



सर्वो ह्ये हरियारो ।  
सर्वो ह्ये खुरारो ॥  
Ministry of Environment & Forests  
Government of India



# Report on Identity Preservation of Basmati Rice at Various Stages in the Rice Supply Chain



Pusa Basmati-1121

Pusa Basmati-1509

Submitted By

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## **INTRODUCTION**

Before any research work on rice began in India, Dehradun Basmati was the only name already known in the trade circles. The Rice Research Station at Doiwala, Dehradun established in 1921 maintained a local germplasm collection of 1265 which included Basmati (Anonymous, 1923). Later on a research farm was established at Kala-Shah-Kaku, Dist Lahore, United Punjab (now in Pakistan) in 1926. It was headed by an Economic Botanist. At that time whole of United Punjab and part of United Provinces were under the control of Economic Botanist for rice research. The scientists of the Kala-Shah-Kaku also made a collection of rice varieties from this area. Out of the promising lines Basmati 370 was found to be superior to others. It was released for commercial cultivation in 1933. It is recorded as a pure line selection from Dehradun Basmati (Ramiah and Rao, 1953). Another variety Type-3 was also released from Agricultural Research station, Nagina, United Provinces later on. Both the varieties have very weak stem and very often prone to lodging. But the cooking quality is very good. Both the varieties were very popular with farmers and rice researchers. They were being cultivated by the rich farmers.

The first mention of word Basmati has been recorded in the poem Heer-Ranjha by Varish Shah (1766). Folk lore of Himachal

Pradesh also mentioned Basmati. In the book "Races of Rice in India" (1911) word "Basmati" has been differently spelled (Bansmatti, Bansmutty, Bansmati, Bansmuttee and Basmatee) and described as a Race of Rice cultivated throughout the erstwhile Punjab (comprising Punjab, Haryana and Himachal Pradesh), Delhi, Uttarakhand, parts of UP and Jammu and Kashmir. The word Basmati has been derived from two Sanskrit words "vasay" connoting aroma and "mati" from mayup meaning ingrained from the origin. In general people pronounce 'V' as 'B', that is how it is pronounced as Basmati. According to Ayurveda, Basmati rice is pure and nourishing for the body tissues and is easy to digest. Basmati rice has a harmonious combination of extra long slender grains, exquisite aroma, high volume expansion during cooking through linear cooked kernel elongation, fluffiness, appealing taste, better mouth feel, after feel, and longer shelf-life after cooking.

Up to early seventies Basmati rice export was on a very small scale. It was being traded by a State Trading Corporation of India. With the development of high yielding, high quality rice varieties the export started picking up from early nineties onwards.

**A brief mention of the present day popular varieties is presented here:**

IARI made collections of Basmati rice varieties from Haryana and Dehradun area. Four of the collections had longer grain than Basmati 370. All the four were similar for their agronomic and quality characteristics. It was given the name of 'Karnal Local' as it was collected from Karnal area. Since it was found better in cooking quality it was accepted as quality check in the national Basmati trials. On the request of United Riceland, Karnal local was given to United Riceland. With systematic seed production and commercial cultivation United Riceland came out with a brand 'Tilda' which became very popular in

Basmati importing countries replacing Basmati 370, being grown in India & Pakistan.

Based on this experience IARI developed Pusa Basmati 1 in 1989. In spite of its moderate aroma due to better linear kernel elongation, taste and high yield became popular with farmers, rice exporters and importers as well. With the popularity of Pusa Basmati 1 it became very clear that high volume expansion during cooking along with fluffiness and taste is the need of the market. This resulted in the development of Pusa Basmati 1121 in 2005 and Pusa Basmati 1509 in 2013.

Another variety CSR 30 is also grown by some farmers to meet the needs of some exporter.

Export Data from nineties and latest export (Table 1) are below:

**Table 1 : Rice Export Quantity in Metric Tons**

<b>Year</b>	<b>Basmati (Tons)</b>	<b>Non Basmati (Tons)</b>
1995-96	373314	4540699
1996-97	523126.82	1988847.21
1997-98	592678.26	1796279.55
1998-99	597756.43	4365841.58
1999-00	638379.78	1257747.51
2000-01	851717.7	682746.62
2001-02	666713.64	1541485.14
2002-03	710156.21	4337062.99
2003-04	771475.37	2640438.93
2004-05	1162989.16	3615109.55
2005-06	1166562.79	2921601.91
2006-07	1045714.95	3702191.99
2007-08	1183355.73	5285916.33
2008-09	1556411.06	931879.8
2009-10	2016775	139540.76
2010-11	2370658.39	100685.78
2011-12	3178174.43	3997719.57
2012-13	3459898.93	6687990.85
2013-14	3757271.42	7133183.37
2014-15	3702260.07	8274046.02
2015-16	4045796.25	6366585.53

**Source: Directorate General of Commercial Intelligence & Statistics (DGCIS)**

Basmati rice is a niche product and not a commodity. The educated customer goes by label written on the product. To remain competitive in the international market in the time to come, it sounds necessary that only India and Pakistan should have the authority to use the word Basmati on their Basmati rice. During past two decades other countries have started using the word Basmati on their long grain aromatic rice. For this Government of India is alert and spending lot of time and money in preventing other nations to use the word 'Basmati'. This practice creates confusion in the International market. It therefore justifies the need for identity preservation of Basmati in Domestic as well as International market.

The introduction of new technology such as genetic engineering in agriculture has further raised trade related concerns such as co-existence, identification, labeling etc in addition to environment and health issues, Multi-lateral agreements such as the Cartagena Protocol on Biosafety to which India is a Party also places obligation which

inter-alia among others, includes proper handling, identification and documentation during transboundary movement of living modified organisms. It is in this context, that is how an initiative was taken by the Ministry of Environment, Forests and Climate Change, Government of India undertook a study to understand the mechanism and modalities for Identity Preservation of high value commodities such as Basmati rice with a view to assess whether such mechanisms can be applied to GM commodities in agriculture. . The study was initiated as part of the UNEP-GEF supported Phase II Capacity Building Project on Biosafety.

The ministry approached All India Rice Exporters Association (AIREA) and a survey was undertaken on all aspects of Basmati rice supply chain carried out during kharif-2014. The survey covered 20,000 farmers from the villages in peripheries of prominent grain markets and 200 representatives of the rice millers were interviewed based on a specified Questionnaire. Most of the farmers from

Punjab, Haryana and Western Uttar Pradesh are well aware of rice varieties, their growing period, crop management, maturity period and grain characteristics. But to identify seed, they are depending on the tag on the seed bag. For the usage of pesticides, most of them are depending on the advice of pesticide dealers. The representative of the rice millers who are responsible at the mandi level to purchase the rough rice (Paddy) have a vast

experience to distinguish among the varieties and quality of the produce.

## Executive Summary

In the global rice industry Basmati trade accounts for USD 5.8 Billion (2.1%), of which India accounts for 72%. (4.8 million tons) Basmati and Indian rice is unique in the region. It can be grown where precise climatic conditions, soil fertility, irrigation water and temperature exist. This occurs only in Indo-Gangetic plains. The name 'Basmati' is protected under the Geographical Indications (GI) of Goods (Registration & Protection) Act 1999' of India. The structured survey covering 20,000 farmers revealed that the farmers of Haryana & Western U.P. are more aware about seed treatment before sowing in comparison to the farmers of Punjab and hence facing lesser incidence of seed borne disease like *Bakanae*

The incidence of Bacterial Leaf Blight and Sheath Blight was also observed with lesser number of farmers in Haryana & Western Uttar Pradesh. The farmers of Haryana take early maturing varieties of Basmati & Non-Basmati and start nursery sowing early (2nd & 3rd week of May), whereas in Western Uttar Pradesh, farmers preferred 1st, 2<sup>nd</sup> & 3<sup>rd</sup> week of June for nursery sowing. In Punjab, the farmers prefer to sow the nursery from 1st to 3rd week of June.

For transplanting, the farmers from Punjab and Western Uttar Pradesh opt 3rd week of

June up to 4th week of July. Most of the area was transplanted in 2nd week of July. And in Haryana the farmers go for transplanting from 1st week of June up to 4th week of July. However, maximum area was transplanted 4th week of June.

Up to 75% farmers buy the seeds from private agencies in Haryana & Western U.P. Remaining are supplied from Govt. agencies and 10-15% have their own or get from other farmers. In Punjab, >90% farmers buy the seed from private agencies. Purchase of seed from the Govt. source is nominal. Remaining farmers in general use their own seed.

In case of seed variety identification and crop identification on field, the farmers of Punjab are well aware, and almost all the farmers deeply know the package & practices for growing Basmati varieties. While in Haryana 15-20% farmers are still depending on the tag on seed bag for identifying seed varieties. The knowledge level of package & practices for Basmati is high among the farmers from Haryana.

Punjab, Haryana and Western Uttar Pradesh are high energy agriculture areas and the per hectare fertilizer consumption is very high. All the farmers apply urea and a very high percentage of the farmers apply ZnSO<sub>4</sub> (>95%) and DAP (34%) in Haryana & Western Uttar Pradesh; >52% in Punjab).

>40% farmers in Haryana & Western Uttar Pradesh apply Farm Yard Manure, whereas in Punjab almost 30% farmers apply Farm Yard Manure (FYM).

Almost 200 representatives were interviewed who revealed that the daily arrival during the season has been 125-200 metric tons in the market during the season. They identify and assess the rates based on quality and grain moisture %, which ranges from 12-17% at the time of

produce arrival in markets. They identify the varieties based on grain size, shape and aroma. As such there is no equipment for aroma measurement at the grain market level. But they have a long experience of judging the aroma and identifying the variety. Initially, it is the tag on the bag and later on the standing crop the farmers use to identify the varieties based on foliage color, leaf orientation, plant height, growth duration and grain color, shape and size.

### **Key Investigators and Authors of the Report**

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**Orientation program for the Surveyors at Regional Research Station (ICAR), Karnal**

## **1. Objective**

To study the feasibility through well-structured surveys/interactions as to how all the stake holders in Basmati rice supply chain including Basmati growers (farmers), purchasers and rice millers identify and distinguish among Basmati and other rice varieties.

## **2. Methodology**

20 surveyors were selected based on their educational background and survey skills. These surveyors were divided into two groups of 10 each. One group surveyed Punjab and the second group surveyed selected areas of Haryana and Western Uttar Pradesh. Two experienced team leaders supervised and monitored the teams.

Before proceeding on survey, the entire team was given a one-day orientation program on all aspects of rice crop at Regional Research Station (Indian Agricultural Research Institute) Karnal, Haryana.

The questions to be asked are given in *annexure-II*.

### ***Stakeholders interacted***

- Farmers – 20,000 (1000 from each mandi)
- Representatives of the rice millers – 5-10 each market (A total 200)

Twenty surveyors were hired and allotted to survey the villages in the vicinity of 20 grain markets. Out of total 20 grain

markets, 9 were selected from Punjab, 7 from Haryana, one from Delhi and 3 from Western Uttar Pradesh. Each surveyor had to interact with 1000 farmers from the grain market area allotted to him. These surveyors were hired for 8 weeks who surveyed the areas under supervision and monitoring of two team leaders one each for Punjab and Haryana/Western Uttar Pradesh/Delhi. Each surveyor had to survey at least 20 farmers a day. The long experienced team leaders were meant to supervise and guide the surveyors and to conduct the fortnightly meetings to collect the duly filled in questionnaire forms. On an average 15-20 villages in the vicinity of each market have been surveyed. Thus, approximately 400 villages have been surveyed.

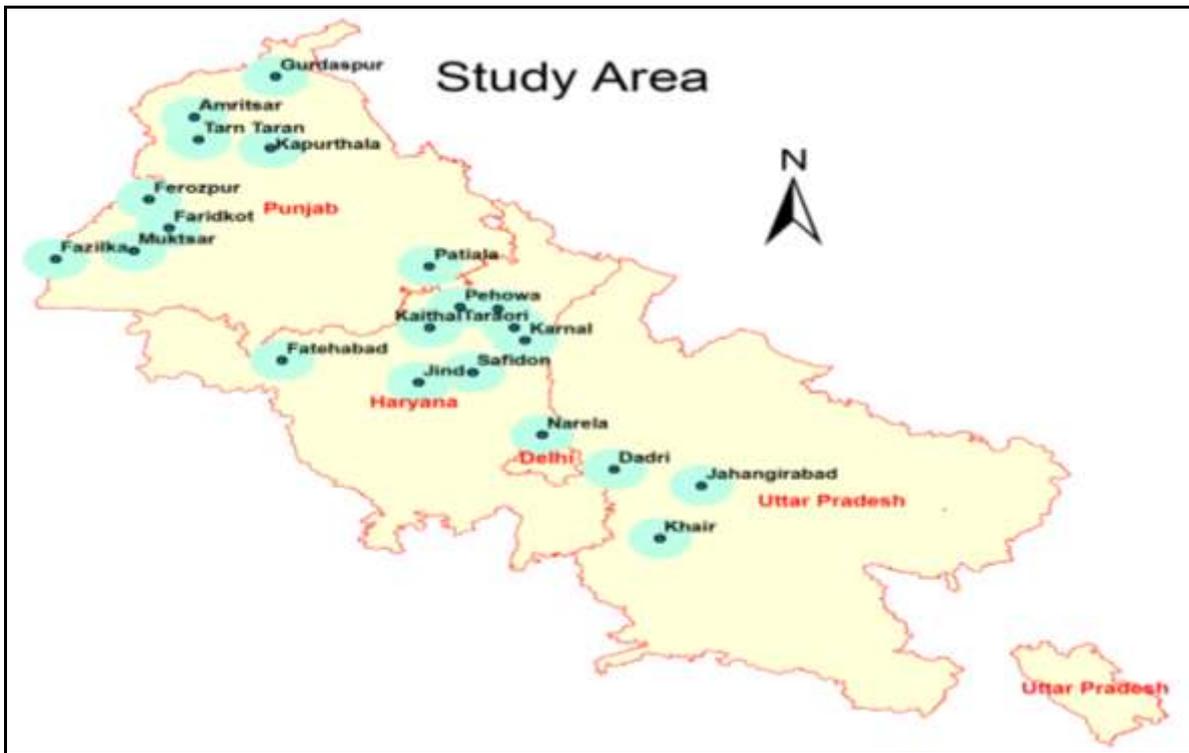
200 representatives of the rice millers have been interacted & interviewed.

## **3. Study Area**

The grain markets were selected strategically to cover the major Basmati growing areas and the seasonal arrival basis. The villages in 10 km radius circle were shortlisted to interview the farmers. The following grain markets were chosen state wise:

**Table-2 : Details of Grain Markets Surveyed**

<b>S.No.</b>	<b>States</b>	<b>Grain Markets</b>
1	Punjab	Amritsar
2	„	Gurdaspur
3	„	Kapurthala
4	„	Ferozepur
5	„	Fazilka
6	„	Faridkot
7	„	Muktsar
8	„	Patiala
9	„	TarnTaran
10	Haryana	Karnal
11	„	Kaithal
12	„	Fatehabad
13	„	Safidon
14	„	Pehowa
15	„	Thanesar
16	„	Taraori
17	West U.P	Dadri
18	„	Jahangirabad
19		Khair
20	Delhi	Narela



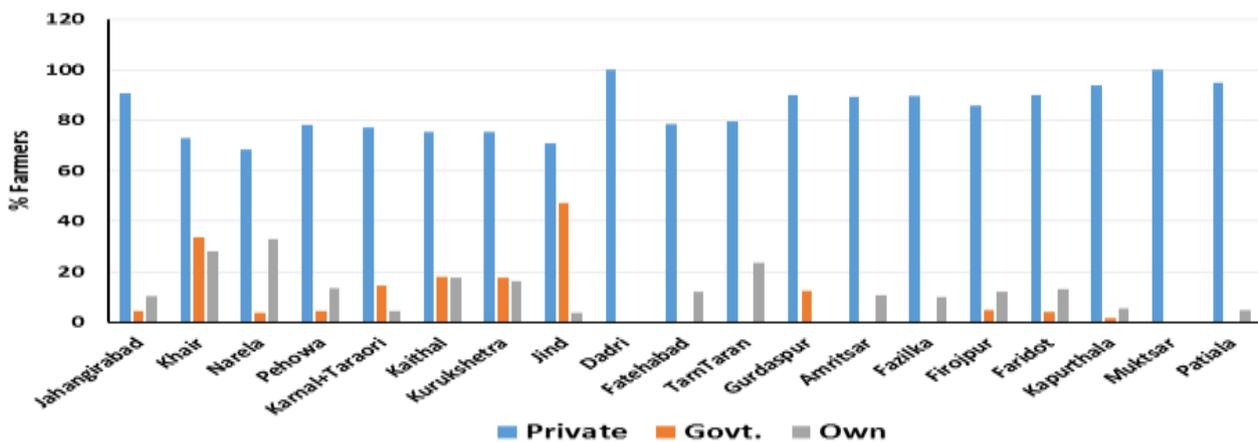
#### 4. Response of the farmers to questions

##### 4.1 Seed Source

In almost all the states, the private seed companies contribute a major share of the seed to the farmers. In Punjab 80-90% and in Haryana 70-80% seed is offered by the small and medium private seed companies and Basmati traders. With the introduction of new variety Pusa Basmati-1509 and its increased demand, many small seed sellers

could not be fair to the farmers and supplied either adulterated seed due to which the produce was not of good quality and the farmers couldn't get a good price for their produce from this particular variety.

Figure-4.1 Seed Source as Reported by the Farmer

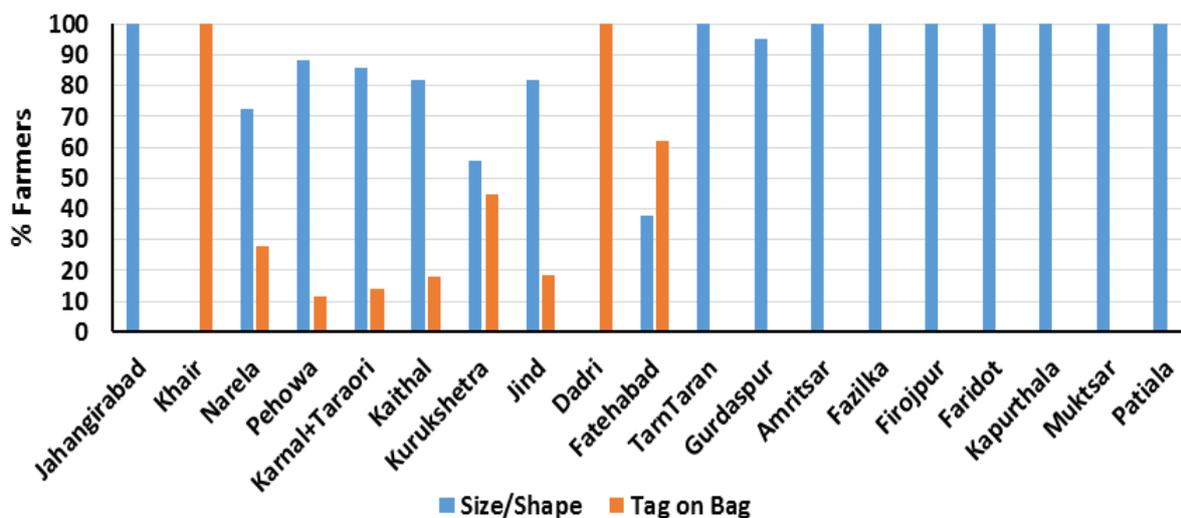


## 4.2 Identification of Seed Variety

Interestingly, almost all the farmers covered in survey from Punjab were aware to identify the seed variety by size and shape. But in case of Haryana, 80-85% farmers were able to identify the seed variety whereas, a large number of farmers (almost 20%) were still depending on

the tag on seed bag they purchased. In Aligarh market area of Uttar Pradesh 100% farmers were depending on the tag on seed bag. It was discussed that due to many single plant selections and mixing, the farmers are not confident in identifying the seed varieties and were depending on the name printed on seed bag.

**Figure-4.2 Response to Variety Identification**



## 4.3 Seed Treatment

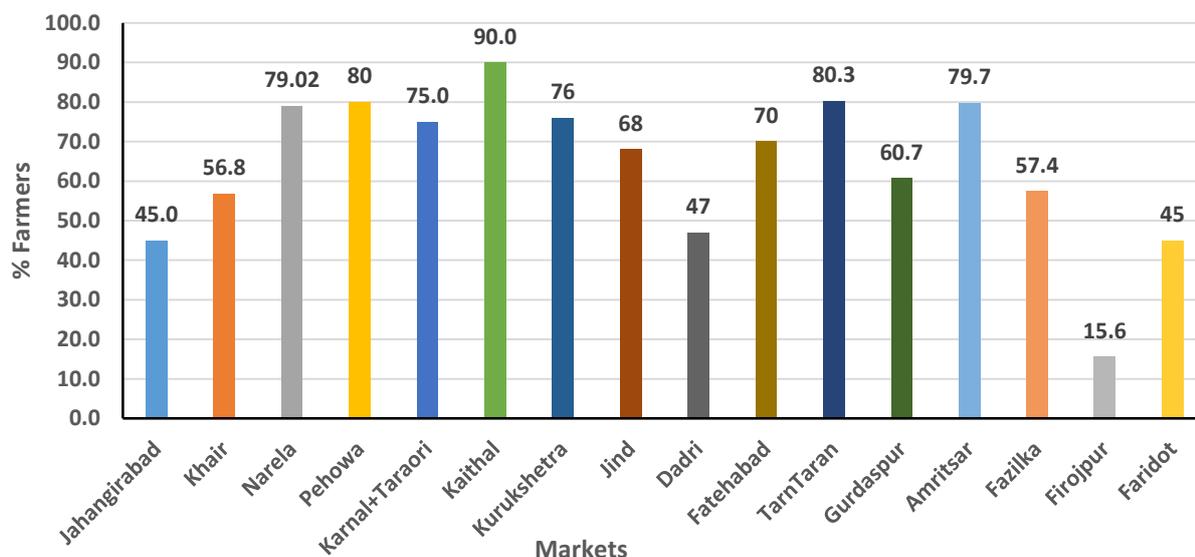
In Haryana average 73% farmers go for seed treatment before sowing, which helped them to protect their crop from seed borne diseases. Where as in Western Uttar Pradesh, where the farmers of Khair market were interacted, only 50% farmers go for seed treatment. The farmers covered from Narela market representing adjacent Haryana districts namely Sonapat and G.B. Nagar, Ghaziabad, Bulandshahr, Meerut of Western Uttar Pradesh apply seed treatment before sowing nurseries but almost 17% farmers do not go for seed treatment.

While in case of Punjab, on an average 50% of the farmers representing 9 prominent markets go for seed treatment.

While in case of other markets 60-100% farmers go for seed treatment, in Muktsar almost no farmer and in Firozpur only 15.6% farmers go for seed treatment. The farmers from TaranTaran and Amritsar districts are having higher awareness level in comparison to the farmers from Malwa region. That is the reason, the seed borne diseases like '*Bakanae*' are reported to a very high extent in these districts.

While in case of Haryana, less incidence of the seed borne diseases are reported.

**Figure-4.3 Response to Seed Treatment**

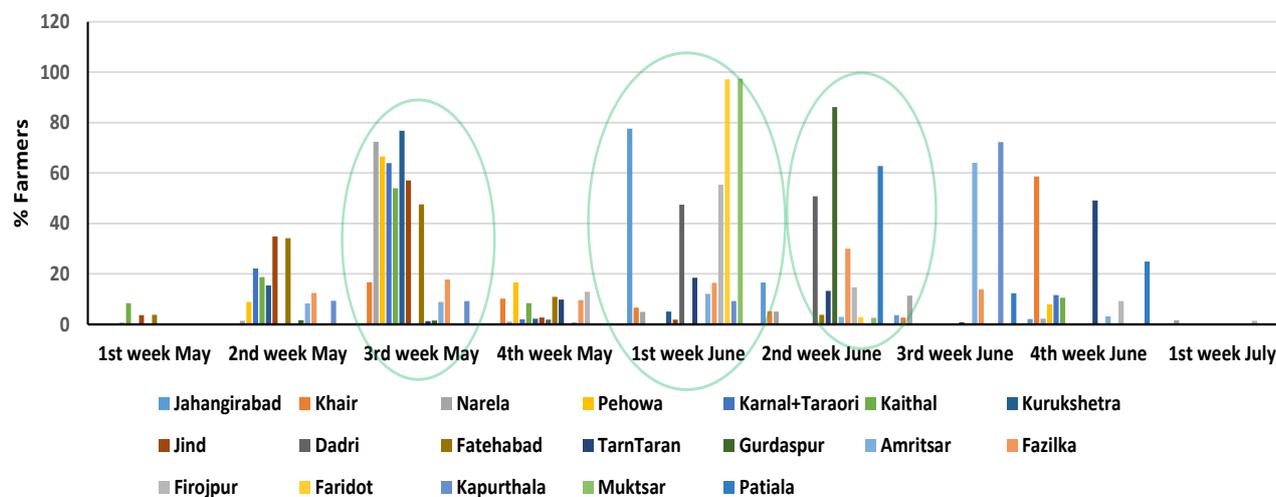


#### **4.4 Nursery Sowing**

Nursery sowing starts from first week of May in a few districts of Haryana namely, Kaithal, Jind and Fatehabad where apart from new variety Pusa Basmati-1509, Non-Basmati early maturing rice is also grown and the crop is taken early before transplanting Basmati. In most of the area, the nursery sowing was at peak in third week of May. And only 10% farmers went for sowing in 4th week of June. In Jahangirabad market area of Western Uttar Pradesh, most of the nursery sowing was done in 1st and 2nd week of June while in Khair market area, more than 58% farmers opted for the 4th week of June.

In Malwa region of Punjab covering Faridkot, Firozpur and Muktsar districts, most of the nursery sowing was done in first week of June. In Gurdaspur and Patiala most of the farmers (>86% and >72% respectively) did nursery sowing in 2nd week of June. While, in Amritsar and Kapurthala, most of the farmers (64% and 72% respectively) went for nursery sowing in 3rd week of June. Fazilka and TarnTaran continued nursery sowing in last two weeks of May and almost all the weeks of June. In Patiala most of the sowing was done in 2nd week of June and was finished by 4th week of June.

**Figure-4.4 Time of Nursery Sowing Followed**

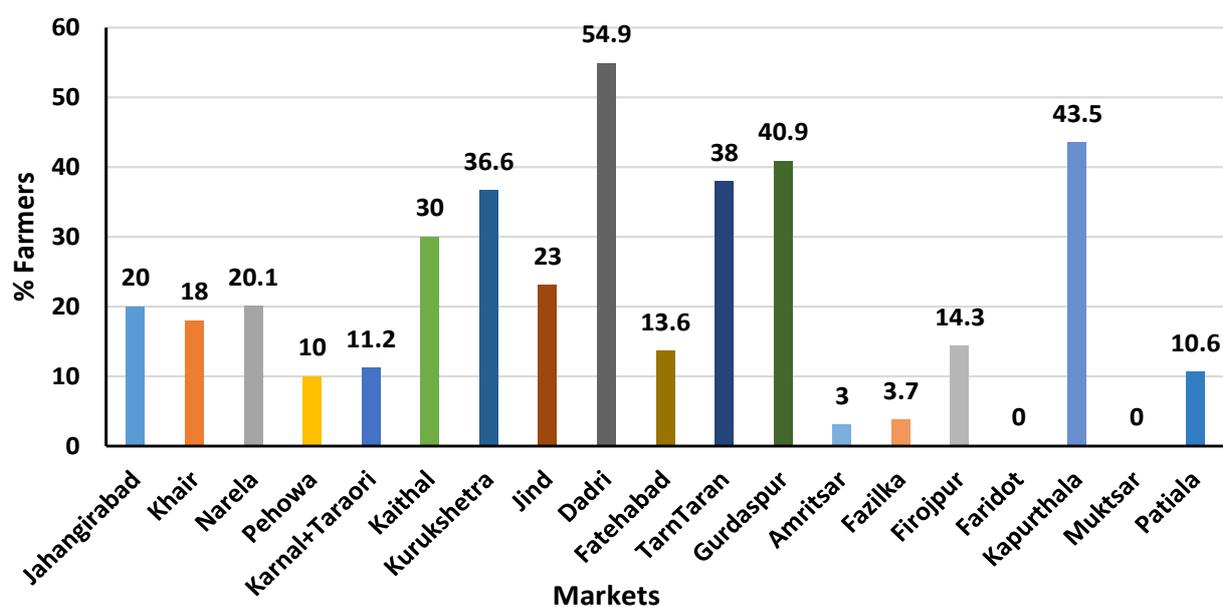


### 4.5 Seedling Treatment

In Haryana and Western Uttar Pradesh, the farmers do not treat seedlings before transplanting. In Haryana only 20-25% farmers from the market areas asserted the seedling treatment before transplanting. However, the farmers from Western Uttar Pradesh exclusively are not aware of seedling treatment before transplanting.

In Punjab, except Gurdaspur, Taran Taran and Kapurthala districts, the farmers from other districts do not go for seedling treatment. Even in these three districts, only 38-43% farmers go for seedling treatment before transplanting.

**Figure-4.5 Response to Seedling Treatment**



## 4.6 Transplanting

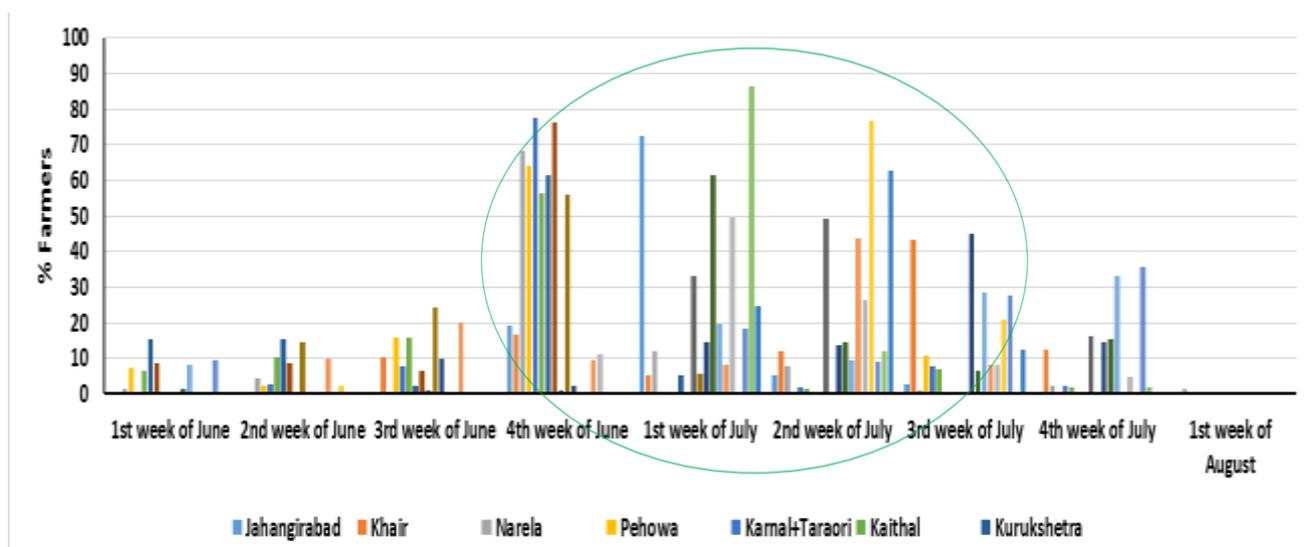
Most of the Basmati transplanting in almost all the districts of Haryana was done in 4th week of June but continued till 1st week of August. In a few districts 5-10% transplanting was done in 3rd week of June too. Although, in Pehowa, Karnal, Taraori, Kaithal, Kurukshetra and Jind markets, 8-15% farmers did transplanting in first fortnight of June which was probably an early and premature transplanting of Pusa Basmati-1509. Which of course disappointed the farmers in many areas

giving a lower than potential yield. In Jahangirabad market area of Western Uttar Pradesh, >72% transplanting was done in 1st week of July, though it started in 4th week of June.

In almost all the districts of Punjab, the transplanting started in 3rd week of June and continued till 4th week of July.

In comparison to Haryana, where maximum farmers opted June for transplanting, the farmers of Punjab preferred July.

**Figure-4.6 Time of Transplanting**



### Crop Field View



#### **4.7 Green Manure**

Almost 31% farmers in Haryana applied Moong and Dhaincha as Green manure while preparing the field while in Punjab only 4% farmers applied Green Manure. Almost 50% farmers from Kurukshetra market area applied Green Manure.

#### **4.8 Farm Yard Manure**

Almost 85-90% farmers from Dadri, Khair, Amritsar and Fazilka applied Farm Yard Manure (FYM) before transplanting. Whereas, in other market areas very few (almost 30%) farmers opted to apply FYM.

It is well established that the soils become compact in rice fields due to puddling over the years and the soil structure worsens. To improve the soil structure, use of FYM is recommended but the scarce availability of FYM and bit increases in cost of cultivation are the issues which inhibit the farmers to apply FYM while preparing the rice fields for cultivation.

#### **4.9 Fertilizer Application**

Almost all the farmers applied more than recommended doses of urea. A lesser number of farmers opted to apply DAP due to higher price. Particularly a large number of farmers from Punjab markets applied

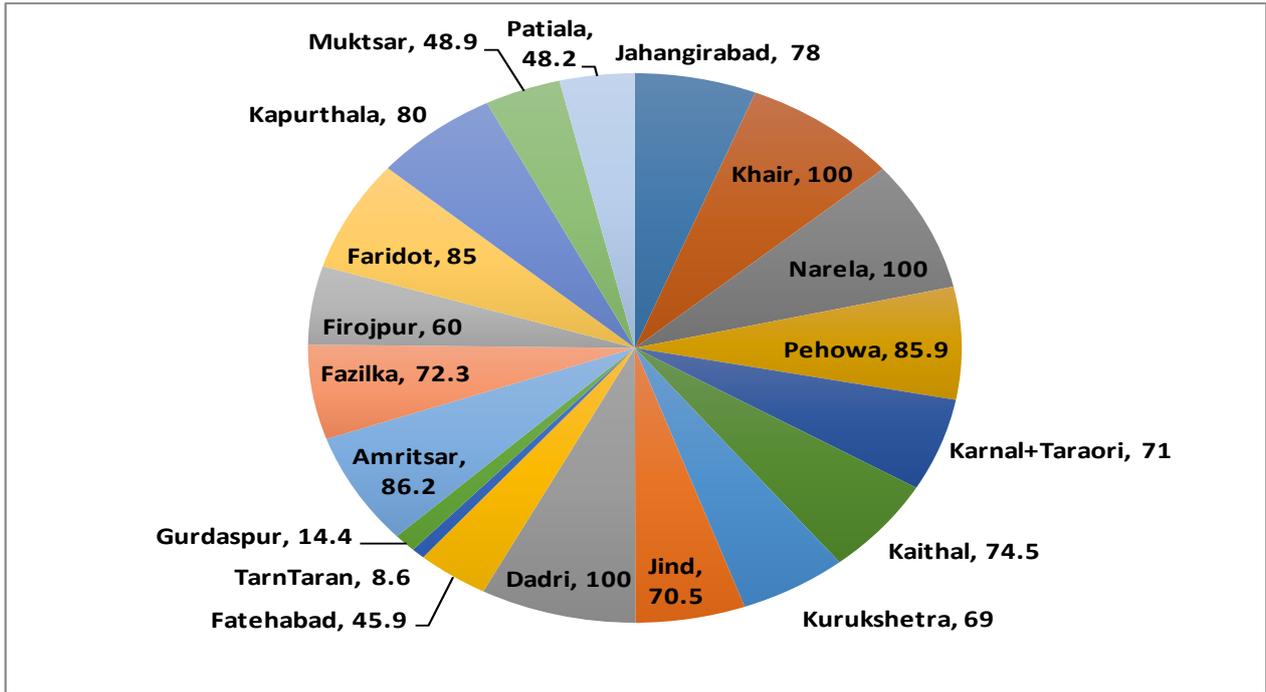
DAP too and in Haryana a lesser number of the farmers applied DAP. While in case of  $ZnSO_4$  >>90% farmers from all five states applied while in Punjab except Faridkot, Fazilka and Muktsar, in almost all the market areas only 75% farmers applied  $ZnSO_4$ . Farmers from almost all the markets were not enthusiastic to apply MOP. The farmers only from Dadri and Fazilka (24% and 35% respectively) applied MOP.

But of course Basmati rice being grown in a high energy agriculture area, the use of chemical fertilizers is more and the consumption is very high.

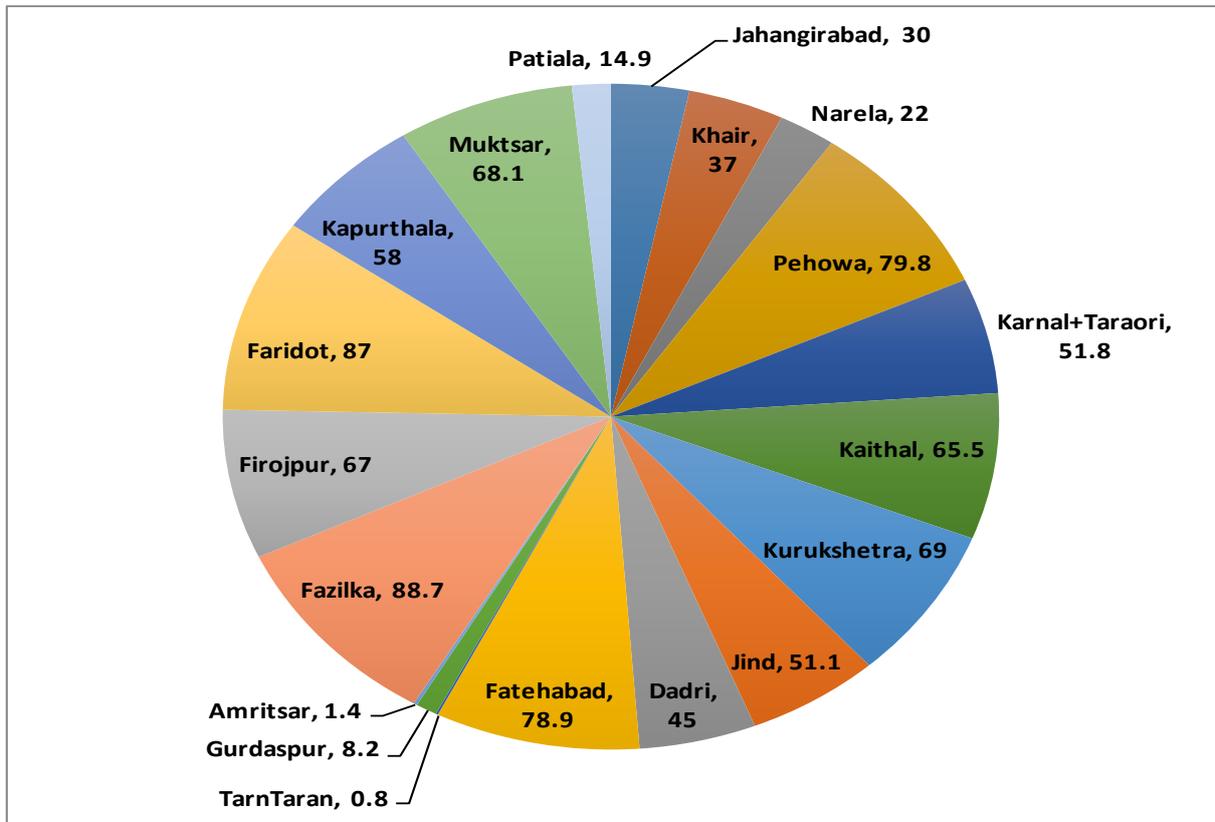
#### **4.10 Major Insect-Pests**

Except Tarn Taran and Gurdaspur of Punjab, almost in all the areas surveyed Stem Borer emerged as major pest but the control through sprays checked the incidence below Economic Threshold Level. Leaf Folder and Plant Hoppers were reported the second major pests attacking the crop reported in Pehowa, Karnal, Taraori, Kaithal, Kurukshetra, Jind and Fatehabad of Haryana and Fazilka, Ferozpur, Faridkot, Kapurthala and Muktsar of Punjab. Lesser incidence (30%) was reported in Khair and Jahangirabad markets of Western Uttar Pradesh

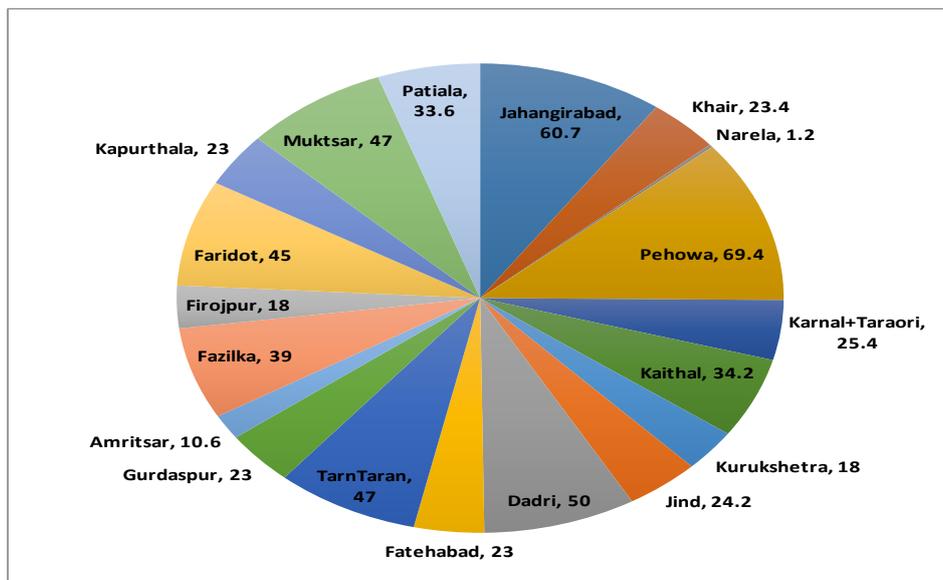
***Figure-4.10a: Incident of Stem Borer as reported by the farmers***



***Figure-4.10b: Incident of Leaf Folder as reported by the farmers***



***Figure-4.10c: Incident of Brown Plant Hopper as reported by the farmers***



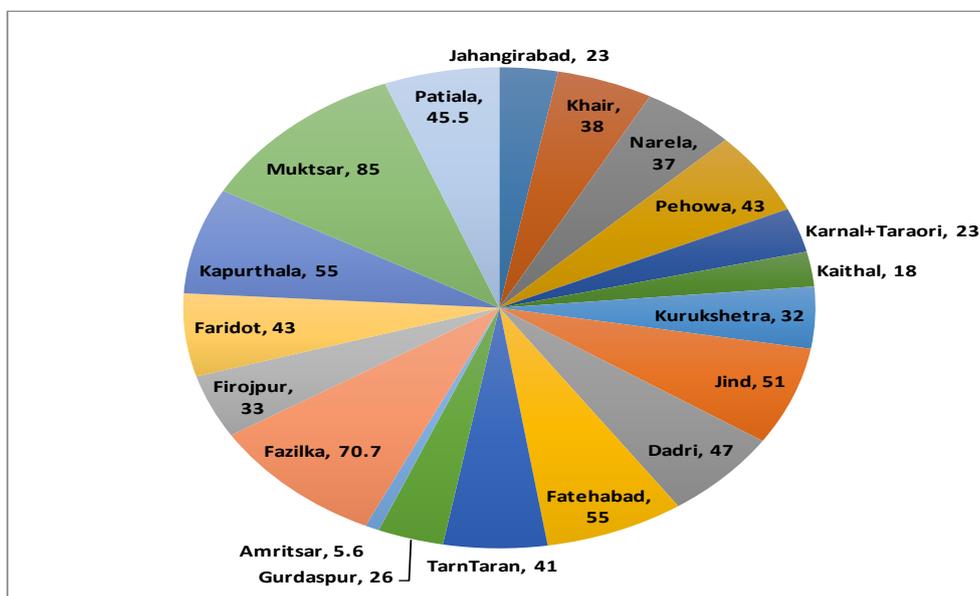
**4.11 Major Diseases**

There were many diseases reported by the farmers in the market areas namely *Bakanae*, *Bacterial Leaf Blight*, *Blast* and *Sheath Blight*.

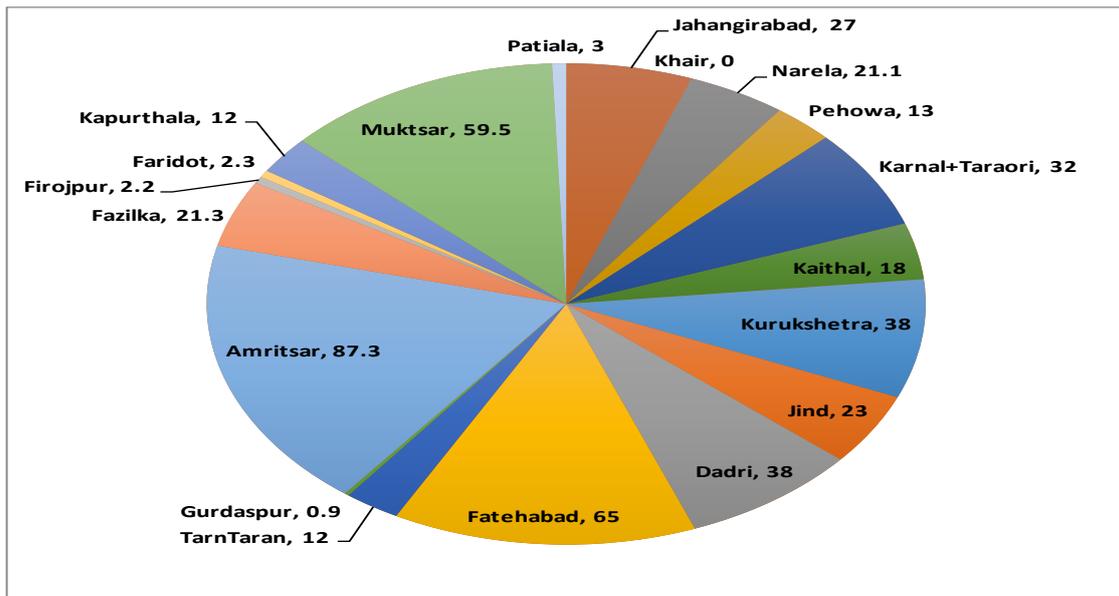
Incidence of *Bakanae* was >50% in Jind & Fatehabad market areas of Haryana and Fazilka, Muksar, Kapurthala and Patiala

market areas of Punjab. The incidence of *Bacterial Leaf Blight* was higher (60-87%) in Fatehabad, Amritsar and Muksar market areas. *Blast* was reported higher in Kurukshetra, Fatehabad, Karnal, Taraori and Dadri market areas. *Sheath Blight* was observed with higher incidence in Fatehabad, Gurdaspur, Ferojpur, Faridkot, Muksar and Kapurthala market areas.

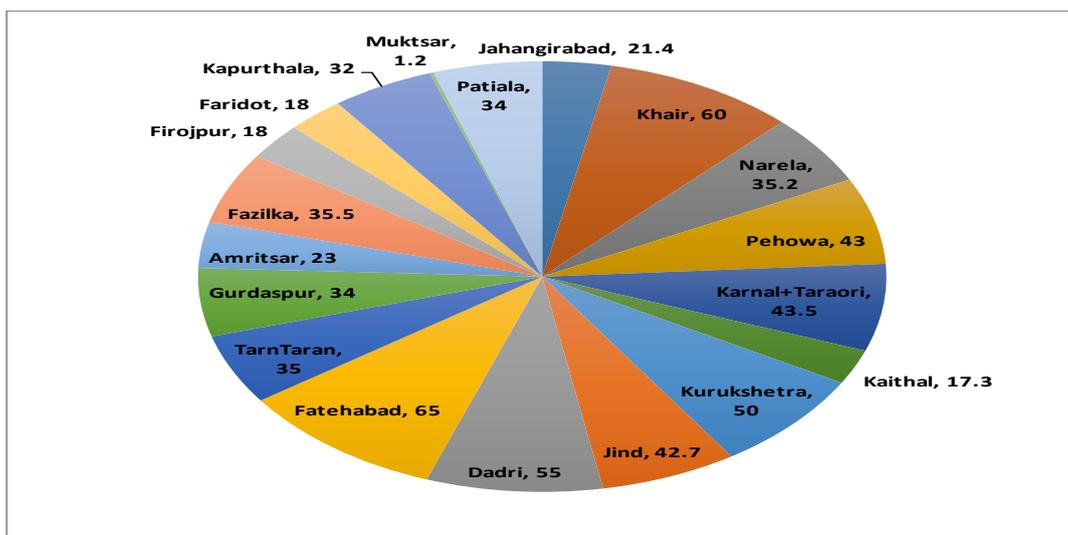
***Figure-4.11a: Incident of Foot Rot (Bakanae) as reported by the farmers***



***Figure-4.11b: Incident of Bacterial Leaf Blight as reported by the farmers***



***Figure-4.11c: Incident of Blast as reported by the farmers***



Produce Auction in the grain market.

### 4.12 Pesticide Usage

Except Narela, Pehowa, Karnal, Taraori, Tarn Taran, Gurdaspur and Amritsar, in other market areas, >95% farmers use pesticides through spray to control the pests. In Malwa region of Punjab, almost 100% farmers use pesticides. The pesticide usage is high in eastern Uttar Pradesh too. Though the fungicides are used by 60-75% farmers in most of the areas except Tarn Taran and Gurdaspur of Punjab, the awareness level is very low among the farmers and they have been applying the pesticides as recommended by the pesticide dealers in the areas.

### 4.13 Heavy Metals

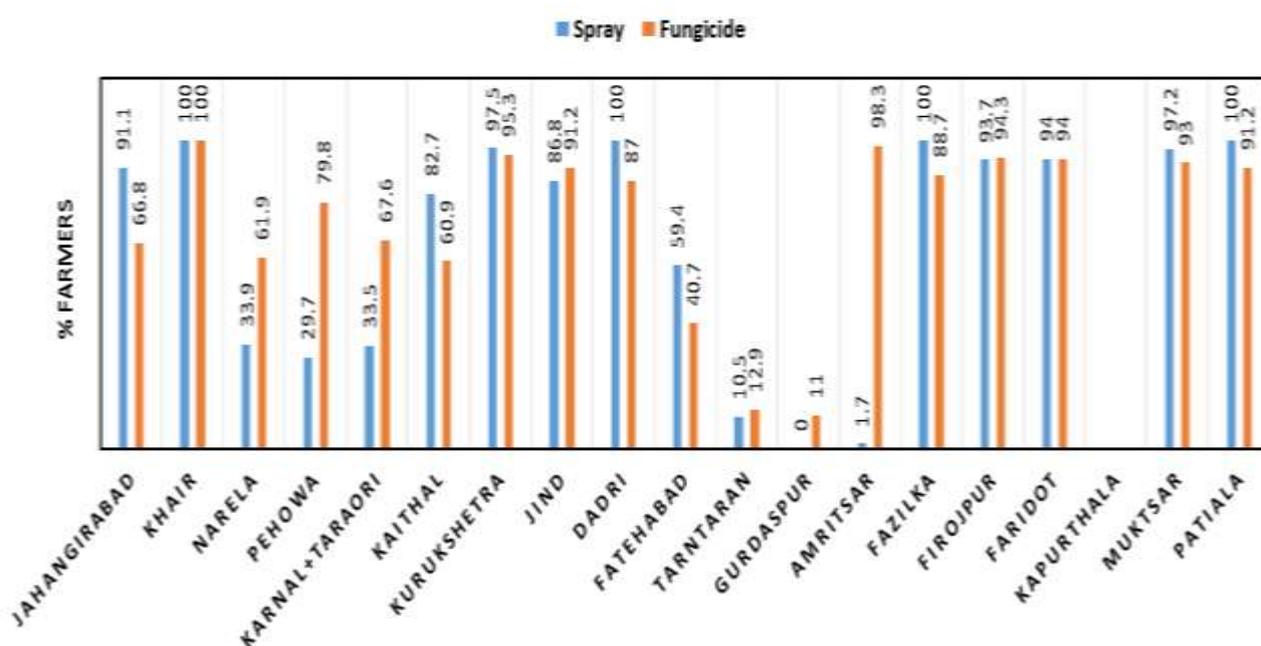
Recently some of the importing countries have revised their Maximum Residue Limit (MRL's) limits of heavy metals that is i.e. arsenic, cadmium and lead. To ensure that produce is within the acceptable limits of heavy metals, recognized laboratories are available in the country. The samples are sent to these

laboratories and the report is attached along with the consignments.

### 4.14 Marketing of the produce

Both in Haryana and Punjab markets, >85% farmers sell their produce in grain market. Whereas in Jahangirabad and Khair market areas of Uttar Pradesh only 40% and 10% farmers sell the produce directly in the market. Remaining farmers sell through agent exclusively.

**Figure-4.12 Response to Pesticide Usage**



## **5. Representatives of Rice Millers**

Almost 200 representatives of rice millers in the market were interviewed who fix the price of the produce based on certain criteria including moisture percentage, grain size & shape, uniformity of color, percentage of broken rice (which they make out by rubbing a small quantity of paddy by hands) and aroma. They distinguish among the varieties based on grain size and aroma. In general, there is moderate aroma in varieties such as Pusa Basmati-1121 and Pusa Basmati-1509. While in case of Taraori Basmati, Basmati-370, Basmati-386, CSR-30, and Pusa Basmati - 6 (Pusa-1401) high aroma has been observed.

The grain size is longer in case of Pusa Basmati-1, Pusa Basmati-1121, Pusa Basmati-1509, and Pusa Basmati-1401. But in case of Basmati-370, Basmati-386, CSR- 30 and Sharbati (Non-Basmati) the grain size is smaller.

## **6. From Mandi to the Mill & Thereafter**

With the development of high-yielding varieties and their acceptance in the domestic and global market, awareness about all aspects of Basmati rice has come at all levels. Farmers, artias, purchasers, procurement staff at all rice processing units, technical staff at all processing levels, storage staff and market personnel are well trained in Basmati rice business. Artias know the varieties by name and grain morphological identification. Similar is the case with purchasers posted by leading rice processing units in various grain markets. The

purchasers can either be free lancers or employed by the millers. They are the essential link between the Mandi and the Mills. They are the ones who hold the key to identity preservation of the Basmati variety purchased. It is their responsibility to properly tag the lot purchase and keep a record of the bulking of different lots of a variety purchased. This is done after the auctioning in the grain market.

The purchased paddy is filled in gunny bags and marked as varieties before loading in the truck. A set of information like name of grain market, artia, date, number of bags, total weight and variety name accompanies the truck.

After the truck reaches the mill, samples are drawn for ascertaining the variety, moisture content, key quality parameters like brown-rice percentage, brown-rice broken and head rice recovery etc. Once accepted, it is stacked as per the varieties as well as quality considerations. In this way, identity of the material is maintained.

Between the mill gate to the paddy storage area samples are taken of the various lots of the same variety for testing and labeled Mandi wise. Almost all the leading rice exporters have a well-equipped rice testing lab with trained and experienced staff.

Those lots found within acceptable levels are aggregated into a bulk and again allotted a number which will be its Lot Number for all tracking purposes.

All the bags of a particular lot number are stacked and kept for ageing. This is an important process for bringing out the essence of Basmati. Depending on the demand for a particular variety the lots are moved for processing. If a certain portion of a lot is to be parboiled the lot number will remain the same with an additional marking to identify that it is the same lot yet processed differently.

As soon as a particular lot reaches the storage yard the packing bags of the various sizes ranging from 1kg to 40kg are prepared bearing the identifying lot number. The packing can be a 1, 2, 3, 5 or 10kgs sizes. These are usually bearing brand labels. Some Mills may be processing for other units in that case the bags will be of a larger size say 20 to 40kgs.

During the milling process it is always according to the rice varieties as the varieties differ in grain dimensions. All care is taken at all levels to maintain the identity of varieties. The exporters and importers both understand the market value of different Basmati rice varieties. Therefore, it has come in practice to maintain the identity during the transport, loading and unloading, milling, grading and packaging.

## **7. Identity preservation methodology**

### **a. Percentage of Basmati rice Production, where Identity Preservation is being followed in India.**

In entire Basmati rice production in the GI area consisting of the states of Punjab, Haryana, Western U.P., Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Delhi is under Identity Preservation. Basmati rice has a special place in the domestic and international market. To remain competitive in domestic and international market it is necessity to maintain the best quality possible and that is possible only following all the steps involved in Identity Preservation.

### **b. Parameters Tested For ensuring Identity Preservation**

Each modern rice milling unit has a well established quality testing laboratory with well trained technicians.

The key quality characters observed are milled rice colour dimensions i.e. milled rice kernel length, breadth, chalkiness and linear cooked and minimum linear cooked kernel elongation ratio, maximum moisture content, maximum damaged, discoloured grain percentage, maximum broken and fragment percentage, maximum foreign matter percentage, maximum other grain percentage, maximum other rice varieties percentage, maximum under milled and red stripped grain percentage, maximum rough rice (paddy) grain percentage and maximum green grain percentage.

Identity preservation indicators that are used by them during procurement and processing of Basmati rice are based on the size and aroma of the grains. The DNA analysis for purity is undertaken on random basis.

The methodology followed for confirmation of identity of Basmati rice include visual identification based on the shape, size and

appearance, length of grains, length/breadth ratio, test for aroma and at times through DNA Fingerprinting also.

*c. Tools being used for identification of specific parameters*

The important devices are moisture meter, electronic balance, water bath, vernier caliper, grain hardness meter, grain whiteness meter, dehusker, miller cum polisher, aspirator and grading device.

The above devices are used making the rice ready for ensuring identity preservation.

*d. The threshold levels being used in identity preservation for specific parameters. (Annexure 1)*

*e. Steps/process to ensure segregation from other product types*

Since Basmati rice is a special product at all levels right from the farmers field to the rice milling units, best care is taken to maintain the identity of the varieties. At the grain market level, the purchasers based on visual appearance and moisture percentage decides the rates. Once purchased the bags are labeled and taken to the rice milling units. At the time receiving the rough rice (paddy), the samples are drawn for quality testing. Based on quality testing report the produce is accepted and stacked properly with a label showing the rate, moisture percentage, name of the variety, quantity of the lot and name of grain market and commission agent (Artiya).

*f. Details of Records Management*

All the observations including variety name, quantity, moisture percentage recorded from receiving the produce are systematically maintained on daily, seasons and year basis

*g. Processes being followed for sampling and testing*

Once the exporters get the order for milled rice from the importers, based on their requirement the milling units inform APEDA/Export Inspection Council (EIC). The inspectors from EIC come and draw the samples for testing the earlier mentioned quality traits.

A Phytosanitary Certificate is also obtained from the Department of Plant Protection and Quarantine, Government of India. A certificate of origin and varietal specifications is issued by the laboratories authorized by EIC, APEDA and Food & Drug Administration.

DNA testing for identity Preservation, wherever needed, the samples from the consignment are sent to the NABL accredited laboratories including the Basmati Export Development Foundation lab, Modipuram.

*h. Labeling & Storage Requirement*

At each step identity is maintained during the process of rice processing, drawing and submitting the samples. The storage space is periodically fumigated by the authorized fumigating agencies recognized by the competent authority.

*i. Trade related parameters/norms*

It is a well known fact that Basmati is the highest Forex earner among agricultural products. India and Pakistan are the only two producers of Basmati. India has a larger share in production as well as in exports. There are some factors which need to mention which are applied for the convenience of trade.

Considering our agro climatic conditions, socio economic status of our farmers and cultivation practices, AGMARK has characterized three grades qualifying the acceptable level of other

grains of rice in the lot which will decide its value. The three categories are given below with percentage of acceptable of other grains of rice. ANNEXURE 3

Second trade consideration that is important to mention is that the EU has a provision of duty relief on Brown rice of 8 varieties of Basmati which they consider as "Basmati". This is being contended by APEDA and AIREA, since in our view all 23 varieties are Basmati as defined under Seed Act. However presently this duty relief is extended only to the following 8 varieties. This comes under the bilateral trade agreement between EU and India to favor the European Rice Millers. Duty relief is an extent of --- on Brown rice. To obtain this relief the exporter has to establish the identity of the variety by providing DNA Certificate.

Under the Commission Regulation (EC) No 972/2006 (last amended by Commission Regulation (EU) No 706/2014) lays down special rules for imports of Basmati rice and a transitional control system for determining their origin.

A zero rate of import duty is granted to husked Basmati rice falling within CN code 1006 2017 and CN code 1006 2098 of the following 9 varieties originating from India and Pakistan:

- For India (8 varieties): Basmati 370, Basmati 386, Type-3 (Dehradum), Taraori Basmati(HBC-19), Basmati 217, Ranbir Basmati, Pusa Basmati and Super Basmati.

- For Pakistan (4 varieties): Kernel (Basmati), Basmati 370, Pusa Basmati and Super Basmati.

There are no specific standard operating procedures (SOPs) for handling of Basmati rice during various steps including transportation and storage. However third party is engaged for documentation/testing of Basmati rice.

The verification of the Basmati rice is mainly done during procurement from mandis. The costs incurred towards the verification and checking at various steps viz. procurement from Mandi, entry into premises, testing etc is estimated to be Rs 100/ton.

The costs towards conducting identity preservation of Basmati rice are not shared between the buyer and companies. The processing units are responsible for all activities related to identity preservation through the various steps.

[http://ec.europa.eu/agriculture/cereals/factsheet-rice\\_en.pdf](http://ec.europa.eu/agriculture/cereals/factsheet-rice_en.pdf)

## **8. Summary and Conclusion**

The survey revealed that the farmers of Haryana & Western Uttar Pradesh are more aware about seed source and seed treatment before sowing in comparison to the farmers of Punjab. There is a shift in nursery sowing dates calendar in major three states. The farmers of Haryana took early maturing varieties including Basmati & non- Basmati and start nursery sowing early (2nd& 3rd week of May). Whereas in Punjab and Western Uttar Pradesh, farmers preferred to sow the nursery from 1st to 3rd week of June.

For transplanting, the farmers from Punjab and Western Uttar Pradesh opted for the 3rd week of June up to 4th week of July. Most of the area was transplanted by 2nd week of July. In Haryana the farmers go for transplanting from 1st week of June up to 4th week of July. However, maximum area was transplanted in the 4th week of June.

Up to 75% farmers buy the seeds from private agencies in Haryana & Western Uttar Pradesh 10-15% have their own or get from other farmers and remaining are supplied from Government agencies. In Punjab, >90% farmers buy the seed from private agencies. The Government share is very less (4-5%). However, almost 10-12% use their own sources of seed.

In case of seed variety identification and crop identification on field, the farmers of Punjab were well aware. Almost all the farmers clearly knew the package & practices for growing Basmati varieties. While in Haryana 15-20% farmers are still depending on the tag on seed bag for identifying seed varieties. The knowledge level of package & practices for Basmati is high among the farmers from Haryana.

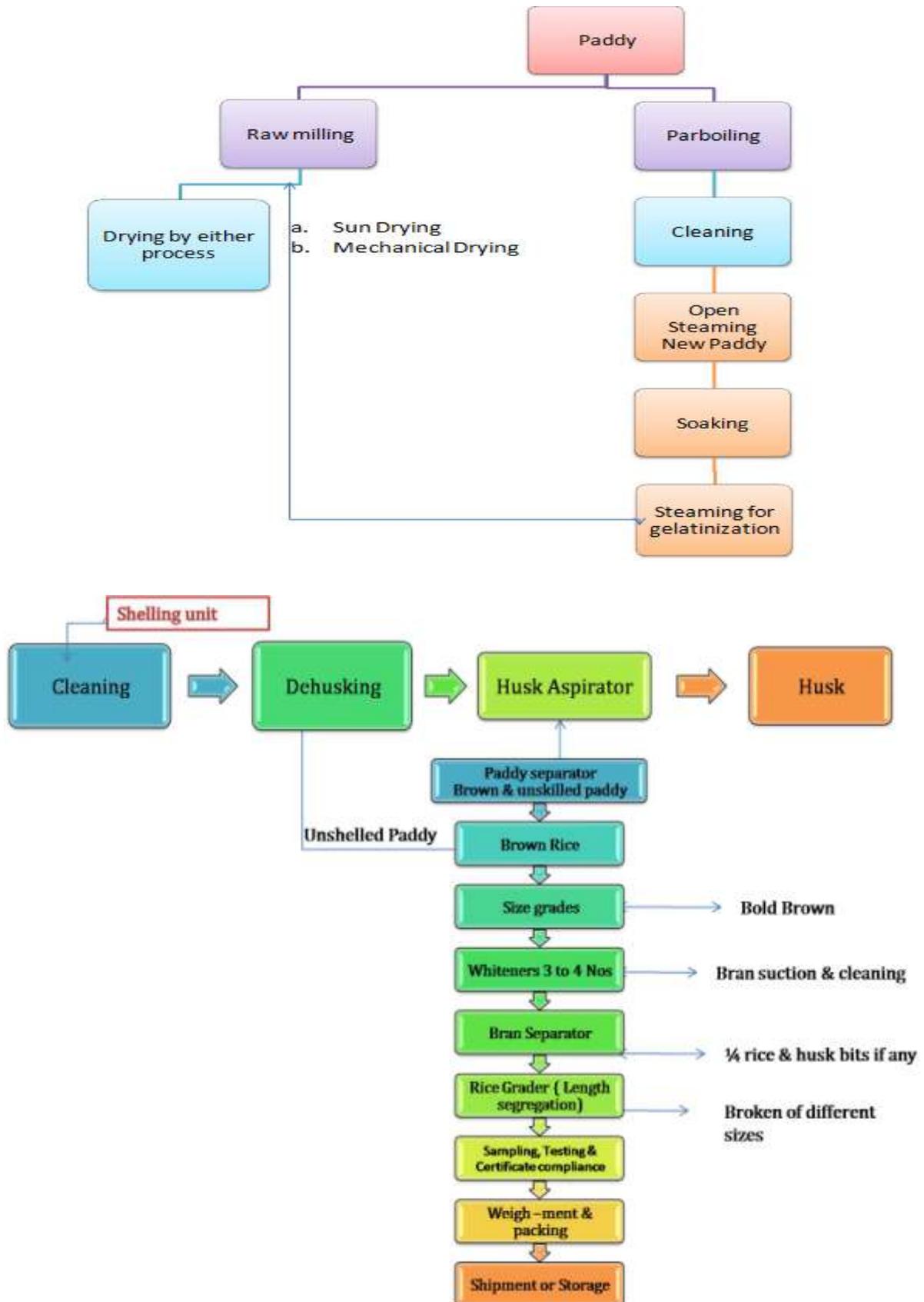
Punjab, Haryana and Western Uttar Pradesh are high energy agriculture areas and the per-hectare fertilizer consumption is also very high. All the farmers apply urea and a very high percentage of the farmers apply ZnSO<sub>4</sub> (>95%) and DAP (34%) in Haryana & Western Uttar Pradesh; >52% in Punjab). In Haryana & Western Uttar Pradesh apply FYM. Whereas, in Punjab almost 30% farmers apply FYM.

Almost 200 representatives of rice millers were interviewed who revealed that the daily arrival during the season has been 125-200 metric tons in the market during the season. They decided and assessed the rates based on quality and grain moisture %, which ranges from 12-17% at the time of produce arrival in markets. They identify the varieties based on grain size, shape and aroma. As such there is no equipment for aroma determination. But they have a long experience of judging the aroma and identifying the variety.

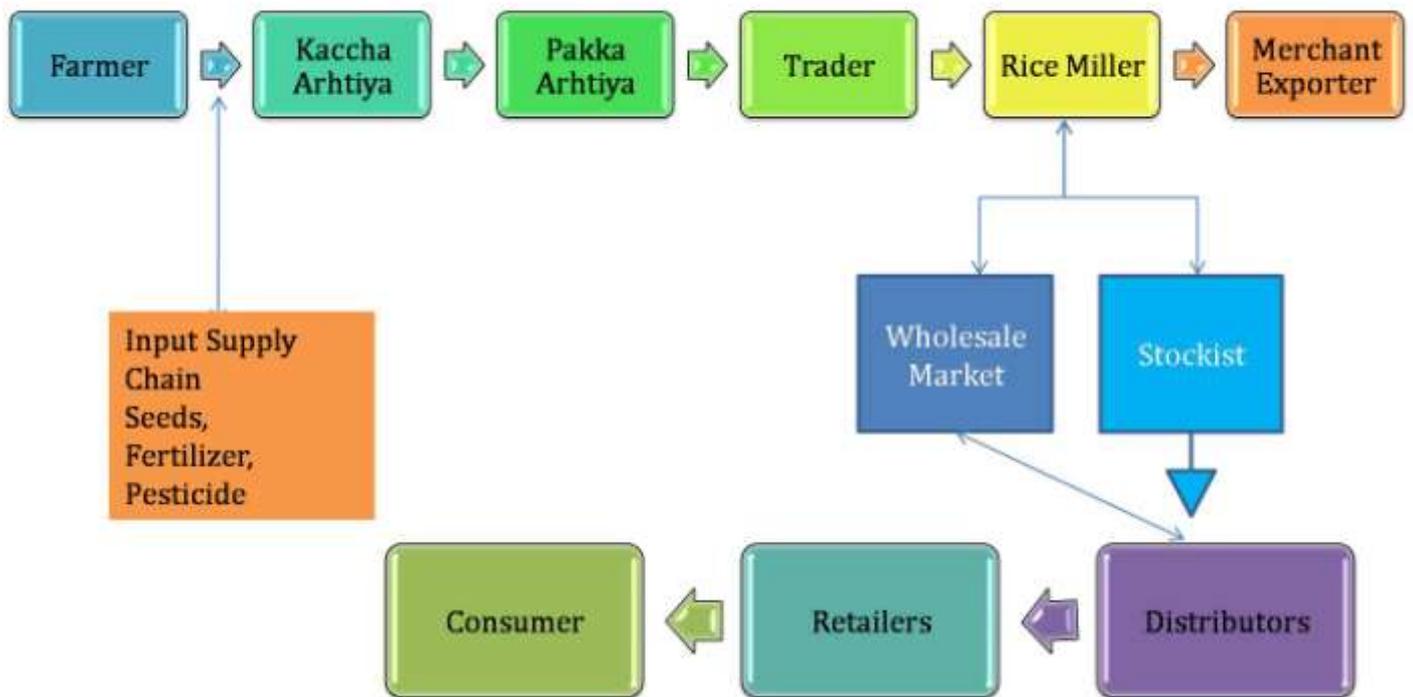
Most of the farmers in all the states have fair knowledge of distinguishing among Basmati and Non-Basmati hybrid varieties. The farmers responded to related questions that the early maturing and high yielding Non-Basmati hybrid rice are transplanted early and the growing period is shorter than lately transplanted Basmati varieties. The seed is non aromatic and small in shape & size in comparison to grain of Basmati varieties. The cost of cultivation was lesser and the plant height was shorter in comparison to many Basmati varieties.

But the pests & diseases are common. The total growth duration from seed to seed varies from 120 days in case of Pusa Basmati 1509 to 155 days in case of Taraori Basmati.

## Process Flow Chart For Raw Rice/Parboiled Rice Processing



## CURRENT SUPPLY CHAIN FOR EXPORT OF BASMATI RICE



Source: Ph.D. thesis, Navneesh Sharma (2012), Strengthening of Supply Chain for the Export of Basmati Rice, Singhania University, Rajasthan

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## **Acknowledgment**

First of all AIREA would like to thank Mr. R S Seshadri who introduced AIREA to the Ministry of Environment, Forest and Climate Change. We are also grateful to Dr Rajni Warriier and Dr. Vibha Ahuja and their respective team for assigning this task to us. We also wish to thank Dr. V P Singh and Dr. Dharmesh Verma along with all the two team leaders and 40 field surveyors painstakingly collected and compiled the data.

***The threshold levels being used in identity preservation for specific parameters Annexure-I***

Grade	Minimum Average Precook Length in mm	Min L/B Ratio	Maximum Moisture Content %age	Maximum Damaged Discoloured Grain %	Maximum Chalky Grain/Black kernels%	Maximum Broken & Fragments %	Maximum Foreign matter-%	Maximum Other Grain %	Maximum other Rice varieties %	Max. under milled & red stripped grain %	Max. Paddy Grain %	Minimum Elongation Ratio	Maximum Green Grain %
1	2	3	4	5	6	7	8	9	10	11	12	13	14

**Milled**

Special	7.10	3.50	14.00	0.50	3.00	2.00	0.10	0.10	5.00	2.00	0.10	1.70	-
A	7.00	3.50	14.00	0.70	5.00	3.00	0.25	0.10	8.00	2.50	0.20	1.70	-
B	6.80	3.50	14.00	1.00	7.00	5.00	0.40	0.20	15.00	3.50	0.30	1.70	-

**Milled Parboiled**

Special	7.10	3.50	14.00	0.50	0.10	2.00	0.10	0.10	5.00	2.00	0.10	1.50	-
A	7.00	3.50	14.00	0.70	0.50	3.00	0.25	0.10	8.00	2.50	0.20	1.50	-
B	6.80	3.50	14.00	1.00	1.00	5.00	0.40	0.20	15.00	3.50	0.30	1.50	-

**Brown**

Special	7.40	3.50	14.00	0.50	3.00	2.00	0.20	0.10	5.00	2.00	0.20	1.70	2.00
A	7.20	3.50	14.00	0.70	5.00	3.00	0.50	0.10	8.00	2.50	0.50	1.70	4.00
B	7.00	3.50	14.00	1.00	7.00	5.00	1.00	0.20	15.00	3.50	0.80	1.70	6.00

**Brown Parboiled**

Special	7.40	3.50	14.00	0.50	0.50	2.00	0.20	0.10	5.00	2.00	0.10	1.50	2.00
A	7.20	3.50	14.00	0.70	1.00	3.00	0.50	0.10	8.00	2.50	0.20	1.50	4.00
B	7.00	3.50	14.00	1.00	2.00	5.00	1.00	0.20	15.00	3.50	0.30	1.50	6.00



# ALL INDIA RICE EXPORTERS' ASSOCIATION

81/2, Adchini, Sri Aurobindo Marg, New Delhi - 110 017.

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Email : airea.delhi@gmail.com Website : www.airea.net

## QUESTIONNAIRE ON IDENTIFICATION INDICATORS

### FARMER

Farmer Name: \_\_\_\_\_ Phone No. \_\_\_\_\_ ID No. \_\_\_\_\_

Village \_\_\_\_\_ Block \_\_\_\_\_ District \_\_\_\_\_ State \_\_\_\_\_

Rice

varieties grown

Variety	PB 1121	PB 1509	PB-1	CSR-30	PB-3	Basmati 386	Permal
Area							

- Does the farmer go for seed treatment before sowing? Yes / No
- Does the farmer go for seedling treatment before transplanting? Yes / No
- Date of Nursery sowing & Transplanting  
DoS - \_\_\_\_\_ DoT- \_\_\_\_\_
- Seed Source – Own/ Private Agency/ Govt. Agency/ Any other
- How does the farmer identify a Basmati variety

- Specific seed traits to distinguish among the various Basmati varieties?

Trait	Pusa1121	Pusa1509	PB-1	CSR30	PB3	386/370	Permal
Shape							
Size (mm)							
Any Other							

- How the farmer decides the date of harvest (variety-wise)?

- Input application

#### A. Inorganic

Fertilizer	ZnSO <sub>4</sub>	Urea	DAP	MOP
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Varieties	Application Stages											
	Basal	TD I	TD II	Basal	TD I	TD II	Basal	TD I	TD II	Basal	TD I	TD II
Pusa-1121												
PB-1												
Pusa-1509												
CSR-30												
Non-basmati												

### B. Organic

- Did the farmer use farmyard manure? Yes/No
- Did the farmer use green manure? Yes/No
- Give details of Green Manures, if used by the farmer:

9. How does the farmer distinguish among the varieties in the field?

Sl. No.	Trait	Pusa 1121	Pusa 1509	PB-1	CSR30	PB3	386/370	Permal
1.	Plant Height							
2.	Tillering (Profuse/Shy)							
3.	Leaf Colour and orientation							
4.	Ear Size							
5.	Visual look of the grain							
6.	Days to Maturity							

### 10. Marketing

- How does the farmer plan to sell the produce? Grain Market/ Agent/ Miller/ At site
- How much area does the farmer keep for seed & own consumption?

#### A. Insect Pests - Stem Borer / Leaf Folder / Plant Hoppers

- What pesticides does the farmer use?

---

**B. Diseases – Bakanae(Jhanda rog) / BLB(Jhulsa)/ Foot Rot / Blast / Sheath Blight**

Details-

- When and what control measures are adopted by the farmer to control pests and diseases? **Spray / Seed Treatment / Fungicide**

Date \_\_\_\_\_

Signature of the Surveyor

**Criteria for grade designation: Annexure III**

Grade designation	[Maximum limit of tolerance (percent by mass)]								
	Foreign matter		Broken and fragments	Damaged discoloured grains	Other varieties of rice	Paddy grains	Under milled and red striped/red grains	Chalky grains	Moisture
	Organic	Inorganic							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Special	0.10	0.10	2.0	0.7	5.0	0.1	2.0	5.0	13.0
Standard	0.25	0.10	3.0	0.8	10.0	0.2	2.0	10.0	14.0
General	0.50	0.10	5.0	1.0	15.0	0.3	2.0	15.0	14.0

**Revised Basmati Standards**

Parameters	Value
<b>Minimum avg pre cooked milled rice Length(mm)</b>	6.61
<b>Average precooked milled rice breadth (mm)</b>	<2.00
<b>Minimum L/B ratio of precooked milled rice</b>	3.50
<b>Minimum average cooked rice length (mm)</b>	12.00
<b>Minimum elongation ratio</b>	1.70
<b>Average volume expansion ratio</b>	>3.5
<b>Aroma</b>	Present  Qualitative sensory analysis as per the penal test
<b>Texture of cooked rice of high integrity (without busting the surface, non stickiness, tenderness, good taste and good mouth feel)</b>	Present  Qualitative sensory analysis as per the penal test

**Revised Basmati Standards:**

<b>Parameters</b>	<b>Value</b>
Amylose content	<b>20-26%</b>
Alkali spreading value (ASV)	<b>4.0-7.0</b>
Minimum brown rice recovery	<b>76%</b>
Minimum milled rice recovery	<b>65%</b>
Minimum head rice recovery	<b>45%</b>