

Basmati



1. Introduction

The Green Revolution Technologies involving greater use of synthetic agro-chemicals such as fertilizers and pesticides with adoption of nutrient responsive, high yielding varieties of crops boosted the productivity in most of the crops. However, the increase in productivity slowed down and in some cases the productivity declined. Environmental and health problems cropped up in many areas due to the chemical intensive agriculture.

2. International Scenario

In the international market rice is traded under two main categories such as Fragrant and Non Fragrant. In case of fragrant rice, India dominates the trade with its Basmati Rice followed by Pakistan. Basmati rice is the leading aromatic fine quality rice of the world trade and it fetches good export price in the international markets.

Basmati exports from India peak during March-April period and the November-December period. Gulf region is the major market for Indian basmati rice and inside Gulf, Saudi Arabia accounts for the major chunk of basmati imports from India. European Union is the next important market for Indian basmati. The EU buys roughly around 1-1.5 lakh tons of basmati rice on an average.

3. National Scenario

India is the largest producer and exporter of basmati rice in the world. The annual production in the country hovers at around 10-15 lakh tons a year, of which around two-thirds is exported. The remaining is consumed, within the country

During 2006-07, the country officially exported 10.41 lakh tonnes of basmati rice, valued at Rs 2,778.31 crore, with the corresponding figures for non-basmati being 37.05 lakh tonnes and Rs 4,257.88 crore. The basmati rice cultivating districts of India is given in Table 1.

Table 1. Rice Cultivating Districts of India

State	Districts
Haryana and Punjab	Karnal, Panipat, Kurukshetra, Kaithal, Amritsar, Fatehgarh, Gurdaspur, Basmati Hoshiarpur, Jalandhar, Patiala, Sangrur, Roopnagar
Himachal Pradesh	Kangra, Solan, Una, Mandi, Sirmour
Rajasthan	Bundi
Uttar Pradesh	Saharanpur, Muzaffarnagar, Pilibhit, Bareilly, Bijnor, Moradabad, Jyotibaphule Nagar, Rampur, Sitapur & Rae Bareli
Uttarakhand	Udham Singh Nagar, Haridwar and Dehradun

4. Organic Farming

Organic production systems are based on specific standards precisely formulated for food production and aim at achieving agro-eco system which are socially acceptable and ecologically sustainable. Organic farming uses ecological principles as the basis of crop management and animal husbandry.

Codex Alimentaris Commission - a joint body of FAO / WHO defines Organic Agriculture as Holistic Food Production Management System which promotes and enhances health of agro-eco systems including bio-diversity and soil biological activity and emphasizes on use of management practices in preference to use of off-farm synthetic inputs. Organic agriculture is knowledge based rather than input based and aims at optimization rather than maximization.

5. Organic Production of Basmati Rice

Rice (*Oryza sativa*), one of the three most important food crops in the world, forms the staple diet of 2.7 billion people. It occupies 150 million ha, producing 573 million tonnes of paddy with average productivity of 3.83 t / ha. In India rice accounts for 40% of Food Grain Production. Basmati rice is known as king of rice and is priced for its characteristic long-grain, subtle aroma and delicious taste. It is one of the major agricultural commodities the country exports every year to earn foreign exchange. Punjab, Haryana and Western Uttar Pradesh are traditional basmati rice growing areas. However, owing to photo-insensitivity of semi dwarf basmati varieties like Pusa Basmati I, the latter can be grown in any parts of India. The package of practices being followed for cultivation of basmati rice is covered in the following paragraphs.

5.1 Climate

Optimum climatic requirements for rice for its normal growth include 20 - 35oC temperature throughout the crop duration, clear sky during day, low night temperatures for reduced maintenance respiration and equitable distribution of rainfall.

5.2 Soil

Rice is grown in all types of soils. However, soils capable of holding water for longer periods such as heavy neutral soils (clay, clay loam and loamy) are most suited for its cultivation. It is grown normally in soils with soil reaction (pH) ranging from 5.0 to 8.0. Saline or alkaline soils adversely affects its growth and productivity.

5.3 Propagation

Rice is cultivated by growing nursery and transplanting of seedlings.

5.4 Varieties

Basmati 370 and Taraori Basmati are the widely cultivated varieties of export quality for decades. Breeding efforts have resulted in development of the world's first high yielding, semi dwarf Basmati variety - Pusa Basmati I, combining the quality features of traditional varieties and yield potential of high yielding semi-dwarf varieties.

Farmers in Punjab, Haryana and Uttar Pradesh have taken to Pusa-1121 and CSR-30, both in view of higher yields as well as remunerative prices. Pusa-1121 yields roughly 47 - 50 quintals a hectare, against 50 - 52 quintal for Pusa Basmati-1, 35 - 38 quintals for CSR-30 and 22 -25 quintals for traditional varieties such as HBC-19 (Taraori). In the past couple of years, the trend has been to replace Pusa Basmati-1 with Pusa-1121 and HBC-19 with CSR-30.

The grain from 1121 has better aroma and lower chalkiness than Pusa Basmati-1, while yields are more or less the same. CSR-30 has higher yields and is salinity resistant compared to traditional cultivars, with very similar grain quality. A lot of CSR-30, in fact, gets shipped out as traditional basmati.

5.5 Spacing

Generally, spacing of plants for rice is 30 cm x 25 cm.

5.6 Land Preparation

The main field is dry ploughed 3 weeks before planting and submerged with 5-10 cm standing water. After incorporating 10 tonnes of organic manure or 10-20 tonnes of green manure, the field is properly levelled. Land preparation for rice is one time ploughing and one time puddling. Field should be flooded at least 3 days before transplanting.

5.7 Planting

Three week old seedlings from nursery are transplanted in puddled condition on rectangular grid.

5.8 Manuring

Manuring is done by applying FYM at the rate of 5 t per ha and Vermicompost at the rate of 5 t per ha.

5.9 Irrigation

Proper water management facilitates good tillering and better nitrogen uptake. Uniform levelling of field and proper drainage are most essential for effective water management. It is ideal to maintain 2-5 cm of water throughout the growing season

5.10 Weeding

As the rice crop is grown under submerged condition weed growth is minimal. Hand weeding must be done 2 to 3 times at 20 days interval starting from 20 days after planting.

5.11 Pests and Diseases

Diseases and insect pests take a heavy toll of rice crop. Neck blast disease in Basmati is becoming increasingly severe. Sheath blight causes considerable damage at endemic sites. False smut and sheath rot have emerged as new threats. Brown plant hopper, gall midge, yellow stem borer are some of the common insect pests of the high yielding varieties of rice.

Natural enemies of insect pests on rice are of great value in integrated pest management for sustainable rice production with possibility of replacement of need for pesticide input. By deploying effective bioagents like *Trichogramma japonicum* and *T. chilonis* in pest infested areas, damage caused by stem borer and leaf folder can be reduced substantially. Inundative release of these egg parasites 5 – 9 times @ 10 adults / m² and one release site per 100 m² , at an interval of 7 – 10 days results in 45 – 60 % decrease in pest damage. Installation of 20 pheromone traps / ha each with 5 mg pheromone impregnate, moderately reduces infestation of stem borer. Application of biocontrol agents like *Trichoderma viride* and *T. harzianum* controls blast disease.

5.12 Harvesting

Harvesting is to be undertaken as soon as rice grains mature, notwithstanding stalks remaining green to avoid shattering of grain and development of sun cracks. In early and medium duration varieties 25 to 30 days after flowering and 35 – 40 days after in late varieties are considered proper stage of harvesting. Moisture content of paddy at harvesting should be 20 % and harvested grain is dried under shade to bring down the moisture content to 14 % for storage and milling

5.13 Yield

The yield of the crop reduces in the beginning of conversion period as application of chemical fertilizers is withdrawn. However, as the process of conversion progresses the yield reaches and

stabilize at 90% of the normal yields in 4th year. The year-wise yields assumed for rice are as under :-

Year	Basmati rice (yield in q /ha)
I	26
II	30
III	34
IV	36

6. Linkages

Basmati rice has a ready market. Basmati rice is regularly exported to other countries. APEDA is providing the necessary guidance to the farmers and also extending incentives to encourage organic cultivation and export of rice.

7. Financial Aspect

7.1 Cost of cultivation

The cost of cultivation of 1 ha organic basmati works out to Rs. 40200. The details of cost of cultivation including techno economic parameters and economics are given in **Annexure-I**.

7.2 Margin Money

The percentage of margin/ down payment to cost of development prescribed is 5%, 10%, and 15% for small, medium and large farmers respectively. The rest of the cost of development is provided as bank loan. Margin provided in the present model is 10%.

7.3 Bank Loan

Bank loan of 85 to 95% is available from financial institutions. Bank loan considered for the model is 90%.

7.4 Rate of Interest

The rate of interest to be charged to the ultimate borrower would be guided by RBI guidelines issued from time to time. However, the ultimate lending rate has been considered as 12% per annum for working out the bankability of the model scheme.

7.5 Security

Banks are guided by RBI guidelines issued from time to time in this regard.

8. Conclusion

The year wise net income from organic farming of Basmati rice is furnished below:

Year	Amount in Rs.
I	12650
II	21450
III	30250
IV	34650

The activity is technically feasible, financially viable and bankable.