Chapter 10. SUMMARY OF CONCLUSIONS

Basmati rice is a unique and high value grain crop. The Himalayan agro-climate had an important role to play in the existence of this unique rice line; hence its legacy was shared only by India and Pakistan. In India it was cultivated in Punjab, Haryana, Western Uttar Pradesh and parts of Jammu & Kashmir. In India, precise information on domestic production of Basmati was not known due to non-availability of systematic record of data. Sources like APEDA stated that the production was around 2.5 Million MT on an area of 7.85 Lakh Hectares. The domestic consumption had been hovering around 0.5 Million MT over the years. Hence, the export thrust on this high value commodity had been very high. The surge in Basmati exports had come mainly at the expense of long grain rice varieties from other countries, such as Thailand’s ‘Jasmine’ and ‘2473’ of the US. The traditional Brown Basmati of Indian origin quoted at $675 per tonne FOB and some premium varieties quoted $850 per tonne FOB. These were way above the corresponding rates of $445 per tonne for Thai Jasmine and $250 per tonne for US 2473. The Thai Jasmine rice was another aromatic variety, but it was glutinous, while Basmati rice was non-sticky on being cooked. Therefore, both in terms of quality as well as prices, neither of these varieties could be compared to Basmati rice.

Though Basmati rice was an important commodity in the export basket of India’s agricultural products, little evidence was available on its cultivation, processing and trading. A critical review of past studies related to Basmati cultivation dealt only partially with issues related to Basmati production in India. Since Basmati rice was an important crop to farmers in Punjab and Haryana, in this study, an attempt was made to understand the economics of Basmati rice cultivation and trade in a comprehensive manner by documenting relevant information relating to production and trade in Basmati. A field survey was undertaken to carry out an in-depth analysis of the situation of Basmati growing farmers. Further, this study also endeavoured to assess the impact of WTO rules on Basmati rice in terms of geographical cultivation and international trade.

This study was dealt at two levels i.e., analysis of the farm-level situation of Basmati and analysis of international Basmati rice trade. Emphasis was given to the methodology used to calculate the cost of cultivation of the various Basmati varieties,
examine the production and marketing system, and their competitiveness in the global market. Further, Indian Basmati rice trade and its international competition with Pakistan was analysed along with an impact assessment of WTO on Basmati rice.

This study was organized into ten chapters. Chapter 1–Introduction, Chapter 2–Database and Methodology, Chapter 3–National and International Issues Related to Basmati Rice, Chapter 4–Socio-Economic Profile of Sample Households, Chapter 5–Distribution of Area and Output of Basmati by Farm Size Categories, Chapter 6–Cost of Cultivation of Basmati, Chapter 7–Basmati Marketing, Chapter 8–Spatial and Temporal Analysis of Basmati Rice Trade, Chapter 9–Basmati Rice Trade and WTO, and Chapter 10–Summary of Conclusions.

Chapter 1 was the introductory chapter and it discussed the rice economy of India followed by the characteristics of Basmati rice, and objectives and hypotheses of the study. The specific objectives of this study were as follows:

1. Farm size category based Cost of Cultivation analysis.
   - To find out which category of farmers were the major producers of Basmati
   - To estimate the prices, yields, costs, gross output, and net returns of Basmati across farm size categories.
   - To carry out an exercise on the functional analysis of Basmati production and productivity.
   - To examine marketing channels, marketed surplus and price spread of Basmati.

2. Spatial and temporal analysis of Basmati rice trade.
   - To understand the rice trade policy of India
   - To compare Basmati rice trade of India and Pakistan
   - To study the major overseas markets of Basmati rice
   - To analyse the global competitiveness of Basmati rice.

3. Assess whether the provisions of the WTO, namely the Agreement on Agriculture (AoA) and the Trade Related intellectual Property Rights (TRIPS) had any impact on Basmati rice trade.

The study started with four hypotheses, first was that since Basmati was a high value crop large farmers allocated higher proportion of area towards Basmati cultivation as compared to small farmers. Second, modern or newer varieties of Basmati offered

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higher returns to farmers. Third, farmers’ profitability was inversely proportional to the length of the marketing channel and lastly, as WTO rules became effective, Basmati exports from India would increase both spatially and temporally.

Chapter 2 discussed the database, sampling techniques and methodologies used in the study. Due to lack of systematic record of data on Basmati this study mainly relied on primary survey. A field survey was carried out in selected sample districts of Amritsar and Gurdaspur in Punjab and Karnal and Panipat in Haryana during the agricultural year 2003-04. The sample districts and villages were chosen based on data and other information gathered through pilot surveys as well as advice given by Officials of Directorate of Agriculture of Punjab and Haryana and Agriculture and Processed Food Exports Development Authority (APEDA). Amritsar and Gurdaspur were selected as they are traditional Basmati cultivating districts of Punjab. Karnal in Haryana was taken up in the study because farmers in this region were cultivating several varieties of Basmati both traditional and hybrid. Panipat district was said to be a stronghold of a particular hybrid variety called Pusa Basmati and hence it was included in the field survey. From all four districts, eight villages were selected through purposive random sampling procedure for drawing the sample of farm households. Based on the net cultivated area (NCA), the farm households had been categorized into three broad sub-classes i.e., small (up to 5 acres), medium (5 to 25 acres) and large farmers (above 25 acres). Within sub-classes, the households were selected based on proportionate random sampling procedure. Accordingly, forty households were selected from each village. Thus, making total sample size of 160 each in Punjab and Haryana. Following this, systematic random sampling method was adopted for the selection of sample households.

Further, information regarding the marketing channel adopted by Basmati farmers was also taken from intermediaries, a few major export houses and grain markets locally called ‘mandis’ near Amritsar and Karnal. Time series data on domestic wholesale prices of paddy and paddy market arrivals was collected from few selected grain markets of Punjab and Haryana. Grain markets in Punjab selected were Amritsar, Tarn Taran, Fatehgarh Churian, Gurdaspur and those selected in Haryana were Taraori, Karnal, Gharaunda, Madlauda. The month wise farm harvest prices of Basmati paddy was collected from the Karnal grain mandi records.

The analysis of international trade in Basmati was based on secondary data sources. Secondary information was collected from Agriculture and Processed Food

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Exports Development Authority (APEDA), Centre for Monitoring India Economy (CMIE) and Director General of Commercial Intelligence and Statistics (DGCIS), FAO Trade Yearbook, Economic Survey and Economic Times newspapers. Secondary information was also collected from reliable websites such as www.basmati.com, www.oryza.com, www.irri.com, www.unctad.org as well as the website of the Federal Bureau of Statistics of Pakistan i.e., www.statpak.gov.pk.

Various mathematical and statistical techniques were used to analyse data and to interpret results properly. These tools included Percentages, Tabular and Graphical analysis, Dependency Ratio, Standard Deviation, Coefficient of Variation, Trend Growth Rates using Semi-log function, Lorenz curves and Gini’s coefficients, Cobb-Douglas production function, Regressions, Correlations and Tests of Significance.

The methodology followed in the yearly report called ‘Comprehensive Scheme for Studying the Cost of Cultivation of Principle Crops in India’ by the Directorate of Economics and Statistics had formed the basis in the calculation of cost estimates of the present study. Cost of cultivation studies during the fifties and sixties had also been referred to in context of the present study. The costs were estimated at three levels viz., actual costs, imputed costs and joint costs. Actual costs were based on the actual market rates prevailing in the village at the time of the field survey. These included casual or hired labour charges for specific farm operations, wages of attached human labour, electricity and mobil oil costs for irrigation, tractor diesel costs, hired machinery rents, repairs of implements, costs of seeds, fertilizers, insecticides and pesticides and growth regulators, leased in land rents and canal taxes. Imputed costs were assigned to those inputs used in production process that came from family sources such as value assigned to family labour, rent of owned land, kind payments, farm saved and exchanged seeds, and depreciation of farm buildings and implements. Joint costs were the expenditure incurred on or imputed for, some of the cost items that related to the farm as a whole. Such joint costs were allocated or apportioned to individual crops. In this study, the joint costs were depreciation on farm buildings and implements, land rents, canal taxes, electricity and mobil oil costs for irrigation, repairs of implements, interest on owned fixed capital and wages of attached human labour. Only two types of costs had been analysed in this study; the Total Cost $C_2 = \text{Total Variable Costs} + \text{Total Fixed Costs}$ and the Total Working
Capital Cost which was named as Cost H. The Cost H included the imputed value of family labour.

Other than cost of cultivation, broad channels of agricultural marketing, marketed surplus and price spread of Basmati rice were also looked into. Indices of global competitiveness such as Domestic Resource Cost Ratio (DRCR) and the Nominal Protection Coefficients (NPC) were analysed. Similarly, in order to arrive at the comparative advantage of rice exports Balassa's Export Performance Ratios (EPRs) were calculated. Further, to test the price sensitivity of Basmati rice price elasticities were also calculated using double log functions.

Basmati Rice trade statistics had been analysed to study the behaviour of Basmati exports from India and Pakistan. The analysis of impact of WTO on Basmati was done for two time periods wherein the establishment of the WTO in 1995 was taken to be the benchmark. Thus, the two time periods were Pre-WTO (1980 - 1994) and Post-WTO (1995 - 2005).

It was mentioned at the outset that the selected sample districts of Amritsar and Gurdaspur were relatively backward agricultural districts of Punjab but were well known for producing good quality Basmati rice whereas the selected sample districts of Karnal and Panipat were the agriculturally most developed districts of Haryana. These differences were kept into consideration while comparing the results of Basmati cultivation between Punjab and Haryana. At some places Basmati was analysed along with Non-Basmati wherein it was thought that a comparison of both could clearly bring out the significance of Basmati.

In chapter 3 national and international issues related to Basmati were reviewed. This chapter firstly critically reviewed two major studies undertaken on issues related to Basmati rice in India. These included a study by Datta.S.K., (2000) and an unpublished document submitted by a Chandigarh based NGO called 'Green World People' to APEDA in 1997. The present study was different from these two previous ones as it dealt with the economics of Basmati production and trade in a comprehensive manner.

From the review of literature it was learnt that there existed two varieties of Basmati. Traditional Basmati varieties were pure line cultivars and had been cultivated over centuries by farmers of the north-western regions of the Indian subcontinent. Modern varieties included improved variants of traditional varieties as well as hybrids that were developed by crossing low yielding traditional Basmati.
varieties with high yielding semi-dwarf Non-Basmati varieties. Modern Basmati varieties were high yielding than traditional ones.

Issues under the agreement on Trade Related Intellectual Property Rights (TRIPS) which was one of the most important agreements in the WTO also had a bearing on Basmati. The issues discussed under this clause were Geographical Indications for Basmati, Bio-piracy, Farmers’ Rights and Food Security and IPRs and lastly the issue of Basmati Patents.

The issue of Basmati patents assumed a lot of importance as the ownership of Basmati had become a deeply emotive issue. In late 1997, an American company, Rice Tec Inc, was granted a patent by the US Patent Office to call the aromatic rice grown outside India ‘Basmati’. With this patent right, Rice Tec Inc tried to not only call its aromatic rice ‘Basmati’ within the US, but also tried to label it ‘Basmati’ for exports. Already the US had tried to capture the international Basmati market with brand names like ‘Kasmati’ and ‘Texmati’ described by them as superior Basmati type rice. This patent thereby had the potential of endangering Basmati exports from both India and Pakistan. However, with timely legislation this patent was contended in the WTO under Patent Clause and the threat was terminated.

From tariff structure on Basmati it was learnt that for Indian Basmati a zero duty had been always effective in all importing countries.

There were serious adulteration issues with the quality of Basmati rice exported from India that had caused the European Union to be sceptical of Indian Basmati. For example, during the field survey farmers reported that ‘Sharbati’ was a high yielding Non-Basmati variety which received better prices (Rs.650/Qtl) than other Non-Basmati varieties. However, rice export houses insisted that ‘Sharbati’ was a Basmati variety. Thereby to assess the quality and purity of rice, the EC had slapped the condition of DNA testing at border.

Datta.S.K., (2000) had identified and analysed some constraints operating for Indian rice exports. Though these constraints had been discussed for rice in general, they held true for Basmati as well. The major constraints reviewed in this study were regarding constraints on supply, procurement, processing, logistical problems, transportation problems and marketing constraints.

Chapter 4 analysed the distribution and demographic profile of sample farming households as well as their economic profile and production structure. In Punjab and Haryana the percentage of small farmers was the highest (53 per cent)
followed by the medium (around 41 per cent) and then the large (around 5 per cent) farmers.

In the demographic characteristics of sample households it was seen that Jat Sikhs comprised the major caste in the selected region. As regards education status, the highest education level in a farming household was considered a more important indicator than the respondent farmer’s qualification. This was because the educational status of members within the family also affected adoption of newer and better farming practices. In both states largest percentages of households with higher education were found among the large farmers. These percentages were observed to increase across farm size categories. This trend indicated that small farmers were using family labour in agriculture hence their family members could not afford to spend much time on higher education. Further, it also indicated that higher education was correlated with higher income.

Due to predominance of joint family system among the large farmers, their average family size was generally higher than small and medium farming households who had a nuclear family system, that resulted into smaller average family sizes. Among sample households in Punjab and Haryana, the population engaged in farming activities as percentage of total working population was observed to be around 90 per cent and this proportion declined across farm size categories. In both states the average earning men per household (1.9) were more than the average earning women per household (0.06). Earning men per household were engaged in both farm as well as non-farm activities whereas earning women per household were found to be engaged only in some non-farm activities like tailoring, stitching and teaching. Further, the dependency ratio was 41.32 per cent for Punjab and 56.33 per cent for Haryana and it showed a decline across farm size categories in both states.

From the study of land holding distribution of sample households it was seen that the average net leased in area per household increased with farm size. The reason for leasing in more land by large farmers was that they already had most farm assets and so by leasing in, they tried to optimally utilize the existing implements, and thus realise the economies of scale. Thus, the phenomenon of ‘reverse tenancy’ was found in the study region.

The cropping intensity (GCA/NCA) of Punjab was estimated to be 1.94 and in Haryana it was 1.97. The cropping intensity was slightly lower in Punjab than Haryana because in Punjab, 8.75 per cent farmers were cultivating Sugarcane which
was an annual crop and furthermore around 1.25 [per cent farmers were not cultivating two seasonal crops in a year. On the other hand in Haryana, only 5 per cent farming households were cultivating the annual Sugarcane crop and infact 0.63 per cent small farmers were cultivating two crops of Non-Basmati paddy in the Kharif season itself, like a crop of Satthi (a sixty day crop) followed by PR-16. The cropping intensity on small holdings was slightly higher than medium and large holdings in both states. This was because most small farmers tried to maximise their output from the limited land by utilizing their surplus labour by growing two seasonal crops a year. The cropping intensity of large farmers was found to be lower because large farmers devoted some portion of their land to annual crops like Sugarcane. Further, it was observed that the cropping intensity (GCA/NCA) decreased with farm size which was statistically significant at 1 per cent level in Haryana but not in Punjab.

Farmers in both states cultivated several Basmati and Non-Basmati varieties of rice. Basmati rice varieties cultivated were Pakistani Basmati, Taraori Basmati, CSR-30, Mucchal and Sugandha while Non-Basmati rice varieties cultivated were PR-16, PR-20, PR-13, PR-120, PR-14, PR-26, PR-147, PR-12, PR-47, PR-11, IR-8, PR-116, PR-106 (Lal Mudi), PR-6, Pusa-44, Hybrid 6111, Sharbati, Satthi and Gobinda. This indicated that farmers in both states were diversifying within rice. Apart from rice varieties Wheat, Sugarcane and Fodder crops (Sorghum and Berseem) were also cultivated. Haryana farmers were also growing other crops like Onion during the Rabi season.

On an average in both states, Rice occupied the largest share in the gross cropped area (43.96 per cent) followed very closely by Wheat (42.42 per cent) and then Fodder crops (11.74 per cent) and Sugarcane (1.68 per cent). Other crops like Onion occupied only 0.37 per cent area in Haryana. In Punjab area under cereal crops such as Rice and Wheat was found to be lower than Haryana while area under Sugarcane and Fodder crops was found to be more than Haryana. Amongst Rice varieties in Punjab Non-Basmati occupied the higher share of area (26.57 per cent) followed by Basmati (15.14 per cent) while in Haryana, the area share under Basmati (25.51 per cent) was higher than Non-Basmati (20.30 per cent).

Further, it was seen that across farm size categories the area devoted to Basmati declined as a percentage of gross cropped area (GCA) and this decline was found to be statistically significant at 1 per cent level in Punjab and at 10 per cent level in Haryana. On the other hand area under Non-Basmati showed an increase as a
percentage of GCA and this increase was statistically significant at 1 per cent level in both states. The reason small farmers were devoting a higher proportion of area towards Basmati was because of the additional revenue that high value Basmati generated which they needed as they were working very close to subsistence level. Secondly, Basmati was a labour intensive crop compared to Non-Basmati and small farmers had surplus family labour at their disposal.

The farm investment structure showed that the percentage share of investments made by farmers in various farm assets in each farm size category was directly proportional to the farm size in both states.

The per acre farm business income (FBY) in Haryana based on C2 costs was 30.72 per cent higher than Punjab and taking H costs it was 12.28 per cent higher than Punjab. This was because the yields realised and prices received for all crops had been reported slightly better off in Haryana compared to Punjab. Further, in both states, the farm business income per acre increased across farm size categories which were statistically significant at 1 per cent level of significance. This phenomenon could be attributed to scale diseconomies suffered by small farmers.

In both states the proportionate shares of income from Rice and Wheat was highest in the farm business income. Among Rice varieties the share of Basmati income in Punjab was 17.02 per cent and that of Non-Basmati was 24.50 per cent. The share of Basmati income in Haryana was 30.73 per cent and that of Non-Basmati was 18.15 per cent. The share of Basmati income in Haryana was greater than Punjab because farmers in Haryana were cultivating several varieties of Basmati as against Punjab farmers who were cultivating only one variety due to their relative backwardness. In both states the share of Basmati income as a percentage of farm business income declined across farm size categories and that of Non-Basmati increased across farm size categories. It was also noticed that this pattern exactly mirrored the cropping pattern across farm sizes for both states. In other words small farmers were devoting larger areas as a percentage of GCA under Basmati cultivation compared to large farmers and the percentage share of income from Basmati cultivation was also higher for small farmers compared to large farmers.

The average net household income of Haryana was higher than Punjab by 54.24 per cent and was because it was found that the average farm business income, income from milk and subsidiary sources, leased out land rent and leased out implement rent which were components of net household income were also higher for
Haryana than Punjab. The average incomes both in terms of household and per capita and for both farm business and net income increased across farm size categories in both states.

Among non-crop income sources the highest proportionate share of incomes per household came from milk and subsidiary sources in both states. Further, average milk incomes and subsidiary incomes per household increased across farm size categories. The proportionate income from farm business per household was lower for small farmers (around 50 per cent) and higher for large farmers (around 88 per cent) in both states. This was because small farming households had lesser area than large farming households and also suffered from diseconomies of scale. Despite the fact that average incomes per household received by small farmers was lower than other farm size categories, their proportionate incomes especially from non-crop sources (around 49 per cent) in the net household income were higher than those of medium (around 21 per cent) and large farmers (around 11 per cent) in both states. The reason for higher dependence of small farmers on non-crop income sources was that mainly, the proportionate income of small farmers from farm business per household was much lower (around 50 per cent). Secondly, small farmers were also devoting a larger proportion of area towards Basmati, whose prices were not regulated by the government though an MSP, hence not offering them a guaranteed return. On the other hand the proportionate income of large farmers from farm business was much higher (around 88 per cent). Secondly, large farmers were allocating a larger proportion of their area towards Non-Basmati whose prices were regulated by the MSP. Hence, the dependence of small farmers on non-crop sources of income was more than large farmers in both states.

The Lorenz curves and Gini's coefficients showed that inequalities in the distribution of per capita farm business income, net household income, total output and net cultivated area existed in both states though the differences between both states were very less. The inequality in the distribution of per capita farm business income was the highest in both states. This was due to scale diseconomies suffered by smaller farmers. The inequality in distribution of per capita net household income was lower than per capita farm business income in both states. This was because small farmers were gaining proportionately more income through non-crop sources like milk, subsidiary occupations, leasing out land etc than large farmers. Inequality also existed in the distribution of per capita total output. This was essentially because of
scale diseconomies suffered by smaller farmers and was in conformity with the direct relationship between farm size and productivity. The net cultivated area was also unevenly distributed amongst farming households and this was brought out by the fact that in both states large farming households that constituted on an average 5 per cent of the households in the sample accounted for as much as 39 acres of net cultivated area per household. On the other hand small farming households that constituted 53 per cent of holdings were having an average net cultivated area of only 3 acres per household.

Chapter 5 carried out a detailed analysis of the sample households who cultivated paddy, their area, prices, yields, and gross output of Basmati. This chapter was organised into six sections namely Basmati varieties in the study area, sample households who cultivated paddy, area allocated to Basmati, Basmati paddy farm harvest prices, Basmati yields in physical terms and Basmati gross output.

It was observed during the field survey that farmers were cultivating several varieties of Basmati rice, though the number of Non-Basmati varieties cultivated was much higher. Farmers in Punjab were growing only the traditional B-386 variety locally called ‘Pakistani Basmati’, while those in Haryana were growing traditional varieties like B-386 and HBC-19 (locally called ‘Taraori Basmati’) as well as modern varieties such as CSR-30, Pusa-Basmati (locally called ‘Mucchal’) and Sugandha. Among these modern varieties CSR-30 was developed by the Central Soil Salinity Research Institute (CSSRI) at Karnal. CSR-30 was stated to be a variant or an improved form of the traditional HBC-19. However, this improved variety was released only in 2001 and had not yet been notified by APEDA and hence was not exportable. Pusa Basmati was a hybrid variety (a cross of low yielding traditional Basmati variety with high yielding semi-dwarf Non-Basmati variety). It was developed by the Indian Agricultural Research Institute (IARI) and released in 1985. Sugandha also developed by IARI was a hybrid variety but was an improved form of Mucchal and was a relatively new variety.

In both states it was observed that farmers who cultivated Basmati were higher than those who cultivated Non-Basmati. The share of farmers cultivating Basmati in Punjab was 81.25 per cent while in Haryana it was 86.25 per cent. In case of Non-Basmati 65 per cent farmers were cultivating it in Punjab as against 63.75 per cent farmers in Haryana. Further, the share of small farmers who cultivated Basmati as a
percentage of total small farmers in both states was the least while that of the medium and large farmers was higher.

In Punjab all sample farming households cultivated the B-386 variety and in Haryana 57.25 per cent of farming households cultivated it. Thus, in both states it was seen that the share of farmers who cultivated B-386 was the highest because this was a traditional variety which received high prices and was also considered to be less prone to price fluctuations compared to the modern varieties. In Haryana, only 2.90 per cent farmers cultivated the other traditional variety HBC-19 because it was prone to lodging. Among modern varieties CSR-30 was cultivated by 36.23 per cent farmers who mostly belong to Karnal district. CSR-30 was a variant of HBC-19 and unlike HBC-19 was less susceptible to lodging. The yields of Mucchal were much higher than other Basmati varieties (16.75 Qt/IlAc). However, lesser percentage of farmers (36.96 per cent) cultivated this compared to B-386 because firstly their prices were low (Rs.908.76/Qtl) compared to traditional varieties and hybrid varieties had shorter life span compared to the traditional varieties like B-386. Their adaptability to the regions microclimate reduced with time. Sugandha a variant of Pusa Basmati was a recently developed evolved variety. This variety had not caught on much with the farmers due to lack of awareness.

In Punjab all farmers were cultivating B-386, and among them 49 per cent were small farmers, 47 per cent were medium farmers and 4 per cent were large farmers. In Haryana most small farmers had cultivated B-386 (56 per cent) followed by modern varieties such as Mucchal (43 per cent) and CSR-30 (25 per cent). Among medium and large farmers the largest proportion (50-60 per cent) had cultivated B-386 followed by CSR-30 and Mucchal (30-50 per cent). Most large farmers (16.67 per cent) had cultivated HBC-19 despite its risk of lodging as it fetched highest prices (Rs.1754.59/Qtl) than other varieties. Most small farmers had also cultivated Mucchal as it gave better yields and could be also used for adulteration purposes. Most medium and large farmers had cultivated CSR-30 and Sugandha due to better awareness.

In Punjab the area allocated to Basmati was 43 per cent lower than Non-Basmati. In contrast, the area allocated to Basmati in Haryana was 26 per cent higher than Non-Basmati. Relative backwardness of the districts selected in Punjab was the reason for lower allocation of area towards Basmati as these farmers lacked the knowledge or did not prefer newly developed varieties of Basmati and had been cultivating only the traditional B-386. Further, crop diseases were also a major

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problem in Punjab which might have lowered acreages there. On the other hand in case of Haryana, large numbers of rice traders operated in and around Karnal and that area had emerged as a specialized pocket in the emergence of different varieties especially those of Basmati. It seemed that the better trade network had created lot of awareness of hybrid varieties of rice and farmers were trying different varieties developed in the state rather than sticking to only the traditional variety. Thus, farmers in Haryana had devoted larger proportion of area towards Basmati.

When Punjab and Haryana were combined the area allocated to Basmati in the net cultivated area was 10 per cent lesser than Non-Basmati. Overall lower area allocation to Basmati than Non-Basmati was also assigned to its limited domestic and international demand compared to Non-Basmati. Basmati being highly priced was targeted for the elite hence its demand in the domestic market was considered to be less compared to ordinary rice, which was more affordable for the common man. Secondly, in the international market Basmati had limited takers (mainly Middle-East countries and EU) while Non-Basmati was exported to several countries. Moreover there were serious adulteration issues with the quality of Basmati rice exported from India which had caused the EU to be sceptical of Indian Basmati and hence less demand. Thereby to increase area allocation as well as production of this variety more advertising, propaganda and an emphasis on quality was needed.

Small farmers in both states had devoted a larger proportion of their net cultivated area towards Basmati (Punjab – 45.47 per cent and Haryana – 58.48 per cent) compared to medium and large farmers. This was firstly because as Basmati gave better returns compared to Non-Basmati, small farmers tried to maximize their returns from their small holdings by allocating more acreage to Basmati as they needed this additional revenue for their subsistence. Whereas large farmers hedged their bets by growing several types of crops and devoted large areas to Non-Basmati which gave them minimum assured returns through MSP. Secondly, Basmati was a labour intensive crop compared to Non-Basmati. Basmati harvesting was done by labour alone while Non-Basmati harvesting could be done by both labour and combine harvester. Management by small farmers was better as they put in more family labour that they had at their disposal. Thus, one of the hypotheses that large farmers were devoting a higher proportion of area towards Basmati as it was a high value crop was thereby rejected.
In Punjab only the traditional B-386 variety was under cultivation and in Haryana it occupied the second position (33.49 per cent) in terms of area after CSR-30 (43.53 per cent). The share of total acreage under HBC-19 the other traditional variety was much less (4.74 per cent) because it was prone to lodging. Among modern varieties CSR-30 had the highest share of acreage (43.53 per cent) because being a new variant of HBC-19 it was less susceptible to lodging. Mucchal was popular mainly because of very high yields but in spite of that the area devoted to Mucchal was less (17.74 per cent) compared to other varieties because of lower prices (Rs. 908.76/Qtl) and also because these evolved varieties had a shorter life span compared to the traditional varieties. Their adaptability to the regions microclimate tended to reduce with time. Sugandha had least acreage (0.50 per cent) because it had not caught on with the farmers due to lack of awareness. So, part of the hypothesis that new varieties improved prospects of area expansion along with better returns was true as most of the modern varieties were earning greater profits than the traditional B-386. But over time only the traditional varieties could survive as the modern ones tended to lose more vigour due to microclimate inadaptability.

As pointed out earlier, the proportionate area under B-386 to the net cultivated area in Punjab reduced with farm size. It was 45.47 per cent for small farmers, 28.49 per cent for medium farmers and 14.22 per cent for large farmers. Similarly the proportionate area under each Basmati variety to total Basmati area in Haryana showed that small farmers had devoted a larger proportion of their Basmati area to B-386 (42.46 per cent) followed by the modern varieties like Mucchal (38.21 per cent) and CSR-30 (19.33 per cent). Small farmers had devoted more area to B-386 because it was a traditional variety that fetched high prices. Secondly, being a traditional variety it might have also been less prone to price fluctuations compared to the modern varieties. These farmers seemed to be wary of HBC-19 because of its susceptibility to lodging. Higher yields of Mucchal (16.75 Qtls /Ac) had also lured small farmers to devote more area to this particular variety. Another possible reason as to why small farmers had devoted a larger proportion of area towards Mucchal was that it could be used for adulteration in the Basmati grain. Medium and large farmers had devoted a larger proportion of area towards the modern CSR-30 followed by the traditional B-386. They had devoted a larger proportion of area towards CSR-30 because they might have been more aware of this variety compared to the small farmers and also because it fetched very high prices (Rs.1532.88/Qtl). Large farmers

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had also devoted a larger proportion of area towards HBC-19 (14.95 per cent) as they had been lured by its comparatively high prices (Rs.1754.59/Qtl) despite the risk of lodging. Once again large farmers had cultivated Sugandha due to greater awareness.

The average Basmati area per household for Haryana was 5.81 acre and that of Punjab was 3 acre. B-386 variety had a slightly higher acreage per household in Haryana (3.4 Ac) than Punjab (3 Ac). Among Basmati varieties in Haryana, HBC-19 had the highest average acreage per household (9.50 Ac). This variety was followed by CSR-30 (6.98 Ac), Sugandha (4 Ac), B-386 (3.40 Ac) and Mucchal (2.79 Ac). The acreage per household of all Basmati varieties in both states increased across farm size categories. This was natural because large farmers' devoted larger areas to their crops hence per household data reflected that.

Average Basmati paddy prices were higher in Punjab (Rs.1386.99/Qtl) than Haryana (Rs.1317.52/Qtl) because Punjab farmers cultivated only one Basmati variety i.e., the traditional B-386 as against Haryana farmers who cultivated several that included high priced traditional as well as relatively low priced hybrid varieties. Thus, the average prices of Basmati cultivated in Haryana became lesser than those of Punjab. B-386 prices cultivated in Punjab (Rs.1386.99/Qtl) were higher than that cultivated in Haryana (Rs. 1322.68/Qtl) as Punjab was a traditional Basmati growing area and farmers were maintaining purity. On the other hand, the large number of Basmati varieties being cultivated in Haryana might have lead to adulteration that had resulted in lower B-386 prices. Amongst Basmati varieties cultivated in Haryana it was observed that HBC-19 (Rs.1754.59/Qtl) followed by CSR-30 (Rs.1532.88/Qtl) received the highest prices. This was because these were the most valued traditional as well as the modern variant of the traditional Basmati variety respectively. The hybrids Mucchal (Rs.908.76/Qtl) and Sugandha (Rs.700/Qtl) received comparatively lesser prices.

Furthermore, in Punjab the prices of B-386 were higher for small farmers and decreased across farm sizes though this decrease was not statistically significant. Small farmers utilized their surplus family labour that worked very efficiently on Basmati cultivation and thereby produced better quality grains, which in turn fetched high prices. The prices of all Basmati varieties taken together in Haryana increased with farm size but this increase was also not statistically significant. Small farming households earned lesser price than other categories because it was found that most small farming households i.e., 42.65 per cent in Haryana cultivated Mucchal which
had lower price than other varieties. Thus, the average Basmati prices of small farmers in Haryana became lesser than that of Punjab.

The yields in physical terms of B-386 variety cultivated in Haryana (10.33 Qtl/Ac) were marginally higher than that of Punjab (10.26 Qtl/Ac). Overall Basmati yields in Haryana (11.90 Qtl/Ac) were also higher than Punjab. The yields in value terms or gross output of B-386 cultivated in Haryana (Rs.15515.39/Ac) were lower than Punjab (Rs.16079.71/Ac) by 3.51 per cent. Overall Basmati gross output in Haryana (Rs.17814.24s/Ac) was higher than Punjab by 10.79 per cent. This was because apart from traditional varieties, Haryana farmers were also growing hybrid varieties which had greater yields than the traditional ones.

From the tabular analysis it was seen that the yields in physical and value terms of all Basmati varieties declined across farm size categories except Mucchal. But the regression analysis did not show a firm relationship between farm size and Basmati productivity in value terms. The decline in the productivity in value terms of B-386 across farm size categories was not statistically significant in Punjab and Haryana whereas the decline in productivity of HBC-19 and CSR-30 and increase in productivity of Mucchal were statistically significant at 1 per cent level. The reasons for such trends were that in case of B-386 both its prices and yields in physical terms had not shown a statistically significant decline in both states. But for HBC-19 its yields had declined significantly. In case of CSR-30, its prices and yields had shown a significant decline at 10 per cent level. For Mucchal, its prices and yields had shown significant increase across farm size categories. The decline in productivity of total Basmati in Haryana was not statistically significant mainly because of the increase in productivity of Mucchal. Thus, from the study of Basmati productivity in value terms it was observed that there existed a statistically non-significant inverse relation between farm size and Basmati productivity in both states.

Among Basmati varieties only the productivity of Mucchal increased across farm size categories. The reason for such an anomalistic behaviour of Mucchal was explained by its geographic pattern. Out of the total large farmers who cultivated Basmati a very small proportion (33.33 per cent) cultivated Mucchal who were located mostly in the Karnal area. It was mentioned in Chapter 2 that Pusa Basmati was a stronghold mainly in the Panipat region. This variety might not have suited the micro-climate of Karnal as the large farmers of Karnal reported higher usage of fertilizers, insecticide and growth regulators resulting in higher costs for them in case
of Mucchal. The investment made by large farmers in cultivating Mucchal in the form of greater usage of plant nutrients and plant protection chemicals had resulted in better yields in physical terms.

The yields in physical and value terms of Basmati for small farmers was higher than other categories as they were able to utilize their family labour in labour intensive Basmati cultivation. Further, the high value status of the crop, the lure of receiving high prices for it, along with the dignity of the family labour to work on their own farm with freedom had resulted in more efficient farming which in turn accounted for their greater productivity compared to the larger farms. The pride/dignity/love of family labour and the fact that a small farmer and his family were cultivating their own land and were mainly dependent on it for subsistence lead them to provide additional care and effort which was difficult to quantify by conventional methods. Small farmers also used hired labour but the additional usage of family labour allowed supervision and management which was instrumental towards their higher productivity of Basmati.

In chapter 6 data collected through field survey was used extensively for detailed analysis of cost of cultivation of Basmati, functional analysis of aggregate crop and Basmati crop production and productivity as well as net returns from Basmati cultivation in Punjab and Haryana.

Initially an exercise on functional analysis of aggregate crop production and productivity was undertaken. Among these two functions, only the production function was estimated using the Cobb-Douglas methodology wherein all variables were taken in logarithms. In both these functions the independent variable taken was aggregate output of all crops i.e., the Gross Value of Output and the dependent variables taken were Farm size or Net cultivated area (Ac), Human labour costs, Machine labour and Depreciation charges, Seed costs, Fertilizer, Growth Regulator & Insecticides costs, and Irrigation costs. In the production function all variables were taken in absolute terms i.e., in Rupees and in the productivity function they were taken in relative terms i.e., in Rs/Ac. The value of each variable was calculated using the actual price paid by the farmer at the time of farm operation.

The results of the aggregate crop production function showed that in Punjab net cultivated area, cost of machine labour & depreciation, cost of fertilizer, growth regulator & insecticides and cost of irrigation had a positive and significant effect at 1 per cent level on gross value of output. Human labour cost showed a positive and

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significant effect at 10 per cent level while seed cost did not show a significant impact on the gross value of output. In Haryana, it was seen that net cultivated area, cost of machine labour & depreciation, seed cost, cost of fertilizer, growth regulator & insecticides and irrigation costs showed positive and significant effect at 1 per cent level on the growth of gross value of output while cost of human labour did not show a significant impact. Further, in both states the deviation from unity of the sum of regression coefficients was not statistically significant, thereby indicating constant returns to scale.

In the event of high multicollinearity among the regressors in absolute terms a productivity function was also carried out. In this productivity function the dependent variable was per acre aggregate crop productivity in value terms and one of the independent variable included was a composite biochemical input. This particular input comprised combined per acre input costs of seed, fertilizers, growth regulators, insecticides & pesticides and irrigation. This composite variable was taken to avoid the problem of multicollinearity among these particular inputs. Further, by combining these inputs there could be more variations in cost. The results revealed that in Punjab the gross value of output per acre of aggregate crops was affected significantly at 1 per cent level of significance by net cultivated area, per acre machinery & depreciation charges and per acre biochemical inputs costs. However, per acre human labour costs did not show a statistically significant relation with crop productivity. In Haryana the gross value of output per acre of aggregate crops was affected significantly at 1 per cent level of significance by net cultivated area, per acre machinery & depreciation charges and per acre biochemical inputs costs. Per acre human labour costs showed a statistically significant relationship at 10 per cent level.

In the productivity function net cultivated area or farm size showed a positive and statistically significant relationship with total crop productivity in both states. Cost of human labour showed a statistically non-significant relationship while machine labour and depreciation costs showed a statistically significant relationship with aggregate crop production and productivity. This fact indicated the predominance of mechanized agricultural operations over human labour inputs. Only in Punjab seed costs did not show a statistically significant relationship with aggregate crop production because firstly seed costs were higher for the Basmati crop grown in Haryana than Punjab because Haryana farmers also cultivated modern varieties of Basmati which were costlier compared to the traditional variety grown in Punjab.

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Moreover, overall seed costs in Haryana were also high because of high seed costs of other crops like Onion which were cultivated in Haryana and not in Punjab.

The cost of cultivation analysis showed that in both states the per acre total C2 and H costs of Basmati was greater than Non-Basmati. In Punjab the per acre total C2 costs of Basmati was greater than Non-Basmati by 6.26 per cent and H costs of Basmati was higher than Non-Basmati by 14.64 per cent. In Haryana the per acre total C2 costs of Basmati was greater than Non-Basmati by 3.26 per cent and H costs of Basmati was higher than Non-Basmati by 5.73 per cent.

The per acre costs which were higher for Basmati over Non-Basmati were human labour costs because Basmati was a labour oriented crop, insecticide costs due to high incidence of crop diseases especially in Punjab and cost of growth regulators especially in Haryana. The, per acre C2 and H costs for Basmati were 2.17 per cent and 2.68 per cent higher respectively in Haryana than Punjab. The particular per acre costs that were higher in Haryana over Punjab were machinery costs because some farmers in Haryana had reported high costs of repair and maintenance of machinery, seed costs because Haryana farmers cultivated traditional and modern Basmati varieties whose seed costs were higher than the only traditional variety cultivated in Punjab. Per acre cost of irrigation, growth regulators and land rent were also higher in Haryana than Punjab. Human labour costs were higher in Punjab over Haryana because Punjab farmers reported use of attached labour which Haryana farmers did not.

The study observed that the per acre cost of cultivation of all Basmati varieties based on C2 and H costs in both states with an exception of Mucchal variety in Haryana reduced across farm sizes. In case of Basmati it had been found that small farmers were devoting a larger proportion of acreage towards Basmati because of the additional revenue it generated that they needed for their subsistence. To make the best usage of this gamble they probably applied more inputs to get the highest possible productivity. Secondly, per acre cost of cultivation of Basmati also declined due to diseconomies of scale suffered by small farmers. An exception was Mucchal where per acre cost of cultivation showed an increase across farm size categories. The reason for such an anomalous behaviour of Mucchal was explained by its geographic pattern wherein a very small proportion of large farmers (33.33 per cent) cultivated Mucchal in the Karnal area whereas Mucchal was a stronghold mainly in the Panipat region. This variety might not have suited the micro-climate of Karnal whose large

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farmers reported higher usage of plant nutrients and plant protection chemicals and thereby higher cost of these. Thus, large farmer costs for Mucchal had become higher than the other farm categories.

The regression analysis showed that per acre C2 costs of B-386 in both Punjab and Haryana and HBC-19 of Haryana declined across farm size categories and this decline was statistically significant at 1 per cent level. Per acre C2 costs of CSR-30 did not show a statistically significant decline and that of Mucchal did not show a statistically significant increase. The per acre C2 costs of all Basmati varieties taken together in Haryana declined across farm size categories and the decline was statistically significant at 1 per cent level.

Production and productivity functions were also estimated for Basmati. Among these two functions only the production function for Basmati was estimated using Cobb-Douglas methodology. In both functions the independent variable taken was Gross Value of Basmati Output and the dependent variables taken were Basmati area (Ac), Human labour use in Basmati cultivation, Machine labour and Depreciation charges for Basmati, Basmati Seed costs, Fertilizer, Growth Regulator & Insecticides costs for Basmati and Basmati Irrigation costs. In the production function all variables were taken in absolute terms i.e., in Rupees and in the productivity function they were taken in relative terms i.e., in Rs/.Ac. Further, in the productivity function Basmati area as an independent variable was replaced by Net Cultivated Area (Ac).

The results of the production function of Basmati showed that the gross value of output of Basmati in Punjab was affected positively and significantly at 1 per cent level only by Basmati area and irrigation costs. Human labour, machine labour & depreciation and seeds costs showed a positive though statistically non-significant relationship, whereas fertilizers and plant protection chemicals showed a negative though statistically non-significant relationship. Similarly in Haryana, the results showed that the gross value of output of Basmati was affected positively and significantly at 1 per cent level only by the area under Basmati, machine labour & depreciation costs and seed costs. Fertilizers and plant protection chemicals and irrigation charges showed a positive though statistically non-significant relationship, whereas human labour showed a negative though statistically non-significant relationship. The sum of regression coefficients for Basmati of Punjab and Haryana showed constant returns to scale as their sum of regression coefficients were not significantly different from unity.
In the event of high multicollinearity among the regressors in absolute terms in the Basmati production function, a productivity function was also undertaken. The results of the productivity function of Basmati showed that in Punjab the gross value of output per acre of Basmati was affected positively and significantly at 1 per cent level of significance only by per acre irrigation costs. The net cultivated area, per acre costs of human labour, machine labour & depreciation and seed showed a positive though statistically non-significant relation. However, per acre cost of fertilizer, growth regulator & insecticides showed a negative though statistically non-significant relation. In Haryana the gross value of output per acre of Basmati was affected positively and significantly at 1 per cent level of significance by per acre machine labour & depreciation costs and per acre seed costs. Per acre human labour costs showed a negative though non-significant relationship. The net cultivated area, per acre costs of plant nutrients and irrigation showed a positive though statistically non-significant relation.

The net cultivated area showed a positive though statistically non-significant relationship with Basmati productivity. In fact correlation matrices showed a negative relationship between farm size and Basmati productivity in both states and confirmed the initial observation that Basmati productivity declined with farm size (albeit not significantly) mainly because Basmati was a labour oriented crop and management by family labour (a surplus in small farms) was better. But then the variable of human labour did not show a significant relationship with Basmati production and productivity firstly because per acre casual labour charges were nearly the same across farm categories due to standardised set of practices among farmers. Only family labour especially of small farmers, who had surplus family labour at their disposal, had the potential to significantly affect Basmati production and productivity. But in this study the cost of family labour was computed based on imputed values of prevalent casual wage rates. However the extra effort and quality that family labour brought in was difficult to measure quantitatively. Thus, the cumulative affect of casual labour, family labour and attached labour to affect Basmati production and productivity significantly did not occur. The qualitative aspect of family labour especially the supervision, managerial aspects and personal involvement on day to day operations was one of the key reasons for higher productivity of small farmers.

Machine labour and depreciation costs showed statistically significant relationship with Basmati production and productivity especially in Haryana despite
the fact that Basmati was a labour intensive crop. Even though the Basmati crop did not require much mechanisation mainly in terms of the use of combined harvester for harvesting purposes, machinery usage like tractors for land tilling, spray pumps, farm implements, tubewell and pumpset usage etc far outweighed the use of human labour in the cultivation of any crop let alone Basmati. Due to this reason the diseconomies of scale in terms of indivisibility of machinery showed a positive relation with Basmati productivity.

In Punjab seed costs did not show a statistically significant relation with Basmati production or productivity because most farmers use farm saved seeds which had a tendency to lose vigour over time. Whereas in Haryana, most farmers purchased seeds (especially of modern varieties) which were chemically treated and hence were of better quality which in turn affected Basmati production and productivity significantly.

Fertilizers, growth regulators and insecticides did not show a statistically significant relationship with Basmati production or productivity because there was a high imbalance in the use of such plant nutrient and plant protection chemicals in both states which did not seem to have a favourable effect on Basmati production and productivity.

Irrigation costs showed a statistically significant relation with Basmati production and productivity in Punjab whereas it was not significant in Haryana. Cost of power was reported lower in Punjab compared to Haryana, therefore increase in per acre irrigation cost tended to affect Basmati productivity more significantly in Punjab compared to Haryana.

It was pointed out that aggregate gross output production and productivity functions was more useful than single crop (Basmati) production and productivity functions as total crop production functions were observed to be much more neatly estimated and free from estimation distortions/abnormalities that at times accompanied the individual crop functions.

Per acre net returns or profits based on both C2 and H Costs in Haryana were highest for CSR-30 and HBC-19 followed by Sugandha, Mucchal and B-386. The per acre net returns of B-386 cultivated in Haryana based on C2 costs (Rs.3524.25/Ac) was around 9.36 per cent lesser than Punjab (Rs.3888.23/Ac) but the overall Basmati profits per acre of Haryana (Rs.5358.41/Ac) were higher than Punjab by 37.81 per cent mainly because Basmati varieties cultivated in Haryana showed higher gross

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output per acre than Punjab. Based on C2 and H costs, the structure of per acre net returns for small and medium farmers was found to be similar, which meant that both small and medium farmers made optimal use of resources, thereby making their profitability greater. This was true for all Basmati varieties cultivated in Punjab and Haryana but with an exception of Mucchal whose large farm per acre net returns based on both C2 and H costs were higher than the other categories.

Further, from it was observed that Karnal district had the highest average area per household under Basmati cultivation (7.16 acres) and also the highest per acre net returns (Rs. 6330.21/.Ac) compared to other sample regions. Moreover this was the only region, which cultivated all varieties of Basmati. Thus, Karnal emerged as an important region for Basmati cultivation. This region located in the Taraori block had a distinct microclimate suitable for Basmati cultivation and was historically commensurate with Basmati cultivation.

Chapter 7 discussed the system and trend of paddy marketing in Punjab and Haryana, analysed marketed surplus and price spread of Basmati paddy and lastly reviewed the system of contract farming in India.

The channels of marketing showed that all farmers irrespective of their farm size categories sold their produce in mandis through commission agents called ‘arhatiyas’ who helped to facilitate the bidding through ‘open auction method’ and eventual selling of the produce to millers/exporters. In the study region it was observed that all farmers irrespective of their farm size sold their produce in mandis through arhatiyas. Thereby, another hypothesis of this study that farmers’ profitability was inversely proportional to the length of the marketing channel, though very true, did not apply in this study.

Market arrivals of Basmati paddy in the selected grain markets in Punjab were less during the early nineties compared to recent years because earlier rice millers of Punjab were buying directly from the farmers so as to evade official market taxes and cesses. But presently due to strict enforcement of rules by the state government and mandi boards, millers had started to buy from the mandis through arhatiyas and so markets arrivals in Punjab had started to increase in recent years. In the present survey there was no instance of millers purchasing paddy directly from the farmers. Market arrivals of Basmati paddy in both states were less in certain years which also indicated the probability of lesser yields due crop damage at a later stage as the Basmati crop was highly susceptible to diseases and pests.

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In this study only the marketed surplus of paddy i.e., the quantity of paddy actually marketed had been taken into consideration. The marketed surplus as a percentage of total output was above 90 per cent for both Basmati and Non-Basmati paddy varieties which suggested that rice was not a staple crop of the people in these regions and was meant mainly for the market. The marketed surplus as a percentage of output of Basmati was directly related to farm size though the relationship was not statistically significant.

Farmers generally sold off their produce during the winter harvesting season when they received the highest prices due to better competition. During this time the wholesale prices of Basmati rice in Delhi was low compared to other seasons as supply during this time was generally higher. Thus, during the winter season the price spread between the farmer’s price and the wholesale (consumers’) price was the least and the share of the producer farmer in the wholesale price was the highest when compared to other seasons. Lastly this chapter also discussed the concept of contract farming including a review of PepsiCo Company’s contract farming of Basmati in Punjab.

In chapter 8 comparative studies of the spatial and temporal features of Basmati rice trade of India vis-à-vis Pakistan was undertaken. This chapter was organised into four sections namely Basmati rice trade of India, Basmati rice trade of Pakistan, comparison of Basmati rice trade of India and Pakistan and problems faced by Basmati in India.

Traditionally India was a producer of both Basmati and Non-Basmati rice but earlier Non-Basmati rice exports from India were insignificant because there was less production surplus for exports plus there were many restrictions on its exports. However, in recent years Non-Basmati exports had started dominating the rice trade as a result of removal of export restrictions as well as a greater surplus.

Basmati rice was mostly meant to be exported and hence there was no restriction on its export. Its contribution in India's agricultural exports had more all less remained constant since the last two decades and had varied between ranges of 6 per cent to 10 per cent. Basmati exports had grown at a trend growth rate of 5.33 per cent from 1980-81 to 2005-06. However, the quantum of its exports was much less than Non-Basmati because Basmati was cultivated in a small pocket of the country whereas other common varieties were grown nearly everywhere so the production of Basmati was lesser than Non-Basmati. Secondly, most countries in the world might
not have been aware of the differences between both varieties of rice. Since Non-
Basmati was cheaper than Basmati, they mostly purchased Non-Basmati rice. Thirdly, some Middle-East countries like UAE and Kuwait, who were major consumers of Basmati, might have had a preference to trade with a fraternal Islamic country i.e., Pakistan.

When export prices of rice were compared it was seen that Basmati rice was a high foreign exchange earner compared to Non-Basmati rice. Its export prices were about 3 times higher than those of Non-Basmati. The overall trend growth rate of Basmati export prices from 1980-81 to 2005-06 was 0.18 per cent. The export price trends showed fluctuations and the coefficient of variation used to show price fluctuations was 12.98 per cent between 1980-81 and 2005-06. Price fluctuations in Basmati were a result of production fluctuations at home and demand fluctuations in an importing country. Secondly, fluctuations in rice exports in certain years were also because of hoarding by importing countries when prices are low. Lastly, competition from Pakistan also caused such price fluctuations.

Uptil 2005-06 Basmati was being exported to 148 countries. Over the years, India’s Basmati rice exports were concentrated in Saudi Arabia, Kuwait, UAE, UK and USA and the share of the Middle-East countries especially Saudi Arabia were the highest. Incidentally all these countries had high Indian population and they formed the basic demand factor for Basmati.

The global competitiveness of Basmati was measured by two methods the Domestic Resource Cost (DRCR) and the Nominal Protection Coefficient (NPC). The DRCR measured the global competitiveness from the perspective of the Indian Basmati paddy farmer while the NPC measured the global competitiveness from the perspective of the trader. NPC was a traditional measure of calculating global competitiveness of commodities. The DRC figures for Basmati were estimated to be 0.372 in Punjab and 0.321 in Haryana. This meant that for earning one unit of foreign exchange from Basmati cultivation 0.372 and 0.321 units of domestic resources were required in Punjab and Haryana respectively. This indicated that the Basmati was competitive from the perspective of the competitiveness of Indian Basmati paddy farmer. The DRCR coefficients for Basmati were lesser than Non-Basmati indicating that Basmati was more internationally competitive than Non-Basmati in both Punjab and Haryana. Further, the Basmati from Haryana farms was more internationally competitive than Punjab. When the DRCR coefficients were compared with those

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calculated by Samar.K.Datta (2000), it was seen that the DRCR coefficients for Basmati rice had declined since 1998. This meant that over the years the competitiveness of the Indian Basmati paddy had increased. The global competitiveness of Basmati rice measured by NPC showed that though it was internationally competitive, its competitiveness was on the decline in recent years more so in Punjab than Haryana.

Based on the analysis of export competitiveness of Basmati rice it was seen that Indian Basmati rice was slightly less competitive in terms of the NPC when compared to the DRCR. This meant that if one looked at the Basmati paddy system as a whole, India's export competitiveness had been more than what the traditional measures suggested. This meant that India could promote her Basmati exports without violating supply constraints at home and also without killing the domestic market; this assuming that India remained the world leader in Basmati prices and shall always remain competitive.

Pakistan was the only competitor of India for Basmati rice. Pakistan had several production constraints for Basmati. India mainly produced traditional Basmati varieties while Pakistan mainly grew hybrid (Super Basmati) varieties. Traditional varieties were costlier than hybrid varieties. Apart from this, its Basmati production was lower than India because in Pakistan the Basmati cultivation belt was much smaller than India. Moreover Basmati supplies in Pakistan were being affected by low yields due to irrigation and old seed problems. Despite, these production constraints, Basmati rice exports grew at nearly the same trend growth rate as that of India i.e., 5.36 per cent from 1980-81 to 2005-06. Basmati export prices showed a negative trend growth rate of -1.68 per cent from 1980-81 to 2005-06. The export price trend growth rate showed a decline probably due to higher exports of hybrid varieties than traditional ones in recent years.

The export prices of Basmati rice of Pakistan were higher than India till 1989-90. After that Pakistan's export prices plummeted and since then had been lower than India. This sudden decline in Pakistan's price was because private traders under the Rice Exporters Association of Pakistan (REAP) had started to handle rice exports which boosted Pakistan's rice exports especially that of Basmati. The surge in Basmati exports between 1989-90 and 1990-91 had resulted in lowering the Basmati export price from Pakistan significantly. This sudden decline in Basmati export prices

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of Pakistan was reflected in a high coefficient of variation of 21.08 per cent between 1980-81 and 2005-06.

Since the last decade, Basmati rice prices of Pakistan remained lower than India because not only were the hybrid varieties that Pakistan mostly cultivated cheaper than the traditional Indian Basmati varieties, freight charges and taxes were also less in Pakistan compared to India.

As regards overseas markets for Basmati rice for Pakistan the major buyers were African nations, Afghanistan, Bangladesh, Indonesia, Middle-East and EU.

The market shares of Basmati rice in value terms showed that though after 1995-96 India’s share was consistently higher, Pakistan’s share of Basmati in the world market started to increase since the year 2000-01 and the differences seemed to be narrowing over the recent years.

The Balassa’s Export Performance Ratios (EPRs) for Basmati were much higher than unity thereby showing high comparative advantage of Basmati vis-à-vis Non-Basmati rice. The contribution of Basmati rice exports in the total merchandise exports of India was substantially higher than the contribution of world Basmati rice exports to the total world merchandise exports. Pakistan had higher EPRs or in other words a greater comparative advantage than India because Basmati rice constituted significantly larger portion of total merchandise exports of Pakistan compared to India. The comparative advantage of India’s Basmati had shown a gradual decline in the past couple of years while that of Pakistan had shown a slight increase. This was because in India the contribution of Basmati rice in the total merchandise trade had reduced while in Pakistan it was increasing.

It was observed that in spite of the fact that the Basmati grown in Pakistan was 20-25 per cent cheaper than India and its market share and comparative advantage in Pakistan was on the rise, there appeared to be very stiff competition for Basmati exports between both countries. This may have been because India’s traditional Basmati varieties, which though costly, might have greater international demand, compared to the hybrid varieties that Pakistan grew. However, the important point to be noted here was that despite several supply constraints Basmati exports from Pakistan were at par with India, its market share and comparative advantage was on the increase which showed that Pakistan had fared quite well in the Basmati exports sector.
Basmati rice being a premium product could be less sensitive to small price increases and hence it was initially hypothesized that the demand level of Basmati rice from existing markets would continue to hold. Basmati rice had a price elastic demand in both countries, which meant that the demand for Basmati rice was responsive to price changes but the price elasticity of demand was statistically significant at 5 per cent level in India and at 1 per cent level in Pakistan. In case of India it had been stated that even when Basmati grown in Pakistan was cheaper than India, there was stiff competition for Basmati exports between both countries because traditional Basmati varieties or pure line cultivars that India mostly cultivated could have greater international demand compared to the hybrid varieties that Pakistan mostly cultivated. Further, it had been seen in the case of India that the Middle-East countries, UK and USA were the major importers of India’s Basmati despite price fluctuations. Therefore, in India the demand for Basmati was not completely dependent upon price. It could have also been dependent on other factors such as hoarding, preference of the Middle-Eastern countries to trade with Pakistan because Pakistan had socio-cultural affinity with these countries, adulteration problems, and change in tastes for other aromatic varieties of rice.

To improve the export performance of Basmati further, certain inherent problems had been identified in this chapter. These problems were very high prices of India’s Basmati compared to Pakistan, decline in its competitiveness measured through NPC as well as a lesser comparative advantage than Pakistan and lastly the act of geographical indications not being extended (as was presently available for wines and spirits) to all varieties of Basmati rice that were cultivated in India. Therefore, to improve its export performance further immediate steps had to be taken to find and implement solutions to its inherent problems.

Chapter 9 discussed the subject matter of the WTO with special reference to the clauses under the Agreement on Agriculture (AoA). It also provided a brief review of the proceedings covered in the WTO summit meetings. Apart from these reviews an impact assessment of WTO on Basmati rice was attempted.

WTO is an international forum for continued negotiations to liberalize the trade in goods and services among nations. By removing trade barriers and developing new rules in trade related subjects WTO hoped to bring about uniformity and parity in international commerce. But new rules seemed to be going against
existing and established practices and were in fact posing a threat. The clauses under the AoA were Market Access, Domestic Support and Export Subsidies.

The negative aspect of all the WTO ministerial conferences held so far was that the implementation issues were meagre. Further, no consensus was reached between the developed and developing countries on the issue of elimination or reduction of domestic subsidies in agriculture. It was doubtful whether future negotiations would result even in a substantial reduction not to mention elimination of agricultural subsidies.

In the case of Basmati it was thought that with implementation of WTO rules its prices should have increased in response to subsidy reductions. But unlike what was thought earlier, Basmati prices in India actually decelerated after the WTO, but in Pakistan, they showed an increase. The deceleration in export prices of India’s Basmati was mainly due to competition from Pakistan and the acceleration in export prices of Pakistan in the Post-WTO period was not in response to subsidy reductions but due to shortages in supplies as crop yields were said to have declined due to old seeds and irrigation problems. Further, appreciation in the local currency against most currencies had been making Pakistani hybrid exports uncompetitive against Indian exports. Further, Basmati rice prices of India had remained higher than Non-Basmati and Pakistan both before and after the establishment of WTO in 1995.

In India, the coefficient of variation of Basmati rice prices indicating price fluctuations did not vary much in the Pre-WTO (1980-1994) and Post-WTO (1995-2005) period. In Pakistan, the coefficient of variation of prices varied a lot in the Pre and Post WTO periods. It was seen that the export prices of Basmati Rice of Pakistan was higher than those of India till 1989-90. After that India’s export prices became higher. Pakistan’s price had plummeted during 1989-90 to 1990-91 from 685 US$/Tonne to 468.3 US$/Tonne because private traders under REAP were allowed to handle rice exports which resulted in a huge surge in exports which in turn reduced prices drastically. This sudden decline in the export price of Basmati was reflected in the high coefficient of variation of 21.08 per cent in the Pre-WTO period. In the Post-WTO period the coefficient of variation of Basmati prices in Pakistan showed substantial reduction.

However ever since 1990-91 Pakistan’s prices had been lower than India. The reason for this was that Pakistan was mainly exporting more hybrid varieties that were
cheaper as compared to India which might have been exporting more traditional varieties that were costlier. Other possible reasons could be that, freight charges were also less in Pakistan compared to India, which might have also resulted in low prices. Lastly, Pakistani exporters had to pay much less taxes compared to their Indian counterparts.

Further, Basmati exports from India grew at a higher rate (9.57 per cent) than Pakistan (4.60 per cent) in the Post-WTO period probably because Pakistan was mainly cultivating and exporting hybrid Basmati varieties as compared to India which was mainly cultivating and exporting traditional Basmati varieties that might be having greater international demand than Pakistan’s hybrids. Therefore, it could be said that since Basmati was cultivated only in India and Pakistan, its exports and prices were determined only by competition between both the countries rather than WTO rules.

However, for India, the most disconcerting fact was that the trend growth rate of Basmati exports in the Post-WTO phase had reduced for major importing countries like Saudi Arabia, UK and USA. It was learnt from APEDA that the drop in Saudi imports of Indian Basmati rice was because of hoarding, besides this decline could also be attributed to the strategy adopted by our sole competitor, Pakistan. UK’s growth rate declined probably due to problems of Basmati adulteration. USA showed a negative growth rate because among all the years its imports of Indian Basmati rice were exceptionally high in the TE 1995-1997 after which its imports became low, as they had started to grow their own non-aromatic long grain varieties.

On the issue of the ‘Market Access’ clause, it was decided in the AoA that to pave the way for exports member countries had to withdraw all quantitative restrictions (QRs) on their imports on a time bound basis. For Indian Basmati a zero tariff duty had been effective both before and after the WTO in all importing countries. With a zero tariff duty throughout if the number of countries to which Basmati got exported increased from 95 in the Pre-WTO to 148 in the Post-WTO period it meant that the market access clause did not seem to affect the spatial expansion of Basmati exports. Basmati rice being a premium product was proliferating into newer markets as a result of better promotional activities as also consumer preference.
In case of the ‘Domestic Support’ clause, it had been envisaged in the WTO that the Aggregate Measure of Support (AMS) for developing countries like India should not exceed 10 per cent of the total value of agricultural production. According to several studies India’s AMS in 1995 was (-) 18 per cent. In 2000 the AMS was (-) 2.62 per cent. These figures were negative and so the question of our reducing subsidies did not arise for any crop let alone Basmati. There was more a case of net taxation of Indian agriculture than subsidization. Thus, the subsidies or domestic support clause of the WTO did not seem to be affecting Basmati prices at all.

The agreement on export competition spoke of export subsidy reduction. In terms of this clause it was stated that so far no export subsidy had been ever given for the exports of Basmati rice. On the matter of Trade Related Intellectual property Rights (TRIPs) the issue of Basmati Patents had caused a lot of controversy in recent years. However, as mentioned before, due to timely legislation by India on the grounds of the Act of Geographical Indications, this threat was done away with and this issue never affected Indian Basmati exports.

Thus, it can be deduced that the WTO had no impact on Indian Basmati exports. In fact during the field survey majority of the farmers’ perception regarding the patent issue was scant. The initial hypothesis that Basmati was a premium product and hence its existing markets would continue to hold had not only been proven right, but also despite some inherent problems Basmati exports had increased temporally and spatially irrespective of the WTO.

To improve the export performance of Basmati further, certain inherent problems and their probable solutions have been identified from this study.

1. One of the findings of this study showed that Basmati productivity in physical and value terms had shown a decline across farm size categories though it was not statistically significant. Small farmers with limited farming resources at their disposal, operating close to subsistence level and only surplus family labour as their asset were devoting proportionately higher acreage and also reaping greater benefits from Basmati cultivation. Since Basmati is a high value crop, the government needs to encourage its cultivation amongst all farmers irrespective of farm size. The use of family labour or hired labour or lower mechanization or even non grant of MSP to Basmati should not determine the acreage or productivity of Basmati. Only the positive aspects of Basmati cultivation that is the high value status of the crop that earns higher

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returns and also requires lesser irrigation compared to Non-Basmati needs to be publicized amongst the farming community as a whole in Punjab and Haryana.

2. Despite development of new varieties, the lack of awareness and knowledge of these amongst farmers, long run microclimate inadaptability of new varieties and less national and international demand compared to Non-Basmati were acting as deterrents to area allocation towards Basmati. The present study has shown that new varieties of Basmati that are coming up are improving prospects of Basmati area expansion along with better yields and returns. But over time only the low yielding traditional varieties can survive better as modern and hybrid varieties tend to lose vigour. Thus, the government needs to give importance and propagate more area under traditional Basmati varieties as modern and hybrid ones do not sustain for long. Further, to increase area allocation as well as production of this crop better farming practices along with aggressive advertising and propaganda to generate demand is needed.

3. The government of Punjab has taken up a step towards encouraging more acreage under Basmati by launching ‘contract farming’ for the crop. In this type of farming agri-business firms are entering into contract with farmers. They are providing material inputs and extension services to farmers and buying back the products at a rate specified in advance. Contract farming if practiced on a large scale has the potential to revolutionize marketing of crops like Basmati and thereby help farmers to realise better and stable prices.

4. India's Basmati prices were much higher than those of Pakistan. Even though India's Basmati rice was superior to Pakistan (India grew both traditional and hybrid varieties of Basmati while Pakistan grew only hybrid ones) but only due to very high prices, buyers were not always ready to pay the big difference in price. Therefore, there has to be better marketing of traditional Indian Basmati varieties that command higher price.

5. There has been a deceleration of Basmati exports to some major importing countries, decline in its trade competitiveness as measured by NPC and also lesser comparative advantage compared to Pakistan. This could be arrested by aggressive market promotion and public relations activities.
6. There is lack of systematic record of data on Basmati. It was very important to have efficient official data sources as they could help in planning.

7. There was mixture of grain qualities at the mandi level i.e., Basmati adulteration issues had assumed a lot of importance. To tackle this problem stringent quality control norm had to be enforced by Indian agencies like the APEDA at the mandis as well as export houses as mixing generally took place here. Proper monitoring at these places would help farmers realise true price for their produce as well as prevent traders from making super normal profits. If Basmati exports were to be promoted on a sustainable basis the government could join hands with industry associations to promote selected mandis for handling export quality Basmati with suitable quality checking facilities as per international standards.

8. A Quality Control System in India should set up an independent and stringent quality control coupled with standardization of products. If Indian Basmati exports were to be increased, then any occurrence of contamination due to incidence of pest or diseases have to be treated or removed at the milling stage, given the sanitary and phytosanitary clauses under the GATT accord.

9. There has been stiff competition and near stagnation of Indian Basmati in the traditional Middle-East market. To widen the Basmati export market, untapped potential markets should be explored and for this emphasis on good quality products along with better public relations exercise is required.

10. Finally the Basmati patent problem was a warning signal. India could be a major beneficiary if the act on geographical indications was extended (as was presently available for wines and spirits) to all varieties of Basmati rice that are cultivated in India.

Thus, it can be concluded that despite facing stringent competition and infringement on its reputation, India's Basmati has stood its ground firmly and proven its mettle and status of being a major producer and exporter of high quality Basmati rice. However in spite of this, Pakistan with its several supply constraints has been giving a stiff competition to India's Basmati. Therefore, to improve its export performance further immediate steps have to be taken to find and implement solutions to its inherent problems. Further, India ought to achieve total quality management of rice starting from paddy cultivation to procurement and storage to processing and ultimately packaging and exports. India must strive to gain more competitive strength.
in Basmati by cross-comparing her strength and weaknesses with an established rice exporter like Thailand and change the underlying policy parameters appropriately. For sustaining exports it is important to develop a long-term view of the matter. Thus, immediate steps have to be taken to develop policy initiatives so as to strengthen the reputation, production and trade of Basmati rice. Basmati rice is important not only for economic reasons, as it is a high foreign exchange earner, but also for ecological reasons as it is a water retentive crop allowing for ground water restoration. Thus, this crop needs to be given a lot more attention and preference.

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