I. NUTRIENT MANAGEMENT TRIALS – AVT-2
(Collaborative with Plant Breeding)

Trial No. : 1 (NMT- 1a to 1o)

Name of the trial : Nutrient response trials on selected AVT-2 rice cultures under high and low input management

Objectives :

- To study the grain yield potential, nutrient response and nutrient use efficiency of promising AVT-2 cultures under high and low input management in rice.
- To identify promising, efficient and stable genotypes based on the Grain Yield Efficiency Index (GYEI) and yield reduction in reduced N application
- To support with agronomy data for the release of cultivars in CVRC f

AVT-2 Culture	*Days to 50% flowering*	Checks	Locations
(a) AVT 2-EH (Irrigated)			
IET 25826 IET 25819 IET 25818	100	Shalimar Rice-3, Vivekdhan 86 and LC	Almora, Khudwani, Malan, Upper Shillong
(b) AVT 2-MH (Irrigated)			

IET 25836 IET 25830 IET 25832 IET 25833 IET 25841 IET 25838	105	RC Maniphace 1(NE), Vivekdhan 62, V L Dhan 65(N) and LC	Almora, Khudwani, Lamphelpat, Malan, Umiam, Upper Shillong, Wangbal
(c) AVT 2-E-DS			
IET 26348 IET 26365 IET 25103(R) IET 26356 IET 26337 IET 25121(R)	80	NC- Sahbhagidhan, Vandana; ZC-Govind (NW), Narendra 97 (E), Varalu and CR Dhan 201 (W&S); and LC	Chiplima, Hazaribagh, Jagdalpur, Mandya, Ranchi, Rewa, Sabour, Varanasi
(d) AVT 2-E-TP			
IET 24911 IET 24914 IET 25713	80	NC- Gotra Bidhan 3; ZC- PR 124 (N), Luit (NE), Sahbhagidhan (C&W), Narendra 97 (E), DRR Dhan 43 (S); US 314 (HC); and LC	Faizabad, Maruteru, Nagina, Puducherry, Raipur, Ranchi
(e)AVT 2 – IME (TP)			
IET 24731 IET 25746 IET 25764 IET 26126 IET 25745 IET 26079 IET 25749 IET 26125		NC- IR 64; ZC- PR 113 (N), Lalat (E & NE), Karjat 7 (W), MTU 1010 (C & S); HC- US 312; and LC	Aduthurai, Chinsurah, Chiplima, Faizabad, Gangavathi,Karjat, Navasari,Pattambi, ARI-Rajendranagar

IET 25295(R) IET 25289(R) IET 25330(R)			
(f) AVT 2 – IM (TP)			
IET 26024 IET 26027 IET 25997 IET 25785	100	NC- NDR 359; ZC- Pant Dhan-19 (N), NDR 8002 (E&C), Jaya (NE & S), Akshayadhan (W); HC- HRI 174; and LC	Chinsurah , Chiplima, Coimbatore, Faizabad, Jagdalpur, Karjat, Kaul,
(g) AVT 2-L			
IET 25269	110	NDR 8002, Salivahana, Samba Masuri, Swarna, Ranjeet, Pushyami and Local check	Aduthurai, Chinsurah, Chiplima, Dhangain, Karjat, Mandya, Maruteru, Pusa
(h) AVT 2-BORO			
IET 25692	100	Gowtham, IR 64	Chinsurah, Chiplima, Cuttack, Gerua, Titabar
(i) AVT 2-MS			
IET 26263 IET 26227 IET 25804 IET 25795 IET 25798	100	DRRH 3, WGL 14	Andaman (CIARI), Chakdah, Karjat, Kaul, Maruteru, Mandya, Nagina, Raipur

IET 25802 IET 25793 IET 26241			
(j) AVT 2-RSL			
IET 25856 IET 25219	125	Dhanrasi, Pooja, Savithri and Local Check	Chinsurah, Dhangain, Faizabad, Ghaghraghat, Pusa
(k) AVT 2-SDW			
IET 25212	110-115	Purnendu, Sabitha	Cuttack, Faizabad, Maruteru, Nellore
(l) AVT 2-AL&ISTVT			
IET 18710 IET 22836	100	CSR-10, CSR-23, CSR-36, Jaya and Local Check	Kanpur, Karnal, Navsari, Lucknow
(m) AVT 2-CSTVT			
IET 25051 IET 25059		CSR-10, Jaya, Improved White Ponny, CST 7-1 and Local Check	Canning. Panvel Vytilla
(n) AVT 2-Aerobic			
IET 25618(R) IET 26200 IET 26155 IET 25728 IET 26198	100	AAUDR – 1, CR Dhan 201, CR Dhan 202, MAS 946 and Local check	Cuttack, Kaul, Ludhiana, New Delhi (IARI), Nawagam, Pantnagar, Raipur,

IET 26178 IET 26157 IET 26171 IET 26194 IET 26170 IET 26168			Vadgaon
(o) AVT 2-Biofortified			
IET 26383 IET 26375 IET 26386		BPT 5204, Chittimuthyalu, IR 64 and Kalanamak	Chinsurah, Coimbattore, Cuttack, Hyderabad (IIRR), Kaul, Mandya, Maruteru, Nagina, Nawagam, Pantnagar, Rajendranagar (ARI), Raipur, Rewa, Varanasi

*** NC- National Check, ZC- Zonal Check, E-Eastern, W- Western, N-Northern, S-Southern, NE- North Eastern, HC- Hybrid Check, LC-Local Check**

Note:

- ***Please include most recently released variety as local check***
- ***Keep the seeds of standard checks for next season.***

Observations:

1. Number of panicles/m^2 at harvest
2. Panicle weight (g)
3. Days to 50% flowering (compulsory)
4. Duration (Seed to Seed) (in days)
5. Grain yield (kg/ha)

6. Water quantification* (for AEROBIC TRIALS)
7. Incidence of disease and pests, if any
8. Soil nutrient status (available NPK)

(a) General instructions for transplanted

Layout **:** Split Plot Design
Replications **:** 3
Plot Size **:** 15 m^2
Spacing **:** 20 cm x 10 cm (Location specific spacing)
Treatments :
Season **:** *Kharif*
Main plots **:** Nitrogen
N1 - 50% N/ha of recommended dose
N2 - 100% N/ha of recommended dose.
N3 - 150% N/ha of recommended dose.

Sub-plots **:** Cultures/Varieties

Use urea as a source of nitrogen, apply N in 3 splits (50% at basal + 25% at tillering + 25% at Panicle initiation) and **indicate N rate applied (kg/ha)** under N1, N2 and N3 treatments for computing N response.

(b) General instructions for aerobic rice (AVT-2 E/ME direct seeded):

Layout **:** Split Plot Design
Replications **:** 3
Plot Size **:** 15 m^2
Spacing **:** Dibble 1 or 2 seeds / hill at spacing of 20 x 10 cm

- Apply Pendimethalin herbicide @ 1 kg a.i. /ha at near saturated condition within 3– 4 days of sowing.
- Inter-cultivation at regular intervals is recommended to control weeds

- Maintain aerobic condition and provide need based frequent irrigation so that plants will not experience moisture stress at critical stages of crop growth
- Rainfall data and quantity of irrigation water and Number of irrigations given during crop growth need to be recorded

P, K & Zn levels :

Apply P, K and Zn on soil test basis through Single Super Phosphate, Muriate of Potash and Zinc Sulphate. Indicate the levels of P, K and Zn applied.

Water Management: Recommended practices of irrigation **(Transplanted/direct seeded rice/ Aerobic rice)** and follow other operations as per package of practices uniformly.

- **Conduct the trials with same of cultivars mentioned in the Technical program**
- **Please retain the seed of check varieties for next season sowing**
- **Furnish the duration of cultures (seed to seed) under different fertilizer levels.**
- Indicate recommended dose of fertilizer (RDF)
- Supply the data of cultivars as per the sequence given in the technical programme.
- Mention the reasons for very high or low yields of the trials
- Mention the incidence of pests and diseases in different levels of N

c). General instructions for evaluation of AVT 2-Biofortified lines :

General instructions:

Sow the seedbed as thin as possible

Transplant 25-day old seedlings
Transplant seedlings very shallow
Gap fill within a week of planting
Incorporate fertilizer uniformly , equal quantity and evenly
Soil samples before planting and after harvesting to be collected and sent to IIRR for analysis for estimating Fe & Zn content

Data to be collected:

Grain yield kg/plot based on net plot size to be reported
Panicles per sq.m (no)
Days to 50% flowering (no)
Plant height (cm)
Spikelets per panicle (no)
Grain quality characteristics to be provided wherever facilities exist.
50gms of grains per entry in 3 replications after harvesting to be sent to IIRR for Fe & Zn analysis

Imposition of Drought

- Trial should be conducted in transplanted condition for yield evaluation
- Drought can be imposed (or stop irrigation) for a period of 25-30 days starting from 50 DAT

- Fertilizer application: all fertilizer doses should be applied before imposing drought. 30% N, full P&K at basal; 40% N at 25 DAT; 30% N at 40 DAT
- Mention if there is any rainfall and quantity of rain during the period

Note: The state wise fertility maps are available and all the fertilizer recommendations in the AICRP trials should be based on the fertility level suggested by these maps in different states. This is for strict compliance and provide RFD as per the recommendation.

II.YIELD ENHANCEMENT TRIALS

Trial No. : 2
Trial Code : YET-1
YET-1 : NEW PLANT TYPE (NPT)

Locations (6): IIRR, NRRI, IARI, PAU,TRRI, NDUAT **Test entries: 8**
Checks: 2 (PA 6444, HRI 174)

The technical details of this trial needs to be discussed at IIRR with the Scientists of Plant Breeding, Agronomy, Soil Science and Physiology. NRRI scientists also expressed their desire to participate in the discussion. Therefore, this issue is being put up to Director for his guidance.

Trial No : 3
Trial Code : YET-2
Name of the trial : Nutrient and Weed management for higher productivity in different rice establishment methods (transplanting, mechanized transplanting, wet direct seeded rice using Drum seeders (puddle soil), SRI, dry direct seeded rice, aerobic rice and semi-dry rice (un-puddled soil)

Objective :
1. To identify the optimum and cost effective nutrient management practices in different crop establishment methods
2. To assess the agronomic efficiency , plant and soil nutrient status under different nutrient management practices in different crop establishment methods

Locations:

Aduthurai	**Arundhatinagar(K+R**	**Chatha**	**Chiplima**
Coimbatore	**Faizabad**	**Gangavati**	**Kaul**
Kota	**Ludhiana**	**Mandya**	**Maruteru**
Nagina	**Nawagam**	**Pantnagar**	**Pusa**
Raipur	**Rajendernagar**	**Ranchi**	**Rewa**
Varanasi	**Puducherry**		

Kharif - 2018

Main plot treatments – any 3: Methods of crop establishment suitable to that area

1. Mechanical Transplanting I method (All the principles as per the SRI)
2. Direct seeding (Use of Drum seeder/ dibbling of sprouted seed at 25 x 25 cm) fb SRI principles (saturation method of water management, weeding with cono- weeder and fertilizer management)
3. Normal Transplanting (20 x15 cm with flooding water management, 3-4 seedlings transplanted at 25-30 days old seedlings)
4. SRI

5. Aerobic rice
6. Semi dry rice

Sub plot Treatments (7): 1-5 is mandatory

S-1: 100% of recommended inorganic fertilizers (120:60:40 kg NPK/ha)
S-2: 75 % inorganic + 25% (equivalent of N dose) organic
S-3: 150 % recommended fertilizer dose
S-4: LCC Based N application (*Chart will be provided by IIRR* having shade 3 as critical for N application of 20-25 kg /ha)
S-5*: Location specific fertiliser management

- *Rabi* crop is grown F1- without fertilizer and F2- 100% of the recommended fertilizers to see the effect of direct and residual effect of the fertilizers by superimposing the treatments.
- Same plots can be utilized for *kharif* treatments

*Rabi crop may be rice or any other I.D. crop like wheat, maize, oilseed or pulses.

Design **:** Split plot design
Replications **:** 4
Row spacing **:** 20 x 15 cm- for T.P and varies for each method
Plot size **:** 30 m^2
Main plots **:** 3-4 methods of Crop establishment
Sub-plots **:** 5 Nutrient management practices
Variety **:** **Any HYV (Medium duration) of the location.**

Note: The state wise fertility maps are available and all the fertiliser recommendations in the AICRP trials should be based on the fertility level suggested by these maps in different states. This is for strict compliance and provide RFD as per the recommendation

Conduct the trial at a permanent site. Conduct of the trial in both the seasons is a must to know the system productivity.

Observations:

- Plant height
- Dry matter accumulation and partitioning of the dry matter (stem, leaves and grains at different stages)
- Tiller production (effective and ineffective)
- Days to 50% flowering
- **Weed parameters in all the treatments(Weed photos,Weed species, Weed density no/m2, Weed dry weight g/m2 at active tillering and panicle initiation stages of Rice crop)**
- Pest and disease incidence/dynamics
- Root activity and root parameters
- If possible microbial activities
- Uptake of major and minor nutrients
- Availability of nutrients in the soil (initial and after harvest)
- Yield attributes (Grain number, panicle number, panicle length, panicle weight and test weight)
- Grain and straw yield
- Economic evaluation of different methods of crop establishments
- Initial and final available soil nutrient status of each treatment.

***Kharif* 2018: Split plot design and**
***Rabi* 2018-2019 Split – split plot design (plot size in Rabi -15 m^2)**
No of treatments in *rabi*: 3 methods x 5 Treatments x 2 *rabi* treatments: 30, Replicated 3 times

Experimental details:

1. Identify a suitable plot with least interference of water seepage from adjoining rice fields as irrigation water input needs to be quantified.
2. The selected plot should be made weed free following Stale Seed Bed Method i.e., spraying Glyphosate weedicide @ 0.75-1.00 kg a.i./ha 10 – 12 days prior to opening the fields, followed by ploughing once, allow germination of left over weed seed, and then prepare the field for sowing rice by shallow ploughing to fine tilth and levelling of the field.

3. Soil from the experimental area must be analyzed initially for texture, bulk density, soil fractions, pH, OC, EC, CEC, available nutrients N, P, K, Zn, S and soil moisture characteristics at saturation, field capacity and wilting point.
4. After dry ploughing the field making the soil into a fine tilth, proper levelling, main blocks are laid with provision for double irrigation channels, and leaving buffer zone of 2 m all round the blocks to minimize water interference from the adjoining plots. Sub plots are laid as per the layout. At the entry point of the plot for irrigation provision should be made to install Digital water meter for quantifying water input or water meter. **Total quantity of irrigation water applied during crop season and effective rainfall must be provided.**
5. For direct seeded rice, dibble 2 – 3 seeds per hill in a well-prepared and levelled field maintaining spacing of 20 x 10 cm and irrigated and ensure proper crop stand.
6. **Chemical Weed control with recommended herbicides one pre emergence application and one post emergence application. If required, another spray of post emergence herbicide for 3rd flush of weeds**
7. Apply fertilizer as per the treatments.
8. In case of occurrence of Fe deficiency, the problem may be corrected by suitable spray schedule (0.50% $(NH_4)_2$ Fe $(SO_4)_2$ in water at pH 5.0) after recording observations on the intensity of deficiency.
9. All weed management practices are to be followed to keep the plots weed free in all the plots.
10. Send 1 kg processed soil from 0 – 15 cm depth collected from the experimental area before applying fertilizers to IIRR, Hyderabad.

Trial No : 4
Trial Code : YET-3
Name of the trial : Water management for enhancing Water use efficiency and Weed control efficiency in different rice establishments methods (transplanted rice, mechanized transplanting, wet direct seeded rice using Drum seeders (puddled soil), aerobic rice and semi-dry rice (un-puddled soil)

Objective :
1. To evaluate the suitable and promising irrigation management practices in different crop establishment methods
2. To assess the agronomic efficiency, plant water potential and water use efficiency under irrigation management practices in different crop establishment methods

Locations :

Faizabad,	**Gangavati**	**Mandya**	**Nawagam**
Pantnagar,	**Puducherry (Rabi)**	**IIRR**	**Varanasi**
Karaikal	**Arundhatinagar**	**Chatha**	

Experimental details:

Design : Split plot design, **Replications:** 3 or 4
Row spacing : 20 x 15 cm- for T.P and varies for each method
Plot size : 25 m^2
Variety : Any High Yielding Variety (Medium duration)

The irrigation management methods as main plots (to make water management precise and easier) and crop establishment methods as sub plots

Main plots : 3 irrigation management practices

Main plot treatments:

$\mathbf{I_1}$ – Flooding throught crop growth (3 + / - 2 cm)
$\mathbf{I_2}$ - Saturation maintenance upto PI and (3 + / - 2 cm) after PI
$\mathbf{I_3}$ _ Alternate wetting and drying (irrigating at 5 -7 days interval with 5 cm/ha of water (5 cm irrigation at 3 DADPW)up to PI and (3 + / - 2 cm) after PI (with the help of Boumans Water tube)

Sub plot treatments – any 4 - 5: Methods of crop establishment suitable to that area

1. Mechanical Transplanting method on puddled soil (crop management methods same as for puddled transplanted rice)
2. Direct wet seeding on puddled soil (Use of Drum seeder/ dibbling of sprouted seed at 25 x 25 cm) fb crop management practices as per direct wet seeded rice
3. Normal Hand Transplanting (20 x15 cm with flooding water management, 3-4 seedlings transplanted at 25-30 days old seedlings)
4. Aerobic rice
5. Direct broadcast dry seeding on well prepared unpuddled soil fb crop management practices for direct dry drill seeded rice (semi dry rice)
6. Optional- Location specific
   (*Select 4-5 methods of crop establishment as the choice of the Location)

Experimental details:

Note: The state wise fertility maps are available and all the fertiliser recommendations in the AICRP trials should be based on the fertility level suggested by these maps in different states. This is for strict compliance and provide RFD as per the recommendation

1. Identify a suitable plot with least interference of water seepage from adjoining rice fields as irrigation water input needs to be quantified.
2. The selected plot should be made weed free following Stale Seed Bed Method i.e., spraying Glyphosate weedicide @ 0.75-1.00 kg a.i./ha 10 – 12 days prior to opening the fields, followed by ploughing once, allow germination of left over weed seed, and then prepare the field for sowing rice by shallow ploughing to fine tilth and levelling of the field.
3. Soil from the experimental area must be analyzed initially for texture, bulk density, soil fractions, pH, OC, EC, CEC, available nutrients N, P, K, Zn, S and soil moisture characteristics at saturation, field capacity and wilting point.
4. For direct seeded rice, dibble 2-3 seeds per hill in a well-prepared and levelled field maintaining spacing of 20 x 10 cm and irrigated and ensure proper crop stand.
5. **Chemical Weed control with recommended herbicides one pre emergence application and one post emergence application. If required, another spray of post emergence herbicide for 3rd flush of weeds**
6. Apply fertilizer uniformly for all the treatments.
7. In case of occurrence of Fe deficiency, the problem may be corrected by suitable spray schedule (0.50% $(NH_4)_2$ Fe $(SO_4)_2$ in water at pH 5.0) after recording observations on the intensity of deficiency.
8. All weed management practices are to be followed to keep the plots weed free in all the plots.
9. Send 1 kg processed soil from 0 – 15 cm depth collected from the experimental area before applying fertilizers to IIRR, Hyderabad.

Details of the plastic water tube- I3 (Bouman tube):

- AWD is also called ‘intermittent irrigation’ or ‘controlled irrigation’
- Alternate flooding

- Compared with the traditional continuous flooding system, AWD using lowland rice cultivars can reduce water input by 15-30% without yield loss

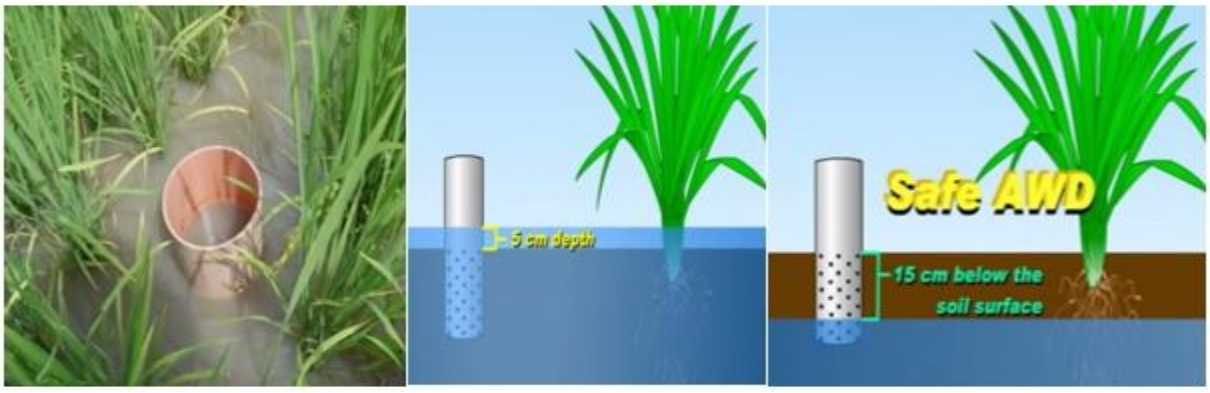


Fig. Safe AWD method

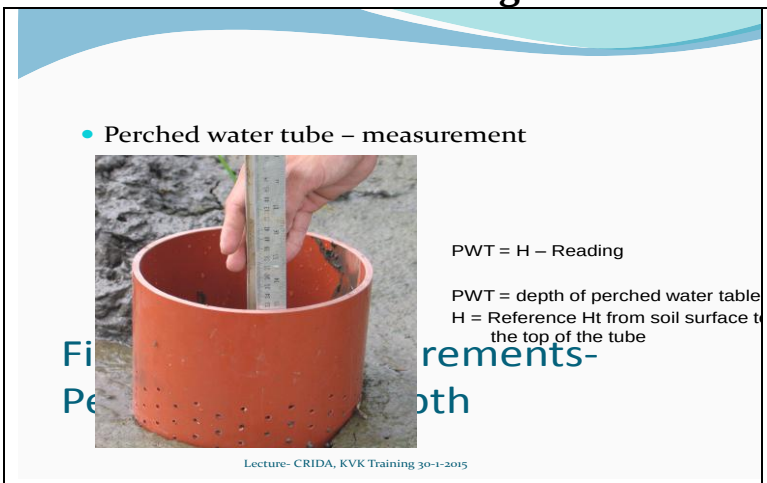


Fig. How to measure the depth of water

Water at 5 cm depth:Time to irrigate and flood the field again

Fig.Can be adopted in the present experiment

Observations:

- Plant height
- Dry matter accumulation and partitioning of the dry matter (stem, leaves and grains at different stages)
- Tiller production (effective and ineffective)
- Weed parameters in all the treatments(weed photos, weed species, weed population no/m2 ,weed dry weight g/m2, at active tillering stage and panicle initiation stages of rice crop)

- Pest and disease incidence/dynamics
- Days to 50% flowering
- Oxidability of the soil
- Root activity and root parameters
- If possible microbial activities
- Uptake of major and minor nutrients
- Treatment wise water input data
- Availability of nutrients in the soil (initial and after harvest)
- Yield attributes (Grain number, panicle number, panicle length, panicle weight and test weight)
- Grain and straw yield
- Economic evaluation of different methods of crop establishments
- Initial and final available soil nutrient status of each treatment.
- After dry ploughing the field making into a fine tilth, proper levelling, main blocks are laid with provision for double irrigation channels, and leaving buffer zone of 2 m all round the blocks to minimize water interference from the adjoining plots. At the entry point of the plot for irrigation provision should be made to install Digital water meter for quantifying water input or water meter. **Total quantity of irrigation water applied during crop season and effective rainfall must be provided.** Sub plots are laid as per the layout.
- Water input has to be quantified in each treatment (based on no of irrigations and quantity of irrigation for each irrigation)
- Provide total rainfall data

Trial No : 5
Trial Code : YET-4
Name of the trial : Enhancing the productivity of Direct seeded rice with Iron coating under different rice ecologies (Collaborative trial with Entomologists)

Locations :
Chiplima, Coimbatore, IIRR, Karjat, Maruteru, Raipur

Design : Split plot
Replication : 3

Main plot : Four sowings with **one week interval**
1st sowing
2nd sowing
3rd sowing
4th sowing

Sub plots

T1 – Iron coated seed, Seed rate 25 kg/ha, Broadcasting in 1-2mm water level condition (Direct sowing)

T2 – Iron coated seed, Seed rate 25 kg/ha, Broadcasting in wet Condition (Direct sowing)

T3 – Un-coated seed, seed rate 25 kg/ha, Broadcasting in 1-2mm water level condition (Direct sowing)

T4 – Un-coated seed, seed rate 25 kg/ha, Broadcasting in wet Condition (Direct sowing)

T5 – Normal transplanting 21 days after sowing

Observation to be taken:

1. Germination Rate(%) (on wet paper in petri dish)
2. Seed problem (Bird attack, Snail attack, Rotting etc.) Snail should be removed if you find out
3. Rain fall and irrigation flow rate
   Seed floating and run out from the field when introducing water
4. Crop establishment (plant/m^2) and distribution
5. Rice growth characteristics (flowering time, final plant height, leaf area index or number of leaves(m^2), etc.)
6. Grain yield(kg/ha) and 1000 grain weight(g)
7. Fe content in grain and plant
8. Taste(eating quality)
9. Chemical check of soil
   N,P,K & Fe status(Initial/Final)
10. Soil condition before and after the test
    (pH, Eh(v), Fe total and soluble content, fumos etc.)
11. Fertilizers (kinds, weight(g/m^2), number of applied times) @120, 60
12. Insects and diseases infestation - if any, control
13. Weather data (Max and Min temperature, Sunshine duration, Rain fall heights and event times, etc.)

Trial No. : 6

Trial code : **YET-5**

Name of the trial : **Management practices for enhancing grain yield with green manure and nutrient management in rainfed upland rice**

Objectives : To study the influence of agronomic practices for increasing the grain yield of rainfed upland rice
To work out the cost benefit ratio and enhancing the profitability

Locations:

Arundhathi Nagar	**Hazaribagh**	**Pusa**	**Ambikapur**
Hazaribagh	**Tuljapur**	**Jagdalpur**	**Umiam**
Upper Shillong			

Layout : Factorial RBD (2 factor RBD)

Replication : 3

Factor – 1 : Rice alone – M1
Rice + GM (Sunhemp/Dhaincha/ or green leaf manuring) – M2

Nutrient Schedules (kg/ha)						
		N	**P**	**K**	**ZnSO4**	**Lime**
Factor-II	T_1	60	0	40	Foliar Spray-(0.5%)	500
	T_2	60	20	40	Foliar Spray-(0.5%)	500
	T_3	60	40	40	Foliar Spray-(0.5%)	500
	T_4	Optional				
	T_5	Farmer practice				

Sources of Phosphorous = SSP (Single Super Phosphate)

Zinc = $ZnSO_4$ (Zinc Sulphate)

Layout of the experiment:

M1T1	M2T3	M2T2
M1T5	M1T3	M2T5
M1T2	M2T4	M1T4
M2T3	M1T2	M2T4
M1T3	M2T1	M1T1
M2T4	M1T5	M1T3
M1T4	M2T5	M2T1
M2T2	M1T1	M1T2
M2T5	M1T4	M2T3
M2T1	M2T2	M1T5

Note : $ZnSO_4$ spray 2 times at 20 DAS and 40 DAS

1. In case of iron deficiency, spraying of $FeSO_4$ @0.2% is recommended 3 times at 4-5 days interval till the leaves turn to normal green

Season : *Kharif 2018*
Variety (Rice) : Anjali/High yield upland local variety
Seed rate Rice : 60 kg/ha
Sunhemp : 40 kg/ha (mix seed with soil before sowing)
Line spacing : 20 cm
Plot size : 12 m^2
Nitrogen (N in 3 splits – 50% basal + 25% N at active tillering + 25% N at panicle initiation stage)
P K : Basal
Lime 15 Days before sowing
Note:
Method of sowing : Rice – direct seeding in rows of 20 cm apart
Sunhemp/Dhaincha-broadcasting first followed by rice seed sowing in rows of 20 cm apart

- Sunhemp/dhaincha grown as intercrop and at maximum vegetative growth has to be cut and incorporated in between rice rows.
- Weeding has to be done at 20 & 40 Days after Germination(DAG) in M1

- In M_2 at 30 DAG weeds along with Sunhemp/Dhiancha has to be cut and incorporated by spreading in between rice rows.

Note :The state wise fertility maps are available and all the fertiliser recommendations in the AICRP trials should be based on the fertility level suggested by these maps in different states. This is for strict compliance and provide RFD as per the recommendation

Observations (SOIL):

1. Initial soil samples (composite) for NPK, Organic Carbon, pH & physical properties (Bulk density; particle density; expansion properties; water holding capacity; sand silt and clay content).
2. Soil samples after harvest for NPK, Organic Carbon, pH and Microbial population.

Observations (PLANT):

1. Sunhemp/Dhaincha dry biomass
2. Total tillers/m^2
3. Total panicles/m^2
4. Dry weight of flag leaf at milk stage (50 leaves/plot)
5. Filled grains/panicle
6. Unfilled grains/panicle
7. 1000 grain weight
8. Grain yield/5m2
9. Straw yield/5m2
10. Population at harvest

Chemical analysis: NPK in grain with husk and milled rice grain
NPK in straw
NPK in flag leaf
NPK in Sunhemp

- **Soil and plant samples replication-wise must be sent to Dr. K.Surekha Principal Scientist, and Head Soil Science. IIRR**

III. INPUT USE EFFICIENCY (IUE)

Trial No. : 7

Trial code : **IUE-**

a) NITROGEN USE EFFICENCY (NUE) TRIALS

Locations (4): IIRR, NRRI, Maruteru, PAU
Checks: Varadhan, Swarna – Tolerant checks, MTU 1075-Susceptible checks

b) PHOSPHOROUS USE EFFICENCY (PUE) TRIALS

Locations (5): IIRR, NRRI, PAU, Barapani, Ranchi
Checks: BPT5204 & ISM – Susceptible checks, Rasi & Vandana – Tolerant checks

For both Nitrogen and Phosphorous trials also scientists of Plant Breeding, Soi Science and Physiology had to sit together and decide the technical program.

***Trials to be finalized with Soil Science**

IV. CONSERVATION AGRICULTURE/SYSTEM BASED MANAGEMENT – CAM

Trial No. : 8
Trial Code : CA/SM-1
Name of the trial: Evaluation of promising cultivars for late planting

Locations (23): Bikramgunj, Sabour, Ranchi, Hazaribagh, Varanasi, Rewa, Jabalpur, Raipur, Bilsapur, Sakoli, Sindewahi, Karjat, Marteru, Ragolu, Bapatla, Nellore, Rudrur, IIRR, Kampasagar, Warangal, Jagtial, Mandya and Gangavati

Entries: 20

Purpose: To evaluate the suitability of varieties for late sown conditions (or) early sown conditions.

These varieties are pooled from different parts of the country. Evaluation is done through direct seeding. We have not done for early sown conditions. Till now only evaluated for late sown conditions and sowing was requested to be done in either in the end of August or 1st week of September.

Trial No.	**:**	**9**
Trial code	**:**	**CA/SM-2**
Name of the trial	**:**	**Conservation Agriculture / system based management practices in rice and rice based cropping systems (crop diversification) to utilise the resources and enhancing the profitability and productivity**

Objectives

1. To find out possibilities for growing short duration summer pulse in different rice based cropping sequences
2. To study the weed dynamics under different rice-based cropping systems
3. To analyse the nutrient uptake pattern in different systems
4. To calculate the profitability of the systems

Locations:

Aduthurai (K+R)	Chinsurah(K+R)	Maruteru	Karjat (K+R)
Rajendranagar	Titabar (K+R)	Varanasi	
Patna	Titabar	Vadgaon	

Design : Split plot design
Replications : 3
Plot size : Kharif : 150 m^2 for each main plot

Treatment
Main plots (Crop establishment methods)
M_1: Transplanting
M_2: Wet seeding (line sowing under puddle condition)
M3- Aerobic rice – Dry rice cultivation

Sub plots (Cropping sequences)- 9
Residue management in each main plot treatments
S_1: No residue

S_2: 15cm height of rice straw from ground
S_3: 30 cm height of rice straw from ground

Plot size of each sub plot : 50 m^2

S_1- M1S1	**S_4 –M2S1**	**S_7 -M3S1**
S_2- M1S2	**S_5–M2S3**	**S_8–M3S2**
S_3- M1S3	**S_6–M2S3**	**S_9–M3S3**

***Rabi crop may as per the location specific based on the prevailing cropping system**

- For *kharif* rice, *rabi* crops (wheat,/ rice/ maize / oilseeds/ pulse) nutrient will be applied as per the recommended package of the location

Note: Please mention recommended dose of fertilizer for all crops at the respective test location
During summer season all pulse crops will be sown under zero tillage condition

Observations:

1. Germination (%)
2. Plant density/m^2 (at 21 DAS and at maturity)
3. Tillers/m^2 (at maximum tillering)
4. Dry matter production /m^2
5. No. of panicles/m^2
6. Test weight of grains (g)
7. Weed population (number / m^2 at critical stages -30 and 60 DAS)
8. Weed dry matter (g/ m^2 at critical stages -30 and 60 DAS)
9. Cost of cultivation for each treatment
10. Grain yield (kg/plot)

11.Straw yield (kg/plot)
12. Soil fertility status (initial and after harvest of each crop)
13. Nutrient uptake by crops and soil available nutrient status
14. System productivity
15. Cost of cultivation (Rs./ha)

Note: The state wise fertility maps are available and all the fertiliser recommendations in the AICRP trials should be based on the fertility level suggested by these maps in different states. This is for strict compliance and provides RFD as per the recommendation.

Associated the Soil scientist of the location to collect data on nutrient uptake

Lay out of the Experiment - Kharif 2018

150 m2		
Canal-		

Rabi 2018-18

50 m ^{2}		
50 m ^{2}		
50 m ^{2}		

Trial No.	**:**	**10**
Trial code	**:**	**CA/SM-3**
Name of the trial	**:**	**Enhancing productivity of rice-pulse system under different crop establishment methods**

Objectives

5. To find out possibilities for growing short duration summer pulse in different rice based cropping sequences
6. To study the weed dynamics under different rice-based cropping systems
7. To analyse the nutrient uptake pattern in different systems
8. To calculate the profitability of the systems

Locations:

Aduthurai	Arundhutinagar	Chinsurah (K+R),	Cuttack
Jagdalpur	Mandya	Ghaghra ghat	Titabar
Ragolu	Kanpur		

All the RBCS trials need to be conducted in both the seasons

Design : Split plot design
Replications : 4
Plot size :

Treatments

Main plots (Crop establishment methods)

M_1: Transplanting
M_2: Wet seeding (line sowing under puddle condition)

Sub plots (Cropping sequences)

S_1: Rice-wheat-pulse
S_2: Rice-rice-pulse
S_3: Rice-maize-pulse
S_4: Rice-oilseed-pulse
S_5: Rice – Rice

- For *kharif* rice, *rabi* crops (wheat, rice, maize and oilseeds) and pulse nutrient will be applied as per the recommended package of the location

Note: Please mention recommended dose of fertilizer for all crops at the respective test location

During summer season all pulse crops will be sown under zero tillage condition

Observations:

1. Germination (%)
2. Plant density/m^2 (at 21 DAS and at maturity)
3. Tillers/m^2 (at maximum tillering)
4. Dry matter production /m^2
5. No. of panicles/m^2
6. Test weight of grains (g)
7. Weed population (number / m^2 at critical stages -30 and 60 DAS)
8. Weed dry matter (g/ m^2 at critical stages -30 and 60 DAS)
9. Cost of cultivation for each treatment
10. Grain yield (kg/plot)
11. Straw yield (kg/plot)
12. Soil fertility status (initial and after harvest of each crop)
13. Nutrient uptake by crops
14. System productivity
15. Cost of cultivation (Rs./ha)

Note : The state wise fertility maps are available and all the fertiliser recommendations in the AICRP trials should be based on the fertility level suggested by these maps in different states. This is for strict compliance and provide RFD as per the recommendation.

INTEGRATED PEST MANGEMENT (IPM)

Trial No.	**:**	**11**
Trial code	**:**	**CA/SM -4**
Name of the Trial	**:**	**Integrated Pest Management – On farm management of insects, diseases and weeds IPMs (Entomology, Pathology and Agronomy) - Special collaborative trial**

Objectives :

1. To validate 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).

Locations:

Chatha	**Chinsurah(K+R),**	**Ghaghraghat**	**Malan**
Mandya	**Nellore**	**Raipur,**	**Titabar,**
Jagdalpur,	**Pattambi,**	**Puducherry**	**Sakoli,**

Interact with AICRIP – Entomologist and Pathologist for pest and disease management

Variety	Local popular high yielding variety
Plot size	Two blocks of not less than 1 hectare for each block.
Replications	5 replications. Divide each block into 5 equal sized units (each unit = one replication)
Treatments	Two treatments/ blocks i) IPM ii) farmers practices (FP) The package of practices to be followed in each block are given below:

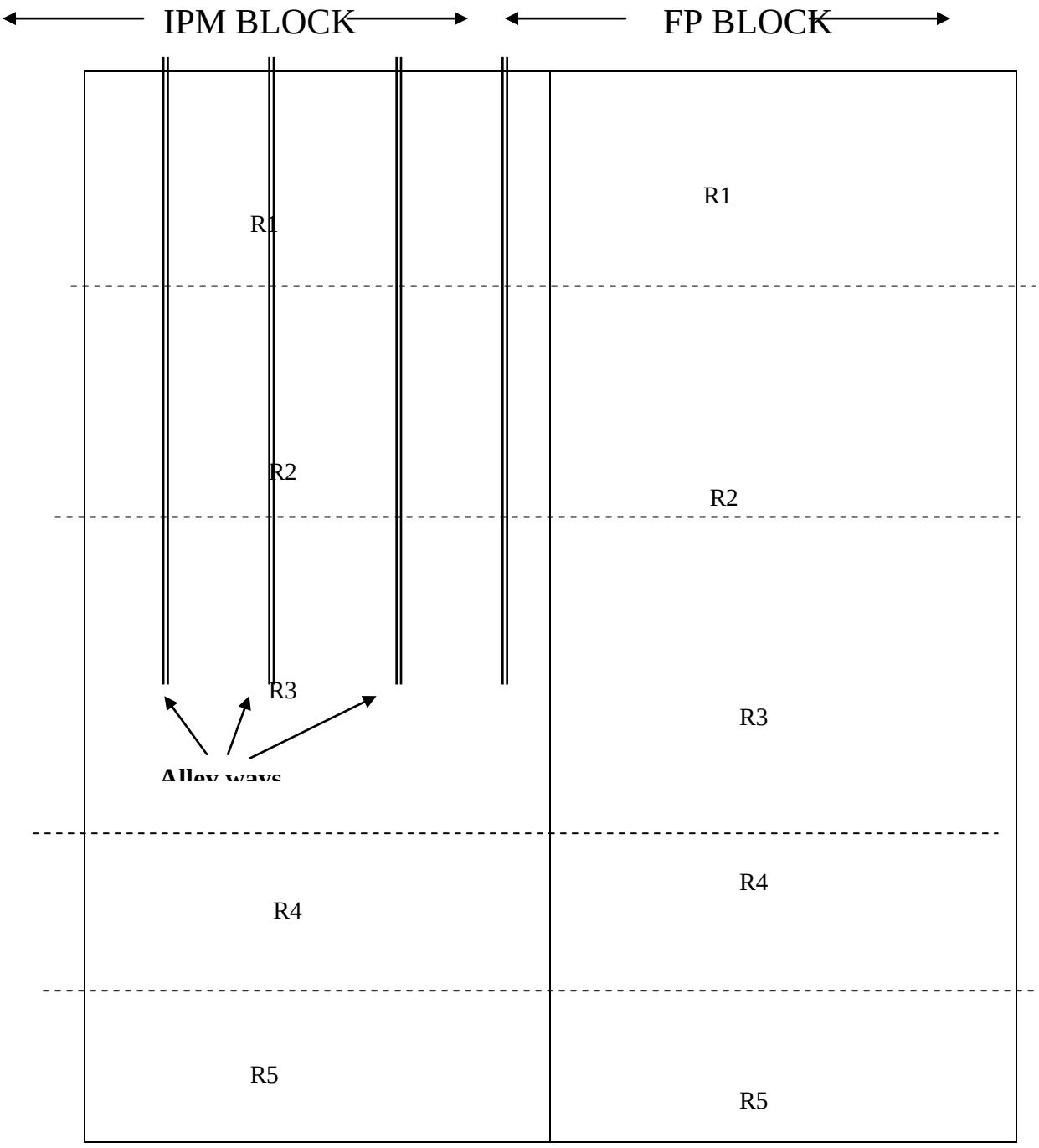
Treatment	IPM block	FP block
Nursery	❖ Apply butachlor or pretilachlor + safener @ 5 ml/lt water at 8-10 days after sowing.	❖ As per the local farmers practice.
	❖ If weed intensity is more apply bispyribacsodium @ 8 ml/lt water at 2-3 leaf stage of weeds	❖ Please record the practices followed by farmers whenever you gofor observation / visit
Main field	❖ Transplant seedlings at a spacing of 20 x 15 cm.	❖ As per the local farmers practice
	❖ Leave alleyways of 30 cm after every 2 m or 10 rows.	❖ Please record the practices followed by farmers whenever you go for observation / visit
	❖ Fertilizers should be applied as per local recommended fertilizer dose.	
	❖ Apply herbicide within one week after transplanting the crop.	
30 – 59DAT	❖ Depending on weed intensity spray post emergence herbicide as given N top dressing to be taken up as given in protocol using Leaf Color Chart	❖ As per the local farmers practice (mention the quantities)
		❖ Please record the practices followed by farmers whenever you go for observation / visit
	❖ Mid season drainage	
> 90 DAT up to harvest	❖ Mark 5 x 5 m^2 area and take yield, at 5 places (5 repl.) in this block	❖ Mark 5 x 5 m^2 and take yield, at 5 places (5 repl.) in this 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	❖ Also record the cost involved for each practice/ operation taken up by farmers starting from nursery to harvest to estimate cost of cultivation as given in data sheet

Observations to be recorded:

- Weed population (number/m^2) 30, 60 DAT
- Dry weight (gm/ m^2)of weeds at 30, 60 DAT
- Grain yield : Record the yield from 5 places of 1 x 1m area from each replication.

Note: In case of insect/ disease infestation, Inform/consult concerned PI/scientist in case of severe infestation or when in doubt about action to be taken.

LAYOUT PLAN FOR INTEGRATED PEST MANAGEMENT (SPECIAL) KHARIF 2016



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) <u>Nursery</u>

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 application 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) **<u>Main field:</u>**

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 literss/ha or Pretilachlor @1250-1500 ml/ha or Aniophos 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 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 leveling and water supply status.

Post-emergence application:

*Broad spectrum weed control – Bispyribasodium @ 250ml/ha at 2-3 leaf stage of weeds- spot application or Chlorimuron + Metsulfuron-methyl (Grasses, Sedges and Annual BLW) at 20-25 DAT @ 20 gm/ha
* If Broad leaf weeds predominate, apply 2, 4-D Na salt @ 1250-1500 g/ha at 20-25 DAT
* If grasses predominate, apply Cyhalofbutyl @1000 m/ha at 15-20 DAT or Fenoxaprop p ethyl @ 800-100ml/ ha at 25-30 DAT.

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 quadrate. 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) 20, 40 DAT
- Dry weight (gm/ m2)of weeds at 20, 40 DAT
- Observe the changes in weed flora

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

Trial No.	**:**	**12**
Trial Code	**:**	**CA/SM-5**
Name of the trial	**:**	**Analysis of long term meteorological data (temperature and rainfall) for identifying the reasons for yield reduction in different rice based cropping systems**
Objective	**:**	To determine the relative sensitivity of rice yield to changes in rainfall, Tmin and Tmax

Rationale:

The impacts of temperature and solar radiation on rice yield remain imperfectly understood, despite decades of agronomic research. Current knowledge is based primarily on field trials and greenhouse experiments. These experimental studies indicate that increased temperature and decreased radiation can reduce yield, with the impacts varying across the plant's three growth phases (vegetative, establishment to panicle initiation; reproductive, panicle initiation to flowering; ripening, flowering to mature grain). Rice, alike other crops, also exhibits nonlinear relationships with various weather parameters, particularly temperature. Existing studies confirm that significant changes have occurred in the climate of this region during the 20th Century and that in some regions in the tropics, weather is already approaching critical levels during the susceptible stages of rice growth. Thus, the observed climatic changes (and attributed weather fluctuations) in the past may have had significant influences on rice productivity in the region.

Methodology:

Our general approach was to regress yield on weather variables (rainfall, Maximum and minimum temperature) and in some specifications, exogenously determined economic variables, whose inclusion improved the precision of the estimated weather impacts. ICAR-IIRR and its cooperating centres will collect the data on crop establishment and harvest dates, production inputs, and yields for each location in each season of each year. The mean weekly weather data will be from a single monitoring station at

each site, which was within 15–20 km from a site. This detail will enable us to construct location-specific measures of weather variables defined according to the rice plant's three growth phases (for each phase, weekly means of rainfall, Tmin and Tmax). The fact that the dataset include observations over multiple growing seasons enable us to use fixed effects to control for unobserved factors that varied across space (i.e., were unique to each location, such as soil) or time (were common to all observational locations at a given site in a given season and year, such as ambient CO_2 concentration).

Locations: All the locations

Funded and Voluntary centres

Data to be collected: Grain yield (t/ha)
Weather parameters (**rainfall, T max and T min**)

Mean weekly rainfall (2005-2015)

Year	**Standard meteorological week**											
2005	1	2	3	.	.	.	.	.	50	51	52	53
2006												
2007												
.												
.												
2015												

Mean weekly maximum temperature (2005-2015)

Year	**Standard meteorological week**											
2005	1	2	3	.	.	.	.	.	50	51	52	53
2006												
2007												

.												
.												
2015												

Mean weekly minimum temperature (2005-2015)

Year	**Standard meteorological week**											
2005	1	2	3	.	.	.	.	.	50	51	52	53
2006												
2007												
.												
.												
2015												

Rice grain yield (2005-2015)

Year	*Kharif*	*Rabi*
2005		
2006		
2007		
.		
.		
2015		

Standard meteorological week

Week No.	Dates	Week No.	Dates
1	01 Jan – 07 Jan	27	02 Jul –08 Jul
2	08 Jan – 14 Jan	28	09 Jul – 15 Jul
3	15 Jan – 21 Jan	29	16 Jul – 22 Jul
4	22 Jan – 28 Jan	30	23 Jul – 29 Jul
5	29 Jan – 04 Feb	31	30 Jul – 05 Aug

6	05 Feb – 11 Feb	32	06 Aug – 12 Aug
7	12 Feb – 18 Feb	33	13 Aug – 19 Aug
8	19 Feb – 25 Feb	34	20 Aug – 26 Aug
9	26 Feb – 04 Mar	35	27 Aug – 02 Sep
10	05 Mar – 11 Mar	36	03 Sep – 09 Sep
11	12 Mar – 18 Mar	37	10 Sep – 16 Sep
12	19 Mar – 25 Mar	38	17 Sep – 23 Sep
13	26 Mar – 01 Apr	39	24 Sep – 30 Sep
14	02 Apr – 08 Apr	40	01 Oct – 07 Oct
15	09 Apr – 15 Apr	41	08 Oct – 14 Oct
16	16 Apr – 22 Apr	42	15 Oct – 21 Oct
17	23 Apr – 29 Apr	43	22 Oct – 28 Oct
18	30 Apr – 06 May	44	29 Oct – 04 Nov
19	07 May – 13 May	45	05 Nov – 11 Nov
20	14 May – 20 May	46	12 Nov – 18 Nov
21	21 May – 27 May	47	19 Nov – 25 Nov
22	28 May – 03 Jun	48	26 Nov – 02 Dec
23	04 Jun – 10 Jun	49	03 Dec – 09 Dec
24	11 Jun – 17 Jun	50	10 Dec – 16 Dec
25	18 Jun – 24 Jun	51	17 Dec – 23 Dec
26	25 Jun – 01 Jul	52	24 Dec – 31 Dec

Supplementary information:

Particulars	
Date of sowing (*kharif)*	
Date of harvesting (*rabi*)	
Variety	
Any major disease, pest attack or reason for yield loss	
Nutrient dose applied	
Irrigated/rainfed	
Succeeding/previous crop	

Data sheet for the Parameters to be collected

Location	2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015	
Rainfall	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)	Week no.	RF (mm)
	1		1		1		1		1		1		1		1		1		1		1	
	2		2		2		2		2		2		2		2		2		2		2	
	3		3		3		3		3		3		3		3		3		3		3	
	4		4		4		4		4		4		4		4		4		4		4	
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	54		54		54		54		54		54		54		54		54		54	

V. SOIL SCIENCE (COLLABORATIVE TRIALS) -SS

Agronomy co-operators list:
Funded centers:

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Funded centers: Soil Science Locations:

1	**Kanpur**			
2	**Maruteru**			
3	**Titabar**			
4	**Pantnagar***			
5	**Pusa**			
6	**Karaikkal**			
7	**Moncompu**			
8	**Chiplima***			
9	**Mandya**			
10	**Kaul***			

- *Yet to recruit the staff*

Note: As per the Work shop proceedings the Agronomy and soil Science trials need to be conducted in collaboration and there should not be any repetition of the trials at these locations

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Field Noting:

Sl.No	Date	Activity/ observations

Sl.No	Date	Activity/ observations

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