TECHNICAL PROGRAMME 2015 - 16

TECHNICAL PROGRAMME 2015 - 2016

I. COLLECTION, CONSERVATION, CATALOGUING AND EVALUATION OF GENETIC RESOURCES OF TUBER CROPS

Exploring the biodiversity in tropical tuber crops from the unexplored areas in the different regions for collecting germplasm having unique character genes for quantitative and qualitative traits, particularly for high yield and tolerance/resistance to biotic and abiotic stress.

Centres: All participating Centres

II. TESTING OF GENETIC RESOURCES AT VARIOUS AGRO CLIMATIC ENVIRONMENTS

II.1.Cassava

II.1.1. IET on K-efficient Cassava lines (2nd Year)

Centres: Yethapur, VR Gudem, Imphal, Thiruvananthapuram
Entries: TCa14-1, TCa14-2, TCa14-3, TCa14-4, TCa14-5, TCa14-6, TCa14-7, TCa14-8, SreeAthulya, Local

Available K status of soil may be analysed before starting the trial.

Fertilizers: No K fertilizers, apply only N and P as per recommendations.

II.1.2. URT on cassava for culinary use (2013) (1st year)

Centres: Thiruvananthapuram, Imphal&Jagdalpur
Entries: TCa 13-1, TCa 13-2, TCa 13-3, TCa 13-4, TCa 13-5, TCa13-6, TCa13-7, SreeVijaya and M 4 (control)

II.1.3. URT on short duration cassava varieties (2012) (2nd Year)

(To be harvested at 6 months)

Centres: Thiruvananthapuram, Yethapur, VR Gudem
Entries: TCa12-3, TCa12-5, TCa12-6, TCa12-7, TCa12-9, TCa12-10, Sree Jaya, Local

II.1.4. MLT (Local adaptation trial) on short duration cassava varieties (2009) (2nd Year)

Centres: Imphal
Entries: Sree Prakash, Sree Jaya, Local

II.1.5. MLT on Cassava mosaic resistant varieties (2011) (2nd Year)

Centres: Dapoli, Yethapur, Thiruvananthapuram & VR Gudem
Entries: TCMS-1, TCMS -2, TCMS-5, TCMS-7, H -226, SreePadmanabha , local

II.2.Sweet potato

II.2.1. URT on sweet potato for weevil resistance (2012) (1st Year)

Centres: Bhubaneswar, Thiruvananthapuram, Kalyani, Dholi, Rajendra Nagar
Entries: TSp12-3, TSp12-4, TSp12-5, TSp12-6, TSp12-13, TSp12-14, Kishan, Local

II. 2.2. URT on sweet potato (2012) (1st Year)

Centres: Kalyani, Barapani& Dharwad
Entries: TSp12-4, TSp12-6, TSp12-7, TSp12-8, TSp12-9, TSp12-10, TSp 12-12, SreeBhadra, Local

II.2.3. MLT on orange fleshed sweet potato (2009) (2nd Year)

Centres: Dharwad, Navasari, Udaipur
Entries: Kamala Sundari, 440038, 440127, ST-14, Gouri, Local

II.3.Yams

II. 3.1.IET on Greater Yam (2014) (2nd Year)

Centres: Thiruvananthapuram, Dapoli, Udaipur, Jagdalpur, Imphal, Jorhat, Kovvur
Entries: TGy14-1, TGy14-2, TGy14-3, TGy14-4, TGy14-5, TGy14-6, TGy14-7, TGy14-8, TGy14-9, TGy14-10, TGy14-11, TGy14-12, TGy14-13, TGy14-14, SreeKarthika, local

II. 3.2. URT on *Dioscoreabulbifera*(2013) (1st Year)

Centre: Jagdalpur, Ranchi, Dapoli
Entries: TDb 13 -1, TDb 13 -3, TDb 13 -4, TDb 13 -5, TDb 13 -6, TDb 13 -10, Local

II. 3.3.URT on greater yam (2012) (1st Year)

Centre: Thiruvananthapuram, Bhubaneshwar, Jagdalpur, Kovvur& Udaipur
Entries: TGy12-1, TGy12-2, TGy12-3, TGy12-4, TGy12-5, TGy12-6, SreeKarthika, Local

II.3.4. MLT on greater yam (1st Year)

Centres: Imphal, Jorhat, Navasari, Jagdalpur
Entries: IGDA-2, Da-25, IGDa-4, SreeKarthika, Local

II. 4.Colocasia

II. 4.1. URT on *Colocasia* (2012) (1st Year)

Centres: Kalyani, Barapani, Dholi, Ranchi, Coimbatore & Port Blair
Entries: TTr12-1, TTr12-2, TTr 2-4, TTr12-5,, TTr12-7, TTr12-8, Muktakeshi, Local

II. 4. 2. URT on *Colocasia* entries for *Phytophthora* leaf blight resistance/ tolerance (1st year).

Centres : Kalyani, Dholi, Dapoli, Rajendranagar
Entries : TC bl 12-1, TC bl 12-2, TC bl 12-3, TC bl 12-4, TC bl 12-5, TC bl 12-6,TC bl 12-7, Muktakeshi, Telia

II. 4. 3. IET on Swamp Taro (2015) (1st Year)

Centres: Jorhat, Kalyani, Imphal
Entries: BCST-1, BCST-3, BCST-5, BCST-13, BCST-14, AAUST-1, AAUST-2, AAUST-3, CAUST-1, CAUST-2

II.4. 4. MLT on *Colocasia* (Bunda) (2nd Year)

Centres: Jagdalpur,Kalyani
Entries: BCB-2, IGB-5, NDB-3(National check), Local

II.5. Tannia

II.5.1.IET on Tannia (2015) (1st Year)

Centres: Rajendranagar, Jorhat, Thiruvananthapuram, Imphal, Kalyani,Jagdalpur
Entries: TTn14-1, TTn14-2, TTn14-3, TTn14-4, TTn14-5, TTn14-6, TTn14-7, TTn14-8, TTn14-9, TTn14-10, local

II. 6.Yam bean

II. 6.1. IET on Yam bean (2nd year)

Centres: Bhubaneswar, Dholi, Kalyani
Entries: TYb 14-1, TYb 14-2, TYb 14-3, TYb 14-4, TYb 14-5, TYb 14-6, TYb 14-7, TYb 14-8, TYb 14-9, TYb 14-10, TYb 14-11, Check

II. 7.Collection and conservation of minor tuber crops available in the respective location of the centres

Centres: All centres

III. AGRO TECHNIQUES

III. 1. Study on Phenology of tuber crops in different agro-climatic zones

III. 1. 1. Cassava

Centres: Thiruvananthapuram, Yethapur, Navasari, Port Blair, Imphal, Dapoli, VR Gudem
Varieties: 2 (H-226, SreeVijaya)

III. 1. 2. Sweet Potato

Centres: Dholi, Ranchi, Dharwad, Hyderabad, Kalyani, Faizabad, Jagdalpur, Udaipur, Bhubaneswar
Varieties: 2 (SreeBhadra& local)

III. 1. 3. Elephant foot yam

Centres: Thiruvananthapuram, Dholi, Ranchi, Navasari, Kovvur, Coimbatore, Kalyani, Faizabad, Bhubaneswar
Varieties: 2 (Gajendra, local)

III. 1. 4. Taro

Centres: Thiruvananthapuram, Coimbatore, Rajendranagar, Kalyani, Faizabad, Port Blair, Barapani, Imphal, Jorhat
Varieties: 2 (Mukthakeshi& local)

III. 1. 5. Greater yam

Centres: Thiruvananthapuram, Jagdalpur, Jorhat, Kovvur
Varieties: 2 (SreeKeerthi& local)

III. 2. Farming system studies in NE region and tribal areas

Centres: Ranchi, Bhubaneswar, Jagdalpur, Jorhat, Barapani, Imphal

III. 3. Micronutrient studies in Tuber Crops

III. 3. 1. Cassava

Centres: Yethapur, VR Gudem, Imphal, Dapoli ,Kalyani

Treatments:

1. POP recommendation (NPK+FYM) specific to the location
2. POP + Soil application of $MgSO_4$@20 kg ha^{-1}
3. POP + Soil application of $ZnSO_4$@12.5 kg ha^{-1}
4. POP + soil application of Borax@10 kg ha^{-1}
5. POP + $FeSO_4$
6. POP+ $MgSO_4$+Zn SO_4+Borax
7. POP+ $MgSO_4$+Zn SO_4+Borax+ $FeSO_4$
8. Absolute control

$MgSO_4$, $ZnSO_4$ and borax may be applied after top dressing of NPK fertilizers and within 2 months of planting cassava.

$FeSO_4$ may be given as stake dipping for 15 minutes and foliar application (0.5% $FeSO_4$ solution) 3-4 times at weekly intervals on appearance of the symptoms

III. 3. 2. Sweet potato

Centres: Dharwad, Rajendranagar, Kalyani, Dholi, Udaipur, Ranchi

Treatments:

T1: Recommended dose of FYM and NPK
T2: Recommended dose of FYM and NPK + Soil application of MgSO4 @ 20 kg/ha after top dressing
T3: Recommended dose of FYM and NPK + Soil application of Borax @ 1.5 kg/ha after top dressing
T4: Recommended dose of FYM and NPK + Dip the cuttings in 2-4% zinc sulphate ZnSO47H2O for 15 minutes before planting+ foliar spraying of 1.5% zinc sulphateheptahydrate solution after top dressing.
T5: Recommended dose of FYM and NPK + Mg+B+Zn treatments
T6: Absolute control

Design: RBD Replication: 4

Observations

1. Initial nutrient status of the soil (pH, organic carbon, available N,P,K, Ca, Mg, Fe, Zn, B)
2. Biometric characters of the plant (plant height, stem girth, number of fallen and retained leaves, leaf area) at 3,6 MAP and at harvest for cassava and Vine length, branching height, no. of branches, no.of leaves, leaf area at 2,3 MAP and at harvest for sweet potato.
3. Tuber yield per plant and per ha and yield attributes (number of tubers, tuber length, tuber girth) at harvest
4. Tuber quality attributes (cyanogenic glucosides for cassava, starch , tuber dry weight)
5. Economic parameters. (cost of cultivation, gross income, net income, net profit, BC ratio)

III.4. Intercropping in greater yam (New)

*Centres:*Jagdalpur, Kovvur, Jorhat, Coimbatore, Dapoli, Navsari, Imphal

Treatments:

(1) Greater yam sole crop (90cm x 90 cm) non-staking
(2) Pigeon pea sole crop (60 cm x 30 cm) non-staking
(3) Maize sole crop (60 cm x 30 cm) non-staking
(4) Jowar sole crop (60 cm x 30 cm) non-staking
(5) Greater yam + Pigeon pea (1:3) additive
(6) Greater yam + Maize (1:3) additive
(7) Greater yam + Jowar (1:3) additive
(8) Greater yam sole (90cm x 90 cm) staking individual plants

In intercropping, pigeon pea, Maize and Jowar to be grown in intra rows of greater yam. Thus the intercrops spacing will be (90 cmx 30 cm)

(Sl. No. 5, 6, 7 – Trailing can be done on the respective intercrop)

Design: RBD
Replications: 3
Plot size 9m x 5.4 m
Harvesting: 7 months after planting

Observations

(1) Greater yam : Primary and secondary branches, plant height, no. of leaves/plant, LAI at 1, 3, 5 and 7 months after planting (Harvest)
(2) Maize: Plant height, no. of leaves/plant, LAI at 30, 60 and 90 days after planting (Harvesting)
(3) Jowar: Plant height, no. of leaves/plant, LAI at 30,60, 90 and120 days after planting (Harvesting)
(4) Pigeon pea: Plant height, no. of leaves/plant, LAI at 1, 3, 5 and 7 months after planting.

Yield attributes & yield

(1) Greater yam: Yield/plant, yield/ha
(2) Maize : no. of cobs/plant, grains/cob, test weight (1100 rot weight) and yield/ha
(3) Pigeon pea: No of pods/plant, seeds/pod, test weight, and yield/ha
(4) Jowar : no of ear head/plant, seeds/ ear head, test weight and yield data

Soil

Pre-plant and post-harvest soil nutrient status (N, P, K), OC, and pH.

III.5. Performance of tuber crops in Rice fallows (New)

*Centres:*Jorhat, Kalyani, ICAR- RC for NEH (Lembuchera), Palampur

Treatments:

1. Rice-Taro with recommended dose of NPK for taro
2. Rice- Taro with 50% dose of NPK for taro
3. Rice-Taro with no fertilizers for taro
4. Rice-Sweet Potato with recommended dose of NPK for sweet potato
5. Rice- Sweet Potato with 50% dose of NPK for sweet potato
6. Rice- Sweet Potato with no fertilizers for sweet potato

7. Rice- Fallow

Replication-3

Plot size: Taro: 3.6x2.7 m
Sweet potato: 4.8x1.4m

Initial soil analysis for available nutrient status

Soil analysis after each crop

Yield attributes & yield

(1) Taro: Corm Yield/plant, Cormel yield /plant, yield/ha
(2) Sweet potato: Tuber yield / plant, Yield/ ha
(3) Rice: yield/ha
Existing package of practices may be followed for Rice in the concerned states.

The experiment may be conducted in farmers field or in university if rice fallow is available.

Variety: Taro: Muktakeshi, Sweet potato: Kamala Sundari

IV. PESTS AND DISEASE MANAGEMENT

IV.1. Integrated management of sweet potato weevil

Centres: *Dharwad, Rajendranagar, Kalyani, Dapoli, Dholi, Udaipur, Ranchi*

Treatment -01

- Dipping the planting material in 0.02% chlorpyriphos (20 EC) for 10 min.
- Earthing up along with weeding and fertilizer application
- Intercrops sweet potato with local crop* (2:1 ratio)
- Spray the bio pesticide *Nanma* at 15, 30, 45, 60, 75 DAP
- Timely harvest

Treatment -02

- Dipping the planting material in 0.02% chlorpyriphos (20 EC) for 10 min.
- Earthing up along with weeding and fertilizer application
- Incorporation of cassava leaf/or available leaf (2-3 kg per mount) at 30 DAP
- Spray the biopesticide*Nanma* at, 45, 60, 75 DAP
- Timely harvest

Treatment -03

- Dipping the planting material in 0.02% chlorpyriphos (20 EC) for 10 min.
- Earthing up along with weeding and fertilizer application
- Spray 0.02% chlorpyriphos (20 EC) at 30 & 60 DAP
- SparyNanma at, 45, 75 DAP
- Timely harvest

Treatment -04

- Earthing up the ridges to avoid cracks in the ridges.

- Spray the biopesticide*Nanma* at, 30, 45, 60, 75 DAP
- Timely harvest

Treatment -05

- Dipping the planting material in 0.02% chlorpyriphos (20 EC) for 10 min.
- Earthing up along with weeding and fertilizer application
- Spray chlorpyriphos (20 EC) 30, 60 DAP
- Timely harvest

Treatment -06

- Untreated control

No of treatment- 6; Replication 04; No. of Plots- 24;

Gross Plot size - 4.8 x 1.4 m (6.72 sq. m)
Net plot size: 3.6 x 1 (3.6 sq. m)
Spacing (60 x 20 cm)
No. of plants in net plot- 30
*Local crop: coriander/garlic

Observations to be taken

1. **Incidence of weevil**
   Randomly select 10 plants per replication and observe the collar region (the region just above the ground level) for weevil infestation.
   Observations are to be taken on 30, 60 DAP and at harvest. Plants need not be uprooted for 30 & 60 DAP.

Sore	Intensity of infestation
0	No infestation
1	< 10%
2	11-20%
3	Over 20% (the collar region is highly swollen due to infestation.)

2. **Tuber damage by weevil (Ebregt et al 2007)**
   On harvest segregate the tubers based on weevil infestation and give scores as given below and take weight

Sore	Intensity of infestation
0	No infestation
1	< 10% (usually seen at the neck of the tuber)
2	11-20% (The infestation spreads form neck region to the middle of the tuber)
3	Over 20% (The entire tuber will be infested)

IV. 2. Mangement of Yam anthracnose

Centres : Rajendranagar, Udaipur, Jagdalpur

Design: RBD
No. of treatments : 8

Replication : 3
Plot size : 4.5 x4.5 m
No. of plants in net plot : 9

Treatments

T1: Standard package of practices (control)
T2: Healthy tuber + Soil application with *Trichoderma*
T3: Healthy tuber +Tuber treatment with *Trichoderma*
T4: Healthy tuber + spray (Carbendazima.i 0.05%)
T5: Healthy tuber + Soil application with *Trichoderma*+ Tuber treatment with *Trichoderma*
T6: Healthy tuber + Soil application with *Trichoderma*+ Tuber treatment with *Trichoderma*+ Spray
T7: Healthy tuber + Soil application with *Trichoderma*+ spray
T8: Healthy tuber +Tuber treatment with *Trichoderma*+ Spray

- Soil treatment with *Trichodermaasperellum* @ 50 g of 10^7 cfu g^{-1} two times one at the time of planting and another at third month
- Tuber treatment with *Trichodermaasperellum* @5 g in fresh cow dung slurry per kg of tuber
- Foliar spraying of Carbendazim @0.05% (1g Bavistin/ litre) three times at 15 days interval from third month after sprouting/ initiation of symptom
- *Trichoderma*culture will be supplied from CTCRI

Standard package of practices:

Use Healthy tubers for planting
Spacing: 90cm x90 cm
Fertilizer: 80: 60:80 kg NPK/ ha

IV. 3. Survey and surveillance of pests and diseases of root and tuber crops

Centres: All Centres

V. PLANTING MATERIAL PRODUCTION

Centres: All Centres
Quality planting material production and distribution

VI. RESEARCH EXTENSION INTERFACE

Centres: All Centres

VI. 1. Popularization and Demonstration of tuber crops in Urban &Peri- urban and non-traditional areas for food and feed.

VI. 2. Value addition and Women empowerment- Demonstrations

VI. 3. Documentation of status of tuber crops in India

VI. 4. Demonstration plots of White Yam

Centres: Imphal, Ranchi, Jagdalpur, Dapoli