

TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

40th Millets and Forage Crops Scientists' Meet 2022 (2nd May, 2022)

Lead Centre

Department of Millets,
CPBG, Coimbatore

Directorate of Research

Tamil Nadu Agricultural University
Coimbatore 641 003

2022

PROCEEDINGS

The 40th Millets and Forage Crops Scientist Meet was held on 2nd May 2022 under the chairmanship of **Dr. V. Geethalakshmi**, Vice Chancellor. The Vice-Chancellor highlighted the role of millets in eradicating malnutrition among children and Type II diabetes among adults. The Vice-Chancellor stressed the need for speed breeding platform to accelerate development of high yielding varieties and mechanization in millets. The Vice Chancellor informed all the UOs to motivate the scientists to send proposals for external funding.

Prior to this, **Dr. K.S. Subramanian**, Director of Research flagged off issues on varietal spread of newly released varieties/ hybrids, speed breeding in millets for development of trait specific varieties, establishing phenomics facility and sustainable millet initiations. He also stressed the need for the endobiome and metabolomes studies, need of seed pelleting and studies on anti nutritional factors in millet crops. Further, he insisted to improve the millet supply chain to benefit the farmers and consumers. Documentation of data, success stories, and scientific reports should be shared for millet research and development.

Dr. S. Geetha, Director (CPBG), **Dr. S. Paneerselvam**, Director (Crop Management), **Dr. K. Prabakar**, Director (CPPS), **Dr. S. Mohankumar**, Director (CPMB), **Dr. S. Sundareswaran**, Director, Seed Centre and **Dr. R. Santhi**, Director (NRM) presented the research highlights, action taken on previous Millets and Forages Scientists Meet and Action Plan for the year 2022-2023 of their respective directorates and departments involved.

The Vice Chancellor offered concluding remarks and suggested to workout bioenergy values and economics of Cumbu-Napier hybrid, nutritional value of white and brown ragi grains and insisted to develop alternate cropping system with suitable millet crops for delta regions including rice fallow and promote millet processed food and bakery items.

Dr. R. Ravikesavan, Professor and Head, Dept. of Millets proposed formal vote of thanks.

The proceedings of the 40th Millets & Forage Crops Scientists meet are furnished below in the following headings:

I. CROP IMPROVEMENT

- A. Entries for variety release proposal/OFT/ART/MLT
- B. Action plan projects
- C. Research projects and remarks

II. CROP MANAGEMENT

- A. Technologies for adoption/OFT
- B. Action plan projects
- C. Research projects and remarks

III. CROP PROTECTION

- A. Technologies for adoption/OFT/Information
- B. Action plan projects
- C. Research Projects and remarks

IV. REMARKS

V. LIST OF PARTICIPANTS

I. CROP IMPROVEMENT					
MILLETS					
A. Entries identified for variety release/ART/OFT/MLT					

A1. Varieties / Hybrids identified for Release :					
1. Sorghum					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over checks (%)	Special features
TKSV 1036	ICSB 518 x SPV 1489	95 -100	2151	K12 (10.8)	Creamy white grains Resistant to shootfly and stem borer. Resistant to downy mildew, grain mould and rust. Suitable for rainfed vertisol tracts of southern districts of Tamil Nadu.
TNS 661	TNS 603 x IS18551	100-105	3016	CO 32 (10.7)	Pearly white grain Moderately resistant to shootfly and stem borer

2. Pearl Millet					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over check (%)	Special features
TNBH 1619	ICMA 10444 A x PT 6679	85-90	3072	CO 9 (12.72)	Bold, Semi Compact Free from Downy mildew Fe content – 71 ppm Zn content – 48 ppm

3. Maize					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over check (%)	Special features
CMH 12 686	UMI N09153-1-2 x UMI 1210	95-100	8200	NK6240 (16.1) COH(M)8(11.5) P 3401(11.1) CO 6 (9.6)	Medium maturing High yielding, Orange semi dent kernels MR to charcoal rot

4. Kuthiraivali					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over check (%)	Special features
TNE β 17	DHBM 99-6 x RBM 36	90	2589	MDU 1(16.4)	Large panicle with bold seeds (> 7g/1000 seeds) Moderately resistant to brown leaf spot and shoot fly

5. Panivaragu					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over check (%)	Special features
TN <i>Pm</i> 238	Selection from IPM 19	65-67	2155	ATL 1(18.5)	Stable in yield potential, Non lodging, Moderately resistant to brown spot and shoot fly

6. Tenai					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over check (%)	Special features

TNSi 337	CO6 x Ise198	82-85	2205	ATL 1(26.4)	High tillering Tip sterility absent Moderately resistant to leaf blast , rust , brown spot and shoot fly
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7. Ragi					
Culture	Pedigree	Duration (days)	Grain yield (kg/ha)	Yield increase over check (%)	Special features
TNEc 1294	CO (Ra) 14 x TNAU 950	125	2923	ATL 1 (18.4)	High yield with large panicles & bold seeds (> 3g/1000 seeds) Moderately resistant to leaf blast, brown spot and shoot fly
TNEc 1310	PR 10-35 x VR 101	132	3216	ATL1 (13.1)	High yielding, Compact earhead Resistant to blast, leaf blast, brown spot and shoot fly

A2. ADAPTIVE RESEARCH TRIALS					
1.Sorghum					
S.No.	Culture	Parentage	Duration (days)	Grain yield (kg/ha)	Special attributes
1.	TKSV 1146	ICSB 539 x K 8	100	2649	Creamy white Bold grain Tolerant to midge. Photo insensitive. Suitable for rainfed situation
Checks : CO 32 and K 12					
Observations to be recorded: Days to 50 % flowering, plant height, grain yield, straw yield pest and disease incidence					

2.Maize (Irrigated)

S.No.	Culture	Parentage	Duration (days)	Grain yield (kg/ha)	Special attributes
1.	CMH 14-716	N09-162 x N148	100-105	8243	Yellow semi dent kernels Moderately resistant – Charcoal rot

Checks: CO 6, S6668, P 3401, COH(M)8

Observations to be recorded: 50 % tasseling, 50% silking, Grain yield (kg/ha), shelling percentage

3.Maize (Rainfed)

S.No.	Culture	Parentage	Duration (days)	Grain yield (kg/ha)	Special attributes
1.	CMH 15-005	UMI1220 x UMI1210	105	5961	Drought tolerant Suited for irrigated & rainfed
2.	VaMH 12013	UMI1200 x VIM 419	100	5705	Suitable – rainfed condition Orange yellow dent kernels Moderately resistant – TLB

Checks: CO 6, S6668, P3502, COH(M) 8

Observations to be recorded: 50 % tasseling, 50% silking, grain yield (kg/ha), shelling percentage

4. Panivaragu

S.No.	Culture	Parentage	Duration (days)	Grain yield (kg/ha)	Special attributes
1.	TNPm 247 I	PV1403 x PV 1673	65-70	2113	Large panicles and high yield Bold grains

Checks : ATL 1

Observations to be recorded: Days to maturity, grain yield kg/ha, straw yield kg/ha and pests and disease score if any.

5.Samai

S.No.	Culture	Parentage	Duration (days)	Grain yield (kg/ha)	Special attributes
1.	TNP _{SU} 223	CO3xKadiri 10	85	1523	Open panicle Bold and grey grain Tolerant to shoot-fly Drought tolerant
2.	TNP _{SU} 224	CO2 x BL 41/3	90	1539	Semi-compact panicle Yellow grains High bulk density

Check: CO (Samai) 4, ATL 1

Centres:Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Aruppukottai, Kovilpatti, Athiyandal, Chettinadu

Distribution of ART 2022-23			
Sorghum			
Season	<i>Kharif</i> (Jun-Jul)	<i>Rabi</i> (Sep-Oct)	<i>Summer</i> (Feb-March)
Districts	18 district-s, 36 locations Villupuram(2), Vellore (2) Tiruvallur(2), Thiruvannamalai (2), Cuddalore(2), Dharmapuri(2), Krishnagiri(2), Salem (2) Namakkal (2), Coimbatore(2) Tirupur (2), Erode (2), Trichy(2), Perambalur(2), Karur(2), Madurai(2), Dindigul(2), Virudhunagar (2)	7 districts, 14 locations Madurai, Dindigul, Virudhunagar, Ramnad, Sivagangai ,Thoothukudi and Thirunelveli	14 districts, 28 locations Dharmapuri, Krishnagiri, Salem,Namakkal, Coimbatore,Tirupur, Trichy, Perambalur, Karur, Pudukkottai, Madurai, Theni, Dindigul, Virudhunagar
KVK	6 KVKs, 12 trials, 2 trials/KVK Cuddalore, Trichy, Vellore, Villupuram, Salem, Madurai	8 KVKs, 16 trials, 2 trials/KVK Pudukottai, Cuddalore, Virudunagar, Trichy, Vellore, Aruppukottai, Villupuram, Madurai	9 KVKs, 18 trials, 2 trials/KVK Pudukottai, Cuddalore, , Trichy, Vellore, Thiruvallur, Villupuram, Salem, Madurai, Dharmapuri

Maize			
Season	<i>Kharif</i> (Jun-Jul)	<i>Rabi</i> (Sep-Oct)	<i>Summer</i> (Feb-March)
	Districts		
Irrigated	Theni, Namakkal, Thiruvannamalai (3 districts 15 trials)	-	-
Rainfed	-	Dindigul, Madurai, Thoothukudi, Virudhunagar, Thirunelveli (5 districts 25 trials)	-

Small millets	
Panivaragu	
Season	<i>Kharif</i> (Rainfed)
Districts	Villupuram, Vellore, Thiruvanamalai, Salem, Namakkal, Madurai, Theni, Virudhunagar, Thoothukudi, Tirunelveli (Each district 5 locations)(10 districts, 50 locations)
Samai	
Season	<i>Kharif</i> (Rainfed)
Districts	Villupuram, Vellore, Thiruvanamalai, Salem, Namakkal, Madurai, Theni, Virudhunagar, Thoothukudi, Tirunelveli (Each district 5 locations)(10 districts, 50 locations)

A3. ON FARM TRIALS					
1.Maize (Rainfed)					
S.No.	Culture	Parentage	Duration (days)	Grain yield (kg/ha)	Special attributes
1.	CMH 15- 005	UMI 1220 x UMI 1210	105	5961	Drought tolerant Suited for irrigated & rainfed
2.	VaMH 12013	UMI 1200 x VIM 419	100	5705	Suitable – rainfed condition Orange yellow dent kernels Moderately resistant – TLB

Checks: CO 6, S6668, P 3401, COH(M)8

Observations to be recorded: 50 % tasseling, 50% silking, Grain yield (kg/ha), shelling percentage

Districts : Dindigul, Madurai, Thoothukudi, Virudhunagar, Thirunelveli (5 locations each)

2.Sweet Sorghum (MLT and OFT)						
Rabi (Support Irrigation)						
S.No.	Culture	Parentage	Duration (days)	Stalk yield (t/ha)	Grain yield (kg/ha)	Special attributes
1	TNSS 227	SS179XSS172	115	49.17	2700	High brix % (16-17) More fresh stalk yield
2	TNSS 255	SS303XSS253	115	42.92	2550	High brix % (15-16) More fresh stalk yield

Checks CSV 24 SS,

Observations to be recorded: Days to 50% flowering, Plant height, Days to maturity, brix %, Fresh stalk yield and grain yield.

OFT- Districts: Cuddalore, Namakkal Erode, Perambalur, Karur (Sugar factories and Farmers field)
MLT- Sirugamani, Cuddalore, Melalathur (Agricultural Research Stations)

A4. MULTI LOCATION TRIALS

1. Grain Sorghum	
Design : RBD	No. of replications : Four
Plot size : 4 × 2.7 m ²	Seed Quantity : 100 g/entry/location
Spacing : 45 × 15 cm	Season: kharif, rabi, Summer

Salient Features of the proposed cultures

Culture	Parentage	Duration (days)	Yield (kg/ha)	Special traits
TNS 695	CO26 x B 35	105-110	3483	Yellow orange grain, Moderately resistant to stem borer, downy mildew and grain mould.
TNS 698	CO 30 x B 35	105-110	3160	Yellow orange grain , Moderately resistant to shoot fly, Downy mildew, Resistant to grain mould
TKSV 1707	TKSV 0806 x SPV 2114	100-105	2380	Creamy white grain, Tolerant to midge, Suitable for rainfed situation
TKSV 1801	IS 9807 x TKS 1003	100-105	2016	Creamy white grain, Tolerant to midge, Suitable for rainfed situation
TKS18013	Selection from K4	85-90	1850	Compact panicle with white grain Moderately Resistant to shoot fly and Stem borer

Checks: CO 32, K12, K4 and Tenkasi Local

<i>Kharif</i> (4)	(June – July)	Coimbatore, Paiyur, Bhavanisagar, Athiyanthal
<i>Rabi</i> (5)	(Sept-Oct)	Kovilpatti, Yethapur, Aruppukkottai, Paiyur, Vaigaidam
Summer (3)	(Jan – Feb)	Coimbatore, Bhavanisagar and Vaigaidam
Fertilizer dose	95:45:45 NPK kg/ha	

Observations to be recorded: Days to 50 % flowering, Days to maturity, grain yield kg/ha, straw yield kg/ha and pests and disease score if any

2.Pearl Millet

Design : RBD	No. of replications : 4
Plot size : 4 × 3 m ²	Seed Quantity : 100 g/entry/location

Spacing : 50 × 15 cm	Season: Kharif, Rabi and Summer
Fertilizer schedule: 80: 40:40 NPK Kg/ha	

Salient Features of the proposed cultures

Culture	Parentage	Duration (days)	Yield (kg/ha)	Special traits
PM(H)2105 I	98222A x PT 6679	85-90	3720	High yield, Bold seed, DM tolerant, Compact ear head
TNBH 19005	ICMA 1508 A x PT 6679	85-90	4189	High grain yield, Bold, Semi Compact DM resistance

Checks : Pearl millet Hybrid CO 9, 86M38

Observations to be recorded: Days to 50 % flowering, Days to maturity, seed set per cent, grain yield kg/ha, straw yield kg/ha and pests and disease score if any.

Seasons

Pearl millet MLT I	<i>Kharif</i> irrigated (June – July) (7)	Coimbatore, Paiyur, Yethapur, Bhavanisagar, Vaigaidam, Vridhachalam, Tindivanam and Athiyanthal
Pearl millet MLT II	<i>Rabi</i> irrigated (Sep- Oct) (6)	Kovilpatti, Aruppukkottai, Paiyur and Tindivanam
Pearl millet MLT III	<i>Summer</i> (February- March)	Coimbatore, Pattukkottai, Paiyur, Bhavanisagar, Vridhachalam and Vaigaidam

3. Maize (Irrigated)

Design : RBD	No. of replications : 4
Plot size : 4 × 3.6 m ²	Seed Quantity : 100 g/entry/location
Spacing : 60 × 25 cm	Season : <i>kharif, rabi (irrigated)</i>

Features of the proposed cultures

Hybrids	Parentage	Duration(days)	Yield (kg/ha)	Special traits
CMH 17021	52198x 52608	100-110	9440	Yellow kernels MR to charcoal rot, TLB and MLB 35 to 40 ker/row
CMH 17026	52327 x 52485	100-110	9481	Deep orange kernels MR to charcoal rot, TLB and MLB
CMBH 19011	UMI1200β ⁺ x UMI1230β ⁺	105-110	10700	High beta carotene maize hybrid β-Carotene content 9.60 (μg/g) 10 times higher β Carotene over CO6
Checks	CO 6, COH(M)8, S6668, P3401			

Seasons		
Maize MLT I	<i>Kharif</i> Irrigated (June – July) (7)	Coimbatore, Vagarai, Bhavanisagar, Paiyur, Athiyanthal, Vaigaidam, Virinjipuram
Maize MLT III	<i>Rabi</i> irrigated (Dec – Jan) (6)	Coimbatore, Vagarai, Bhavanisagar, Paiyur, Vaigaidam, Virinjipuram
Fertilizer schedule: 250: 75:75 NPK Kg/ha		
Observations to be recorded : Days to 50 % tasseling, Days to 50 % silking, Plant height (cm), Grain yield (kg/ha), pests and disease score if any		

4. Maize (Rainfed):

Design : RBD	No. of replications : 4
Plot size : 4 × 3.6 m ²	Seed Quantity : 100 g/entry/location
Spacing : 60 × 25 cm	Season: Rabi (Rainfed)

Features of the proposed cultures

Hybrids	Parentage	Duration	Yield (kg/ha)	Special traits
VaMH 16018 I	UMI 564 x UMI 528	95-100	6936	High grain yield Suitable for rainfed conditions, Moderately Resistant to TLB Semi dent kernels
VaMH 20001	VIM 528 X VIM 487	105-107	7333	High grain yield Suitable for rainfed conditions, Moderately Resistant to TLB Semi dent kernels
Checks: Maize Hybrid CO 6, COH(M)8, P3502				

Seasons		
Maize MLT III	Rainfed (Sept-Oct) (5)	Aruppukkottai, Kovilpatti, Yethapur, Veppanthattai, Vagarai
Fertilizer schedule: 250: 75:75 NPK Kg/ha		
Observations to be recorded: Days to 50 % tasseling, Days to 50 % silking, Plant height (cm), Grain yield (kg/ha), pests and disease score if any		

5. Sweetcorn:

Design : RBD	No. of replications : 4
Plot size : 4 × 3.6 m ²	Seed Quantity : 100 g/entry/location
Spacing : 60 × 25 cm	Season: Rabi (Rainfed)

Features of the proposed cultures

Hybrids	Parentage	Duration	Cob Yield (t/ha)	Special traits
CSCH 17021	45684 x 45508	95-100	13.0 – 14.5	High green cob yield Plumpy kernels MR to BSLB and C.rot
Checks: Misthi, VL sweet corn hybrid 2, Misthi				

Seasons

<i>Kharif</i>	Irrigated (June – July) (7)	Coimbatore, Vagarai, Bhavanisagar, Paiyur, Athiyanthal, Vaigaidam, Virinjipuram
Fertilizer schedule: 250:75:75 NPK Kg/ha		
Observations to be recorded: Days to 50 % tasseling, Days to 50 % silking, Plant height (cm), Grain yield (kg/ha), pests and disease score if any		

Small Millets MLT

6. Ragi

Design : RBD	No. of replications : 4
No. of rows : 6 rows	Seed Quantity : 100 g/entry/location
Spacing : 22.5 × 10 cm	Season: Kharifi (Rainfed)

Features of the proposed cultures

Culture	Parentage	Duration	Yield (kg/ha)	Special traits
TNEc 1324 (white) I	TNEc 1228 x GE 276	120	2241	Compact earhead, Bold and white grains, Medium tall, Blast tolerant
TNEc 1335 I	TNAU 946 x TNAU 824	83	3380	Top curved earhead Purple pigmented, Drought tolerant, Blast resistant Extra early duration
PYR 20-5 I	Paiyur 1 x Venchuruttai	127-130	3600	Compact ear head, Bold and white grains, Medium tall, Blast tolerant
Check: CO9, CO10, Paiyur 1, ATL 1				
Fertilizer schedule: 40: 20:00 Kg of NPK /ha				
Centres: Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Aruppukottai, Kovilpatti, Athiyandal, Chettinadu				

7. Varagu

Design : RBD	No. of replications : 4
No. of rows : 6 rows	Seed Quantity : 100 g/entry/location
Spacing : 22.5 × 10 cm	Season: Kharif (Rainfed)

Features of the proposed cultures

Culture	Parentage	Duration	Yield (kg/ha)	Special traits
TNPS _C 310 I	PLS from GPLM 589	115	3630	Semi dwarf, High tillering Non lodging, Drought tolerant
TNPS _C 313 I	PLS from GPLM 463	110	3726	Input responsive, High biomass, Longer panicle, Bold seeds
Check: ATL 1, TNAU 86				
Fertilizer schedule: 40: 20:00 Kg of NPK /ha				
Centres: Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Aruppukottai, Kovilpatti, Athiyandal, Chettinadu, Vriddachlam				

8. Kudiraivali

Design : RBD	No. of replications : 4
No. of rows : 6 rows	Seed Quantity : 100 g/entry/location
Spacing : 22.5 × 10 cm	Season: Kharifi (Rainfed)

Features of the proposed cultures

Culture	Parentage	Duration	Yield (kg/ha)	Special traits
TNEf322 I	VL 207 x TNEf 19	95	3164	Compact panicle, High test weight, High biomass, Non lodging, High Fe content : 17.6 mg/100g
TNEβ23 I	TNAU 201 x VL 322	90	3168	Large panicle, Nonshattering More tillers, Non lodging High Fe content : 18.3 mg/100g
Check:MDU 1				
Fertilizer schedule: 40: 20:00 Kg of NPK /ha				
Centres: Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Aruppukottai, Kovilpatti, Athiyandal, Chettinadu, Madurai				

9. Samai

Design : RBD	No. of replications : 4
No. of rows : 6 rows	Seed Quantity : 100 g/entry/location
Spacing : 22.5 × 10 cm	Season:Kharifi (Rainfed)

Features of the proposed cultures

Culture	Parentage	Duration	Yield (kg/ha)	Special traits
TNPSu 237 I	TNPSu115 xTNPSu 317	85	2665	Open panicle, Bold and grey grain, Tolerant to shoot-fly, Drought tolerant, Fe and Zn content: 6.5 – 10.9mg/100g
TNPSu 239 I	TNPSu 210 x TNAU 12	90	2744	Semi-compact panicle, Yellow grains, High bulk density, Fe and Zn content -5.3 – 8.6 mg/100g
Check: ATL 1				
Fertilizer schedule: 40: 20:00 Kg of NPK /ha				
Centres: Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Aruppukottai, Kovilpatti, Athiyandal, Chettinadu				

10. Tenai

Design : RBD	No. of replications : 4
No. of rows : 6 rows	Seed Quantity : 100 g/entry/location
Spacing : 22.5 × 10 cm	Season: Kharifi (Rainfed)

Features of the proposed cultures

Culture	Parentage	Duration	Yield (kg/ha)	Special traits
TNS382 I	TNSi 337 x GS 206	82	2043	Large panicle, More biomass, Input responsive, Bold grains, High in Carotenoids: 254ppm
TNSi 385 I	TNSi 348 x TNSi 223	85	2155	More tillers, Drought tolerance, Dense panicle, Non lodging, High in Carotenoids: 269ppm
Checks: ATL 1				

Fertilizer schedule: 40: 20:00 Kg of NPK /ha

Centres:Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Aruppukottai, Kovilpatti, Athiyandal, Chettinadu

11. Panivaragu

Design : RBD	No. of replications : 4
No. of rows : 6 rows	Seed Quantity : 100 g/entry/location
Spacing : 22.5 × 10 cm	Season:Kharifi (Rainfed)

Features of the proposed cultures

Culture	Parentage	Duration	Yield (kg/ha)	Special traits
TN <i>Pm</i> 282 I	TNPm 247 x TNPm 244	72	2471	Open panicle, Bold grains, Tolerant to shoot-fly, Drought tolerant
TN <i>Pm</i> 283 I	GPUP 25 x TNPm 276	70	2390	Semi compact panicle, Tolerant to shoot fly, High test weight, Input responsive
Checks: ATL 1				
Fertilizer schedule: 40: 20:00 Kg of NPK /ha				
Centres: Coimbatore, Paiyur, Bhavanisagar, Vaigaidam, Kovilpatti,Athiyandal				

Monitoring team to visit Millets MLT 2022-23 Team	Stations to be visited
Dr. R.Chandira kala Dr. N. Kumari Vinodhana Dr. D. Kavithamani Dr. A. Sudha	Bhavanisagar, Vagarai
Dr. S. Sivakumar Dr. K. Iyanar	Kovilpatti, Aruppukkottai, Vaigaidam, Chettinadu
Dr. K. R. V. Sathyasheela Dr. N. Malini Dr. Radhajayalakshmi	Coimbatore, Madurai
Dr. A. Nirmalakumari Dr. Rajesh	Paiyur, Virinjipuram
Dr. K. Iyanar Dr. T. Srinivasan	Athiyanthal, Vridhachalam
Dr.K.Geetha	Yethapur, Veppanthattai

Time of visit

Season	Month of monitoring team visit
<i>Kharif</i> 2022	Appropriate stage may be fixed in discussion with the scientist in-charge of conducting MLT. Monitoring team can inspect the crop just before the cutting to assess the superiority of the genotypes in MLT.
Late <i>rabi</i> / <i>Summer</i>	

FORAGE CROPS**V.2022 Entries identified for variety release/ART/OFT/MLT (2022-2023)****V. Cultures identified for MLT****V. Cumbu Napier hybrid grass (continued)**

Design : RBD	No. of replications : 2
Plot size : 4 m × 3 m	No. of cuttings/plot: 40 cuttings/entry/location
Spacing : 60 cm × 50 cm	Season: <i>Kharif</i> 2022

Features of the proposed cultures

Entry	Parentage	Duration	GFY (t/ha/yr)	Special features
TNCN 1534	IP 20379 x FD 434	Perennial	390.60	High biomass, More leaf stem ratio
TNCN 1536	IP18308 x FD 470	Perennial	383.00	

MLT Centres : Coimbatore, Bhavanisagar, Mettupalayam, Needamangalam, Melalathur, Vaigaidam

Monitoring team to visit Cumbu Napier hybrid grass MLT 2022-23

Team	Stations to be visited
Dr. K.N.Ganesan Dr.T. Ezhilarasi	Coimbatore, Bhavanisagar, Mettupalayam, Needamangalam, Melalathur, Vaigaidam

V. ACTION PLAN

2022-2023

1.1 Millets

S.No	Details of action plan	Work plan for 2022-2023	Centre	Scientists
1	Theme 1: Germplasm characterization in Millets			
	Characterization of Sorghum accessions	Characterization of 100 Sorghum accessions	Coimbatore	Dr. D. Kavithamani
		Characterization of 100 Sorghum accessions	Kovilpatti	Dr. N. Malini
	Characterization of Maize accessions	Characterization of 100 Maize accessions	Coimbatore	Dr. N.KumariVinodhana
		Characterization of 100 Maize accessions	Vagarai	Dr. K.R.V. Sathyasheela
2	Theme No 2: Evolution of Shoot fly and Midge resistant sorghum varieties			
	Theme Leader Dr. R. Chandirakala, Associate Professor (PBG), Department of Millets, Coimbatore			
		<ul style="list-style-type: none"> Raising and evaluation of F₅ at Coimbatore for both pests Evaluation of stable genotypes under yield trials 	Coimbatore Kovilpatti	Dr. R. Chandirakala Assoc. Professor (PBG) Dr.N. Malini, AP (PBG)
3	Theme No 3: Evolution of high yielding single cut forage sorghum varieties with improved quality traits			
	Theme Leader Dr. D. Kavithamani, Asst.Prof (PBG), Department of Millets, Coimbatore			
		<ul style="list-style-type: none"> Raising and evaluation of F₅ generation Evaluation of stable genotypes in yield trials 	Coimbatore	Dr. D. Kavithamani, Asst.Prof (PBG), Department of Millets,
4	Theme No 4: Development of biofortified Pearl millet hybrids for high Fe and Zn			
	Theme Leader Dr. K. Iyanar, Professor (PBG), Department of Millets, Coimbatore			
		<ul style="list-style-type: none"> Making new crosses with donors Validation of Fe and Zn content 	Coimbatore	Dr.T.Chitdeshwari Professor (SS&AC)

5				
	Theme Leader Dr. N. KumariVinodhana, AP (PBG), Dept. of Millets, Coimbatore			
		<ul style="list-style-type: none"> Evaluation of already haracteriz hybrids Screening of new set of inbreds under sick plot condition and scoring for charcoal rot Identification of promising inbreds resistant to charcoal rot and utilization in the breeding program 	Coimbatore	Dr.V. Sendhilvel Asst.Prof (Pl.Pathology)
6	Theme 7: Screening of maize inbreds and hybrids for drought tolerance			
	Theme Leader Dr. S. Sivakumar, Professor and Head, Department of Millets, Coimbatore			
		<ul style="list-style-type: none"> Evaluation of synthesized hybrids for drought New set of inbreds will be screened Crossing with identified drought tolerant inbreds 	Coimbatore Vagarai Veppanthattai	Dr.N.KumariVinodhana, Asst.Professor (PBG) Dr.A.Senthil Professor and Head (CRP), Dr.K.R.V. SathyaSheela, AP (PBG) Dr. K.Sakthivel Asst.Professor (PBG)
7	Theme 8: <i>Introgression of crtRB1/ lcyE</i> allele using marker-aided selection in to the elite inbreds of maize			
	Theme Leader Dr. S.Siva Kumar, Professor and Head, Department of Millets, Coimbatore			
		<ul style="list-style-type: none"> Quantification of the beta carotene Synthesis of new crosses 	Coimbatore	Dr.A.Subramanaian, Professor Dr.R.Ravikesavan, Director, CPBG Dr.N.Senthil, Director, CPMB
8	Theme 9: Development of FAW tolerant / resistant maize hybrids			
	Theme Leader Dr. S.Siva Kumar, Professor and Head, Department of Millets, Coimbatore			
		<ul style="list-style-type: none"> Screening and haracteriz of new donors 	Coimbatore	Dr.N.KumariVinodhana

		<ul style="list-style-type: none"> Synthesis of new crosses Evaluation of segregating population 	Vagarai	Asst.Professor (PBG) Dr.T.Srinivasan, Asst.Professor (Ento) Dr.K.R.V.Sathyasheela, Asst.Professor (PBG)
9	Theme 10: Farmers' participatory selection of high yielding Barnyard millet and long duration blast resistant Ragi varieties (CEM, ATL, AC&RI, Madurai, RRS, Paiyur)			
	Theme Leader Dr. A. Nirmalakumari, Professor (PBG), CEM, Athiyandal			
		<ul style="list-style-type: none"> Estimation of grain and fodder quality traits Compilation of yield data for release 	Madurai	Dr. P. Suthamathi Assoc. Professor (PBG)
10	Theme 11: Evaluation of grain Amarathus for its suitability to North eastern zone of TN			
	Theme Leader Dr.A.Nirmalakumari, Professor and Head, CEM, Athiyanthal			
		<ul style="list-style-type: none"> Evaluation of promising entries in MLT Evaluation of promising entries for inter cropping system 	CEM, Athiyanthal	Dr. P. Suthamathi Assoc. Professor (PBG)

V.2022 Action Plan – Forage Crops

Action Plan: 2020-2023

Theme Leader : Dr. K. N. Ganesan, Professor and Head, Department of Forage Crops, Coimbatore				
S. No.	Details of action Plan	Work Plan for 2022-23	Centre	Scientists
1.	Development of high yielding <i>Stylosanthes</i> variety suitable for pasture land	<p>V. The elite performing genotypes of <i>Stylosanthes</i> may be evaluated under <i>Cenchrus</i> + <i>Stylosanthes</i> pasture system</p> <p>ii. Test verification of dormancy breaking seed treatments on seed germination</p>	Coimbatore	<p>Dr. T. Ezhilarasi Asst. Prof. (PBG) Dept. of Forage Crops</p> <p>Dr. S. Kavitha Asst. Prof. (SS&T) Dept. of PGR</p>

Action Plan: 2021-2024

Theme Leader : Dr. K. N. Ganesan , Prof & Head, Dept of Forage crops and Dr.P.Subramanian, Prof & Head , Dept of Renewable Energy Engineering, TNAU, Coimbatore				
S. No.	Details of action Plan	Work Plan for 2022-23	Centre	Scientists
1.	Utilization of High Biomass Yielding Forage Crops and Sweet Sorghum for Biofuel Production	i. Assessing the green fodder yielding potential of newly identified Bajra Napier hybrids and sweet sorghum genotypes.	Dept. of Forage Crops	Dr. T. Ezhilarasi Dept. of Forage Crops Dr. R. Chandirakala Dr. D. Kavithamani Dept. of Millets
		i. Screening of high biomass yielding genotypes of BN hybrids and sweet sorghum. ii. Optimization of suitable pretreatment process for enhanced biofuel production	Dept. of Renewable Energy Engineering.	Dr. S. Karthikeyan Prof.(Microbiology), Dept. of Ren. Energy Engg., Dr. D. Ramesh Assoc. Prof. (Bioenergy) Dept. of Ren. Energy Engg.,

V. Activities for New Action Plan 2022 – 2025

Millets

S. No	Proposed action plan	Proposed Activities for			Centre	
		2022-23	2023-24	2024-25		
1	Theme : International Year of Millets 2023 – Raising of all the millet varieties/ hybrids released by all TNAU centres					
	Team leader :					
		Showcasing all the released varieties / hybrids of millet crops	Kharif	Dept of Millets, CEM, Athiyanthal RRS, Paiyur, AC&RI, Killikulam		

		Millet crop farmers mela	<i>Rabi</i>	AC&RI, Madurai, ARS, Kovilpatti Dept of Millets, CEM, Athiyanthal		
2	Theme : Deposition of all the released varieties / hybrids with PGR					
Team leader : Dr.R.Saraswathy, P& H (PGR)						

V. New action Plan (2021-2024)- Forage Crops

Theme	Development of high biomass yielding genotypes of forage maize		
Theme leaders	Dr. K. N.Ganesan , Prof & Head, Dept of Forage crops, TNAU, Coimbatore.		
Theme members	2022-23	2023-24	2024-25
Dr. T. Ezhilarasi, Asst. Prof. (PBG), Dept of Forage Crops, TNAU, Coimbatore.	i. Evaluation of available inbreds for fodder quality traits ii. Hybridisation between superior inbreds with diverse fodder quality traits.	i. Evaluation of single cross fodder maize hybrids for enhanced biomass yield. ii. Laboratory analysis of fodder quality traits for the superior performing single cross fodder maize hybrids.	i. Preliminary evaluation trial for the superior performing single cross fodder maize hybrids. ii. Multiplication of elite inbreds for large scale multiplication of superior single cross fodder maize hybrids.

V. Research projects on Millets and Forage crops

A total number of 46 projects including URPs, AICRP and Externally funded projects of Millets and Forage crops and CPMB handled by 24 scientists were reviewed by the respective Directors of CPBG and CPMB. The abstract of the projects reviewed is furnished below:

Crops	Centres	URP	AICRP	Externally funded	Others	Total	Scientists
Sorghum	Coimbatore	4	1	-	-	5	2
	Kovilpatti	3	-	-	-	3	1
	Aruppukottai	1	-	-	-	1	1
	Madurai	1	-	-	-	1	1
	Sub total	9	1	-	-	10	5
Pearl millet	Coimbatore	2	1	-	-	3	1
Maize	Coimbatore	3	1	-	-	4	2
	Vagarai	2	1	-	-	3	2
	Sub total	5	2	-	-	7	4
Small millets	Athiyandal	3	1	-	6	10	2
	Paiyur	1	-	-	-	1	1
	Madurai	2	-	-	-	2	2
	Sub total	6	1	-	6	13	5
PGR	Coimbatore	1	-	-	-	1	1
CPMB&B	Coimbatore	3	-	1	-	4	4
Forage Crops	Dept. of Forage Crops, TNAU	4	1	-	-	5	2
	Dept. of Genetics & Plant Breeding, CPBG, TNAU	1	-	1	-	1	1
	ADAC&RI, Trichy	1	-	-	-	1	1
	Total	6	1	1	-	8	4
Grand total		32	6	2	6	46	24

URP: University Research Project, AICRP: ICAR funded AICRP projects, EFP: Externally funded projects

D. Remarks of the Ongoing URPs / AICRPs / Externally Funded Projects in Crop Improvement**I.University Research Projects**

Sl. No	Project No and Title	Period	Investigators	Remarks of DCPBG
I	SORGHUM			
1.	CPBG/CBE/PBG/SOR/2018/001 Collection and characterization of sorghum germplasm	April 2018 to March 2023	Dr. D. Kavithamani Asst. Professor (PBG), Dept. of Millets	Economically important genotypes may be utilized in the crossing programme
2.	CPBG/CBE/PBG/SOR/2018/002 Development of dual purpose varieties of sorghum resistant to major pests (Shoot fly/Stem borer/ Midge)	June 2018 to May 2023	Dr.R. Chandirakala Assoc.Professor (PBG) Dept. of Millets	Select the genotypes based on grain yield coupled with pest resistance
3.	CPBG/CBE/PBG/SOR/2020/001 Evolution of red sorghum varieties suited for Tamil Nadu	Sep, 2020 to Aug, 2025	Dr.R. Chandirakala Assoc.Professor (PBG) Dept. of Millets	Pest resistant donors may be utilized in the crossing programme. Collect and evaluate the performance of Murungaikodi local red sorghum from Erode region.
4.	CPBG/CBE/PBG/SOR/2019/001 Development of high yielding fodder sorghum varieties with improved quality traits	Feb' 2019 to June 2022	Dr. D. Kavithamani Asst. Professor (PBG) Dept. of Millets	The project may be closed. New Project may be formed with material from the previous project. The promising forage sorghum lines may be evaluated under yield trials to identify the better genotypes for green fodder yield.
5.	CPBG/KPT/PBG/SOR/2020/003 Evolution of high yielding, drought tolerant sorghum varieties suitable for rainfed condition in southern districts of Tamil Nadu.	Oct. 2020 to Sep.2025	Dr. N. Malini Asst. Professor (PBG) ARS, Kovilpatti	TKSV 1036 culture may be screened for pest and disease incidence.
6.	CPBG/KPT/PBG/SOR/2020/002 Nucleus and Breeder seed production of sorghum varieties	Oct 2020 to Sep' 2023	Dr. N. Malini, Asst. Professor (PBG), ARS, Kovilpatti	The allotted indent must be produced without any short fall.

	of Tamil Nadu.			
7.	CPBG/KPT/PBG/SOR/2020/001 Collection and characterization of sorghum germplasm	Oct' 2019 to Sep' 2022	Dr. N. Malini, Asst. Professor (PBG) ARS, Kovilpatti	Economically important genotypes may be utilized in the crossing programme. The project may be closed and new project may be formed.
8.	CPBG/APK/PBG/SOR/2018/001 Evolution of dual purpose sorghum varieties suitable for rainfed regions of south Tamil Nadu	Sep' 2018 to Aug' 2023	Dr. M. Gnanasekaran Asst. Professor (PBG) RRS, Aruppukottai	Project may be closed. The generated materials may be be handed over to Departmet of Millets, Coimbatore.
9.	CPBG/MDU/PBG/SOR/2019/001 Evolution of high yielding red sorghum (<i>Sorghum bicolor</i>) varieties suitable for industrial utilities	Feb' 2019 to Jan' 2024	Dr.S. Chithra Asst.Professor (PBG)	The promising genotypes may be nominated to MLT
II	PEARL MILLET			
1.	CPBG/CBE/PBG/SMM/2020/002 Evolution of high yielding hybrids/varieties in pearl millet (<i>Pennisetum glaucum</i> (L.) Br.R.)	April 2021 to March 2025	Dr. K.Iyanar, Professor (PBG) Department of Millets, TNAU, Coimbatore	Parental purity should be maintained to generate new set of hybrids and haracteri. Action should be inititated to developoe OPV.
2.	CPBG/CBE/PBG/SMM/2020/001M aintenance of genetic purity and production of nucleus seeds of parental lines of hybrids and open pollinated varieties (OPV) in pearl millet	July 2021 to June 2025	Dr. K.Iyanar, Professor (PBG) Department of Millets, TNAU, Coimbatore	Efforts may be taken to maintain the vigour and uniformity of released OPVs/Composites.
III	MAIZE			
1.	CPBG/CBE/PBG/MAZ/2018/001 Development of high yielding sweet corn hybrids suitable for Tamil Nadu	June 2018 to May 2023	Dr.S. Sivakumar Professor (PBG) & Head	High yielding sweet corn hybrids may be developed and nominated for testing under AICRP and MLT trials

2.	CPBG/CBE/PBG/MAZ/2018/002 Development of high yielding single cross maize hybrids in late (> 95 d) and medium (> 85-95 d) maturity suitable for irrigated ecosystems.	June 2018 to May 2023	Dr.N.Kumari Vinodhana, Asst.Professor (PBG)	The parental inbreds and promising hybrids developed may be subjected to FAW screening
3.	CPBG/CBE/PBG/MAZ/2018/003 Germplasm maintenance and Breeder seed production in Maize	June 2018 to May 2023	Dr.N.Kumari Vinodhana, Asst.Professor (PBG)	The promising inbreds identified based on characterization with good cob characters may be utilized in breeding programme
4.	CPBG/VGI/PBG/MAZ/2020/002 Development of high yielding single cross maize hybrids suitable for rainfed ecosystems	April 2020 to March 2025	Dr. S. Lakshmi Narayanan Assoc. Professor and Head (PBG)	Constitute a trial to evaluate grain yield performance of entries Raise three pre released cultures in a single field along with national hybrids to see the performance. Make entries from QPM trial.
5.	CPBG /VGI/PBG/MAZ/2020/001 Collection, Characterisation and Maintenance of Maize germplasm	July 2019 to June 2022	Dr.K.R.V.SathyaSheela Assistant Professor (PB&G)	Inbreds possessing market appealing colour with yield contributing cob traits shall be identified for utilization in breeding programmes. Project may be closed. New Project may be initiated.
IV	SMALL MILLETS			
1.	CPBG/ATL/PBG/SMM/2020/001 Development of high yielding varieties in Small Millets suitable for Tamil Nadu	August,2019 to July, 2024	Dr.A.Nirmalakumari Professor and Head Dr.P.Sudhamathi Assoc.Prof(PBG) CEM, Athiyandhal	New URP may be proposed for Ragi.
2.	CPBG/ATL/PBG/SMM/2020/002 Induced mutation in Kodo millet for earliness, non-lodging and non-shattering variations	August 2020 to July, 2023	Dr.A.Nirmalakumari Professor and Head CEM, Athiyandhal	The mutants may be critically evaluated
3.	CPBG/ATL/PBG/BSP/2020/003M	Oct,2020 to	Dr.A.	The allotted indent must be produced without any

	aintenance Breeding in Small Millets Varieties	Sep,2023	NirmalakumariProfessor and Head CEM, Athiyandhal	short fall
4.	CPBG/MDU/PBG/SMM/2019/001 Evolution of high yielding, high nutritive value and problem soil tolerant barnyard millet variety better than MDU 1	June 2019 to May 2024	Dr. C. Vanniarajan, Professor and Head	Analyse crude fibre content in the promising entries. Check the number of trials conducted.
5.	CPBG/MDU/PBG/BSP/2020/001 Nucleus and Breeder seed production of Madurai varieties of rice, Barnyard millet and black gram	Sep,2019 to Aug, 2022	Dr.S. Muthuramu Asst.Professor(PBG)	The allotted indent must be produced without any short fall
6.	CPBG/PAI/PBG/SMM/2017/001 Development of high yielding long duration ragi varieties (<i>Eleusinecoracona</i> (L.) Gaertn) suitable for rainfed areas of North Western zone	Apr. 2017 to Mar. 2022	Dr. K.Geetha, Professor (PBG) RRS, Paiyur	The promising ragi cultures may be studied for blast resistance
	PGR			
1.	CPBG-CBE-PGR-2019-001 Collection, conservation, documentation, viability monitoring and exchange of germplasm in the Ramiah Gene Bank (RGB)	July 2019 to June 2022	Dr.S. Manonmani Professor and Head	The project may be closed. Documentation of germplasm activities may be compiled.

V	FORAGE CROPS			
1.	CPBG / CBE / PBG / FRG/2021/001 Evolving superior single cross fodder maize hybrid with desirable forage attributes.	November 2020 to October 2025	Dr. K.N.Ganesan	The newly synthesized F ₁ hybrids may be evaluated for green fodder yield. The seed increase in the inbreds of elite hybrids identified may be taken up.
2.	CPBG/CBE/PBG/FRG/2020/001 Evolution of forage grass for high biomass and quality	April 2020 to March 2025	Dr. T. Ezhilarasi	Best performing hybrids in the clonal nursery may be analysed for quality aspects.
3.	CPBG/CBE/PBG/FRG/2020/002 Evolving leguminous forage crops for high green fodder yield and quality	June 2020 to May 2025	Dr. T. Ezhilarasi	The elite Agathi lines may be planted in larger plots to ascertain the green fodder yield and to standardize harvesting intervals.
4.	CPBG/CBE/PBG/FRG/2020/003 Maintenance breeding in Forage Crops	October 2020 to September 2025	Dr. T. Ezhilarasi	Nucleus/breeder seed production may be programmed as per the indents communicated by the DCPBG.
5.	CPBG/CBE/ PBG /MIL / 2021/ 001 Evolving high green fodder yielding pearl millet varieties with enhanced crude protein	July, 2021 to June, 2026	Dr.A. Subramanian	The superior progenies identified in F ₃ generation may be studied critically for green fodder yield in comparison with fodder pearl millet CO 8.
6.	CPBG / TRY / PBG / BUF / 2020 / 001.Development of high yielding Buffel grass (<i>Cenchrus</i> sp.)	September 2020 to August 2025	Dr.P.Anantharaju	The superior accessions of Buffel grass under sodic soil condition may be multiplied and evaluated for green fodder yield and quality.

7.	CPBG/KKM/PBG/2017/001 Development of Cumbu Napier Hybrids with Superior Quality traits for Tamil Nadu	April 2017 to March 2020 Extended: April 2020 to March 2022	Dr. N. Aananthi	The elite bajra germplasm lines identified may be shared with the Dept. of Forage Crops. The Project may be closed. Completion report may be submitted.
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AICRP Projects

Sl. No	Project No.	Period	Investigators	Remarks of DCPBG
I	SORGHUM			
1.	AICRP/PBG/CBE/SOR/006 ICAR – AICRP on Sorghum	Continuous Project	Dr. R. Chandirakala, Prof.(PBG) Dr. D. Kavithamani Asst. Prof. (PBG)	The Coordinated trials may be laid out and promising entries have to be utilized in the crossing programme.
II	PEARL MILLET			
1.	AICRP /PBG/CBE/PEM/009 All India Coordinated Research Project on pearl millet	Continuous Project	Dr. K.Iyanar Professor (PBG) Dept. of Millets	Efforts may be taken to identify the potential of AICRP nominated entries and utilization for improvement of yield plateau.
III	MAIZE			
1.	AICRP /PBG/CBE/ MAZ/004 Evaluation of hybrids and composites from All India Coordinated Research Project on Maize	Continuous Project	Dr. S.Sivakumar Professor and Head Dr.N.Kumari Vinodhana Assistant Professor (PBG)	More hybrids may be nominated for AICRP trials
2.	AICRP/PBG/VGI/MAZ/005 ICAR – AICRP on Maize	Continuous Project	Dr.K.R.V.SathyaSheela Asst professor (PB&G) MRS, Vagarai	The project may be continued. The promising hybrids in the AICRP trials shall be utilized for the new inbred development.

IV	SMALL MILLET			
1.	AICRP / PBG / ATL / SMM / 008 ICAR – AICRP on Small Millets	Continuous Project	Dr. A. Nirmalakumari Professor (PB & G) CEM. Athiyanthal	The Coordinated trials may be laid out and promising entries have to be utilized in the crossing programme.
V	FORAGE CROPS			
1.	AICRP/PBG/CBE/FCR/026 AICRP on Forage Crops	August 2020 to March 2022	Dr. K.N.Ganesan Prof. and Head (Forages)	The elite cultures identified from breeding programmes may be nominated for AICRP evaluation. AICRP Trials may be laid out as per the technical programme finalized in the respective NGM.

III.	Externally funded schemes			
1.	DBT/CPBG/CBE/FC/2019/R004 Establishment of biotech KISAN hub in Two aspirational districts (Virudhunagar and Ramanathapuram) of Tamil Nadu	April 2019 to December 2021	Dr. K. N. Ganesan Prof. and Head (Forages) Dr. S. D. Sivakumar Assoc. Prof. (Agron.) Dr. T. Ezhilarasi Asst. Prof. (PBG)	Completion Report may be submitted.

Ia. CENTRE FOR PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

A. Action Plan 2021-22

S.No.	Theme	Proposed plan of work during 2021-2022
1	Theme 2: Evolution of shoot fly and midge resistant sorghum (Dr. N. Senthil and Team)	<ul style="list-style-type: none"> • Validation of markers linked to shoot fly resistance in sorghum • Developing breeder friendly markers for shoot fly resistance in sorghum • Initiating molecular breeding for developing shoot fly resistant sorghum genotypes
2.	Theme 10: DNA finger printing of varieties/hybrids and pre-release cultures (PI: Dr. R. Gnanam; Dr N. Senthil)	DNA Finger printing of newly released varieties and pre-release cultures will be carried out;

A1. New Action Plan (2021-2024)

Theme: UNRAVELLING NUTRITIONAL AND THERAPEUTIC CLUES IN SORGHUM

Unraveling therapeutic clues of sorghum Dr. M. Raveendran Dr. N. Manikanda Boopathi	Work Plan (2021-22) <ul style="list-style-type: none"> • Non-targeted metabolomics using LC-MS/MS • Re-sequencing of the panel using GBS/RAD • GWAS analysis of yield and metabolite accumulation
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V. Remarks of the Ongoing URPs / Externally Funded Projects in CPMB

University Research Projects

Sl. No.	Project No. and Title	Duration	Investigators	Remarks
1	CPMB/VVNR/BIC/2019/001: Studies on profiling of nutritional and anti-nutritional factors in selected minor millets	June'2019 – May 2021	Mr. S. Pandarinathan AP, Biochemistry	Project to be continued for one more year. Reliable and reproducible protocols may be used for quantifying nutritional and anti-nutritional factors

2	DBT/CPMB/MDU/DPB/2015/R003: Enrichment of nutritional quality in maize through molecular breeding	March'2015 – Sep'2020	Dr. N. Senthil, Director, DPMB&B	Project completed. Leads obtained may be used for proposing externally funded projects
3	CPMB/CBE/PBT/2018/CP004: DNA fingerprinting and barcoding of varieties and hybrids and pre- release cultures for varieties/hybrids identification and notification	April'2018 – Sep'2020	Dr. R. Gnanam, Professor& Head, DPMB&B, Dr. N. Senthil, Professor (Biotechnology) Dr. N. Manikanda Boopathi, Assoc. Professor (Biotechnology) Dr. P. Jayakanthan, Asst. Professor (Bioinformatics)	Project activities may be continued under new URP
4	ICAR-CRP/CPBG/CBE/PGR/2015/R001 Consortia Research Platform (CRP) of ICAR on "Bio-fortification in selected crops for Nutritional Security-Low phytate maize" at TNAU, Coimbatore	April'2020 – Mar'2025	Dr. A. John Joel, Professor (DPB)	Project may be continued

II. CROP MANAGEMENT

A. Technologies for adoption / OFT

Adoption

1. Evaluation of the organic production system in barnyard millet

State recommended management practices (FYM @ 10t/ha + Azophos @ 2kg/ha + 100% RDF) recorded the highest grain yield (1895 kg/ha) with BC ratio (1.69) were fetched from 75% organic (organic manures equivalent to 75% N requirement of the system) + innovative organic practice (3% Panchagavya + Azophos @ 2 kg/ha) treatments.

2. Effect of Potassium on partitioning efficiency and productivity of minor millet crops.

Foliar spray of 1% K₂SO₄ at 35 DAS is recommended for higher grain yield in Samai and Tenai with yield increment of 15% and 18.5% respectively. It recorded higher partitioning efficiency percentage of 34.6% (Samai) and 43.8% (Tenai) to grain with higher benefit cost ratio of 2.57 (Samai) and 4.1 (Tenai).

On Farm Trial (OFT)

OFT 1. Studies on the production potential of foxtail millet + oilseed intercropping systems in Tamil Nadu

Objective

To study growth and yield potential of foxtail millet + oilseed intercropping system

Treatments

- T₁ - Sole foxtail millet
- T₂ - Foxtail millet + Sesame (4: 1)
- T₃ - Foxtail millet + Niger (4: 1)

Centres

- ❖ CEM, Athiyandal (Lead Centre)
- ❖ RRS, Paiyur
- ❖ AC & RI, Vazhavachanur
- ❖ ORS, Tindivanam

Observations to be recorded:

All growth and yield parameters, grain yield, straw yield, system productivity, profitability and economics

For Information

1. Assessment of Nanoceria toxicity at different trophic levels and its influence on Sorghum yield under terminal drought stress

Foliar application of nanoceria @ 20 mg L⁻¹ improved the sorghum grain yield through increased photochemistry, photosynthetic rate, and pollen germination percentage.

2. Conservation agriculture for rainfed sorghum under vertisols

Minimum tillage with tractor drawn cultivator and growing cover crop (green gram) + application of 100 % RDF + crop residue compost 12.5 t/ha + seed and soil inoculation of biofertilizers recorded higher grain yield, straw yield and rain water use efficiency.

3. Quantifying the response of Kharif grain sorghum to different levels and sources of sulphur

Application of RDF+FYM @ 6t/ha+ZnSO₄ @ 15kg/ha+ Gypsum (21% S) @ 20 kg/ha recorded higher grain yield of 4497 kg/ha and straw yield of 11886 kg/ha with B:C ratio of 2.57.

4. Evaluation of parching sorghum (Hurda) genotypes for crop diversification

The parching sorghum variety PKV Ashwini showed better performance with application of 120 kg N/ha and 60 kg P/ha on growth and yield of sorghum for crop diversification.

5. Enhancing bio-fortified pearl millet hybrid productivity through micronutrients under irrigated situation

Pearl millet hybrid (HHB 299) registered higher grain yield compared to MPMH 17. Basal application [ZnSO₄ @ 25 kg/ha + FeSO₄ @20 kg/ha along with RDF (80:40:40 kg NPK/ha)] and foliar spray [borax @ 0.2% at 20-25 DAS] recorded higher grain yield with with BCR (1.83) in HHB 299 hybrid.

6. Contribution of production factors to the yield and economics of pearl millet

Pearl millet cultivation with full package of practices (RDF+ZnSO₄+FeSO₄+ Bio-inoculant seed treatment + thinning, gap filling, weeding, hoeing and irrigation) recorded the highest grain yield, stover yield and economic returns. Irrigation, weed management, thinning, gap filling and fertilizers application (both RDF and ZnSO₄) showed higher contribution towards the yield and economics of pearl millet.

7. Effect of tillage and nutrient management systems on pearl millet yield and soil properties.

Conventional tillage (two harrow + one cultivator and planking + one inter culture operation by power weeder at 21-28 DAS) recorded higher grain yield (2974 kg/ha).100% N through inorganic supply produced higher grain yield (2950 kg/ha) with higher energy productivity (0.36) and net returns (Rs. 37830/ha).

8. Response of pearl millet to split application of nitrogen at different growth stages under irrigated condition

Pearl millet hybrid showed positive response to higher dose of N fertilizers (112.5% & 125% RDN). Application of N in three splits [25% N at sowing + 50% N at

tillering (20-25 DAS) + 25% N at boot stage (35-40 DAS)] recorded higher grain yield (3108 kg/ha) with BCR (1.96) over two splits.

9. Grain cum fodder production in maize based intercropping system under irrigated condition

Sole maize with 100% RDF recorded the highest mean grain yield (6987 kg / ha) followed by maize + fodder maize with 125% RDF and maize + fodder maize with 150% RDF. Lesser grain yield was recorded under maize + fodder cowpea with 150% RDF. Maize + fodder maize with 125% RDF recorded higher net return (Rs. 79,184/-) and BC ratio (2.40).

10. Weed management in maize

Application of Topramezone at 25.2 g/ha + Atrazine 0.75kg/ha on 15 DAS recorded higher grain yield (6799 kg ha-1) and BC ratio (2.54) in maize.

11. Integrated nutrient management in maize

Application of 100% RDF (250:75:75 Kg NPK/ha) + 5 kg Zn/ha recorded higher grain yield (8289 kg/ha) and BC ratio (2.97) in maize (COHM 6).

12. Evaluation of organic, inorganic and integrated production systems in pearl millet, barnyard millet and finger millet

Performance of State recommended nutrient management practice: Farm yard manure @ 25 t ha-1 + Azophos @ 2 kg ha-1 + Recommended dose of fertilizers found better in finger millet and barnyard millet, whereas, 50% organic + 50% inorganic management practices performed well in pearl millet with respect to grain yield.

Organic nutrient management (50% N requirement through organic manures (50% FYM + 50% vermicompost) + seedling treatment with Beejamrit + Ghanajeevamrit @ 250 kg ha-1, Jeevamrit @ 500 litres ha-1 time-1 twice a month with irrigation water recorded the highest yield and benefit cost ratio in all the millets

13. Evaluation of natural farming practices in sorghum under different agro -ecology

Application of Beejamrit + Ghanajeevamrit + Jeevamrit + Crop residue mulching recorded the highest grain yield of 1792 kg/ha with BC ratio of 1.24.

14. Evaluation of cost-effective mechanization in finger millet cultivation

Seed cum fertilizer drill (40 cm row spacing) with power operated weeder recorded more number of effective tillers (70.8 Nos./sq.m.), ear head length (5.42 cm), maximum grain yield (2500 kg/ha) and straw yield (3549 kg/ha).

- 15. Evaluation of integrated weed management approaches in rainfed ragi**
PE application of Isoproturon @ 0.50 kg a.i./ha followed by Power weeder on 30 DAS recorded more number of effective tillers (112 Nos. per sq.m), grain yield (3412 kg ha⁻¹), straw yield (5828 kg ha⁻¹) and BC ratio (2.29).
- 16. Evaluation of integrated weed management approaches in irrigated ragi**
PE application of Oxyfluorfen 0.05 kg/ha followed by power weeder on 30 DAS recorded more number of effective tillers (112.6 /sq.m.), grain yield (3823 kg ha⁻¹), straw yield (6002 kg ha⁻¹) and BC ratio (2.63).
- 17. Developing Vriksh ayurvedic farming protocols for Panivaragu (*Panicum miliaceum*)**
Leaf Biomass transfer of Albizia lebbeck @ 1.38 Mg / ha + Mangifera indica 5% LTS extract recorded higher grain yield of 900 Kg/ ha and straw yield of 4000 Kg/ha. Moringa oleifera extract may be adopted as an alternative measure.
- 18. Response of millets to potassium nutrient**
Application of 20 kg/ha potassium with recommended dose of N and P (44-22-0 kg NPK/ha) recorded higher grain yield in millets which facilitated high tolerance to lodging and reduced pest and disease incidence than control.
- 19. Finger millet intercropping with blackgram and redgram under irrigated eco system**
Finger millet intercropped with blackgram (4:1 ratio) registered higher equivalent yield and BC ratio of 2.85.
- 20. Physiological evaluation of finger millet (*Eleusine coracana* (L.) Gaertn) for sodicity tolerance and mitigation through growth promoters and nutrients**
Paiyur 2 & ATL 1 identified as tolerant varieties and Paiyur 1 and CO 14 as susceptible for sodicity stress. The susceptible varieties – Paiyur 1 & CO 14 showed significant improvement in grain yield by foliar spray of nutrient mixture (Calcium nitrate (0.5%) + K₂SO₄ (0.5%) + ZnSO₄(0.5%) + Boric acid (0.2%) at active tillering and flowering stage.
- 21. Physiological evaluation of Tenai and Panivaragu genotypes for low temperature tolerance**
Tenai – Tnsi 375 and Panivaragu – TNpm 280 lines are performed better under low temperature stress with higher specific leaf weight, relative growth rate, cell membrane integrity, soluble protein, 1000 grain weight, grain yield and harvest index.

New Action Plan

1. Farmer's participatory validation of TNAU organic package of practices in finger millet

Treatment details:

T₁ – Package of practices developed by TNAU for organic finger millet cultivation

T₂ – Farmers' practice

Variety: ATL – 1

Period: 2022-23

Organic Package of practices developed by TNAU for finger millet

- ❖ Application of FYM @ 3 t/ha during last ploughing
- ❖ Application of azophos @ 2.5 kg/ha and *Trichoderma viride* @ 2.5 kg/ha along with 50 kg of FYM.
- ❖ Application of vermicompost at 1.5 t/ha in two equal splits at basal and 30th day after sowing
- ❖ Foliar spray of panchagavya 3% at vegetative, flowering and grain filling stages
- ❖ Need based application of NSKE 5% and *Bacillus subtilis* 0.5%.

Observations to be recorded:

- ❖ Growth characters: Plant height and DMP at harvest
- ❖ Yield characters: No. of productive tillers / hill, earhead length, earhead weight and No. of fingers/ earhead, grain yield and straw yield.
- ❖ Economics: Cost of cultivation, Net returns and BCR

Centres: NOFRC – Coimbatore, CEM – Athiyanthal and RRS – Paiyur

2. Optimizing spacing and nutrient levels for pre-release sweet corn hybrids

Objective:

To optimize spacing and nutrient levels for pre-release sweet corn hybrids

Treatments

Main plot: Plant Density

D₁: 60 x 25 cm (66,666 plants/ha)

D₂: 60 x 20 cm (83,333 plants/ha)

Sub plot: Nutrient management

N₁: 120 % RDF (144:72:54 NPK kg/ha)

N₂: 100 % RDF (120:60:45 NPK kg/ha)

N₃: 80 % RDF (96:48:36 NPK kg/ha)

Sub sub plot: Hybrids

G₁: CSCH-16027

G₂: CSCH-17021

G₃: Misthi (Check)

Design: Split Split plot

Replication: 3

Period: 2022-2023

Centre: TNAU, Coimbatore

Scientist in-charge: Dr. R. Ravikesavan, Director (CBPG)

Dr. P. Kathirvelan, Asst. Prof. (Agronomy), Dept. of Millets

Dr. C. Bharathi, Asst. Prof. (SS & AC), Dept. of Agronomy

3. Effect of leaf extract on weed management of Little Millet (*Panicum sumatrense*).

Objective:

To evaluate the efficiency of eco-friendly weed management by using different leaf extracts and their combinations in little Millet.

Treatments:

T₁ & T₂ : PE of Tamarind leaf extract @ 20 and 30% (3DAS)

T₃ & T₄ : PE of Casuarina leaf extract @ 20 and 30% (3DAS)

T₅ & T₆ : PE of Castor leaf extract @ 20 and 30% (3DAS)

T₇ & T₈ : PE of Papaya leaf extract @ 20 and 30% (3DAS)

T₉ & T₁₀ : PE of Teak leaf extract @ 20 and 30% (3DAS)

T₁₁ & T₁₂ : PE of Pine leaf extract @ 20 and 30% (3DAS)

T₁₃ & T₁₄ : PE of Nerium flower extract @ 20 and 30% (3DAS)

T₁₅ : Absolute control

Scientist In-Charge: Dr. P. Murali Arthanari, Assoc. Prof. (Agronomy),
Dept. of Agronomy, TNAU, Coimbatore

4. Grain nutritional maximization in proso millet.

Objective: To develop nutrient dense proso millet through nutrient management

Treatments details:

T₁: Absolute control

T₂: RDF

T₃: RDF + FeSO₄ (25 kg/ha)

T₄: RDF + ZnSO₄ (25 kg/ha)

T₅: RDF + Humic acid (20 kg/ha)

T₆: RDF + Humic acid (20 kg/ha)

T₇: RDF + Humic acid (20 Kg/ha)

Observations to be recorded:

1. Initial and post harvest soil analysis
2. Proximal analysis of the crop at 25, 50 DAS and Harvest
3. Growth, yield parameters and yield
4. Quality analysis of grains and straw
5. Economics

Centres: CEM – Athiyanthal, RRS – Paiyur and AC & RI – Vazhavachanur

5. Evaluation of ratoonability in kodomillet.

Objectives:

To identify the suitable variety for ratooning and management practices for higher grain yield

Treatment details:

Factor 1 : Kodomillet cultivars

V₁ : ATL1

V₂ : ATL 2

V₃ : KMV 553

Factor 2 : Cutting height from ground level

C₁ : 10 cm

C₂ : 15 cm

C₃ : 20 cm

Factor 3 : Nutrient management

N₁ : RDF (44-22-0 kg NPK/ha)

N₂ : RDF + 25% additional N

Observations to be recorded:

1. Initial and post harvest soil analysis
2. Growth, yield parameters and yield
3. Economics

Centres: CEM – Athiyanthal, RRS – Paiyur and AC & RI – Vazhavachanur

6. Understanding Drought Tolerance Mechanisms in Sorghum

Objective:

To understand the role of shoot and root traits for sorghum drought tolerance

Methodology

- ❖ Contrasting lines will be evaluated for shoot traits (transpiration rate, photosynthetic rate, and stomatal characters) and root traits (root angle, rooting depth, root: shoot ratio, total root length, and root diameter) under greenhouse condition.
- ❖ Confirmation of drought tolerance under field condition.

Expected Outcome:

Sorghum root and shoot traits for assessment of drought tolerance will be arrived.

Duration: Two years (2022-2024)

Scientist In-charge:

Dr. M. Djanaguiraman, Assistant Professor (Crop Physiology), TNAU, Coimbatore.

V. Optimizing Technology Package for Tenai

Objectives:

- ❖ To study the effect of different crop establishment techniques, inter cropping and foliar nutrition on the growth, yield and quality of Tenai.

Period: June 2022 to May 2024

Treatment details:

V. Mechanized Sowing

1. Seed drill sowing (Pelleted seeds)
2. Manual Broad casting (non pelleted seed)
3. Manual Line sowing (non pelleted seed)

II. Inter cropping

1. Tenai +Field Bean at 6:1ratio
2. Tenai +Red gram at 6:1ratio

III. Foliar nutrition

1. Panchagavya @ 3% at Vegetative and Flowering stage.
2. Fish amino acid @ 2% at Vegetative and Flowering stage.

Coordinating centre

Dr. P. Kathirvelan, Asst. Prof. (Agronomy), Department of Millets, TNAU, CBE
Dr. S. Kavitha, Asst.Prof. (SST), Department of PGR, TNAU, CBE

Centres

Dr. P. Parasuraman, Professor and Head, RRS, Paiyur
Dr. K. Sathya, Asst. Prof. (Agronomy), CEM, Athiyanthal

University Research Project

Sl. No.	Project No. and Title	Project leaders	Remarks
Sorghum			
1	URP DCM/CBE/CRP/SOR/2019/001 Assessment of nanoceria toxicity at different trophic levels and its influence on sorghum yield under terminal drought stress (Nov 2019 to Dec 2021)	Dr. M. Djanaguiraman Asst. Prof. (CRP) Dr. R. Raghu Asst. Prof. (AGM) TNAU, Coimbatore	Project to be closed. Results given for information
2	URP DCM/KPT/AGR/SOR/2020/001. Conservation agriculture for rainfed sorghum under vertisols (September 2020 to June 2022)	Dr. A. Solaimalai Professor (Agronomy)	Project to be continued for another one more year. Results given for

Sl. No.	Project No. and Title	Project leaders	Remarks
			information.
Pearl millet			
3	Action Plan DCM/CBE/AGR/SMM/2020/001 Studies on performance of prerelease pearl millet hybrids under different spacing and nutrient levels (July, 2019 – June, 2022)	Dr. R. Karthikeyan, Asst. Prof. (AGR) Dr. K. Iyanar Assoc. Prof. (PB & G) Dr. A. Renuka Devi Asst. Prof (SS & AC)	Project to be closed
Maize			
4	Action Plan DCM / VGI / AGR / MAZ / 2020 / 001 Grain cum fodder production in maize based intercropping system under irrigated condition (July 2020 to June 2023)	Dr. T. Selvakumar Asst. Prof. (AGR) Maize Research Station, Vagarai Dr. R. Jeyasrinivas Asst. Prof. (AGR) ARS, Vaigai Dam Dr. N. Satheesh Kumar Asst. Prof. (AGR) ARS, Bhavanisagar	Project to be continued and the results given for information. Soil related parameters have to be recorded.
Small millets			
5	URP DCM/PAI/AGR/SMM/2020/001 Evaluation of cost-effective mechanization in Finger Millet (<i>Eleusine coracana</i> L.) cultivation (July 2021 to March 2023)	Dr. P. Parasuraman Professor and Head, RRS, Paiyur Dr. R. Thiyagarajan Asst. Prof. (FM), AEC & RI, TNAU, Cbe.	Project to be continued for one more year and the results given for information
6	DCM/PAI/AGR/SMM/2020/002 Evaluation of Integrated Weed Management approaches on Irrigated Ragi (<i>Eleusine coracana</i> L.). (December 2020 to March 2022)	Dr. G. Guru, Assoc. Prof. (AGR) RRS, Paiyur	Project is to be conducted for one more year. Statistical data have to be furnished.
7	DCM/PAI/AGR/SMM/2020/003 Evaluation of Integrated Weed Management approaches on Rainfed Ragi (<i>Eleusine coracana</i> L.). (Dec 2020 to Mar 2022)	Dr. G. Guru, Assoc. Prof. (AGR) RRS, Paiyur	Project is to be conducted for one more year. Statistical data have to be furnished.
8	URP DCM/MDU/AGR/SMM/2020/002 Evaluation of <i>Vriksh ayurvedic farming</i>	Dr. C. Swaminathan Professor (Agronomy) Dept. of Agronomy	Project to be closed. Results given for

Sl. No.	Project No. and Title	Project leaders	Remarks
	practices in kodo millet (<i>Paspalum scrobiculatum</i>). (July 2020 to June 2021)	AC&RI, Madurai	information.
9	URP DCM/MDU/AGR/SMM/2020/001 Developing <i>Vriksh ayurvedic farming</i> protocols for panivaragu (<i>Panicum miliaceum</i>) (January 2020 to June 2021)	Dr. C. Swaminathan Professor (Agronomy) Dept. of Agronomy AC&RI, Madurai	Project to be closed. Results given for information.
10	URP DCM/ATL/CEM/MIL/2021/002 Finger millet intercropping with blackgram and redgram under irrigated Eco-system (2020 -2023)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal Dr. K. Ananthi Asst. Prof. (CRP) AC&RI, Vazhavachanur	Project to be continued and the results given for information.
11	Action Plan Studies on the production potential of foxtail millet + oilseed intercropping system in Jawadhu hills of Tamil Nadu (2020-2023)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project outcome to be recommended for OFT
12	Physiological evaluation of Tenai and Panivaragu genotypes for low temperature tolerance) (November 2020 to October 2023)	Dr. K. Ananthi Asst. Prof. (CRP) AC&RI, Vazhavachanur	Project to be continued
	AICRP		
	Sorghum		
13	AICRP/PBG/CBE/SOR/006 Evaluation of pre-released <i>kharif</i> grain sorghum genotypes for their productivity under rainfed environment (<i>Kharif, 2022</i>)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
14	AICRP/PBG/CBE/SOR/006 Performance of pre-released sweet sorghum genotypes under rainfed environment (<i>Kharif, 2022</i>)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
15	AICRP/PBG/CBE/SOR/006 Quantifying the response of kharif grain sorghum to different levels and sources of	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the

Sl. No.	Project No. and Title	Project leaders	Remarks
	haract (Kharif, 2022)		proceedings of AICRP
16	AICRP/PBG/CBE/SOR/006 Performance of sorghum under different tillage systems (Kharif, 2022)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
17	AICRP/PBG/CBE/SOR/006 Evaluation of parching sorghum (Hurda) genotypes for crop diversification (Kharif, 2022)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
18	AICRP/PBG/CBE/SOR/006 Boron nutrition in rabi grain sorghum (Rabi, 2022)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
19	ICAR / DCM / CBE / SOA / 2015 / R001 Network Project on Organic Farming: Evaluation and validation of natural farming ecosystem in sorghum based cropping system (01.04.2020 to 31.03.2023)	Dr. R. Krishnan Prof. & Head Dr. R. Sunitha Asst. Prof. (ENS) Dr. M. Suganthi Prof. (AEN) NOFRC	Project may be continued / Closed as per the proceedings of AICRP
20	AICRP/ DCM/ KPT/ AGR/003. Response of sorghum varieties to sowing windows (September 2016 to June 2021)	Dr. S. Subbulakshmi, Asst. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
	Pearl Millet		
21	AICRP/PBG/CBE/PEM/009 Moisture conservation through polymers and crop residues under rainfed conditions (June 2020 to May 2022)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
22	AICRP/PBG/CBE/PEM/009 Enhancing bio-fortified pearl millet hybrid productivity and quality through micronutrients under irrigated situation (June 2021 to May 2023)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
23	AICRP/PBG/CBE/PEM/009 Contribution of production factors to the	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed

Sl. No.	Project No. and Title	Project leaders	Remarks
	yield and economics of pearl millet (June 2021 to May 2023)		as per the proceedings of AICRP
24	AICRP/PBG/CBE/PEM/009 Effect of tillage and nutrient management systems on pearl millet productivity (June 2020 to May 2023)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
25	AICRP/PBG/CBE/PEM/009 Response of pearl millet to split application of nitrogen at different growth stages under irrigated condition (June 2021 to May 2023)	Dr. N. Vadivel Assoc. Prof. (AGR)	Project may be continued / Closed as per the proceedings of AICRP
26	ICAR/DCM/CBE/SOA/2015/R001 Network Project on Organic Farming: Evaluation of organic, inorganic and integrated production systems in Pearl millet (01.04.2018 to 31.03.2023)	Dr. R. Krishnan Prof. & Head Dr. M. Suganthi Prof. (AEN) NOFRC	Project may be continued / Closed as per the proceedings of AICRP
	Maize		
27	AICRP/PBG/CBE/MAZ/005. Performance of pre-release genotypes under varying planting density and nutrient levels in <i>kharif / rabi / spring</i> season (June 2022 to April 2023)	Dr. P. Kathirvelan Assistant Professor (Agronomy)	Project may be continued / Closed as per the proceedings of AICRP
28	AICRP/PBG/CBE/MAZ/005 Long term trial on Integrated nutrient management in maize (June 2018 to April 2022)	Dr. P. Kathirvelan Assistant Professor (Agronomy)	Project may be continued / Closed as per the proceedings of AICRP
29	AICRP/PBG/CBE/MAZ/006 Efficacy of nano urea in maize systems (June 2022 to April 2023)	Dr. P. Kathirvelan Assistant Professor (Agronomy)	Project may be continued / Closed as per the proceedings of AICRP
30	AICRP/PBG/VGI/MAZ/005 MAT 1. Performance of pre-release medium maturity genotypes under varying planting	Dr. T. Selvakumar Assistant Professor (Agronomy)	Project may be continued / Closed as per the

Sl. No.	Project No. and Title	Project leaders	Remarks
	density and nutrient levels in <i>Kharif</i> season (June 2021 to May 2022)		proceedings of AICRP
31	AICRP/PBG/VGI/MAZ/005 MAT 7 Weed Management in Maize Systems (June 2021 to May 2022)	Dr. T. Selvakumar Assistant Professor (Agronomy)	Project may be continued / Closed as per the proceedings of AICRP
32	AICRP/PBG/VGI/MAZ/005 MAT 1. Performance of pre-release medium maturity genotypes under varying planting density and nutrient levels in <i>Rabi</i> season (June 2021 to May 2022)	Dr. T. Selvakumar Assistant Professor (Agronomy)	Project may be continued / Closed as per the proceedings of AICRP
	Small Millets		
33	ICAR / DCM / CBE / SOA / 2015 / R001 Network Project on Organic Farming: Evaluation of organic, inorganic and integrated production systems in barnyard millet (01.04.2018 to 31.03.2023)	Dr. R. Krishnan Prof. & Head Dr. M. Suganthi Prof. (AEN) NOFRC	Project may be continued / Closed as per the proceedings of AICRP
	ICAR / DCM / CBE / SOA / 2015 / R001 Network Project on Organic Farming: Evaluation of organic, inorganic and integrated production systems in Finger millet (01.04.2018 to 31.03.2023)	Dr. R. Krishnan Prof. & Head Dr. M. Suganthi Prof. (AEN) NOFRC	Project may be continued / Closed as per the proceedings of AICRP
34	AICRP/PBG/TVM/GNT/019 Response of pre-released Kodo millet varieties to different levels of fertilizer under rainfed conditions (2019 – 2021)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP
35	AICRP/PBG/TVM/GNT/019 Response of Kodo millet to liquid biofertilizers and their mode of application (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP
36	AICRP/PBG/TVM/GNT/019 Response of Brown top millets to liquid biofertilizers and their mode of application (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP

Sl. No.	Project No. and Title	Project leaders	Remarks
37	AICRP/PBG/TVM/GNT/019 Response of millets to different doses of potassium nutrient (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP
38	AICRP/PBG/TVM/GNT/019 Effect of mulching and hydrogel on the productivity of barnyard millet under rainfed conditions (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP
39	AICRP/PBG/ATL/SMM/008 Effect of foliar application of water-soluble fertilizer on growth, yield and nutrient uptake of kodo millet (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP
40	AICRP/PBG/ATL/SMM/008 Intensification of rainfed small millet production (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP
41	AICRP/PBG/TVM/GNT/019 Assessing the performance and yielding ability of millets in Rice fallows (2021-2022)	Dr. K. Sathiya Asst. Prof. (AGR) CEM, Athiyandal	Project may be continued / Closed as per the proceedings of AICRP

II. CROP MANAGEMENT FORAGES

B. Technologies for adoption / OFT

Adoption

1. Silage production in polybags (2019-2022)

Fodder maize (African Tall) is highly suitable for poly bag silage production with air evacuation method and 1% molasses as additive.

New Action Plan

1. Effect of different nitrogen sources on growth, yield and quality of fodder maize

Treatments

- T₁ : RDF (30:40:20 Kg NPK at basal + 30 Kg N at 30 DAS)
T₂ : 30:40:20 Kg NPK at basal + 30 Kg N substitute by Nano urea in 1 split – 30 DAS
T₃ : 30:40:20 Kg NPK at basal + 30 Kg N substitute by Nano urea in 2 splits -15 DAS & 30 DAS
T₄ : 30:40:20 Kg NPK at basal + 30 Kg N substitute by Nano urea in 3 splits – 10 DAS, 20 DAS & 30DAS
T₅ : N (Control), P and K as RDF at Basal
- Observations to be recorded
- Growth attributes (Plant height, Stem girth)
 - Yield (GFY, DMY, CPY)
 - Quality parameters (Crude protein and Crude fibre content)
 - Economics (Cost of cultivation, Gross return, Net return and B:C ratio)
 - Design: RBD Replication: 4
- Expected Outcome
- Response of fodder maize yield and quality to Nano-Urea in comparison with conventional fertilizers will be evaluated
- Scientist in-charge
- Dr. S. Rani, Asst. Prof. (Agronomy), Dept. of Forage crops, TNAU, CBE
 - Dr. T. Selvakumar, Asst. Prof. (Agronomy), Maize Research station, Vagarai

Research Projects and Remarks -DNRM

Millet Scientists Meet, 2022 was held during 26 April, 2022 and 02 May 2022 Director (NRM) reviewed the projects on Millets representing Action Plan, OFT, University Research Projects, AICRPs and Externally Funded Projects. About 17 projects comprising 3 action plan, 5 URPs, 3 AICRPs, 3 OFT, 1 externally funded project, 2 student thesis on millet crops were reviewed. 26 scientists emanated attended the review and presented the salient findings of their project on online mode. The following findings are forwarded for adoption/information/OFT.

V. List of projects reviewed

Project	No. of Project		Total
	SS&AC	Agri. Microbiology	
Action Plan	1	2	3
University Research project	1	4	5
Externally funded	1	-	1
AICRP	3	-	3
On farm Trials	3	-	3
Student Thesis	1	1	2
Total projects	10	7	17
No. of Scientists involved	26		

a). Technologies for Adoption

1. Land Configuration with nutrient management for dual Sorghum in Dryland Vertisols of Southern Tamil Nadu

Adoption of tied ridge land configuration along with the application of 100% NPK as per STCR-IPNS is recommended to achieve higher grain and stalk yield (1673 and 4107 kg ha⁻¹, respectively) in dual sorghum (K 12) with 33 per cent additional grain yield over farmers' practice. The farmers' practice includes sowing with cultivator + 100 % RDF with K + foliar spray @1 % FeSO₄ + 0.1 % citric acid & 0.5 % ZnSO₄. This treatment resulted in higher net income of Rs. 9557 with B:C ratio of 1.34.

b). OFTs for the year 2022-2023

OFT 1: Validation of STCR-IPNS based Fertilizer Prescriptions for Barnyard millet

Objectives

To validate STCR- IPNS based Fertilizer Prescriptions for Barnyard Millet on mixed black calcareous soils (P.N.Palayam soil series)

Treatment Details

T₁ : STCR-IPNS for yield target 3 t ha⁻¹

T₂ : Blanket recommendation (RDF + 12.5 t FYM ha⁻¹)

T₃ : Farmer's fertilization practice

T₄: Absolute control

Observations to be recorded

Grain & Straw yield

Initial and Post harvest soil fertility status

Computed parameters

Per cent Achievement

Response Ratio & BCR

Lead centre & Scientist Incharge

Dr. R. Santhi, Professor (SS&AC)

Lead centre Coordinating scientist

TNAU, Coimbatore : Dr. S. Maragatham, Professor (SS&AC)

AC&RI, Madurai : Dr. P. Kannan, AP (SS&AC)

HC&RI, Jeenuur : Dr. M. Gopalakrishnan, AP (SS&AC)

OFT 2: Evaluation of amendments and microbial consortia for improving the productivity of

Maize and Groundnut on Calcareous soils

Objectives

To improve the crop yield and nutrient availability in Calcareous soils

Treatment Details

T₁ : Soil test based fertilizer recommendation

T₂ : T₁ + 40 kg (Maize) / 80 kg (Groundnut) haract as Elemental haract + 12.5 t FYM + 500 ml calcite dissolving (CD) microbial consortia ha⁻¹

T₃ : Farmer's fertilization Practice

Observations to be recorded

- Grain and Stover yield
- Nutrient availability and uptake
- Soil properties (pH, EC, Free CaCO₃)

Crop: Maize and Groundnut

Lead centre & Scientists in charge

Department of SS&AC, TNAU, Coimbatore

Dr. T. Chitdeshwari, Professor (SS&AC)

Dr. U. Sivakumar, Professor & Head (AGM)

Centres & Scientists in charge

Maize : Dr.T.Chitdeshwari, Professor (SS&AC), TNAU, Coimbatore

Groundnut : Dr.C.Sudhalakshmi, Asst. Professor (SS&AC), CRS, Aliyarnagar

Dr.S.Suganya, Asst. Professor (SS&AC), TNAU& TC, Chennai

Dr.G.Gayathri, Asst. Professor (AGM), KVK, Vridhachalam

c. for Information:

V. STCR-IPNS based Fertiliser Prescriptions for hybrid maize under drip fertigation

- Fertiliser Prescriptions for hybrid maize were validated on red, non calcareous, sandy loam soil (Typic Rhodustalf, Palaviduthi soil series).
- Targeting of 10 t ha⁻¹ grain yield of hybrid maize under drip fertigation on Alfisol under STCR-IPNS is ideal in terms of yield (9.28 and 9.44 t ha⁻¹), RR (15.36 & 15.77 kg kg⁻¹), BCR (2.38 & 2.44) and soil fertility maintenance.

V. Plant probiotics to combat moisture deficit stress and yield increase in finger millet

- Microbial strains of Ragi strains viz., CRB6, CRB7 and SA8 were assessed for plant growth promoting traits. These strains proved their potential role in nutrient (P, K and Zn) solubilization and siderophore production. The consortium primed seeds significantly increased germination % (100 % for both ATL1 and CO15 in NS; 97.7% for CO15 and 100% for ATL 1 in 10% stress and 95.5% for CO15 and 100% for ATL1 in for 20% stress.

3. Dissecting the microbiome of little millet (*Panicum sumatransae* L.) and their mechanism of stress tolerance

- Leaf endophytic bacterial isolates tolerated up to – 4.5 Mpa and posses maximum nutrient solubilization (P solublization, Zn solublization and K releasing efficiencies)
- Germination percentage recorded 40% more with consortium treated seeds compared to non treated seeds and 15 % more with individual potential strains under induced drought stress condition (-0.45 Mpa),

- Seed priming with consortium of LRS2, LAB6, LSB6 and LLB10 enhanced shoot (50-25%), root length (50-25%) and vigor index (16 to 4%) compared to individual isolate under induced drought stress condition (-0.45 Mpa)

V. Permanent Manurial Experiment, Coimbatore: Maize – Sunflower sequence

- Maize: STCR-IPNS recorded the highest grain yield (8257 kg ha⁻¹) followed by 100% NPK + FYM @ 12.5 t ha⁻¹ (7725 kg ha⁻¹) (After 12 years of continuous cropping).
- Sunflower: 100% NPK + FYM @ 12.5 t ha⁻¹ recorded the highest seed yield (2347 kg ha⁻¹) followed by STCR – IPNS (2308 kg ha⁻¹) besides sustained yield over years.
- Soil organic Carbon built up {3.2 g kg⁻¹ during 1909}: 4.23 g kg⁻¹ (control); 9.10 g kg⁻¹ (INM) and 9.06 g kg⁻¹ (STCR-IPNS) and 6.30 g kg⁻¹ (100% NPK alone) during 2021.

V. Long Term Fertilizer Experiment (LTFE), Coimbatore : Finger Millet- Maize sequence

- After 50 years of continuous cropping, INM practice of 100 % NPK +FYM @10 t ha⁻¹ increased grain yield of finger millet 2678 kgha⁻¹ and maize 6329 kgha⁻¹.
- Yield increase in INM was 18.3 % over 100% NPK in finger millet (111th crop). Organic carbon increased from 3.0 g kg⁻¹ (1972-76) to 7.45 g kg⁻¹ (2021-22) in INM.
- Imbalanced nutrient application recorded significantly lower Sustainable Yield Index (SYI) values. INM registered high SYI in both maize (0.31) and Finger millet (0.53).

V. STCR-IPNS based Fertiliser Prescriptions for Foxtail Millet

- Fertiliser Prescriptions for Foxtail millet (*var.* CO 7) were developed for Mixed black calcareous, sandy clay loam soils (Vertic Ustropept, P.N.Palayam soil series).
- Targeting of 2.25 t ha⁻¹ grain yield of Foxtail millet on Inceptisol under STCR-IPNS or by STCR –NPK alone is ideal in terms of yield (2290 and 2215 kg ha⁻¹), RR (13.33 and 12.75 kg kg⁻¹) and BCR (2.01 & 1.98).
- An increase of 28% grain yield has been recorded due to STCR-IPNS over blanket + FYM. For achieving blanket equivalent yield, on an average, there is a saving of 24: 05: 08 kg Fertiliser N, P & K, respectively due to STCR-IPNS.

V. STCR-IPNS based Fertiliser Prescriptions for Barnyard Millet

- Fertiliser Prescriptions for barnyard millet (*var.*MDU 1) were developed for Mixed black calcareous, sandy clay loam soils (Vertic Ustropept, P.N.Palayam soil series)
- Targeting of 3.0 t ha⁻¹ mean grain yield of barnyard millet on Inceptisol under STCR-IPNS is ideal in terms of yield (2979 kg ha⁻¹), RR (11.92 kg kg⁻¹), BCR (1.98).
- An increase of 10% grain yield has been recorded due to STCR-IPNS over blanket + FYM.

- For achieving blanket equivalent yield, on an average, there is a saving of 19:12: 8 kg character N,P & K, respectively due to STCR-IPNS.

V. Real time monitoring and management of drought in major rainfed crops

- Under real time monitoring and management (ridges & furrow, moisture conservation, mulching drought mitigation strategies) of sorghum (K 12) crop during dry spell reported higher grain (2225 kg ha⁻¹) and stover (5006 kg ha⁻¹) yields and also recorded higher B:C ratio (1.77) and net income (Rs. 21506/-) over control (no intervention), Higher RUE of 1.77 kg/ha-mm over control.

9. Amendments and microbial consortia for improving the productivity of maize and

groundnut genotypes on calcareous soils

- Combined application of soil test based NPK + 40 (maize) / 80 (groundnut) kg character as Elemental character + 12.5 t FYM + 500 ml calcite dissolving microbial consortia ha⁻¹ substantially improved the yield (18.6 to 22.7%) of both the crops and nutrient availability.
- Higher yield and tolerance to calcareousness was observed in Maize hybrid : CMH-12-686 > COH(M) 6 > COH(M) 8 ; Groundnut : CO 6 > CO7
- The efficient isolates are *Acinetobacter calcoaceticus* and *Acinetobacter pittii*

10. Seed coating of AM fungal inoculants for improved production of finger millet

- Vermiculite based *Rhizophagus intraradices* and *Funneliformis mosseae* sieved through 500 micron mesh and coated with maize seeds (10 g/kg of seeds) using Carboxy methyl cellulose (0.8%) recorded the highest germination (93.33%), seedling length (31.77 cm) and vigour index (2961.66) and root colonization potential (90.5%) followed by Biosticker coated seeds. The coated seeds were stored upto 6 months with 100 % germination and 90% AM root colonization.

11. Microbial nutrient supplementation for certain localized minor millets

- Totally 27 isolates were purified, of which 11 isolates from pearl millet, 7 isolates from finger millet and 9 isolates from barnyard millet grown soils.
- Screening of these cultures for plant growth promoting traits viz., N₂ fixation, P solubilization, K release, ACC Deaminase activity, IAA, GA, siderophore, ammonia and HCN production was carried out. Among the 27 isolates screened, seven isolates PM5, PM9, FM3, FM6, BM3, BM6 and BM7 were performed well in all the PGPR traits.

12. Studies on culturable core seed microbiome of Maize hybrid (COH6)

- Unculturable core seed bacterial flora of parents and hybrid of maize COH6 was found to include 5 phyla and character endophytic bacterial flora of parents and hybrid of COH6 include 12 isolates and culturable core bacterial flora with plant growth promoting activity include following 7 isolates.

d). Action Plans proposed for 2022-23

1. Action Plan 1 (New): AM fungal inoculants for improved production of finger millet

Objectives

AMF as seed coating for improved growth and yield of finger millet

Treatments

T₁ – Absolute control

T₂ – *Rhizophagus intraradices* + *Funneliformis mosseae* (seed treatment) + 75% NPK

T₃ – *Rhizophagus intraradices* + *Funneliformis mosseae* (seed treatment) + 75% N&K; 50%P

T₄ – Vermiculite based AMF inoculum (soil application) + 75 % NPK (recommended practices)

T₅ – Recommended dose of NPK (100%) + 12.5 t FYM (as per STCR – IPNS)

Note: Other practices same as CPG including bacterial biofertilizers (*Azospirillum* + Phosphobacteria + potash bacteria)

Variety: Paiyur 2 / ATL1; Season: Irrigated and dryland condition

Observations to be recorded

Initial and Post harvest soil analysis: pH, EC, available N,P, K, soil phosphatase & glomalin

Growth and yield, AMF colonization

Weather parameters: Seasonal rainfall & rainy days, Rainwater use efficiency

Locations and Scientists involved

TNAU, Coimbatore: Dr.R. Anandham, Asst. Prof (AGM)

Dr. R. Karthikeyan Asst. Prof. (Agronomy).

Co ordinating centre:

AC & RI, Madurai : Dr. K. Kumutha, Professor and Head

HC&RI, Jeenuur : Dr. A. Ramalakshmi, Asst. Prof(AGM)

AC & RI, Vazhavachanur : Dr. Ananthi, AP (Crop Physiology)

Action Plan 2 (contd.):

Validation of STCR-IPNS based Fertiliser Prescriptions for Hybrid Maize under Drip Fertigation

Rationale

- Rational usage of fertiliser inputs
- Site specific & balanced nutrient supply for higher yield
- Nutrient requirement of the crop, nutrient contribution from soil, fertilizer and organic manure are taken care of.
- Higher FUE and WUE along with sustained soil health and productivity

Objective

To validate STCR-IPNS fertilizer prescriptions for hybrid maize under drip fertigation
Duration: 2 years (2021-2023)

Treatments

- T1 : STCR-NPK alone-8.0 t ha⁻¹
- T2 : STCR-NPK alone-9.0 t ha⁻¹
- T3 : STCR-NPK alone-10.0 t ha⁻¹
- T4 : STCR-IPNS -8.0 t ha⁻¹
- T5 : STCR-IPNS -9.0 t ha⁻¹
- T6 : STCR-IPNS -10.0 t ha⁻¹
- T7 : Blanket recommendation
- T8 : Blanket + FYM
- T9 : Farmer's Practice
- T10 : Absolute control

Soil Type : Palaviduthi soil series; Red sandy loam

Observations: Grain and Stover yield

Analysis : Initial & post harvest soil fertility status

Parameters : Per cent achievement, Response Ratio and BCR

Locations and Scientists involved

Department of SS&AC, TNAU, Coimbatore

Dr. P. Malathi, Assistant Professor (SS&AC)

Dr. S. Maragatham, Associate Professor (SS&AC)

Action Plan 3 (contd.):**Development of an efficient plant probiotics to combat moisture deficit stress and yield increase in finger millet****Rationale**

- Rhizobium esperanzae CRB6, a potential microbe for drought tolerance and PGP attributes to finger millet
- Metabolites released by CRB6 confirms its functional potential & its compatibility with other microbes offer scope for developing probiotic consortia

Objective

- To formulate and optimize suitable delivery mechanism of the microbial consortium for stage specific application
- To evaluate the efficiency of the consortium to combat moisture stress and yield increase.

Duration: 2 years (2021-2023)

Treatments

- T₁ : Absolute control

T₂ : STCR based RDF

T₃ : Liquid formulation *R. esperanzae* CRB6 + *Bacillus subtilis* CRB7 + *B. altitudinus* FD48

+ Yeast SA8 + AMF

T₄ : Nano Formulation of above bioinoculants

T₅ : T₂+T₃

T₆ : T₂+T₄

Parameters to be recorded:

- Live cell based formulation- seed biotisation methods
- Physiological parameters
- Drought tolerant indices
- Biochemical parameters
- Molecular responses
- Agronomic traits

Lead Centre & Scientists: Department of Agricultural Microbiology, TNAU, Coimbatore.

Dr. U. Sivakumar , Prof (AGM); Dr. A. Nirmala Kumari, P&H (PBG), CEM, Athiyandhal, & Dr.TCK.Sugitha (Fr. PDF, CEM, Athiyandhal)

Centres :

- 1.CEM, Athiyandhal (Dr. A. Nirmala Kumari);
- 2.ORS, Tindivanam (Dr.R.Brindhavathy)
- 3.RRS, Paiyur (Dr.P.Parasuraman)
- 4.TRRI, Aduthurai (Dr.T.Sivasankaridevi)
- 5.TNAU, Coimbatore (Dr. R.Ravikesavan, Dr.A.Ramalakshmi & Dr.U.Sivakumar)

Action Plan 4 (contd): Dissecting the microbiome of little millet (*Panicum sumatransae* L.) and their mechanism of stress tolerance towards crop growth and fitness
As per the technical programme approved in the CSM Millets 2021.

Scientist involved: Dr.U.Sivakumar, Professor & Head (AGM), TNAU, Coimbatore

Project wise remarks

S. No.	Activity	Scientist(s)	Remarks
OFTs of 2021-22			
1.	Economising phosphorus use in maize – groundnut sequence	Dr. S. Meena, Dr. M. Baskar and Dr.K.P. Raghunath	<ul style="list-style-type: none"> OFT is in progress The second crop (groundnut) is to be completed and results of the Maize-Groundnut sequence is to be compiled & presented for Adoption in the forthcoming CSM 2022-23
2.	Evaluation of Sorghum Varieties for their tolerance to Sodicity	Dr.M.Baskar, Prof. & Head, SSAC, Trichy Dr. P. Christy Nirmala Mary; Dr. M. Vijayakumar Dr. G. Gomadhi and Dr. P.C.Prabu	<ul style="list-style-type: none"> The OFT is in progress Pooled analysis is to be done for the data collected from all the locations
	Research Projects		
3.	AICRP/DCM/KPT/SAC/AGR/1971/004 Real time monitoring and management of drought in major rainfed crops	Dr. K. Baskar Prof. & Head ARS, Kovilpatti	Findings may be given for Information
4.	NRM/MDU/AGM/2020/003 Microbial nutrient supplementation for certain localized minor millets	Dr. R.Thamizh Vendan	<ul style="list-style-type: none"> May be given for Information Isolated microbial cultures may be characterized, screened with pot culture level and test verified

			in field condition
5.	NRM/ KPT/ AGR/ SOR/2020/001 Effect of AM fungi on growth and yield of sorghum under rainfed conditions	Dr. S. Subbulakshmi Dr. Jeberlin Prabina	<ul style="list-style-type: none"> • The suitable statistical analysis may be used • To project may be continued
6.	NRM/CBE/ AGM/RIC/ 2021/001 Delivery of indigenous AM fungal inoculants as seed coating for improved minor millet production under dryland condition	Dr. A. Ramalakshmi	<ul style="list-style-type: none"> • To project may be continued
7	NRM/CBE/SAC/PME/2019/001 Permanent Manurial Experiment of Coimbatore Under irrigated Tropical Agro Ecosystem	Dr. G.Sridevi Dr. K.Sivakumar	<ul style="list-style-type: none"> • May be given for information and to be continued • Mathematical models for the available data may be developed • Articles should be published in high Impact factor journal
8	AICRP/NRM/CBE/SAC/003 Long Term Fertilizer Experiments – Soil Quality, Crop Productivity and Sustainability as influenced by Long Term Fertilizer Application and Continuous Cropping of Finger Millet – Maize sequence in Swell – Shrink Soil	Dr. K.Sivakumar Dr. G.Sridevi	<ul style="list-style-type: none"> • For information and to be continued • Mathematical models for the available data may be developed • Data generated from the study may be brought as compendium for release
9.	AICRP/NRM/CBE/SAC/002 Soil Test Crop Response Correlation Studies under IPNS for Foxtail millet	Dr. S.Maragatham Dr. M.Gopalakrishnan	<ul style="list-style-type: none"> • To be continued for 2 more years for validation (or) propose for OFT for Adoption
10.	STCR – IPNS Fertiliser Prescriptions for barnyard millet (Student Thesis)	Dr. R.Santhi Dr. S. Maragatham	<ul style="list-style-type: none"> • Findings may be proposed for OFT

11.	DBT/NRM/CBE/SSAC/2019/R009 Exploiting Plant-Microbial interactions to unlock the fixed nutrients in calcareous soils for increasing the crop productivity and soil fertility	Dr. T. Chitdeshwari Dr.U.Sivakumar	<ul style="list-style-type: none"> • To be continued • Best treatments may be selected for conducting OFT
12.	NRM/CBE/AGM/MAZ/2020/001 Multifunctional bacterium, arbuscular mycorrhizal fungi (AMF) and <i>Azospirillum brasilense</i> mediated effect on the growth of maize in calcareous soil	Dr. T. Kalaiselvi Dr. M.R.Latha	<ul style="list-style-type: none"> • The microbial isolates may be characterized for calcareous soil and may be continued.
13.	Student thesis: Studies on culturable core seed microbiome of maize hybrid (COHM6)	Dr. T. Kalaiselvi	<ul style="list-style-type: none"> • May be given for Information • The findings may be published in high NAAS rated journals

Seed Centre

V. Plan of work for Action plan project 2022-23

S. No.	Work plan 2022-23	Scientist in-charge	Remarks
Action Plan Project			
1	SEC/CBE/SST/MIL/2022/001 Seed pelleting for haracteri sowing in small millets (2019-2022)	Dr. P.R.Renganayaki Professor (SST) Dept. of SST, TNAU, Coimbatore Dr. S.Lakshmi Assoc. Prof. (SST) Dept. of Pulses TNAU, Coimbatore Dr. A.P.Mohan kumar,Asst. Prof. (Farm Mach.) AEC&RI, TNAU, Coimbatore Dr. V.Alex Albert Asst. Prof. (SST) KVK, Sirugamani Dr. K.Sathya Asst. Prof. (Agron.) CEM, Athiyandal	<ul style="list-style-type: none"> The nutrient component may be added with pelleting consortia and the effect on the crop performance in field condition may be studied. The project may be continued.
University Research Projects			
1	SEC/BSR/SST/MAZ/2019/001 Study on mitigating the impact of heat stress on flowering phenology, seed yield and quality in maize (September 2019 to August 2022)	Dr. K.Malarkodi Assoc. Prof. (SST) Dr. V.Manonmani Professor (SST) Dr.Babu Rajendra Prasad Asst. Prof. (CRP)	<ul style="list-style-type: none"> Salient findings of the project may be forwarded for OFT. The project may be completed. Publication may be made in NAAS rated journals.
2	SEC/CBE/SST/SOR/2020/001 Assessment of seed storage potential of sorghum genotypes (August 2020 to July 2022)	Dr. S.Kavitha Asst. Prof. (SST)	<ul style="list-style-type: none"> The project may be completed. Publication may be made in NAAS rated journals.

OFT on Mitigating the impact of terminal heat stress to improve seed yield in maize

Duration	From 2022 to 2023		
Location and Scientist In-charge	ARS, Bhavanisagar	:	Dr.K.Malarkodi, Assoc. Prof. (SST) Dr.V. Manonmani, Prof. (SST)
	KVK, Aruppukottai	:	Dr.B.Venudevan, Asst. Prof. (SST)
	KVK, Vamban	:	Dr.V. Vijayalakshmi, Asst. Prof. (SST)
	KVK, Sandhiyur	:	Dr.R.Vijayan, Asst. Prof. (SST)
Treatments	T_0 : Control (Recommended practice) T_1 : Seed priming with SNP 50 μ m for 9 h + foliar spray with SNP 50 μ M at 42 and 50 days after sowing T_2 : Seed priming with SNP 50 μ m for 9 h + foliar spray with Salicylic acid 75 ppm at 42 and 50 days after sowing		
Stage of foliar spray	Boot leaf and flower initiation stage		
Observations to be recorded	<ul style="list-style-type: none"> • Seed Emergence % • Days to first flowering • Days to 50% flowering • Plant height (cm) at 30 DAS • Number of leaves/plant at 30 DAS • Cob length (cm) • Cob weight (g) • Days to maturity • Shelling % • 100 seed weight (g) • Seed yield /plant/plot/ha (kg) 		

CROP PROTECTION

Type of project	AEN	PAT	Total
University sub projects	3	6	9
AICRP projects	3	4	7
Externally funded project (EFP)	1	-	1
Total	7	10	17

A. Technologies for Adoption/OFT/Information

1. FOR ADOPTION

1. Refined IPM capsule for management of maize fall armyworm

The refined IPM capsule for the management of fall armyworm in maize has been validated at 26 centres and has been recommended for adoption. The validated TNAU IPM capsule is furnished below.

Application of neem cake @ 250 kg/ha @ last ploughing to increase plant and soil health. Seed treatment with cyantraniliprole 19.8% + thiamethoxam 19.8% FS @ 4 ml/kg seed. Border cropping with cowpea, gingelly/ redgram or sunflower in garden land conditions & fodder sorghum in dryland conditions @ 3 rows of selected crop. Monitoring of FAW adults using pheromone traps @ 12/ha and damage score at weekly intervals following TNAU 1-5 scale. Release of *Telenomus remus* @ 1,25,000/ha @ early vegetative stage. Application of insecticides as follows:

Early whorl stage (15 – 20 DAE)

- a. Chlorantraniliprole 18.5 SC @ 0.4 ml/ lit (or) flubendiamide 480 SC @ 0.5 ml/lit followed by azadirachtin 1500 ppm @ 5 ml/lit on need basis.
- b. *Metarhizium anisopliae* (TNAU-MA-GDU isolate) @ 2.5 kg/ha (1.6×10^{11} spores / ml) at 35 -40 DAE.

Late whorl stages (35-40 DAE)

- c. Emamectin benzoate 5 SG @ 0.4 g/lit or novaluron 10 EC @ 1.5 ml/lit or spinetoram 11.70 SC @ 0.5 ml/lit

Tasseling and cob formation stage (60 – 65 DAE) (if required)

- Spinetoram 11.70 SC @ 0.5 ml/lit (or) emamectin benzoate 5 SG @ 0.4 g/lit (Do not repeat insecticide sprayed at late whorl stage).

V. Biological management of rust disease in pearl millet

Spraying of 0.2% *Bacillus subtilis* (Bbv57) talc formulation on 30th and 45th day is recommended for the management of pearl millet rust disease

V. Management of leaf blight disease in barnyard millet

Foliar spray of carbendazim 12% + mancozeb 63% @ 0.2% on the appearance of disease and second spray on 15 days later (or) seed treatment with *Bacillus subtilis* (Bbv57) @ 10g/kg + foliar spray with *B. subtilis* (Bbv57) @ 1g/lit on appearance of disease and second spray on 15 days later is recommended for the management of leaf blight disease in barnyard millet

V. For On Farm Trial

OFT 1: Insect pest complex of sorghum earhead and their management

Treatments (to be imposed during milky stage of the crop)

- T1 – Thiamethoxam 25 WG 100 g/ha
- T2 – Quinalphos 1.5DP 25 kg/ha
- T3 – KKM dust 10D 25 kg/ha
- T4 – Untreated control

Design: RBD

Replication: Five

Observations to be recorded:

- Pre-treatment observations on major earhead pests viz., earhead bug, stink bug and grain midge
- Post treatment observations after spraying at weekly intervals (7 and 14 days after imposing treatments)
- Residue analysis to be carried out TNAU, Coimbatore centre
- Yield (kg/ha)

Centres to be involved:

TNAU, Coimbatore (MS)	:	Dr. K. Premalatha, Asst. Professor (Entomology)
Coordinating Centres		
AC&RI, Killikulam	:	Dr.L. Allwin, Asst. Professor (Entomology)
HC&RI, Periyakulam #	:	Dr. Suganyakanna, Asst. Professor (Entomology)
* MS – Monitoring scientist # Trial has to be taken up at MRS, Vagarai		

OFT 2: Management of avian fauna in Maize

Treatments (to be imposed during cob initiation stage)

- T1 – Red reflective ribbons + scare crows (5/ac)+ Sound producing device (5/ac)
- T2 – Farmers practice

Design : Macroplot

Observations:

- Per cent cob damage & weighted cob damage at the time of harvest

$$\text{Weighted cob damage (\%)} = \frac{(0.0 \times S1) + (0.25 \times S2) + (0.50 \times S3) + (0.75 \times S4) + (1.0 \times S5)}{N} \times 100$$

where

S1 = No. of cobs with no damage; S2 = No. of cobs with < 25 % damage;
 S3 = No. of cobs with 25 – 50 % damage; S4 = No. of cobs with 51 – 75 % damage S5 = No. of cobs with > 75 % damage N = Total no. of cobs scored

- Yield (kg/ha)
- BC ratio

Centres to be involved:

AC & RI, Killikulam	:	Dr. N. Balakrishnan, Assoc. Professor (Entomology) – TEAM LEADER
Coordinating Centres	:	
TNAU, Coimbatore	:	Dr. T. Srinivasan, Asst. Professor (Entomology)
AC & RI, Madurai	:	Dr. B. Usharani, Asst. Professor (Entomology)
HC & RI (W), Trichy	:	Dr. V.R. Saminathan, Assoc. Professor (Entomology)
* MS – Monitoring scientist		

OFT 3: Biointensive management of maize charcoal rot disease

S. No.	Treatments
T1	Seed treatment with <i>Bacillus subtilis</i> (Bbv 57) @ 10g/kg of seeds and soil

	application of <i>B. subtilis</i> (Bbv 57) at the time of sowing and <i>T. viride</i> @ 2.5kg/ha each at character stage
T2	Spot drenching with Carbendazim @ 1g/l
T3	Farmers' Practice

Theme leader: **Dept. of Millets, CBE : Dr. V. Sendhilvel (Coimbatore)**

Centers to be involved:

- MRS, Vagarai : Dr. R. Radhajeyalakshmi, Asst. Professor (Plant Pathology)
- CEM, Athiyandal : Dr. P. T. Sharavanan, Asst. Professor (Plant Pathology)
- ADAC&RI, Trichy : Dr. M. Rajesh, Asst. Professor (Plant Pathology)
- TC & RS, Yethapur : Dr. V. Ravichandran, Professor (Plant Pathology)

Design : RBD **Replication :** 7 **Season :** *Kharif*

Observations: PDI , Yield (Kg/ha), CB ratio

3. For information

a. Agricultural Entomology

I. Sorghum

- Seed treatment with *Acorus calamus* TNAU formulation (*Sweet flag 6%EC*) @ 10 ml / kg of sorghum seed was found to be effective upto first two months against *Sitophilus oryzae* and was next only to emamectin benzoate 5SG @ 40 mg/kg seed.
- Spraying of tebuconazole 25.9% EC @ 1ml/l at 50 and 100% flowering in sorghum recorded minimum ergot incidence of 10.23 % as against 48.88 % in control. The highest grain yield of 2094 kg/ha was recorded in the above treatment.
- Among 85 sorghum entries screened, the entries from AVHT-GS viz., SPH1939, SPV2776, SPV2780, SPV2781, SPH1943, SPH1938, SPC02 entries from IHT-GS viz., SPH2000, SPH2003, SPH2004, SPH2001, entries from IVT-GS viz., SPV2862, SPV2863, SPV2869, SPV2870, SPV2872, SPV2875, SPV2877, entries from IAVHT-MC viz., SPH1933, SPH1934, SPH1935, SPH1966, SPH1967, SPH1995, SPH1996, SPH1997, entries from AVHT-SC viz., SPH1985 and SPV2704 showed resistance against ergot, grain mould, anthracnose, rust and downy mildew diseases.

II. Maize

- N-alkyl chitosan @ 7500 ppm registered higher antifeedant index and cumulative mortality (14.28 & 29.33%) and was next only to azadirachtin 1% @ 2 ml/lit (26.36 & 44.65 %). Similarly, Chitosan – O – arginine @ 4000 ppm was effective against I & II instar larvae of FAW with higher antifeedant index and cumulative mortality (8.64 & 21.67%) and was next only to azadirachtin 1% @ 2ml/lit (36.24 & 40.0%)
- Out of 20 inbreds/ hybrids screened at MRS, Vagarai against fall armyworm, the inbred VIM 245A and hybrid VaMH 12013 were found to be resistant (score <

2.0). Similarly, the fodder maize entries *viz.*, AVT M 1-2 and AVT M 1-5 were found to be resistant to fall armyworm with score less than 2.0.

- Studies conducted on persistence of residues of foliar applied insecticides in maize against fall armyworm revealed that, residues of emamectin benzoate persisted for 1 day while, spinetoram persisted for up to 7 days.
- A total number of 530 AICRP entries were screened during *Kharif* 2020 against Post Flowering Stalk Rot (PFSR) caused by *Macrophomina phaseolina* by artificial tooth pick inoculation method. The resistant entries were identified in different maturity groups such as 49 in early maturity (ID 953) , 49 in Medium Maturity (ID-952) , 118 in Late Maturity (ID-955) , 62 in QPM –I-II-III (ID-963), 36 in Sweet Corn & Baby Corn (I-II-III) (ID 964). Among the 530 entries, 380 entries were found to be resistant with < 3 grade to charcoal rot in maize. 101 lines were found to be moderately resistant to PFSR disease.
- Among 62 nos. of TNAU maize inbreds screened, 53 entries were found to be resistant to Charcoal rot. The entries *viz.*, CMH12-686, 707-9-4-1-4-1, 701-15-3-3-3-3, UMI1210, NO9-153-1-2, UMI1223, NK6240, CO6, NO-9-162-6, NO9-154-1, N12-2, N206, N240, N248, N20 and N73 were found to be highly resistant by registering grade 1.
- The validation of the predicted model for the occurrence of the Leaf Blight Disease in maize was studied in four different locations and the results revealed that the following weather parameters were highly significant in the occurrence of the disease.

Prediction Model for the occurrence of TLB

- Occurrence of the spore – 1.2 to 3.0 / microscopic field
- Relative humidity – 77 to 92 %
- Minimum temperature – 22.6 to 24.30°C
- Dewfall – 0.02 to 0.16 mm
- Rainfall- 6.14mm Or drizzling for three days

PEARL MILLET

- Among the twenty-one summer pearl millet entries screened 17 entries were completely free from downy mildew while, SHT 110 and 112 showed 5.56 and 16.08 per cent downy mildew incidence, respectively.
- Among one hundred and five initial pearl millet entries screened during *Kharif* 2021, 68 were found to be completely free from downy mildew disease, while, 28 entries were showing less than five per cent incidence even at 60 days after sowing under sick plot conditions.
- TNAU entries *viz.*, GMR 250, TNBH 1619, TN-PM (H)-2112, TN-PM(H)-2122 and TN-PM(H)-2124 were showing 4.05, 2.71, 10.74, 1.47 and 3.00 per cent downy mildew incidence under sick plot conditions respectively.
- Rust was the predominant disease on TNAU entries and the incidence was ranged from 5.0 to 22.50 per cent while, blast incidence was recorded in few entries and the incidence ranged from 0.5 to 5 grade.

SMALL MILLETS

- The finger millet entries *viz.*, VR1152 and IIMR-FM-7835 showed resistant reaction to all the three blast.
- The foxtail millet entries *viz.*, IIMR FXM-7, IIMR FXM-9, DHFT 20-3, SIA 4201, TNSI 380, TNSI 382, CRSFXM 4 and CRSFXM 3 were found to be resistant to blast, rust and brown spot diseases
- The little millet entries *viz.*, US-33, WV-168, BULM 18-21, LMV-539 (VS-25), IIMR LM 8001, IIMR LM-4001, RLM 208 showed least incidence of brown spot and no other (leaf blight, banded blight, Cercospora leaf spot) diseases was recorded
- The kodomillet entries *viz.*, DHKM 350-7, TNAU-86, DK 159, IIMR-KM-1, KMV 568 were totally free from all diseases

B. Action Plan (2022-2023)

I. Agricultural Entomology

1. Monitoring major pests on millets & forages and development of prediction models
2. Estimation of yield losses due to insect pests in fodder sorghum (NEW)
3. Evaluation of N alkyl chitosan & Chitosan – O arginine against maize fall armyworm (NEW)

II. Plant pathology

4. Monitoring of major diseases of millets and development of disease prediction models
5. Development of weather driven model for decision support system for the management of maize leaf blight
6. Host specific interaction and biological management of *Magnaporthe grisea* on nutriceals
7. Management of sorghum downy mildew
8. Biological management of rust disease

Action Plan – 1: Monitoring major pests on millets & forages and development of prediction models (Contd...)

Theme Leader	Dr. S. Douressamy, Professor (Entomology), AC&RI, Vazhavachanur		
Activity	Scientist incharge and Centre	Observations	Deliverables
Survey of major pests of millets and documentation (One on campus fixed plot survey in the District identified during the district specific crop season) Besides this, roving survey will be undertaken by scientists identified for "Pest	<u>FIXED PLOT SURVEY</u> <u>AC&RI, VVNR</u> <u>(Tiruvannamalai Dt)</u> Dr. S. Douressamy, Professor (Entomology) (Crop: Pearl millet, Ragi, Tenai, Samai) <u>TNAU, CBE (Coimbatore District)</u> Dr. T. Srinivasan, Asst. Professor (Entomology) (Crop: Sorghum, Pearl millet) <u>KVK, MDU (Madurai District)</u> Dr. B. Usharani, Asst. Professor (Entomology) (Crop: Sorghum, Kudiraivali) <u>RRS, VRI (Cuddalore District)</u> Dr. S. Jayaprabhavathi, (Crop: Pearl millet, Ragi, Tenai,	<ul style="list-style-type: none"> • Fixed plot on campus survey at weekly interval • The major pests pertaining to the crop alone to be included for developing prediction models. • Periodical recording of weather parameters • Correlation of pest population/ infestation 	<ul style="list-style-type: none"> • Documentation of pests of millets • Development of bulletin on pests of millets • Regression model for one or two major insect pest of millets • The shoot fly species infesting

Monitoring" in different districts	<p>Varagu) <u>KVK, APK (Virudhunagar District)</u> Dr. J. Ramkumar, Asst. Professor (Entomology) (Crop: Sorghum, Kudiraivali)</p> <p><u>ROVING SURVEY TNAU, CBE</u> Dr. T. Srinivasan, Asst. Professor (Entomology) (Crop: Sorghum, Maize)</p> <p><u>AC&RI, MDU (Madurai District)</u> Dr. Zadda Kavitha, Asst. Professor (Entomology) (Crop: Sorghum, Maize)</p> <p><u>KVK, APK (Virudhunagar District)</u> Dr. J. Ramkumar, Asst. Professor (Entomology) (Crop: Sorghum, Pearl millet)</p> <p><u>ADAC&RI, Trichy</u> Dr. A. Kalyanasundaram, Professor (Entomology) (Crop: Maize, Sorghum)</p> <p><u>AC&RI, VVNR (Tiruvannamalai Dt)</u> Dr. S. Douressamy, Professor (Entomology) (Crop: Maize, Pearl millet, Ragi, Tenai, Samai)</p> <ul style="list-style-type: none"> • Identification of shoot fly species Dr. N. Chitra, Professor (Entomology) • Molecular confirmation - Dr. S. Mohankumar, Professor (Entomology) 	<p>with weather parameters.</p> <ul style="list-style-type: none"> • Documentation of new/ emerging pests. • Per cent shoot fly infestation to be recorded in surveyed crops along with details of age, variety/ hybrid details, GPS coordinates, etc. • Shoot fly infested central shoots shall be collected in fixed/ roving survey plots and sent to Dept. of Agrl. Entomology, TNAU, Coimbatore for identification 	<p>different millet crops will be delineated</p> <ul style="list-style-type: none"> • Morphological and molecular confirmation of species will be done.
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Action Plan 2: Estimation of yield losses due to insect pests in fodder sorghum (NEW)

Theme Leader	Dr. K. Premalatha, Asst. Professor (Entomology)		
Activity	Scientist incharge and Centre	Observations	Deliverables
<ul style="list-style-type: none"> Fodder sorghum to be raised in 20-25 cent plots Treatments to be imposed as per the protocol for the management of shoot fly and fall armyworm <p>Treatments T1 – Protected (Seed treatment with thiamethoxam 30 FS @ 2g/kg seed; Azadirachtin 3000 ppm @ 2ml/lit at 15 DAE; Emamectin benzoate 5 SG @ 0.5g/lit at 30 DAE T2 – Unprotected</p> <p>Design: Macroplot</p>	<p>TNAU, CBE Dr. K. Premalatha, Asst. Professor (Entomology)</p> <p>KVK, Tirur Dr. V.A Vijayashanthi Asst. Professor (Agrl.Ento.)</p> <p>KVK, NDM Dr. V. Radhakrishnan, Programme Co-ordinator</p>	<ul style="list-style-type: none"> Observations on shoot fly infestation at 15 and 21 days after emergence (DAE) Observation of FAW infestation (% infestation & TNAU 1-5 score) at 30 DAE (pre-treatment) and at 37 & 44 DAE (post treatment) Yield B: C ratio 	<ul style="list-style-type: none"> Management of major pests of fodder sorghum

Action Plan 3: Evaluation of N alkyl chitosan and Chitosan – O – Arginine against maize fall armyworm, *Spodoptera frugiperda* (NEW)

Theme Leader	Dr. M. Shanthi, Director, Centre for Plant Protection Studies, TNAU, Coimbatore		
Activity	Scientist incharge and Centre	Observations	Deliverables
<ul style="list-style-type: none"> Conduct of field experiments <p>Treatments</p> <ul style="list-style-type: none"> T1 – N alkyl chitosan @ 7500 ppm T2 – Chitosan – O 	<p>AC&RI, MDU Dr. Zadda Kavitha, Asst. Professor (Entomology)</p> <p>TNAU, CBE Dr. T. Srinivasan, Asst. Professor (Entomology)</p>	<ul style="list-style-type: none"> Fall armyworm infestation (% infestation & TNAU score) to be recorded prior to imposing treatment and 7 days after each spraying (17 	<p>Evolving a novel botanical formulation for the management of maize FAW during</p>

– Arginine @ 4000 ppm • T3 –Emamectin benzoate @ 0.4 g/lit (standard check) • T4 – Control Replication: Five Design: RBD • Two sprays @ 10 & 20 days after emergence • Refined IPM module shall be followed from II window onwards	<u>AC&RI, KKM</u> Dr. L. Allwin, Asst. Professor (Entomology) <u>ADAC&RI, TRY</u> Dr. A. Kalyanasundaram, Asst. Professor (Entomology)	DAE & 27 DAE) and @ time of harvest • The infestation to be recorded from 20 plants per plot • Yield (kg/ha) • B: C ratio	early vegetative stage
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Action Plan 4: Monitoring of major diseases of millets and development of disease prediction models (Contd...)

Theme leaders	Dr. R. Radhajeyalakshmi – MRS, Vagarai		
Activity	Centre	Observations	Deliverables
1. Fixed plot survey (on/off campus) 2. Roving survey in millet growing regions	<u>Coimbatore & Erode</u> (Maize, Pearl millet and Sorghum) Dr.I.Johnson, Dr. V. Sendhilvel & Dr.A. Sudha Dept. of Millets, TNAU, Cbe <u>Madurai, Virudhunagar, Tuticorin</u> (Maize, Sorghum & Kudiraivali) Dr. R. Akila, RRS, Aruppukottai <u>Dindigul & Tiruppur</u> (Maize, Sorghum and Pearl millet) Dr. R. Radhajeyalakshmi – MRS, Vagarai <u>Dharmapuri, Krishnagiri and Salem</u> (Ragi, Tenai, Pearl millet and Samai) Dr.M.Deivamani, KVK, Papparapatti <u>Tiruvannamalai & Vellore</u> (Ragi, Tenai, Pearl millet and	Occurrence of major diseases Periodical recording of weather parameters	Regression model for diseases of millets

	Samai) Dr. P. T. Sharavanan, CEM, Athiyandal) <u>Villupuram & Kallakurichi</u> (Maize, Pearl millet and Ragi, Varagu, Tenai) Dr. T. K. S. Latha, RRS, Vridhachalam <u>Perambalur and Cuddalore</u> (Maize, Pearl millet, Ragi, Varagu and Tenai) A. Sangeetha, RRS, Vridhachalam		
Foxtail Millet – Epidemiology of fungal diseases	<ul style="list-style-type: none"> Dr. P. T. Sharavanan, CEM, Athiyandal 		

Action plan 5: Development of weather driven model for decision support system for the management of maize leaf blight (Contd...)

Team leader: Dr. V. Sendhilvel, Asst. Prof. (Pl. Path.,) Dept. of Millets, Coimbatore

Activity	Centre	Observations	Deliverables
1. Development of weather driven model 2. Validation of the model	<u>Coimbatore district</u> Dr. V. Sendhilvel, Dept. of Millets, TNAU, CBE Dr. K. Senguttuvan, Dept of Cotton, TNAU, Cbe <u>Dindigul district</u> Dr. R. Radhajeyalakshmi, MRS, Vagarai <u>Thiruvannamalai district</u> Dr. P. T. Sharavanan, CEM, Athiyandal, <u>Salem district</u> Dr. V. Ravichandran, TCRS, Yethapur	Observation to be recorded on <ul style="list-style-type: none"> Validation of the model for the occurrence and forewarning message of the disease. Adoption in the farmers level 	Disease forewarning model development for effective disease management
	Dr. S. Kokilavani, ACRC, TNAU, Coimbatore	Validation	

Action plan 6: Host specific interaction and biological management of *Magnaporthe grisea* on nutricereals (Contd...)

Theme leader	Dr. P.T. Sharavanan, Asst. Professor (Plant Pathology), CEM, Athiyandal		
Activity	Name of the Scientist(s) and Centre(s) – Proposed	Proposed Activities and Observations	Deliverables
<ul style="list-style-type: none"> • Cross infectivity • Exploitation of endophytes from rainfed small millets ecosystems 	<ul style="list-style-type: none"> • Dr.P.T. Sharavanan, CEM, Athiyandal • Dr. G. Senthilraja, TNAU, Cbe • Dr. T.K.S. Latha, RRS, Vridhachalam • Dr. P. Mareeswari, AC &RI, MDU 	<ul style="list-style-type: none"> • Isolation of pathogen causing blast disease in millets. • Confirmation of host specificity of <i>M. grisea</i> through cross infectivity in cumbu, ragi, hara and other millets • Isolation, characterization and evaluation of endophytes against <i>M. grisea</i> 	<ol style="list-style-type: none"> 1. Host specificity of <i>Magnaporthe grisea</i> will be identified 2. Non chemical methods of blast disease management
<ul style="list-style-type: none"> • The CEM, Athiyandal center will carry out the cross infectivity studies, isolation, characterization and <i>in vitro</i> evaluation of endophytes in collaboration with TNAU, Coimbatore centre. • The other centres will conduct only field evaluation of endophytes against blast diseases. 			

Action Plan 7: Management of sorghum downy mildew (Contd...)

Theme leader	Dr. A.Sudha, Asst. Professor (Plant Pathology)		
Activity	Name of the Scientist(s) and Centre(s) – Proposed	Proposed activity and Observations to be made	Deliverables

Integrated Management of downy mildew disease Season: Kharif <u>Treatments</u> 1. ST with <i>Bacillus subtilis</i> (Bbv 57) @ 5ml/kg + spraying of mancozeb @ 2.5g/litre on 30 th day on 45 th day 2. ST with metalaxyl @6g/kg + spraying of mancozeb 2.5g/litre on 30 th day on 45 th day 3. ST with metalaxyl @6g/kg + Foliar spraying of <i>B. subtilis</i> (Bbv57) @ 0.2 % on 30 th day + spraying of mancozeb @ 2.5g/litre on 45 th day 4. ST with metalaxyl @6g/kg + Foliar spraying of <i>B. subtilis</i> (Bbv57) @ 0.2 % on 30 th day on 45 th day 5. ST with <i>Bacillus subtilis</i> (Bbv 57) @ 5ml/kg + Foliar spraying of <i>B. subtilis</i> (Bbv57) @ 0.2 % on 30 th and 45 th day 6. ST with metalaxyl @6g/kg + Foliar spraying of <i>B. subtilis</i> (Bbv57) @ 0.2 % on 30 th day + spraying of metalaxyl @ 2.5g/litre on 45 th day 7. ST with <i>Bacillus subtilis</i> (Bbv 57) @ 5ml/kg + spraying of metalaxyl @ 2.5g/litre on 30 th and 45 th day 8. Control	Dr.A.Sudha, Dept. of Millets, TNAU, Cbe Dr. V.Ravichandran, TCRS, Yethapur Dr. P.T.Sharavanan, CEM, Athiyandal Dr. P. Mareeswari, AC & RI, Madurai	Observation : PDI, Yield (straw) and BC ratio	Effective IDM will be developed
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Action plan 8: Biological management of rust diseases (New)

Theme leader	Dr.I.Johnson, Asst. Prof. (Pl. Path.), Dept. of Millets, Cbe		
Activity	Centre	Observations to be made	Deliverables

<p>Evaluation of bacterial and actinobacterial formulation (Talc) for rust disease management in Pearl millet, Sorghum, Foxtail millet</p> <p>Treatments</p> <ol style="list-style-type: none"> 1. <i>Streptomyces rochei</i> 0.2% (30DAS) + <i>Bacillus subtilis</i> (Bbv 57) 0.2% (45DAS) 2. <i>B. subtilis</i> (Bbv 57) 0.2% (30DAS) + <i>S. rochei</i> 0.2% (45DAS) 3. <i>S. rochei</i> 0.2% (30 & 40 DAS) 4. <i>B. subtilis</i> (Bbv 57) 0.2% (30 & 40 DAS) 5. Mancozeb 0.2% (30 & 40 DAS) 6. Control 	<p>Pearl millet Dr.I.Johnson, Dept. of Millets, TNAU, Cbe Dr. M.Paramasivam, AC & RI, Killikulam</p> <p>Sorghum Dr. V. Ravichandran, TCRS, Yethapur Dr. R. Akila, RRS, Aruppukottai</p> <p>Pearl millet, Sorghum, Foxtail millet Dr.P.T Sharavanan, CEM, Athiyandal Dr.M.Deivamani, AC & RI, Thiruvannamalai</p>	<ul style="list-style-type: none"> • PDI on 30th 45th and 60th day after sowing • Initiation of rust diseases and • Impact of other diseases (Anthracnose, leaf blight/leaf spot) are to be recorded 	<p>Effective biocontrol strategy for rust management</p>
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C. Remarks on the Research Projects

1. AGRICULTURAL ENTOMOLOGY

S. No.	Project details	Remarks
SORGHUM		
1.	<p>CPPS/CBE/PAT/SOR/2019/001 Management of Sorghum ergot disease caused by <i>Claviceps sorghi</i> by biocontrol agents and fungicides Dr.A.Sudha, Asst. Prof. (Pl. Path.), Dept. of Millets, Coimbatore Period: June, 2019 to May, 2022</p>	<p>The project may be closed and the completion report may be submitted. A new URP may be proposed</p>
MAIZE		
1.	<p>CPPS/CBE/ENT/MAZ/2019/001 – Pest Succession and documentation of insect pests and natural enemies fauna in maize ecosystem Dr. T. Srinivasan, Asst. Professor (Agrl. Entomology) Period: Aug, 2019 – Sept, 2021</p>	<p>Extension proposal may be submitted. The project completion report may be submitted.</p>

2.	GoTN – F360T Developing Integrated Pest Management Module for Maize Fall Armyworm and Validation under Area-wide Integrated Pest Management (AWIPM) through Farmer Participatory Approach in Tamil Nadu Dr. S.V. Krishnamoorthy , Professor and Head , Dept. of Agrl. Entomology (Lead PI& Nodal Scientist) Dr. N. Muthukrishnan , Dean, AC&RI, Vazhavachanur (Lead PI) Dr. K. Prabakar , Director, (CPPS) (Team Leader)	Completion report of the project to be submitted.
3.	CPPS/CBE/PAT/MIL/2021/001 Development of maize shank based substrate for the multiplication of <i>Trichoderma viride</i> for charcoal rot disease management in maize Dr. V. Sendhilvel , Asst. Prof. (Pl. Path.), Dept. of Millets, TNAU, Coimbatore Period: March, 2021 to April, 2024	The project may be continued
4.	CPPS/VGI/PAT/MAZ/2017/001 Studies on the genetic diversity of maize downy mildews in Tamil Nadu Dr.R.Radhajeyalakshmi , Asst. Prof. (Pl. Path.) MRS, Vagarai Period: January 2021 to Dec 2024	The project may be continued

PEARL MILLET		
5.	CPPS/CBE/MILL/MILL/2021/001 Development of a mobile-based diagnostic system for rust and downy mildew diseases of pearl millet using deep learning techniques Dr. I. Johnson , Asst. Prof. (Pl. Path.), Dept. of Pl. Pathology, TNAU, Coimbatore Period: August, 2021 to July, 2023	The project may be continued
SMALL MILLETS		
6.	CPPS/ATL/PAT/SMM/2020/001 Integrated disease management of finger millet blast with bio-agents, new molecule fungicides and antibiotics Dr. M. Rajesh , Asst. Prof. (Pl. Path.), CEM, Athiyandal Period: June 2019 to May 2021	<ul style="list-style-type: none"> • The project may be closed and the completion report may be submitted immediately • Another URP may be proposed

7.	CPPS/ATL/PAT/SMM/2020/002 Management of finger millet blast disease through varietal composite Dr. M. Rajesh , Asst. Prof. (Pl. Path.), CEM, Athiyandal Period: June 2020 to May 2022	The project may be closed and the completion report may be submitted immediately
AICRP Projects		
SORGHUM		
8.	AICRP/PBG/CBE/SOR/006 – Evaluation of AICRP trials in sorghum Performance of sorghum entries against major diseases under sick plot conditions	The project may be continued as per AICRP technical programme
PEARL MILLET		
9.	AICRP/PBG/CBE/PEM/009 – Evaluation of AICRP trials in Pearl millet Performance of pearl millet entries against major diseases under downy mildew sick plot conditions and management of Pearl millet downy mildew Dr. A. Sudha , Asst. Prof. (Pl. Path.), Dept. of Millets, Coimbatore (Continuous project)	The project may be continued as per AICRP technical programme

MAIZE		
10	AICRP (Maize) – AICRP/PBG/CBE/MAZ/004 AICRP on Maize Improvement – Continuous project Screening Evaluation of maize lines against major pests of maize and development of management strategies Dr. T. Srinivasan , Asst. Prof. (Entomology), Dept. of Millets, TNAU, Coimbatore (Continuous project)	The project may be continued
	AICRP/PBG/CBE/MAZ/004 – AICRP on Maize Improvement Performance of maize entries against major diseases under sick plot conditions Dr. V. Sendhilvel , Asst. Prof. (Pl. Path.), Dept. of Millets, Coimbatore (Continuous project)	The project may be continued as per AICRP technical programme
SMALL MILLETS		
11	AICRP/PBG/ATL/SMM/008 – AICRP on Small Millets Dr. P.T.Sharavanan , Asst. Prof. (Pl. Path.), CEM, Athiyandal (Continuous project)	The project may be continued as per AICRP technical programme.

IV. REMARKS

a. General recommendations

- Nutrient profile of cultivated millet varieties and value added products may be assessed and documented (Action: CSC & RI)
- Millet supply chain may be strengthened for diverse uses involving ABD initiatives (Action: CARDS & DCM)
- Popularization of millets and their products for eradicating malnutrition among children and Type II diabetes among adults need to be strengthened (Action: DEE & CSC&RI)
- Suitable bird scaring technique for millet crops may be developed and popularized (Action: AEC&RI & DEE)
- Cost effective mechanization for millet cultivation and post harvest processing machineries may be promoted (Action: AEC&RI)
- Documentation of data, success stories and scientific reports on millet cultivation and processing may be carried out (Action: CARDS)
- Identification and popularization of suitable high yielding millet varieties for the 'Minor Millets Special zones' project to be implemented by Government of Tamil Nadu (Action: CPBG & DEE).
- A Tamil book on 'Millet cultivation' comprising of all aspects *viz.*, varieties, cultivation practices, Pests and disease control measures, processing and value addition techniques, potential processing industries, millet based industries, market information, success stories of farmers *etc.* may be prepared and published (Action: DCPBG, DCM, CPPS, CSC&RI and DEE).
- Bio energy potential of Cumbu-Napier hybrid in comparison with forage value may be assessed (Action: AEC&RI, CBE)
- Studies on profiling of nutritional and anti-nutritional factors in forage crops may be carried out and documented (Action: Dept of Forage Crops & CPMB&B)
- All the scientists working in millets and forage crops may be motivated to submit proposals for external funding.

b. Crop Improvement

- Introducing speed breeding concept in millets for accelerated development of high yielding varieties (Action: Dept. of Millets)
- Bio-fortification in maize and pearl millet for nutritional security (Action: CPMB&B & CBPG)
- Development of shoot fly resistant sorghum varieties (Action: Dept. of Millets, ARS, KPT & RRS, APK)
- Red sorghum with high anthocyanin and tannin may be evolved for therapeutic use (Action: Dept. of Millets, ARS, KPT & RRS, APK)
- Development of high fodder yielding pearl millet varieties with increased crude protein content (Action: Dept of Forage Crops)

- Germplasm collection in Napier grass and Guinea grass may be carried out (Action: Dept of Forage Crops).
- Strengthening the germplasm collections in small millets (Action: CoE, ATL & Dept of Forage Crops)

c. Crop Management

- A technology capsule on 'millet production' may be developed and popularized (Action: CPBG, DCM, CPPS & NRM)
- Research on alternate cropping system with suitable millet crops for delta regions including rice fallow may be intensified (Action: ARS, Thanjavur)
- Conservation agriculture for commonly cultivated rainfed millet crops (Action: CoE, ATL, MRS, Vagarai, Dept. of Millets, ARS, KPT & RRS, APK)
- Seed pelleting studies in millets suited for mechanical sowing may be standardized (Action: SS&T & AEC&RI).
- Studies on endobiome and metabolomics in millets may be initiated (Action: Dept. of Millets, NRM & CPMB&B)
- Optimization of nutrient package for Cumbu Napier hybrids (Action: Dept of Forage Crops)
- Cost effective silage techniques may be developed for forage crops other than fodder maize (Action: Dept of Forage Crops)

d. Crop Protection

- Identification and utilization of resistant sources for new pests and diseases in sorghum and maize (Action: Dept. of Millets, ARS, KPT, RRS, APK & MRS, Vagarai)
- Mobile-Apps for identification of pests and diseases in millets may to be developed (Action: DCM & CPPS)
- Biological control of invasive pests as well as frequently occurring pests/diseases in millets (Action: Dept. of Millets, MRS, Vagarai, ARS, KPT & RRS, APK).
- The prediction model has to be developed for one or two major insect pests of millets with the data generated thus far (Action: CPPS).
- Biological control measures for aphids in fodder cowpea and Lucerne and mealy bug in *Desmanthus* may be developed (Action: Dept of Forage Crops)
- The identity of shoot fly species infesting millets may be confirmed through molecular analysis (Action: CPPS & CPMB&B).
- Necessary pests and disease control measures may be advocated in the identified millet special zones as and when required utilizing the services of Plant Protection scientists of nearby KVKs (Action: CPPS & DEE)

V. LIST OF PARTICIPANTS

S. No.	Name and Designation
1	Dr. S. Geetha, Director, CPBG, TNAU
2	Dr. S. Panneerselvam, Director (WTC)
3	Dr. S. Mohanakumar, Director (CAMB &B)
4	Dr. R. Santhi, DNRM
5	Dr. K. Prabakar, Director (CPPS)
6	Dr. S. Sundareswaran, Director, Seed Centre, TNAU
7	Dr. A. Velayutham, Dean, AC&RI Eachangkottai
8	Dr. N.O. Gopal, Professor and Head (AGM)
9	Dr. S. Karthikeyan, Prof. Dept. of Renewable Energy Engg.
10	Dr. G. Karthikeyan, Professor and Head, Dept. of Pl. Pathology
11	Dr. N. Senthil, Prof (Biotech), CPMB & B
12	Dr. U. Sivakumar, Prof (Microbiology)
13	Dr. T. Srinivasan, Asst. Prof. (Entomology) Dept. of Millets
14	Dr. G. Senthilraja, Asst. Prof. (Plant. Pathology) , Dept. of Pulses
15	Dr. V. Sendhilvel, Asst. Prof. (Plant. Pathology) ,Dept. of Millets
16	Dr. I. Johnson, Asst. Prof, (Plant. Pathology), NPRC , Vamban
17	Dr. K. Premalatha, Asst. Prof. (Entomology) ,Dept. of Forage
18	Dr. G. Preetha, Asst. Prof. (Entomology), Dept. of Millets
19	Dr. P. Subramanian, Professor and Head, Dept. of REE
20	Dr. D. Ramesh, Professor (BE), Dept. of REE
21	Dr. A. Christopher Lourduraj, Prof, O/o D.R. TNAU, Cbe
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25	Dr. N. Vadivel, Assoc. Prof, (Agronomy), Dept. of Millets
26	Dr. P. Murali Arthanari, Assoc. Prof, (Agronomy),
27	Dr. M. Ravindran, Professor, (Boitech),
28	Dr. A. Surendrakumar, Professor and Head, Dept. of FM & PE
29	Dr. G. Guru, Assoc. Prof (Agronomy), RRS, Paiyur
30	Dr. P. Anantharaju, Assoc. Professor, PBG, ADAC & RI ,Trichy
31	Dr. N. Maragatham, Professor, ACRC, TNAU, Cbe
32	Dr. Djanaguiraman, AP, CRP
33	Dr. M. Kalarani, P&H , CRP
34	Dr. A. Senthil, Professor, CRP
35	Dr. R. Karthikeyan, Asst. Prof (Agronomy)
36	Dr. T. Kalaiselvi, Prof, (Agronomy), Microbiology
37	Dr. G. Jothi, Assoc. Prof (Nemotology)
38	Dr. V. Manonmani, Prof. (SST)
39	Dr. S. Kavitha, Asst. Prof. (SS&T), Dept. of PGR
40	Dr. P.R. Renganayaki, Prof (SST)

41	Dr. R. Jerlin, Prof, & Head, ASST, TNAU, Cbe.
42	Dr. T. Chitdeswarai, Prof, (SS &AC), TNAU, Cbe
43	Dr. S. Maragatham, Prof. (SST) , Cbe
44	Dr. M. Maheswari, Prof, Environmental Science.
45	Dr. P. Santhy, P & H (SS & AC)
46	Dr. T. Kalaimagal, P & H (Oilseeds)
47	Dr. S. Manonmani, P & H (PGR)
48	Dr. E. Kokiladevi, Prof (Biotech)
49	Dr. Uma, P & H (Biochemistry)
50	Dr. R. Gnanam, P & H(DPMB & B)
51	Dr. G. Sridevi, Asst. Prof (SS & AC)
52	Dr. R. Sunitha, Asst. Prof (ENS), NOFRC , TNAU, Cbe
53	Dr. M. Suganthi, Professor (Ento), NOFRC , TNAU, Cbe
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63	Dr. A. John Joel, Professor, Dept. of Plant Biotechnology
64	Dr. L.S. Shanmugam, AP (Entomology)
65	Dr. R. Arulprakash, AP (AG. Entomology)