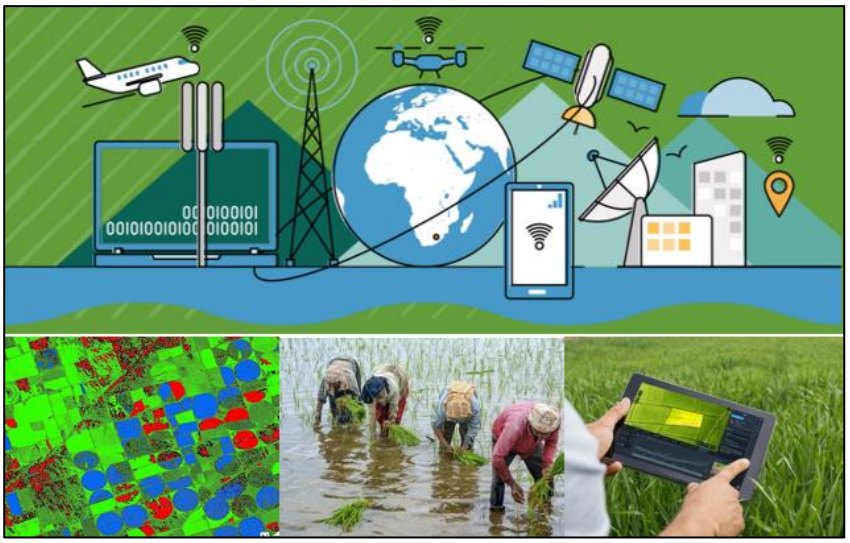
Crop Survey for Estimation/Assessment of Acreage, Crop Health and Expected Yield of Basmati Rice During Kharif-2023

Volume: I



Submitted To:

Dr. DDK Sharma,
Director, Basmati Export Development Foundation
Agricultural & Processed Food Products Export Development Authority,
Ministry of Commerce, Govt. of India, NCUI Building,
3, Siri Institutional Area, August Kranti Marg,
New Delhi 110 016

Submitted By:

LeadsConnect Services Pvt. Ltd.
1601, 16th Floor, World Trade Tower,
Plot No. C-001, Sector-16, Noida (U.P.) 201301
Tel: 0120 4573 110

Contents

1. Executive Summary:

- Basmati is one of the most popular long-grain rice varieties due to its texture, nutty flavour, and popcorn-like aroma. Much of the basmati rice is cultivated in India and India is the major exporter of Basmati rice.

- The scope of present report (Vol. I) is to provide field and satellite data-based crop acreage of total paddy in different states of study area. The current report also covers the estimates of field survey-based acreage estimation of all paddy, information of Basmati varieties, other non-notified selected varieties found in field during survey and details of seed distribution in study area.

- The study area has covered total 85 districts, which includes 23 districts of Punjab, 30 districts of Uttar Pradesh, 22 districts of Haryana, 3 Districts of Jammu & Kashmir, 4 districts of Uttarakhand, 2 districts of Himachal Pradesh and NCT of Delhi.

S. No.	State Name	Acreage (000'Ha) 2022	Acreage (000'Ha) 2023	Deviation	Flooded Area (000'Ha)
1	Punjab	3081	2969	-4%	125
2	Haryana	1325	1280	-3%	90
3	Uttar Pradesh	1536	1577	3%	15
4	Uttarakhand	121	120	-1%	
5	Jammu & Kashmir	100	99	-1%	
6	Himachal Pradesh	46	43	-6%	
	Total	**6209**	**6090**	**-2%**	

- Satellite data and field survey observation base study was carried out for estimation of Basmati acreage. The largest acreage under paddy is found in state of Punjab, which is about 2969 thousand hectares, followed by Uttar Pradesh (1577 thousand ha) and Haryana (1280 thousand ha). There are now 120, 99, and 43 thousand hectares of paddy being grown in the targeted districts of Uttarakhand, Jammu & Kashmir, and Himachal Pradesh, respectively.

- A field Survey was scheduled from 21st July to 27th July in all the districts of Punjab, Haryana, and Uttar Pradesh. During the field survey it was observed that major Basmati Rice transplanting is done in the month of July. The most sown Basmati varieties in study area are PB1509, 1692, 1847 followed by PB1121, 1718, 1825, 1885 and PB1401 (PB-1, PB-4, PB-5, PB-6 and PB-1886).

- During the Basmati field survey, a few new varieties, such as PB-1885, PB-1847, and PB-1886, are also spotted in the field.

- According to the field survey report and farmer-based interaction, it is revealed that the Basmati area has increased in Punjab and Uttar Pradesh as compared with previous year.

- It is also observed that, Paddy crop area has increased while cotton crop area has decreased in the states of Punjab and Haryana in comparison of Previous Year as told by the Farmers present on the field.

- As per the details of seed information and field-based observation highest Basmati area was observed in Punjab (Approx. 750-800) followed by Haryana (Approx.700-750) and Uttar Pradesh (Approx. 450-500) thousand ha.

- Normal rainfall conditions are observed in many districts of Jammu & Kashmir. Mixed distribution of Rainfall observed in Uttar Pradesh however normal rainfall condition is noticed in most of the districts of Uttar Pradesh. Excess rainfall was reported in western part of Himachal Pradesh and NE part of Punjab and Haryana. Heavy rainfall was departed in all Basmati states except J&K in the 2nd week of July.

- Flood condition was also seen near rivers/drainage in Punjab and Haryana. Due to excess rainfall and damage of canals at some places crop was submerged and affected in agriculture fields. However, nurseries are being prepared by farmers in these areas for re-transplanting of paddy crop. Therefore, transplanting of paddy crop may continue till 1st week of August.

2. Introduction:

Among the food grains exported from India, basmati rice is a significant export product. Basmati rice is mostly farmed in India for export. a significant amount of money was made from exporting this fragrant rice product. The majority of the world's basmati rice production and exports come from India. It produces 75% of the world's basmati rice. Every year, India exports Basmati to close to 132 nations. Iran, Saudi Arabia, the United Arab Emirates, and Iraq are the main importers of these. For exporters and farmers alike, timely information regarding crop acreage, crop health, and crop varietal distribution may be essential in this situation. It aids exporters and other Basmati trade decision-makers in making judgements on the quantity and timeline.

Basmati rice is the one of the costly food grains in the world since its price is mostly set and it commands high rates on the worldwide market. Basmati rice is increasingly becoming the choice across consumer groups mainly because of its superior taste and aroma that is highly pleasing to the senses. India now has a fantastic chance to export Basmati rice to other nations. There are many downstream applications for basmati rice, and recently, deep processing and direct edible uses have elevated basmati rice to a more prominent position. The primary factor propelling the basmati rice market globally is the rise in demand for Direct Edible.

LeadsConnect services Pvt. Ltd. is working with BDEF for the estimation/assessment of acreage, crop health and expected yield of Basmati rice during 2022 and 2023. Basmati occupies a special status in Rice cultivation. It is a variety of long, slender grained, aromatic rice. In India, Basmati rice is grown in the specific geographical area, at the Himalayan foothills confined into few states of India. As part of scope, Basmati survey to be carried out in seven area viz., Punjab, Haryana, Himachal Pradesh, Uttarakhand, Delhi, Western UP and J&K. These states are located at northern parts of our country.

Keeping this in view, the Basmati Export Development Foundation (BEDF), New Delhi awarded M/s. LeadsConnect services Pvt. Ltd. the work of Crop Survey for estimation/assessment of acreage, crop health and expected yield of Basmati rice during 2023. This will include all basmati rice crop varieties differentiated in traditional and evolved varieties of Basmati rice and Sharbati and Sugandha varieties of non-Basmati. Survey will be attempted through the satellite imageries and field-based methods for assessment of acreage, crop health and yield of Basmati rice during Kharif 2023.

The use of Satellite Image based Remote Sensing and GIS technique offers an effective system for monitoring crops, its type, Crop health and acreage estimation at large spatial extent. The remote sensing-based solution is relatively quick, affordable, and more successful. Additionally, remote sensing sensors are a great option for retrieving temporal information about crop phenology, plant health (stress), response to weather, and soil nutrients (such as manure and fertilizer) due to their repetitive data acquisition capabilities. Monitoring agricultural crops and export vegetation phenology is made possible by the free availability of optical remote sensing data from Sentinel-2 satellites with multiple spectral bands in the red, red edge, and near infrared (NIR). The present study has been conducted on area, production and productivity of basmati rice of India. The nature of data used for study is based on the Remote sensing, field-based study and secondary data collected from different sources. The growth in area, productivity and production of basmati rice was measured by integrated methods applied for the study.

The present report gives the detail analysis of the paddy acreage Status and majorly transplanted Basmati

varieties in the designated districts of the project. In the line with scope of the project, an app-based field survey was also conducted by LeadsConnect to know the current status of paddy in Basmati growing districts in different states.

3. Objective and Scope of work:

The major objective of the project can be listed as:

1. "Field based survey to be carried out on the basis of sample group of farmers selected at district level in seven GI area states viz., Punjab, Haryana, Himachal Pradesh, Uttarakhand, Delhi, Western UP and J&K".
2. To provide Remote Sensing based estimation of Crop Area, Crop Health and Production estimate of notified BasmatiRice varieties.

The scope of work which included satellite images and field-based survey will cover the following activities:

1. Acreage estimation of all basmati rice crop varieties differentiated in traditional and evolved varieties of Basmati rice and Sharbati and Sugandha varieties of non-Basmati. Reports will be submitted on district level basis for each state.
2. Variety-wise Crop Health Monitoring and Analysis.
3. Variety-wise Crop maturity survey, describing the percentage of acreage under particular crop growth.
4. Climate based yield modeling using historical yield and climate data (10 years) in order to predict yield well in advance.
5. Questionnaire based sample survey of farmers for area/districts mentioned above with a suitable sample size covering all blocks of the respective districts. The sample size may be arrived at, taking in to view the crop density in the concerned block. The contact details of the farmers included in the survey may be provided. Reports to mention as to how many farmers and how much crop area has been covered from each block/district.
6. Percentage-wise sale/distribution of basmati seeds by different agencies including Govt. sources, private sector for each variety. This information should be contained in report for the month of July.
7. Crop cutting experiment in sample areas for yield estimation.

4. Study Area:

The study area includes total 85 districts of Basmati rice and non-Basmati rice (Sharbati and Sugandha), which includes

- 23 Districts of Punjab,
- 30 Districts of Uttar Pradesh,
- 22 Districts of Haryana,
- 3 Districts of Jammu & Kashmir,
- 4 Districts of Uttarakhand,
- 2 District of Himachal Pradesh and
- NCT of Delhi.

The map of the entire study area including all districts in the designated States is being given below:

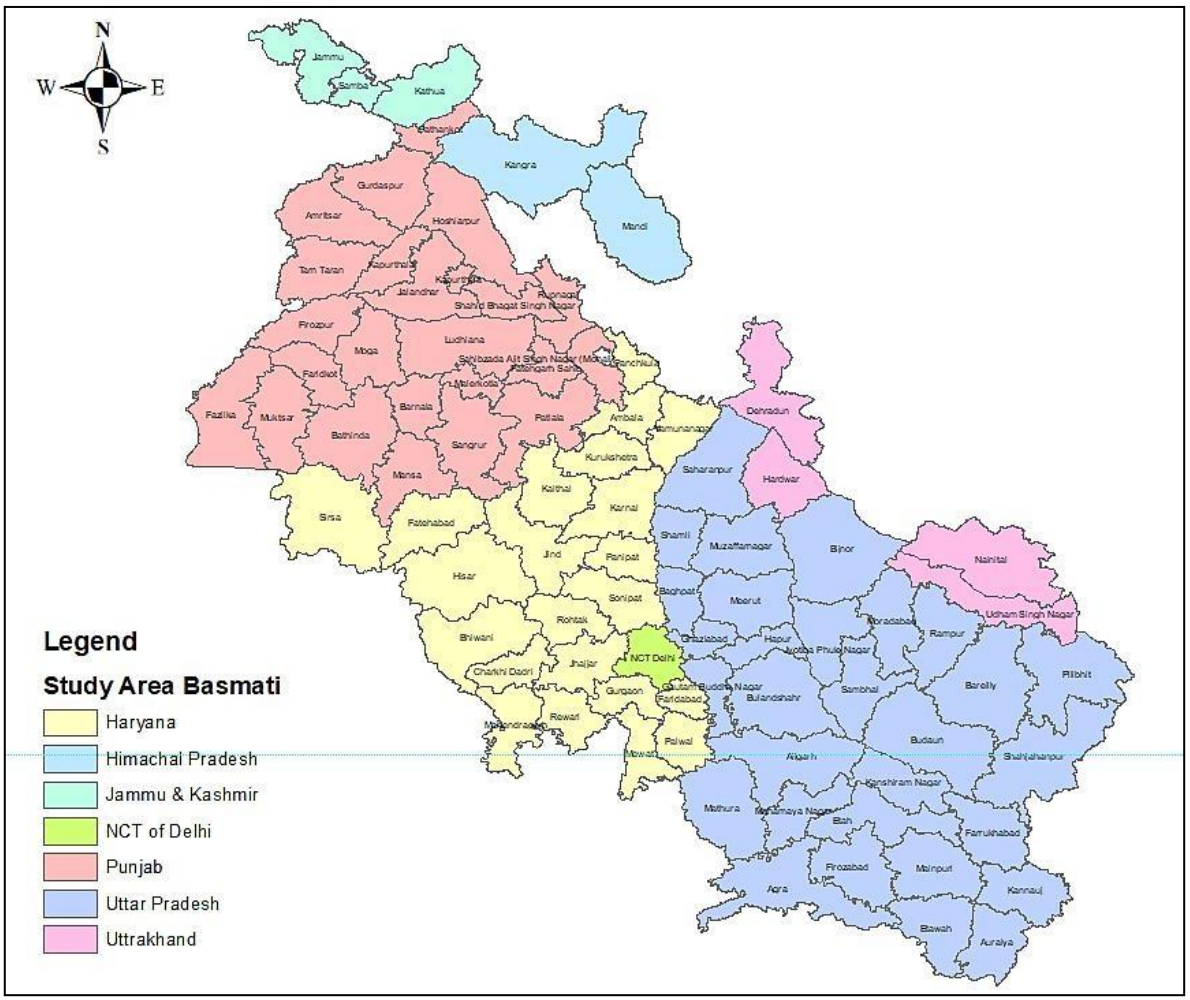


Fig. 1: Project Study area

5. Approach & Methodology:

- **Rice Acreage Estimation:**

Remote sensing-based approach supported with field-based survey input is used for current study. The following methodologyis used for acreage estimation which is depicted in the process flow given below:

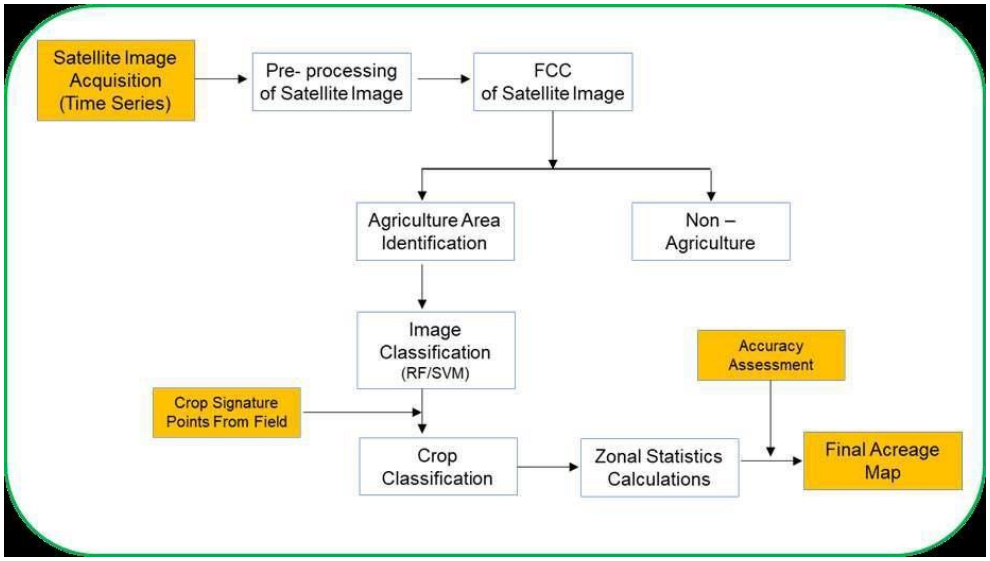


Fig. 2: Crop clarification using Remote sensing

The details of the adopted methodology can be summarised as below:

- Temporal satellite data of sentinel – 1 (SAR) was used for remote sensing based sowing estimation.
- Pre-processing of satellite data was performed, and all necessary corrections applied to remove errors in satellitedata.
- Ground control points (GCP) was used for classification and validation of remote sensing-based Rice areaestimation.
- FCC was generated using temporal dates for better interpretation. Non- agri area was removed and crop mask wasprepared. Date range which used for acreage estimation of rice is given in table:

State	Satellite Data Used	Data Duration (2023)
Punjab	Temporal Sentinel-1 SAR	10th June to 21st July
Haryana	Temporal Sentinel-1 SAR	10th June to 21st July
Uttar Pradesh	Temporal Sentinel-1 SAR	13th June to 19th July
Uttarakhand	Temporal Sentinel-1 SAR	05th June to 11th July
Jammu & Kashmir	Temporal Sentinel-1 SAR	10th June to 16th July
Himachal Pradesh	Temporal Sentinel-1 SAR	10th June to 16th July

- To achieve the accuracy of crop classification, a field survey is done during 21st July to 27th July 2023 in different districts of Haryana, Punjab and Uttar Pradesh. During field survey, estimation of sowing, GCP point collection for crop signature, field photographs and discussion-based crop condition was assessed. This information was used forthe finalization of sowing status in study area.
- Image classification was performed using suitable software and reliable ground truth information to get the area statistics of rice.
- Ancillary data collected from different sources were also used for paddy area validation.

6. Results:

- **Satellite Image and Field based Rice Acreage**

Sowing acreage estimation was executed using hybrid approach. Sentinel – 1 (SAR) data was used for classification of rice crop with the help of GCP and other ground truth information collection during field in study area. State wise acreage map and area statistics is given below for each state. Estimated Rice acreage in Punjab is about 2969.14 000'Ha followed by 1577.83, 1280.61, 120.23, 99.45 & 43.30 thousand hectares in Uttar Pradesh, Haryana, Uttarakhand, Jammu & Kashmir and Himachal Pradesh respectively.

S. No.	State Name	Acreage (000'Ha) 2022	Acreage (000'Ha) 2023	Deviation	Flooded Area (000'Ha)
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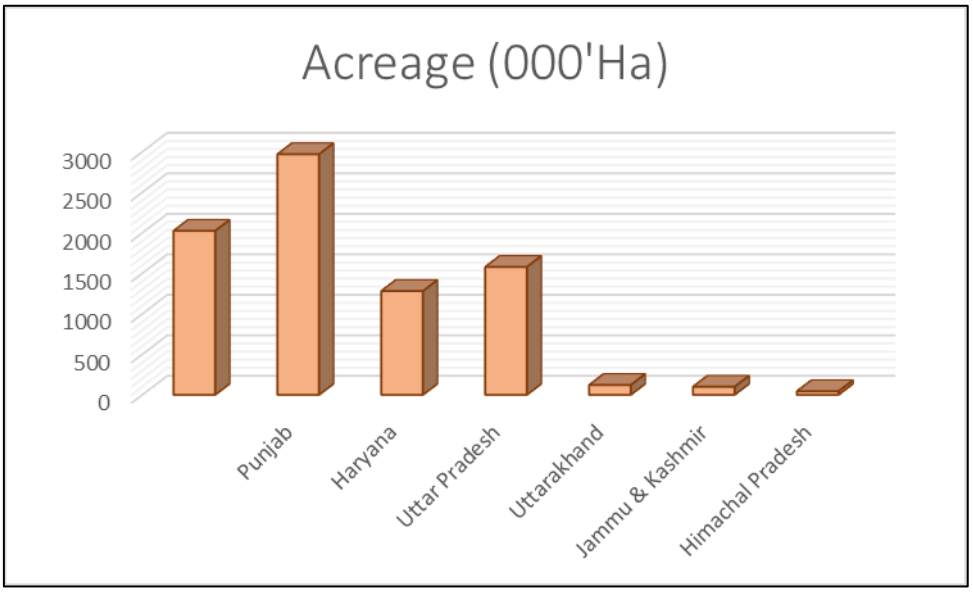


Acreage of Paddy 2023

Paddy Acreage- Punjab:

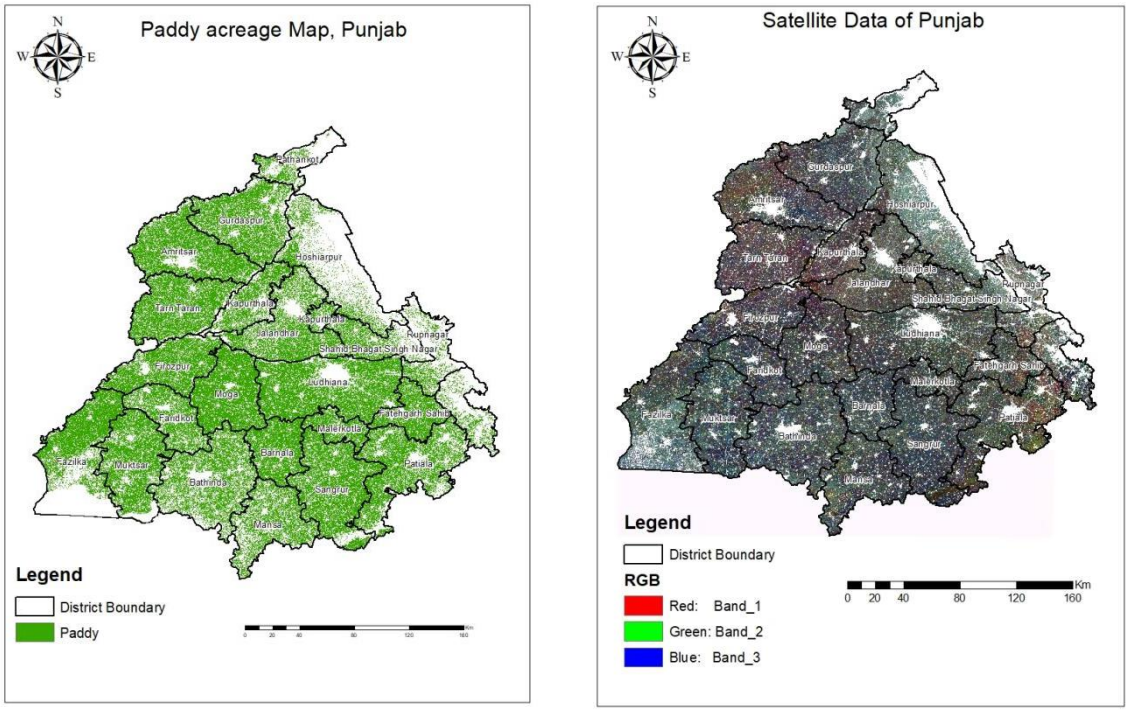


Fig. 3: Paddy acreage map and satellite data, Punjab

Satellite data and field-based Rice acreage detail of Punjab				
S. No.	**State Name**	**District Name**	**Acreage (000'Ha) 2022**	**Acreage (000'Ha) 2023**
1	Punjab	Amritsar	181.33	179.08
2		Barnala	101.39	99.18
3		Bathinda	177.99	178.34
4		Faridkot	111.82	94.76
5		Fatehgarh Sahib	84.60	84.25
6		Fazilka	183.34	172.44
7		Firozpur	143.91	146.11
8		Gurdaspur	169.66	167.49
9		Hoshiarpur	74.85	75.22
10		Jalandhar	172.65	156.08
11		Kapurthala	106.19	91.24
12		Ludhiana	252.14	252.03
13		Malerkotla	51.29	51.03
14		Mansa	110.17	122.16
15		Moga	177.62	170.64
16		Muktsar	190.14	176.09
17		Pathankot	26.66	27.80
18		Patiala	230.80	204.14
19		Rupnagar	38.76	38.45
20		Sahibzada Ajit Singh Nagar (Mohali)	28.32	27.52
21		Sangrur	228.83	223.47
22		Shahid Bhagat Singh Nagar	57.88	57.71
23		Tarn Taran	181.18	173.90
	Total		**3081.50**	**2969.14**

The highest acreage of paddy is observed in Punjab which is of 2969.14 thousand hectares. In Punjab highest acreage is observed in Ludhiana district followed by Sangrur while lowest acreage is observed in Sahibzada Ajit Singh

Nagar (Mohali). The total area observed in state in the year 2023 is less if we compare with last year 2022.

Paddy Acreage-Haryana:

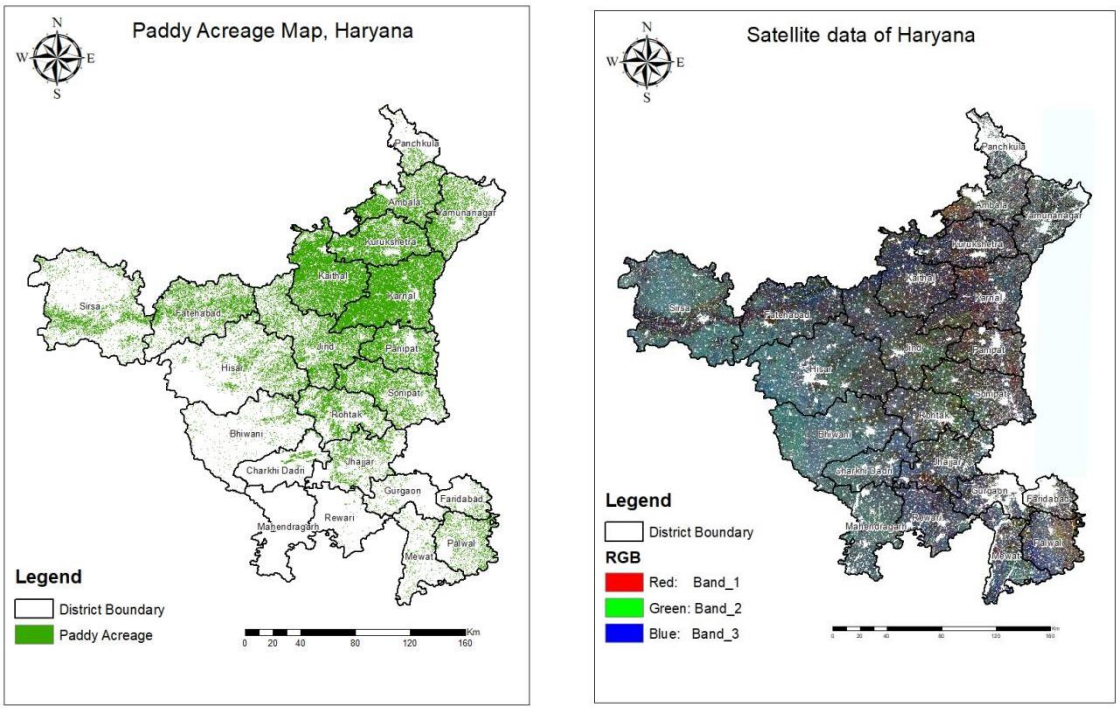


Fig. 5: Paddy acreage map and satellite data, Haryana

Satellite data and field-based Rice acreage detail of Haryana				
S. No.	**State Name**	**District Name**	**Acreage (000'Ha) 2022**	**Acreage (000'Ha) 2023**
1	Haryana	Ambala	84.86	80.49
2		Bhiwani	21.65	19.95
3		Charkhi Dadri	9.14	8.93
4		Faridabad	12.17	9.27
5		Fatehabad	89.03	88.15
6		Gurgaon	5.70	5.48
7		Hisar	66.44	69.64
8		Jhajjar	39.47	38.21
9		Jind	120.79	118.77
10		Kaithal	160.03	159.21
11		Karnal	173.81	166.90
12		Kurukshetra	112.33	105.51
14		Mewat	10.98	11.43
15		Palwal	35.89	33.42
16		Panchkula	10.98	9.60
17		Panipat	74.74	72.09
18		Rewari	2.08	1.91
19		Rohtak	57.68	55.77
20		Sirsa	71.84	69.86
21		Sonipat	92.42	89.21
22		Yamunanagar	72.53	66.83
		Total	**1324.56**	**1280.61**

In Haryana, paddy acreage is 1280.61 thousand hectares. Karnal district has the highest acreage and Rewari has the lowest. The total area of paddy is less in comparison of last year 2022.

Paddy Acreage- Uttar Pradesh:

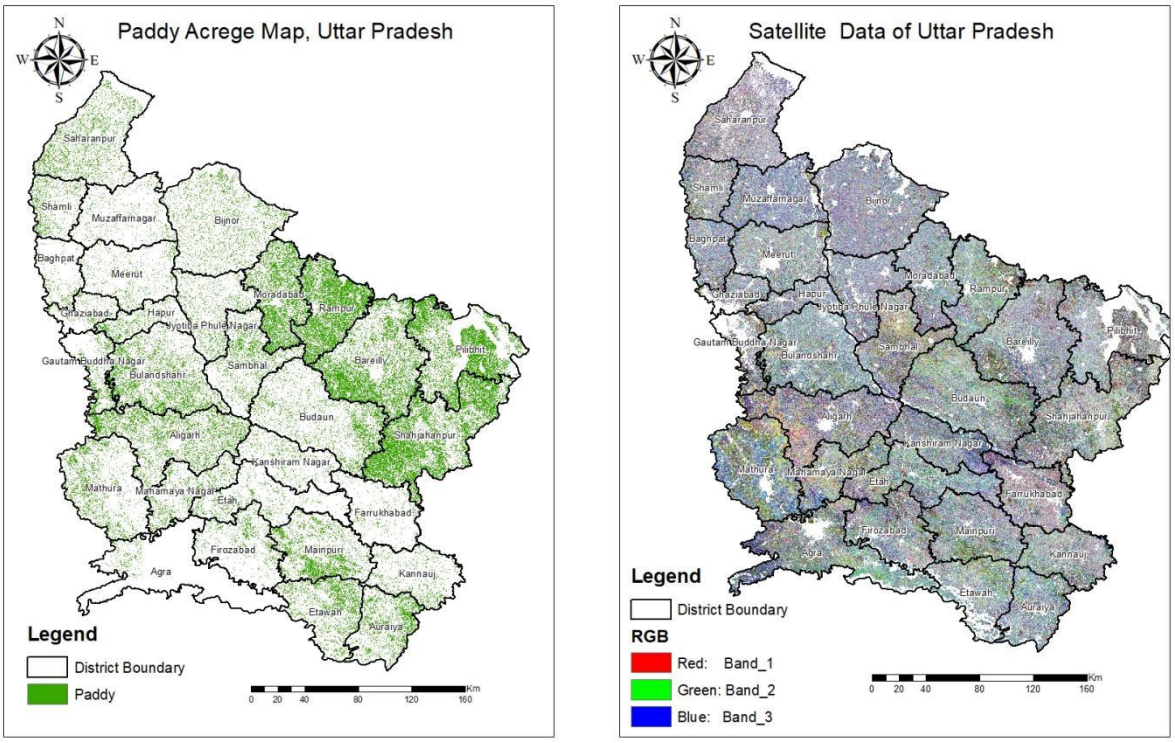


Fig. 6: Paddy acreage map and satellite data, Uttar Pradesh

Satellite data and field-based Rice acreage detail of Uttar Pradesh				
S. No.	State Name	District Name	Acreage (000'Ha) 2022	Acreage (000'Ha) 2023
1	Uttar Pradesh	Agra	5.27	6.05
2		Aligarh	91.06	93.87
3		Auraiya	44.95	46.69
4		Baghpat	1.98	7.75
5		Bareilly	147.69	148.45
6		Bijnor	55.62	54.18
7		Budaun	44.54	64.05
8		Bulandshahr	89.17	93.12
9		Etah	18.02	20.40
10		Etawah	52.30	53.30
11		Farrukhabad	10.48	10.38
12		Firozabad	20.93	23.33
13		Gautam Buddha Nagar	20.51	19.78
14		Ghaziabad	9.69	9.60
15		Hapur	17.95	17.89
16		Jyotiba Phule Nagar	24.51	25.72
17		Kannauj	19.01	20.51
18		Kanshiram Nagar	17.72	16.14
19		Mahamaya Nagar	22.27	26.64
20		Mainpuri	62.67	63.48
21		Mathura	48.42	47.24
22		Meerut	15.32	17.42
23		Moradabad	90.29	91.87
24		Muzaffarnagar	11.21	12.27
25		Pilibhit	135.72	132.75
26		Rampur	136.66	129.84
27		Saharanpur	57.07	60.60
28		Sambhal	38.70	39.70
29		Shahjahanpur	207.02	204.85
30		Shamli	19.19	19.96
		Total	**1535.93**	**1577.83**

The acreage of Basmati Rice is observed in Uttar Pradesh which is of 1577.83 (000 Ha). In UP highest acreage is

observed in Shahjahanpur district followed by Bareilly while lowest acreage is observed in Agra.

Paddy Acreage-Uttarakhand:

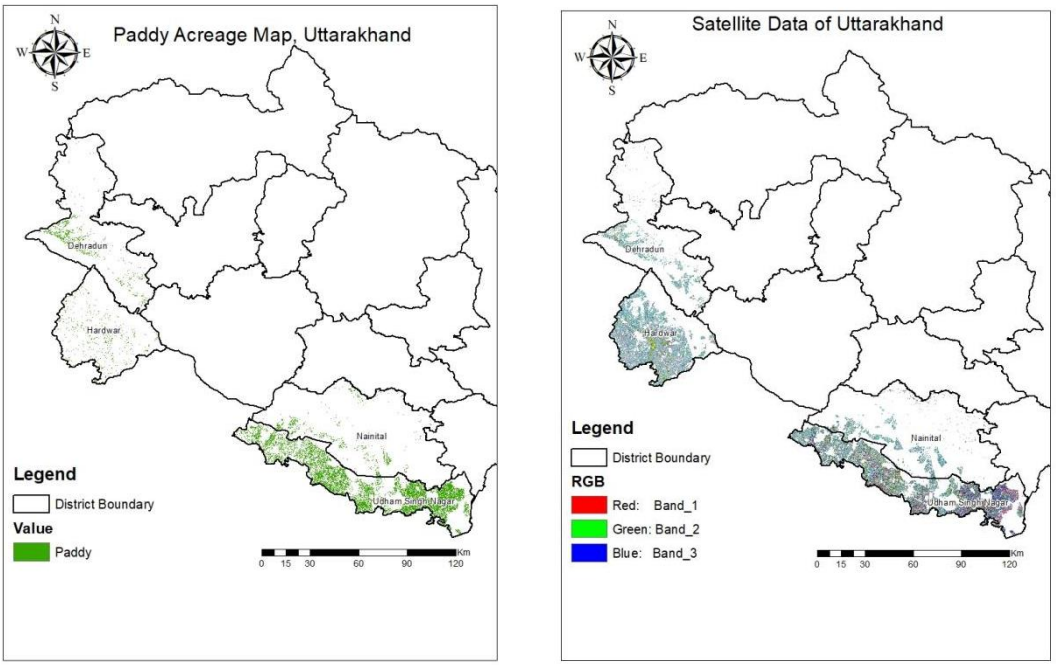


Fig. 7: Paddy acreage map and satellite data, Uttrakhand

Satellite data and field-based Rice acreage details of Uttarakhand				
S. No.	**State Name**	**District Name**	**Acreage (000'Ha) 2022**	**Acreage (000'Ha) 2023**
1	Uttarakhand	Dehradun	8.39	9.40
2		Hardwar	13.53	11.78
3		Nainital	9.75	9.84
4		Udham Singh Nagar	88.80	89.22
Total			**120.46**	**120.23**

The acreage of Basmati Rice is observed in Uttarakhand which is of 120.23 thousand hectares. In Uttarakhand highest acreage is observed in Udham Singh Nagar district followed by Hardwar while lowest acreage is observed in Dehradun.

Paddy acreage-Jammu & Kashmir:

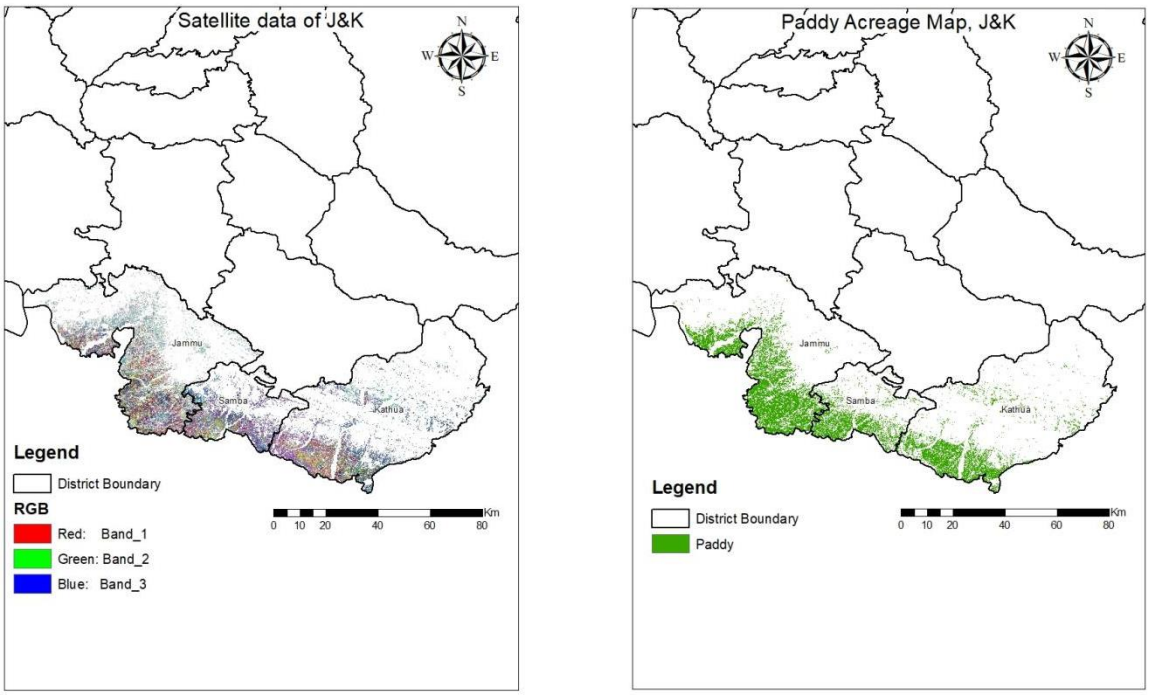


Fig. 8: Paddy acreage map and satellite data , Jammu & Kashmir

Satellite data and field-based Rice acreage detail of Jammu & Kashmir				
S. No.	**State Name**	**District Name**	**Acreage (000'Ha) 2022**	**Acreage (000'Ha) 2023**
1	Jammu & Kashmir	Jammu	52.85	51.15
2		Kathua	28.279	29.22
3		Samba	19.087	19.09
	Total		**100.21**	**99.45**

The acreage of Basmati Rice is observed in J& K which is of 99.45 thousand hectares. In J&K highest acreage is observed in Jammu district followed by Kathua while lowest acreage is observed in Samba.

Rice Acreage-Himachal Pradesh:

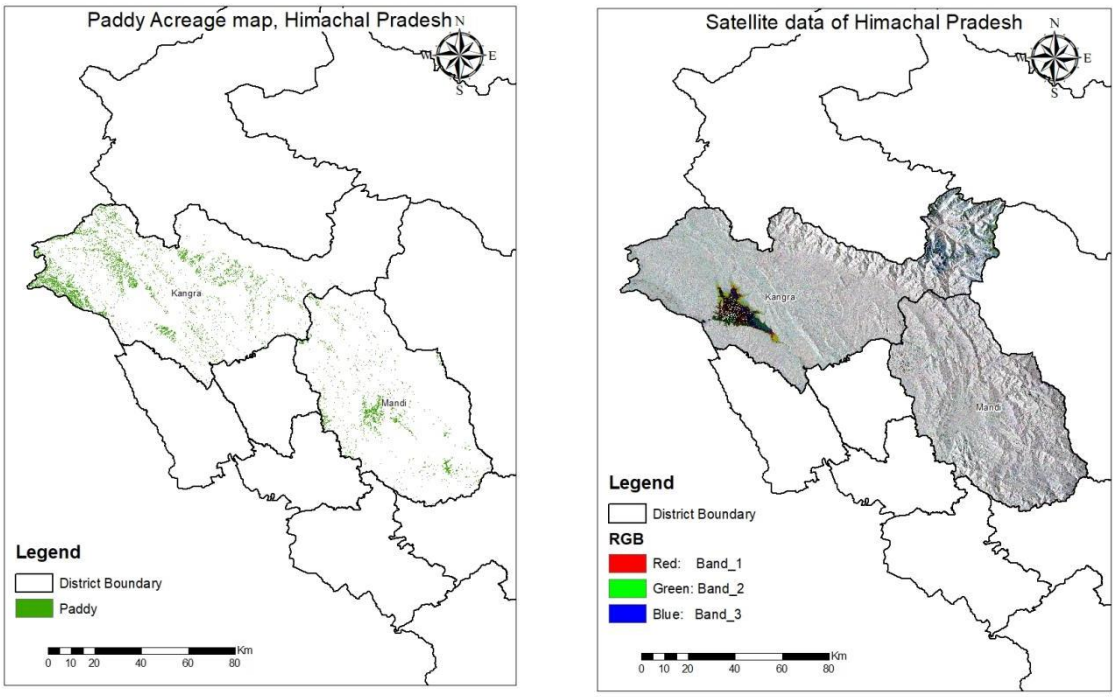


Fig. 9: Paddy acreage map and satellite data, Himachal Pradesh

Satellite data and field-based Rice acreage detail of Himachal Pradesh				
S. No.	**State Name**	**District Name**	**Acreage (000'Ha) 2022**	**Acreage (000'Ha) 2023**
1	Himachal Pradesh	Kangra	31.20	31.49
2		Mandi	14.48	11.80
	Total		**45.69**	**43.30**

The acreage of Basmati Rice is observed in Himachal Pradesh which is of 43.30 thousand hectares. In Himachal Pradesh highest acreage is observed in Kangra while lowest acreage is observed in Mandi.

7. Rainfall Status:

- As per the rainfall observed till date, normal rainfall is observed in many districts of Punjab, and Haryana. However excess rainfall conditions are also seen in districts of NE part of Punjab and NE part of Haryana. Overall good rainfall conditions are observed in Haryana and Punjab state.
- Normal Rainfall condition has been observed in most of the districts of Uttar Pradesh. Few districts received excess rainfall. Overall good rainfall condition is witness in state till date.
- In Uttarakhand, normal rainfall is observed in area of basmati districts. Basmati districts of Himachal Pradesh and J&K are also showing the normal rainfall conditions.

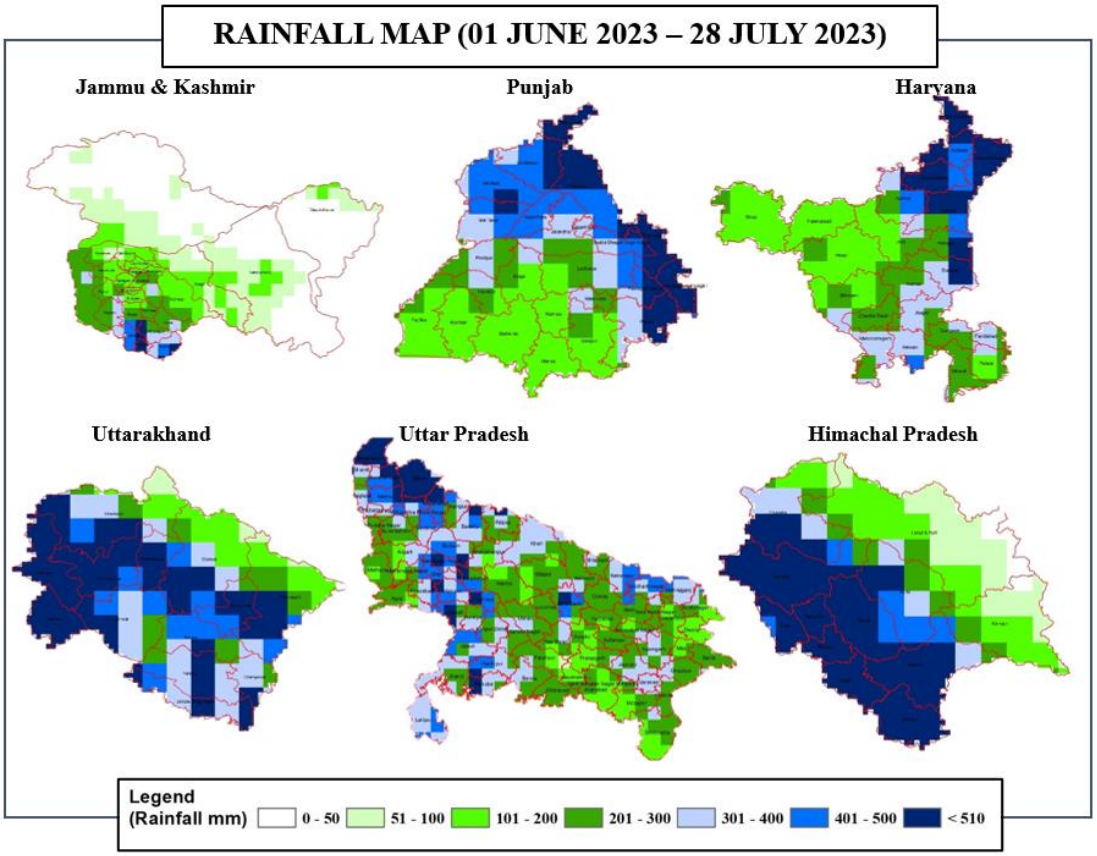
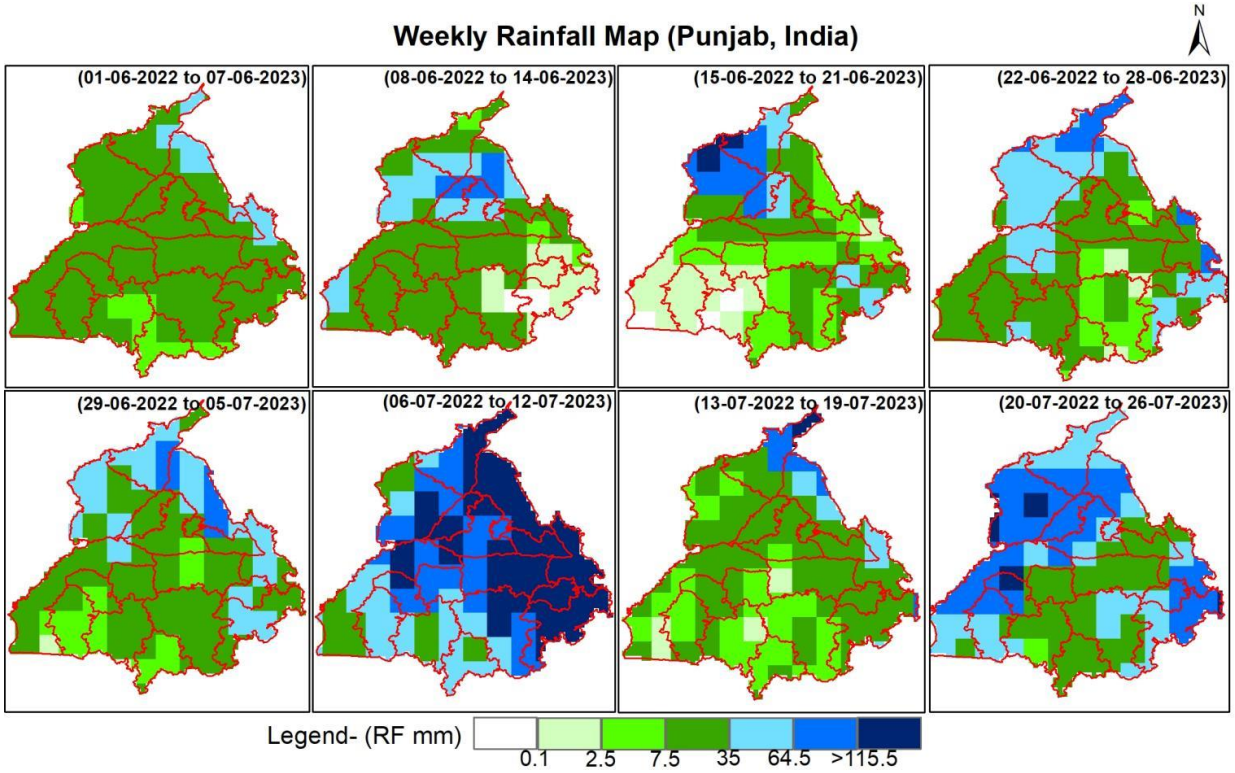
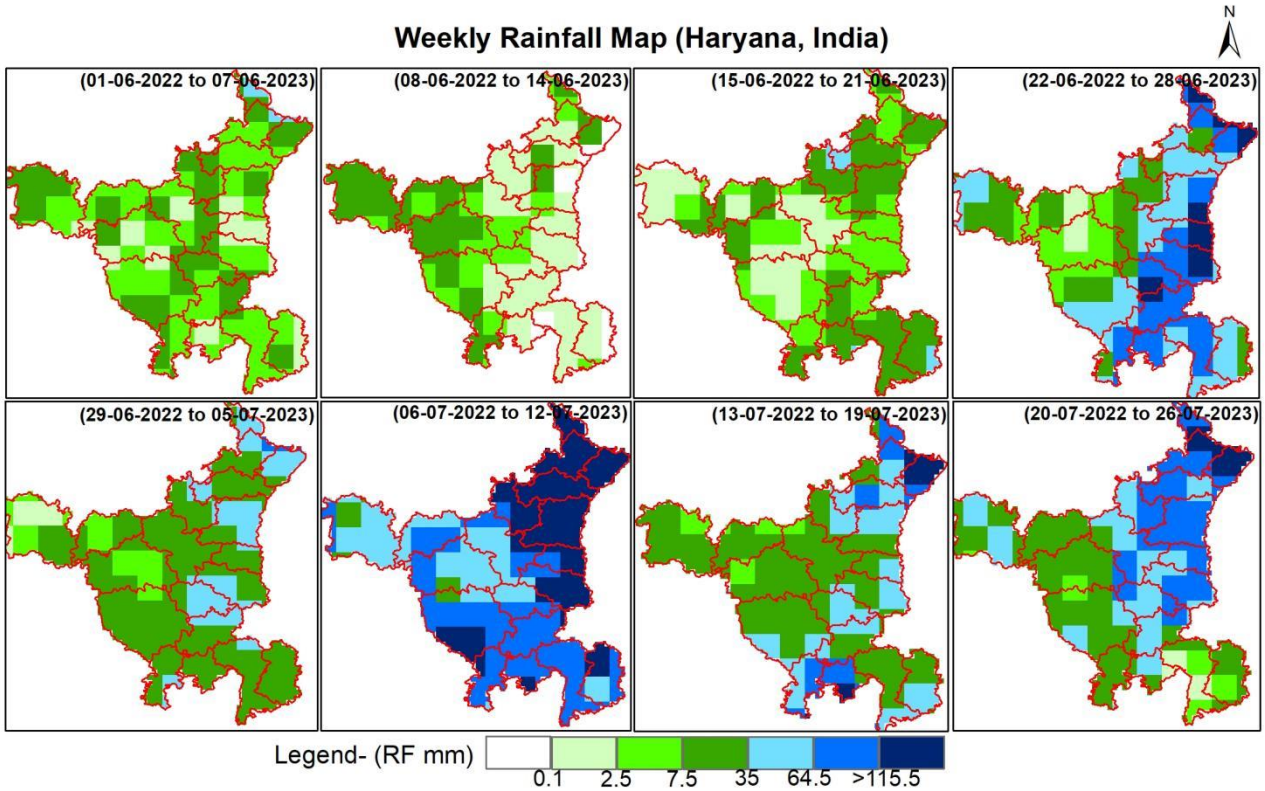


Fig. 10: Cumulative rainfall map starting from 1st June 2023


Weekly Rainfall Map (Punjab, India)
N
(01-06-2022 to 07-06-2023)
(08-06-2022 to 14-06-2023)
(15-06-2022 to 21-06-2023)
(22-06-2022 to 28-06-2023)
(29-06-2022 to 05-07-2023)
(06-07-2022 to 12-07-2023)
(13-07-2022 to 19-07-2023)
(20-07-2022 to 26-07-2023)
Legend- (RF mm)
0.1 2.5 7.5 35 64.5 >115.5


Weekly Rainfall Map (Haryana, India)
N
(01-06-2022 to 07-06-2023)
(08-06-2022 to 14-06-2023)
(15-06-2022 to 21-06-2023)
(22-06-2022 to 28-06-2023)
(29-06-2022 to 05-07-2023)
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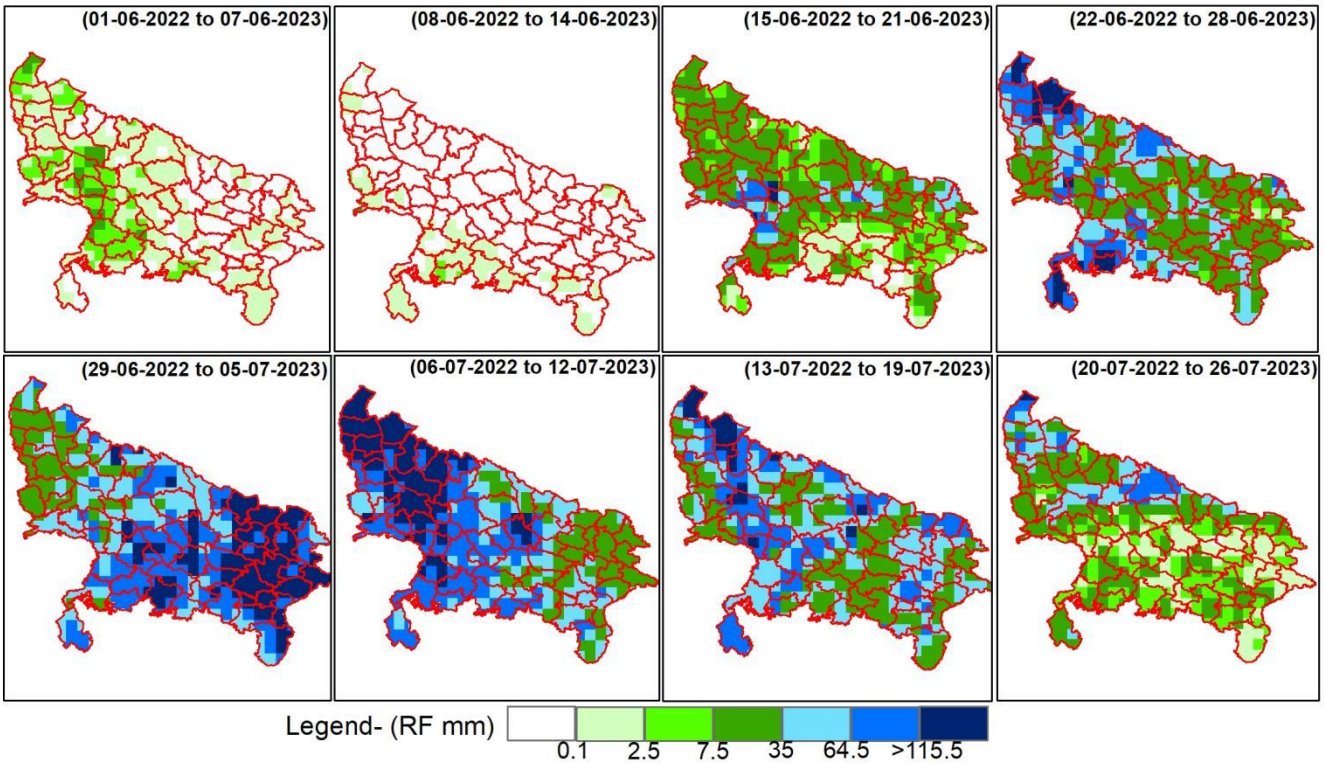
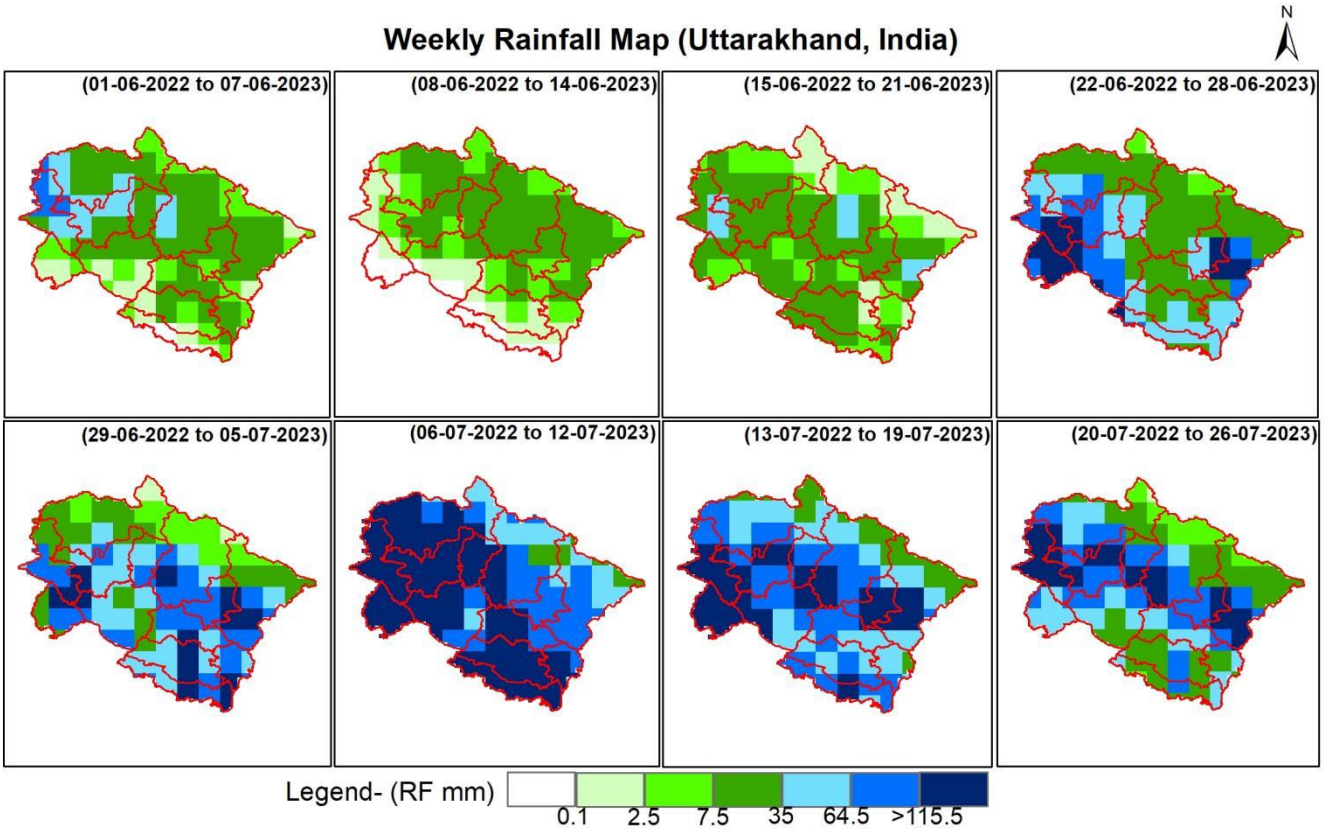
(20-07-2022 to 26-07-2023)
Legend- (RF mm)
0.1 2.5 7.5 35 64.5 >115.5

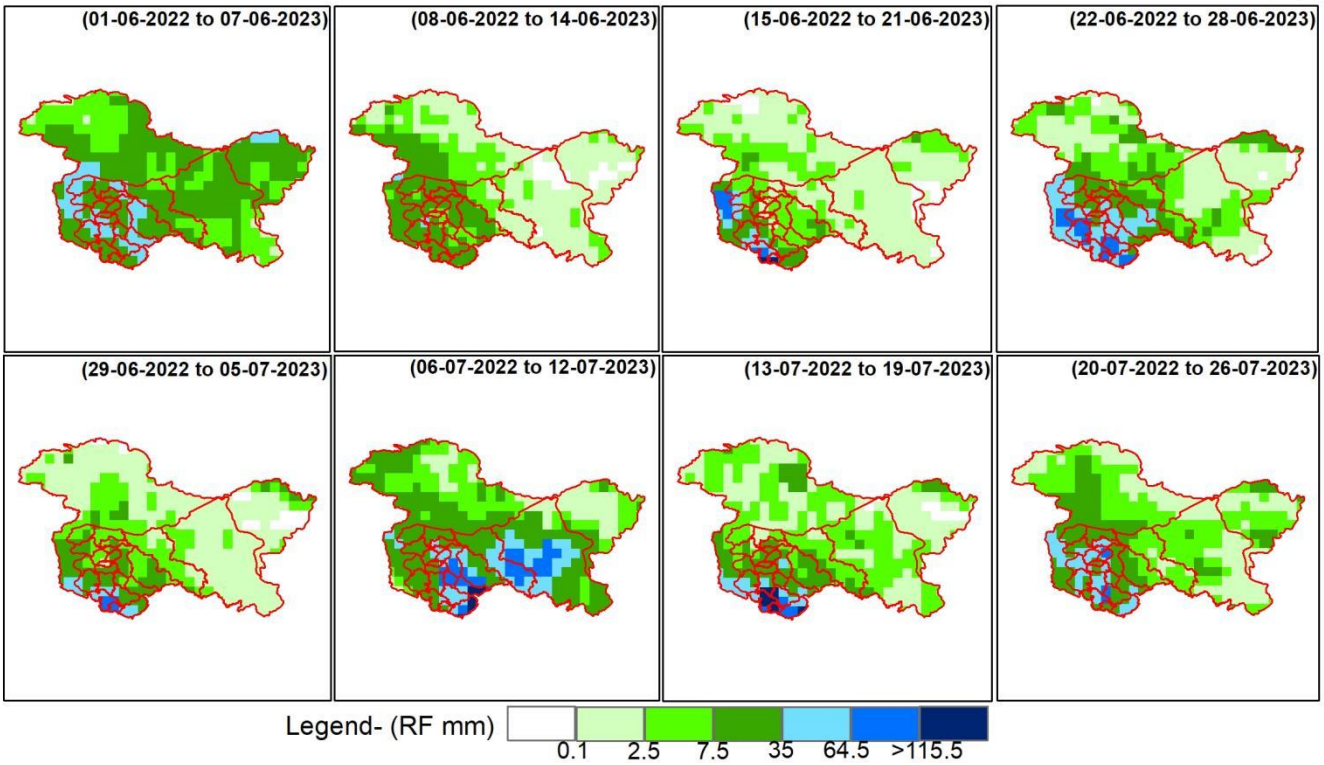
Weekly Rainfall Map (Uttar Pradesh, India)



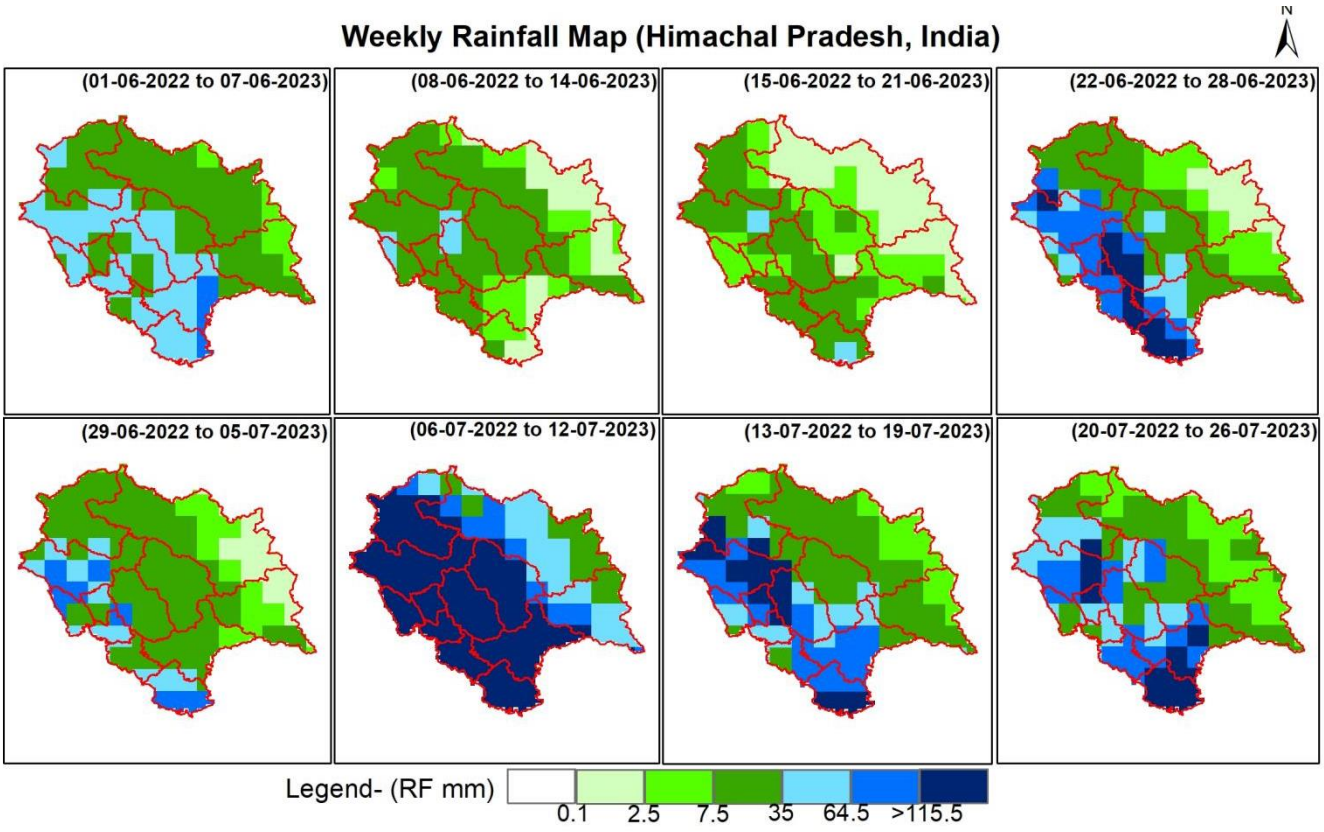
Weekly Rainfall Map (Uttarakhand, India)



Weekly Rainfall Map (Jammu & Kashmir, India)



Weekly Rainfall Map (Himachal Pradesh, India)



8. Basmati Rice Seed Availability:

Percentage-wise sale/distribution of basmati seeds were collected from different agencies including Govt. National Seed Corporation (NSC), State seed departments, Indian Agricultural research institute (IARI) and other sources e.g., newspapers/magazine. Details of variety wise seed distribution is illustrated in table below.

Basmati variety wise seed availability in study area Kharif 2023		
S. No.	**Basmati Varieties**	**Seed availability (Q)**
1	PB 1121	23,931
2	PB 1509	20,793
3	PB 1692	3,490
4	PB 1718	3,350
5	PB 1637	3,873
6	PB 1401/PB 01	2,031
7	PB 06	3,000
8	Basmati 370	6,615
9	PB 1847	500
10	CSR 30	275
11	PB 1885	500
12	Punjab Basmati 4	100
13	Punjab Basmati 5	100
Total		**68,558**

9. Field Survey:

For Field based Rice estimation field surveys were done from 21st July to 27th July covering all the districts in study area of Punjab, Haryana and Uttar Pradesh. It is observed during the field survey that Rice transplanting was almost completed in all the states except some districts i.e., Mahamayanagar, Auraiya and Farrukabad, Rampur, Budaun, Patiala, yamunanagar and Sangrur. The major transplanting of Basmati rice was observed in first fortnight of July month.

The field observations shows that the major sown varieties are PB-1121, PB-1509, PB-1401(PB-1, PB-4, PB-5, PB-6). Sugandha variety was observed in Bulandshahar, Aligarh, Mahamayanagar and surrounding areas. Sharbati variety majorly observed in Rampur, Moradabad, Bijnor and Bareilly. In Punjab and Haryana, flood conditions were also visible near rivers and drainage systems. Crops were flooded and affacted in agricultural fields as a result of excessive rainfall and canal damage in few areas.

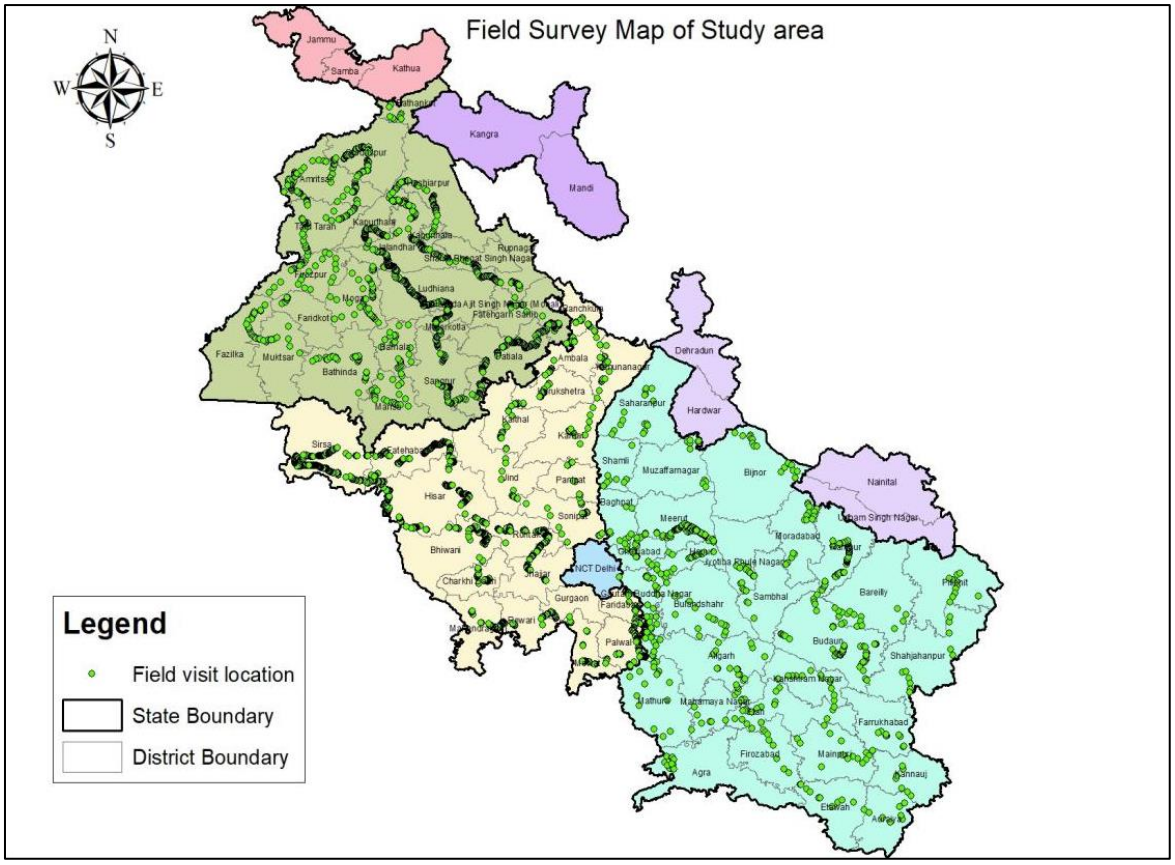


Fig. 11: Basmati Field survey Map of study area

State wise field observations:

The state wise field observations on the basis of field survey can be summarized as below:

Haryana:

- Major transplanting of Basmati rice was observed in first fortnight of July.
- Major Basmati varieties observed are PB1509, PB1121, CSR30, PB1692, PB1718, PB1847, PB1185 and PB01/1401.
- The crop was found in transplanting and tillering growth stage.
- Other competing crops observed in field are Sugarcane, Sorghum (Jowar), Cotton and Bajra.
- Major Basmati sowing districts are Jind, Karnal, Panipath, Sonipath and Rohtak.
- Crop was damaged due to flood condition near river/canals in many district specifically in Fatehabad, Sirsa, Palwal, Faridabad, Kurushetra, Karnal and Ambala districts.
- It has also been noted that in Haryana, paddy crop is leading cotton ones.

Punjab:

- Major transplanting of Basmati rice was observed in 1st fortnight of July.
- Major Basmati varieties observed are PB1509, PB1121, PB1718, PB1401, 1692, 1847, PB1885.
- In few districts at some places new varity PB1885 also seen.
- Other crops like Sugarcane, Maize, Cotton and fodder were present in the field.
- Major Basmati rice area was found in Amritsar, Tarn Taran, Gurdaspur (Batala), Fazilka and Muktsar district.
- Damage was also observed due to flood condition in Patiala, Sangrur, Tarn Taran, Kaputhala, Firozpur and Jalandhar districts.
- Bakanae disease was also seen in few paddy field during survey in Bhatinda, Jalandhar, Ludhiana and Tarn Taran.
- It is also observed that by replacing the cotton, Punjab state is seeing an increase in paddy acres.

Uttar Pradesh:

- Major transplanting of basmati rice was observed in the first fortnight of July.
- Major Basmati varieties observed were PB1509, PB1718, PB1121, PB1692, PB2626, PB1882, PB1447, Sarvati and Sugandha.
- Other crops like Jowar, Bajra, and Sugarcane were observed in the field.
- Major Basmati sowing districts are Aligarh, Bulandshahar, GB Nagar, Hapur, Moradabad and Rampur.
- Crop area was also damaged by flood condition in Mathura and Kasganj districts.

Field Photographs collected during Field Survey:

- **Punjab**

Basmati Variety – 1121



New nursery of PB1121

Basmati Variety – 1509

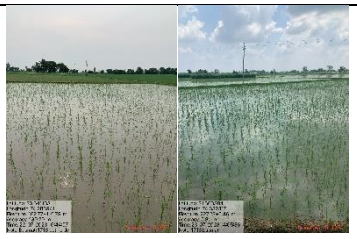


Muchal Basmati - 1401

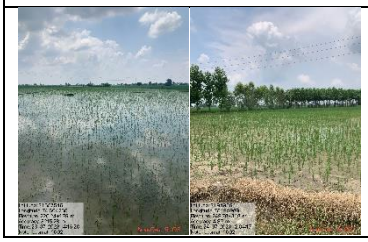
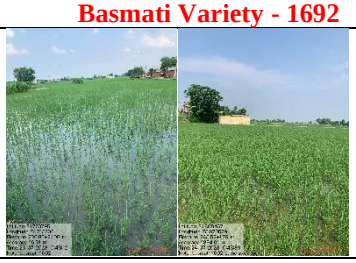


Basmati Variety - 1718





Basmati Variety - 1692


Note: These Photographs are from different parts of the region. Each photograph is with their Geo-tag details with their Latitude and Longitude.

Flood area map and Photographs of Punjab:

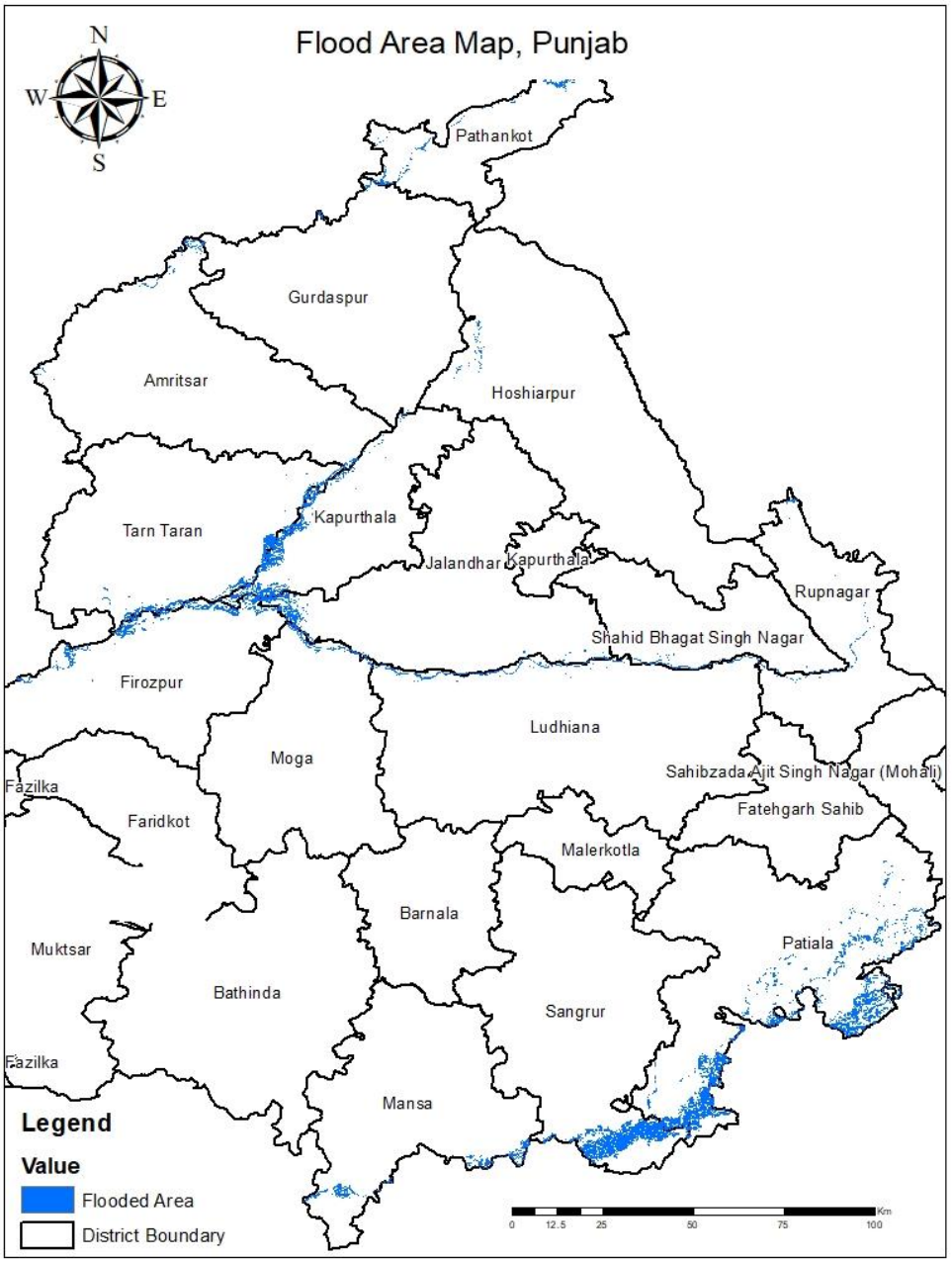


Fig. 11: Flood Area map of Punjab

The blue colored area shows the inundated land with water. In Punjab it is widely spread around the banks of river specially in Tarantaran, Kapurthala and Firozpur while in the lower portion of the state more specifically in Southern east portion has the outflow in which more areas are falling in the Patiala District and a small portion area in the south part of Sangrur district. This pattern continues and also being witnessed in the Mansa district as well.

Punjab		
		
		
		
		

These photographs shows the indundated areas during the field visit survey of Leads team.

Field Photographs collected during Field Survey:

- **Haryana**

Basmati Variety – 1121



Transplanting is in progress

Basmati Variety – 1509



Basmati Variety - 1718



Basmati Variety – 1886



Basmati CSR -30



Basmati Variety – 1847



Note: These Photographs are from different parts of the region. Each photograph is with their Geo-tag details with their Latitude and Longitude.

Flood area map and photographs of Haryana :

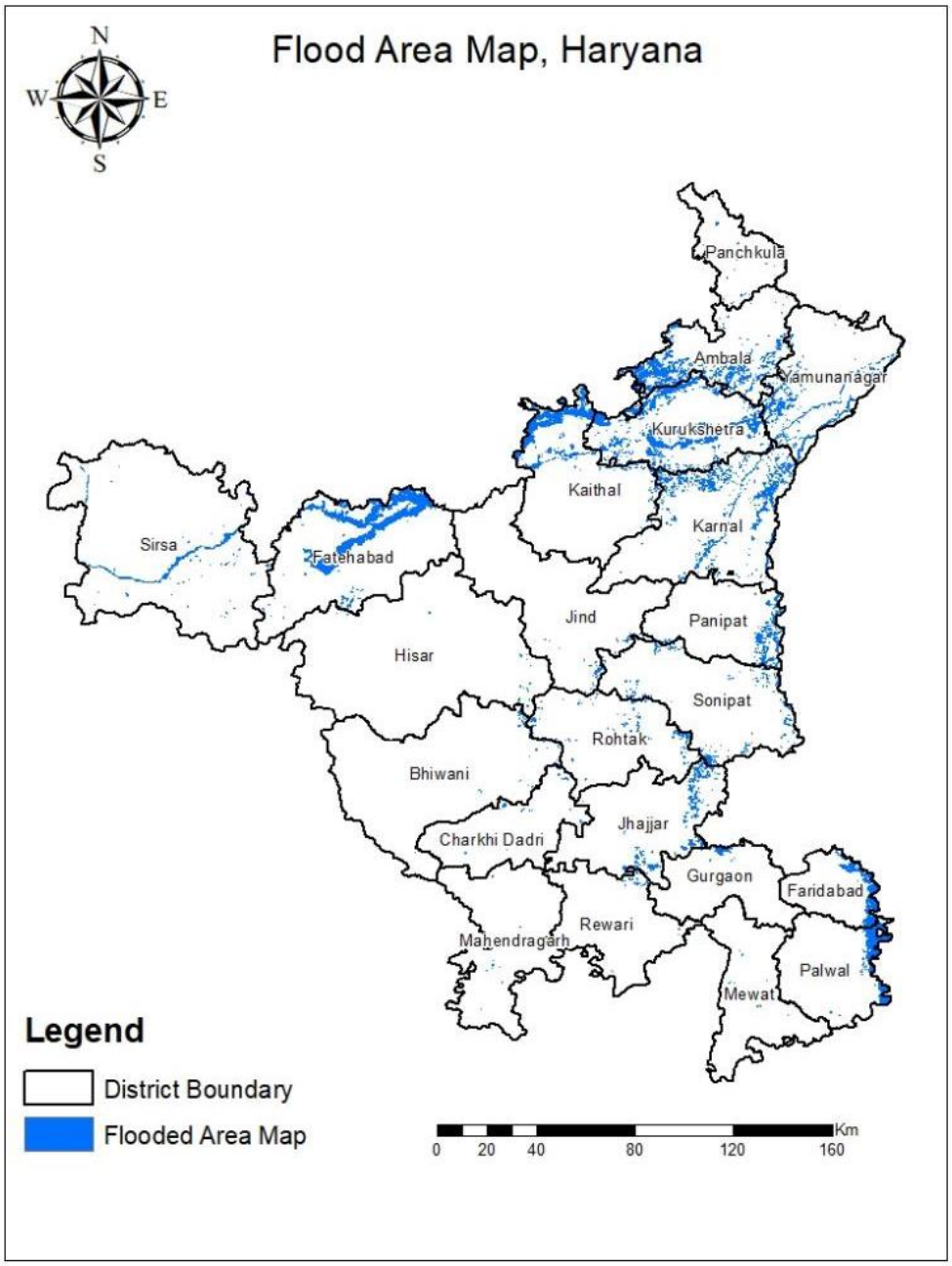


Fig. 11: Flood Area map of Haryana

The Flooded areas are mapped with blue colored area which shows the inundated land with water. In Haryana the effect in Northeastern portion of the State specially in Ambala, Yamuna Nagar, Kurukshetra, Karnal are clearly visible. The nearby areas parallel to Yamuna River specifically in the southern districts like Faridabad and Palwal the effect is also being visualized. In the western portion of the state specifically in Fatehabad district the inundated areas are shown nearby Ghaggar River. The patch is thick and continues parallel to river towards the center of the district.

Haryana		
		
		
		

These photographs shows the indundated areas during the field visit survey of Leads team.

Field Photographs collected during Field Survey:

- **Uttar Pradesh**

Basmati Variety – 1121



Basmati Variety – 1509



Basmati Variety - 1718



Sarbati



Sugandha



Basmati Variety - 1692


Basmati Variety – 1882

Note: These Photographs are from different parts of the region. Each photograph is with their Geo-tag details with their Latitude and Longitude.

Flood Damage Area Photographs collected during Field Survey:

Uttar Pradesh		
		
		

These photographs shows the indundated areas during the field visit survey of Leads team.

10.Schedule wise Report Status:

The present report is first volume of reports to be delivered. This report covers District wise total Rice area (Basmati + Rice) and Basmati seed sale distribution in percent. The status of Schedule wise report status is being given for the reference below.

Report Schedule				
S. No.	**Report**	**Report Content**	**Submission Date**	**Status**
1	1st Report	District wise total rice area (Basmati + Rice) Basmati seed sale distribution (in percent)	31st July 2023	Submitted
2	2nd Report	Basmati rice acreage and health monitoring	31st August 2023	In Process
3	3rd Report	Basmati rice acreage estimation (Variety wise evolved Sarbati and Sugandha)	30th September 2023	In Process
4	4th Report	Climate based Basmati rice yield model and production	31st October 2023	In Process
5	5th Report	Questionnaire based farmer survey report of Basmati rice	30th November 2023	In Process
6	6th Report	Final Report (All statistics and maps)	30th December 2023	In Process

Note: The green highlighted row shows report is submitted.