

TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

**39th Rice Scientists' Meet 2020
(May 20, 2020)**

**Lead Centre
Tamil Nadu Rice Research Institute
Aduthurai - 612 101, Thanjavur District**

Directorate of Research
Tamil Nadu Agricultural University
Coimbatore 641003

2020

PROCEEDINGS

39th Rice Scientists' Meet 2020 (May 20, 2020)

The first time in the history of Tamil Nadu Agricultural University, Coimbatore, the Annual Crop Scientists Meets were conducted through Webinar in line with COVID 19 lockdown period and to adopt social distancing, sanitation and other guidelines stipulated by the Government of Tamil Nadu. The 39th Rice Scientist Meet was conducted on 20.5.2020 in Anna Auditorium involving 30 scientists off-line and more than 300 scientists on-line covering all college campuses, research stations and KVKs.

Dr. N. Kumar, Vice Chancellor, TNAU, has inaugurated the event and offered his opening remarks. He suggested that the rice production has increased phenomenally over the years and the total food grain production has touched all time high of 296 million tonnes in the country. The improved varieties and technologies developed by the universities and research institutes that were adopted by the farmers are squarely responsible for such a resounding success. TNAU has released 175 rice varieties (inclusive of 5 hybrids) so far. The Vice Chancellor emphasized that land races native of the State must be exploited to infuse tolerance to biotic and abiotic stresses besides fortification of vitamins and minerals. Thanks to the Government of Tamil Nadu for giving sanction of **Rs. 50 lakhs** to establish Nel Jayaraman Exhibition Hall in KVK Needamangalam and Center of Excellence in Molecular Breeding in Coimbatore. Scientists have to develop stage-specific bioinoculants, technology capsule for emerging pests and diseases to sustain the farm productivity.

Dr. K.S. Subramanian, Director of Research flagged off issues such as accelerating release of rice varieties with special traits such as therapeutic, heat tolerance, herbicide tolerance, high photosynthetic efficiency and biofortified with micronutrients. He indicated that the STCR based approach has facilitated rationalization and economizing fertilizer use that can be demonstrated in large scale in Cauvery Delta Zone. The emerging pest and disease in rice gall midge and false smut require special attention in the action plan of CPPS.

Dr. S. Geetha, Director (CPBG), **Dr. V. Geethalakshmi**, Director (Crop Management and **Dr. K. Prabakar**, Director (CPPS), presented the research highlights, action taken on previous Crop Scientists Meet and Action Plan for the year 2020-2021 of their respective directorates and departments involved. The Vice Chancellor offered concluding remarks and the Director of Research summarized the event. **Dr. V. Ambethgar**, Director, TRRI, Aduthurai, proposed a formal vote of thanks.

The proceedings of the meet is furnished as below

A. CROP IMPROVEMENT

- I. Cultures recommended for variety release/OFT/ART/MLT
- II. Action plan
- III. Project-wise remarks

B. CROP MANAGEMENT

- I. Adoption/OFT/Information
- II. Action plan
- III. Project-wise remarks

C. CROP PROTECTION

- I. Adoption/OFT/Information
- II. Action plan
- III. Project-wise remarks

D. CLOSING REMARKS

E. PARTICIPANTS

A. CROP IMPROVEMENT

I. Cultures recommended for variety release/OFT/ART/MLT

i. Cultures Recommended for the submission of Variety Release Proposal to UVTRSC during 2020

1. TR 05031: Additional OFT need to be conducted in comparison with ADT 39

Parentage	:	ADT 39 / CO 45
Duration	:	127 days and suitable for Late <i>Samba</i> / <i>Thaladi</i> / Late <i>Thaladi</i>
Yield (136)	:	5706 kg/ha (5.4 percent yield increase over TRY 3)
Special Features	:	Moderately tolerant to sodicity, Medium Slender white rice, Increased per day productivity (12.66%), HRR- 57.2% and Multiple resistance to major pests viz., Leaffolder, Stem borer and Gall Midge and to Blast & Brown spot

2. Two short duration cultures viz., CB 12558 and AD 09219 have to be demonstrated competitively in large area along with ADT 53 and CO 51 at Aduthurai, Coimbatore, Ambasamudram and Tirur stations. Based on the competitive performance and unique traits and with consensus, the best culture in terms of yield, quality and other features will be proposed.

CB 12588

Parentage	:	CB 04110/ CB 05501
Duration	:	118 days suitable for <i>Sornavari</i> / <i>Kar</i> / <i>Kuruvai</i> seasons under transplanted conditions
Average yield	:	6127 kg ha ⁻¹ which is 12.9 percent higher yield than CO51 5555 kg ha ⁻¹ which is inferior with CO 51(5645 kg ha ⁻¹)
Resistance to blast and moderate resistance to brown spot. Intermediate amylose with medium gel consistency and intermediate GT. The medium slender grain had shown more elongation in breadth upon cooking (BER 1.44 and LER 1.38). The HRR is 61.4 per cent		

AD 09219

Parentage	:	ADT (R) 45 / ACK 03002
Duration	:	115 days suitable for <i>Sornavari</i> / <i>Kar</i> / <i>Kuruva</i> seasons under transplanted condition
Average yield	:	MLT(18): 6147 kg ha ⁻¹ which is 16 per cent higher than ADT 43 ART (81): 5930 kg ha ⁻¹ and on par with ADT 43
Resistant to Blast (score 3) at Gudalur condition. MR to sheath blight, stem borer and BPH, Possess high Iron and Zinc content (Zn :30.28 ppm and Fe: 10.2 ppm) Medium slender grains. Head Rice Recovery 63.6 per cent with good cooking qualities		

ii. Cultures Recommended for the conduct of OFT during 2020-21

Short Duration	
Rainfed Early	: TM 12061 and TM 12077 competitively along with CO 53 and Anna(R)4 in Ramanathapuram, Sivagangai and other rainfed paddy cultivation districts
Salt tolerant- Early	: TR 09030 with TRY 2
Transplanted - Mid Early	: AD 12132 and TP 08053 with TKM 13 and ADT 39
Hybrid Rice- Mid Early	: TNTRH 55
Medium Duration	
Transplanted	: CB 12132, CBMAS 14065 along with CO 52 ADT 54, BPT 5204 and NLR 3444

During the meeting CBMAS 14142 was recommended for OFT. However, after the reexamination by the Director, CPBG, it was understood the culture CBMAS 14142 is a aromatic basmati type for which there is no area under cultivation and hence it was not recommended for inclusion in OFT. However, it is insisted that the minimum quantity of seeds of same entry should be maintained; as and when the demand for such type arises it would be promoted.

iii Cultures Recommended for Adaptive Research Trials (2020-21)

A). Sufficient quantity of seeds (100kg) of the culture AS 15024 and checks from the respective centres are to be sent to TRRI, Aduthurai on or before 15th June 2020 for co-ordination of ART.

Parentage and checks	Yield and Duration	Special attributes	Locations
Rice 4/2020-21: Transplanted (Oct 25 – Nov 10, 110 to 125 days)			
AS 15024* (ASD 16 /Manjalsaradai) Check : TPS 5 and TKM 13	6306 kg/ha in 119 days 14.95 per cent higher yield than CO 51 and 5.50 per cent higher than TPS 5	HRR: 57 % Intermediate amylose, soft gel, low GT, LER:1.42 and BER :1.28 MR to Leaf Folder and Stemborer	All districts except Virudhunagar, Ramnad, Sivagangai, and The Nilgiris

AS 15024 was tested in MLT –I, Since the culture recorded 119 days consecutively in both the years of MLT, the culture is recommended to evaluate in ART 4.

B). In the special MLT, the Kavuni derived cultures which has recorded more than 30 % yield increase over Kavuni genotype i.e CK145-3 (601), CK 144-2(604),CK 32-2(607),CK 145-6(610) and CB 11161 will be assessed for nutrient and therapeutic

values at IICPT, Thanjavur, Aduthurai and Coimbatore. The best culture in terms of nutritive point will be given for ART/OFT.

iv. Cultures recommended for Multi Location Trials 2020-21

- The MLT data is to be sent along with weather data (Monthly basis) for the crop growth period.
- The dropped culture CBMAS 14110 from MLT I may be tested in station trial at ARS, Paramakudi for its drought tolerance for two consecutive years. Based on the performance of station trial, it may be nominated for MLT during 2021-22..
- The data with trial mean less than 4000 kg/ha and CV more than 15% will not be considered for assessing genotypic performance

MLT I (100- 115 days; May-June sowing) 2020-21

Entry	Parentage	Duration (days)	Grain yield (kg/ha)	Rice grade	Nominating Centre
Repeat					
AD 16028	(WGL 14377/MDU 5)	116	5771	MS	Aduthurai
New					
AD 17037	Turantdhan / IET 22075	115	6698	MS	Aduthurai
AD 18010	ADT 37 / JGL 17004	110	6638	SB	Aduthurai
CB 16533	CO 51 / Wag Wag	114	6806	MS	Coimbatore
CB 16763	CO 51/IR 20	112	6696	MS	Coimbatore
TR 09030	Mutant of TRY 2	108	3842	LS	Trichy
ACK 12026	Mutant progeny of White Ponni	112	6340	MS	Killikulam

Checks	TPS 5, CO 51 and ADT 53
Replications	Three
Plot size	9 m ²
Spacing	15 x 10 cm
Locations (12)	: Aduthurai, Coimbatore, Madurai, Ambasamudram, Tirur, Thirupathisaram, Killikulam, Thanjavur, Paiyur, Cuddalore, Pattukottai, Vaigaidam
Seed dispatch	: 6.0kg to be sent to TRRI, Aduthurai on or before 20 th May 2020

MLT II (115-125 days, September/October sowing) 2020-21

Entry	Parentage	Duration (days)	Grain yield (kg/ha)	Rice grade	Nominating Centre
New					
AD 17083	WGL 14377 / MDU 5	123	6481	MS	Aduthurai
AD 17759	ADT(R) 46 / AD 09465	122	6693	MS	Aduthurai
AS 16059	Manjalsaradai / ASD 16	125	6513	M	Ambasamudram
ACK 12024	Mutant of White Ponni	125	6233	MS	Killikulam
CB 16574	CO 51/ GD 11.114	124	6846	MS	Coimbatore
CB 16785	WGL 14/JGL 17197	120	6739	MS	Coimbatore
TR 05031	ADT 39 / CO 45	127	5706	MS	Trichy

Check	:	ADT 39, TKM 13 , RNR 15048
Replications	:	Three
Plot size	:	9 m ²
Spacing	:	15 x 10 cm
Locations (9)	:	Aduthurai, Coimbatore, Madurai, Ambasamudram, Tirur, Thirupathisaram, Killikulam, Thanjavur and Paiyur
Seed dispatch	:	5.5 kg to be sent to TRRI, Aduthurai on or before 15 th May 2020

MLT III (131-140 days, September/October sowing) – 2020-21

Entry	Parentage	Duration (days)	Grain yield (kg/ha)	Rice grade	Nominating Centre
Repeat					
AD 13253	AD 01246/CO (R)49	134	5873	MS	Aduthurai
New					
AD 17713	ADT (R) 46 / AD 09391	134	6781	MS	Aduthurai
AD 17729	CO (R)50 / AD 09494	136	6730	MS	Aduthurai
ACK 14034	TPS 3 / ADT 43	130	6056	MB	Killikulam
CB 16118	CR1009/GMS48	138	7176	SB	Coimbatore
CB 15138	CB09153 / BG 358	133	6906	SB	Coimbatore
CB 16217	CO52/JGL17190	138	6891	SS	Coimbatore

Checks	:	CO 52 , TPS 3, ADT 54 and Amman
Replications	:	Three
Plot size	:	9m ²
Spacing	:	20 x 10 cm
Locations (13)	:	Aduthurai, Ambasamudram, Coimbatore, Madurai, Thirupathisaram, Sirugamani, Tirur, Killikulam, Vaigaidam, Thanjavur, Cuddalore, Pattukottai and Palur

MLT IV (140 days and above, August Sowing)- 2020-21

Entry	Parentage	Duration (days)	Grain yield (kg/ha)	Rice grade	Nominating Centre
AD 18111	CR 1009/OR 23780	148	7000	MB	Aduthurai
AD 18131	CR 1009/MTU1075	152	7375	MB	Aduthurai
AD 18073	CR 1009/BPT 2270	150	6760	SB	Aduthurai
AD 18147	CR 1009/MTU1075	155	6725	MB	Aduthurai

Checks		CR 1009 <i>Sub1 and ADT 51</i>
Replications		Four
Plot size		9m ²
Spacing		20 x 15 cm
Locations (8)	:	Aduthurai, Ambasamudram, Coimbatore, Thirupathisaram, Sirugamani, Tirur, Killikulam, Thanjavur,
Seed despatch	:	5.0 kg to be sent to TRRI, Aduthurai on or before 15 th May 2020

MLT – Drought 2020-21

Entry	Parentage	Duration (days)	Grain yield (kg/ha)	Rice grade	Nominating Centre
PM 16002	ADT (R) 45/Moraberagan	112	3900	SS	Paramakudi
PM 17022	Jeeraga samba / TKM 12	108	4087	MS	Paramakudi
TM 14029	ADT (R) 45/Norungan	116	3433	MS	Tirur
TM 14032	ADT 39 / PM 09022	118	3600	MS	Tirur

Checks		Anna (R) 4,
Replications		Five
Plot size		9 m ²
Spacing		20 x 10 cm
Locations (5)	:	Ramnad, Paramakudi, Coimbatore and Tirur

- At Paramakudi, trial is to be conducted both at field and ROS. The breeder at Paramakudi is the incharge for the MLT at Ramnad.
- At Coimbatore, trial is to be conducted in ROS
- Apart from the regular observations, Drought Sensitivity (DRS), Leaf Drying at vegetative stage, Spikelet Fertility and Drought Recovery (DRR), root traits need to be recorded at Department of Rice, TNAU, Coimbatore with the technical support of Dr. K. Krishnasurender, AP (CRP).

MLT – Salinity 2020-21(Early)

TR 13069	ADT43 / FL 478// ADT 43	115	5139	MS	Trichy
TR 13083	ADT43 / FL 478// ADT 43	113	5171	MS	Trichy
TR 15035	CSR 36 / IRGC 41-05//RPBio 226	110	4018	MS	Trichy
TR 15057	IR 20 / CSR 23 // CSR 23	113	4315	MS	Trichy

Checks		TRY 2
Replications		Three
Plot size		9 m ²
Spacing		20 x 10 cm
Locations (3)	:	Trichy, Farmers field at Tiruvarur, Thanjavur Districts

MLT – Salinity 2020-21(Medium)

TR 15029	CSR 36 / IRGC 41-05//RPBio 226	135	5613	MS	Trichy
TR 15031	CSR 36 / IRGC 41-05//RPBio 226	132	5893	MS	Trichy

Checks		TRY 3
Replications		Three
Plot size		9 m ²
Spacing		20 x 10 cm
Locations (6)	:	Trichy and farmers field at Ramanathapuram, Tiruvarur, Nagapattinam, Kancheepuram and Tutukudi District(5locations)

V. RICE MULTILOCATION TRIALS MONITORING TEAM 2020-21

Sl. No	MLT Stations	Monitoring team
1	Aduthurai/Thanjavur/ Pattukottai	Dr.R.Saraswathi, Prof. (PBG) Dr.A.Sheeba,Asst.Prof. (PBG) Dr.C.Gopalakrishnan,Prof. (Path) Dr.V. Balasubramani, Prof. (Ent)
2	Coimbatore / Sirugamani	Dr.RP.Gnanamalar,Prof. (PBG) Dr. R. Suresh, Asst.Prof. (PBG) Dr.A. Ramanathan, Prof. (Path) Dr.P.Anandhi,Asst.Prof. (Ent)

3	Thirupathisaram/ Killikulam/ Ambasamudram	Dr..Arumugachamy, Prof. (PBG) Dr.K.Amutha, Asst.Prof. (PBG) Dr.C.Gopalakrishnan, Prof. (Path) Dr.V. Balasubramani, Prof. (Ent)
4	Tirur/ Palur/ Cuddalore	Dr.D.Sassikumar, Assoc.Prof. (PBG) Dr.S.Muthuramu, Asst.Prof. (PBG) Dr.A.Ramanathan, Prof (Path.) Dr.P. Anandhi, Asst. Prof. (Ent)
5	Madurai/Vaigaidam	Dr.K.Geetha, Prof. (PBG) Dr.S.Saravanan, Asst.Prof. (PBG) Dr.C. Gopalakrishnan, Prof. (Path) Dr.V. Balasubramani, Prof. (Ent)
6	Paramakudi/Ramanathapuram	Dr.John Joel, Prof.(PBG) Dr.G.Anand, Asst.Prof.(PBG) Dr.A.Ramanathan, Prof. (Path) Dr.P.Anandhi, Asst.Prof. (Ent)
7	Paiyur	Dr. R.Pushpam, Assoc.Prof. (PBG) Dr.S.Banumathi, Assoc.Prof.(PBG) Dr.A. Ramanathan, Prof. (Path) Dr.P.Anandhi, Asst.Prof.(Ent)

The monitoring team will visit at appropriate stage of the trial and report on

1. General conduct of the trial
 - a. Plot size and replications
 - b. Labelling of the plots.
2. Admixtures, Disease and pest susceptibility if any
3. Top two entries based on visual observation
4. General remarks of the trial

II. ACTION PLAN for 2020-21 on Identified Thematic Areas of Research

THEME I. Developing climate smart varieties by gene pyramiding			
A. Pyramiding of Biotic stress resistance genes			
Sl.No	Activity	Work plan for the year 2020-21	Station/ Scientist Incharge
1.	Development of Biotic stress tolerant rice through pyramiding of genes for BLB, Blast and BPH resistance.	Effecting double crosses between TKM13/BLB donors AD(Bio)09518 & AD(Bio)09366 and CO 52/BPH donors (PTB 33 & RP 206818-3-5	TRRI: Dr.D.Sassikumar, Associate Prof. (PB&G) Dr. A. Ramanathan, Professor (PAT) Dr.P.Ananthi, Assistant Professor (ENT) Department of Rice Dr. K. Amudha, Assistant Professor (PB&G) Dr.C.Gopalakrishnan, Professor (PAT) Dr. V. Balasubramani, Professor (ENT) CPMB&B: Genotyping Dr.M.Raveendran, Professor (CPMB&B) Dr.V.Thiruvengadam, Assistant Professor, Dept.of PGR
2.		Synthesis of crosses between donors for blast (APD19026 & APD190270) and donor for false smut (RG170) with TKM 13 and CO 52	
3.		Effecting crosses between double cross F ₁ (TKM 13/BLB donors// CO 52/BPH donors) x single cross F ₁ (Blast and false smut donors)	
4.		Identification and validation of new source of resistance for BPH, BLB, Blast and False smut.	

B. Double trouble (drought + salinity) tolerant rice			
Sl.No	Activity	Work plan for the year 2020-21	Station/ Scientist Incharge
1.	Development of rice genotypes tolerant to drought and salinity stress through marker aided selection	1.Synthesis of new crosses involving fine varieties viz., Rice CO 52 and RNR 15048 with the identified donors 3-11-11-1, 3-11-11-2, TR 13069, TR 13083, TR 09027	<p>Department of Rice : Dr.R. Pushpam Assoc. Prof. (PB&G)</p> <p>Dr.K.Krishna Surendar, Assistant Professor (CRP)</p> <p>ARS, Paramakudi : Dr. S. Muthuramu, AP(PB&G)</p> <p>ADAC&RI, Trichy: Dr.T.Thirumurugan AP (PB&G)</p> <p>CPMB &B: Marker validation: Dr. M. Raveendran, Prof. & Head</p>
2.		2. Fixing of true F ₁ s and foreground selection	<p>TRRI: Dr.R.Suresh, Asistant Professor (PB&G)</p> <p>Dept. of Rice: Dr.R. Pushpam, Assoc.Professor (PB&G)</p>
3.		Synthesis of BC ₁ F ₁ s	<p>TRRI:Dr.R.Suresh, Asistant Professor (PB&G)</p> <p>Dept. of Rice: Dr.R. Pushpam, Assoc.Professor (PB&G)</p>
4.		Raising of F ₂ populations and genotyping for drought and salinity with specific markers	<p>TRRI:Dr.R.Suresh, Asistant Professor (PB&G)</p> <p>Dept. of Rice: Dr.R. Pushpam, Assoc.Professor (PB&G)</p>

THEME II. Breaking the yield barriers in rice			
Sl.No	Activity	Work plan for the year 2020-21	Station/ Scientist Incharge
1.	Synthesis of TNAUMAGIC population	<p>1. Raising the F₁s and identification of true F₁s through marker validation.</p> <p>2. Attempting two way crosses viz., 1. CO (R) 50 /VGD 1 // TRY 3 / IR 20</p> <p>2. CR 1009 / <i>Thooyamallij</i>/ TPS 5 / CB 13132</p> <p>3. ADT 52 / Wild MAGIC// ASD 16 / <i>Mappillai Samba</i></p> <p>4. . TKM 13 / AC 38471//ADT 39 / GEB</p> <p>5. Validating the F₁s through marker analysis</p>	<p>TRRI: Dr.D.Sassikumar, Associate Professor</p> <p>Dr.R.Suresh, Assistant Professor (PB&G)</p> <p>Dr.R.Pushpa, Assistant Professor (PB&G)</p> <p>Mrs. A. Arulmozhi, Assistant Professor (PB&G)</p> <p>CPMB&B: Development of markers for genotyping Dr.M.Raveendran, Prof. & Head (Biotechnology)</p>
2.	Next generation restorers using Wild Rice MAGIC lines and Tropical <i>Japonica</i> lines	<p>1. Raising of F₂s generated from R x Wild Rice Magic parents and forwarding to F₃.</p> <p>2. Raising of F₃ generation of <i>indica</i>/ tropical <i>japonica</i> crosses and selection of plants with complete fertility and other agromorphological traits and generation advancement to F₄. Molecular screening for presence of restorer genes in selected crosses</p> <p>3. Evaluation of biparental progenies synthesized from intersubspecific crosses and generation advancement</p> <p>4. Raising of BC₁F₂s of six <i>indica</i>/ tropical <i>japonica</i> crosses and advancement to F₃.</p>	<p>Department of Rice Dr.R.Saraswathi (PB&G)</p>

3.	Developing new CMS lines with enhanced outcrossing	1. Phenotypic evaluation of maintainers for panicle, floral and grain traits and molecular screening to ensure the absence of fertility restorer genes	
		2. Generating new crosses, F ₁ evaluation and backcrossing	

THEME III. Breeding for special traits

Sl.No	Activity	the year 20-21	Station/ Scientist Incharge
1. Developing pre-breeding stocks for direct seeded rice			
A.	Synthesis of fresh crosses	1. Synthesis of crosses involving identified donors for anaerobic germination viz., CO 40, CO 44, TKM 9, Anna (R) 4, TKM 9, ADT 40 in to CO 52, ADT 52, TKM 13 and ADT 53.	TRRI: Dr.R.Suresh, Assistant Professor (PB&G)
B.	Fixing of true F ₁ s	2. Raising the F ₁ s and fixing of true F ₁ s	
2. Enriching accumulation of therapeutic proprieties in rice			
A.	Evaluating the improved <i>Kavun</i> lines for agronomic traits and photosensitivity	Characterisation of the Kavuni lines for therapeutic and nutritional properties	TRRI: Dr.D.Sassikumar, Associate Professor (PB&G) Department of Rice: Dr.R.Pushpam, Associate Professor (PB&G) CPMB &B : Dr. M. Raveendran, Prof. (Biotech)

B.		Conducting second year MLT with the same entries evaluated during 2019-20.	ADT: Dr.D.Sassikumar, Associate Professor (PB&G) Dr.R.Pushpa, Asistant Professor (PB&G) CBE: Dr.R.Pushpam Associate Professor (PB&G) Dr.K.Amudha, Assistant Professor (PB&G)
			TPS: Dr.N.Shunmugavalli, Professor (PB&G) ASD : Dr.S.Arumugachamy, Professor (PB&G)
3. Resource Use Efficient Rice			
	Developing P Use Efficient cultures	Background analysis of homozyogous NILs of ASD16, ADT43 and CR1009 Sub1 harboring <i>OsPSTOL1</i> and identification of elite lines for testing	AC&RI, Madurai : Dr. J. Ramalingam, Professor (Biotechnology) Dr. S. Banumathy, Associate Professor (PB&G) AC&RI, Killikulam Dr.Aanandhi, Assistant Professor, (PB&G)
4. Special Purpose Rice			
	Identification of rice varieties suitable for popping	1. Evaluation of parents for puffing characters 2. Raising the F ₁ s and fixing of true F ₁ s 3. Genetic studies of puffing related characters	AC&RI, Madurai: Dr.R.Gnanamalar, Professor (PB&G) Dr.S. Banumathy, Associate Professor (PB&G) CSCRI, Madurai: Dr.K.Jothilakshmi, Assistant Professor

THEME IV. Rejuvenation and reconstitution of land races

Sl.No	Activity	Work plan for the year 2020-21	Station/ Scientist Incharge
1.	Characterization and documentation of all landraces pertinent to TamilNadu	<p>1. Biochemical characterization of land races for assessing its nutritive value. Nutritional profiling of four different kavuni morphotypes and Mappillaisamba and other promising landraces with therapeutic values.</p> <p>2. Evaluation of fifteen variants selected through PLS in the yield trials for the assessment of uniformity and yield superiority over the corresponding land race from which selection was made</p>	<p>TRRI Dr.D.Sassikumar, Assoc. Prof. (PB&G)</p> <p>Dr.R.Pushpa, Assistant Prof. (PB&G)</p> <p>Department of Rice Dr.K.Amudha, Assist. Prof.(PB&G)</p> <p>PGR : Dr.V.Thiruvengadam, Assistant Professor (PB&G)</p>

THEME V. Next generation genomics and bio-informatics for allele mining and trait discovery

No	Activity	Work plan for the year 2020- 21	Station/ Scientist Incharge
1.	Whole genome re-sequencing of native rice	<p>Retrieval of whole genome sequence information of rice genotypes available at TNAU from 3K Panel (including ASD16 and ADT43)</p> <p>Haplotype analysis of candidate genes controlling grain quality traits</p> <p>Phenotypic characterization for grain quality traits</p> <p>Mining superior alleles of grain quality related genes</p> <p>Phenotypic evaluation of putative transgenic plants over-expressing contrasting alleles of OsOLP</p>	<p>AC&RI, Madurai Dr.J. Ramalingam Professor (Biotechnology)</p> <p>CPMB & B Dr.M.Raveendran, Prof. & Head (Biotech.)</p>
2.	Exploiting newer areas of research	Characterization of gene edited mutant lines for aroma and Lutien accumulation	<p>CPMB & B</p> <p>Dr. D. Sudhakar, Professor (Biotech.)</p> <p>Dr.M.Raveendran, Prof. & Head (Biotech)</p>

THEME VI. Accelerated breeding to develop super fine rice varieties for high end market

Sl.No	Activity	Work plan for the year 2020-21	Station/ Scientist Incharge
1.	Development of Super fine rice varieties for high end market	Screening of advanced rice cultures for superfine quality comparable with consumer's preferred popular varieties like RNR 15048, NLR 3449, Akshaya and Amman	<p>TRRI: Dr.D.Sassikumar, Asso. Professor (PB&G)</p> <p>Dr.R.Suresh, Assistant Professor (PB&G)</p> <p>Department of Rice: Dr.R.Pushpam, Asso. Professor (PB&G)</p> <p>Dr. K. Amudha, Assistant Prof (PBG)</p> <p>TPS: Dr.N.Shunmugavalli, Professor (PB&G)</p> <p>ASD :Dr.S.Arumugachamy, Professor (PB&G)</p> <p>AC&RI, Madurai: Dr.R.Gnanamalar, Professor(PBG)</p>
2.		Conducting MLT for short duration cultures during Summer and Kharif and Medium duration cultures during Rabi	<p>TRRI: Dr.D.Sassikumar, Assoc. Professor (PB&G)</p> <p>Dr.R.Suresh, Assistant Professor (PB&G)</p> <p>Department of Rice: Dr.R.Pushpam, Asso. Professor(PB&G)</p> <p>Dr. K. Amudha, Asst. Prof.(PBG)</p>

			<p>ASD :Dr.S.Arumugachamy, Professor (PB&G)</p> <p>Paiyur: Dr.K.Geetha, Professor(PBG)</p>
3.		Conducting field day at PBS Coimbatore and screening the MLT cultures by involving senior breeders, Millers and traders	<p>Department of Rice: All Scientists</p>

III. Project wise remarks – CPBG		
S. No.	Project No. & title	Remarks
I. Projects on germplasm maintenance		
COIMBATORE		
1.	<p>CPBG/CBE/PBG/RIC/2016/001</p> <p>Germplasm collection, evaluation and conservation in rice</p> <p>Dr. K. Amudha , Assistant Professor (PB&G)</p> <p>(June 2016 to May 2021)</p>	<p>The newly collected rice land races by PGR should also be included in the next year's study. The PLS made should be maintained with an aim to develop a PLS variety from the favourable land race types. The glycemic index should be given importance in biochemical analysis. The project may be continued</p>
II. Projects on evolution – Aduthurai		
2.	<p>CPBG/ADT/PBG/RIC/2019/New</p> <p>Development of medium duration rice with high yield potential, preferential grain quality and resistance to BLB suitable for irrigated ecosystem of Tamil Nadu</p> <p>Dr. D. Sassikumar Associate Professor (PB&G)</p> <p>Dr. A. Ramanathan Professor (Plant Pathology)</p> <p>August 2019 - July 2022</p>	<p>The number of cross combinations should be restricted only to six numbers and should be strictly followed based on the objectives. The best BLB resistant source identified should be used as donor in action plan activities also in the</p>

		ensuing season. In addition to BLB, the resistance for false smut should also be scored. The nomenclature IYT should be changed as observational trial as it is not raised in replicated trials. The project may be continued. New cross combinations should involve wide genetic bases only.
3.	<p>CPBG/ADT/PBG/RIC/2017/001</p> <p>Evolving short duration rice varieties/culture with fine grain and resistance to blast, brown plant hopper and bacterial leaf blight</p> <p>Dr. R. Suresh, Asst. Professor (PBG)</p> <p>June 2017 to May 2022</p>	The number of cross combination should strictly be restricted to six numbers only and the population size of segregating generation should be increased. Only the no lodging entries from IYT be promoted to PYT. Emphasis should be given to develop alternate variety to ADT 37 also. The genetic base of the parents should be widened. The project may be continued.
4.	<p>CPBG/ADT/PBG/RIC/2017/05</p> <p>Evolution of extra early rice varieties (<100 days) suitable for direct seeding in water limited areas of CDZ</p> <p>Dr. R. Suresh, Asst. Professor (PBG)</p> <p>June 2017 to May 2022</p>	The IYT should be conducted under direct sown condition to screen the early maturing genotypes. The parents which lime Heera which matures in 70 days should be used as parents. The maturity days should critically be evaluated. The Project may be continued
5.	<p>CPBG/ADT/PBG/RIC/2017/006 (Core project)</p> <p>Development of breeding stocks in rice with preferable nutritional properties</p> <p>Dr. R. Pushpa, Assistant Professor (PBG)</p> <p>November 2017 to September 2020</p>	The objectives of the two projects handled by this Project leader are overlapping and both the projects should be merged and suitable proposal

		should be submitted for approval. Why hitherto identified high Fe and Zn donors have not been used? The project is to be completed on 30.09.2020
6.	<p>CPBG/ADT/PBG/RIC/2018/CP044: (Core Project)</p> <p>Development of super fine short slender rice variety with enhanced nutritional qualities suitable for Tamil Nadu</p> <p>Dr. R. Pushpa, Assistant Professor (PBG)</p> <p>April 2018 to September 2020</p>	In the title it has been given as super fine variety but in the objectives short bold has also been included. Why the high Fe and Zn containing genotypes identified by the project leader have not used in crossing programme. The project needs midterm correction. It is suggested to concentrate on Improvement of enhancement of Fe and Zn only. Proposal should be submitted for mid term correction. The project is to be completed on 30.09.2020
7.	<p>CPBG/ADT/PBG/RIC/2017/003</p> <p>Development of high yielding, non lodging, long duration (> 140 days) rice varieties suitable for sambaseason</p> <p>Dr. R. Manimaran, Asst. Prof. (PB&G),</p> <p>Aug. 2017 to July 2022</p>	The Project may be continued.
COIMBATORE – CPBG		
8.	<p>CPBG/CBE/PBG/RIC/2016/002</p> <p>Evolution of fine grain medium duration rice varieties resistance to blast and BLB</p> <p>Dr. K. Amudha, Assistant Professor (PB&G)</p> <p>June 2016 to May 2021</p>	Number of cross combinations should strictly be restricted to six numbers only and out of which two crosses for developing short bold varieties and four for fine rice varieties. Care should be taken fixing the parents with wide genetic base. More backcrosses and multiple crosses with fine

		grain varieties is recommended. The project may be continued.
9.	<p>CPBG/CBE/PBG/RIC/2016/003:</p> <p>Development of stable CMS lines and restorer/maintainer breeding in rice with good phenotypic acceptability</p> <p>Dr. R. Saraswathi, Professor (PB&G)</p> <p>June 2016 to May 2021</p>	<p>Research must be focused on developing outstanding parental lines (A line), with fine grain characteristics having very good panicle exertion, panicle length and stigma exertion. Variety Bhavani may be utilized. The Project may be continued</p>
10.	<p>CPBG/CBE/PBG/RIC/2016/004</p> <p>Development of new three line hybrids with high yield and quality</p> <p>Dr. R. Saraswathi, Professor(PB&G)</p> <p>June 2016 to May 2021</p>	<p>Accelerated breeding methods may be adopted for early identification of the new rice hybrid. The project may be continued</p>
11.	<p>CPBG/CBE/PBG/RIC/2016/005</p> <p>Developing early maturing (105-115 days) rice varieties resistant /tolerant to BPH and blast</p> <p>(Dr. R. Pushpam, Associate Professor(PB&G)</p> <p>June 2016 to May 2021</p>	<p>Studies on drought tolerance and other traits may be dispensed (except in action plan) and more attention should be given only for yield and quality for irrigation conditions. As already indicated during the review, the number of cross combinations should be restricted only to eight numbers and wide genetic base should be followed. The project may be continued. Rejection of undesirable genotypes in the early segregating generations should be followed. The Project may be continued</p>

12.	<p>CPBG/CBE/PBG/RIC/2017/001</p> <p>Development of two line hybrids and TGMS lines in rice</p> <p>Dr. R. Saraswathi, Professor (PB&G)</p> <p>January 2017 to December 2021</p>	<p>The newly developed TGMS based hybrid TNTRH 55 may be evaluated extensively and be released if found promising.</p>
RRS, AMBASAMUDRAM		
13.	<p>CPBG/ASD/PBG/RIC/2016/001</p> <p>Evolving high yielding medium duration rice variety suitable for <i>Pishanam</i> season</p> <p>Dr. S. Arumugachamy, Professor (PB&G)</p> <p>June 2016 to May 2021</p>	<p>The Project may be continued</p>
14.	<p>CPBG/ASD/PBG/RIC/2019/001:</p> <p>Evolving high yielding short duration rice variety suitable for <i>Kar</i> and Late <i>Pishanam</i> seasons of Thamirabarani tract</p> <p>Dr. S. Arumugachamy, Professor (PB&G)</p> <p>April 2019 – March 2024</p>	<p>The Project may be continued</p>
ARS, THIRUPATHISARAM		
15.	<p>CPBG/TPS/PBG/RIC/2016/001</p> <p>Evolving early duration rice variety suitable for <i>Kannipoo</i> season of Kanyakumari district.</p> <p>Dr. N. Shunmugavalli, Professor (PBG) & Head</p> <p>Dec. 2016 - Nov. 2021</p>	<p>The Project may be continued</p>
16.	<p>CPBG/TPS/PBG/RIC/2016/002</p> <p>Evolving long duration rice variety suitable for <i>Kumbapoo</i> season of Kanyakumari district.</p> <p>Dr. N. Shunmugavalli, Professor (PBG) & Head</p> <p>Dec., 2015 to Nov., 2020</p>	<p>The Project may be continued</p>

ARS, TIRURKUPPAM

17. CPBG/TKM/ PBG/RIC/2015/001 Evolving short duration drought tolerant rice varieties suitable for rainfed/semidry conditions. Dr. A. Sheeba, Asst.Professor (PB&G) Dec. 2015 to Nov. 2020	The project may be continued. As selection is meant for drought a larger population of F ₂ is recommended and number of cross combinations should be restricted to four numbers only with the proven parents
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AC & RI, MADURAI

18. CPBG/MDU/ PBG/ RIC/ New Evolution of high yielding fine grain quality medium duration rice variety suitable for PeriyarVaigai River Project Area. Dr. R.P.Gnanamalar, Professor(PB&G) Dr. K. Premalatha, Assistant Professor (Agrl.Ento.) December 2018 to November 2023	The number of cross combinations should be restricted to three only but with a larger sized segregating population. Gall midge resistant parents may be included in crossing programme. Care should be taken in selecting the parents. Lodging resistance should be taken into account. The project may be continued
19. CPBG/MDU/PBG/ RIC/2019/002 Development of high yielding short duration variety suitable for PVP area Dr.S.Banumathy, Associate Professor (PB&G) Dr.M.Ilamaran, Assistant Professor (FSN) June,2019 to May, 2022	The Project may be continued

20.	<p>CPBG/MDU/PBG/RIC/2019/003 :</p> <p>Improvement of grain quality in Anna (R) 4 rice variety through mutation breeding.</p> <p>Dr. P. Arunachalam, Asst. Professor (PBG)</p> <p>Dr. S. Muthuramu, Asst. Professor (PBG),</p> <p>April 2019 to March 2022</p>	<p>The main purpose of this project to give an alternate variety to Anna 4 for the rainfed regions. But the entries have not be tested under rainfed environment. The data given for Anna4 with respect to grain size should be checked in. The single palnt yield is not at all required and unnecessarily the SPY data have been recorded in the stabilised lines. Critical evaluation is required. The project may be continued.</p>
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AC & RI, KILLIKULAM

21.	<p>CPBG/ KKM/ PBG/ RIC/ 2014/ 001: Evolution of high yielding short duration rice variety (110-115 days) for <i>Kar</i> and <i>Pishanam</i> seasons of Thoothukudidistrict</p> <p>Dr.M. Arumugam Pillai, Professor and Head (PBG)</p> <p>June 2014 to March 2017; Extended upto March 2019</p>	<p>The Project may be continued</p>
22.	<p>CPBG/KKM/PBG/RIC/2017/001:</p> <p>Development of high yielding medium duration rice variety with desirable cooking quality traits suited for <i>Pishanam</i> season in Southern districts of Tamil Nadu</p> <p>Dr. S. Saravanan, Assistant Professor (PBG)</p> <p>April 2017 to March 2022</p>	<p>The Project may be continued.</p>

23.	<p>CPBG/KKM/PBG/RIC/2018/CP 163 Studies on rice landraces under high risk of climate variability for development of climate resilient varieties / hybrids</p> <p>Dr.Asish K Binodh, Assistant Professor (PB&G) C. Raja Babu, Assistant Professor (CRP)</p> <p>December 2018 – September 2020</p>	<p>The project may be continued. Based on these results a proposal may be prepared for externally funded projects and the core project is to be completed on 30.09.2020</p>
ADAC&RI, TRICHY		
24.	<p>New Project Evolution of high yielding medium duration rice genotypes tolerant to sodicity</p> <p>Dr. T. Thirumurugan, Assistant Professor (PB&G)</p> <p>October 2019 to September 2022</p>	<p>The project may be continued. Much efforts should be taken to conduct OFTs of TR 09 030 and TR 05031</p>
HREC, GUDALUR		
25.	<p>CPBG/GDR/PBG/Rice/2016/001: Development, evaluation and multiplication of Temperature Sensitive Genic Male Sterile (TGMS) lines suitable for TamilNadu</p> <p>Dr. D. Kumaresan, Associate Professor (PBG)</p> <p>September 2015 to August 2020</p>	<p>The Project may be continued</p>

ARS, PARAMAKUDI

26.	CPBG/PMK/PBG/RIC/2015/004: Evolution of early / very early duration drought tolerant rice genotypes with acceptable grain and cooking quality suitable for rainfed rice ecosystem. Dr. S. Muthuramu, Assistant Professor (PB&G) September 2015 to August 2020	The Project may be continued. Fresh crosses at least three should be taken from next season onwards
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SWAMRI, THANJAVUR

27.	CPBG/TNJ/PBG/RICE /2018 NEW Development of extra early duration rice cultures suitable for direct sown paddy areas in Cauvery Delta Zone of Tamil Nadu Dr. L. Subha AP (PBG), SWMRI, TNJ Dr. R. Suresh AP (PBG) TRRI, ADT Dr. P. Arunachalam AP (PBG)AC & RI, Madurai April 2018 to March 2021	/why no fresh crosses effected? No efforts had been made to generate new genetic material. Quantum of work is not satisfactory. Inclusion of Dr.Arunachalam as one of the project leaders is not justified. Intensive work is expected
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II. PROJECTS ON MAINTENANCE BREEDING – ADUTHURAI

28.	CPBG/ADT/PBG/RIC/2017/002: Nucleus seed production of medium and long duration rice varieties of TRRI, Aduthurai Dr. R. Suresh Asst. Prof. (PB&G) Sep. 2017 to Aug. 2022	The Project may be continued
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29.	CPBG/ADT/PBG/RIC/2017/004: Breeder seed production of short, medium and long duration rice varieties Dr. D. Sassikumar Assoc. Prof. (PBG) Sep. 2017-Aug. 2020	More attention should be given for the genetic purity of BS. The Project may be continued
30.	CPBG/ADT/PBG/RIC/2019/New : Maintenance and production of nucleus seeds of TRRI released short duration varieties in seed chain Dr.D.Sassikumar Associate Professor (PB&G) May 2019 to April 2022	More care should be taken to ensure 100% genetic purity of Nucleus Seed. Project may be continued
COIMBATORE – CPBG		
31.	CPBG/CBE/PBG/RIC/2016/006 Maintenance breeding of CO varieties and Breeder seed multiplication Dr. K. Gnesamurthy, Prof &Head (Rice) June 2016 to May 2021	The Project may be continued
32.	CPBG/CBE/PBG/RIC/2017/002 Maintenance breeding of parents, seed multiplication of advanced hybrids and released hybrids in rice Dr. R. Saraswathi, Prof.(PB&G) June 2017 to May 2022	The Project may be continued. Utmost care should be taken up in maintaining the purity of parental lines
RRS, AMBASAMUDRAM		
33.	CPBG/ASD/PBG/RIC/2020/001: Breeder Seed Production of rice varieties ASD 16 and ASD 19. Dr.R.Thangapandian Assoc. Prof. (PB&G) June 2019 – May 2022	Nucleus seed maintenance register should be maintained separately in order to ascertain the genetic purity of the released rice varieties during the supply.

AC & RI, KILLIKULAM		
34	<p>CPBG/KKM/PBG/RIC/2017/002: Maintenance breeding for breeder seed production of rice varieties released from TNAU</p> <p>Dr.S. Saravanan, Asst.Prof.(PBG), Sep 2017 to Aug 2020</p>	The Project may be continued
35	<p>New Project Evolution of high yielding medium duration rice genotypes tolerant to sodicity</p> <p>Dr. T. Thirumurugan, Assistant Professor (PB&G)</p> <p>October 2019 to September 2022</p>	The project may be continued. Much efforts should be taken to conduct OFTs of TR 09030 and TR 05031
ARS, TIRURKUPPAM		
36	<p>CPBG/TKM/PBG/RIC/2020/001. Nucleus / Breeder seed production of TKM rice varieties.</p> <p>Dr. A. Sheeba, Assistant Professor (PB&G)</p> <p>December 2019 – November 2022</p>	The project may be continued.
ADAC&RI, TRICHY		
37	<p>CPBG/TRY/PBG/RIC/2018/001: Breeder seed production in rice.</p> <p>Dr. S. Chitra, Asst. Prof.(PBG)</p> <p>June 2018 to May 2021</p>	The Project may be continued.

ARS, PARAMAKUDI	
38. CPBG/PMK/PBG/BSP/2015/001 Nucleus and Breeder seed production of rice varieties released from ARS, Paramakudi. Dr. S. Muthuramu, Assistant Professor (PB&G) September, 2015 – August, 2020	Details on roguing and progeny number should be incorporated for next season onwards. The Project may be continued
SWAMRI, THANJAVUR	
39. CPBG/TNJ/PBG/SPN/2019/001 Breeder seed production in paddy and pulses. Dr.L.Subha, AP (PB &G) April 2018 to March 2021	More care is required in maintaining the genetic purity of Breeder Seed
ARS, BHAVANISAGAR	
40. CPBG/BSR/PBG/RIC/2016/ 001: Nucleus and Breeder seed production in popular rice varieties of Tamil Nadu Dr. B. Meenakumari, Asst.Prof. (PB&G) June 2016 to May 2021	The Project may be continued.
ARS, VAIGAIIDAM	
41. CPBG/VGD/PBG/RIC/2020/001. Nucleus and Breeder Seed Production of VGD 1 paddy variety Dr.S.Juliet Hepziba, Professor (PB&G.) and Head, Sep 2019 to Aug 2021	The Project may be continued
42. CPBG/VGD/PBG/RIC/2018/001: Breeder Seed Production in Paddy. Dr. M.Jayaramachandran Assistant Professor (PBG) Oct 2018 to Sep 2021	The Project may be continued

ARS, PATTUKOTTAI		
43.	<p>CPBG/PKT/PBG/2018/New: Breeder seed production in rice.</p> <p>Dr. A. Bharathi, Asst. Professor (PBG)</p> <p>April 2018 to March 2021</p>	<p>More attention should be devoted for BSP</p>
CPMB & B, COIMBATORE		
44.	<p>CPMB/CBE/BIF/2018/001:</p> <p>Functional annotation of hypothetical proteins present in <i>Xanthomonas oryzae</i> for prioritizing the targets against Bacterial blight</p> <p>Tmt. N. Bharathi, Asst. Professor (Bioinformatics) Dr. M. Sudha, Assistant Professor (Biotechnology)</p> <p>January 2018 to January 2020</p>	<p>Validation can be done and published. Completion report has to be prepared.</p>
45.	<p>CPMB/CBE/BIF/RIC/2018/CP005:</p> <p>Genome-wide identification of rice long noncoding RNAs responsive to <i>Xanthomonas oryzae</i> infection</p> <p>Dr N. Saranya, Assistant Professor (Bioinformatics)</p> <p>June 2015 to July 2018</p>	<p>Validation with pathologist has to be planned. Project may be continued and is to be completed on 30.09.2020</p>

B. CROP MANAGEMENT

Adoption/OFT/Information

A. For Adoption

1. **Cost effective weed management in DSR under puddled low land condition**
 - Application of pre and early post emergence herbicide augmented broad spectrum weed control in puddled direct seeded rice. Pre emergence herbicide application of Pyrazosulfuron ethyl 10% WP @ 20 g ha⁻¹ at 3 DAS + Early post emergence application of Bispyribac sodium 10% SC @ 25 g ha⁻¹ at 2-3 leaf stage (20-25 DAS) effectively control the weeds and resulted higher weed control efficiency.

2. **Alternative crops for *Kuruvai* season a contingent plan in Canal irrigated limited water situation**

- Pre-monsoon sowing of Greengram (Co 8) for canal irrigated area where water is not released for irrigation for first season as contingent plan. It recorded higher yield, B:C ratio and higher water productivity in pre-monsoon sowing.

3. **Improvement of grain filling in rice by foliar spray of nutrients and growth promoters**

- Foliar application of 2% MAP + 1% KCl at heading and grain filling stages (or) 6 – Benzylamino-purine (30 ppm) at heading and grain filling stages increases grain filling duration (25 to 27 days) and grain filling rate (1.11 to 1.19 mg grain-1day-1) in four varieties (ADT 49, ADT 53, CO 51 and CO 52) and also increase grain yield from 9 % to 17.7 %

B. On Farm Trials (OFT's) for the year 2020-21:

OFT 1: Reducing methane emission from rice ecosystem

Objective: To reduce the methane emission from rice ecosystem

Treatment details:

T₁ - Modified SRI (15 days old seedlings, machine planting at 30 x 12 cm, AWD irrigation at 15 cm depletion of water in clay loam soil and 10 cm in sandy loam soil, cono-weeding starting from 15 DAT at 10 days interval and LCC based N application)

T₂ - Conventional method (Normal package of practices)

Season: *Kar/ Kuruvai* 2020

Observations to be recorded: Growth parameters and yield attributes, Microbial population, Air samples at all growth stages by closed chamber method for estimation of methane, carbon dioxide and nitrous oxide, Economics.

Co-ordinating centre & Scientist In-charge:	RI, Aduthurai	Dr. C. Umamaheshwari, Associate Professor (Agronomy)
Centres & Scientist In-charge:	AC&RI, Madurai	Dr. E. Subramanian, Assistant Professor (Agronomy)
	ARS, Ambasamudram	Dr. S.R. Shri Rangasami, Assistant Professor (Agronomy)
	ARS, Tirur	Dr. C. Muralidaran, Professor (AGR)

OFT 2: Evaluation of response of different rice varieties suitable for organic farming

Objective: To demonstrate the rice varieties suitable for organic farming in different locations.

Treatment details:

T₁ - Improved White Ponni

T₂ - CO (R) 48

T₃ - Mappillai Samba

T₄ - Standard check (Best performing variety of the region)

Season: Samba, 2020

Package of practices for organic rice cultivation

Nursery practices

- Green manure crop (*Sesbania aculeata*) *in-situ* cultivation and incorporation
- Seeds soaking with *Pseudomonas fluorescens* @ 10g/kg + *Azospirillum* @ 30g/kg + *Phosphobacteria* @ 30g /kg.
- Basal application of well decomposed FYM @ 1.25kg/m² + Neem cake @ 50 gm / m² + *Trichoderma viride* @ 4g/m²
- Gypsum application @ 100gm / m² at 10 days after sowing to prevent root snapping.

Main field practices

- Neem cake @ 250 kg/ha as basal
- Gypsum @ 500 kg /ha (source of Ca and S nutrients) at last ploughing.
- Seedling root dip with *Azospirillum* (1kg/ha) + *Phosphobacteria* (1kg/ha) in 40 lit. of water for 15 - 30 minutes before transplanting.
- Soil application of *Azospirillum* @ 2 kg + *Phosphobacteria* 2 kg mixed with 25 kg of FYM and applied before transplanting.
- Vermicompost @ 1ton / ha each at active tillering, panicle initiation and heading stages.
- *Panchagavya* @ 30ml/lit. of water twice at 30 and 45 DAT as growth promoter
- Application of Neem Seed Kernel Extract (5%) at tillering stage, insect herbal repellent and *Beauveria bassiana* (2%) at maximum tillering stage for insect pests.
- Application of liquid *Pseudomonas fluorescens* @ 4ml/lit at maximum tillering stage for foliar diseases.

Observations to be recorded:

Green manures: Plant height, no. of plants / m², fresh weight, dry weight, nutrient uptake and N added to the soil.

Rice:

- **Growth characters:** Plant height at harvest, DMP at harvest
- **Physiological parameters:** Photosynthetic rate/Chlorophyll index, CGR, SLW.
- **Yield characters:** Days to 50% flowering, No. of productive tillers / hill, No. of grains & filled grains / panicle, test weight, grain yield, straw yield and HI.
- **Quantification of Irrigation Water,** Water Use Efficiency and water productivity.
- **Quality characters:** Head rice recovery, hulling per cent, milling per cent, kernel length and breadth before cooking (mm), kernel length and breadth after cooking (mm), LER, Volume expansion ratio, breadth wise expansion ratio, gel consistency, alkali spreading value, aroma, Glycemic Index and organoleptic characters.
- **Economics:** Cost of cultivation, Net returns with and without premium (20%) and BCR
- **Soil Biological properties**

Co-ordinating centre & Scientist In-charge:	pt. of Sustainable Organic Agriculture, TNAU, Coimbatore	Dr. E. Somasundaram, Prof & Head, Dr. K .Ganesan, Asst. Prof (Ag. Ento.),
Centres& Scientist In-charge:	TRRI, Aduthurai	Dr. M. Raju, Associate Professor (Agron.)
	RRS, Ambasamudram	Dr. S.R. Shri Rangasami, Assistant Professor (Agronomy)
	AC&RI, Killikulam	Dr. N. Senthil Kumar, Assistant Professor (Agronomy)
	ARS, Bhavanisagar	Dr. N. Satheesh Kumar Assistant Professor (Agronomy)

OFT 3: Technology for improving the productivity of rice in sodic soil under water scarce condition

Objective: To improve the productivity of rice in sodic soil under water scarce condition.

Treatments:

T₁: Farmer's Practice

T₂: Daincha incorporation followed by rice wet seeding + anti oxidant microbial consortia (AOMC)+100% soil test based NPK

T₃: Daincha incorporation followed by rice wet seeding + anti oxidant microbial consortia

(AOMC) + 125% soil test based NPK

AOMC application: Liquid Formulation foliar spray @ 1.5%

Time of application - Boot leaf and Panicle initiation stages

Co-ordinating centre & Scientist In-charge:	AC& RI, Trichy	Dr. P. Janaki, Assoc Professor (SS&AC) Dr. J. Ejilane, Assistant Professor (AGM),
Centres & Scientist In-charge:	AC&RI, Killikulam	Dr. D. Lenin Raja, Asst. Professor (SS&AC) Dr. K. G. Sabarinathan, Asst Prof. (AGM)
	RRS, Paiyur	Dr. M. Vijayakumar, Asst Professor (SS&AC)

- Observations to be recorded: Leaf microbial population, DPPH assay, DMP, Grain & Straw yield

C. For Information

1. Cost effective agronomic management to enhance the productivity of wet DSR

- Drum seeding with pre germinated seed had close contact in soil resulted better germination and better yield.

2. Long term trial on weed dynamics under different establishment methods

- Unpuddled direct seeding method resulted higher grassy weeds (*Leptochloa chinensis*) population. Machine transplanting with mechanical weeding recorded lesser weed density and higher grain yield.

3. Mitigation of methane emission from rice

- SRI, MSRI and AWD irrigation are effective in reducing CH₄ and CO₂-eq emissions (40, 49 and 52% respectively compared to conventional method)
- Saving of irrigation water (26, 27 and 28% respectively for SRI, MSRI and AWD compared to conventional method) without affecting rice grain yield.

4. Multi- site monitoring network of canopy micrometeorology and heat stresses in rice for evaluating the adaptation strategies under the climate change

- Physiological basis for heat avoidance in IR 64 EMF was correlated with early first spikelet opening time which before 7.00 AM, lower panicle temperatures and transpirational cooling at the time of anthesis.

5. Demonstration of STCR-IPNS based fertilizer prescription for rice in Cauvery Delta Zone

- The demonstrations conducted at KVK, Needamangalam on Kalathur soil series (Udic Haplustert) for two seasons (Kuruvai and Thaladi) revealed that the highest grain yield was recorded with STCR-IPNS technology for 7 t ha⁻¹ during both kuruvai (6.86 t ha⁻¹) and thaladi seasons (6.60 t ha⁻¹) along with the highest response ratio of 11.58 and 9.73 kg of grain yield per kg of nutrient applied. The yield increase in STCR-IPNS treatment was 21.6 & 34.5 per cent and 20.6 & 38.9 per cent respectively over blanket and Farmer's practice. Through these field demonstrations and farmer and scientist interaction, the benefit of adoption of STCR-IPNS technology in rice was highlighted to farmers of this region.

6. Long term STCR-IPNS Experiment on rice-rice sequence

- After 21 years of cropping with STCR-IPNS technology - maintenance of available N (280 to 266 kg ha⁻¹); built up in OC (4.6 to 8.4 g kg⁻¹) and available P (20.2 to 29.6 kg ha⁻¹); lesser magnitude of decline in available K (670 to 580 kg ha⁻¹); increased yield by 25.9 % (6.84 t ha⁻¹) and 23.7 % (6.06 t ha⁻¹) in *kharif* and *rabi* seasons respectively were recorded.

7. Permanent Manurial Experiment in Rice - Rice sequence

- In Madurai centre: After 45 years of cropping - higher yield in *rabi* season: 150:50:50 kg NPK + GLM @ 6.25 t ha⁻¹ (5675 kg ha⁻¹), negative balance of N (-24 to -69 kg ha⁻¹), positive balance of P (+1.60 to 29.8 kg ha⁻¹), K (+3 to 41 kg ha⁻¹) and organic carbon (+1.10 to 4.80 g kg⁻¹); higher urease, dehydrogenase activity & microbial population in GLM + NP, NK & NPK treatments was observed.
- In Aduthurai centre: After 28 years of cropping - higher yield in *Kuruvai* season: 125:50:50 kg NPK + GM @ 6.25 t ha⁻¹ (5901 kg ha⁻¹); *Thaladi* season: 150:60:60 kg NPK +12.5 t FYM ha⁻¹ (6326 kg ha⁻¹), higher organic carbon (13.84 g kg⁻¹), available N, P & K - Positive balance - and built up was higher in INM.

8. STCR based Fertilizer Prescriptions for Rice under Sodic Soil

- Fertiliser prescription Equations (FPEs) for rice on sodic soil have been developed through refinement of existing FPEs and ready reckoner of fertiliser doses were computed for desired yield target of rice. Application of FYM @ 12.5 t ha⁻¹ with a manurial composition of N: 0.60 %, P: 0.30 %, K: 0.50 % and moisture: 30% contributed 42:18:32 kg ha⁻¹ of fertilizer N, P₂O₅ and K₂O from the recommended dose of fertilizers based on soil test values.

9. Development of technology for improving the productivity of rice in Sodic Soil under water scarce condition

- Incorporation of Daincha (6.25 t ha⁻¹) + rice wet seeding + foliar spraying of anti oxidant microbial consortia (1.5%) during boot leaf and panicle initiation stages with 100 % soil test based NPK significantly lowered the ESP (48.8%) and increased phosphatase activity in soil and proline content and higher grain yield in plants.

10. Distillery industrial wastes product on changes in soil properties and performance of rice in calcareous sodic soil

- Application of 75% STCR-K as value added products (VAP) from sugar and distillery industrial wastes with 100% STCR-N and P as inorganic sources was the best for increasing the grain yield of rice, agronomic efficiency and apparent nutrient recovery; carbon stock (15.31 Mg ha⁻¹) and humus stability index (2.35%).

11. Evaluation of Organic and Inorganic sources of nutrients under safe AWDI for transplanted rice

- Under safe Alternate Wetting and Drying Irrigation (AWDI), application of recommended NPK + 12.5 t FYM ha⁻¹ recorded the highest grain yield which was on par with recommended NPK + 6.25 t GM and STCR-IPNS + 6.25 t GM ha⁻¹. STCR - IPNS treatment sustained the soil fertility by saving 13:29 kg of fertiliser N and P₂O₅ ha⁻¹ respectively.

12. Nitrogen management strategies for direct seeded rice in Kuruvai& Samba seasons

- In Aduthurai centre, under direct seeded rice in Old Cauvery delta (Vertisol - Kalathur series) - High response was recorded for added N up to 125 kg ha⁻¹ in terms of grain yield and N availability which was on par with N applied @150 kg ha⁻¹ in *Kuruvai* and *Samba* seasons.
- In Thanjavur centre, under direct seeded rice in New Cauvery delta (Alfisol - Madukkur series)- higher response was recorded for the added N @150 kg ha⁻¹ during *Kuruvai* season and 125 kg ha⁻¹during *Samba*season.

13. Nitrogen Use Efficiency of rice varieties and fertilizer management for sustainable production in Tamiraparani command area of Tamil Nadu

- Among the 32 rice varieties tested with four levels of recommended N (0, 50%, 100%, and 150%), screened genotypes were grouped as :Efficient and responsive (ER): ADT39, ADT45, TPS5, ACK14001, AD09206, CB06803, TM10085, TM12077, PM12009 and EC725224; Non-efficient and non-responsive : ADT 43, CO 51, MDU 5, ANNA 4, ACK 14004, AD 10034,CB 08702,TR 09027, TR 13069, TR 13083, TR 13007, TM 07335 and TM 12061.
- Application of either 100% N as Neem coated or 150 % N as gypsum coated urea recorded higher N use efficiency.

13. Reclamation of sodic soil with organic and industrial amendment

- In Vermicompost prepared using partially decomposed cowdung (PDC): fly ash (FA) @ 3:1, reduction in C : N ratio from 31.63 to 11.07 (65%) after 42 days of composting was observed. Vermicomposting of PDC + FA @ 3:1 resulted in increase in total N(0.784 - 0.96%), P(0.150 - 0.27 %), **K** (2.43 -2.98%), Ca (11.40 -14.40 %) and other nutrients. Four of the five silica solubilising microbes isolated from sodic soil were used for microbial consortia preparation for *insitu* decomposition of paddy stubbles.

14. Popularization of stage-specific inoculant for rice in Tamil Nadu

- Application of specific inoculants at different growth stages of the rice crop to ensure yield maximization.

15. *Bacillus altitudinis* FD48 induces systemic tolerance in rice against moisture stress

- *Bacillus altitudinis* FD48 under induced moisture stress triggered the antioxidant defense enzymes *viz.*, catalase, peroxidase and super oxide dismutase, ascorbate peroxidase and proline that aids in drought resilience of rice cultivars (CO51 and IR64). Yield and yield attributing components were superior in *B. altitudinis* FD48 inoculated plants under drought stress. It induces drought responsive genes of rice for drought mitigation. It also induces root metabolome (d-mannitol, benzoic acid, squalene, β -D-glucopyranoside, cis-vaccenic acid, acetylsyringic acid, coumarins, and l-(+)-ascorbic acid) conferring drought tolerance in rice.

16. Rhizosphere and Phyllosphere yeasts to improve rice growth, drought mitigation and soil aggregation

- Yeast strains isolated from rhizosphere of rice and other crops have multi-functional beneficial role in plant growth promotion (mineral solubilization, growth hormone and siderophore production) and also improve soil aggregation. Foliar spray of yeast

cell lysate (0.2%) significantly triggered rhizosphere colonizing ability of PGPR strain in rice. It modulates rice and changed the chemical composition of root exudates. The change in root exudation favored rhizosphere biological properties and chemotactic motility of PGPR and hence improved the plant and soil health. Spraying yeast lysate favored rice plant for drought mitigation, which in turn recovered from drought (at 50% field capacity) and ensured yield under field conditions.

17. New Promising inoculants for growth and drought mitigation of rice

- New promising inoculants are *Bacillus megaterium* PB50, *Bacillus altitudinis* PB46, *Sphingobium yanoikuyae* MH394206 that possess multifaceted plant growth promoting traits, drought mitigation in rice and capable to colonize internal tissues of rice.

18. Multifaceted *Azotobacter* as inoculant for rice

- *Azotobacter vinelandii* MAZO 36 and *A. salinestris* MAZO 13 from rice rhizosphere showed enhanced plant-growth promoting activities viz., N fixation, P and Zn solubilization, IAA and siderophore production. Seed coating of *Azotobacter vinelandii* MAZO 36 with *Arbuscular mycorrhiza* significantly increased the grain and straw yield (17.8 & 19.2% over control) of direct-sown rice (CO51). This technology can be an alternative to present inoculants (*Azospirillum* + PSB) for direct sown rice.

19. Prevention of pre-harvest sprouting by inducing temporary dormancy in rice varieties

- Foliar spray of ABA @ 250 ppm or sodium molybdate @ 100 ppm at the time of flowering or NaCl @ 1 % at 10 days before harvest is recommended for inducing temporary dormancy and to arrest the pre-harvest sprouting in rice.

20. Redefining ODV standards for foundation and certified seeds of rice varieties

- In foundation class seed, lower number of ODV (8 No / kg) was observed than the prescribed limit (10 No / kg); whereas in certified class seed higher number of ODV (28 No / kg) was observed than the prescribed limit (20 No / kg) as per IMSCS 2013.
- Hence, the permissible limit of ODV standard for certified class seeds of rice need to be revised as 30 No / kg instead of existing 20 No / kg.

II. Action Plans

Action Plan 1: Development of crop geometry for cost effective drip irrigation system in rice

Objectives:

- To optimize plant geometry for higher production under drip irrigation.
- To enhance water productivity and profitability in paddy.

Treatments:

I. Method of establishment:

M₁ - Direct seeded under raised bed

M₂ - Transplanting under raised bed

II. Spacing:

S₁ - 20 x 10 cm (Rectangular)

S₂ - 20 x 20 cm (Square)

S₃ - 25 x 25 cm (Square)

S₄ - 40 x 20 x 10 cm (paired row)

III. Varieties:

V₁ - ADT 54

V₂ - TKM 13

V₃ - CR 1009

Design: Strip plot

Duration: Two Years (2020-21 to 2021-22) Season: Samba season

Practices to be followed: Raised bed 30 cm height, Lateral spacing – 90 cm, Emitters – 2LPH, Irrigation= 100 %PET and fertigation: 100 % RDF

Observations to be recorded: Growth and yield parameters; Water productivity, Economics

Co-ordinating centre & Scientist In-charge:	AEC&RI, Kumulur	Dr. S. Vallalkannan, Assistant Professor (Agronomy)
Centres& Scientist In-charge:	SWMRI, Thanjavur	Dr. S. Porpavai, Professor (Agron.) & Head

Action Plan 2: Feasibility of intercropping in aerobic rice

Rationale: To obtain the sustainable yield advantage in aerobic rice system.

Objectives:

- To study the feasibility of intercropping in aerobic rice system.

Treatments:

Main plot:

M₁: Aerobic rice (Surface irrigation)

M₂: Drip irrigation method

Sub plot:

S₁- Rice alone (30 x 10 cm spacing)

S₂- Rice + Blackgram in 30 x10 cm spacing (1:1 ratio)

S₃- Rice + Blackgram in 30 x10 cm spacing (2:1 Ratio)

S₄- Rice + Greengram in 30 x10 cm spacing (1:1 ratio)

S₅- Rice + Greengram in 30 x10 cm spacing (2:1 Ratio)

Design: RBD with 4 replications

Variety: Rice – CO 52, Blackgram VBN 8 ; Greengram Co 8

Duration: Two Years (2020-21 to 2021-22) Season: *Samba*;

Practices to be followed: Lateral spacing – 90 cm, Emitters – 2LPH, Irrigation= 100 %PET and fertigation 100 % RDF

Practices to be followed:

For Drip irrigation method: Lateral spacing – 90 cm, Emitters – 2 LPH, Irrigation= 100 %PET and fertigation 100 % RDF,

For aerobic rice: Irrigation at 100% PET

Observations to be recorded: Physiological and yield characters of rice at AT, PI, Flowering and at harvest, Yield and yield attributes of inter crops, Indices of inter cropping

Co-ordinating centre & Scientist In-charge:	AC&RI, Madurai	Dr. E. Subramanian Assistant Professor (Agronomy)
Centres & Scientist In-charge:	SWMRI, Thanjavur	Dr. S. Porpavai, Professor (Agron.) & Head
	AEC&RI, Kumulur	Dr. S. Vallalkannan, Assistant Professor (Agronomy)

Action Plan 3: Response of different landraces of rice for organic farming

Objectives

- To evaluate the response of land races of rice to organic production system
- To study the yield and economics of rice land races grown organically
- To study the quality parameters of rice land races in response to organic management practices

Treatments:

Season	Crop	Land races
<i>Kharif</i>	Green manure (Dhaincha)	Green manure (Dhaincha)
<i>Rabi</i>	Rice	Any 10 out of 12 traditional land races listed: Arupatham kuruvai, Athur Kitchili samba, Garudan samba, Kala namak, Kothamalli samba, Kullakar, Kuzhiadichan, Iluppaipoo samba, Milagu samba, Poonkar, Sorna masuri, Thanga samba, Thuaiya malli, Kudavazhlai, Rathasali, Anaikomban

Duration : Two years (2020-21 to 2021-22)

Package of practices for organic rice cultivation

Nursery practices

- Seeds soaking with *Pseudomonas fluorescens* @ 10g/kg + *Azospirillum* @ 30g/kg + *Phosphobacteria* @ 30g /kg.
- Basal application of well decomposed FYM @ 1.25kg/m² + Neem cake @ 50 gm / m² + *Trichoderma viride* @ 4g/m²
- Gypsum application @ 100gm / m² at 10 days after sowing to prevent root snapping.

Main field practices

- Neem cake @ 250 kg/ha as basal
- Gypsum @ 500 kg /ha (source of Ca and S nutrients) at last ploughing.
- Seedling root dip with *Azospirillum* (1kg/ha) + *Phosphobacteria* (1kg/ha) in 40 lit. of water for 15 - 30 minutes before transplanting.
- Soil application of *Azospirillum* @ 2.5 kg/ha + *Phosphobacteria* 2.5 kg /ha mixed with 25 kg of well decomposed FYM and applied before transplanting.
- Vermicompost @ 1ton / ha each at active tillering, panicle initiation and heading stages.
- *Panchagavya*@ 30ml/lit. of water twice at 30 and 45 DAT as growth promoter
- Need based application of Neem Seed Kernel Extract @ 5% / Neem oil @ 2% / *Beauveria bassiana* @ 2% for the management of insect pests.
- Need based application of liquid *Pseudomonas fluorescens* @ 2ml/lit for foliar diseases.

Observations to be recorded

Green manures: Plant height, no. of plants / m², fresh weight, dry weight, nutrient uptake and N added to the soil.

Rice:

- **Growth characters:** Plant height at harvest, DMP at harvest
- **Physiological parameters:**Photosynthetic rate/Chlorophyll index,CGR, SLW
- **Yield characters:** Days to 50% flowering, No. of productive tillers / hill, No. of grains & filled grains / panicle, test weight, grain yield, straw yield and HI
- **Quantification of Irrigation Water:** Water Use Efficiency and water productivity
- **Quality characters:** Head rice recovery, hulling per cent, milling per cent, kernel length and breadth before cooking (mm), kernel length and breadth after cooking (mm), LER, Volume expansion ratio, breadth wise expansion ratio, gel consistency, alkali spreading value, aroma, Glycemic Index and organoleptic characters.
- **Economics:** Cost of cultivation, Net returns with and without premium (20%) and BCR

- **Soil Biological properties**

Co-ordinating centre &	Department of Sustainable Organic	Dr. E. Somasundaram, Professor and Head, Dept. of SOA
Scientist In-charge:	Agriculture, TNAU, Coimbatore	Dr. K. Ganesan, Asst. Prof. (Agrl. Ento.), Dept. of SOA Dr. G. Senthil Kumar Asst. Prof. (Agron)., Dept. of Rice

Action Plan 4: Evaluating the Agronomic efficiency of Marine Gypsum in sodic soil amelioration in Irrigated lowland rice

Rationale:

- Reclamation of sodic soils: Removal of Na⁺ from the colloid's cation exchange sites and leaching of the replaced Na⁺ out of the root zone in percolating water.
- Mined gypsum: (CaSO₄·2H₂O), by product recovered from salt pan, most common chemical amendment for saline-sodic and sodic soil reclamation because it is comparatively cheap, generally available, and easy to apply: But the supply is very much limited or Nil for Agricultural use.

Objectives:

- To study the effect of Marine Gypsum application alone / with green manure on crop growth and development of rice under sodic soil.
- Improvement of physical and chemical properties of Sodic soil.
- To study the economics of rice production under varied sodic soil amelioration methods.

Treatment details:

Factor A: Levels of Marine Gypsum application

T₁: 25 % Gypsum requirement

T₂: 50 % Gypsum requirement

T₃: 75 % Gypsum requirement

T₄: 100 % Gypsum requirement

Factor B: Organic Amendments

S₁: No organic amendments (Control)

S₂: Green Manuring

Duration: Two Years (2020-21 to 2021-22)

Co-ordinating centre & Scientist In-charge:	ADAC&RI, Trichy	Dr. A. Alagesan, Assistant Professor (Agronomy)
		Dr. P. Janaki, Assoc. Professor (SS&AC)
		Dr. S. Nithila, Assistant Professor (Crop Physiology)
		Dr. J. Ejilane. Assistant Professor (Agrl. Microbiology)

Action Plan 5: Refinement of Existing STCR based IPNS fertilizer prescription for desired yield target of Rice in North Eastern Zone of Tamil Nadu

Rationale

- Imbalanced fertilization, Multi-nutrient deficiencies, Deterioration of soil health.
- Blanket recommendations either over or under usage of fertilizer inputs.
- Rationalization of nutrient application ----- STCR-IPNS approach.

Objectives

- To refine the existing Fertilizer Prescription Equations (FPE's) for irrigated Rice on Kadambady and Mathur soil series (Sandy clay loam).
- To validate the refined Fertilizer Prescription Equations for the same soil series.

Methodology

Targeted yield model (refinement protocol)

Phase I: No. of treatments : 9

- T₁, T₂& T₃ : STCR-NPK alone for yield target I, II & III
- T₄, T₅& T₆ : STCR-IPNS for yield target I, II & III
- T₇& T₈ : FYM @ 6.25 & 12.5 t ha⁻¹ alone
- T₉ : Absolute control

Phase II : No. of treatments – 10

- T₁, T₂&T₃ : STCR-NPK alone for yield target I, II & III
- T₄, T₅&T₆ : STCR-IPNS for yield target I, II & III
- T₇ : Blanket (100%RDF)
- T₈ : Blanket + FYM @ 12.5 t ha⁻¹
- T₉ : Farmer's fertilization practice
- T₁₀ : Absolute control

Replications: 3 **Design** : RBD

Observations to be recorded: Grain and Straw Yield

Lab analysis:

- Initial and post-harvest soil nutrient availability, Nutrient content and uptake by plant
- Computation of Nutrient Requirement (NR), contribution of nutrients from soil (Cs), fertilisers (Cf), manure (Co) and developing Fertiliser Prescription Equations
- Computation of per cent achievement, response ratio and BCR

Locations:

Tiruvallur district (Kadambady soil series, sandy clay loam)
Tiruvannamalai district (Mathur soil series, sandy clay loam)

Duration: 2 Years (2020-21: Phase I - Refinement experiment, 2021-22: Phase II- Validation experiments)

Expected outcome

- STCR-IPNS based balanced fertiliser recommendation for achieving desired yield target in irrigated Rice with sustained soil health in North Eastern Zone of TamilNadu.

Co-ordinating centre & Scientist In-charge:	Department of SS&AC, TNAU, Coimbatore	Dr. R. Santhi Director, NRM Dr. S. Maragatham, Associate Professor (SS&AC)
Centres & Scientist In-charge:	TNAU - ITC, Chennai	Dr. S. Suganya, Assistant Professor (SS&AC)
	AC&RI, Vazhavachanur	Dr. V. Arunkumar, Assistant Professor (SS&AC)

Action Plan 6: Management of water logging associated soil problem in rice ecosystem of Cauvery delta zone of Tamil Nadu

Rationale:

- Yield reduction due to heavy algal growth
- Reduced oxygen supply in root zone hinders the supply of essential plant nutrients
- Algal and nutrient management practices - improve crop yield and nutrient availability

Treatments:T₁ – CuSO₄ @ 5 kg ha⁻¹T₂ - Gypsum @ 500 kg ha⁻¹T₃ - Cono Weeding twice + AWDIT₄ - Microbial consortia (PSB+KRB)*RDF: NPK as per STCR-IPNS + ZnSO₄ @ 25 kg ha⁻¹**Period:** June 2020 to May, 2021**Observations to be recorded:** Population density, Growth and yield attributes, Available Nutrients, Microbial load and Algal population

Co-ordinating centre & Scientist In-charge:	TRRI, Aduthurai	Dr .K. Sathiya Bama, Assoc. Prof. (SS&AC) Dr. S. Elamathi, Asst. Professor (Agronomy) Dr. T. Sivasankari Devi, Asst. Professor (AGM)
Centre & Scientist In-charge:	KVK, Needamangalam	Dr. A. Anuratha, Asst. Professor (SS&AC)

Action Plan 7: Field evaluation of *Bacillus altitudinis* FD48 for moisture stress tolerance, crop growth and yield of rice**Rationale:**

- Multifunctional *B.altitudinis* FD48 isolated from rice phylloplane could tolerate -2.5 Mpa moisture stress and possessed stress tolerance genes for trehalose, glycine betaine, acetoin, Hsp, chaperones, nitrogen fixation, P and Zn solubilization, phenazine and ABA precursor
- Evaluating the effect of FD48 formulation under field conditions leads to the development of newer bioinoculant for rice to mitigate moisture stress.

TreatmentsT₁ : ControlT₂ : *B.altitudinis* FD48T₃ : *Methylobacterium sp.* TNAU 1 (PPFM)

Inoculation method: Seed treatment and Foliar spray

Replications: 5; Design: RBD Crop: Rice (CO 51, IR 64)

Duration: Two Years (2020-21 to 2021-22)

Observations to be recorded:

Plant morphological, Biochemical parameters (ROS enzymes and osmolytes) & Yield and yield parameters at both non stress and induced moisture stress

Co-ordinating centre & Scientist In-charge:	Department of Agrl. Microbiology, TNAU, Coimbatore	Dr. U. Sivakumar, Professor (Agrl. Micro) Dr.M.Gnanachitra, Assoc Prof (AGM)
Centres & Scientist In-charge:	KVK, Needamangalam	Dr. A. Anuratha, Asst. Professor (SS&AC)
	AC&RI, Madurai	Dr.M.Jayabharathi, Asst Prof (AGM)
	TRRI, Aduthurai	Dr.T.Sivasankaridevi, Asst Prof (AGM)

III. Project Wise Remarks				
a. Action Plans				
Sl. no	TITLE	Scientist involved / Lead scientist	Duration	Remarks
1.	Documentation of weed biology and assessing the impact of crop weed competition in direct seeded rice ecosystem	Dr. P. Murali Arthanari, Assoc. Prof. (Agron.) Dr. G. Senthil Kumar, Asst. Prof. (Agron.) Dr. M. Raju, Assoc. Prof. & Head (Agron.) Dr. E. Subramanian, Asst. Prof. (Agron.) Dr. N. Senthil Kumar, Asst. Prof. (Agron.) Dr. N. Satheesh Kumar, Asst. Prof. (Agron.)	2019-21	To be Continued.
2.	Climate smart organic farming in rice	Dr. SP. Ramanathan, Prof. & Head Dr. S. Kokilavani, Asst. Prof (Agmet), Dr. E. Somasundram, Prof (Agron) & Head Dr. P. Ganesan, Asst.Prof (Ento) Dr. S. R. ShriRangasami,Asst.Prof (Agron) Dr. K. G. Sabarinathan,Asst.Prof (Agrl. Micro) Dr. P. Muralidharan, Professor (Agron), Dr. E. Subramaniam, Asst. Prof(Agron) Dr. P. Kannan, Asst.Prof(Soil Science) Dr. M. Raju, Assoc. Prof(Agron) Dr. C. Uma Maheswari, Assoc. Prof(Agron)	2019-21	To be Continued.
3.	Standardization of Drip Fertigation techniques in rice based cropping systems of Tamil Nadu	Dr. S. PanneerSelvam, Director, WTC Dr. N. K.Prabhakaran, Prof, (Agron.) & Head Dr. S. Sakthivel, Prof. (Agron.) Dr. M. Joseph, Associate Prof. (Agron.) Dr. S. Porpavai, Prof, (Agron.) & Head Dr. M. Sankaran, Prof, (Agron.) & Head	2019-21	To be Continued.

4.	Redefining ODV standards for foundation and certified seeds of rice varieties	Dr. C. Vanitha, Assistant Professor (SST)	2019-21	Completed. Recommendation has already been submitted to Govt. of India through AICRP for inclusion in Indian Minimum Seed Certification Standards.
5.	Unravelling the mechanism of <i>Bacillus altitudinis</i> FD48 induced drought tolerance in rice by Metabolomic and Transcriptomic profiling.	Dr. U. Sivakumar, Professor (AGM)	2018-20	Completed.

b. On Farm Trials				
Sl. no	Title	Scientist involved / Lead scientist	Duration	Remarks
1.	Alternate crops for Kuruvai (1 st crop) season as a contingent plan in limited water scarce situation	Dr. E. Subramanian, Asst. Prof. (Agron.) Dr. Porpavai, Pro. (Agron.) Dr. M. Hemalatha, Asso. Prof. (Agron.) Dr. S. Shri Rangasami, Asst.Prof. (Agron.) Dr. S. Vallalkannan, Asst. Prof. (Agron.)	2019	Recommended for adoption
2.	Cost effective weed management practices in direct seeded rice under puddle low land condition	Dr. E. Subramanian, Asst. Prof. (Agron.) Dr. Porpavai, Professor (Agron.) Dr. M. Hemalatha, Asso. Prof. (Agron.) Dr. S. Shri Rangasami, Asst.Prof. (Agron.) Dr. S. Vallalkannan, Asst Prof. (Agron)	2019	Recommended for adoption

3.	Improvement of grain filling in rice by foliar spray of nutrients and growth promoters	Dr. V. Ravichandran, Asso. Prof. (CRP) Dr. K. Vanitha, Asst. Prof. (CRP) Dr. K. Krishanasurender, Asst Prof. (CRP) Dr. G. Senthilkumar, Asst. Prof. (Agron.) Dr. M. Raju, Associate Prof. (Agronomy) Dr. V. Vakeswaran, Asst. Prof. (SST)	2019	Recommended for adoption
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c. University Research Sub Projects				
Sl. no	TITLE	Scientist involved / Lead scientist	Duration	Remarks
1.	Assessment of the yield advantage, water requirement and water use efficiency under different methods of irrigation in rice	Dr. K. Kalaichelvi, Asst. Prof. (Agron.) Dr. J. Prabhakaran, Asst. Prof(SS&AC)	2019-2021	To be Continued.
2.	NRM/ADT/SAC/RIC/2017/001: Permanent manurial experiment in rice based cropping system.	Dr. K. Sathiya Bama, Asso.Prof.(SS&AC)	April 2017 to March 2022	To be Continued. Given for information. The treatment, composted coirpith may be changed to farm waste compost using mineraliser
3.	NRM/ ADT/ SAC/ RIC/ 2017/ 002: Nitrogen Management for direct seeded rice in Kuruvai and Samba season	Dr. K. Sathiya Bama, Associate Professor (SS&AC)	August 2018 to July 2021	To be Continued. Given for information.

4.	NRM/ADT/SAC/RIC/2017/002: Nitrogen management strategies for direct seeded rice in kuruvai and samba seasons	Dr. M.Babu, Professor (SS & AC)	August 2018 to July 2021	To be Continued. Given for information
5.	NRM/ KTM/ SAC/ RIC/ 2016/ 001 Evaluation of organic sources under safe AWDI method in transplanted rice.	Dr. M.Babu, Professor (SS & AC)	August 2016 to March 2020	To be closed.
6.	NRM/TRY/SAC/RIC/2019/001: Refinement of Fertilizer Prescription Equations for Paddy under Sodic Soil through Soil Test Crop Response correlation studies.	Dr. T. Sherene Jenita Rajammal, AP (SS&AC) Dr. S. Maragatham, Assoc. Professor (SS &AC)	September 2019- September 2021	To be Continued. Given for information.
7.	NRM/TRY/SAC/RIC/2016/001: Development of technology for improving the productivity in Sodic Soil under water scarce condition.	Dr. P. Santhy, Professor (SS&AC) Dr. P. Balasubramaniam P&H (SS&AC) Dr. P. Janaki, ASP (SS&AC) Dr. A. Alagesan AP (Agronomy) Dr. S. Nithla AP (CRP) Dr. J. Ejilane, AP (Agrl. Micro)	June, 2016 to May, 2019	To be Closed. Recommended for OFT.
8.	NRM/MDU/SAC/RIC/1975/001 Permanent Manurial Experiment on Rice.	Dr. P. SaravanaPandian, Professor (SS&AC)	From Sep 1975 (61 st rice crop) It is a long term experiment	To be Continued with new project number. Given for information.
9.	NRM/MDU/SAC/RIC/2018/001 Enhancing phytolith and phytolithoccluded carbon on carbon sequestration in rice ecosystems.	Dr. P. Christy Nirmala Mary, Associate professor (SS&AC)	August 2018- December 2021	To be Continued.
10	NRM/CBE/AGM/YST/2018/CP066 Core Project: Phyllospheric yeast as a growth stimulant and drought-mitigating inoculant for crops	Dr. D. Balachandar, Professor (Agrl. Micro)	Nov, 2018 to March 2020	To be Closed.

11	Core project: NRM/ CBE/ AGM/ YST/ 2018/ CP065 Assessment of soil yeast diversity and functionality for sustainable soil health improvement	Dr. R. Parimaladevi, Assistant Professor (Ag. Micro.) Dr M. Malarkodi, Assistant Professor (SS&AC)	Nov, 2018 to March 2020	To be Closed.
12	NRM/CBE/AGM/RIC/2020/001 Exploring bioinoculants for developing coated seeds for enhanced nutrient uptake in Rice	Dr. M. Gnanachitra, Associate Professor (Ag. Microbiology)	November 2019 to October'2021	To be Continued.
13	NRM/CBE/AGM/2018/CP015 Multifunctional <i>Bacillus altitudinis</i> FD48 for drought protection, plant growth promotion and productivity.	Dr. U. Sivakumar, Professor (Ag. Microbiology)	December 2018 to September 2020	To be Continued. Given for information. The project is to be completed on 30.09.2020
14	NRM/MDU/AGM/RIC/2016/001 Development of multifunctional strains of <i>Azotobacter</i> sp. for enhancing Rice productivity	Dr. K. Kumutha, Professor and Head, Dept. of Ag. Microbiology, AC&RI, Madurai	October 2016 to September 2019	Project may be extended for another one year and the field performance in comparison with the existing recommendation may be studied.
15	NRM/ CBE/ AGM/ RIC/ 2018/ CP134. Screening plant growth promoting rice apoplastic fluid bacterial strains for drought stress management in rice	Dr. T. Kalaiselvi, Professor (Ag. Microbiology) Dr. P. Jeyakumar, Professor & Head, Dept. of Crop Physiology	January 2019 to December 2019	To be continued and is to be completed on 30.09.2020

16	SEC/TKM/SST/RIC/2019/001 Estimating effects of high temperature on yield and seed quality traits in rice	Dr. M. Bhaskaran, Professor and Head Dr. A. Sheeba, Assistant Professor (CPBG)	November 2019 to October 2021	To be Continued.
17	DCM/CBE/CRP/CSF/2018/CP009: Development of Crop Specific foliar formulations for yield enhancement in selected crops (rice, red gram, sesame and finger millet) under normal and water deficit conditions	Dr. P. Jeyakumar, Professor and Head Dr. V. Ravichandran, Associate Professor (CRP) Dr. S. Vincent, Professor (CRP) Dr. S. Srinivasan, Assistant Professor (CRP) Dr. N. Sritharan, Assistant Prof. (CRP)	2018-2019	To be Continued and is to be completed on 30.09.2020
18	SEC / CBE / SST / RIC / 2018 / CP 074 Prevention of pre-harvest sprouting by inducing temporary dormancy in rice varieties	Dr. J. Renugadevi, Professor (SST)	June 2018 to March 2020	To be Closed
19	DCM/TRY/AGR/RIC/2018/CP151 Evaluation of fermented egg and fish waste extracts as foliar spray on yield and economics of rice and green gram	Dr. T. Ramesh, Assistant Professor (Agronomy)	February, 2019 to September 2020	To be Continued and is to be completed on 30.09.2020

D. AICRIPs				
Sl. no	TITLE	Scientist involved / Lead scientist	Duration	Remarks
1.	AICRP /PBG /ADT / RIC/ 002 Nutrient Management Trials – AVT 2 – IME and Late (TP) Nutrient response trials on selected AVT 2 rice cultures under high and low input management.	Dr. S. Elamathi, Assistant professor (Agronomy)	2019-2021	To be Continued.
2.	AICRP /PBG /ADT / RIC/ 002. Cultural Management Trial (CMT 1) Development of package of practices for mechanized transplanting	Dr. S. Elamathi, Assistant professor (Agronomy)	2019-2021	To be Continued.
3.	AICRP /PBG /ADT / RIC/ 002 Cultural Management Trial (CMT 3) Developing suitable package of practices for wet DSR	Dr. S. Elamathi, Assistant professor (Agronomy)	2019-2021	To be Continued and given for information.
4.	AICRP /PBG /ADT / RIC/ 002 Cultural Management Trial (WMT 2) Long term trial on weed dynamics in mono or double cropped rice system under different establishment methods	Dr. S. Elamathi, Assistant professor (Agronomy)	2019-2024	To be Continued and given for information.
5.	AICRP /PBG /ADT / RIC/ 002 Cultural Management Trial (WMT 2) Evaluation of promising cultivars for late planting and management for higher productivity and mitigate the effect climate change	Dr. S. Elamathi, Assistant professor (Agronomy)	2019-2021	To be Continued.

6.	AICRP /PBG /CBE / RIC/ 003 Nutrient Management Trials – AVT 2 – IM (TP) Nutrient response trials on selected AVT 2 rice cultures under high and low input management.	Dr. G. Senthil Kumar, Assistant professor (Agronomy)	2019-2020	To be Continued.
7	AICRP /PBG /CBE / RIC/ 003 Nutrient Management Trials – AVT 2 – Bio-fortified nutrient response trials on selected AVT 2 rice cultures under high and low input management.	Dr. G. Senthil Kumar, Assistant professor (Agronomy)	2019-2020	To be Continued.
8	AICRP /PBG /CBE / RIC/ 003 Cultural Management Trial (CMT 3) Development of package of practices for wet direct deeded rice (Wet DSR)	Dr. G. Senthil Kumar, Assistant professor (Agronomy)	2019-2020	To be Continued.
9.	AICRP/DCM/CBE/AGR/RIC/ 2020/001 Cultural Management Trial (CMT 4) Enhancing the productivity of direct seeded rice with iron coating under different rice ecologies	Dr. G. Senthil Kumar, Assistant professor (Agronomy)	2019-2020	To be Continued.
10.	AICRP/DCM/CBE/AGR/001 Identification of need based Cropping system for Cauvery New Delta Zone	Dr. S. Porpavai, Professor (Agronomy)	June, 2015- May, 2019	To be Closed
11.	AICRP/NRM/CBE/SAC/002 AICRP On Soil Test Crop Response	Dr. S. Maragatham, Assoc.Prof. (SS&AC) Dr. J. Balamurugan, Asst. Professor (SS&AC) Dr. M. Gopalakrishnan, Asst. Professor (SS&AC)	Continuous	To be Continued

12	AICRP/PBG/CBE/RIC/003 Influence of silicon on improving abiotic stress tolerance in rice genotypes	Dr.K. Krishna Surendar, Assistant Professor (Crop Physiology)	June 2019 – April 2020	To be Continued.
13.	AICRP/PBG/CBE/RIC/003 Screening for submergence tolerance in rice genotypes	Dr. K. Krishna Surendar, Assistant Professor (Crop Physiology)	June 2019 – April 2020	To be Continued.
14.	AICRP/PBG/CBE/RIC/003 Physiological characterization of selected rice genotypes for multiple abiotic stress tolerance	Dr. K. Krishna Surendar, Assistant Professor (Crop Physiology)	June 2019 – April 2020	To be Continued.
15.	AICRP/PBG/CBE/RIC/003 Phenotyping of elite rice genotypes for Drought Tolerance	Dr. K. Krishna Surendar, Assistant Professor (Crop Physiology)	June 2019 – April 2020	To be Continued.
16.	ICAR/DCM/CBE/SOA/2015/R001: Project On Organic Farming Title: Evaluation of response of different rice varieties suitable for organic farming.	Dr. E. Somasundaram, Professor and Head Dr. K. Ganesan, Assistant Professor (Agrl. Entomology)	August 2013 - July 2023	Recommended for OFT. To be continued.

E . Externally Funded Projects				
Sl. No	TITLE	Scientist involved / Lead scientist	Duration	Remarks
1.	JAPAN/ DCM/ ADT/ AGR/ 2016/ R006: Estimation of Regional- Global Methane Emissions and Refinement of its Estimate by GOSAT-2 and Surface Observations (Phase II)	Dr. V. Ambethgar, Director, Dr. M. Raju, Assoc. Prof. (Agron.) Dr. C. Umamageswari, Assoc. Prof. (Agron.) Dr. K. Sathiya Bama, Assoc. Prof. (SS & AC)	Phase I: 01.04.2016 to 30.06.2018 Phase II: 01.07.2018 to 28.02.2021	Recommended for OFT. To be continued.
2.	GoTN/NRM/AGM/CBE/2018/D003 NMSA Project: Strengthening biofertilizer production units for stage-specific inoculant production for rice	Dr. P. Marimuthu, Professor (Ag Micro) Dr. D. Balachandar, Professor (Ag Micro) Dr. R. Parimaladevi, Asst Professor (Ag Micro) Dr. K. Kumutha, Professor & Head (Ag Micro) Dr. R. Ejialne, Asst Professor (Ag Micro) Dr. K. G. Sabarinathan, Asst Professor (Ag Micro) Dr M. Gomathy, Asst Professor (Ag Micro) Dr. M. Senthilkumar, Associate Professor (Ag Micro) Dr. S. Mathiyazhagan, Asst Professor (Pl. Pathology) Dr. M. JeyaBharathi, Asst Professor (Ag Micro) Dr. T. Sivasankari Devi, Asst Professor (Ag Micro)	Nov, 2018 to Mar, 2020	To be closed

3.	<p>MHRD/NRM/CBE/AGM/2014/R015 Centre of Excellence in Frontier areas of Science and Technology (FAST) on MICROBES TO FEED THE WORLD: Plant-Microbe interactions to boost Agricultural Production</p>	<p>Dr. U. Sivakumar, Prof., Dept. of Agrl. Microbiology (PI) Dr. P. Marimuthu, Prof., Dept. of Agrl. Microbiology Dr. D. Balachandar, Prof., Dept. of Agrl. Microbiology Dr. M. Senthilkumar, Asst. Prof., Dept. of Agrl. Micro. Dr. K. Kumutha, Prof., Dept. of Agrl. Microbiology Dr. K. Eraivan Arutkani Aiyathan, Prof (Pathology) Dr. T. Chitdeshwari, Prof., Dept. of SS & AC Dr. E. Somasundaram, rof., Dept. of Agronomy Dr. R. Sivakumar, Asst. Prof., Dept. of Crop Physiology</p>	2014-2020	To be continued.
4.	<p>NIAES/DCM/CBE/CRP/2019/R010 No. DR/P7/ NIAES, Japan/Crop Physiology, CBE/ ASO/2019 dt.22.01.2019 of DR,TNAU, Coimbatore Multi- site monitoring network of canopy micrometeorology and heat stresses in rice for evaluating the adaptation strategies under climate change (HOA: F38IB)</p>	<p>Dr. D. Vijayalakshmi, Associate Professor (Crop Physiology)</p>	1.4.2019 to 31.3.2022	To be Continued. Given for information.
5.	<p>PPV/SC/CBE/SST/2003/R001 DUS test centre for Rice and Sunflower under PPV & FR Authority at the Department of Seed Science and Technology, TNAU, Coimbatore</p>	<p>Dr. P. R. Renganayaki, Professor and Head (SST) Dr. K. Raja, Associate Professor (SST)</p>	13.02.2004 to continuation project	To be Continued.

6.	DST/DCM/ADT/CRP/2017/R001 Physiological evaluation of rice genotypes for multiple stress tolerance	Dr. K. Vanitha, Asst. Prof. (CRP), Dept. of Crop Physiology, Dr. P. Boominathan, Assoc. Prof. (CRP),	September 2016 - September 2019	To be Closed
7.	EID / NRM / TRY/ SAC / 1997/ R012 Eco - friendly utilization of distillery effluent and value added products from sugar and distillery industrial wastes in agriculture and its effect on soil and crops	Dr. G. Gomadhi, Assistant Professor (SS&AC)	June 2018 - Nov 2020	To be Continued. Given for information.

C. CROP PROTECTION

A. Adoption/OFT/Information

I. Technology for Adoption

1. Camphor oil for yellow stem borer management

➤ Camphor oil at 1000 ml/ha is recommended for rice yellow stem borer management. Camphor oil 1000 ml/ha is cost effective and safe to predators and parasitoids in rice ecosystem; good alternate to azadirachtin 1% @ 1000 ml/ha

2. Mass trapping technology for rice stem borer

➤ Mass trapping with sex pheromone trap @ 25/ac had more attraction of yellow stem borer with the highest CB ratio. Mass trapping with sex pheromone traps, reduced the number of insecticide sprays. This technology is eco-friendly, supports natural enemies and good option in organic farming.

3. Management of leaf and neck blast

➤ Foliar spraying of azoxystrobin + difenoconazole @ 0.1 % (single spray) at the time of symptom appearance is recommended for the management of leaf and neck blast.

II. Technology for OFT

1. Evaluation of sequential application of botanical and chemical insecticides against major pests of rice Treatments

1. Botanicals + Insecticide: Azadirachtin1% EC 1000ml/ha 25 DAT + Triflumezopyrim 10% SC 240ml/ha 45 DAT + Neem oil 1% 5 lit/ha 60 DAT
2. All botanicals: Azadirachtin1% EC 1000ml/ha 25 DAT+ Eucalyptus oil 1000ml/ha 45 DAT+ Neem oil 1% 5 lit/ha 60 DAT
3. All insecticides: Chlorantraniliprole 0.4G 10 kg/ha 25 DAT+ cartap hydrochloride 50% SC 1.0 kg/ ha 50 DAT+ Triflumezopyrim 10% SC 240 ml/ha 65 DAT
4. Control (untreated)

Centres to be involved:

ADT (Dr. P. Anandhi), CBE (Dr. V. Balasubramani), KKM (Dr. K. Elanchezhyan), TR (Dr. P. Yasotha), MDU (Dr. G. Srinivasan)

Observations:

To be taken from 15 days after transplantation till pre-harvest stage at weekly interval on the existing pests and natural enemies as indicated below

1. Thrips population per sweep and damage (leaf damage)
2. Stem borer adults per sweep and damage (DH/WE)
3. Leaf folder adults per sweep and damage (leaf damage)
4. GM damage (silver shoot)
5. Number of leaf and plant hoppers /10 hills
6. Any other pests (if noticed)
7. Natural enemies such as coccinellids, rove beetles and spiders

8. Grain yield
9. CB ratio

Note: Pre-treatments counts (PTC) should be recorded without fail and per cent reduction over control should be calculated using PTC.

2. IPM technologies for major pests of rice Treatments

1. IPM package with:
 - a. High yielding variety - ADT 51/ Co 51
 - b. Raising blackgram ADT 6 as bund crop
 - c. Mass trapping of yellow stem borer with pheromone traps @ 25/ac
 - d. Release of the egg parasitoid, *Trichogramma japonicum* thrice (at weekly interval from 37 DAT) @ 1,00,000/ha each release (when stem borer moth activity is noticed)
 - e. Release *Trichogramma chilonis* thrice (at weekly interval from 30 DAT) @ 1,00,000/ha each (when leaf folder moth activity is noticed)
 - f. Azadirachtin 10,000 ppm spray at 1000 ml/ha at 25 and 45 DAT
 - g. Need based application of chlorantraniliprole 18.5 SC @ 150 ml/ha

2. All chemical insecticides spraying :

- a. Thiamethoxam 100 g/ha (Thrips) 25 DAT
- b. Chlorantraniliprole 18.5 SC @ 150 ml/ha (stem borer) 45 DAT
- c. Profenophos 50 EC @ 1000ml/ha (Leaf folder & stem borer) 60 DAT
- d. Chlorantraniliprole 18.5 SC @ 150 ml/ha (stem borer) 75 DAT

3. Control

Centres to be involved:

ADT (Dr. P. Anandhi), CBE (Dr. N. Muthukrishnan), KKM (Dr. G. Preetha), TRY (Dr. R. P. Soundararajan), MDU (Dr. J. Jayaraj).

Observations:

To be taken from 15 days after transplantation till pre-harvest stage at weekly interval on the existing pests and natural enemies as indicated below

1. Thrips population per sweep and damage (leaf damage)
2. Stem borer adults per sweep and damage (DH/WE)
3. Leaf folder adults per sweep and damage (leaf damage)
4. GM damage (silver shoot)
5. Number of leaf and plant hoppers /10 hills
6. Any other pests (if noticed)
7. Natural enemies such as coccinellids, rove beetles and spiders
8. Grain yield
9. CB ratio

3. Management of rice grain discolouration through botanicals Treatments

- T1. Foliar spray of *Ocimum sanctum* leaf extract (10%) at 50 % flowering stage followed by second spray 10 days later
- T2. Foliar spray of Neem oil @ 3 per cent at 50 % flowering stage followed by second spray 10 days later
- T3. Absolute control

Treatment spraying:

First spray at 50% flowering & second spray 10 days later

Observations to be recorded:

Grain discolouration incidence and severity using scale at harvest stage

Season: Rabi

Variety: ADT 53

Design: RBD

Replication: 3

Coordinating scientist: Dr. N. Rajinimala, AC & RI, Killikulam

Centres to be involved:

ADT (Dr. A. Ramanathan); KKM (Dr. N. Rajinimala); ASD (Dr. R. Ramjagathesh); Tirur (Dr. S. Malathi); AD AC & RI, Trichy (Dr. K. Chitra) and MDU (Dr. P. Akila).

4. Management of sheath rot and grain discolouration in rice Treatments

- T1. Seed treatment with *Bacillus subtilis* @ 10g/kg + one foliar spray with Azoxystrobin @ 0.2 % at 50 per cent flowering.
- T2. Seed treatment with *Bacillus subtilis* @ 10g/kg + one foliar spray with Carbendazim + Thiram + Mancozeb (1:1:1) @ 0.2 % at 50 per cent flowering.
- T3. Untreated control

Observations to be recorded:

Sheath rot incidence and severity at grain filling stage and grain discolouration incidence at harvest.

Season: Rabi

Variety: ADT53

Design: RBD

Replication: 3

Coordinating scientist: Dr. A. Ramanathan, TRRI, Aduthurai

Centres to be involved: Aduthurai (Dr. A. Ramanathan), ADAC&RI, Trichy (Dr. K. Chitra), Tirur (Dr. S. Malathi), ASD (Dr. Ramjegethesh) and Thirupathisaram (Dr. M. Jayasekhar).

III. For Information

1. Resistant entries against major insect pests

Pests	Entries identified	Category
Stem borer	RMLT 19-302, RMLT 19-501, ART 1519-1, ART 1819-1, KAUPTB 0627-2-11 and BK-35-155	Resistant
BPH	RMLT 19-105	Moderately Resistant

	ART 1519-2 CB-16-512, CB-15-569, CB-16-570 IR 7103315B, RP206818-3-5, PTB 33, 9-1-48, PTB41	Resistant
WBPH	RMLT 19-105, RMLT 19-505 ART 1519-2	Moderately Resistant
Leaf folder	ACK 15001, AS 16004CB 16512, 144-2, 35-3, Anna (R) 4 and ADT 39	Resistant

2. Rice Stem borer Species Diversity: In *samba* season yellow stem borer was dominant in Trichy, Aduthurai & Coimbatore.

3. Pesticide residue monitoring: Rice grains collected from 11 locations in Tamil Nadu and analysed for residues, showed level below quantification for 39 insecticides tested

4. HIPV (Herbivore Induced plant Volatiles) in Pest management: HIPV viz., JA and MeSA affected the biological parameters of rice leaf folder *Cnaphalocrocis medinalis*, showing antibiosis activity after spraying at 5 mM and 100 mg L⁻¹ respectively. JA and MeSA spraying resulted in release of volatiles (like Dodecane, Eicosane, Tetracontane & 2,4-Di-tert-butylphenol etc.), which attract natural enemies

5. Outbreak of rice pests: Outbreaks of Rice Gall Midge, BPH and GLH were noticed in Cauvery Delta area, Trichy and parts of Erode (Bhavani).

Outbreak of gall midge, *Orseolia oryzae* was recorded during December 2019. Field surveys were conducted in the Cauvery delta areas of Thanjavur, Thiruvarur, Nagapattinam and Pudukkottai districts. Damage ranged from 16.58 % (Pillayarpaty, Thanjavur) to 85.64 (Melanambankurichi, Muthupettai block, Thiruvarur) with order of severity as Thiruvarur > Thanjavur > Pudukkottai > Nagapattinam districts. Reasons for the outbreak is continuous cloudy or rainy weather, use of high tillering varieties, intensive management practices (high nitrogen and indiscriminate use of combination insecticides), low incidence of parasitoid *Platygaster oryzae*, dry season survival of

pupal stage in the stubbles of harvested rice crop. Early sowing with CR1009 – escaped the attack; Late sowing of CR1009, ADT39, BPT5204, NLR34449, MTU 7029 resulted in severe incidence.

The management practices suggested include:

a. Rice gall midge:

- Following ETL (10% silver shoots) based control measures
- Immediately after crop harvest deep ploughing to remove stubbles
- Removal of alternate weed host plants
- Use of neem cake 250 kg /ha and optimum recommendation of potash fertilizer
- Setting up of light trap and infrared light trap on field bunds to attract and kill adult flies during early evening to night hours
- Collection and redistribution of *Platygaster oryzae* parasitised galls at the rate of one parasitized gall for every 10 m² area
- Conserving naturally occurring potent predators such as rove beetles, carabid beetles and spiders
- Spraying any one of the following insecticides during outbreak
- Chlorpyriphos 20% EC 1250 ml/ha
- Chlorpyriphos 10% G 10 kg/ha
- Fipronil 5% SC 1000-1500 g/ha
- Fipronil 0.3% GR 16-25 kg/ha
- Thiamethoxam 25% WG 100 g/ha
- Avoidance of synthetic pyrethroids to prevent resurgence of brown plant hopper (BPH).

b. Brown plant hopper (BPH)

- Following the ETL of 1 hopper/ tiller in the absence of predatory spider and 2 hoppers / tiller when spider is present at 1/hill.
- Avoiding excessive use of nitrogen
- Controlling the irrigation by intermittent draining
- Set up light traps during night or yellow pan traps during day time
- Draining water before use of insecticides
- Direct spray towards the base of the plants. Spraying any one of the following insecticides during outbreak: Acephate 75 % SP 666-1000 g/ha
- Acetamiprid 20% SP 50-100 g/ha
- Azadirachtin 0.03% 1000 ml/ha
- Neem oil 3% 15 lit/ha
- Buprofezin 25% SC 800 ml/ha
- Chlorantraniliprole 18.5% SC 150 g/ha
- Chlorpyriphos 1.5% DP 25 kg/ha
- Dinotefuran 20% SG 150-200g/ha
- Fipronil 5% SC 1000-1500 ml/ha
- Fipronil 0.3% GR 16.67-25 kg/ha
- Imidacloprid 17.8 SL 100-125 ml/ha
- Pymetrozine 50% WG 300g

c. Green leaf hopper (GLH)

- Following the ETL of 60 hoppers/25 net sweeps or 5 hoppers/hill at vegetative stage or 10 hoppers/hill at flowering or 2 hoppers/hill in tungro endemic area
- Setting up, light traps to attract and control the leafhoppers as well as to monitor the vector population.
- Destroying/ killing the leafhoppers attracted to light trap
- Spraying any one of the following insecticides twice, 15 and 30 days after transplanting per ha:
 - Phosphamidon 40% SL 1000 ml/ha
 - Buprofezin 25% SC 800 g/ha
 - Fipronil 5% SC 1000-1500 g/ha
 - Imidacloprid 17.8% SL 100 -125 ml/ha
 - Thiamethoxam 25% WG 100 g/ha
 - Spraying the vegetation on the bunds also with the insecticides.

6. Development of loop-mediated isothermal amplification (LAMP) assay protocol for the detection of rice blast pathogen, *Magnaporthe oryzae*

This is a rapid detection method to detect airborne inoculum of *Magnaporthe oryzae*. The detection and amplification occurs in a single step and suitable for *in situ* applications and suitable for quarantine applications.

7. Identification of resistance sources for major diseases

a. MLT I:

AD 17152 was moderately resistant to sheath blight, sheath rot and rice tungro disease. CB 15530 was moderately resistant to rice tungro disease. AD 16028 was moderately resistant to sheath rot. AD 16052 was moderately resistant to sheath blight and rice tungro disease. CB 16585 was resistant to sheath blight and moderately resistant to rice tungro disease. AS 13228 was moderately resistant to blast and rice tungro disease. ACK 15001 was moderately resistant to sheath blight and sheath rot. AS 15024 was moderately resistant to sheath blight and blast. AS 16004 was moderately resistant to sheath blight, bacterial leaf blight and rice tungro disease. AD16019 was resistant to sheath blight and blast and moderately resistant to sheath rot and rice tungro disease.

b. MLT II:

AS 16050 was moderately resistant to blast, sheath blight, sheath rot, bacterial leaf blight and rice tungro disease. TNRH 294 was resistant to sheath blight. US 312 was resistant to sheath blight and moderately resistant to blast and rice tungro disease. CB 16570 was moderately resistant to blast and brown spot. AD 16269 was moderately resistant to sheath blight, sheath rot and bacterial leaf blight. CB16512 was moderately resistant to sheath blight, blast and bacterial leaf blight. AD 17036 was moderately resistant to rice tungro disease. AS 13203 was resistant to sheath blight and moderately resistant to blast. AD 16024 was moderately resistant to sheath rot.

c. MLT III:

ACK 14029 was resistant to sheath blight and blast and moderately resistant to sheath rot. AD 13253 was resistant to brown spot and moderately resistant to blast, bacterial leaf blight, sheath blight and sheath rot. CB 15138 was moderately resistant to blast, bacterial leaf blight and sheath blight. AD 15105 was moderately resistant to blast, bacterial leaf blight, sheath blight and rice tungro disease. TNTRH 105 was moderately resistant to blast, sheath blight and sheath rot. AD 16148 was resistant to blast and moderately resistant to false smut. AD 16124 was moderately resistant to blast, bacterial leaf blight, sheath rot and rice tungro disease.

d. MLT V – Dry and semi dry:

IR 64 dt.QTL was moderately resistant to blast, sheath blight and sheath rot. TM 14035 was moderately resistant to bacterial leaf blight, sheath blight and brown spot. CB 13804 was moderately resistant to sheath blight and sheath rot. TM 12012 was moderately resistant to blast and brown spot. PM 16003 was resistant to bacterial leaf blight and moderately resistant to blast, sheath rot and rice tungro disease. TM 16017 was resistant to sheath blight and moderately resistant to blast, sheath rot and rice tungro disease.

e. MLT special:

145-3 was resistant to sheath rot and moderately resistant to bacterial leaf blight, blast, sheath blight and brown spot. Kavuni was resistant to sheath rot and moderately resistant to bacterial leaf blight, rice tungro disease, sheath blight and brown spot. 144-2 was resistant to blast, sheath rot and false smut. 35-3 was moderately resistant to blast and sheath blight. 32-2 was moderately resistant to blast, brown spot, sheath blight and sheath rot. 148-2 was resistant to blast and false smut. 145-6 was moderately resistant to bacterial leaf blight, sheath blight and sheath rot.

f. ART:

AD12132 was moderately resistant to sheath blight. TP 08053 was resistant to blast and moderately resistant to sheath blight and rice tungro disease. TM 12077 was moderately resistant to blast and brown spot. CB 12132 was resistant to blast and moderately resistant to sheath blight and bacterial leaf blight. CBMAS 14142 was resistant to sheath blight and moderately resistant to sheath rot, rice tungro disease, brown spot and false smut.

In addition, 11 entries from AYT – early and 6 entries from AYT – Mid - early were moderately resistant to blast.

8. *Aspergillus flavus* and Aflatoxin in rice grains

Out of 40 samples collected from farmer's field, 6 samples yielded *A. flavus* (15%) and Aflatoxin (AFB1) was detected in 2 samples by TLC (5%). Out of 20 samples collected from warehouses, 10 samples yielded *A. flavus* (50%) and Aflatoxin (AFB1) was detected in 3 samples by TLC (15%).

9. Integrated management of pest and disease in rice

Recommended dose of fertilizers @ 75 per cent + soil application of *Daincha* @ 6.25t/ha + spraying of Panchakavya @3 per cent + *P. fluorescens* @ 0.5 % + spraying of zineb+ hexaconazole @0.25 % recorded lowest intensity of blast, sheath blight diseases and higher yield. Soil application of *Daincha* 6.25t/ha + *P. fluorescens* (2.5kg/ha) + spraying of neem oil 3 per cent recorded the lowest gall midge and leaf folder damage and minimum number of ear head bug/hill.

B. Action plan (2020-2021)

1. Agricultural Entomology

1. Theme Areas:

1. Prediction of changing insect pest scenario in rice ecosystems
2. Exploring insect resistance mechanisms
3. Pesticide residue monitoring in rice grains
4. Species complex, population dynamics, yield loss and refined IPM capsule for rice stem borer and leaf folder
5. Developing location specific refined IPM capsule for rice gall midge
6. Population dynamics, yield loss and management of rice mite species

Action Plan 1: Prediction of changing insect pest scenario

Theme Leader	Dr. P. Anandhi, Asst. Prof. (Agrl. Entomology), TRRI, Aduthurai		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables
1. Keeping vigilance on emerging pests either through introduction or shift in pest status.	Dr. P. Anandhi, TRRI, ADT	Fixed and rowing survey on pest incidence	Forewarning on emerging pests.
2. Assessment of insect pest and natural enemies population <i>in situ</i> , light and pheromone trap.	Dr. V. Balasubramani, TNAU, CBE	Recording of weather parameters	Intervention with suitable IPM package.
3. Impact of light trap on non target arthropods.	Dr. G. Preetha, AC&RI, KKM	Multiple correlation and regression analysis with previous years weather data and pests damage and population data	Data generation for forecasting model development
4. Fixed and rowing survey (One on campus fixed plot and roving plot study at fortnightly interval in the District identified during the district specific crop season)	Dr. K. Suresh, AC & RI, MDU		
	Dr. Sheela Venugopal, ARS, BVSR		
	Dr. Sheeba Joyce Roseleen, AC & RI, TRY		
	Dr. V.A. Vijayashanthi, KVK, Tirur		
	Dr. N.K. Sathyamurthi ACRC, CBE		

Action Plan 2. Exploring insect resistance mechanisms			
Theme Leader	Dr. V. Balasubramani, Professor (Agrl. Entomology), TNAU, CBE		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables/ expected out come
1. Identification of resistance sources for major insect pests. 2. Investigation of resistance mechanisms	Dr. V. Balasubramani, TNAU, CBE Dr. P. Anandhi, TRRI,ADT Dr. K. Elanchezhyan, AC&RI, KKM Dr. G. Srinivasan, AC&RI, MDU Dr. Sheela Venugopal , ARS, BSR Dr. SheebaJoyce Roseleen, AC & RI,TRY	Screening of TNAU entries (MLT/ART etc.) Screening of AICRIP/ entries from other sources if any Biophysical and Biochemical analyses of identified resistant lines / donors	Resistant donors for breeding programme can be identified

Action Plan 3. Pesticide residue monitoring in rice grains			
Theme Leader	Dr.A.Suganthi, AP (Ento.) TNAU, Coimbatore		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables/ expected out come
Pesticide residue monitoring in rice grains	Dr. A. Suganthi TNAU, CBE Dr. K. Premalatha AC & RI, MDU Dr. P. Yashotha, AC & RI, TRY Dr. L. Allwin, AC&RI, KKM	As, all identified centres are having facilities, both collection and analysis of residues in rice grains from six nearby Districts should be done by each centre (CBE, MDU, TRY and KKM). Theme leader will allot six districts to each centre.	For monitoring residues of important insecticides in two popular rice varieties of their region

Action Plan 4. Species complex, population dynamics, yield loss and refined IPM capsule for rice stem borer and leaf folder			
Theme leader	Dr. N. Muthukrishnan, Professor (Agrl. Ento.), AC & RI, Coimbatore		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables/ expected outcome
Determination of species complex and development of IPM capsule for rice stem borer and leaf folder including: Suitable less susceptible variety Seed treatment with Imidacloprid 48FS @ 2.5 g/kg seed. Border crop with aromatic rice Light trap @ 1/ac. Spraying of Chlorantraniliprole 18.5 SC 150 ml/ac during vegetative stage Spraying of botanical Azadirachtin 10000 ppm at 1000 ml/ha during grain formation stage Control	Dr.N.Muthukrishnan, TNAU, CBE Dr. P. Anandhi, TRRI, ADT Dr. J. Jayaraj, AC&RI, MDU Dr. Sheela Venugopal, ARS, BSR Dr.V.A.Vijayashanthi KVK, Tirur Dr. R.P. Soundararajan, HC & RI(W), TRY Dr. M. Ravi, AC & RI, KKM	Dead heart and white ear symptom for stem borer during vegetative stage, grain formation stage and pre-harvest stage (45, 60 and 90 DAT) Per cent damage by leaf folder during vegetative stage and boot leaf stage (30, 45 and 60 DAT) Natural enemies population(30, 45, 60 and 90 DAT) Yield data and BCR	New IPM capsule for rice stem borer and leaf folder will be formulated

Action Plan 5: Developing location specific refined IPM capsule for rice gall midge			
Theme Leader	Dr. A.Thirumurugan, Professor, AC&RI, Eachankottai		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables
Developing IPM capsule for Rice gall midge including: Use resistant/ tolerant variety (ADT45, ADT48)	Dr. A.Thirumurugan AC&RI, ECK Dr. R. Raja Ramesh, KVK, NDM	Gall midge incidence (per cent silver shoot) on 25, 45 and 65 DAT Natural enemies	• Location specific refined IPM capsule for rice gall midge will be available

<p>Early sowing (based on water availability) Seed treatment with Imidacloprid 48FS @ 2.5 g/kg seed Distribution of <i>Platygaster oryzae</i> parasitised galls at 1 per 10 m² on 10 DAT, when natural parasitisation is noticed in abundance. Neemazal 1% EC at 1000ml/ha on 25 DAT Fipronil 0.3 % G @ 20 kg/ha during boot leafstage Control</p>	<p>Dr. C.Vijayraghavan AC & RI, KDM</p> <p>Dr. P. Anandhi, TRRI, ADT</p> <p>Dr. S. Manisegarane, AC&RI, MDU</p>	<p>population on 25, 45, 65 and 90 DAT</p> <p>Yield data and BCR</p>	
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Action Plan 6: Population dynamics, yield loss and management of rice mite species			
Theme Leader	Dr. E. Sumathi, Associate Professor (Ento.), TNAU, CBE		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables
<p>Activity 1 Yield loss assessment due to mite infestation Grain yield in acaricide treated plot</p> <p>Grain yield in untreated control</p> <p>Activity 2 Management of rice mites</p> <p>Use of high yielding cultivar based on season</p> <p>Application of Azadirachtin 10000ppm @ 1000</p>	<p>Dr. E. Sumathi, TNAU, CBE</p> <p>Dr. P. Anandhi, TRRI, ADT</p> <p>Dr. R. Raja Ramesh, KVK, NDM</p> <p>Dr. C. Chinniah, AC & RI, MDU</p> <p>Dr. K. Elanchezhyan, AC & RI, KKM</p>	<p>Population of mites from top, middle and bottom leaves (1x10 cm leaf length) from five randomly selected plants at 10 days interval starting from 30 DAS to 60 DAT with the help of 10X lens</p> <p>Pre-treatment count on 29th DAT</p> <p>Yield and BCR</p>	<ul style="list-style-type: none"> • Effective management capsule for leaf mite in paddy

ml/ha at 30 DAS			
Application of propargite 57 EC at 2 ml/lit at 45 DAT			
Application of fenazaquin 10 EC 1.5 ml/lit at 60 DAT			
Untreated control			

Plant Pathology

I. Theme Areas:

1. Disease monitoring, surveillance, epidemiological studies on rice diseases and forewarning
2. Identification and mechanism of resistance sources for major diseases
3. Exploring mechanisms involved in silicon induced resistance in rice
4. Developing diagnostic kits for detection of seed borne pathogens of rice
5. Characterization of *Ustiloginoidea virens* and management of false smut disease in rice

Action Plan 1: Disease monitoring, surveillance, epidemiological studies on rice diseases and forewarning

Theme Leader	Plant Pathology: Dr. A. Ramanathan, TRRI, Aduthurai		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables/ out come
Monitoring of pest and diseases under irrigated and direct sown rice (Blast, sheath blight, sheath rot, bacterial blight, brown spot, grain discoloration and false smut) diseases	Dr.C. Gopalakrishnan Dept. of Rice, CBE	Per cent disease incidence / PDI as per standard grades.	Timely monitoring of disease epidemics and fore-warning of farmers and line departments.
Fixed plot survey	Dr. P. Akila AC&RI, Madurai	Correlation and regression analysis of pest and disease progression during cropping periods in relation to weather parameters.	
Roving survey	Dr. K.Chitra ADAC&RI, TRY		
Correlation with weather factors	Dr. N. Rajinimala AC&RI, KKM.		
	Dr.R.Ramjegathesh RRS, ASD	Regular bulletins on pest and disease scenario in the particular zone should be given for the benefit of farmers through press and media marking a copy to Director (CPPS).	
	Dr. S. Malathi RRS, Tirur and ACRC, Coimbatore.		

Action Plan 2: Identification of resistance sources and mechanism for major diseases

Theme Leader				Plant Pathology: Dr. A. Ramanathan, TRRI, Aduthurai			
Activity		Name of the Scientist and Centre		Observations to be recorded		Deliverables	
I. Identification of resistant sources for major diseases (Blast, sheath blight, sheath rot, bacterial blight, brown spot, false smut and grain discolouration)		Dr. A. Ramanathan, TRRI, Aduthurai		Multiple resistant entries for diseases under both natural and artificial conditions (wherever possible).		Multiple resistant donors for breeding programme will be identified.	
II. Unravelling mechanism of resistance to major rice diseases		Dr. C. Gopalakrishnan, Dept. of Rice, TNAU, Coimbatore		The mechanism of resistance <i>viz.</i> , physical and biochemical basis for disease resistance to be studied.			
		Dr. P. Akila AC&RI, Madurai					
		Dr. R. Ramjegathesh RRS, Ambasamudram					
		Dr. S. Malathi RRS, Tirur					

Action Plan 3: Exploring mechanisms involved in silicon induced resistance in rice

Theme Leader				Pathology: Dr. C. Gopalakrishnan, Dept. of Rice, TNAU, Coimbatore			
Activity		Name of the Scientist and Centre		Observations to be recorded		Deliverables	
Physiological and cytological mechanisms involved in silicon induced resistance will be studied in blast, stem borer, and drought / salinity tolerant lines		Plant Pathology Dr.C. Gopalakrishnan, Dept. of Rice, TNAU, Coimbatore		i. Silicon and lignin content in leaves of blast and drought / salinity tolerant lines		Blast resistant donors combined with drought /saline tolerant traits will be identified.	
		Crop Physiology Dr. K. Krishna surendar, Dept. of Rice, TNAU, Coimbatore		ii. Pattern of silicon deposition in rice leaves and guard cell of stomata		Better understanding of physiological and cytological mechanisms involved in silicon induced resistance in stress tolerant/resistant lines	
		Entomology Dr. V. Balasubramani Dept. of Rice, TNAU, Coimbatore		iii. Leaf anatomical characterization of blast resistant drought /saline tolerant and susceptible lines			

Action Plan 4: Developing diagnostic kits for detection of seed borne pathogens of rice

Theme Leader	Dr. C. Goplakrishnan, Professor, Dept. of Rice, TNAU, Coimbatore Dr. A. Kamalakkannan, Professor, TNAU, Coimbatore		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables
Developing LAMP based protocol for the detection of important seed borne pathogens of rice.	Plant Pathology Dr. C. Goplakrishnan Dept. of Rice, Coimbatore Dr. A. Kamalak - kannan, Dept. of Plant Pathology, TNAU, Coimbatore Dr. T. Anand Seed Centre, TNAU, Coimbatore	i. Isolation of DNA of <i>Magnaporthe grisea</i> , <i>Cochliobolus miyabeanus</i> , and <i>Sarocladium oryzae</i> from seeds. ii. Designing lamp primers for each pathogen iii. Validating sensitivity and specificity of LAMP primers iv. Developing LAMP based protocol for the detection of seed borne pathogens	Development of diagnostic kit for the detection of important seed borne diseases in rice seeds which can be used in quarantine and seed certification.

Action Plan 5: Characterization of *Ustiloginoidea virens* and management of false smut disease in rice

Theme Leader:	Dr. K. Kalpana, Asst. Prof. (Pl. Path.) AC&RI, Madurai		
Activity	Name of the Scientist and Centre	Observations to be recorded	Deliverables
i. Isolation of <i>Ustiloginoidea virens</i> from different locations of Tamil Nadu and its characterization	Dr. A. Ramanathan, Professor (Pl. Patho.), TRRI, Aduthurai		To develop suitable methods for rice false smut disease management
ii. Standardization of artificial inoculation protocol	Dr. K. Chitra Asst. Prof. (Pl. Path.) ADAC&RI, TRY		
iii. Evaluation of newer molecules for the management of false smut disease	Dr. N. Rajinimala, Asst. Prof. (Pl. Path.) AC&RI, KKM		

<p><u>Treatment schedule:</u> T1: Two sprays with propiconazole 25 EC @ 500 ml/ha at boot leaf and 50% flowering stages</p> <p>T2: Two sprays with tricyclazole 45% + hexaconazole 10% WG @ 500 gm/ha. at boot leaf and 50% flowering stages</p> <p>T3: Two sprays with azoxystrobin 11% + tebuconazole 18.3% w/w SC @ 750 ml/ha. at boot leaf and 50% flowering stages</p> <p>T4: Two sprays with azoxystrobin 16.7 % + tricyclazole 33.3% SC @ 500 ml/ha. at boot leaf and 50% flowering stages</p>	<p>Dr.R.Ramjegathesh, Asst. Prof. (Pl. Path.), RRS, Ambasamudram</p> <p>Dr. S. Malathi, Asst. Prof.(Pl. Path.), RRS, Tirur</p>		
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C. Remarks on the ongoing URP/AICRIP/EPF/UCF

List of URP/AICRP/EPF/UCF

Discipline	URP	AICRIP	EPF	UCP	Total
Agricultural Entomology	4	3	-	2	9
Plant Pathology	6	2	1	-	9
Agricultural Nematology	-	-	-	-	-
Total	10	5	1	2	18

1. 1. AGRICULTURAL ENTOMOLOGY

Sl. No.	Project No. and Title	Remarks
1	<p>CPPS/CBE/ENT/RIC/2018/CP017:</p> <p>Ecological engineering for rice Dr. N. Muthukrishnan, Professor (Agrl. Entomology) June 2018 to May 2020</p>	<p>The project may be concluded and publication in peer reviewed journal should be made. New project may be submitted</p>

2	CPPS/TPS/ENT/RIC/2016/001: Pest management strategies for the changing rice pest scenario in Kanyakumari District Dr.G.Preetha , Asst. Professor (Agrl. Entomology) (Oct. 2016 to Sep. 2019)	The project may be concluded and publication in peer reviewed journal should be made. New project may be submitted
3	CPPS/TRY/ENT/RIC/2018/CP093: Exploring the effectiveness of newer insecticides and its detoxifying mechanisms for the management of Stem borer complex in rice. Dr. Sheeba Joyce Rosleen , AP (Ento.) and Dr. G. Preetha , AP (Ento.) Sept, 2018 – Sep' 2020	Project may be continued and is to be completed on 30.09.2020
4	CPPS/ADT/ENT/RIC/2018/NEW Determination of population dynamics and formulation strategies for the management of Rice hispa, Black bug and whorl maggot Dr.P. Anandhi ,Asst. Professor (Agrl. Entomology) (April 2019- March 2022)	Project may be continued
5	AICRP/PBG/CBE/RIC/003: All India Co-ordinated Rice Improvement Project – Entomology Part (Coimbatore) Dr. V. Balasubramani (Agrl. Entomology), Professor (Ento.)	Project may be continued
6	AICRP/PBG/ADT/RIC/002 All India Co-ordinated Rice Improvement Project – Entomology Part (Aduthurai) Dr. P. Anandhi , Asst. Professor (Ento.)	Project may be continued
2. 2. Plant Pathology		
S. No	Project No. and Title	Remarks
1	New: Studies on host plant resistance and management of Blast, Brown Spot and BLB in rice under artificial and field conditions. (April 2020 – March 2022) Dr.A. Ramanathan	The project proposal has been approved by RPAC and project number yet to be allotted. The project may be continued.

2	<p>CPPS/CBE/PAT/RIC/2019/001 Management of aflatoxin contamination in rice through botanicals. July 2019 - June 2022 Dr. C. Gopalakrishnan</p>	The project may be continued.
3	<p>CPPS/TPS/PAT/RIC/2015/001 Screening of rice cultures to major diseases and management of sheath rot and grain discolouration (Sep. 2015 – Mar. 2018) Dr. M. Jayasekhar</p>	Completion report was submitted on 31.01.2020 and a research paper was sent for publication
4	<p>CPPS/ASD/PAT/RIC/2018/001. Eco - friendly management of blast and sheath blight diseases of rice. (May 2018 – April 2021) Dr. R. Ramjgathesh</p>	The observations on pest and beneficial insect population in the field trial may be taken up with the help of Entomologist from AC & RI, Killikulam. The project may be continued.
5	<p>CPPS/ASD/PAT/RIC/2018/002. Management of bacterial leaf blight disease in rice. (June 2018 – May 2021) Dr. R. Ramjgathesh</p>	The approval may be obtained for inclusion of copper hydroxide treatment. The project may be continued.
6	<p>CPPS/TKM/PAT/RIC/2020/001: Management of rice blast disease under irrigation and direct sown conditions (March 2020 to February 2023) Dr. S. Malathi</p>	The project may be continued.
7	<p>AICRP/PBG/CBE/RIC/003 All India Co-ordinated Rice Improvement Project – Pathology Part (Coimbatore) Dr. C. Gopalakrishnan</p>	The research work may be continued as per the technical programme of AICRIP.
8	<p>AICRP/PBG/ADT/RIC/002 All India Co-ordinated Rice Improvement Project – Pathology Part (Aduthurai) Dr. A. Ramanathan</p>	The research work may be continued as per the technical programme of AICRIP.

9	DBT/CPPS/CBE/PAT/2019/R020. External funded Project (DST) Climate change mediated aerobiological studies on air borne pathogens of rice (2019-2022) Dr. A. Kamalakannan	The LAMP assay may be standardised for the samples collected from newly designed spore traps for major pathogens. The work may be continued as per the objectives of the project.
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IV CLOSING REMARKS

Recommendations of the Vice Chancellor

Crop Improvement

- The Wild rice garden available in PBS has to be renovated and the species with new sources of genes for specific traits may be utilized in wide hybridization programmes (**Action:** Department of Rice, Coimbatore)
- Priority to be given to develop varieties pyramided with multiple stress tolerance using the donors identified for the biotic and abiotic stresses without compromising on yield. (**Action :** TRRI, Aduthurai and Dept. Rice, Coimbatore & CPMB & B, Coimbatore)
- Super fine rice varieties with good cooking qualities may be developed through fast track breeding by inviting senior breeders, millers and traders. (**Action:** Dept. of Rice, Coimbatore; TRRI, Aduthurai; RRS, Tirur, RRS, Ambasamudram,)
- Development of rice variety suitable for Puffing has to be given top priority due to the emerging demand from the particular sector and may be commercialized through Directorate of Research and ABD (**Action :** Madurai)
- All the newly released varieties and culture in advanced stage of release may be raised in one acre demonstration plots in each station to enable the officials and farmers to make their assessment before its release (**Action :** All stations & KVks)
- All efforts should be made to bring "**Nel Jayaramanm Exhibition Hall**" for traditional rice land races" (to be established by the government of Tamil Nadu at Needamangalam) as the centre of activity for conservation of rice land races and promotion of these cultivation (**Action :**Coimbatore & Aduthurai)
- Efforts are needed to develop improved version of the traditional land races for the release in short span of time (**Action :** Dept. of Rice, Coimbatore & TRRI, Aduthurai)

- Top priority is to be given for maintaining genetic purity of the varieties in the seed chain. (**Action** : All BSP Centres & Director, Seed Centre)
- The proposals for the notification of newly released rice varieties CO 53 and ADT 54 are to be pursued vigorously to get varieties notified early. (**Action** : CPBG)

Crop Management

- Action may be initiated to reduce water usage for rice cultivation
- Efficient soil microbes should be identified for drought resistant in rice cultivation
- Studies on organic rice cultivation integrating with local land races should be initiated.
- Develop a package of practice for newly release rice variety ADT 54 (TRRI, Aduthurai)
- All potential technologies be integrated and conduct large scale demonstration (Agronomy, SS & AC, Crop Physiology & SST) and demonstrated in one acre area (Lead centre – TRRI, Aduthurai)
- Complete mechanization in rice involving Engineers and Agronomists
- Stage specific bioinoculation technique may be tested at large scale for adoption by farmers
- Combined foliar application of 2% MAP + 1% KCl at heading and grain filling stages found effective in increasing the grain yield which requires large scale testing

Plant Protection

- Application of insecticides and fungicides using drones has to be standardized in collaboration with remote sensing and farm machinery department.
- Development of forewarning model for major pests and diseases of rice may be explored in collaboration with Directorate of Crop Management
- Screening of rice entries has to be carried out under artificial conditions for major diseases. The entries should be screened in larger areas under natural conditions in hot spot areas in order to assess their reaction to other diseases.
- Research on false smut and gall midge should be intensified in order to develop suitable technologies/varieties as a quick response.

Remarks of the Registrar

- Only 25% of works may be on screening and remaining 75% may be concentrated on new molecules etc.,
- Use of more endophytes may be explored in disease management
- Prediction model on aerobiology may be updated
- Storage studies may be taken up in rice which had undergone oil spray
- Aflatoxin work is to be considered in storage studies

Remarks of the Director of Research

- Efforts may be taken to set the timeline for early release of therapeutic rice
- Accelerate efforts to advance rice lines with special traits (photosynthetic efficiency, Fe & Zn fortification, thermo-tolerance, herbicide tolerance)
- Popularization of TRY 3 and VGD 1
- Digital farming in rice cultivation may be strengthened by using AI, Sensors, IOT & Drones.

Remarks of the Director (CPPS)

- All the scientists are instructed to monitor the insect pests, diseases and nematodes of rice in their districts regularly. If any outbreak of existing pests, disease and nematodes or occurrence of new insect pests, diseases and nematodes of rice is noticed, it should be reported to the Director (CPPS) immediately.
- Monthly pest and disease surveillance report should be submitted to the Professor and Head, Department of Agrl. Entomology and Plant Pathology, CPPS on or before 25th of every month without fail in the Google Forms for consolidation.
- The dates given for sending the closure proposal / deletion proposal should be strictly adhered.
- Based on the thrust area identified, new URP should be submitted by the scientists who do not have URP on or before 30.06.2020. All proposals should be presented before the RPAC convened by the Director (CPPS) before getting final approval.

- Involving PG and Ph.D students, basic work on mechanism of resistance, effect of cropping systems on pests and diseases and their natural enemies, insect plant interaction, host pathogen interaction and induced systemic resistance should be taken up.
- Since *Pseudomonas fluorescens* is to be withdrawn, the available *Bacillus subtilis* formulations may be evaluated for the management of major diseases of rice in order to replace *P. fluorescens*.

DIRECTOR OF RESEARCH

V. PARTICIPANTS

Name of the Scientist
Offline mode participants
Dr. N. Kumar, Vice- Chancellor, TNAU, Coimbatore
Dr. A.S. Krishnamoorthy, Registrar, TNAU, Coimbatore
Dr. K.S. Subramanian, Director of Research, TNAU, Coimbatore
Dr.S.Geetha, Director, CPBG, TNAU, Coimbatore
Dr.V.Geethalakshmi, Director, Crop Management, TNAU, Coimbatore
Dr.R.Shanthi, Director, NRM, TNAU, Coimbatore
Dr. K. Prabakar, Director, CPPS, TNAU, Coimbatore
Dr. T. Raguchander, Dean, Students welfare, TNAU, Coimbatore
Dr.S.Panneerselvam, Director (WTC), TNAU, Coimbatore
Dr.K.R.Ashok, Director (CARDS), TNAU, Coimbatore
Dr.S.Mohankumar, Director, CPMB&B, TNAU, Coimbatore
Dr.K.Ganesamoorthy, Prof. & Head, Dept. of Rice, TNAU, Coimbatore
Dr.C.R.Chinnamuthu, Prof. & Head, Dept. of Agronomy, TNAU, Coimbatore
Dr.S.P.Ramanathan, Prof. & Head, ACRC, TNAU, Coimbatore
Dr. G. Karthikeyan, Prof.& Head, Dept. of Plant Pathology, TNAU, Coimbatore
Dr.E.Somasundaram, Prof. & Head, Dept. of SOA, TNAU, Coimbatore
Dr.P.Malarvizhi, Prof. & Head, Dept. of SS&AC, TNAU, Coimbatore
Dr.V.Gomathi, Prof. & Head, Dept. of Agrl.Microbiology, TNAU, Coimbatore
Dr.Jeyakumar, Prof. & Head, Dept. of Crop Physiology, TNAU, Coimbatore
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Dr.N.Muthukrishnan, Prof.(Agrl.Ento.), Dept. of Agrl.Ento., TNAU, Coimbatore
Dr.V. Balasubramani, Prof.(Agrl.Ento.), Dept. of Agrl.Ento., TNAU, Coimbatore
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Dr.M.Kannan, Prof. (Hort.), Directorate of Research, TNAU, Coimbatore
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Dr.M.Mohamad Yassin, Prof.(Agron.), Directorate of Research, TNAU, Coimbatore
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Dr.U.Sivakumar, Prof. (Agrl.Micro.), TNAU, Coimbatore
Dr.M.Kumar, Prof. (PBG) & TPO to VC, TNAU, Coimbatore
Dr.P.Murali Arthanari, Assoc.Prof. Dept. of Agronomy, TNAU, Coimbatore
Dr.D.Kumaresan, Assoc.Prof.(PBG), CPBG, TNAU, Coimbatore
Dr.R.Pushpam, Assoc.Prof.(PBG), Dept. of Rice, TNAU, Coimbatore.
Dr.K.Amutha, Asst.Prof.(PBG), Dept. of Rice, TNAU, Coimbatore.