

**Paper Title: “RELIABLE REMOTE SENSING – TEST CASE – A  
COMPARISON WITH SUPPLY CHAIN-MANDIS/MILLERS”**

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**ABSTRACT**

Reliability of Remote Sensing based data is a long-standing question due to paucity of technical knowledge in evaluating the accuracy. Normally Remote Sensing data accuracy is checked through systematic sampling and ground verification. Here an attempt is made to compare the RS based data with Supply chain sources such as millers and Mandis. For this purpose, a study was undertaken to compare and assess the accuracy of Remote Sensing-based production estimation of Basmati rice for kharif 2005 against the mandis arrivals and other related sources at the end of the Kharif

season -2005. A well planned mandi survey was carried out and data was collected from important mandis and mandi boards of Basmati growing major four states namely Uttar Pradesh, Uttaranchal, Punjab and Haryana. Mandi arrival data of rice and basmati was collected for Haryana and Punjab, whereas in Uttar Pradesh and Uttaranchal only total rice data was available and the same was collected. The survey experts also collected data from rice mills, state marketing boards of respective states and the Agents (Arthias) Analysis was carried out based on information gathered from various sources like discussions with respective mandi officials, mandi agents (Arthias), and rice millers to arrive at the conclusion. Based on comparative analysis between Kharif 2005 estimates derived using Remote Sensing approach and Mandi arrivals (As well as allied sources) as on 31<sup>st</sup> March 2006 and considering certain calculated and logical assumptions, limitations, it is concluded that the Remote Sensing based estimated results for Kharif 2005 is matching up to an accuracy of 90% to 94% in the states of study area at 100% confidence level. As a by product, an interesting result on RS data being always higher than total supply chain sources confirms the reliability of this data.

Above is a first of its kind, cautious, well calculated and mathematical analyses based study done first time in India keeping in mind to open an avenue for usage of remote sensing technique in market research and supply chain study. This study may be useful for demand forecasting also.

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## 1. Introduction

In the recent years Remote Sensing has been accepted as indispensable tool in the field of agriculture. It is widely used for various purposes as crop acreage estimation; yield estimation and health monitoring. Remote Sensing based data have become useful to take vital decisions for crop marketing and export. But the accuracy of remote sensing data is always questionable due to its processing technique and technical know-how required for the interpretation of satellite images and deriving out the results. In the present study it has been tried to validate the remote sensing data based results i.e. acreage and yield based production of Basmati rice for kharif 2005, compared with supply chain sources that include mandis, millers and exporters.

## 2. Background

RMSI and Birla Technical Services (BTS) have jointly carried out acreage estimation and health monitoring of Basmati rice for last four consecutive years in the Basmati growing districts of Punjab, Haryana, Uttar Pradesh and Uttaranchal. To validate the Remote Sensing based results with the production arrivals in the market an attempt has been made to verify the Remote Sensing based 2005 estimation production with actual arrival in market at the end of Kharif season of the same year.

## 3. Study Area

The study area covers approximately 1,78,200 sq km stretching between 25° 50'to 32° 2' latitude and 73° 52' to 81° 36' longitude. Geographically, the study area was spread over major Basmati growing districts in the states of Punjab, Haryana, Uttar Pradesh and Uttaranchal.

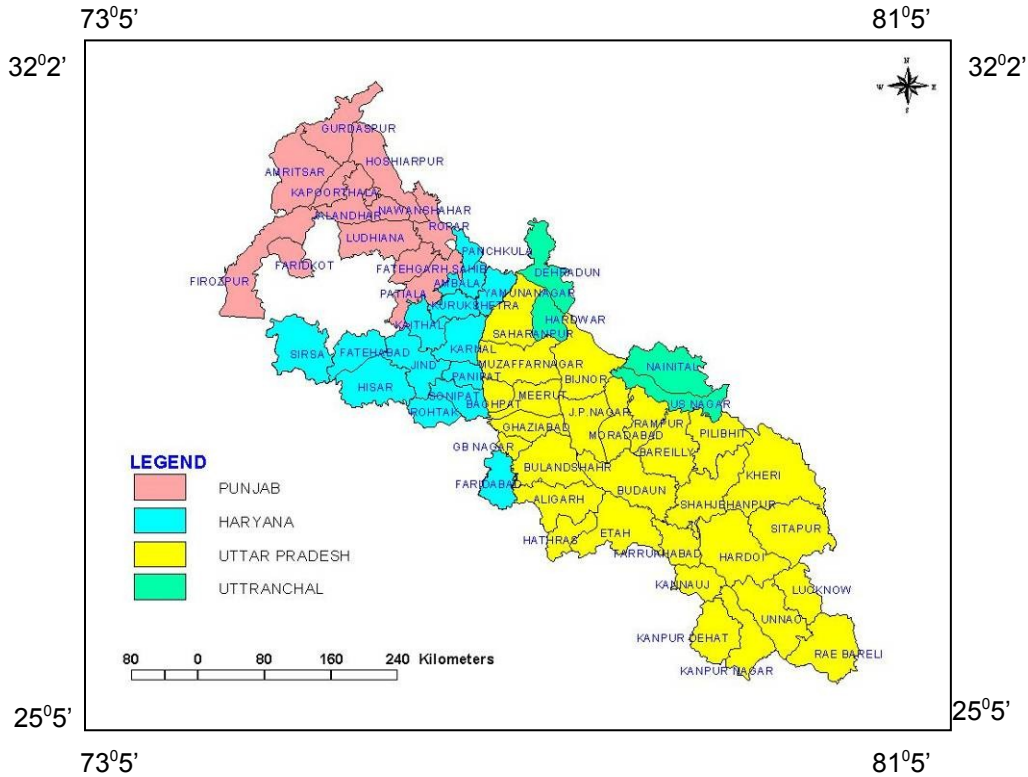


Figure1: Study Area for Basmati Estimation Kharif 2005

#### 4. Scope of the Study

To validate remote sensing based estimated production with the produce arrival in the market.

#### 5. Methodology & Analysis

Basmati acreage was estimated on the basis of image interpretation and GPS based field signature. Classification of different varieties of Basmati was carried out using two methods i.e. Time Series Classification and Supervised Classification of the satellite data supported by ground truthing.

Market arrival data was collected from important mandis at block/tehsil level and mandi boards at district and state level. The study team also interacted with various Rice mills in the districts and met Agents (Arthias) to drive out the market scenario. In Punjab and Haryana mandi arrivals for rice and basmati was collected, whereas in the case of Uttar Pradesh and Uttaranchal only paddy arrivals was recorded and no separate records for Basmati maintained. For these states paddy (including Basmati) arrivals data was collected at different levels.

The analysis was undertaken on the basis of estimated production (through Kharif 2005 study) using Remote Sensing technique, and the total Basmati arrivals in the mandis for all the four states. In the case of UP and Uttaranchal where Basmati arrivals not available separately a different methodology was adopted.

Analysis was carried out based on information collected from various sources like discussions with respective mandi officials, mandi agents (Arthias), and rice millers. It was found that in case of Punjab, 10-15% of total estimated Basmati produce was stocked for “personal use & seed purpose” by large land holding farmers. The same was only 2-5% in case of Haryana. The difference is due to the fact that Haryana farmers sell most of their produce for commercial purposes and also land holdings are much smaller than Punjab.

In Punjab about 15% of Basmati produce being kept for personal use and seed purposes and 25-30% of the produce sold out through other channels that include contract farming, millers, agents and unorganized sector (Figure 2), whereas in the case of Haryana 15% of Basmati produce being kept for personal use and seed purposes and about 20% of the produce sold out through other channels that include contract farming, millers, agents and unorganized sector (Figure 3).

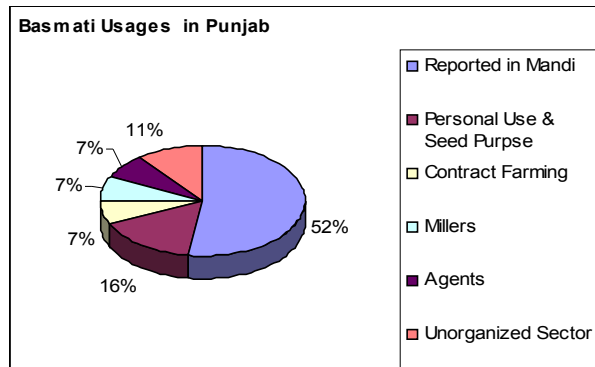


Figure 2: Basmati usages in Haryana

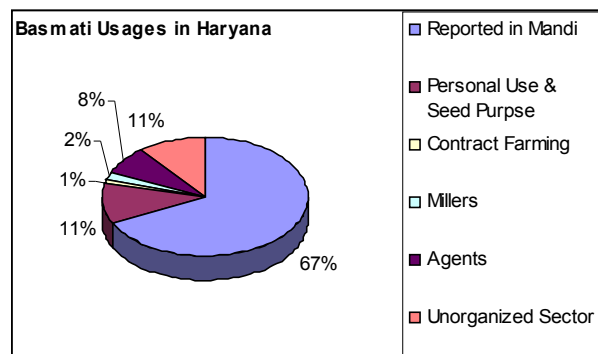


Figure 3: Basmati usages in Haryana

Analysis results and comparison for Punjab and Haryana is given in Figure 4 and 5 respectively.

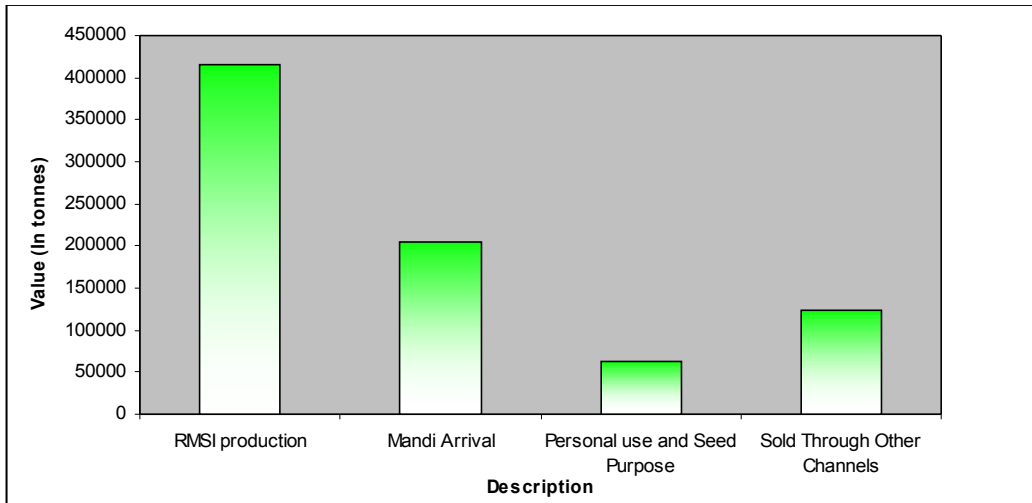


Figure 4: Comparison of RMSI Production and Basmati Arrivals for Punjab

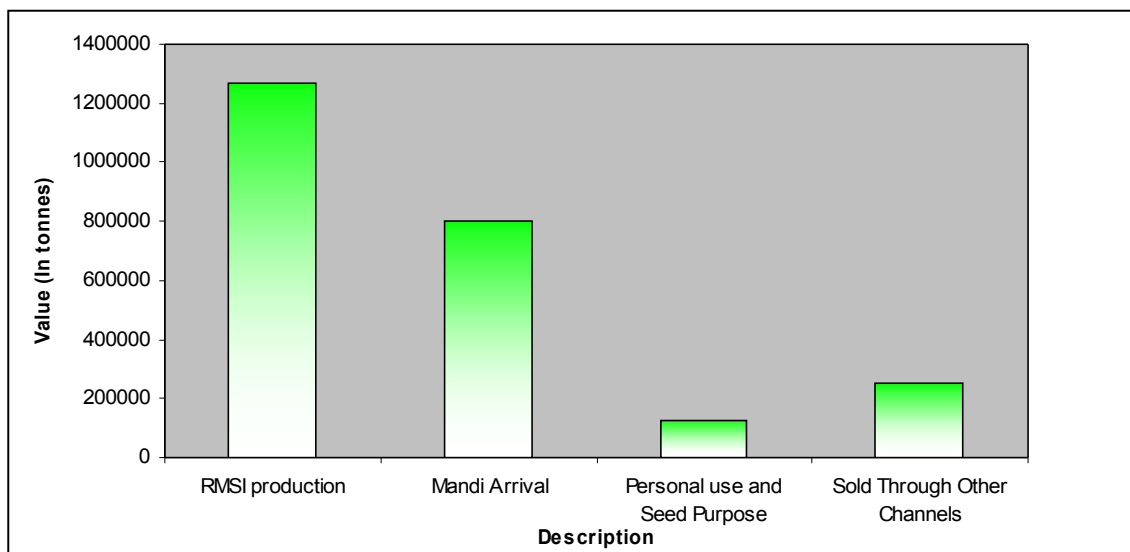


Figure 5: Comparison of RMSI Production and Basmati Arrivals for Punjab

In case of Uttar Pradesh and Uttaranchal the arrival of Basmati was not available therefore analysis was undertaken on the basis of following parameters:

- Total rice arrivals in the mandis multiplied by the ratio of estimated Basmati to total rice production (through Kharif-2005 study) in the respective states.
- Estimation of other uses and sale through other channels based on information gathered from various sources & through discussions with farmers, agents & millers.

For these states Basmati arrivals have been calculated through a statistical equation based on simple ratio of Basmati produce to rice produce multiplied by rice arrivals in Mandis.

Basmati Produce was taken from Kharif-2005 report and total rice produce is calculated from reported acreage multiplied by district-wise yield for Kharif-2005. "Yield data" was taken from "Kharif Production Programme-2006" report published by Directorate of Agriculture Deptt, Govt of Uttar Pradesh<sup>1</sup>.

$$B_a = R_a * (B_p/R_p)$$

Whereas,

$B_a$  = Basmati arrivals in mandi

$B_p$  = Basmati produce 2005

$R_a$  = Rice arrivals in mandi

$R_p$  = Rice produce 2005

During the data collection it was found that in these states good amount of Basmati being sold out through unorganized sector and also being kept for other purposes like personal use & seed purpose. On the basis of discussion with farmers, Arthias, Mandi officials it has been concluded that in UP and Uttaranchal 10-15% of total produce kept for personal use and seed purposes and 15-20% sold out through unorganized sectors (Figure 4 and Figure 5).

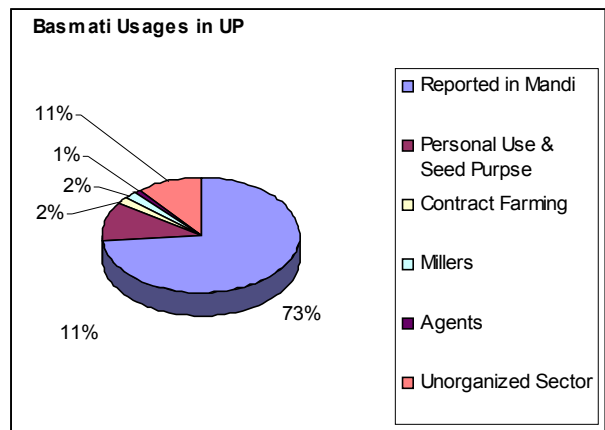
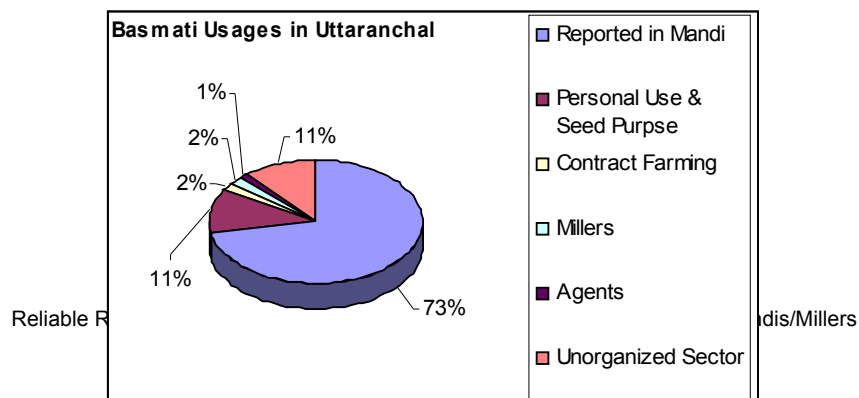


Figure 4: Basmati usages in Uttar Pradesh



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dis/Millers

Figure 5: Basmati usages in Uttaranchal

The analysis and comparison for Uttar Pradesh and Uttaranchal in figure 6 and 7 respectively.

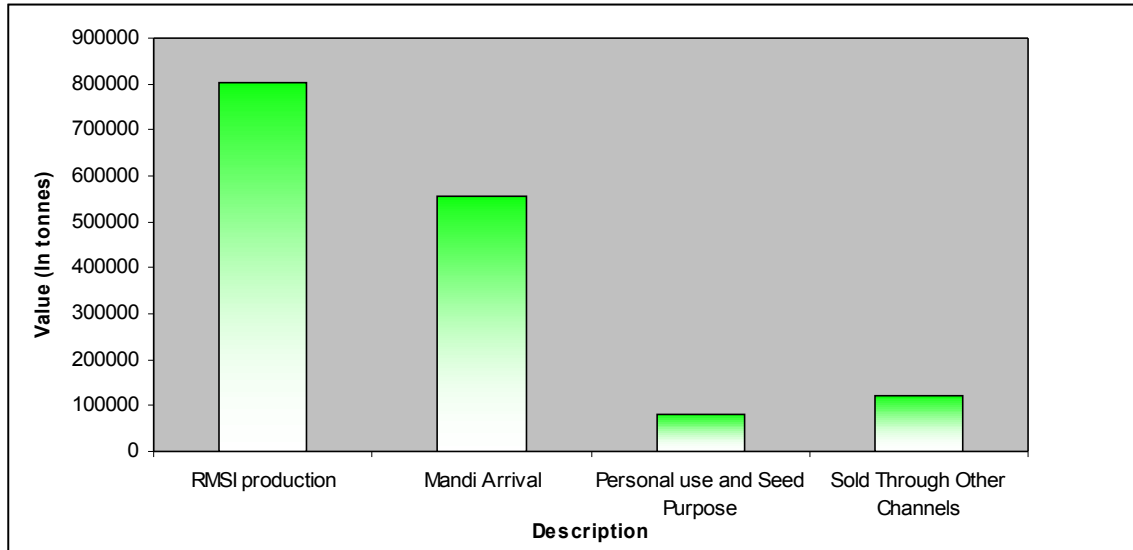


Figure 6: Comparison of RMSI Production and Basmati Arrivals for Uttar Pradesh

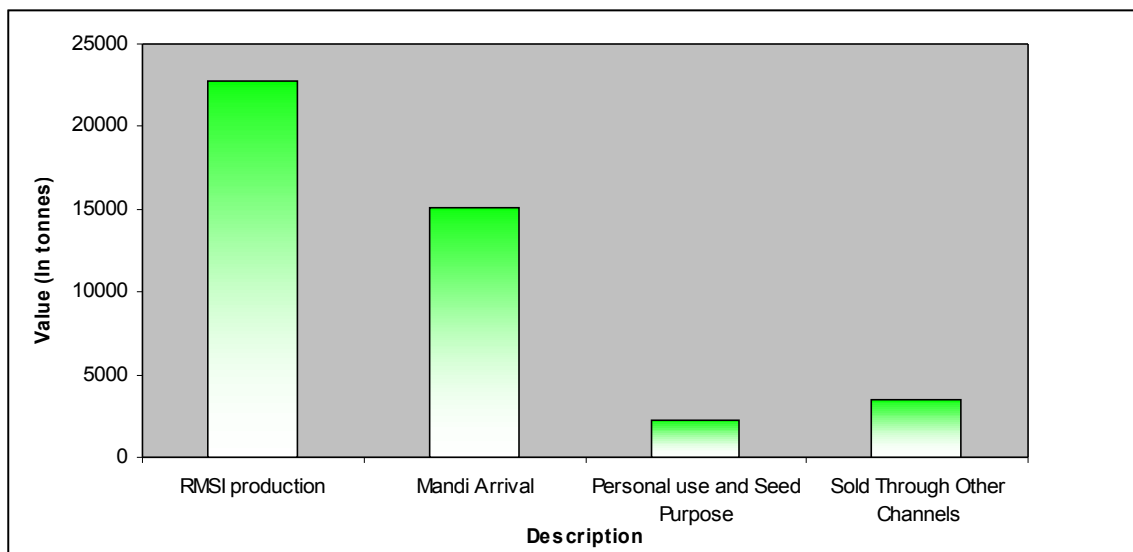


Figure 7: Comparison of RMSI Production and Basmati Arrivals for Uttaranchal

Certain observations recorded during Mandi survey were:

- Large-land holding farmers prefer to sell their produce at higher price; they prefer to move to other district mandis or state mandis or keep stock of some quantity.
- Some millers buy produce directly from farmers that may not be included in the mandi arrivals

## **6. Conclusion**

Based on comparative analysis between Kharif 2005 estimates and Mandi arrivals (As well as allied sources) at the end of agricultural year 2005-06 and considering certain assumptions, limitations, it is concluded that the estimated figure reported through Kharif 2005 study is matching up to an accuracy of 94% and 93% in the case of Punjab and Haryana respectively. While in case of UP and UA it was 94% and 90% respectively at 100% confidence level.

The cumulative comparison of total estimated production and total accounted Basmati gives an accounted basmati percent of 93.67% for four states.

## **References:**

1. Kharif Production Programme (2006). Department of Agriculture Uttar Pradesh, Lucknow, Government of UP.

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