

ALL INDIA CO-ORDINATED PLANT PATHOLOGY TRIALS 2023-2024

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TRIAL 1: SCREENING FOR LEAF BLAST RESISTANCE

Objective: To identify resistance in entries to leaf blast from the promising cultures in Advanced and Initial Variety Trials - 2023.

NSN 1 (34)

Arundhutinagar	Bankura	Aduthurai	Coimbatore	Cuttack
Gangavati	Gerua	Ghaghraghat	Gudalur	Hazaribagh
IIRR	Imphal (Lamphalpet)	Jagdapur	Jagtial	Karjat
Karaikal	Kaul	Khudwani	Lonavla	Malan
Mandya	Maruteru	Mugad	Navsari	Nawagam
Nellore	New Delhi	Pattambi	Ponnampet	Rajendranagar
Ranchi	Rewa	Wangbal	Warangal	

NSN2 (21)

Aduthurai	Bankura	Coimbatore	Cuttack	Gangavati
Ghaghraghat	Hazaribagh	IIRR	Jagdapur	Kaul
Malan	Mandya	Maruteru	Mugad	Nawagam
Pattambi	Ponnampet	Rajendranagar	Ranchi	Rewa
Wangbal				

NSN Hills (13)

Almora	Gerua	Gudalur	IIRR	Imphal (Lamphalpet)
Karjat	Khudwani	Lonavla	Malan	Ponnampet
Umiam (Barapani)	Upper Shillong	Wangbal		

NHSN (26)

Arundhutinagar	Aduthurai	Bankura	Coimbatore	Gangavati
Ghaghraghat	Imphal	IIRR	Imphal (Lamphalpet)	Jagdapur
Karjat	Khudwani	Lonavla	Malan	Mandya
Maruteru	Mugad	Nawagam	Nellore	Pattambi
Ponnampet	Rajendranagar	Ranchi	Rewa	Upper Shillong
Wangbal				

DSN (27)

Almora	Aduthurai	Arundhutinagar	Bankura	Coimbatore
Cuttack	Gangavati	Ghaghraghat	Hazaribagh	IIRR
Imphal (Lamphalpet)	Jagdapur	Karjat	Lonavla	Malan
Mandya	Maruteru	Mugad	Nawagam	Nellore
Pattambi	Ponnampet	Rajendranagar	Ranchi	Rewa
Upper Shillong	Wangbal			

Layout: Adopt Uniform Blast Nursery (UBN) pattern. Each test entry should be sown in a single row of 50 cm long and 10 cm apart. After every 20 test entries plant local susceptible variety. The entire nursery should be surrounded on all sides by two rows of susceptible variety.

Fertilizers : Apply excessive nitrogen (100-120 kg N/ha). Apply one-half of the nitrogen dose as basal and the remaining half 15 days after sowing (DAS). Other fertilizers may have to be applied as per the local recommended practice. It is desirable to incorporate a high level of farm yard manure before sowing.

Inoculum : It is necessary to sow the nursery during blast favourable weather conditions. To create severe blast incidence additional inoculum may be provided. For this collect diseased leaves, chop them into pieces of 3-6 cm long and scatter them over the plot. Infected plants can also be transplanted between boarder rows. This operation may be carried during prolonged wet weather to facilitate infections and polycyclic development of the disease.

Observations to be recorded: The test entries are to be scored based on leaf blast severity following SES scale given hereunder. At least two readings on blast severity in entries are to be taken at 10 days intervals from 25 to 30 DAS.

Layout of uniform blast nursery for screening against leaf blast at seedling stage

Layout should contain two rows of susceptible lines as a Border: 20 rows of test entries: Two rows of susceptible entries: 20 rows of test entries

Wind direction →

S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
S	S	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	S	S
S	S	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	S	S
S	S	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	S	S
S	S	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	S	S
S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Length of nursery bed depends on land availability and topography of the area.

T = Each test entry in a single row of 50 cm long and 10 cm apart.

S = Highly susceptible blast varieties flanked around the test nursery.

SES Scale (2014) for Leaf blast

Description

0= No lesions

1= Small brown specks of pinhead size without sporulating centre.

2= Small roundish to slightly elongated, necrotic grey spots, about 1-2 mm in diameter with a distinct brown margin and lesions are mostly found on the lower leaves.

3= Lesion type is the same as in scale 2, but significant number of lesions are on the upper leaves.

4= Typical sporulating blast lesions, 3 mm or longer, infecting less than 2% of the leaf area.

5= Typical blast lesions infecting 2-10% of the leaf area.

6= Blast lesions infecting 11-25% leaf area.

7= Blast lesions infecting 26-50% leaf area.

8= Blast lesions infecting 51-75% leaf area.

9= More than 75% leaf area affected.

TRIAL 2: SCREENING FOR NECK BLAST RESISTANCE

Objective: To identify resistance in entries to neck blast from promising cultures in Advanced and Initial Variety trials-2023

NSN 1 (12)

Bankura	Jagdapur	Karaikal	Khudwani	Lonavla
Mandya	Maruteru	Mugad	Nawagam	Nellore
Ponnampet	Rajendranagar	Ranchi		

NSN 2 (7)

Bankura	Jagdapur	Mandya	Maruteru	Mugad
Ponnampet	Ranchi			

NSNHills (8)

Almora	Gudalur	Imphal (Lamphalpet)	Khudwani	Lonavla
Malan	Ponnampet	Umiam (Barapani)		

NHSN (12)

Bankura	Imphal (Lamphalpet)	Jagdapur	Khudwani	Lonavla
Malan	Mandya	Maruteru	Mugad	Nawagam
Rajendranagar	Ranchi			

DSN (11)

Almora	Bankura	Imphal (Lamphalpet)	Jagdapur	Lonavla
Mandya	Maruteru	Mugad	Nawagam	Rajendranagar
Ranchi				

Note: No separate nursery boxes will be sent. The seeds sent for leaf blast screening or seedlings from uniform blast nurseries may be transplanted and used for these trials. Sufficient quantity of seeds for each entry is put in seed packets of trial 1.

Layout: The test entries included in the nursery vary with respect to maturity duration (from 70 to 150 days). Hence, local susceptible (neck blast) check may be staggered planted for 68 times at 10 day intervals, starting from the date of planting of test nursery. The purpose is to evaluate the neck blast resistance of test entries in relation to the susceptible check. The staggered planting of the susceptible check may be done in a space left in the plot after planting test entries. However, the first planting of check variety has to be done along with the test nursery planting after every 50 test entries. Each test entry may be planted preferably in two rows each of 1m length, adopting a spacing of 20 x 10 cm.

Fertilizers: As per local recommendations. Nitrogen may be applied @ 150kg/ ha.

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Observations to be recorded: The first recording on neck blast incidence should be done when heading is complete in test entries and the second between milk and dough stages. The scoring should be done following the SES scale given hereunder. **SES Scale (2014) (Incidence of severely neck infected panicles)**

Score	Description
0	No incidence
1	Less than 5%
3	5-10%
5	11-25%
7	26-50%
9	More than 50%

TRIAL 3: SCREENING FOR BROWN SPOT RESISTANCE

Objective: To identify entries resistant to brown spot from the promising cultures included in Advanced and Initial Variety Trials-2023.

NSN 1 (20)

Bankura	Chatha	Chinsurah	Coimbatore	Cuttack
Gangavati	Ghaghraghat	Gudalur	Hazaribagh	IIRR
Jagdapur	Khudwani	Lonavla	Ludhiana	Mugad
Ponnampet	Pusa	Rewa	Sabour	Upper Shillong

NSN 2 (13)

Bankura	Chatha	Gangavati	Ghaghraghat	Hazaribagh
IIRR	Jagdapur	Ludhiana	Mugad	Ponnampet
Pusa	Rewa	Sabour		

NSN Hills (6)

Almora	Cuttack	IIRR	Khudwani	Lonavla
Ponnampet				

NHSN (15)

Bankura	Chatha	Chinsurah	Cuttack	Gangavati
Ghaghraghat	Hazaribagh	IIRR	Jagdapur	Khudwani
Lonavla	Ludhiana	Mugad	Pusa	Rewa

DSN (15)

Almora	Bankura	Chatha	Cuttack	Gangavati
Ghaghraghat	Hazaribagh	IIRR	Jagdapur	Lonavla
Ludhiana	Mugad	Pusa	Rewa	Sabour

Layout: The nursery can be screened either at seedling stage in nursery adopting UBN or in a transplanted field. In either situation 50 kg N/ha and other fertilizers may be applied as per the recommended practice.

Observations to be recorded: The entries should be evaluated based on brown spot disease severity following the SES scale given here under.

SES Scale (2014) Brown spot disease

Score	Description
0	No incidence
1	Less than 1%
2	1-3%
3	4-5%
4	6-10%
5	11-15%
6	16-25%
7	26-50%
8	51-75%
9	76-100%

TRIAL 4: SCREENING FOR SHEATH BLIGHT RESISTANCE

Objective: To identify resistant entries to sheath blight disease from the promising cultures included in Advanced and Initial Variety Trials-2023.

NSN 1 (22)

Aduthurai	Arundhutinagar	Bankura	Chinsurah	Chiplima
Coimbatore	Gangavati	IIRR	Kaul	Ludhiana
Mandya	Maruteru	Masodha (Faizabad)	Moncompu	Navsari
New Delhi	Pantnagar	Patna	Pattambi	Raipur
Titabar	Varanasi			

NSN 2 (18)

Aduthurai	Bankura	Coimbatore	Gangavati	IIRR
Kaul	Ludhiana	Mandya	Maruteru	Masodha (Faizabad)
Moncompu	Navsari	Pantnagar	Patna	Pattambi
Raipur	Titabar	Varanasi		

NSN Hills (3)

Cuttack	IIRR	Pantnagar
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NHSN (21)

Aduthurai	Arundhutinagar	Bankura	Chinsurah	Coimbatore
Gangavati	IIRR	Kaul	Ludhiana	Mandya
Maruteru	Masodha (Faizabad)	Moncompu	Navsari	New Delhi
Pantnagar	Patna	Pattambi	Raipur	Titabar
Varanasi				

DSN (21)

Aduthurai	Arundhutinagar	Bankura	Chiplima	Coimbatore
Gangavati	IIRR	Kaul	Ludhiana	Mandya
Maruteru	Masodha (Faizabad)	Moncompu	Navsari	New Delhi
Pantnagar	Patna	Pattambi	Raipur	Titabar
Varanasi				

Layout: Transplant 25 days old seedlings. Each test entry should be planted in two rows, each of two meter length adopting a spacing of 20 x 15 cm.

Fertilizers: Apply adequate dosage of N (120 kg/ha) in 3 splits, one-half as basal, and the remaining in two splits at tillering and panicle initiation stages. P, K and Zn have to be applied as per the local recommendations.

Inoculum and inoculation: Multiply pure culture of the pathogen on autoclaved typha bits or corn or rice culm bits (5-7 cm) or rice: hull (1:3) medium. Inoculate test entries at tillering

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stage by placing the inoculum between the tillers just above the water line. Alternatively, fresh sheath blight infected material with active lesions can also be used as inoculum.

Observations to be recorded: Take the first reading 15-20 days after inoculation of sheath blight pathogen or first appearance of the disease. A second observation should be made at flowering stage adopting SES scale given hereunder.

SES Scale (2014) sheath blight disease

Description
0= No infection
1= Vertical spread of the lesions up to 20% of plant height
3= Vertical spread of the lesions up to 21-30% of plant height,
5= Vertical spread of the lesions up to 31-45% of plant height
7= Vertical spread of the lesions up to 46-65% of plant height.
9= Vertical spread of the lesions up to 66 100% of plant height

TRIAL 5: SCREENING FOR SHEATH ROT RESISTANCE

Objective: To identify entries resistant to sheath rot disease from promising cultures included in Advanced and Initial Variety Trials 2023.

NSN 1 (13)

Aduthurai	Bankura	Chinsurah	Coimbatore	Cuttack
Karjat	Lonavla	Navsari	Nawagam	Pusa
Raipur	Rajendranagar	Titabar		

NSN 2 (5)

Aduthurai	Bankura	Coimbatore	Pusa	Raipur
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NSNH (2)

Karjat	Lonavla
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NHSN (13)

Aduthurai	Bankura	Chinsurah	Coimbatore	Cuttack
Karjat	Lonavla	Navsari	Nawagam	Pusa
Raipur	Rajendranagar	Titabar		

DSN (11)

Aduthurai	Bankura	Coimbatore	Cuttack	Karjat
Lonavla	Navsari	Nawagam	Pusa	Raipur
Rajendranagar				

Layout : Transplant 25 days old seedlings. Each test entry should be planted in two rows each of two meter length adopting a spacing of 20 x 15 cm.

Fertilizers : Apply adequate dosage of N (120 kg/ha) in 3 equal splits, one-half at basal and the remaining in two splits at tillering and panicle initiation stages. P, K and Zn have to be applied as per the recommended practice.

Inoculum and inoculation : Multiply the pathogen on autoclaved rice grains. When the test entries are at booting stage, prepare thick spore suspension and spray towards evening hours.

Observations to be recorded: Record the disease score from heading stage onwards as per the SES scale given hereunder.

SES Scale (2014) (Incidence of severely sheath rot affected tillers)

Score	Description
0	No incidence
1	Less than 1%
3	1-5%
5	6-25%
7	26-50%
9	51-100%

Note: No separate nursery boxes will be sent for sheath rot screening. Screening observations on sheath rot disease need to be recorded in either uninoculated plants of entries in sheath blight or BLB screening nurseries.

TRIAL 6: SCREENING FOR BACTERIAL BLIGHT RESISTANCE

Objective: To identify entries resistant to bacterial leaf blight (BLB) from the promising cultures included in Advanced and Initial Variety Trials-2023.

NSN 1 (30)

Aduthurai	Arundhutinagar	Bankura	Chatha	Chinsurah
Chiplima	Coimbatore	Cuttack	Gangavati	Gerua
IIRR	Jagtial	Karikal	Karjat	Ludhiana
Maruteru	Masodha (Faizabad)	Moncompu	Navsari	Nawagam
Nellore	New Delhi	Pantnagar	Patna	Pattambi
Raipur	Sabour	Titabar	Varanasi	Warangal

NSN 2 (18)

Aduthurai	Chatha	Coimbatore	Gangavati	IIRR
Ludhiana	Maruteru	Masodha (Faizabad)	Moncompu	Navsari
Nawagam	Pantnagar	Patna	Pattambi	Raipur
Sabour	Titabar	Varanasi		

NSN Hills (3)

IIRR	Karjat	Pantnagar
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NHSN (21)

Aduthurai	Bankura	Chatha	Chinsurah	Coimbatore
Gangavati	IIRR	Karjat	Ludhiana	Maruteru
Masodha (Faizabad)	Moncompu	Navsari	Nawagam	New Delhi
Pantnagar	Patna	Pattambi	Raipur	Titabar
Varanasi				

DSN (22)

Aduthurai	Chatha	Chiplima	Coimbatore	Cuttack
Gangavati	Gerua	IIRR	Karjat	Ludhiana
Maruteru	Masodha (Faizabad)	Moncompu	Navsari	Nawagam
New Delhi	Pantnagar	Patna	Pattambi	Raipur
Titabar	Varanasi			

Layout : Plant each entry in two rows each of 2 meter length, adopting a spacing of 20 x 15 cm. The nursery is flanked by 3 to 4 border rows of TN 1 or any other susceptible variety. Include local susceptible and resistant checks after every 100 test entries.

Fertilizers : Apply adequate nitrogen (150 kg N/ha). One-half nitrogen is to be applied as basal and the remaining in two equal splits at tillering and panicle initiation stages. Apply P, K and Zn as per the local recommendations.

Inoculum and inoculation: The pathogen is multiplied on peptone sucrose agar and 48 hour old pure culture of the pathogen is brought into suspension by adding 10 ml of water per slant to give a concentration of bacterial cells of about 10^8 to 10^9 /ml. In the absence of pureculture the bacterial suspension may be prepared by cutting the fresh diseased leaves into small pieces of about 2 mm and soak them in water for 10 to 20 minutes so that the suspension has bacterial cell concentration of 10^8 to 10^9 /ml. Inoculate the plants between maximum tillering and booting stages. Dip the scissors in the bacterial suspension and cutoff top 2 to 3 cm of leaves.

Observations to be recorded: Score the entries 15 days after inoculation adopting the SES scale as given here under:

SES Scale (2014) for bacterial leaf blight

Score	Description (affected lesion area)
1	1-5%
3	6-12%
5	13-25%
7	26-50%
9	51-100%

TRIAL 7: SCREENING FOR RESISTANCE TO RICE TUNGRO DISEASE

Objective : To identify rice tungro resistant entries from the promising cultures included in the Advanced and Initial Variety Trials-2023.

NSN 1 (3)	NSN 2 (1)	NSN-H (1)	NHSN (3)	DSN (3)
Coimbatore	IIRR	IIRR	Coimbatore	Coimbatore
Cuttack			Cuttack	Cuttack
IIRR			IIRR	IIRR

Layout: Each entry has to be planted in two rows, each of 2m length with 20 x 15 cm spacing. Each entry is alternated with a row of TN1.

Fertilizer: Apply fertilizers as per the local recommendations.

Inoculation: Where natural infection is absent inoculate test entries 20 days after planting. For this, release 2 to 3 viruliferous leafhoppers per hill and cage them for 24 hours for effective transmission. Insecticides should not be used in the nursery.

Observations to be recorded: Score the entries 50 days after inoculation for tungro incidence based on the SES scale given here under:

SES Scale (2014) for rice tungro disease

Score	Description
1	No symptoms
3	1-10% plant height reduction with no distinct leaf discoloration.
5	11-30% plant height reduction with no leaf discoloration.
7	31-50% plant height reduction and yellow to orange leaf discoloration
9	More than 50% plant height reduction and yellow to orange leaf discoloration.

TRIAL 8: MONITORING FIELD VIRULENCE IN *Pyricularia oryzae*

Objective: To characterise the virulence spectrum of the blast pathogen in different rice ecosystems.

Locations (28)

Almora	Coimbatore	Gangavati	Gerua	Ghaghrahat
Gudalur	Hazaribagh	Impthal (Lamphalpet)	Jagdapur	Jagtial
Karjat	Khudwani	Lonavla	Malan	Mandya
Maruteru	Mugad	Navsari	Nawagam	Nellore
New Delhi	Patna	Pattambi	Ponnampet	Rajendranagar
Ranchi	Upper Shillong	Wangbal		

Layout: Each entry will be sown in two rows of 50 cm each and replicated twice in a randomized block design adopting uniform blast nursery pattern. Also include two local commercials, resistant and susceptible to nursery composition. Use high dose of organic and N-fertilizer and give details in the data sheets.

Inoculation: The trial on monitoring of field virulences of rice blast pathogen should be done under natural condition. However, if the disease does not occur, then the concerned scientist should collect blast infected leaves from 4-5 farmer's fields, chop them into pieces and sprinkle the chopped infected leaves on the differentials.

Observations to be recorded: Record the lesion type (as given hereunder) and severity leaf blast based on the SES scale. The observations are recorded twice, once at 10 days after the appearance of the disease and the second a fortnight later.

Two types of data recording needed:

A = No symptoms or reddish brown flecks

B= minute reddish specks or distinct circular spots without central ashy zone

C= Circular spots (2-3 mm in diam.) with central ashy zone and dark purplish brown margin

D= Distinct spindle shaped lesions (only slightly longer than broad 3-5 mm in diam.)

E= Large distinct spindle shaped lesions with a central zone ashy gray and brown margin zone, 3-5 mm broad and up to several cm in length. Burning or scorching of leaves due to coalition of several lesions of type C and type D. If it is due to C type lesions - score them as E (C); and If it is due to D type lesions - score them as E (D).

Also score as follows:

SES Scale (2014) for Leaf blast

Description
0=No lesions
1=Small brown specks of pinhead size without sporulating centre.
2=Small roundish to slightly elongated, necrotic grey spots, about 1-2 mm in diameter with a distinct brown margin, lesions are mostly found on the lower leaves.
3=Lesion type is the same as in scale 2, but significant number lesions are on the upper leaves.
4=Typical sporulating blast lesions, 3 mm or longer, infecting less than 2% of the leaf area.
5=Typical blast lesions infecting 2-10% of the leaf area.
6=Blast lesions infecting 11-25% leaf area.
7=Blast lesions infecting 26-50% leaf area.
8=Blast lesions infecting 51-75% leaf area.
9=More than 75% leaf area affected.

TRIAL 9: MONITORING FIELD VIRULENCE IN *Xanthomonas oryzae* pv. *oryzae*

Objective: To characterize the virulence spectrum of bacterial leaf blight pathogen in different rice ecosystems.

Locations (25)

Aduthurai	Chatha	Chinsurah	Chiplima	Coimbatore
Gangavati	Gerua	Jagtial	Karjat	Ludhiana
Maruteru	Masodha (Faizabad)	Moncompu	Navsari	Nawagam
Nellore	New Delhi	Pantnagar	Patna	Pattambi
Raipur	Rajendranagar	Sabour	Titabar	Warangal

Layout : Grow test entries in rows of 3.0 m each, 30 cm apart, replicate twice. Use high doses of N-fertilizer to encourage disease incidence and give details.

Inoculation: The experiment should be done under natural condition. However, if the disease does not occur naturally, the concerned scientist should collect BLB infected leaves from 4-5 different farmer's fields and cut those leaves in sterile water in a beaker or bucket and allow the bacteria to come out and use this suspension for inoculating the differentials.

Inoculate at panicle initiation to booting stage.

Clip method of inoculation to be followed.

Five to ten hills of each entry should be inoculated.

Observations to be recorded: Score for bacterial leaf blight disease in the entries adopting SES scale around flowering.

SES Scale (2014) for bacterial leaf blight

Score	Description (affected lesion area)
1	1-5%
3	6-12%
5	13-25%
7	26-50%
9	51-100%

TRIAL 10: DISEASE OBSERVATION ON TRAP CROP

Each location can take up this trial separately under

1. Under transplanted condition
2. Under Wet DSR condition

Locations (10)

Bankura	Chatha	Chinsurah	Kaul	Malan	Mandya
Maruteru	Moncompu	Nawagam	Pusa	Raipur	

Objective: To observe the time of occurrence, progression and intensity of disease(s) in a given location.

1. Under transplanted condition

Variety: Popular local susceptible variety.

Treatments: Three sowings - early sown, normal sown and late sown and each sowing should be done at **15 days interval** (strictly followed) in 150 sq.m plot with a spacing 20 X 10 cm with two replications.

Fertilization: 120-150 kg N ha in 3 splits - one-half as basal, and the remaining two in splits as top dressings at 25 and 45 days after planting. Apply other nutrients as per local recommendations.

Observations to be recorded:

Nursery: Incidence of diseases and their intensities are recorded before uprooting.

Main field: Disease incidence and their **severity as PDI** are to be recorded from the day first disease symptom appears till the physiological maturity at 7 days interval.

The severity of the diseases is to be recorded as percent disease Index, only.

$$\text{PDI (\%)} \text{ or } \text{SI (\%)} = \frac{\text{Sum of all disease ratings} \times 100}{\text{Total Number of ratings} \times \text{Maximum disease grade}}$$

(Calculation of PDI): From each replication, minimum 10 observations need to be recorded for a particular disease **as disease score** (following 0-9 SES scale). For example: in case of sheath blight following observations are taken from three replication

Calculation of PDI (%): Example

Disease score for Replication 1	Disease score for Replication 2	Disease score for Replication 3
5,5,7,9,7,9,5,7,3,5	5,7,9,9,7,5,7,3,5,3	7,7,9,7,5,5,3,7,3,9

Calculation for Replication 1

$$\text{PDI (\%)} = \frac{(5+5+7+9+7+9+5+7+3+5)}{10 \times \text{Max score (i.e. 9)}} \times 100 = (62/90) \times 100 = 68.89\%$$

Collect daily weather data and send to IIRR along with the experimental data recorded.

2. Under Wet DSR condition

Objective: To study the disease spectrum in Direct Seeded Rice in a given location

Variety : A popular local susceptible variety

Treatments: Three sowings - early sown, normal sown and late sown and each sowing should be done at **15 days interval** (strictly followed) in 150 sq.m plot with a spacing 20 X 10 cm with two replications.

Fertilization: 120-150 kg N ha in 3 splits - one-half as basal, and the remaining two in splits as top dressings at 25 and 45 days after planting. Apply other nutrients as per local recommendations.

Experimental details:

Field Preparation

- Plough the field repeatedly to conserve the moisture, destroy weeds and break the clods
- After flooding the field for 1-2 days, puddling should be done (as done in case of transplanted rice) and field should be levelled
- Drain out the excess water and there should not be standing water at the time of sowing.
- Select good quality, fully filled and healthy seeds of the variety selected for this trial
- Wash the seeds in clean running water and soak the seeds in water for 24 hours and incubate the seeds for another 12-24 hours in a cloth bag.
- Seeds about to germinate are best suitable for direct sowing in the puddled field
- Seeds should be sown in lines by dibbling or using a drum seeder. @ 2-3 seeds per hill in a well-prepared and levelled field maintaining spacing of 20 x 10 cm . Shallow sowing of 2-3 cm depth is advisable.
- Care should be taken to ensure that there is no standing water at the time of sowing and also till the seedlings reach 4-5 leaf stage.
- Need based Irrigation of less than 2 cm depth can be given during crop growth period.
- Pre-emergence herbicide like pyrazosulfuron ethyl (Saathi) 10% @ 80 gm/acre should be applied 1-3 days after sowing (DAS), followed by mechanical/hand weeding at 25-30 DAS. Mechanical weeding is preferred for this trial. Hand weeding or mechanical weeding using motorized cono and other hand weeders can also be done.

- If mechanical weeding is not possible, then, apply post-emergence weedicides bispyribac Sodium (Nominee Gold @ 100 ml/acre) or cyhalofop-Butyl 5.1% + penoxsulam 1.02% OD (Vivaya @ 1 lit/acre) at 30-40 DAS or at 2-3 weed leaf stage.

Observations to be recorded: Disease incidence and their **severity as PDI** are to be recorded from the day first disease symptom appears till the physiological maturity at 7 days interval.

For disease recording please follow the procedure mentioned under transplanted condition.

Collect daily weather data and send to IIRR along with the experimental data recorded.

Trail No. 11: EVALUATION OF FUNGICIDES AGAINST LOCATION SPECIFIC DISEASES

Objective: To evaluate the efficacy of new and commercially available fungicides for the control of location-specific fungal diseases such as

- Blast
- Sheath blight
- Brown spot
- Sheath rot
- False smut
- Glume discolouration
- Stem rot
- Any other minor diseases of local importance

(Please restrict to 1-2 major/predominant rice diseases in each centre)

Locations (34)

Aduthurai	Bankura	Chatha	Chinsurah	Chiplima
Coimbatore	Cuttack	Gangavati	Gerua	Ghaghraghat
Hazaribagh	Jagdapur	Kaul	Lonavla	Ludhiana
Malan	Mandya	Maruteru	Masodha (Faizabad)	Moncompu
Mugad	Navsari	Nawagam	Pantnagar	Pattambi
Ponnampet	Pusa	Raipur	Rajendranagar	Ranchi
Rewa	Sabour	Titabar	Varanasi	

Layout: RBD with 4 replications adopting a net plot size of 5 x 2 m and a spacing of 15 x 15 cm. Plant a local susceptible high yielding variety.

Fertilizers: Fertilizers as per the local practice recommended to a high yielding variety ensuring adequate N supply to predispose the crop to the disease/s.

No.	Treatments	Doses (g or ml/l of water)
T1	Treatment-1	-
T2	Treatment-2	-
T3	Treatment-3	-
T4	Treatment-4	-
T5	Treatment-5	-
T6	Treatment-6	-
T7	Treatment-7	-
T8	Treatment-8: Control	-

Details of chemicals will be finalized and then sent to you at the time of despatch of chemicals

Inoculation: Artificial inoculation should be done for the major rice diseases by spraying conidial suspension (in case of blast and brown spot) and typha inoculation in case of sheath blight.

Fungicidal spray schedule:

Spray the fungicides to the respective treatments as follows (The number of sprays depends on the stage of the crop at which the disease occurs):

- Strictly 2 sprays at 15 days interval and the first spraying should be given after the appearance of the disease
- It is requested that for important fungal diseases like blast and sheath blight, artificial inoculation is must.
- All observations to be completed within 15 days of 2nd spray except yield.
- Observations to be recorded as PDI only (please refer Trial 10).

Observations to be recorded:

- Fix sampling units of 1 sq.m. at random in each plot, and record observations as follows.
- In case of foliar and sheath diseases, minimum 10 observations (disease score according to SES scale) should be taken from each replication. The data should be then converted to PDI as mentioned in Trial 10.
- In case of post-flowering diseases like false smut and grain/glume discoloration and others
 - Record percentage of infected panicles (For calculating percentage of infected panicles, randomly 10 hills are to be taken from each of the three sampling units of 1 sq m per plot and total number of panicles and number of infected panicles should be counted and then average percentage of infected panicles should be calculated)
 - Record percentage of infected spikelets/panicle (For calculating percentage of infected spikelets, count total number of spikelets and number of infected spikelets in randomly selected 10 panicles from each of the three sampling units of 1 sq m per plot from the same sample taken for recording percent infected panicles and calculate average percentage of infected spikelets).
- Phyto-toxicity observations on 0–10 scale for epinasty, hyponasty, chlorosis, necrosis, stunting, *etc.*, may also be recorded.
- Record the grain yield of the net plot and express in kg/plot at 14% moisture.

Weather data: Maximum-minimum temperatures, rainfall, and RH during the crop growth period, may be recorded.

Layout: RBD with 4 replications

R1	R2	R3	R4
T2	T7	T3	T5
T5	T1	T6	T2
T1	T8	T5	T7
T7	T4	T1	T4
T3	T2	T7	T8
T6	T5	T2	T1
T4	T3	T8	T6
T8	T6	T4	T3

Trial No. 12: EVALUATION OF BIO-CONTROL FORMULATIONS AGAINST FUNGAL DISEASES

Objective: To test the efficacy of different biocontrol formulations for the management of major fungal diseases on Local high yielding susceptible variety

Formulations; Solid formulation (65gm/centre) and liquid formulation (35ml/centre) will be supplied by IIRR, Hyderabad.

Locations (10)

Gudalur	Hazaribagh	IIRR	Karaikal	Maruteru
Moncompu	Navsari	Pantnagar	Rewa	Varanasi

Layout: RBD with 3 replications adopting a net plot size of 5 x 2 m and a spacing of 15 x 15 cm. Plant a highly susceptible local high yielding variety.

Fertilizers (Recommended): (N:P:K: Zn-120:60:40:25)-Apply fertilizer @ 120 kg N/ha, 60 kg P₂O₅/ha and 40 K₂O/ha. Apply entire P and K and ½ N as basal dose and the remaining 1/2 N at maximum tillering stage. Apply additional 25% N at booting to make the plants more prone to the disease. Apply ZnSO₄ @ 25 kg/ha as basal dose.

Treatment	Treatment details
T1	Seed treatment with solid formulation @10gm/lit followed by seedling dip (during transplantation) with solid formulation 10gm/lit
T2	Seed treatment with liquid formulation @ 5ml/lit followed by seedling dip (during transplantation) with liquid formulation @ 5ml/lit
T3	Sheath blight management: T1 + followed by foliar spray with solid formulation @ 5gm/lit tillering stage Neck blast: T1 + followed by foliar spray with solid formulation @ 5gm/lit panicle emergence stage False smut disease- T1 + followed by foliar spray with solid formulation @ 0.5%- (5gm/lit)booting stage
T4	Sheath blight management: T2 + followed by foliar spray with liquid formulation @ 5gm/lit tillering stage Neck blast: T2 + followed by foliar spray with liquid formulation @ 5gm/lit panicle emergence stage False smut disease: T2 + followed by foliar spray with liquid formulation @ 0.5%- (5gm/lit)booting stage
T5	T1+ Fungicide for the respective disease given below
T6	T2+ Fungicide for the respective disease as given below
T7	Fungicide for the respective disease as given below
T8	Control

Sheath Blight: Hexaconazole @2ml/l at tillering stage

Neck Blast: Isoprothiolane @ 1.5ml/l panicle emergence

False Smut: Propiconazole @ 1ml/l at booting stage

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Inoculation: The trial will be conducted under natural condition in hot spot locations. However, if the disease is not occurring naturally, artificial inoculation should be done.

Design: Randomized Block Design

Observations: Observations on **PDI (%)** and grain yield should be recorded as detailed in **Trial 10 &11. Calculate the cost benefit ratio for the trial**

Layout: RBD with 3 replications

R1	R2	R3
T 5	T 4	T 2
T 2	T 7	T 1
T 7	T 6	T 3
T 1	T 2	T 5
T 4	T 8	T 6
T 6	T 3	T 4
T 8	T 1	T 7
T 3	T 5	T 8

Trial 13: INTEGRATED PEST MANAGEMENT (SPECIAL)

This trial is jointly conducted by entomologist, pathologist and agronomist in selected locations. The locations are finalized with consent from all the three co-operators. Therefore, entomologist, pathologist and agronomist should conduct the trial together and send the data to the respective PIs. The details of the practices to be followed are given below.

Name of the Trial	Integrated Pest Management (Special)
Objective	To validate location-specific IPM practices from a basket of options available and demonstrate to farmers the management of pests in a holistic way (including insects, diseases and weeds).
Variety	Local popular variety of the region
Plot size	One-acre area. Each acre is to be divided into 5 equal sized units (each unit = one replication)
Replications	5 replications.
Treatments	Take 3-5 farmers in each centre/location, each farmer representing a replication with at least 1acre area /farmer as IPM plots. Farmers can be selected from same village or different villages

Locations

Zone	Locations	Number
Zone I – Hilly areas	1) Khudwani (J&K) 2) Malan (HP) 3) Umiam (Barapani) (ML)	3
Zone II - Northern	4) Pantnagar (Uttarakhand) 5) Ludhiana (Punjab) 6) Kaul (Haryana)	3
Zone III - Eastern	7) Chiplima (Odisha) 8) Chinsurah (WB) 9) NRRI (Cuttack) (OD) 10) Pusa (Bihar) 11) Ghaghraghat/ Masodha (UP)	5
Zone IV – North Eastern	12) Titabar (Assam) 13) Imphal (Lamphalpat), (MN) 14) Arundhutinagar (Tripura)	3
Zone V - Central	15) Rewa (MP) 16) Raipur(CG) 17) Jagadapur (CG)	3
Zone VI - Western	18) Karjat (MH) 19) Sakoli (MH) 20) Nawagam (GJ) 21) Navsari (GJ)	4
Zone VII - Southern	22) Maruteru (AP) 23) Rajendranagar (TS) 24) Aduthurai (TN) 25) Coimbatore (TN) 26) Pattambi (Kerala) 27) Gangavati (KN) 28) Mandya (KN)	7
Total locations		28

Details of the treatments

The package of practices to be followed in IPM module in each zone is given below

Zone 1 – Hilly areas

- Locations (3): 1) Khudwani (J&K)
2) Malan (HP)
3) Umiam (Barapani) (ML)

Major Insect Pests: Grasshopper, rice hispa, caseworm, stem borers

Major Diseases: Leaf blast, Sheath blight, brown spot, false smut

Major weeds: Grasses: *Echinochloa colona*, *Echinochloa crusgalli*, *Panicum sp.* **Sedges:** *Cyperus iria*, *Eleocharis sp.* **BLW:** *Alternanthera sp.*, *Monochoria sp.*

IPM module for Zone I		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma (Commercial formulation) @ 10g/kg. Pre-soak the seeds in water for 12 hrs. Take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma, later allow it for germination in gunny/cloth bag. • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Use of resistant or moderately resistant variety • Need based application of bispyribacsodium <u>10% SC @ 0.5ml/L</u> water at 15 days of nursery. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
Main field Up to 30 DAT	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Apply balanced fertilizers as per the local recommended dose. • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha mix with fine sand (50kg/ha) and broadcast it. • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Trimming of bunds for grasshopper management. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • If blast/brown spot symptoms seen between 20 to 30 DAT, need based application of carbendazim+ mancozeb combination fungicide. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
30 – 60 DAT	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder. • Depending on weed intensity, spray post emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i. /ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever</p>

	<p>spraying, mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days.</p> <ul style="list-style-type: none"> • N top dressing to be taken up as given in protocol using Leaf Color Chart • Blanket spray of NeemAzal @ 3 ml/ liter water and repeat after 10 days' interval • Need based application of Fipronil 0.3G @ 10 kg/ acre depending on the severity of caseworm, hispa and stem borers 	<p>you go for observation/visit</p>
61 – 90 DAT	<ul style="list-style-type: none"> • One prophylactic spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against lepidopterous pests, if incidence crosses ETL value). • Need based application of Propiconazole (1 ml/lit). 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever you go for observation/visit</p>
> 90 DAT up to harvest	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (1 from each repl.) in this IPM block • Also record the cost involved for each practice/ operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in FP field • Also record the cost involved for each practice/ operation taken in FP starting from nursery to harvest to estimate cost of cultivation as given in data sheet

Zone II – Northern

Locations (3): 1) Pantnagar (Uttarakhand)
 2) Ludhiana (Punjab)
 3) Kaul (Haryana)

Major Insect Pests: Planthoppers, stem borers, leaf folder

Major Diseases: Leaf blast, sheath blight, bacterial blight, False smut, brown spot

Major weeds: Grasses, sedges and broad-leaved weeds

IPM module for Zone II		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs, take the seeds in a container and add the Trichoderma, coat the 	As per the local farmers practice.

	<p>seeds with Trichoderma later allow it for germination in gunny/cloth bag</p> <ul style="list-style-type: none"> • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Use of resistant or moderately resistant variety • Need based application of bispyribacsodium <u>10% SC @ 0.5ml/L</u> water at 15 days of nursery. 	<p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
<p>Main field Up to 30 DAT</p>	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Cut the tips of leaf blades after removing seedlings from nursery for transplanting in the main field (this practice can be avoided in bacterial blight endemic areas). • Leave alleyways 30 cm after every 2 m or 10 rows • Apply balanced fertilizers as per the local recommended dose. • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha, mix with fine sand (50kg/ha) and broadcast it. • Grow cowpea, marigold, soybean, green gram or any flowering plant on bunds to attract natural enemies. • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • At 15 DAT, install pheromone traps with 5 mg lure @ 3 traps/acre for stem borer monitoring. While installing, make sure that the trap remains 5 inches above the crop canopy. Change the lure after 3 weeks. If the trap catches exceed 30 – 35 adults/trap/week, go for the pesticide application. • Release of <i>Trichogramma japonicum</i> adults against yellow stem borer and <i>Trichogramma chilonis</i> against leaffolder. Release 5 - 6 times @ 40, 000/ acre, starting from 15 days after transplanting. Tricho cards containing 1000 parasitised eggs to be stapled to the underside of leaves at 40 points uniformly distributed across 1-acre area. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
<p>30 – 60 DAT</p>	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder. • Depending on weed intensity, spray post emergence herbicide triafamone + 	<p>As per the local farmers practice.</p>

	<p>ethoxysulfuron @ 67.5 g a.i. /ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide spraying, mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days.</p> <ul style="list-style-type: none"> • N top dressing to be taken up as given in protocol using Leaf Color Chart. • Blanket Spray NeemAzal @ 3 ml/ liter water and repeat after 10 days' interval. • Installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at vegetative stage serve as resting/ landing sites for birds. • Mid season drainage of the field to mitigate planthopper multiplication. • If the stem borer incidence is high, install pheromone traps with 5 mg lure @ 8 traps/acre for mass trapping. Change the lure after 3 weeks. • If sheath blight occurs in more than threshold level, then apply hexaconazole 5 EC (2 ml/lit) or propiconazole 25EC (1 ml/lit) or difenoconazole 25EC (0.5ml/lit) • When the hopper population exceeds 10 – 15 hoppers/hill, apply Triflumezopyrim 10% SC @ 94 ml/ acre between 45 – 60 DAT only once. 	<p>Please record the practices followed by farmers when- ever you go for observation/visit</p>
<p>61 – 90 DAT</p>	<ul style="list-style-type: none"> • One prophylactic spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against stem borer/leaf folder, if incidence crosses ETL). • In case of severe incidence of planthoppers, apply Pymetrozine 50 WP @ 120 g/ acre (or) Dinotefuran 20 SG @ 80 g/ acre. Do not repeat or use the same insecticide. While spraying, nozzle should be directed to the basal portion of the plants. • For managing post flowering disease, apply propiconazole @ 1 ml/lit • In the false smut endemic areas, if a cool climate prevails at the time of booting/flowering, one prophylactic spray of propiconazole @ 1 ml/lit can be applied. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever you go for observation/visit</p>
<p>> 90 DAT up to</p>	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this IPM block 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this block.

harvest	<ul style="list-style-type: none"> • Also record the cost involved for each practice/ operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Also record the cost involved for each practice/ operation taken in FP starting from nursery to harvest to estimate cost of cultivation as given in data sheet
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Zone III – Eastern

- Locations (3):
- 1) Chiplima (Odisha)
 - 2) Chinsurah (WB)
 - 3) NRRI (Cuttack) (OD)
 - 4) Pusa (Bihar)
 - 5) Ghaghraghat/ Masodha (UP)

Major Insect Pests: Planthoppers, stem borer, gall midge, leaf folder, caseworm, cutworm, panicle mite

Major Diseases: Leaf blast, neck blast, sheath blight, sheath rot, bacterial blight, brown spot, false smut

Major weeds: Grasses, sedges and broad leaved weeds

IPM module for Zone III		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs. Take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma, later allow it for germination in gunny/cloth bag. • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Use of resistant or moderately resistant variety • Apply fipronil 0.3 G @ 10 kg/ acre, 5 days before pulling seedlings from nursery for transplantation (in gall midge endemic areas) 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
Main field Up to 30 DAT	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Cut the tips of leaf blades after removing seedlings from nursery for transplanting in the main field (this practice can be avoided in bacterial blight endemic areas). • Leave alleyways 30 cm after every 2 m or 10 rows • Apply balanced fertilizers as per the local recommended dose. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>

	<ul style="list-style-type: none"> • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha, mix with fine sand (50kg/ha) and broadcast it. • Grow cowpea, marigold, soybean, green gram or any flowering plant on bunds to attract natural enemies • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • At 15 DAT, install pheromone traps with 5 mg lure @ 3 traps/acre for stem borer monitoring. While installing, make sure that the trap remains 5 inches above the crop canopy. Change the lure after 3 weeks. If the trap catches exceed 30 – 35 adults/trap/week, go for the pesticide application. • Release of <i>Trichogramma japonicum</i> adults against yellow stem borer and <i>Trichogramma chilonis</i> against leaffolder. Release 5 - 6 times @ 40, 000/ acre, starting from 15 days after transplanting. Tricho cards containing 1000 parasitised eggs to be stapled to the underside of leaves at 40 points uniformly distributed across 1-acre area. • In case leaf blast or brown spot appears in early stage, then apply combination fungicide i.e. carbendazim + mancozeb (@ 2-2.5 gm/lit) 	
<p>30 – 60 DAT</p>	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder • Depending on weed intensity, spray post emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i./ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide spraying mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days. • N top dressing to be taken up as given in protocol using Leaf Color Chart. • Blanket spray of NeemAzal @ 3 ml/ liter water at 40 – 45 DAT and repeat after 10 days' interval • Installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at vegetative stage serve as resting/ landing sites for birds 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever you go for observation/visit</p>

	<ul style="list-style-type: none"> • Mid season drainage of the field to mitigate planthopper multiplication. • If the stem borer incidence is high, install pheromone traps with 5 mg lure @ 8 traps/acre for mass trapping. Change the lure after 3 weeks. • If sheath blight occurs in more than threshold level, then apply hexaconazole 5 EC (2 ml/lit) • If the planthopper population exceeds 10 – 15 hoppers/hill, apply Triflumezopyrim 10% SC @ 94 ml/ acre between 45 – 60 DAT only once. 	
61 – 90 DAT	<ul style="list-style-type: none"> • One prophylactic spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against lepidopterous pests, if incidence crosses ETL). • In case of severe incidence of planthoppers, apply Pymetrozine 50 WP @ 120 g/ acre (or) Dinotefuran 20 SG @ 80 g/ acre. Do not repeat or use the same insecticide. While spraying, nozzle should be directed to the basal portion of the plants. Application with power sprayer is preferable. • Need based spray of Spiromesifen 240 SC @ 2 ml/ liter in case of severe incidence of panicle mite • For managing post flowering disease, apply propiconazole @ 1 ml/lit. • In the false smut endemic areas, if a cool climate prevails at the time of booting/flowering, one prophylactic spray of propiconazole @ 1 ml/lit can be applied. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever you go for observation/visit</p>
> 90 DAT up to harvest	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (1 place in each repl.) in this IPM field • Also record the cost involved for each practice/ operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this FP field • Also record the cost involved for each practice/ operation taken in FP starting from nursery to harvest to estimate cost of cultivation

Zone IV – North -Eastern

- Locations (3):
- 1) Titabar (Assam)
 - 2) Imphal (Lamphalpat), (MN)
 - 3) Arundhutinagar (Tripura)

Major Insect Pests: Stem borer, leaf folder, rice hispa, case worm, cut worm in flooded areas, gundhi bug

Major Diseases: Leaf blast, neck blast, false smut, sheath blight, bacterial blight (Arundhatinagar and Titabar)

Major weeds: Grasses: *Echinochloa crusgalli*, *Hymenachne sp*; **Sedges:** *Cyperus iria*, *Eleocharis sp*; **BLW:** *Alternanthera sp*, *Monochoria sp*

IPM Module for Zone IV		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs, take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma later allow it for germination in gunny/cloth bag • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Use of resistant or moderately resistant variety • Need based application of bispyribacsodium 10% SC @ 0.4ml/L water at 15 days of nursery. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
Main field Up to 30 DAT	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Cut the tips of leaf blades after removing seedlings from nursery for transplanting in the main field (this practice can be avoided in bacterial blight endemic areas). • Leave alleyways of 30 cm after every 2 m or 10 rows • Fertilizers should be applied as per the local recommended fertilizer dose. • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha, mix with fine sand (50kg/ha) and broadcast it. • Grow cowpea, marigold, soybean, green gram or any flowering plant on bunds to attract natural enemies. • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • At 15 DAT, install pheromone traps with 5 mg lure @ 3 traps/acre for stem borer monitoring. While installing, make sure that the trap remains above the crop canopy. Change the lure after 3 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>

	<p>weeks. If the trap catches exceed 30 – 35 adults/trap/week, go for pesticide application.</p> <ul style="list-style-type: none"> • Release of <i>Trichogramma japonicum</i> adults against yellow stem borer and <i>Trichogramma chilonis</i> against leaffolder. Release 5 - 6 times @ 40, 000/ acre, starting from 15 days after transplanting. Tricho cards containing 1000 parasitised eggs to be stapled to the underside of leaves at 40 points uniformly distributed across 1-acre area. • In case leaf blast or brown spot appears in early stage, then apply combination fungicide i.e. carbendazim + mancozeb (@ 2-2.5 gm/lit) 	
30 – 60 DAT	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder. • Depending on weed intensity, spray post emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i. /ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide spraying, mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days. • N top dressing to be taken up as given in protocol using Leaf Color Chart • Blanket spray of NeemAzal @ 3 ml/ liter water at 40 – 45 DAT and repeat after 10 days' interval • Installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at vegetative stage serve as resting/ landing sites for birds • If the stem borer incidence is high, install pheromone traps with 5 mg lure @ 8 traps/acre for mass trapping. Change the lure after 3 weeks. • If sheath blight occurs in more than threshold level, then apply hexaconazole 5 EC (2 ml/lit) 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers whenever you go for observation/visit</p>
61 – 90 DAT	<ul style="list-style-type: none"> • One spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against stem borer/leaf folder, if incidence crosses ETL). • For managing post flowering disease, apply propiconazole @ 1 ml/lit • Use of decomposing crabs as bait - As the filling of paddy grain starts, locally available crabs can be smashed and put on pointed bamboo sticks in paddy fields as bait to attract gundhi bugs. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers whenever you go for observation/visit</p>

	<ul style="list-style-type: none"> • In the false smut endemic areas, if a cool climate prevails at the time of booting/flowering, one prophylactic spray of propiconazole @ 1 ml/lit can be applied. 	
> 90 DAT up to harvest	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (1 place in each repl.) in this IPM field • Also record the cost involved for each practice/operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this FP field • Also record the cost involved for each practice/operation taken in FP starting from nursery to harvest to estimate cost of cultivation

Zone V – Central

Locations (3): 1) Rewa (MP)
2) Raipur(CG)
3) Jagdalpur (CG)

Major Insect Pests: Stem borer, leaf folder, gall midge, Planthoppers, gundhi bug, panicle mite

Major Diseases: Leaf blast, neck blast, brown spot, sheath blight, sheath rot, false smut, bacterial blight

Major weeds: Grasses, sedges and broad leaved weeds

IPM Module for Zone V		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs, take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma later allow it for germination in gunny/cloth bag. • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Use of resistant or moderately resistant variety • Apply fipronil 0.3 G @ 10 kg/ acre, 5 days before pulling seedlings from nursery for transplantation. (in gall midge endemic areas) • Need based application of bispyribacsodium 10% SC @ 0.5ml/L water at 15 days of nursery. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers’ whenever you go for observation/visit.</p>
Main field	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Cut the tips of leaf blades after removing seedlings from nursery for transplanting in the main field 	<p>As per the local farmers practice.</p>

<p>Up to 30 DAT</p>	<p>(this practice can be avoided in bacterial blight endemic areas).</p> <ul style="list-style-type: none"> • Leave alleyways of 30 cm after every 2 m or 10 rows • Fertilizers should be applied as per the local recommended fertilizer dose. • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha, mix with fine sand (50kg/ha) and broadcast it. • Grow cowpea, marigold, soybean, green gram or any flowering plant on bunds to attract natural enemies • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • At 15 DAT, install pheromone traps with 5 mg lure @ 3 traps/acre for stem borer monitoring. While installing, make sure that the trap remains 5 inches above the crop canopy. Change the lure after 3 weeks. If the trap catches exceed 30 – 35 adults/trap/week, go for the pesticide application. • Release of <i>Trichogramma japonicum</i> adults against yellow stem borer and <i>Trichogramma chilonis</i> against leaffolder. Release 5 - 6 times @ 40, 000/ acre, starting from 15 days after transplanting. Tricho cards containing 1000 parasitised eggs to be stapled to the underside of leaves at 40 points uniformly distributed across 1-acre area. • In case leaf blast or brown spot appears in early stage, then apply combination fungicide i.e. carbendazim + mancozeb (@ 2-2.5 gm/lit) 	<p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
<p>30 – 60 DAT</p>	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder. • Depending on weed intensity, spray post emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i. /ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide spraying, mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever you go for observation/visit</p>

	<ul style="list-style-type: none"> • N top dressing to be taken up as given in protocol using Leaf Color Chart. • Blanket spray of NeemAzal @ 3 ml/ liter water at 40 – 45 DAT and repeat after 10 days' interval. • Installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at vegetative stage serve as resting/ landing sites for birds • Mid-season drainage of the field to mitigate planthopper multiplication. • If the stem borer incidence is high, install pheromone traps with 5 mg lure @ 8 traps/acre for mass trapping. • If sheath blight occurs in more than threshold level, then apply hexaconazole 5 EC (2 ml/lit) • If the planthopper population exceeds 10 – 15 hoppers/hill, apply Triflumezopyrim 10% SC @ 94 ml/ acre between 45 – 60 DAT only once 	
61 – 90 DAT	<ul style="list-style-type: none"> • One prophylactic spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against stem borer/leaf folder, if incidence crosses ET value). • In case of severe incidence of planthoppers, apply Pymetrozine 50 WP @ 120 g/ acre (or) Dinotefuran 20 SG @ 80 g/ acre. Do not repeat or use the same insecticide. While spraying, nozzle should be directed to the basal portion of the plants. Application with power sprayer is preferable. • Use of decomposing crabs as bait - As the filling of paddy grain starts, locally available crabs can be smashed and put on pointed bamboo sticks in paddy fields as bait to attract gundhi bugs. • For managing post flowering disease, apply propiconazole @ 1 ml/lit • In the false smut endemic areas, if a cool climate prevails at the time of booting/flowering, one prophylactic spray of propiconazole @ 1 ml/lit can be applied. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers whenever you go for observation/visit</p>
> 90 DAT up to harvest	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (1 place in each repl.) in this IPM field • Also record the cost involved for each practice/ operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this FP field • Also record the cost involved for each practice/ operation taken in FP starting

		from nursery to harvest to estimate cost of cultivation as given in data sheet
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Zone VI – Western

- Locations (3): 1) Karjat (MH)
 2) Sakoli (MH)
 3) Nawagam (GJ)
 4) Navsari (GJ)

Major Insect Pests: Stem borer, leaf folder, gall midge, planthoppers, cutworm, panicle mite

Major Diseases: Sheath blight, sheath rot, leaf blast, grain discolouration, brown spot

Major weeds: Grasses: *Dactyloctenium sp*, *Echinochloa colona*, *Echinochloa crusgalli*;

Sedges: *Cyperus difformis*, *Cyperus iridea*; **BLW :** *Alternanthera philoxeroides*, *Bergia capensis*, *Eclipta alba*, *Marsilea quadrifolia*, *Rotala densiflora*, *Sphenoclea zeylanica*

IPM Module for Zone VI		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs. Take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma later allow it for germination in gunny/cloth bag. • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Need based application of bispyribacsodium 10% SC @ 0.4ml/L water at 15 days of nursery. • Apply fipronil 0.3 G @ 10 kg/ acre, 5 days before pulling seedlings from nursery for transplantation (in gall midge endemic areas). 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
Main field Up to 30 DAT	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Cut the tips of leaf blades after removing seedlings from nursery for transplanting in the main field (this practice can be avoided in bacterial blight endemic areas). • Leave alleyways of 30 cm after every 2 m or 10 rows • Fertilizers should be applied as per the local recommended fertilizer dose. • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha, mix with fine sand (50kg/ha) and broadcast it. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>

	<ul style="list-style-type: none"> • Grow cowpea, marigold, soybean, green gram or any flowering plant on bunds to attract natural enemies • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • At 15 DAT, install pheromone traps with 5 mg lure @ 3 traps/acre for stem borer monitoring. While installing, make sure that the trap remains above the crop canopy. Change the lure after 3 weeks. If the trap catches exceed 30 – 35 adults/trap/week, go for pesticide application. • Release of <i>Trichogramma japonicum</i> adults against yellow stem borer and <i>Trichogramma chilonis</i> against leaffolder. Release 5 - 6 times @ 40, 000/ acre, starting from 15 days after transplanting. Tricho cards containing 1000 parasitised eggs to be stapled to the underside of leaves at 40 points uniformly distributed across 1-acre area. • In case leaf blast or brown spot appears in early stage, then apply combination fungicide i.e. carbendazim + mancozeb (@ 2-2.5 gm/lit) 	
<p>30 – 60 DAT</p>	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder. • Depending on weed intensity, spray post emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i. /ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide spraying, mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days. • N top dressing to be taken up as given in protocol using Leaf Color Chart • Blanket spray of NeemAzal @ 3 ml/ liter water at 40 – 45 DAT and repeat after 10 days' interval. • Installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at vegetative stage serve as resting/ landing sites for birds. • Mid season drainage of the field to mitigate planthopper multiplication. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers whenever you go for observation/visit</p>

	<ul style="list-style-type: none"> • If the stem borer incidence is high, install pheromone traps with 5 mg lure @ 8 traps/acre for mass trapping. Change the lure after 3 weeks. • If sheath blight occurs in more than threshold level, then apply hexaconazole 5 EC (2 ml/lit) • If the planthopper population exceeds 10 – 15 hoppers/hill, apply Triflumezopyrim 10% SC @ 94 ml/ acre between 45 – 60 DAT only once. 	
61 – 90 DAT	<ul style="list-style-type: none"> • One spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against stem borer/leaf folder, if incidence crosses ET value). • In case of severe incidence of planthoppers, apply Pymetrozine 50 WP @ 120 g/ acre (or) Dinotefuran 20 SG @ 80 g/ acre. Do not repeat or use the same insecticide. While spraying, nozzle should be directed to the basal portion of the plants. Application with power sprayer is preferable. • Need based spray of Spiromesifen 240 SC @ 2 ml/ liter in case of severe incidence of panicle mite • For managing post flowering disease, apply propiconazole @ 1 ml/lit 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers whenever you go for observation/visit</p>
> 90 DAT up to harvest	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (1 place in each repl.) in this IPM block • Also record the cost involved for each practice/ operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this block • Also record the cost involved for each practice/ operation taken in FP starting from nursery to harvest to estimate cost of cultivation as given in data sheet

Zone VII – Southern

- Locations (7):
- 1) Maruteru (AP)
 - 2) Rajendranagar (TS)
 - 3) Aduthurai (TN)
 - 4) Coimbatore (TN)
 - 5) Pattambi (Kerala)
 - 6) Gangavati (KN)
 - 7) Mandya (Karnataka)

Major Insect Pests: Planthoppers, stem borer, leaf folder, gall midge, panicle mite

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Major Diseases: Leaf blast, sheath blight, bacterial blight, brown spot, stem rot, neck blast, false smut

Major weeds: Grasses: *Cynodon dactylon*, *Echinochloa colona*, *Echinochloa crusgalli*, *Leptochloa chinensis*, *Panicum repense*, *Panicum tripheron*; **Sedges:** *Cyperus difformis*, *Cyperus iria*, *Cyperus procerus*, *Fimbristylis miliacea*, *Scirpus spp*; **BLW:** *Ammania baccifera*, *Eclipta alba*, *Eclipta prostrate*, *Glinus oppositifolia*, *Lindernia veronicifolia*, *Ludwigia parviflora*, *Spilanthus acmella*.

IPM Module for Zone VII		
	IPM	FP
Nursery	<ul style="list-style-type: none"> • Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma, later allow it for germination in gunny/cloth bag. • Slurry Dry seed treatment: Dissolve the required quantity of fungicide in water to make a slurry. Coat the seeds manually with the prepared fungicide slurry and shade dry for one hour. • Use of resistant or moderately resistant variety • Need based application of bispyribacsodium 10% SC @ 0.5ml/L water at 15 days of nursery. • Apply fipronil 0.3 G @ 10 kg/ acre, 5 days before pulling seedlings from nursery for transplantation. 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>
Main field Up to 30 DAT	<ul style="list-style-type: none"> • Transplant seedlings at a spacing of 20 x 15 cm. • Cut the tips of leaf blades after removing seedlings from nursery for transplanting in the main field (this practice can be avoided in bacterial blight endemic areas). • Leave alleyways 30 cm after every 2 m or 10 rows • Fertilizers should be applied as per the local recommended fertilizer dose. • Apply Pretilachlor 500 g ai/ha (or) Anilophos 300 g ai/ha (or) Pyrazosulfuron ethyl 20 g ai/ha (or) Oxadiargyl 80-100 g ai/ha mix with fine sand (50kg/ha) and broadcast it. • Grow cowpea, marigold, soybean, green gram or any flowering plant on bunds to attract natural enemies • Survey for pest incidence and level of damage at weekly interval starting from 15 DAT. • Cleaning of bunds to eliminate the alternate hosts for off-season survival of pests and diseases. • At 15 DAT, install pheromone traps with 5 mg lure @ 3 traps/acre for stem borer monitoring. While installing, make sure that the trap remains above the crop canopy. Change the lure after 3 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers' whenever you go for observation/visit.</p>

	<p>weeks. If the trap catches exceed 30 – 35 adults/trap/week, go for pesticide application.</p> <ul style="list-style-type: none"> • Release of <i>Trichogramma japonicum</i> adults against yellow stem borer and <i>Trichogramma chilonis</i> against leaffolder. Release 5 - 6 times @ 40, 000/ acre, starting from 15 days after transplanting. Tricho cards containing 1000 parasitised eggs to be stapled to the underside of leaves at 40 points uniformly distributed across 1-acre area. • In case leaf blast or brown spot appears in early stage, then apply combination fungicide i.e. carbendazim + mancozeb (@ 2-2.5 gm/lit) 	
30 – 60 DAT	<ul style="list-style-type: none"> • Mechanical weeding using conoweeder • Depending on weed intensity spray post emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i./ha for 2nd flush of weeds. If only Broad leaf weeds predominate, apply ethoxysulfuron @ 20 g a.i./ha. For herbicide spraying mix in 500 liters' water/ha and spray by flat Z type nozzle uniformly. It is necessary to maintain standing water (2-3 cm water) in the field. Water should not be let in or let out for 2 days. • N top dressing to be taken up as given in protocol using Leaf Color Chart • Blanket spray of NeemAzal @ 3 ml/ liter water at 40 – 45 DAT and repeat after 10 days' interval • Installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at vegetative stage serve as resting/ landing sites for birds • If the planthopper population exceeds 10 – 15 hoppers/hill, apply Triflumezopyrim 10% SC @ 94 ml/ acre between 45 – 60 DAT only once • If the stem borer incidence is high, install pheromone traps with 5 mg lure @ 8 traps/acre for mass trapping. Change the lure after 3 weeks. • If sheath blight occurs in more than threshold level, then apply hexaconazole 5 EC (2 ml/lit) 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever you go for observation/visit</p>
61 – 90 DAT	<ul style="list-style-type: none"> • One prophylactic spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/ acre (against stem borer/leaf folder, if incidence crosses ETL). • In case of severe incidence of planthoppers, apply Pymetrozine 50 WP @ 120 g/ acre (or) Dinotefuran 20 SG @ 80 g/ acre. Do not repeat or 	<p>As per the local farmers practice.</p> <p>Please record the practices followed by farmers when- ever</p>

	<p>use the same insecticide. While spraying, nozzle should be directed to the basal portion of the plants. Application with power sprayer is preferable.</p> <ul style="list-style-type: none"> • Need-based spray of Spiromesifen 240 SC @ 2 ml/ liter in case of severe incidence of panicle mite • For managing post-flowering disease, apply propiconazole @ 1 ml/lit • In the false smut endemic areas, if a cool climate prevails at the time of booting/flowering, one prophylactic spray of propiconazole @ 1 ml/lit can be applied. 	<p>you go for observation/visit</p>
<p>> 90 DAT up to harvest</p>	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (1 place in each repl.) in this IPM field • Also record the cost involved for each practice/ operation taken in IPM starting from nursery to harvest to estimate cost of cultivation as given in data sheet 	<ul style="list-style-type: none"> • Mark 5 X 5 m² area and take yield, at 5 places (5 repl.) in this FP field • Also record the cost involved for each practice/ operation taken in FP starting from nursery to harvest to estimate cost of cultivation as given in data sheet

Observations to be recorded:

- Starting from 15 DAT, observations on pest incidence should be recorded on 5 randomly selected hills (each time hills are selected randomly) in each replication (25 hills/ acre) at weekly interval. (Total of 25 hills in IPM & 25 hills in FP at each observation).
- At each observation, record total tillers, dead hearts, silver shoots, total leaves, damaged leaves, number of planthoppers/ hill as per the data sheet given.
- Also record disease incidence (% disease severity) against Blast (leaf/neck), bacterial blight and other major diseases.
- Also record the following weed observations:
 - ✓ Weed population(number/m²) 30, 45 DAT
 - ✓ Weed Dry matter production (gm/ m²) of weeds at 30, 45 DAT

Grain yield: Record the yield from 5 places of 5 x 5 m² area from each replication.

Note: In case of insect/ disease infestation, please follow ETL's and control measures should be taken as per the IPM guidelines/protocol given below. Inform/consult concerned PI/scientist in case of severe infestation or when in doubt about action to be taken.

IIRR IPM team (Note: You can contact anyone at any time)

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A. Protocol for effective weed management in IPM Special trial (in IPM treatment)

Since the trial is being laid out in irrigated ecology, weed management both in nursery and main field are equally important.

1) Nursery

- i. Maintain water level to avoid weeds
- ii. In weed intense areas, apply Butachlor @25ml/250 m² nursery area or Pretilachlor+safener @ 60ml/250 m² nursery area at 8-10 days after sowing seed in nursery beds
- iii. Raising nursery in strips of 1 m wide and leaving water canal of 0.25 m in between will help in intercultural operations

2) Main field: Immediately after transplanting within a week

* Liquid formulation of new herbicides can be applied by mixing with sand or by foliar spray, respectively, within first week after transplanting by following the procedure outlined hereunder.

* Required quantity of herbicide (Butachlor @3 liters/ha or Pretilachlor @1250-1500 ml/ha or Anilophos 1250-1500 ml/ha or Metsulfuron methyl+chlorimuronethyl (Almix)@20g/ha) mixed with fine sand (50kg/ha) and broad casted. Or mixed in 500 liters' water/ha and spray by flat Z type nozzle uniformly within 3 to 7 days after transplanting. It is necessary to maintain standing water (2-3 cm water) in the field.

Do not remove or let in water at least 48 hours after application of herbicide.

* **Note** that under thorough land preparation and proper water management conditions this step may not be required. Take a decision on 2nd day after transplanting based on land levelling and water supply status.

Post-emergence application:

*Broad spectrum weed control – Bispyribasodium @ 250ml/ha after 1 month of planting at 2-3 leaf stage of weeds- spot application or Chlorimuron + Metsulfuron-methyl (Grasses, Sedges and Annual BLW) @ 20 gm/ha

* If Broad leaf weeds predominate, apply 2, 4-D Na salt @ 1250-1500 g/ha after 1 month of planting

* If grasses predominate, apply Cyhalofopryl @1000 m/ha at 15-20 DAT or Fenoxaprop p ethyl @ 800-1000ml/ ha after 1 month of planting.

Fertilizer management: Apply top dressing nitrogen based on Leaf Color Chart (modified IIRR -LCC) supplied by IIRR. The instructions to use LCC are given on backside of LCC.

Observation to be recorded under IPM plot as well as in Farmers Practice plots:

Monitor at regular interval weed growth (Group wise no. of weeds i.e., grasses, sedges and broad leaves weeds) in 1 m² area in each replication with the help of a quadrat. Collect all

the weeds, dry them in oven at 60⁰ C for constant dry wet and record dry weight at 20, 40, 60 DAT.

- Weed population (number/m²) 30, 45 DAT
- Weed Dry matter production (gm/ m²) of weeds at 30, 45 DAT
- Observe the changes in weed flora

B. Protocol for effective disease management in IPM Special trial (in IPM treatment)

1. Seed Treatment: (can be taken up as prophylactic)

- Seed treatment with Trichoderma @ 10g/kg. Pre-soak the seeds in water for 12 hrs, take the seeds in a container and add the Trichoderma, coat the seeds with Trichoderma later allow it for germination in gunny/cloth bag.

The cloth bag should then be incubated in closed chamber (like cement tank) and should fully covered with paddy straw. After 24 to 48 hours, the seeds will germinate and the germinated seeds can be used for nursery sowing. Use of hand gloves is must at the time of seed treatment and transfer of seeds from bucket to cloth bags.

Most of the diseases appear in the maximum tillering stage onwards

Blast: If still there is incidence of blast in the nursery, then give one spraying with tricyclazole 75 WP @ 0.6 g/l or iprobenphos 48 EC @ 2g/l or isoprothiolane 40 EC @ 1.5 ml/l or carpropamid 30 SC @ 1 ml/l or carbendazim 50 WP @ 1 g/l or kasugamycin 3 SL @ 2.5 g/l or Epoxyconazole 125 g/l + carbendazim 125 g/l @ 0.5 ml/l.

Sheath blight: Sheath blight in general starts at the tillering to maximum tillering stage. Many cases, it has been noticed that the disease appears near the bund (probably from the infected weed hosts or inoculum present in the infected straw kept in the bunds or the sclerotia floating on water and accumulated near the bunds) and then progresses inwards. Regular surveillance is must and if the initiation of the disease is seen in any parts especially near the bunds, then one spraying can be given especially in the affected area. The sprayings can be done with the chemicals like validamycin 3L @2.5 ml/l or propiconazole 25 EC @ 1 ml/l or hexaconazole 5 EC @ 2 ml/l or carbendazim 50 WP @ 1g/l or thifluzamide 24 SC @ 30 g a.i/ ha.

Bacterial blight : The disease appears initially in patches and near the shades. If bacterial blight symptoms are noticed, delay the next top dressing.

Brown spot: Under irrigated ecosystem, if the fields are well managed and if fertilizer application is balance, then brown spot will not be a big problem. Moreover, seed treatment with carbendazim will take care of brown spot. However, still if it comes in some of the pockets in plots then, sprayings with chemicals like carbendazim 50 WP @ 1g/l or chlorothalonil 75 WP @ 2g/l or combination of carbendazim (12%) and mancozeb (63%) @ 1.5-2 g/l or mancozeb 75 WP @ 2g/l can be done.

Foot Rot (Bakanae): Generally, seed treatment will take care of the seed borne inoculum of the fungus. However, if it is observed then one spraying with carbendazim (0.1%) will take care of the disease.

Stem Rot: Though it is minor disease, it can cause havoc in association with the BPH infestation. If stem rot symptoms are seen, then one spraying with Iprobenphos 48 EC @ 2g/l or thiophanate methyl 70 WP @ 1 g/l or isoprothiolane 40 EC @ 1.5 ml/l can be done.

One need based application (based on the disease history of the location) with 0.1% propiconazole or Nativo (0.4 g/l) around flowering will take care of false smut, grain discolouration and sheath rot diseases.

Economic Thresholds Suggested for application of fungicides

S.No	Disease	ETL
1	Foliar blast	3-5 lesions/leaf
2	Brown spot	2-3 spots/leaf & 2-3 infected plants/ m ²
3	Sheath blight	Lesions of 5-6 mm in length & 2-3-infected plants/m ²
4	Sheath-rot	Lesion length 2-3 mm on sheath & 3-5 infected plants/m ²
5	Bacterial blight	2-3 infected leaves/m ²
6	Tungro	1 tungro infected plants/m ² & 2 GLH/hill (in fungus endemic areas)
7	Neck blast	2-5 neck infected plants/m ²

C. Protocol for effective insect pest management in IPM Special trial (in IPM treatment)

Following information on major pests will help to decide on appropriate IPM interventions

Planthoppers

The pest generally appears 45 to 50 days after planting. Adults and nymphs suck the sap at the base of the tillers, resulting in yellowing and drying of the plants. Infestation spreads in concentric circles and in severe cases the affected field gives a burnt appearance. Provision of alley ways leads to change in micro-climate and helps in monitoring pest population and pesticide application. Regular surveillance is a must starting from 40 DAT. Walk along the alleyways and observe on either side at the base of plants for planthoppers. If the population exceeds ETL, go for suggested measures given. In BPH endemic areas, go for mid-season drainage to prevent population build-up.

Stem borers

This pest may appear even in nursery and in main field during any stage of the crop. Adult moths are seen resting on the leaf tip during early hours of the day or egg masses are seen on the stem and leaf. The pest has a patchy distribution resulting in a patch of dead hearts/ white ears depending on the stage of the crop. Installing pheromone traps for monitoring the pest is effective way of tracking the pest. Install 8 traps/ha with 5 mg lure such that trap remains above crop canopy. The trap catches are monitored at weekly interval to know the pest build-up. When trap catches exceed 30-35 moths/trap/week, go for suggested measures. Change

the lure after 25 days as it loses its effectiveness. If the stem borer incidence is high, mass trapping can also be done by the installation of 20 traps / ha.

Gall midge

The pest may appear in the nursery or in the main field up to active tillering stage. Galls or silver shoots appear after 4 weeks of adult appearance and egg laying. If pest damage exceeds ETL, resort to control measures as suggested.

Defoliators

Most of the defoliators like leaf folder, case worm, green horned caterpillar, skipper, semi-looper appear immediately after transplanting. Go for regular scouting and only if pest damage exceeds ETL, go for suggested control measures.

Based on the periodic observation compute average pest damage in IPM plot and determine if the damage has crossed Economic threshold level.

Economic Thresholds Suggested for application of insecticides

S.No	Insect pest	ETL	Recommended Insecticides
1	Stem borer	10 % dead hearts or one adult moth or one egg mass per sq. m or >30 moths/pheromone trap/week	Cartap hydrochloride 4G @ 8 kg/acre (or) Chlorantraniliprole (Rynaxypyr) 0.4 G @ 4 kg/acre (or) Spray any of the following chemicals: cartap hydrochloride 50 WP/SP @ 400 g/acre (or) Chlorantraniliprole (Rynaxypyr) 18.5 SC @ 60 ml/acre
2	Leaf folder	2 damaged leaves per hill with a live larva.	
3	Gall midge	5 % silver shoots	Fipronil 0.3 G @ 10 kg/acre
4	Planthoppers	10 -15 insects/hill at vegetative stage; 20 insects/hill at later stage.	Apply Triflumezopyrim 10% SC @ 94 ml/acre between 45 – 60 DAT only once. Apply Dinotefuran 20 SG @ 80 g/acre (or) Pymetrozine 50 WP @ 120 g/acre. Do not repeat or use the same insecticide. While spraying, nozzle should be directed at the basal portion of the plants. Application with power sprayer is preferable.

Note: Do not apply synthetic pyrethroids like deltamethrin, cypermethrin, lambda cyhalothrin, either alone or in combination of other insecticides in rice crop as they cause resurgence of planthoppers

D. Operational guidelines for implementing IPM (Special) trial

It is envisaged that IPM (special) trial may be implemented in ‘On-line real-time’ mode. Hence it is essential that all the team leaders of the concerned AICRIP centre’s are in touch with IIRR team and coordination unit on almost daily basis.

IPM is obviously a knowledge intensive technology and its impact depends on timely and informed decisions. Periodic surveillance at weekly interval is the core activity of the Trail and needs to be religiously followed. It is desirable that entire team of scientists visit the experiment site together, as often as possible, during this surveillance. If not, at least a representative of the scientist may accompany the team.

During any of the surveillance, if the pest damage crosses threshold, IPM interventions need to be decided within 24 h in consultation with the IIRR team. If response is not available from IIRR within this time, local decision may be taken and IIRR be informed of this. Impact of such specific intervention needs to be monitored through subsequent surveillance visit.

It is also important to timely record and report farmer’s practices being followed in FP plots. This information may also be forwarded to IIRR unit.

Trial No. 14: SPECIAL TRIAL ON YIELD LOSS ASSESSMENT DUE TO MAJOR RICE DISEASES

Objective: To evaluate the effect of different levels of disease on rice yield

Locations (11)

Cuttack	Gangavati	Jagdapur	Ludhiana	Malan
Mandya	Maruteru	Moncompu	Nellore	Pantnagar
Pattambi				

Experiment/Trial: Will be conducted under artificial inoculation condition. A graded level of disease intensity will be creating by manipulating the artificial inoculation

Crop Stage: Artificial inoculation will be done at maximum tillering stage for all the three diseases

Variety: One highly popular local disease susceptible variety; **Total area:** 500 sq. m

Spacing: 15 x 15 cm

Treatments: 2 main treatments (Artificially inoculated plot and un-inoculated + fungicide/antibiotic treated control plot)

Fertilizers: Apply fertilizer as per the local practice recommended for HYV or hybrid. Apply entire P and K and ½ N as basal dose and the remaining 1/2 N at maximum tillering stage.

Inoculation: Artificial inoculation should be essentially done by spraying conidial suspension (in case of blast), typha inoculation in case of sheath blight and leaf clip inoculation in case of BLB at the maximum tillering stage

Spray schedule of control plot: Two spraying of isoprothiolane or any other suitable blasticide in case of blast trial; two spraying of propiconazole (1 ml/l) or hexaconazole (2 ml/l) or any other fungicide suitable in sheath blight trial; two spraying of plantomycin or any other suitable bactericide for bacterial blight trial.

Procedure to be followed:

A total area of 500 sq m (300 sq m for the inoculated treatments and 200 sq m for the uninoculated treatment) should be used for the experiment. The 300 sq m area marked for inoculation should be further divided into 3 blocks of 100 sq m each to create graded level of disease.

For blast trial, Block I should be sprayed with blast spores thrice at an interval of 2 days; Block II should be sprayed with blast spores twice at an interval of 2 days and Block III should be sprayed once with blast spores during maximum tillering stage to create different level of disease.

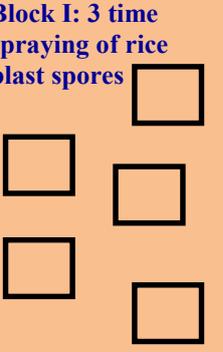
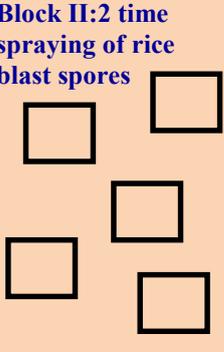
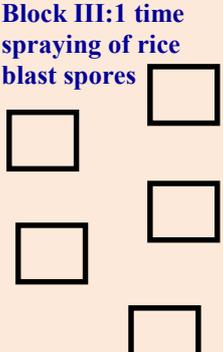
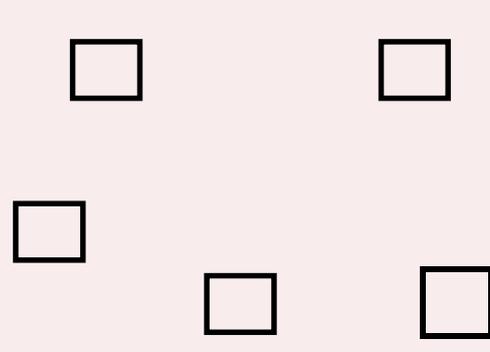
For sheath blight and bacterial blight, in Block I all the plants should be inoculated; in Block II alternate plants should be inoculated and in Block III, one in each three plants should be inoculated to create different level of disease intensity.

Observations:

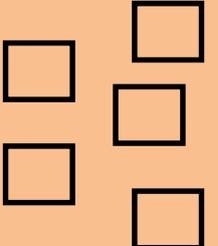
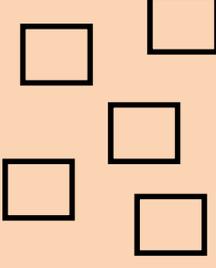
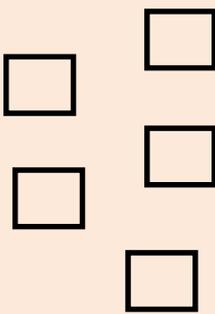
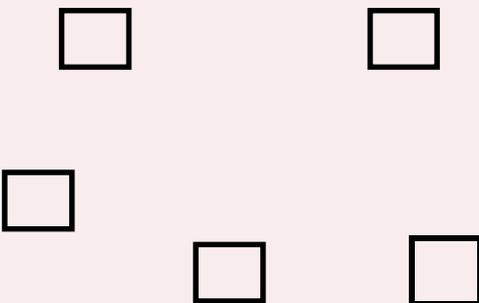
In block I, select 5 one sq m area where disease intensity is more 50%. Take disease data from each plant in these 5 one sq m area and record yield. Similarly, select 5 one sq m area in Block II where disease intensity is between 30-50% and in Block III, select 5 one sq m area where disease intensity is less than 30%.

Take disease data from each plant in these 5 one sq m area and record yield. Disease data should be recorded following the SES scale as mentioned earlier and should be converted into disease intensity/PDI as mentioned in Trial 10. Record the yield in each one sqmt area in each of the three blocks and in control treatment

Field layout for yield loss assessment against blast

Rice blast Inoculated plot (Total area = 300 sq. m)			un-inoculated + fungicide/antibiotic treated control plot (total area =200 sq m)
<p>Block I: 3 time spraying of rice blast spores</p> 	<p>Block II: 2 time spraying of rice blast spores</p> 	<p>Block III: 1 time spraying of rice blast spores</p> 	
<p>Randomly select 5 one sq m area where disease intensity is more than 50%. Record the disease in each plant in the 1 sq m area and calculate disease intensity and yield in each 1 sq m area</p>	<p>Randomly select 5 one sq m area where disease intensity is 30-50%. Record the disease in each plant in the 1 sq m area and calculate disease intensity and yield in each 1 sq m area</p>	<p>Randomly select 5 one sq m area where disease intensity is below 30%. Record the disease in each plant in the 1 sq m area and calculate disease intensity and yield in each 1 sq m area</p>	<p>Randomly select 5 one sq m area where plants are free from any disease. Record the yield</p>

Field layout for yield loss assessment against sheath blight and bacterial blight

Rice Sheath blight/bacterial blight Inoculated plot (Total area = 300 sq. m)			Un-inoculated + fungicide/antibiotic treated control plot (total area =200 sq m)
<p>Block I: Inoculate all the plants/hills in each 1 sq mt block</p> 	<p>Block II: Inoculate alternate plants in each 1 sq mt block</p> 	<p>Block III: Inoculate one in every three plants in each 1 sq mt block</p> 	
<p>Randomly select 5 one sq m area where disease intensity is more than 50%. Record the disease in each plant in the 1 sq m area and calculate disease intensity and yield in each 1 sq m area</p>	<p>Randomly select 5 one sq m area where disease intensity is 30-50%. Record the disease in each plant in the 1 sq m area and calculate disease intensity and yield in each 1 sq m area</p>	<p>Randomly select 5 one sq m area where disease intensity is below 30%. Record the disease in each plant in the 1 sq m area and calculate disease intensity and yield in each 1 sq m area</p>	<p>Randomly select 5 one sq m area where plants are free from any disease. Record the yield in each 1 sq m area</p>

TRIAL 15: SPECIAL SCREENING TRIAL FOR FALSE SMUT RESISTANCE

Introduction: In recent years, false smut of rice caused by fungus *Ustilaginoidea virens* (Cooke) Tak (telomorph: *Villosiclava virens*) has become a serious problem in different rice growing regions of India. At ICAR-IIRR, Hyderabad artificial screening methodology was standardised to screen rice genotypes under field conditions. This technique can be adopted at different AICRIP centres to evaluate the genotypes under artificial conditions.

Objective: To identify rice genotypes resistant to false smut disease from the promising cultures included in Advanced Variety Trials-2023 (NSN-1).

NSN 1-Locations (5)

Gangavathi	Gudalur	IIRR	Ludhiana	Masodha (Faizabad)
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Layout: Plant each test entry (25 days old seedlings) in one row each of 1 meter length, adopting a spacing of 20 x 15 cm. The borders of screening plot should be planted with a highly susceptible variety like BPT 5204 or PR 116 or any locally susceptible rice variety/hybrid. Plant one row of susceptible check variety after every 25 rows of test entries. Co-operator can choose the sowing and planting time based on their experience in such a manner that the booting stage coincides with the rainy season.

Fertilizers: Apply adequate nitrogen (150 kg N/ha). One-half nitrogen is to be applied as basal and the remaining in two equal splits at tillering and panicle initiation stages. To increase the chance of false smut incidence, an additional split dose of N can be given at the start of booting stage. Apply P, K and Zn as per the local recommendations.

Isolation of *U. virens*: Take yellow coloured smut balls in a glass vial and surface sterilize it with 1% sodium hypochlorite for 2 min and subsequently wash three times with sterile distilled water. Use a sterilized bacterial inoculation needle to touch the chlamyospore mass and streak onto petri dishes containing potato sucrose agar (PSA). To check the bacterial contamination, the medium should be incorporated with streptomycin (100 ppm). Incubate the plates at 27°C for 6 days. Small white colour colonies will appear on 6th or 7th day. Subsequently, subculture the pathogen in the PSA slants and store at 4°C for further studies.

Mass Multiplication and inoculation: Always use a freshly isolated *U. virens* culture and inoculate the pure culture into 100 ml of potato sucrose broth (PSB) in 250 ml conical flask and incubate in an incubator shaker at 125 rpm at 27°C for one week. The conidia can then be harvested by centrifugation at 4000 rpm for 10 minutes and suspend the conidial pellet in sterile distilled water. Before centrifugation check the conidial production in PSB under microscope. Adjust the conidial concentration (2x 10⁵ or ~ 80-100 conidia per microscopic field in 10 X magnification. Highly concentrated conidial solution should not be used for inoculation as it may cause sterility of spikelets. Select the panicles at booting stage which are going to emerge after a week and not the early booting stage panicles. Identification of booting stages and inoculation of different test entries is the continuous process for about a month

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because of variation in the duration of genotypes. Label the selected tillers at booting stage with tag (with date of inoculation) and inject 2 ml of conidial suspension (2×10^5 conidia ml^{-1}) per panicle using hypodermic syringe. While injecting, observe the flow of the conidial suspension inside the boot. For each entry, inoculate a minimum of three to four tiller. If possible provide green shade net condition or water spray (two times/day) during the inoculation to create a conducive condition for infection and development of the disease. Preferable inoculate the plants during evening hours to avoid desiccation.

Observations to be recorded: Score the entries 15 to 20 days after inoculation. For each entry record the observations as mentioned below.

Entry Name	Number of Hills free from smut Balls	Number of Hills with 1 smut ball	Number of Hills with 2 smut balls	Number of Hills with ≥ 3 smut balls	Date of Inoculation (if artificially inoculated)
Entry No.1					
Entry No.2					
Entry No.3					
Entry No.4					

TRIAL 16: SPECIAL TRIAL ON SCREENING FOR BROWN SPOT RESISTANCE UNDER ARTIFICIAL SCREENING

Objective: To identify resistance in entries to brown spot disease from the promising cultures in Advanced Variety Trials (NSN-1)-2023 through artificial screening

Locations (5)

IIRR	Gangavathi	Ludhiana	Pusa	Rewa
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Layout: The genotypes should be screened at seedling stage adopting similar conditions like UBN (followed in case of blast). Grow the seedlings in raised nursery following the sandwich method (see the layout drawing below). Each test entry should be sown in a single row of 50 cm long and 10 cm apart. After every 5 test entries, susceptible check variety BPT 5204 (or local susceptible variety if known) should be put. The entire nursery should be surrounded on all sides by one row of susceptible variety like BPT 5204.

Fertilizers: It is desirable not to apply any fertilizers in brown spot screening nursery or 1/4th of the local recommendation may be applied.

Inoculum: Pure culture of the brown spot pathogen (*Helminthosporium oryzae*) should be mass multiplied by growing on rabbit food agar (RFA) medium at $27 \pm 2^{\circ}\text{C}$ with 12 h alternate exposure of the culture to near UV light (NUV)/Normal fluorescent light and dark conditions to induce conidia production. Harvest the conidia from 15 days old culture plates in sterile distilled water by passing through cheese cloth and concentration of conidia may be adjusted to 10^5 conidia/ml using a haemocytometer. A pinch of sucrose and L- alanine (if available) may be added to harvested conidial suspension to enhance the germination of conidia. Alternatively, mixture of mycelial fragments and conidia may be employed in inoculation if the isolate of the fungus not profusely sporulating.

Inoculation: Twenty-one days old seedlings should be inoculated by spraying spore suspension in the evening hours (10^5 conidia/ml) after adding 0.01% of Tween 20. Spray the conidial suspension to cover entire leaf surface till runoff occurs from leaf surface. The inoculated plants have to be covered with plastic sheet for 24 hours to maintain the relative humidity. The symptoms of brown spot disease will generally appear 4-5 days after inoculation as small reddish brown spots. Gradually the number and size of spots will increase to cover larger leaf area.

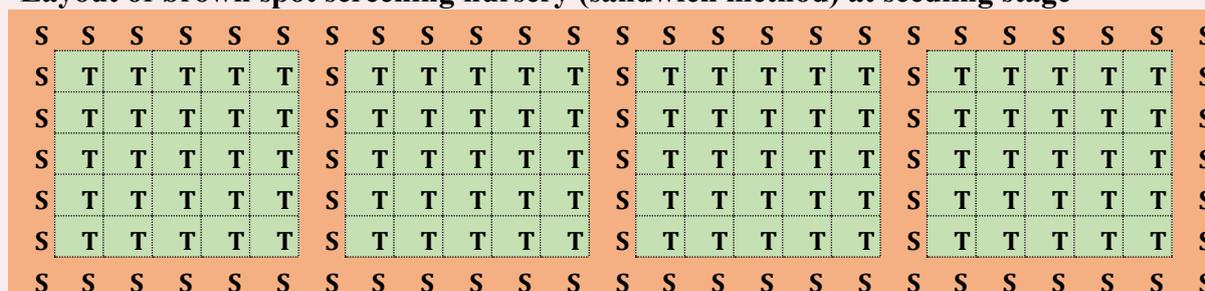
Preparation of Rabbit food agar (RFA) medium: Commercially available rabbit food pellets (available in Amazon) have to be powdered using a mixer grinder. For preparation of 1 litre RFA medium, take 25 g of rabbit food powder in 500 ml of water and boil it for 10-15 min. Collect the extract, add 20 g of agar and make up the volume to 1 litre and autoclave the medium. RFA medium plates then can be inoculated by putting a 5 mm disc from actively growing culture of *H. oryzae* (grown in PDA plate) and can be incubated for 15 days in alternative cycle of NUV/normal light and darkness as described above.

Observations to be recorded: The test entries are to be scored for brown spot reaction following SES scale given hereunder. At least two readings (at 10 days intervals) on disease severity in entries are to be taken 30 days after inoculation or when susceptible check attains maximum disease.

SES scale (IRRI, 2014) to score brown spot disease severity

Score	Description
0	No incidence
1	Less than 1% leaf area covered
2	1-3 %
3	4-5 %
4	6-10 %
5	11-15 %
6	16-25 %
7	26- 50 %
8	51-75 %
9	76-100 %

Layout of brown spot screening nursery (sandwich method) at seedling stage



S-Susceptible check; T-Test entries

PRODUCTION ORIENTED SURVEY-2023

- To undertake extensive periodical survey in rice growing areas of the country, and to study the practices and constraints in rice cultivation.
- To suggest suitable remedial measures on the spot to solve the farmers' problems, if any.
- To minimize input costs and suggest methods to avoid any wasteful practices.

Locations (29)

Aduthurai	Bankura	Chatha	Chinsurah	Coimbatore
Cuttack	Gangavati	Gerua	Ghaghraghat	Hazaribagh
Karaikal	Karjat	Kaul	Khudwani	Ludhiana
Malan	Mandya	Maruteru	Masodha (Faizabad)	Moncompu
Nawagam	Pantnagar	Patna	Pattambi	Raipur
Rajendranagar	Ranchi	Rewa	Varanasi	