiality for grapes to produce in the future. The similar results were found in Srivatsava and Shivendra kumar (1997) study on production, marketing and export potential of fruits and vegetables in Bihar that the total export of horticulture products in 1991-92 had been valued at Rs. 482.66 crores of which fresh vegetables and vegetable products accounted for Rs. 205.25 crores constituting 42.5 per cent. There was thus tremendous scope for export potential for vegetables specially frozen vegetables and tomato products.

The export of grapes was growing at higher rate 13.63 % as compared to production growth rate of 4.91 % in India (Table 4.8). And even share of grapes exported from India out of grapes produced in India also growing over the years. This indicates that there is a greater potentiality to produce and export of grapes from India.

The export of Indian grapes also growing destination-wise. The export to Bangladesh (20.84 %), Germany (27.79 %), Netherlands (33.54 %) were growing annually and indicates that there is greater demand for Indian grapes in these countries and also in UK, UAE and Saudi Arabia were the other important importers of Indian grapes. The trend showed the greater potentiality of Indian grapes to earn a foreign exchange value from the markets, which revealed the greater demand for Indian grapes.

The study of Chauhan (2005) revealed the similar results, on pattern of domestic milk marketing and export potential of milk and milk products in India, that Indian dairy market is currently growing at 4% per year. Among the different products exported from India, skim milk powder had the largest share, the lowest was observed for milk cream. Milk product exports from India between 2000-01 and 2001-02 was almost doubled.

5.5 Direction of Indian fresh grapes exports

The dynamics of export trend was an important aspect in drafting export oriented programs in order to enhance or sustain current export trends. Hence, the knowledge of changing export trade across the destinations was important. The dynamics of changes in the export trade of Indian grapes was studied by estimating Markov Transitional Probability Matrix.

The finite Markov Chain process, a stochastic process, was used in the analysis of the changes in the direction of exports of Indian grapes to capture the net effect of switching pattern of export trade over a period of time. This was achieved by examining gains and losses in the export share of grapes by major importing countries by deriving Transitional Probability Matrices (TPM) presented in Table 4.9 of fresh grapes exports.

Indian grapes were highly preferred for table purpose due to the inherent superior quality characteristics. The analyses of Transitional Probability Matrix of fresh grapes export from India revealed that the country's export share to Germany was 6.43 per cent during 2000-01 and decreased to 0.75 per cent by 2010-11 although quantity of export was increasing (Table 4.10). This was due to the fact that though Germany was the potential growing market for India's fresh grapes did not remain loyal importer, may be due to stiff competition by other countries like Bangladesh and Netherland. Indian mango exports to Hong-Kong also faced similar problems by Pakistan and Sri Lanka as indicated by Mamale Desai (2002) in his study of export potential of mangoes from northern Karnataka. However, the TPM indicates that Germany gained 4.87 per cent of the market share from UK and 4.65 per cent from other countries destinations and 3.27 per cent from Netherland market.

Bangladesh appeared to be most loyal and stable market for Indian fresh grapes indicated by retention of 68.44 per cent of its market share as well as a steady growth in its imports. However, Bangladesh also gained market share from Germany (65.19%) and from Netherland (32.81%). This high retention of market share of Indian grapes by Bangladesh may be due to increasing demand for fresh grapes in the country and grapes being a temperate crop was not cultivated extensively in Bangladesh, and it was easy to import grapes from India, an adjacent country since the transportation cost was low. However, the quantity of exports of Indian grapes to Bangladesh decreased during 2000-04 of the study period due to lower unit value realisation (Rs10/kg) and against high unit price realised from European countries (Rs 50/kg). As a result, a large share (20.5%) was diverted to Netherland from Bangladesh. (Laxmi Patil, 2006)

India could retain 50 per cent of its market share to UK during the study period. UK has been the major export destination for India's fresh grapes and had gained market share from UAE (42.73%), during the study period, Netherlands retained 45.50 per cent share of its import share. UK and Netherlands were the largest European trading partners for Indian grapes and this might have contributed for higher retention. Similar observations have been made by Laxmi Patil (2006) in her study and found that UK retained 66 per cent and Netherlands 26 per cent of Indian market share and both European countries were leading importer of Indian grapes and UK grained 47 per cent from Bangladesh and 39 per cent from Saudi Arabia and Netherlands gained 48 per cent from others countries.

Among other importing countries Saudi Arabia and UAE were the other markets for Indian fresh grapes as the country retained 42.74 per cent and 30.74 per cent of its market share respectively. Though a larger proportion of this share was diverted to UK, Netherland and other countries (42.73, 20.37 and 5.73 % respectively) from UAE and 57.26 per cent to other countries from Saudi Arabia. This was indicative that both European and Gulf countries were the most potential markets of Indian fresh grapes and India needs to hold its share intact for the recent competition from other countries.

5.5.1 Prediction of Indian fresh grapes export to major importing countries

The predictions in Table 4.10 revealed that Bangladesh will be the largest importer of Indian grapes from 2011-12 up to 2014-15 continuously 32.92, 30.89, 29.93 and 29.45 per cents share, respectively. The share of Germany, Netherlands and other countries predicted to rise from existing level. However, the shares of UK, UAE and Saudi Arabia were expected to fall; because these countries will be selling grapes at cheaper rate in the world market as may be the quality concern of Indian grapes.

It appears that India needs to strive to improve its export shares to these three major importers by improving upon the quality of grapes exports and also by improving the yield levels. Besides, in order to avoid dependency on a few markets, there is a need to identify the consumer's preferences of the new markets where India's export shares are likely to increase.

5.6 Trade competitiveness of grapes in International market

In order to derive maximum benefits from the new World trade environment, India needs to give greater emphasis on production strategy with respect to the commodities for which the country has greater comparative advantage, as country's performance in the International market depends largely on its export competitiveness. Assuming identical quality of domestic and foreign products, the export competitiveness signifies a situation when the domestic supply price would be lower than International price expressed in domestic currency net of freight, transport and related costs involved in taking produce from the exporting country to the importing country. In other words, a unit of a commodity fetches considerably higher price in the export market than the domestic market.

Under exportable hypothesis, Indian grape export was price competitive since average NPC below unity (0.67) implies that domestic prices received by the farmers were lower than the International prices (Table 4.11). Thus, we can infer that Karnataka grape cultivators enjoy comparative advantage in grapes export. These results were in consonance with the findings of the study of NPC for grapes during the period 1989-90 to 1996-97 by Tammanna *et al* (1999) observed a value of 0.59 NPC for Indian grapes export and attributed the same to production and export of quality grapes like Thompson Seedless and its mutants having a high demand in the International markets. These results were also similar with the findings of Savadatti (2007) study on export competitiveness of Basmati rice with the help of Nominal Protection Coefficient (NPC) for the period 1980-81 to 1989-99. The estimated NPC of the basmati rice with respect to USA with an average of 0.82 revealed that basmati rice export was competitive and enjoys advantages in exports. Basmati rice was a good exportable product. Hence, export of grapes from India to UK was competitive and enjoys advantage in exports and it was a good exportable product.

The Table 4.12 revealed that NPC for grapes in the period 2010-11 under exportable hypothesis was 0.62.Which also revealed that the domestic prices received by the farmers were lower than the international prices, which also implies that cost involved in transportation, market margins, C & F handling charges, service charges and service tax imposed in the domestic market were comparatively low thereby domestic price was low compared to international price. Hence, NPC for grapes was less than unity. It also revealed that grapes export had a high degree of comparative advantage in the world market. India needs to capitalize this advantageous position by ensuring its position in the international market as a stable and dependable source of exportable quality grapes. There is also an urgent need to enhance the productivity levels of grapes so that cost of production can be minimized and thereby the comparative advantage could be increased.

5.7 Role of grape grower association in production and export of grapes

The role of Grapes Growers Association in the production, marketing and export of grapes in the study region was studied by collecting required information from the officials of Karnataka State Grapes Growers Association, Regional Office, Bijapur.

The objective of association was to educate the farmers in technical front for the production of good quantity and quality of grapes for marketing and export. To supply the growth regulators like Giberlic acid (GA), dipping oil (Ethyl aldehyde) and so on for the improvement of quality standards. The objective of the association has a motive to help poor farmers who were having deficit in farm resources and unable to take up new production technology. The association had an objective to overcome these problems at farmers level and increase the economic status of farmers.

The functions carried out by the association were to conduct seminars to educate and create awareness about quality grapes production, export standards, export procedure and of supply required inputs for the member farmers. These functions might help the farmer to carry out good agricultural practices (GAP) and improve the quality for the export purpose. Association also help the mass of grape growing farmers and even to non members of the association by participating in the policy making decisions with the government with regards to grapes industry and launching new schemes required for the farmers from time to time.

A good number of seminars were conducted to create awareness about advanced technology, pests and diseases management and soil health management in production (Table 4.13). In marketing and export of produce, association conducted awareness programmes to farmers, purchasers and exporters. To increase the quality standards of grapes, association supplied required quantity of Gibberlic acid and dipping oil to members and thereby helped the farmers to increase the quality growing of grapes in the study area. Association has been imparting quite useful information about marketing and also helping farmers by conducting weekly once dry grapes auction in Bijapur. These help farmers to get remunerative price for their products and hence less exploitation by the middlemen as association lead from the forefront in auctioning of products.

The quantity exported was decreasing over the years in study area because of association member-farmers get good price for their dry grapes in the domestic market and also the exporting farmers' needs to maintain quality standards lay down by different countries. The association has been playing a pivotal role, but needs support and encouragement.

5.8 Constraints in production, marketing and export of grapes

An informal discussion with the sample farmers revealed that the grape cultivation had lot of problems. Opinion survey was conducted to know the constraints faced by the farmers in grapes production, marketing and export and results of opinion survey have been presented in the tables 4.14, 4.15 and 4.16 revealed as under.

5.8.1 Production constraints of grapes

Grapes being a commercial crop require high initial investment in establishment of orchard for grapes cultivation. The growers expressed that this is the main constraint to take up grapes cultivation and also lack of capital from institution. Grapes being a sensitive crop require higher use of inputs like fertilizer, water and labour and as a result this cost of cultivation was high. The non-availability of water to take up cultivation was another problem. As high care required for maintaining irrigation structures farmers opined this as one among the major constraints. Smitha (2004) observed similar problems in the cultivation of anthurium in Coorg district of Karnataka; where in high cost of planting materials and huge initial investment were the major problems. The lack of guidance from the universities and state department of horticulture were also opined by the farmers as lack of transfer of technology gap from officials to farmer. The high incident of pest and disease was another major one opined by the sample farmers as crop was highly sensitive to varying weather conditions and susceptible to pest and diseases.

Grapes being an irrigated and commercial crop was also labour intensive. Further, some of the operations like pruning, treating with growth regulators and use of chemicals require special skills and needs specially trained labours for carrying out these operations. The non-availability of such a skilled labour was the other production constraint expressed by grapes cultivators of study area. Similar observations have been made by Sharanesh (1994) in Bijapur district of Karnataka, where 67.5 per cent of the farmers expressed the same problem of non- availability of skilled labours. The producers were apprehensive of taking up chemical pesticides but some time resistance of pest and diseases occurs besides spurious chemicals. As the crop was exclusively cultivated for export and the farmers were afraid of rejection due to presence of pesticide residue. Shortage of fertilizers, plant protection chemicals and non-availability of quality planting materials were the other important constraints in the cultivation of grapes as perceived by the grapes growers in the study area.

5.8.2 Constraints in marketing of grapes

It can be seen from Table 4.14 that, the major constraint was absence of support price in the case of glut (100 %), absence of regulated markets (100 %), fluctuation of prices in market (95 %), lack of storage facility (92.50 %), exploitation by middlemen (90 %) as expressed by respondents, followed by high commission charges (77.50 %), high cost of transportation (75 %), delayed cash payment (72.50%), markets were far away (56.67 %).

Respondents producing nearly about 10 to 12 tonnes of grape per unit acre, out of which maximum 6 to 8 tonnes was exportable depending on the quality, remaining 4 to 6 tonnes have to be marketed. Hence, they might be facing problems like fluctuation of market price, high cost of transportation, exploitation by wholesale traders, high commission charges; markets were for away, delayed cash payment. The fact that, grape has no support price declared by the government; the same is expressed by the respondents in the present study. These findings were in conformity with the findings of Govinda Gowda (2002) who reported that the important constraints in grape marketing as, no fixed price, low price, lack of regulated markets, exploitation by middle men, lack of cold storage facility, no guidance on marketing aspects and lack of transportation facilities.

5.8.3 Constraints in grapes exports from India

Grapes growers complained on Non-availability of quality testing laboratories and lack of adequate cold storage facilities leads to improper pre-cooling and fluctuation in storage temperature, leading to post harvest decay. Transporting for a long distance required long duration storage facility during transport by sea and exporters expressed a keen interest to acquire these facilities but as it involves huge initial investments they wanted the Government to extend more financial support to co-operatives and other export agencies for acquisition of such facilities. Also inadequate clearing and forwarding agents in the process of movement of consignments was also a problem.

As the high quality standards imposed on grapes by the many of the European countries to import grapes, it was difficult to meet export standards of those countries so farmers complained this was also main constraints in export of grapes. As the international market for Indian grapes in some of the countries were unstable due to fluctuations of international price and it might be due to lack of demand for grapes and fluctuating value of Indian rupee as against US dollar. These constraints were in consonance with the findings of Gopal Rao (1998) who observed that, the major constraint in the way of increasing export of fruits and vegetables to the International markets were poor quality, premature harvesting of the fruits leading to reduced shelf life and low sugar content, lack of adequate knowledge of the quality standards in International market by both farmers as well as the merchants. Thus, the author opinioned that the promotion of export of fruits and vegetables in the state needs dissemination of knowledge on International standards of quality, export policies, duties, subsidies and taxes, freight, etc., to all stake-holders from growers to exporters as well as strict supervision and control on quality for export.

High pesticide residue in grapes was an important constraint faced by the grapes exporters. These constraints were in consonance with the findings of Pradhumn (1998). European consumers were highly sensitive to pesticide residues in consumable products and hence recommends special research and development efforts to overcome these problems by introducing pest and diseases resistant varieties and biological control methods in integrated management of insect pests to reduce use of pesticides as well as cost of cultivation and hence grape growers to be educated properly on these aspects.

Indian Grape productivity has been comparatively high (20 tonnes/ hectare), but production of export quality grapes, need to maintain loose bunches weighs between 400-600 gm, which involves removal of alternate branch of rachis to maintain 5-6 branches leading to decrease in productivity levels (12 tonnes per hectares). As a consequence, many grape growers need not willing to produce export quality grapes. This would also call for research and developments to evolve practice/varieties to maintain desired bunch characters and yield levels.

6. SUMMARY AND POLICY IMPLICATIONS

Grapes is one of the important fruit crop of India with immense export potential that has increased enormously with liberalization and WTO agreement. Though comparatively India's production of grapes was very small, its productivity was very high and comparable with other leading producers, enabling the country to step up grape production and exports significantly from a meagre beginning of 3462 tonnes during 1985-86 to a record 99,278 tonnes by 2010-11. Grapes has been identified as a major fruit crop for export promotion. However, a detailed analysis of export of India's grapes and its direction of trade would help in future policy decisions for its promotion. Hence, the present study has been initiated with the following objectives.

1. To assess the growth and instability in area, production, productivity and export of Grapes.
2. To estimate the extent of export potentiality of grapes in the study area.
3. To study the trade competitiveness and direction of trade in grapes.
4. To study the role of grape growers association in production and export of grapes
5. To document the constraints in the production, marketing and export of grapes in the study area and suggest suitable policy measures.

Hypotheses

1. There is a positive growth in area, production, productivity and export of grapes with lower variability.
2. There is a greater export potentiality of grape.
3. Indian grapes are competitive in the international market.
4. There are considerable constraints in the export of grapes from the study area

6.1 Methodology

The study has been conducted in three taluks viz., Bijapur, Athani and Jamakandi. The study was based on both primary and secondary data. The role of grape growers association in production, marketing and export of grapes was also documented. The study period considered for the analysis of growth rates in area, production, productivity of grapes from India and Karnataka and its export from India, was 1985-86 to 2010-11. The export potentiality of grapes from Karnataka and India for a period of 20 years from 1991-92 to 2010-11 was considered for the analysis. A period of 19 years from 1992-93 to 2010-11 was considered, for examining the competitiveness in exports. Direction of trade in fresh grapes was analyzed for the period 2000-01 to 2010-11. For identifying constraints in production, marketing and export of grapes, primary information collected from randomly selected sample farmers of Bijapur, Athani and Jamakandi taluks of Bijapur, Belgaum and Bagalkot districts of Northern-Karnataka were used.

Secondary data for the study were collected from various published sources. Time series secondary data on area, yield, production, export quantity and value of grapes for a period of 26 years from 1985-86 to 2010-11 were obtained from the publications of FAO, APEDA, NHB. Data on destination wise exports were obtained from "APEDA. The freight rates for grapes were obtained from Mahagrapes, Maharastra. The total production and exports of different countries were also obtained from FAO trade yearbook. Information on domestic prices of the grapes and other agricultural statistics were compiled from various issues of "Karnataka at a Glance", and "Karnataka's Economy in Brief" published by Directorate of Economics and Statistics, Bangalore. Study period was selected based on the availability of data and primary data represented the period 2010-11.

Exponential growth function and instability index technique were employed to compute the compound growth rate and instability index of grapes in terms of area, production, productivity, export quantity, value and unit price realized. Markov Chain Analysis of first order was used to analyze the direction of trade of Indian grapes. Nominal Protection Coefficient was used to analyze the export competitiveness of grapes. Tabular analysis was used to find out the extent and status of constraints in production, marketing and export of grapes faced by farmers.

6.2 The findings of the study were

1. The average age of farmers in selected taluks was 40 years and the family size was 5 members. About 87 to 93 per cent of the farmers were practicing agriculture as the main occupation with more area under dry land.

2. The growth rates and instability in area, production and productivity of grapes in India during pre-WTO period (1985-86 to 1995-96) were 11.46 per cent, 10.86 per cent and -0.53 per cent with instability index of 11.63 per cent, 14.82 per cent and 10.99 per cent respectively compared to a modest growth of 7.09, 2.43 and -4.34 per cent with instability index of 10.72, 20.70 and 19.49 was observed in area, production and productivity of grapes in India during post-WTO period (1996-97 to 2010-11). The growth rates over the entire study period (1985-86 to 2010-11) were 6.92, 7.28 and 0.34 per cent with instability index of 14.00, 21.80 and 24.10 respectively. Thus area and production growing significantly but productivity has been decreasing for the different study periods in India.

3. The growth rates and instability in area, production and productivity of grapes in Karnataka during pre-WTO period were 7.07 per cent, 1.48 per cent and 5.46 per cent with instability index of 11.97 per cent, 16.50 per cent and 10.86 per cent respectively compared to a modest growth of 7.02, 3.11 and -3.65 per cent with instability index of 9.97, 20.34 and 18.79 were observed in area, production and productivity of grapes in Karnataka during post-WTO period. The growth rates over the entire study period were 5.41, 4.58 and -0.78 per cent with instability index of 15.32, 18.68 and 22.96 respectively. Thus area and production were growing significantly but productivity was decreasing for the study period in Karnataka.

4. Grapes exports during pre-WTO period, registered a growth of 23.98, 37.83, 11.16 per cent with instability index of 17.77, 15.39 and 6.81 per cent in terms of export quantity, value and unit price realized as against 18.74, 20.65 and 1.60 per cent with the instability index of 34.93, 24.75, and 14.26 per cent during post-WTO period. While these were 15.13, 21.85 and 5.84 per cent with instability index of 36.52, 28.41 and 17.78 per cent respectively for entire study period.

5. Quantum of fresh grapes exported to Bangladesh, Germany, Netherlands and Saudi Arabia increased at the rate of 20.84, 27.79, 33.54 and 5.33 per cent respectively and was associated with high instability indices of 100.80, 67.71, 53.29 and 102.31 per cent respectively. The compound growth rate of 7.90, 6.22 and 18.22 per cent was observed in quantity of fresh grapes exported to UK, UAE and others respectively with low instability indices of 33.12, 35.76 and 43.17 per cent respectively. Hence, UK and UAE were stable importer of Indian grapes.

6. High growth rate in export value realized was observed in the case of Netherlands (39.24%), Germany (30.34%), others (23.93%) and Bangladesh (22.02%) with instability indices of 44.92, 53.32, 44.85 and 98.93 per cent respectively during the study period. While low growth rate of 14.03, 12.04, 11.13 and 23.93 per cent for UK, Saudi Arabia, UAE and others with instability of 46.60,118.30, 30.90 and 44.85 per cent respectively. And high instability index was found in Saudi Arabia (118.30 %) and Bangladesh (98.93 %).

7. Unit price realized for fresh grapes export to Saudi Arabia, UK, UAE, others and Netherlands were at the high growth rate of 6.37, 5.68, 4.78 and 4.27 per cent with moderate instability of 19.29, 31.85, 12.24, 20.45 and 19.81 per cent respectively. Whereas, low growth rate in the case of Bangladesh (0.97%) with high instability of 62.49 per cent and Germany (1.99%) with instability of 26.30 per cent during the study period.

8. The area and production of grapes in Karnataka were growing at the rate 6.30 and 3.36 per cent respectively and share of Karnataka's grapes under area and its production also growing over the year.

9. The quantity and value of fresh grapes export from India has been growing at the rate of 14.09 and 18 per cent respectively and share of fresh grapes export out of total fruits exported from India also growing over the years during study period

10. The extent of fresh grapes export out of grapes produced in India also increased over the years during study period

11. The other countries category, Bangladesh, UK and Netherlands were the most stable markets for Indian fresh grapes during the study period as indicated by 80.37, 68.44, 50.06 and 45.50 per cent of market share retention by the Transitional Probability Matrix of Markov Chain Analysis and Germany was the most unstable market tending to lose its entire share to other countries

12. Saudi Arabia and UAE were also moderately loyal to Indian fresh grapes with retention of 42.74 and 30.75 per cent respectively during the study period.

13. Analysis of the losses and gains in market share indicated, Bangladesh as the major net gainer, gaining 65.19 per cent of Germany market share and 32.81 per cent of Netherlands's imports from India. Entire share of Germany was diverted to Bangladesh (65.19 %) and Netherlands (34.81 %) making it the most unstable market.

14. Karnataka has a comparative advantage in grapes production and competitiveness in grapes exports as indicated by average value of NPCs (0.67) during the study period (1992-93 to 2010-11).

15. The actual share of Bangladesh in fresh grapes export had shown fluctuation over the study period but on the whole it had increased from 2.67 per cent to 38.84 per cent. Similar picture was in prediction of export share too, the estimation for 2014-15 suggested a slight decline from 32.28 per cent to 29.45 per cent.

16. The actual and predicted export share of Indian grapes to Germany showed a decreasing trend from 6.43 per cent to 0.75 per cent and 3.08 to 2.10 per cent respectively from 2000-01 to 2010-11. The actual quantum of exports shown an erratic trend during study period but predicted value was increasing. The estimation for 2014-15 also was likely to decrease from 2753.37 tonnes (2010-11) to 2392.41 tonnes.

17. The actual and predicted quantum and also the proportion of exports with regards to UK showed an erratic trend. But on the whole the actual proportion of India's exports to UK decreased from 41.50 per cent to 7.81 per cent. The predicted proportion showed a decline from 31.11 to 9.79 per cent.

18. The actual proportion of Netherland market share of imports from India showed a rising trend from 8.26 per cent to 17.83 per cent. The predicted export share also increased from 13.67 per cent to 22.35 per cent over the study. The actual and predicted quantum of exports also fallowed a similar trend. The estimation for 2014-15 suggested a decrease from 29299.49 tonnes in 2010-11 to 22648.49 tonnes.

19. The actual market share of India's fresh grape exports to UAE decreased from 24.18 per cent to 10.46 per cent whereas the predicted share decreased from 26.28 per cent to 9.81 per cent from 2000-01 to 2010-11. The estimation was also likely decrease from 12862.75 tonnes to 7179.79 tonnes during the study period. The actual and predicted proportion of exports share of India's grapes exports to Saudi Arabia showed an increasing trend. The estimation was also likely decrease from 4842.56 tonnes in 2010-11 to 3157.29 tonnes in 2014-15.

20. High cost of establishment, lack of capital, maintenance problem of irrigation structures, high cost of inputs, lack of technical guidance, non-availability of water etc, were the major constraints in production of grapes in the study area.

21. Absence of support price in the case of glut, absence of regulated markets, fluctuations in market prices, lack of storage facility, exploitation by middlemen etc, were the major constraints in marketing of grapes in the study area.

22. Non-availability of quality testing laboratories, inadequate of C & F agents, lack of adequate cold storage facilities, difficulty to meet export standards, fluctuating prices of produce in the international market, non-availability of guidance from export organizations of government, high residual effect and lengthy procedures and formalities for export were the major constraints in export of grapes from the study area.

23. Role played by the association in the production are technical support for quality and quantity growing of grapes, conducting seminars, management of pest, disease and problematic soil and water with the coordination of APEDA, NRC Pune, IIHR, ARS scientists. Weekly once dry grapes auction in Bijapur and awareness programmes for the purchasers and farmers were the few roles played by the association in marketing of grapes.

24. The awareness program to the farmers for the quality standards lay down by the APEDA, NRC on grapes Pune, supply of inputs like hormones for the export quality growers, awareness about banned chemicals and number of spray and quality standards are extension activities to the farmers for export of grapes to Europe as well as local market are major role played by the association in the export of grapes to different markets of country and the world. Also Participate in the policy making decisions with the government with regards to grapes industry.

6.3 The policy implications emerging out of the study are outlined below in brief

1. High priority need to be given to increase the area and productivity of grapes to meet the increasing domestic demand on one hand and to build up a sustained supply to the international markets to earn precious foreign exchange.
2. As revealed by high compound growth rates of export of grapes to European countries and Bangladesh, the crop needs to be identified as an important commodity for export promotion not only to these countries but also to other potential importing countries.
3. As indicated by Markov Chain Analysis, Bangladesh, UK, Netherlands, Saudi Arabia, UAE and other countries were important markets for fresh grapes. India can concentrate on export promotion in these countries to tap the import potential for Indian grapes.
4. Instability index in the export of fresh grapes was relatively high for Bangladesh and Saudi Arabia. And such instability increases market risk to exporters. Attention need to be focused on maintenance of quality requirements of the importing countries so as to reduce instability.
5. There is a need to give a greater support to existing Karnataka grape growers association in order to increase the working capability on the line of Mahagrapes in Maharashtra.
6. The growers may be given training to update knowledge base and technologies for improved cultivation methods, integrated pest and disease management system, marketing and export
7. International trade fairs, exhibitions etc., may be organized to gain knowledge about the quality preference and thereby planned measures could be initiated to promote the required quality of grapes of the needy country.

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Appendix I: World Area, Production and Productivity of Fruits by Major Countries during 2010-11

Country	Area (Million hectares)	Production (Million tonnes)	Productivity (Tonnes/Ha)
China	11.40	122.18	10.70
India	6.38	74.80	11.70
Brazil	2.44	39.28	16.10
USA	1.14	25.38	22.20
Italy	1.27	16.90	13.20
Philippines	1.15	16.18	14.00
Mexico	1.21	15.25	12.60
Spain	1.56	15.18	9.70
Indonesia	0.66	14.86	22.40
Turkey	1.09	13.94	12.80
Others	26.75	245.22	9.20
World	55.08	599.30	10.90

Source: FAO Production Year Book (2010-11)

Appendix II: Major Grapes Producing Countries in the world during 2010-11

Country	Area (lakh Hectares)	Production (lakh Tonnes)	Productivity (Tonnes/Ha)
China	6.43 (8.90)	86.53 (12.90)	13.40
Italy	7.77 (10.70)	77.87 (11.60)	10.00
USA	3.82 (5.20)	62.20 (9.20)	16.30
Spain	10.02 (13.90)	61.07 (9.10)	6.10
France	7.87 (10.90)	58.48 (8.70)	7.40
Turkey	4.77 (6.60)	42.55 (6.30)	8.30
Chile	1.88 (2.60)	27.55 (4.10)	14.60
Argentina	2.23 (3.10)	26.16 (3.90)	11.70
Iran	2.2 (3.00)	22.25 (3.30)	10.20
India	1.11 (1.50)	12.35 (1.80)	11.10
Others	24.12 (33.40)	195.86 (29.10)	8.10
World	72.27	673.22	9.30

Note: Figures in parentheses indicate percentage to total.

Source: FAO Production Year Book (2010-11)

Appendix III: Major grapes exporting countries in the world during 2010-11

Exporting Country	Quantity (lakh tones)	Value (million USD)	Share (%)
Chile	9645.84	2037.65	24.57
USA	4925.11	947.79	11.43
Turkey	4606.72	773.99	9.33
South Africa	3272.16	771.86	9.31
Italy	4896.51	746.85	9.01
Mexico	1797.43	540.69	6.52
Spain	1394.32	300.78	3.63
Peru	946.13	218.86	2.64
Brazil	770.27	201.50	2.43
Greece	1247.55	200.30	2.42
Netherlands	769.10	179.32	2.16
Argentina	937.45	172.89	2.08
Iran	1143.72	155.94	1.88
Egypt	599.74	147.50	1.78
India	**747.46**	**121.26**	**1.46**
China	913.58	116.13	1.40
Germany	517.00	104.05	1.25
Uzbekistan	740.13	82.65	1.00
Namibia	232.84	69.07	0.83
Australia	293.46	65.25	0.79

Source: FAO Production Year Book (2010-11)

Appendix IV: Production of different Fruit Crops in India during 2010-11

Fruits	Area (lakh Hectares)	Production (Lakh tonnes)	Productivity (Tonnes/Ha)
Banana	8.30 (13.00)	297.80 (39.80)	35.90
Mango	22.97 (35.99)	151.88 (20.30)	6.60
Citrus	8.46 (13.25)	74.64 (9.90)	8.80
Papaya	1.06 (1.66)	41.96 (5.60)	39.60
Guava	2.05 (3.21)	24.62 (3.30)	12.00
Apple	2.89 (4.53)	28.91 (3.90)	10.00
Pineapple	0.89 (1.39)	14.15 (1.90)	15.90
Sapota	1.60 (2.51)	14.24 (1.90)	8.90
Grapes	1.11 (1.74)	12.35 (1.60)	11.10
Pomegranate	1.07 (1.68)	7.43 (1.00)	6.90
Litchi	0.78 (1.22)	4.93 (0.70)	6.40
Others	12.65 (19.82)	75.83 (10.10)	6.00
Total	63.83	748.78	11.70

Note: Figures in parentheses indicate percentage to total.

Source: Indian Horticulture Database-2011(NHB)

Appendix V: Export of different Fruit Crops from India during 2010-11

Fruits	Quantity (Thousand tonnes)	Value (Rs Crores)
Fresh grapes	99.27 (24.13)	411.98 (38.70)
Mango	59.20 (14.40)	162.90 (15.30)
Banana	56.30 (13.70)	100.05 (9.40)
Apple	47.07 (11.40)	59.74 (5.60)
Papaya	15.24 (3.70)	18.52 (1.70)
Orange	13.98 (3.40)	22.95 (2.20)
Pineapple	1.81 (3.70)	4.15 (0.40)
Sapota	2.04 (0.50)	3.53 (0.30)
Litchi	1.18 (0.20)	1.35 (0.10)
Guava	0.28 (0.06)	0.63 (0.06)
Others	114.9 (27.90)	278.71 (26.20)
Total	411.27	1064.51

Note: Figures in parentheses indicate percentage to total.
Source: Indian Horticulture Database-2011(NHB)

Appendix VI: State Wise Area, Production and Productivity of Grapes in India 2010-11

State	Area (000 Ha.)	Production (000 tonnes)	Productivity (tonnes/Ha.)
Maharashtra	86.00 (77.20)	774.00 (62.70)	9.00
Karnataka	**18.10 (16.20)**	**330.30 (26.70)**	**18.30**
Tamil Nadu	2.70 (2.40)	53.00 (4.30)	19.30
Andhra Pradesh	1.30 (1.20)	27.60 (2.20)	21.00
Mizoram	1.60 (1.40)	20.40 (1.70)	12.90
Others	1.70 (1.60)	29.50 (2.40)	17.30
Total	111.40	1234.90	11.10

Note: Figures in parentheses indicate percentage to total.
Source: Indian Horticulture Database-2011

Appendix VII: District Wise Area, Production and Productivity of Grapes in Karnataka 2009-10

Districts	Area (Ha.)	Production (tonnes)	Productivity (tonnes/Ha.)
Bijapur	**5388 (39.10)**	**185261 (43.20)**	**34.38**
Belgaum	2147 (15.50)	64837 (15.10)	30.20
Bangalore(R)	1787 (12.90)	58451 (13.60)	31.00
Bagalkot	1221 (8.90)	57878 (13.50)	47.40
Chikkballapur	1236 (9.00)	23699 (5.50)	19.20
Bangalore (U)	849 (6.20)	18023 (4.20)	21.20
Koppal	268 (1.90)	5581 (1.30)	20.80
Others	881 (6.40)	15113 (3.50)	17.20
State	13777	428843	31.18

Note: Figures in parentheses indicate percentage to total.

Source: DES, Karnataka (2009-10)

Appendix VIII: Area, Production and Productivity of Grapes in India during 1985-86 to 2010-11

Year	Area (000HA)	Production (000 MT)	Productivity (MT/HA)
1985-86	12.50	260.00	20.80
1986-87	15.39	251.01	16.31
1987-88	21.30	415.14	19.49
1988-89	24.88	374.44	15.05
1989-90	25.10	408.13	16.26
1990-91	24.82	412.54	16.62
1991-92	32.40	668.20	20.60
1992-93	34.00	653.10	19.20
1993-94	38.80	702.50	18.10
1994-95	42.10	672.90	16.00
1995-96	35.60	603.60	17.00
1996-97	42.90	1134.60	26.40
1997-98	40.80	969.30	23.80
1998-99	42.60	1082.70	25.40
1999-00	44.30	1137.80	25.70
2000-01	45.20	1056.90	23.40
2001-02	47.50	1184.20	24.90
2002-03	52.10	1247.80	24.00
2003-04	57.80	1474.80	25.50
2004-05	60.50	1564.70	25.90
2005-06	66.00	1649.60	25.00
2006-07	65.00	1685.00	25.90
2007-08	68.00	1735.00	25.50
2008-09	80.00	1878.00	23.50
2009-10	106.40	880.70	8.30
2010-11	111.00	1235.00	11.10

Source: NHB, Ministry of Agriculture, GOI

Appendix IX: Area, Production and Productivity of Grapes in Karnataka during 1985-86 to 2010-11

Year	Area (000 ha)	Production (000mt)	Productivity (MT/ha)
1985-86	4.80	90.72	18.90
1986-87	5.20	101.40	19.50
1987-88	5.70	115.14	20.20
1988-89	4.33	70.23	16.21
1989-90	4.42	97.80	22.13
1990-91	4.57	100.56	22.01
1991-92	6.5	141.70	21.80
1992-93	5.8	128.40	22.14
1993-94	5.8	173.60	29.93
1994-95	5.2	157.10	30.21
1995-96	5.4	162.00	30.00
1996-97	6.5	196.00	30.15
1997-98	7.5	226.60	30.21
1998-99	7.5	226.60	30.21
1999-00	7.6	228.20	30.03
2000-01	8.2	144.10	17.57
2001-02	10.0	169.70	16.97
2002-03	10.2	168.92	16.56
2003-04	9.1	170.90	18.78
2004-05	10.1	185.50	18.37
2005-06	10.8	190.30	17.62
2006-07	10.3	216.60	21.03
2007-08	14.3	258.80	18.10
2008-09	14.9	269.00	18.05
2009-10	17.4	317.60	18.25
2010-11	18.1	330.30	18.30

Source: NHB, Ministry of Agriculture, GOI

Appendix X: Export quantity, Value and Unit value of Grapes export from India during 1985-86 to 2010-11

Year	Quantity (tonnes)	Value (Rs. Crores)	Unit value (Rs./Kg)
1985-86	3462	3.06	8.84
1986-87	2561	2.56	9.99
1987-88	3297	4.05	12.29
1988-89	4738	6.40	13.51
1989-90	6933	10.17	14.68
1990-91	5348	8.59	16.06
1991-92	11143	18.66	16.74
1992-03	10770	25.22	23.42
1993-04	15928	34.03	21.36
1994-05	16813	40.68	24.2
1995-96	22151	55.55	25.08
1996-97	20958	52.17	24.89
1997-98	23680	64.74	27.34
1998-99	11382	37.45	32.9
1999-00	14006	55.5	39.62
2000-01	20646	84.37	40.87
2001-02	14571	63.67	43.7
2002-03	25568	108.15	42.3
2003-04	26470	102.34	38.66
2004-05	39340	128.45	32.65
2005-06	51652	209.04	40.47
2006-07	85897	301.92	35.15
2007-08	96964	317.79	32.77
2008-09	124626	408.61	32.79
2009-10	131091	545.05	41.58
2010-11	99278	411.97	41.50

Source: APEDA

Appendix-XI: Destination-wise Export of Fresh Grapes from India during1992-93 to 2010-11

(Qty in tonnes and value in lakh Rs)

Year	Bangladesh		Germany		Netherlands		UK		UAE		Saudi Arabia		Others		Total	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
1992-93	1751.70	174.80	18.70	4.00	31.30	14.20	894.50	304.80	5212.10	1081.40	1905.50	404.90	956.29	181.32	10770.10	2165.40
1993-94	2558.40	270.10	33.20	11.30	184.40	56.90	2693.60	789.00	6748.60	1488.20	2499.10	495.80	1211.38	278.80	15928.70	3390.10
1994-95	2399.10	250.00	47.90	14.40	532.30	150.30	7063.20	1989.60	4368.70	1076.90	962.70	219.10	1439.42	348.60	16813.40	4049.00
1995-96	4578.90	447.80	136.70	33.80	2022.70	559.50	7578.70	2215.70	4836.50	1397.90	926.30	160.20	2071.12	542.40	22150.90	5357.00
1996-97	3016.60	253.80	391.00	118.00	2346.50	711.90	8310.60	2359.90	3875.60	1102.60	611.40	127.40	2404.93	574.67	20957.70	5248.30
1997-98	5246.70	423.40	430.00	166.50	4022.20	1437.60	9689.80	3152.10	2929.80	940.00	288.90	54.00	1072.35	278.68	23679.80	6452.30
1998-99	2030.00	274.10	77.80	34.00	863.30	321.90	4476.50	1847.90	1976.70	753.40	241.50	52.80	1716.48	425.06	11382.20	3709.00
1999-00	798.40	145.20	344.60	155.20	733.10	286.60	7065.00	155.20	3800.80	1400.00	274.10	76.70	989.48	360.72	14005.60	5513.80
2000-01	550.30	250.00	1328.00	129.00	1705.50	1165.80	8567.10	3784.00	4992.90	1689.40	477.40	124.80	3024.78	1150.60	20646.10	8293.60
2001-02	248.20	38.70	280.30	117.00	1347.10	646.70	5042.40	2407.80	4829.70	1690.50	620.80	192.90	2218.61	902.01	14571.00	5995.60
2002-03	526.70	48.00	724.90	342.50	3646.80	1841.50	8887.80	4457.80	6617.10	2234.50	489.70	157.80	4675.01	1785.16	25568.00	10867.20
2003-04	2125.50	202.90	2381.00	957.00	4260.10	3388.80	6618.60	3388.80	4685.30	2072.50	249.90	97.40	6463.39	1900.76	26783.80	10588.80
2004-05	14724.00	830.40	1151.00	462.00	7529.00	4047.00	5889.00	3290.00	5476.00	2788.00	163.00	86.00	4408.00	1342.00	39340.00	12845.00
2005-06	13933.00	1959.00	2992.00	1110.00	12133.00	6195.00	11319.00	5915.00	7046.00	3423.00	345.00	190.00	3884.00	2112.00	51652.00	20904.00
2006-07	25716.00	3108.00	6137.00	1440.00	19021.00	10013.00	13638.00	7657.00	8140.00	3668.00	1115.00	564.00	12130.00	3742.00	85897.00	30192.00
2007-08	37995.00	4379.00	2162.00	785.00	24379.00	13587.00	11640.00	6368.00	9686.00	3399.00	2403.00	745.00	8699.00	2516.00	96964.00	31779.00
2008-09	54509.00	6274.00	1304.00	472.00	24341.00	13449.00	12758.00	6597.00	13064.00	5650.00	3489.00	1627.00	15161.00	6792.00	124626.00	40861.00
2009-10	45656.00	6276.00	2356.00	1010.00	29074.00	16884.00	14360.00	8211.00	13205.00	7286.00	5099.00	2726.00	21341.00	12112.00	131091.00	54505.00
2010-11	38563.00	5496.00	741.00	313.00	17700.00	11810.00	7749.00	4848.00	10384.00	5332.00	4058.00	1769.00	20083.00	11627.00	99278.00	41197.00

Source: APEDA

Appendix-XII: Computation of Nominal Protection Coefficient for Grapes

	Particulars	Units	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
1	Wholesale price in Karnataka	Rs/Qtl	950	1200	1500	1410	1400	1380	2117	2070	1558	1700
2	Transport cost Mumbai	Rs/Qtl	219.31	219.31	225.4	233.2	237.58	240.02	243.67	247.33	254.64	260
3	Market Margins @ 5%	Rs/Qtl	47.5	60	75	70.5	70	69	105.85	103.5	77.9	85
4	C&F Handling charges	Rs/Qtl	21	22.75	23.8	25	27	27.5	28	30	30	30
5	Wharfage charges	Rs/Qtl	5.8	6	6.1	6.25	6.4	7	7	7.25	7.25	7.3
6	Service charges	Rs/Qtl	3	3	3.25	3.45	3.65	3.8	3.9	4	4	4
7	Service tax	Rs/Qtl	0.24	0.24	0.26	0.28	0.29	0.3	0.31	0.32	0.32	0.32
8	FOB price@ Mumbai (1+..+7)	Rs/Qtl	1246.85	1511.3	1833.81	1748.68	1744.92	1727.62	2505.73	2462.4	1932.11	2086.62
9	Plus Freight from India to UK	Rs/Qtl	444.77	359.73	324.4	463.5	536.81	606.15	641.12	849.96	986.56	1132.61
10	Plus Insurance @ 1 % of price	Rs/Qtl	12.47	15.11	18.34	17.49	17.45	17.28	25.06	24.62	19.32	20.87
11	Equals landed Price(8+9+10)	Rs/Qtl	1704.08	1886.14	2176.55	2229.67	2299.18	2351.04	3171.91	3336.98	2937.99	3240.09
12	FOB price UK	Rs/Qtl	3407.55	2929.09	2816.84	2923.64	2839.59	3253	4128.08	4372.81	4416.88	4775.15
13	NPC (11/12)		**0.5**	**0.64**	**0.77**	**0.76**	**0.81**	**0.72**	**0.77**	**0.76**	**0.67**	**0.68**

Contd…

	Particulars	Units	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1	Wholesale price in Karnataka	Rs/Qtl	1500	1600	1760	2009.50	2445.80	3033.50	2746.50	4802.43	4031.75
2	Transport cost Mumbai	Rs/Qtl	275	300	300	325	330	355	387	395	410
3	Market Margins @ 5%	Rs/Qtl	75	80	88	100.475	122.29	151.675	137.325	240.12143	201.5875
4	C&F Handling charges	Rs/Qtl	31.5	31.75	32	33	33.75	33.75	34	34	34.5
5	Wharfage charges	Rs/Qtl	7.5	7.89	8.1	8.23	8.3	8.3	8.5	8.75	8.95
6	Service charges	Rs/Qtl	4.2	4.13	4.2	4.25	4.3	4.35	4.25	4.4	4.45
7	Service tax	Rs/Qtl	0.33	0.37	0.38	0.37	0.38	0.38	0.39	0.4	0.41
8	FOB price@ Mumbai (1+..+7)	Rs/Qtl	1893.53	2024.14	2192.68	2480.83	2944.82	3586.96	3317.97	5485.10	4691.65
9	Plus Freight from India to UK	Rs/Qtl	1300	1330	1420	1465	1500	1528	1500	1575	1610
10	Plus Insurance @ 1 % of price	Rs/Qtl	18.94	20.24	21.93	24.81	29.45	35.87	33.18	54.85	46.92
11	Equals landed Price(8+9+10)	Rs/Qtl	3212.47	3374.38	3634.61	3970.64	4474.27	5150.83	4851.15	7114.95	6348.57
12	FOB price UK	Rs/Qtl	5015.57	5120.1	5557.03	5839.18	6883.49	8796.74	8237.39	12179.57	10293.54
13	NPC (11/12)		**0.64**	**0.66**	**0.65**	**0.68**	**0.65**	**0.59**	**0.59**	**0.58**	**0.62**

AN ECONOMIC ANALYSIS OF EXPORT POTENTIAL OF GRAPES FROM NORTHERN KARNATAKA

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ABSTRACT

The grape (*Vitis vinifera L.*) has emerged as the highest foreign exchange earning fruit crop of India in recent years. Hence, the present study was planned to analyse the export potentiality of grapes in a holistic manner. A multistage sampling technique was employed for selection of sample districts, taluks, villages and respondents. Primary data from 120 sample farmers were collected from Bijapur, Belgaum and Bagalkot districts of Northern Karnataka. Secondary data were collected from FAO, NHB and APEDA statistics yearbooks.

The compound growth rate in area, production and export of grapes was positive and productivity was negative with moderate instability index during both Pre-WTO and Post-WTO period. Export to Netherlands, Germany and UK showed higher growth rate. High instability index was observed in export of grapes to Bangladesh and Saudi Arabia. The proportion of grapes export out of grapes produced in India increased over the years. The other countries, Bangladesh, UK and Netherlands were the most stable markets as indicated by 80.37, 68.44, 50.06 and 45.50 per cent of market share retention by Transitional Probability Matrix and Germany was the most unstable market tending to lose its entire share to other countries. NPC for grapes exports during study period from India were less than unity indicating, that Indian grapes are highly competitive in the Global market. High cost of establishment and lack of capital were the major production constraints. Absence of support price in the case of glut, absence of regulated markets and fluctuations in market prices were major marketing constraints while non-availability of quality testing laboratories and lack of adequate cold storage facilities were the major export constraints.