

# **Booklet** **On** **Indigenous Technical knowledge (ITKS)**

**Crop wise with reference to promotion of organic farming**

## **Editor**

**Dr. Ajay Singh Rajput, Regional Director**

## **Co-Editors**

**Dr. Monu Jariyal, JSO**

**Dr. Ankit Singla, JSO**

## **Publication Assistants**

**Sh. Vivek Chandra Pandey, TA**

**Sh. Suman Kar, LA**

**Sh. Trilochan Rauta, LA**

**Year of publication: Oct-Nov 2018**

**Published during Thirty Days Certificate Course on Organic Farming (24 Oct to 23 Nov 2018)**

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### Preface

The Government of India is promoting organic farming in different parts of the country through various schemes like National Project on Organic Farming (NPOF), Paramparagat Krishi Vikas Yojna (PKVY), Mission Organic Value Chain Development-NER(MOVCD-NER), National Horticulture Mission (NHM) etc. The Regional Centre of organic farming (RCOF) Bhubaneswar has taken up a much needed initiative to prepare a booklet on "**Indigenous Technical Knowledge**" for promotion of Organic Farming during "Thirty Days Certificate Course on Organic Farming".

Indigenous knowledge is **not yet fully utilized in the development process**. Conventional approaches imply that development processes always require technology transfers from locations that are perceived as more advanced. This has led often to overlooking the potential in local experiences and practices. It is, obviously, most important for the local community in which the bearers of such knowledge live and produce. Development agents (CBOs, NGOs, governments, donors, local leaders, and private sector initiatives) need to recognize it, value it and appreciate it in their interaction with the local communities. Before incorporating it in their approaches, they need to understand it – and critically validate it against the usefulness for their intended objectives. Indigenous knowledge forms part of the global knowledge. In this context, it has a value and relevance in itself. Indigenous knowledge can be preserved, transferred, or adopted and adapted elsewhere. The development process interacts with indigenous knowledge. The purpose of compilation of this booklet on ITKs is to disseminate the knowledge and benefits among various farmers, researchers and scientists to find out the science behind these techniques as these are cost effective and popular among agricultural community. I believe this booklet will bring fruitful outcomes for the promotion of organic farming, nationwide.

On this occasion, I would like to thank Mrs. Neerja Adidam, Hon'ble J.S. (INM) for providing the constant support in all the extension and farmers knowledge oriented activities in this region. I also would like to thank Dr. Krishan Chandra, Director, NCOF for providing us the opportunity and constant support to organize CCOF at BBSR. Without their encouragement and support, this publication was not possible.

  
Dr. Ajay Singh Rajput  
Regional Director  
RCOF, BBSR



जीव विज्ञान संस्थान  
**INSTITUTE OF LIFE SCIENCES**  
(An Autonomous Institute of the Department of Biotechnology, Govt. of India)

ड. अजय परिड़ा  
निदेशक  
**Dr. Ajay Parida**  
Director

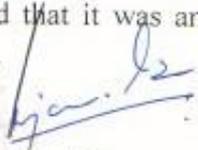
## MESSAGE

I take great pride to congratulate all of the participants, faculty members, staff members who have attended 30 Days Certificate Course on Organic Farming from 24 October to 23 November, 2018, organized by Regional Centre of organic farming Bhubaneswar.

This training course is definitely the step for a giant leap into the prospects of amalgamating conventional agriculture with the brilliance of the resurgence of Organic farming with the young and brilliant and talented students.

I applaud the publication of book Indigenous Technical knowledge (ITKS) - Crop wise with reference to organic progressive farmer practices for the benefits of farmers. Conventional approaches imply that development processes always require technology transfers from locations that are perceived as more advanced. This has led often to overlooking the potential in local experiences and practices. This book will provide an insight to local community in which the bearers of such knowledge live and produce.

I am particularly happy to be present on the valedictory function of this training program and to exchange views and share experiences with other high level professors, colleagues and friends. I extended my greetings and good wishes to the Regional Director RCOF, BBSR and his team, to organize such a needful program and said that it was an enriching experience for the participants and wish it all success.

  
**Dr. Ajay Parida**

Nalco Square, Bhubaneswar - 751 023, Odisha, India  
Ph. +91-674-2301900 (D), Fax : 2300728  
EPABX : 2300137, 2301460, 2301476, 2301219  
E-mail : director@ils.res.in, drajayparida@gmail.com  
Website : www.ils.res.in

नालको चौक, भुवनेश्वर-751023, ओडिशा, भारत  
दूरभाष : +91-674-2301900 (सी), फैक्स : +91-674-2300728  
ईपीएबीएक्स : 2300137, 2301460, 2301476, 2301219  
ई-मेल : director@ils.res.in, drajayparida@gmail.com  
वेबसाइट : www.ils.res.in

## **Introduction**

Indigenous Technical Knowledge (ITK) is the actual knowledge of a given population that reflects the experiences based on tradition and includes more recent experiences with modern technologies (Haverkort, 1995). Indigenous agricultural practices (IAPs) are an unwritten body of knowledge. There is no systematic record to describe what they are, what they do and how they do what they do, how they can be changed, their operations, their boundaries and their applications. It is held in different brains, languages and skills in as many groups, cultures and environments as are available today (Atte, 1989). Hence, there is immense pressure on the people of India to collect, preserve, validate and adopt IAPs so as to reduce dependence on external inputs, to reduce the cost of cultivation and to propagate eco-friendly agriculture (Sundramari and Ranganathan, 2003).

Indigenous Technical Knowledge is the local knowledge – knowledge that is unique to a given culture or society. It contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision making in agriculture, health care, food preparation, education natural resource management and a host of other activities in rural communities (Warren 1991). ITK is the information base for a society, which facilitates communication and decision making. The advent of the concept of sustainable agriculture in late eighties in Indian agricultural scenario has evoked interest on indigenous technical knowledge (ITK) that has the element of use of natural products to solve the problems pertaining to agriculture and allied activities.

Indian farmers, over centuries have learnt to grow food and to survive in difficult environments; where rich tradition of ITK has been interwoven with the agricultural practices followed by them. The enhancement of the quality of life of the Indians who in great majority live in and depend on agricultural production systems would be impossible by keeping this rich tradition of ITK aside. The special features of indigenous technical knowledge are (World Bank, 1998). It is 'local', as it is rooted in particular community and situated within broader cultural traditions; it is a set of experiences generated by people living in those communities. Therefore, separating the technical from the non-technical, the rational from the non-rational could be problematic. Therefore, when transferred to other places, there is a potential risk of dislocating indigenous technical knowledge.

**Some Famous ITKs developed by progressive organic farmers which have been scientifically validated by universities/organizations**

**BIJAMRUT**

**Ingredients**

- Cow Dung- 5kg
- Cow urine- 5L
- Cow milk- 1L
- Lime- 250g
- Water- 100L



**Method of Use:**

Sprinkled over the seeds before they are sown as seed treatment.

*Scientifically Validated by: TNAU, Coimbatore and CSKHPKV, Palampur*

**SANJIVAK**

**Ingredients**

- Cow urine- 100L
- Cow dung- 100-200kg
- Jaggery- 500g
- Water- 300L

Kept for 10 days (Fermentation)



**Method of Application**

(Diluted 20 times before use)

- Along drip irrigation
- Foliar spray
- To enrich soil with microorganisms for quick residue decomposition.

*Scientifically Validated by: University of Stellenbosch, South Africa*

## JIVAMRUT

### Ingredients

- Cow dung- 10kg
- Cow urine- 10L
- Jaggery- 2kg
- Flour of gram (Tur, Moong, Cowpea, Urad) – 2kg
- Live soil (Healthy soil)- 1 kg
- Water- 200L

### Uses

- Promoting growth and flowering along with acting as a yield enhancer (@5-10% spray with water)
- Soil fertility enhancer (applied along with irrigation water)



*Scientifically Validated by: TNAU, Coimbatore, CSKHPKV, Palampur and UAS, Bangalore*

## AMRITPANI

### Ingredients

- Cow dung- 10kg
- Honey- 500g ( can be replaced by 500gm jaggery )
- Cow desi ghee- 250g or 250 ml mustard oil
- Water- 200L

### Uses

- Soil fertility enhancer (@ 200 ltrs per acre along with irrigation water)



*Scientifically Validated by: NEERI (CSIR Institute), Nagpur*

## PANCHAGAVYA

Panchagavya is an organic product having the potential for promoting growth and providing immunity in plant system.

### Ingredients

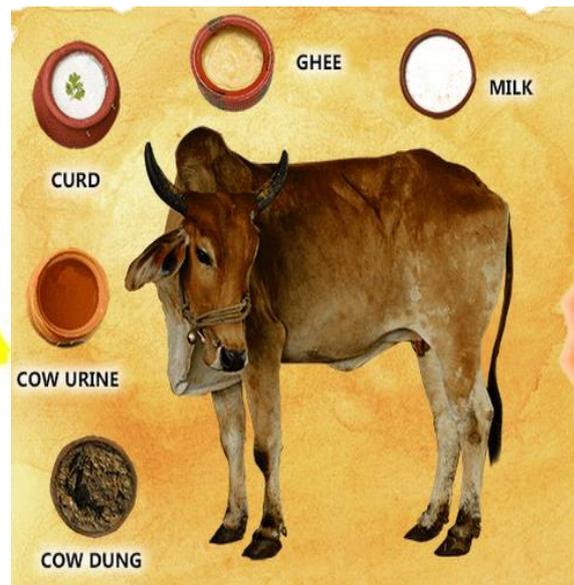
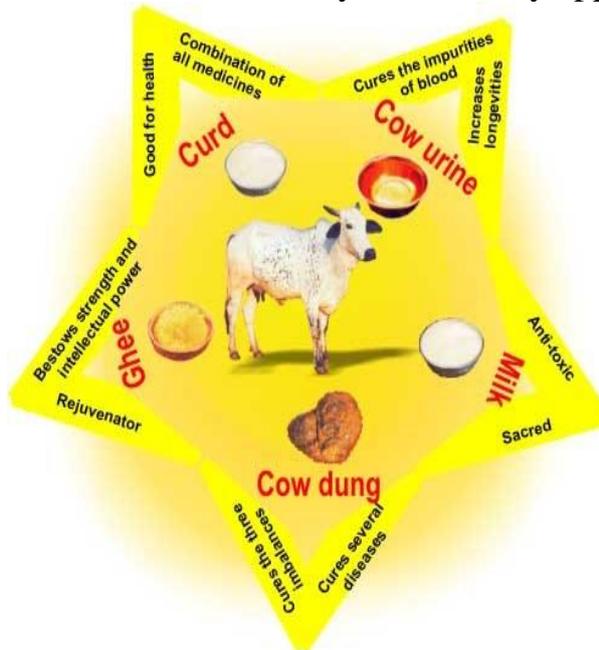
- Cow dung slurry- 4kg
- Fresh cow dung- 1kg
- Cow urine- 3L
- Cow milk- 2L
- Curd- 2L
- Cow butter oil- 1kg

### Method of Application

3l Pachagavya diluted in 100L water

### Uses

- Seed and seedling treatment
- As a soil fertility enhancer by applying through irrigation water



***Scientifically Validated by:*** TNAU, Coimbatore, CSKHPKV, Palampur, UAS, Bangalore and MPUAT, Udaipur.

## PANCHAGAVYA ENRICHED

- ✓ To enrich Panchagavya, crushed banana fruit, cow desi ghee, sugarcane juice, coconut water can be added.



## ENRICHED AMRUT GHOL

### Ingredients

- Cow urine- 5L
- Cow dung- 1kg
- Decaying fruits (juice) - 1L

Mixed and kept for 5 days

### Method of application

- For 1 acre- 20-30L spray

### Uses

- Soil fertility enhancer (60-100 ltr per litre)
- Growth and flowering enhancer (Spray)



Source: Akhil Bharatiya Sajiv Kheti Samaj, Mapusa, Goa  
Scientific validation yet to be done

## ANDA-ARKH

### Ingredients

- Juice of 25 lemons (Approx.) (can be collected as waste lemon from lemon field)
- 5 eggs
- Jaggery- 250g
- Close for 10 days and use 11<sup>th</sup> day onwards

10 ml - 50ml of this solution in 10L of water diluted before use.

### Uses

- Growth and flowering enhancer (Spray)
- Spray for disease control (10-50 ml/10 litre water)



Source: Akhil Bharatiya Sajiv Kheti Samaj, Mapusa, Goa  
Scientific validation yet to be done

## FISH-ARKH

### Ingredients

- Desi Fish- 1kg (depends on availability)
- Jaggery- 1kg
- Clean cloth (to cover)
- Clean stick (to mix)
- Earthen pot/ Plastic drum

### Uses

- Spray for disease control (3 ltr/100 litre water)



Source: Akhil Bharatiya Sajiv Kheti Samaj, Mapusa, Goa  
Scientific validation yet to be done

## COCONUT- BUTTERMILK GHOL

### Ingredients

- Cow buttermilk (chaanch) – 5L
- Coconut water- 1L
- Fruit juice- 1L
- Turmeric- 100g
- Hing- 20g

It has pesticidal actions.

### Method of application

- 1L of this solution diluted with 10L of water before spray.
- Used as a tool for plant protection against fungal disease and insects



Source: Akhil Bharatiya Sajiv Kheti Samaj, Mapusa, Goa  
Scientific validation yet to be done

## **BRAHMASTRA (broad spectrum botanical pesticide)**

- Crush 3 kg neem leaves in 10 L cow urine.
- Crush 2 kg custard apple leaves, 2 kg papaya leaves, 2 kg pomegranate leaves and 2 kg guava leaves in water.
- Mix the two and boil 5 times at same interval till it becomes half.
- Keep for 24 hours, then filter squeeze the extract. This can be stored in bottles for 6 months.
- Dilute 2-2.5 litre of this extract to litre to 100 litre for acre.
- **Benefits:** Useful against sucking pests, pod/fruit borers.



Neem Leaves



Custard apple leaf



Papaya leaf



Pomegranate leaf



Guava leaf

Source: NCOF, Ghaziabad (2011-12)

### NEEMA STRA (broad spectrum botanical pesticide)

- Crush 5 kg neem leaves in water
  - Add 5lit cow urine and 2 kg cow dung
  - Ferment for 24 hrs with intermittent stirring
  - Filter squeeze the extract and dilute to 100 lit
  - Use as foliar spray over one acre
  - Useful against sucking pests and mealy bugs
- Source: NCOF, Ghaziabad (2011-12)

### AGNEYASTRA

- Crush 1 kg Ipomea (besaram) leaves, 500 gm hot chilli, 500 gm garlic and 5 kg neem leaves in 10 lit cow urine.
  - Boil the suspension 5 times till it becomes half
  - Filter squeeze the extract.
  - Store in glass or plastic bottles
  - 2-3 lit extract diluted to 100 lit is used for one acre.
  - Useful against leaf roller, stem/fruit/pod borer
- Source: NCOF, Ghaziabad (2011-12)

### ORGANIC EARTHEN POT ARKH

#### Ingredients

Earthen pot	-	1 unit
Indigenous Cow Urine	-	5 litres
Neem leaves	-	1 kg
Pongamia Leaves	-	1 kg
Calotropis Leaves	-	1 kg
Jaggery	-	50 g



#### **Method of Preparation**

1. Collect the fresh leaves of Neem, Pongamia and calotropis and crush them
2. Mix the Cow urine, cow dung and jaggery properly in the earthen pot.
3. Add the crushed leaves to the earthen pot and stir well.
4. Cover the mouth of the earthen pot with a clean cloth

5. Store it in a shade place for 7-10 days.
6. Collect the extract and further add 5 litre of cow urine and again collect the extract every 10 days.

### Method of application

- For use dilute 20 ml of extract per litre of water and spray the crop or drench the soil in a rose cane for control of disease pests



S K Parija Method, Bhubaneswar

### SANJEEVANI

#### Ingredients

Neem leaves Extract	-	250 ml
Desi Cow Urine	-	2.5 Litre
Earthen Pot	-	1 Unit

#### Method of Preparation

1. Collect the fresh leaves of Neem, extract juice out of it.
2. Take an earthen pot and pour the cow urine.
3. Pour the neem juice extract and stir well.

The medicine is ready in 1 day.

#### Method of application

- Dilute 50 ml for every litre of water and spray in crop.



S K Parija Method, Bhubaneswar

### **KHAJARA KHATA**

Made up from residual dung and urine in which we have to add termite soil or ash after getting decomposed it act as biofertiliser.



**S K Parija Method, Bhubaneswar**

### **AMRIT JAL**

#### **Method of Preparation**

- Cow dung - 1 kg
- Cow urine - 1lt
- Jaggery - 50 g

These are mixed in earthen pot, then cover with a cloth and tied. Allow 3days to decompose, then, it will act as a biofertilizer.

**Use:** Dose 200ml in 20 lt water.

**S K Parija Method, Bhubaneswar**

### **KITCHEN WASTE COMPOST AND MINERAL SOLUTION**



All the kitchen waste like peels of fruits and vegetables, food waste, gruel water etc. are put in the plastic drum and extract is collected through the tap. It is can be used as micronutrient spray as claimed by the developers

**S K Parija Method, Bhubaneswar**  
**Scientific validation yet to be done**

### **BILB RASYAN**

#### **Method of Preparation:**

Half kg dry Bilb powder or 5kg fresh Bilb dissolve in 20 liter water and then add 1kg jaggery. After one month, add this prepared solution to roots.



#### **Benefits:**

This will increase potassium in the soil

**Tara Chand Balji Method, Madhya Pradesh**  
**Scientific validation yet to be done**

### **GAAJAR GHAAS SVARAS**

**Method of Preparation** Add 2kg Gaajar Ghaas Svaras in 20 lt water then add 20 gm powdered fitkari(Alum). After 15 days, filter and spray in 1acre land.



**Benefits:** This will increase Nitrogen in the soil

**Tara Chand Balji Method, Madhya Pradesh**  
**Scientific validation yet to be done**

### **PHUSP RASAYAN**

**Method of Preparation:** Add 2kg flowers in 2 litre cow urine and add 2lt water. After 7days, spray in 1acre land.

**Benefits:** This will increase Boron in the soil

**Tara Chand Balji Method, Madhya Pradesh**  
**Scientific validation yet to be done**

### **AMRIT DHARA**

**Method of Preparation:** Add 15 gm peppermint, 15 gm ajawaine, 15 gm kapur and mix well. Spray in 1 acre land.

**Benefits:** This will protect crops from sucking pests.

**Tara Chand Balji Method, Madhya Pradesh**

**Scientific validation yet to be done**

### **CALCIUM AARK**

**Method of Preparation:** Add 150 gm dry turmeric clots in 100 gm calcium water, add 50 ml milk. After 4 days take turmeric clots and dry. Then add 1gm turmeric powder/ltr water and spray in plants for Calcium

**Benefits:** This will provide Calcium to the plants

**Tara Chand Balji Method, Madhya Pradesh**

**Scientific validation yet to be done**

### **HARAD RASAYAN**

**Method of Preparation:** Add 2 kg Harad in 10 ltr water then add 20 gm fitkari. After 6 days, filter and spray this solution after every 15 days interval.

**Benefits:** This will increase Iron in the soil



**Tara Chand Balji Method, Madhya Pradesh**

**Scientific validation yet to be done**

### **CONTROL OF MAHU (APHIDS)**

#### **Ingredients**

Cow urine: 1L

Fresh cow dung: 2kg

Groundnut cake: 1 kg

Fermented Jaggery: 250 g

**Method of application:** Mix all the ingredients in 5 litre of water and spray in crops.

## FUNGAL DISEASE CONTROL

- A mixture of ash (2-3 kg) and 1 liter of castor oil is spread on a seed bed of a size of about 100 m<sup>2</sup>. The application is repeated 2-3 times at intervals of 7-10 days. This provides protection against soil borne diseases in tobacco nurseries.
- A mixture of 2 kg of turmeric powder and 8 kg wood ash is used as dust over leaves for treatment against powdery mildew.
- Ginger powder at 20 gm/lit of water and sprayed thrice at interval of 15 days can also effectively check the incidence of powdery mildew and other fungal diseases.
- Handful of slaked lime applied at the base of tomato plant can combat damping off disease.
- Cattle and goat urine have fungicidal properties. Two cups of cattle urine with 5ml peppermint oil and 10 lit of water can be used to control fungal diseases on grapes.

## CROP - WISE ITK

### CEREALS CROPS

#### RICE

- Treatment of paddy seeds in diluted bio gas slurry for 12 hours increases resistance of seedlings to pests and diseases.
- soaking of paddy seeds in milk increases its resistance against 'tungro' virus and 'stunt' virus.
- Vacha (*Acoruscalamus*) powder and cow urine are mixed in the water that has been boiled and cooled over night and the seeds are soaked in the solution. The floating seeds are removed. The remaining seeds are used for sowing. This serves the dual purpose of seed selection and treatment of seed borne disease.



*Acoruscalamus*    Biogas slurry    Pudina

- For control of red leaf spot disease in paddy, the seeds are soaked in 'Pudina' leaf extract (*Mentha sativa*) for 24 hours
- 'T' shaped bamboo stands are placed in many places in the paddy fields so that birds can sit on them and feed on the larvae and adults of rice pests.

- Dhaincha (*Sesbania* spp.) seeds are sown on paddy main fields when paddy nursery is raised and the grown up dhaincha is ploughed in-situ during field preparation.
- Plough the main field for four to six times for better yield.
- The rice crop will establish better if it is transplanted along the wind direction.
- Farmers use custard apple (*Annonasquamosa*) for pest control in paddy crop. Leaves and seeds of custard apple contain chemicals having insecticidal properties. Insect/pests of paddy crop are controlled by broadcasting leaves or seeds of custard apple. The smell of leaves act as repellent, whereas, leaves are toxic in nature to plant parasites. Leaves are used raw, whereas seeds are processed and used as powder.
- **ITK to get rid of BPH** 7kg rice bran + 1.5 kg jaggery or molasses + 1.5 lit kerosene are mixed thoroughly and placed in plastic glasses in the BPH affected paddy crop. It helps in repelling the BPH population completely. This is for 1 acre.



(Developed by: Sri Sarbeswar Mohanty of village Mendhasal, Khordha)

## MAIZE



- If the sheaths on maize cobs are not removed, they can be stored for more than three months.
- Before sowing, maize seeds are soaked in warm water for 3-6 hours and shade dried to induce better germination and to control shoot borer.

- Maize is sown after tomato in the same ridges and furrows to reduce the cost of land preparation.
- Dried maize stalks are stacked as heap on stone slabs and covered with paddy straw. This can be stored for more than a year and used as cattle feed.

## MILLETS

### PEARLMILLET



- For bird scaring, the carcass of a crow is hung on a long pole in the center of the pearl millet field.
- When pearl millet seeds are immersed in salt solution (1 kg. of common salt in 10 lit. of water) and the floaters and disease affected seeds are removed.
- Pearl millet seeds are presoaked in water overnight before sowing, for early germination.
- Pearl millet nursery is grown on raised beds for better seedling growth.
- Before transplanting, seedling tips are clipped to remove the eggs of pests and white flies and to control tip blight disease.
- Dusting Chula ash in pearl millet fields to control green leaf hoppers sitting on inner side of leaves.
- Grow cowpea as intercrop to control leaf miner in pearl millet.
- Storing pearl millet seeds by mixing with ash.

### SORGHUM



- Soak the sorghum seeds in common salt solution before sowing to secure good germination under adverse conditions.
- Soak the sorghum seeds in cow urine for half-an-hour and sun drying them before sowing to control head smut and to induce drought tolerance.
- To ensure quick germination of sorghum seeds and to avoid shoot fly attack, enough water is boiled and kept in an open place throughout the night for cooling. In the next day morning prior to sowing, the sorghum seeds are immersed in cold water for some time and sown in the field, which produces better seedlings.
- Sow cowpea as an intercrop in sorghum to minimize stem borer attack due to its repellent smell.
- Sow lab-lab as an intercrop to reduce stem borer damage in sorghum.
- Pouring neem cake extract drop by drop on the sorghum shoot to control shoot borer.
- Dusting ash on the infected leaves of sorghum to prevent the pest incidence.
- Dusting ash at milking stage to control ear head bugs.
- Growing coriander as a mixed crop in sorghum to control the parasitic weed viz., witch weed (*Strigalutea*).
- A black cloth is tied to a long pole and fixed in the centre of the field to scare away the crows.
- Mixing sorghum seeds with ash to prevent storage pests

### FINGERMILLET



- Long duration varieties are adopted in dry lands to avoid the rainy days coinciding with the harvesting stage.
- Finger millet seeds are treated with cow urine at 1:10 ratio to enhance germination
- When a sample of dried finger millet grain is chewed, metallic sound indicates its dryness

## PULSES CROPS

### RED GRAM



- Spray the decoction of tobacco waste to control sucking pests and caterpillars.
- Red gram seeds are mixed with red earth slurry, dried and stored to avoid storage pests.
- Castor seeds are fried, powdered and mixed with red gram seeds to reduce pest attack during storage.
- Storing the red gram seeds after mixing them with 'sweet flag' (*Acoruscalamus*) powder @1 kg. per 50 kg of seeds to preserve them for one year.
- Dry the red gram seeds well and store them in gunny bags after placing dried leaves of 'Naithulasi' (*Ocimumcanum*) inside them to prevent pod borer attack. (Also for black gram)
- Putting the pods of dried chillies in the red gram container to control bruchids (beetle) attack.

### BLACK GRAM

- When a wooden plank is moved with pressing over the drying gram, splitting of gram indicates optimal drying.
- Yield will be higher in black gram crop, if it is sown in the second fortnight of September.
- Neem oil is sprayed @ 6 lit./ac. to control powdery mildew in black gram crop.
- Mixing the black gram seeds with ash and storing them in earthen pots for longer period (Also for cow pea and green gram).
- Mixing the black gram with sweet flag (*Acoruscalamus*) powder for seed purpose.
- Coating the black gram with castor oil to increase the keeping quality.



- Black gram grains broken into halves will escape from weevil attack during storage.

### **COWPEA**

- Putrefied buttermilk is sprayed on cowpea crop to control yellow mosaic disease. (Also for green gram)
- Vegetable oil is mixed with cowpea before storage.
- For safe storage, cowpea seeds are filled in earthen pot to its 4/5th volume and the remaining volume is filled with ash. (Also for field bean)
- Mix cowpea seeds with red earth slurry, dry and store them in earthen pots for one year.

### **GREEN GRAM**

- Mixing the green gram seeds with sand for better storage.

### **PEAS**



- Raising the peas during January (i.e.) during heavy mist time reduces the plant growth and leads to poor yield.
- Three harvestings of peas with 10 days interval to ensure good harvest.

### **OILSEEDS CROPS**

#### **GROUNDNUT**

- Cowpea grown as an intercrop in groundnut fields acts as a trap crop to control red hairy caterpillar.

- Kitchen ash is spread around the groundnut storage bags to prevent insect attack.
- Sandy soil is highly suitable for groundnut crop since it gives less number of ill-filled pods.
- Spray lime solution to control leaf roller.



Castor plant(Jada)



Neem Cake

- Grow castor as a border crop (trap crop) to reduce the attack of tobacco cut worms.
- Grinding well and dissolving 10kg of the leaves of Aloe vera in water and spaying for an acre to control pest in ground nut.
- To control groundnut ring mosaic, dried sorghum or coconut leaves are powdered and boiled in water to 60° C for one hour, filtered, diluted and sprayed for two times at 10 and 20 days after sowing.
- Neem oil solution 4% or neem kernel extract 6% is sprayed to control rust disease in groundnut.

## GINGELY

- Gingelly seeds are mixed with dry sand and then sown to have uniform plant population. Gingelly needs more manures than other crops.
- Spray diluted cow urine to control leaf roller
- Storing gingelly seeds after mixing them with ash.
- Mix gingelly seeds with activated clay for storage.
- Addition of palm sugar to gingelly during oil extraction gives higher oil recovery.
- Putting a small piece of palm sugar in to gingelly oil increases its keeping quality.

## SUNFLOWER



- Rubbing the nearby two flower heads for better seed set.
- Application of cow dung before planting ensures bigger size sunflower head.

## CASH CROPS

### COTTON



- Coating the cotton seeds with red soil and sun drying them before sowing to ensure good germination and to make the dibbling easy.
- Mixing one kg of cotton seeds with 200ml. of neem oil and pasting it with fresh cow dung and then drying this over night before sowing to avoid pests.
- Applying groundnut cake three times during the crop period to enhance plant growth and boll reduction.
- Growing castor as intercrop or border crop to attract tobacco cut worms.
- Five kg. of neem kernels are powdered and soaked in 100 lit of water for one day and filtered in the next day, diluted, mixed with soap solution and sprayed to control white flies.
- About 600g. of tobacco is soaked in water for 2-3 days, filtered and sprayed to control white flies.
- Sugar solution and neem oil are mixed with water and sprayed to control mealy bugs.
- Cultivating sorghum or pearl millet around cotton fields to prevent whiteflies and thrips.
- Powdering the neem kernels with 'Vasambu' (Sweet flag- *Acoruscalamus*), soaking in water even night and spraying the filtrate in the next day to control all pests.

## SUGARCANE



- Chulah ash is applied 2-3 months after planting to control early shoot borer.
- Neem kernels or neem cake are powdered, soaked in water overnight and the filtrate is diluted and sprayed to control early shoot borer.
- Dried neem fruits are powdered and applied @ 200kg./ha. to control stem borers and fungal diseases.

## FRUIT CROPS

### BANANA



- Unripened banana bunches are piled in a vessel and incense sticks are inside the vessel. Then if the lid of the vessel is closed, the bunches will ripen in about 12 hours.
- For quick ripening of banana fruits, lime solution is sprinkled over the bunches.
- For easy ripening of banana, neem leaves are inserted in between the bunches

- Diluted tobacco leaf extract is sprayed on banana crop to control leaf spot diseases.
- Banana suckers are immersed for a while in 1 lit. of neem oil dissolved in 100 lit. of water before planting in order to prevent rhizome rot.
- Ground nut cake is applied to banana crop for better yield.
- To control fruit rot in banana during storage, the fruit stalks are soaked in 10% thulasi (*Ocimumcanum*) leaf extract or 1 % neem oil solution and stored.
- Growing *Sesbania spp.* (trees) as border crop around banana fields to act as a shelter crop in order to prevent the wind damage.
- Neem leaves are put inside a vessel containing banana hands for ripening of fruits. But ripening will take about four days.
- Dried, drooping leaves are removed once in three months to avoid shade effect which may produce black spots on fruits and to reduce wind damage there by preventing lodging.
- One kg each of powdered neem cake and tobacco waste are soaked separately in 5 lit. of water each. In the next day they are filtered and decanted solutions are mixed together in which suckers are immersed before planting to prevent nematode attack.
- To control banana wilt, affected plants are removed and burnt and 1 -2 kg of lime is applied in each pit.
- For quick ripening and for festive occasions, bunches are stacked in bigger earthen pots in to which fuming incense sticks are kept and mouth is covered with clothes

## MANGO



- Neem oil is sprayed to control the hoppers.
- Sunflower is cultivated in between the mango trees to attract honey bees which increase pollination and fruit production.
- To induce early ripening of mango fruits, they are spread on a layer of the branches of 'Aavaram' (*Cassia auriculata*) plant on the floor and again covered with its branches

## GRAPES



- Groundnut cake is powdered, soaked in water and poured to grapes @ 1 bucket/pit for better fruit quality and yield.
- Circular trenches are dug around vines in which green manures and FYM are applied in 3:1 ratio and covered with soil before the monsoon starts in order to get higher yields.
- Neem cake is applied to control the nematodes.

## GUAVA



- Pounding 2kg.of foliage of *Calotropis sp.* with 3 kg.ofneem cake, soaking them in 20 lit. of water for four days and dissolving the extract in 200lit.of water and spraying for one ac. to control all the pests.
- Applypig manure @ 1 basket/tree to increase the yield and to prevent flower shedding.
- Neem seed kernel extract or neem cake solution is sprayed to control leaf miner.
- Dried neem fruits are powdered and applied @ 500g. per tree to control the nematode attack.

## MANDARIN ORANGE



- Greenish *Aloe vera* plants are cut into small pieces and spread to a radius of 2 feet around the tree during flowering to control powdery mildew.
- Collected orange seeds are mixed with ash to avoid ants' attack

## PLUM



- One year old plum grafts are used for planting to control algal infestation, 1kg. of lime dissolved in 10 lit. of water is sprayed after pruning.
- Plum fruits are packed in bamboo baskets and leaves of a fern type called 'Idaivalai' (*Pteridiumaculinum*) are kept in between the fruits in order to slow down their ripening since these leaves are slow drying.

## VEGETABLE CROPS

### TOMATO

- A decoction of *Aloe vera*, *Ocimumtenuiflorum*, and *Aristolochia bracteolate* is prepared and sprayed on tomato crop to control pests and disease and to reduce flower shedding.
- Twenty ml. of leaf extract of *Bougainvillea glabra* is mixed with 1 lit. of water in which the tomato seeds are soaked for six hours to control damping off in nursery.
- About 25 - 30 days old tomato seedlings are preferred for planting.
- Spraying neem oil to reduce flower droppings in tomato.



**Aristolochia**



**Ash**

- Dissolving Chula ash and cow dung in water and spraying it to reduce flower dropping in tomato.
- Growing marigold as border crop in tomato fields to control nematode attack.
- Raising garlic or onion as border crop in tomato fields to prevent fruit borer attack.
- Two kg. of neem kernels are powdered and soaked, in water for 10 days after which it is filtered, mixed with water and sprayed for one acre of tomato crop to control fruit borer and thrips.
- Mixing neem cake with sheep droppings and dusting on the field to control thrips.

### **BRINJAL**

- In order to prevent fruit rotting in brinjal plants, a solution is made of 1 lit. of water and eight crushed leaves of Aloe vera and sprayed on the crops.
- *Chrysanthemum coronaries* is grown as a border crop in brinjal to control fruit borers.
- Grinding and applying the neem seeds @40kg./ac. on 35th day after transplanting gives higher yield.



**Aloe vera**



**Chrysanthemum**



**Castor plant(Jada)**



**Onion plants**

- Growing castor in Brinjal fields as border crop to act as a trap crop for insects.
- Growing onion as intercrop in Brinjal to control many pests including fruit borers.
- Mixing and grinding well neem cake with *Aloe vera* and soaking in water for 10 days, after which spraying the filtrate to control thrips.
- Ash and turmeric powder are mixed in equal proportion and sprinkled to control aphids.

- Cow urine, neem oil and tobacco decoction are mixed and sprayed to control all sucking pests.
- Spraying neem cake extracts to control mites and the spotted beetle (*Epilachnaoctopunctata*) in brinjal.

### CHILLIES



- Chilli seeds are immersed in biogas slurry for 1½ hours for disease resistance.
- Groundnut cake is applied to reduce the flower dropping and to increase the yield.
- Growing castor as border crop to act as a trap crop for tobacco cut worms.
- Tows of maize or sorghum are grown for every five rows of chillies to control mosaic disease.
- Spraying the leaf extract of *Prosopisjuliflora*, two months after planting to control leaf spot, powdery mildew and fruit rot in chillies.
- Leaf extract of "Vilvam" (*Aeglemarmelos*) is sprayed to control fruit rot in chillies.

### DRUMSTICK

- Drumstick plants are pinched off when they are at 4 - 5 feet height so as to facilitate more branching.
- Crop wastes and other residues are burnt around the base of the drumstick tree to control hairy caterpillar.

## CUCUMBER



- About 10 kg. of groundnut cake is soaked overnight and in the next morning this solution is poured to get more yields.
- Ash is sprinkled on cucumber crop to control aphids and powdery mildew.
- Cucumber seeds are extracted from fully ripened fruits, washed well with water, mixed with ash, dried and stored up to one year

## CAULI FLOWER

- To control diamond back moth in cauliflower, neem oil is mixed with water @ 30 ml. /lit. of water and sprayed.

## CABBAGE



- Spray solution made of the mixture of ash and cattle urine on the cabbage plants to control leaf hoppers.
- Application of 1.5 kg lime mixed in 2 – 3 litres of buttermilk and weekly intervals by using broomstick to control cabbage caterpillar.
- Hoist five-balled sticks in the cabbage fields at an interval of 20 days to control insect pest attack on cabbage.

## CARROT

- Crop rotation of carrot with potato, peas to get more income because same next crop will not give more yield.
- .Spray the solution made from the mixture of ash and cattle urine on the carrot plant to kill leafhoppers.
- Wash the carrot tubers after harvesting in the running water of small streams for better shining of carrot tubers.
- Use the stem and leaves after harvesting either as cattle feed or for making compost to use as manure in the next crop.

## POTATO



- Crop rotation of potato crop followed by vegetables for the nematode management.
- Grow potato increases soil texture.
- Mixed cropping of potato with Marigold (*Tagetes* sp.) reduces the risk of root nematode.
- Rotation of potato crop with other crop minimizes pest and disease infestation.
- Crop rotation of potato with carrot or beet root or turnip utilizes the time and moisture available.
- Heavy application of farm yard manure to potato every year before ploughing to increase the number of tubers formation.
- Soil amendment with FYM for the reduction of cyst nematode in potato.
- Land stirring by using hand fork to expose the bottom soils to sun.
- Gathering more soil near the stem of the potato crop helpful for the roots to spread over unobstructed and the potatoes were also believed to grow in bigger size.

## **FLOWER CROPS**

### **JASMINE**

- Every year, FYM is applied or sheep penning is practiced to replenish soil fertility.
- *One* kg. of oleander fruits is soaked in water for one day after which, they are crushed and extract is taken. Then it is diluted with water for 10 times and sprayed to control all the pests in jasmine.
- Neem cake powder is applied @ 1 50g./plant to control nematodes.

### **CROSSANDRA**

- To control the root knot nematodes in 'crossandra dried flowers of red oleander (*Nerium oleander*) are mixed with neem cake and applied at last ploughing.
- Neem cake is applied to control nematodes (Also for Chrysanthemum).

### **CHRYSANTHEMUM**

- Groundnut cake is powdered and applied to get higher yields and big sized flowers (Also for tuberose)
- Pinching of terminal shoots is done two months after planting to have more branches.
- In case of one day delay for sending to market, harvested flowers are spread on gunny bags, sprinkled with water and covered with white cloth in order to preneut.

### **RED OLEANDER**

- FYM is abundantly applied during January and August for increased flower yield.
- Oleander plants are severely pruned to 1-2 feet height at 5-6 years after planting for getting fresh shoots and higher yields. This pruning is repeated for another 2 times once in 4 years after which they are uprooted and fresh planting is done.

## **SPICES AND PLANTATION CROPS**

### **PEPPER**

- When a sample of pepper is chewed, metallic sound indicates its optimal dryness.
- For producing white pepper, the fruits are allowed to ripen in the climber itself. Then they are collected, put in tanks, foot pressed to remove the

skins and they are washed with water and dried to produce white pepper which is having medicinal value.

### **CARDAMOM**

- Cardamom seeds are sown immediately after harvest to get better germination.
- Seeds, after extraction, are washed well with water for 2 or 3 times to remove the mucilaginous substances, mixed with ash and dried for 2 or 3 days.
- A mixture of neem cake powder and sheep manure is applied @ 200g/plant.
- A mixture of extracts of neem cake and tobacco waste is sprayed to control stem borer and capsule thrips in cardamom.

### **GARLIC**

- Neem cake is applied 4kg /ac. to reduce the infestation for root grub.
- Time of harvest is indicated by yellowing and withering of leaves which turn to pale green colour and start drying from the top. Over maturity causes damage to the bulbs.

### **COCONUT**

- To prevent rats from climbing coconut trees, a large palm leaf is split along its mid rib; one set of leaflets is wrapped around the trunk below the crown and the other set is wrapped in the opposite direction.
- To control flower shedding in coconut, salt is poured on the apical portion of the flower buds and also spread at the root zone and given plenty of water.



- About 6-8 months old coconut seedlings having 5-6 leaves are selected for planting
- Before planting coconut seedling, roots are removed in order to induce fresh roots.
- Application of 10 -15kg. of FYM per tree every year.
- Mulching by burying of coconut husks around the tree to conserve moisture and to control weeds.

- Inter space in the coconut garden is ploughed twice in a year in Jun.-July and Dec.-Jan. to facilitate aeration to the roots and to control weeds.
- Spraying neem oil to reduce flower shedding.
- To prevent button shedding, common salt is applied around the growing tip @ 2kg. tree during rainy season.
- Application of neem cake in the pits before planting coconut, to avoid the attack of insect pests and ants.
- Putting 1 -2 kg of common salt in the pit, while planting coconut, to control termites and to conserve moisture.
- To control stem bleeding, the bleeding mouth on the trunk is cut to certain extent, cleaned and poured with lime solution.
- Greenish yellow coconuts are harvested.
- Adding a piece of jaggery (country sugar) in coconut oil to separate the dusts and make the oil more clear.

### **GINGER**

- Use rhizomes collected near the bunds of the field for seed purpose.
- Application of lime to the field before planting of rhizomes to avoid pests.
- Spreading the available fresh or dried green leaves over the planted rhizomes to avoid weeds and give shading.

### **ARECANUT**

- Mixing the selected big nuts with sand and soil mixture prepared in 2:1 ratio keeping in gunny bag in shade and sprinkling water for 2 – 3 times/week over it for 30 days for sprouting.
- Protecting the young seedlings against heavy rain, hot sun and mist by covering it with the branches of local trees.

### **BEVERAGES AND NARCOTICS**

#### **TOBACCO**

- A solution is made of 5 lit. of milk in 100 lit. of water and sprayed after a month of planting for 1 ac. of tobacco crop to prevent tobacco mosaic virus.
- Wider spacing is provided to get more yield in tobacco.
- Neem seed kernel extract is sprayed to control tobacco cut worm.
- Sorghum or gingelly is grown as a trap crop to control broom rape weed (*Orabanchecernua*).
- Spraying putrefied buttermilk @ 50ml. dissolved in 1 lit. of water to control tobacco mosaic.

## COFFEE

- Half a kg of fresh cow dung is dissolved in 15 lit. of water and sprinkled on coffee seedlings at nursery stage for better growth.
- Forming semi circular basins around the coffee plants to conserve moisture.
- Coffee berry borer mostly spreads from one plantation to another through the gunny bags used for transport of coffee beans to curing factories. Hence, these gunny bags are impregnated with neem cake extract and dried before packing.
- To control berry borers in coffee, 3 kg. of neem cake and 6 kg of forest marigold are soaked in water separately for 3 days after which they are dissolved together in 200lit. of water and sprayed for an acre twice with an interval of 15 days
- Lime is applied to control wilt disease in coffee.
- Good quality coffee is obtained at third or fourth picking.
- Disease free coffee plants having good vigor are selected for seed collection.

## TEA

- Raise 'Etham' grass in bunds across the slope to arrest the soil erosion in the tea plantations.
- Grow tea at higher elevation gives good quality tea.
- Place the seeds above one layer of sand, covering with one layer of sand and water spraying for three weeks for getting sprouting.

Biological Pesticides against pest and disease			
Sr.N.	Bio- pesticides	Against pest	Against Diseases
1	Tricoderma viridaeL		Damping off, Root rot,Pythium, Fusarium,Phytophthora ,Rhizoctonia
2	Verticilium Lecani)L		Mealy bug ,Aphids ,scale insects
3	Heligard(NPV)L	Caterpillars	
4	Delfin(WG)L Bio-dart(B.t)	Caterpillars	
5	Econeem Plus L	Caterpillars	
6	Lepidocard (Trichograma)	Caterpillars	
7	Spodoptera virus(S.N.P.V)L	Caterpillars	
8	Helicoverpa virus(HNPV) L	Caterpillars	
9	Criptolaemus sp.(Leady bird)	Aphids, Thrips, bugs	
10	Crysoarla Carnia	Aphids, Thrips, Jassids	
11	Paecilomycic (L)	Nematodes	
12	Sakicides(L)	All types of sucking insects	
13	Pseudomin Pseudomonus sp.(L)	~~~~~	
14	Beaverean	Mealy bug ,white fly	
15	(B.bassiana)L	Heliothis , spodpthera	
16	Metarayzium	white grub	
17	Cryptolaemus montrouzieri	Mealy bug , grubs	
18	Bracon brevicornis	Borers	
19	Calnova (C&S)	Spider mites	
20	Calphomil		Damping off, Root rot,Pythium,
21	Cal -10	Aphids, DBM Spodoptera sp	
22	Calmyte	Mites, sucking pest	
23	Calpaste	Thrips ,Aphids ,White fly	
24	Cal- MB	Leaf miner & sucking pest	

### Nursery management in polyhouse

Sr.N	LAND PPREPARATION
1	4 to 6 kg vermicompost /plant and Neem cake 500 gm to 1 kg for per plant
2	Jiva amrut drenching in soil 50 lit for 10 R
3	NEEM ARKH or Dashparni Arkh drenching in soil for controlling Nematodes
4	Note- Nematodes infestation are soil born diseases

### Intial Organic fertilizers for horticultural crops

#### LAND PPREPARATION

**Intial fertilizers** 15 to 20kg well decomposed cow dung mixed with 3-4 kg vermicompost / plant  
2 to 3kg Neem cake / plant  
Jiva Amrut drenching 200 lit / acre

**Note-** This dose increases according to their age. Next year it would required double dose to the plants (perennial crops)

Sr.N.	Number of spray	Quantity of spray
1	After 7 days	250ml filter jivaamrut 10 lit of water sprayed
2	After 14 days	500ml Dashparni arkha 10 lit of water sprayed
3	After 17 days	NEEM ARKA OR NEEM ASTRA 250 ml @10 lit of water
4	After 22 days	Jiva Amrut drenching 200 lit per actre

This protocol repeated upto maturity

**Note -** In summer season it would required double of its water Requirements  
In rainy season not required water ( only for field crops)

#### For vegetable crops

Sr.N.	periods	Name of spray
1	5 DAYS	250ml filter jivaamrut 10 lit of water sprayed
2	10 DAYS	500ml filter jiva amrut 10 lit of water sprayed
3	15 DAYS	DASHPARNI ARKHA OR NEEM ASTRA 250 ml @10 lit of water
4	20 DAYS	200 ml sour butter milk in 10 lit of water sprayed
5	21DAYS	Drenching jiva armrut@ 50 lit for 10 R or through drip
<b>Note</b>		Plant Photosynthesis process active after 21 days
6	24 DAYS	NEEM ARKH OR NEEM ASTRA 250 ml @10 lit of water

1 month protocol

#### water requirement per day per plant / lit (For vegetables)

Before flowering	after flowering	fruit bearing stage	maturity
700 ml to 1 lit/ plant/day	2 to 3 lit of water /plant	3 to 4.5 lit of water	2 to 3 lit water/day /plant

seed treatment- Mix 6-10 gm of **Tricoderma powder** /1kg of seed before planting  
**Controlling Damping off, Root rot ,Pythium , fusarium, phyphthora, Rhizoctonia**  
Nursery treatment- Apply 10-25 gm of Tricoderma powder per 100 Square meter of Nursery bed  
Soil drenching- Apply 2.5 tricoderma powder / ha  
**HNPV(helicoverpa nuclear polyhedrosis virus) - Spray 1ml of HNPV/lit of water**  
2-3 times at 10-15 days interval  
spray preferally in the evening  
**Controlling caterpillar**  
**Verticillium Lecani L- Spray 6 to 8 ml of verticillium leccani /lit of water**  
**Controlling plant hoppers , Thrips, Aphids , Mealy bugs**

Method and use of pheromone lure

Sr.N.	Lure Name	Crop name	Type of Trap	Quantity in acre	period of change lure
1	Heli lure (green Bollworm)	Tur, Bengal gram, tomato, Capsicum, corn, pea, grapes	funnel trap	5 to 7 acres	30days
2	spodo lure (Defoliater worm)	Soybean, cotton, groundnut, grapes, Cabbage, cauliflower, sunflower	funnel trap	5 to 7 acres	60days
3	Arveet lure (spotted bollworm)	Okra	funnel trap	5 to 7 acres	21days
4	baque lure (vines fruit fly)	Cucumber, Ridge guard, Bitter guard, sponge guard, pumpkin, watermelon, muskmelon, Bottle guard	Fly tree trap	6 acres	60 days
5	bador lure (fruit fly on fruits)	mango, gauva, sapota, pomogranate, Sweet lime, Orange, grapes	Fly tree trap	6 acres	60days
6	E.S.B. Lure	Sugarcane stemborer	vota trap	6 to 8 acres	60days
7	I.N.B. Lure	Sugarcane stalkworm	vota trap	6 to 8 acres	60days
8	S.T.P. lure	Sugarcane shoot worm	vota trap	6 to 8 acres	30days
9	scripo lure (Rice stem borer)	Rice	funnel trap	5 to 7 acres	60days
10	D.B.M. lure (diamondback moth on cabbage)	cabbage, cauliflower	vota trap	16 to 20 acres	60days
11	lucin lure (shoot and fruit borer of Brinjal)	Brinjal	vota trap	16 to 20 acres	60days
12	R.P.W. lure (weevil beetle on coconut)	Coconut	Bucket trap	1 to 2 acres	180 days
13	R.B. lure (Rhinceros beetle on coconut)	Coconut	Bucket trap	1 to 2 acres	120 days
14	T.L.M. lure	Tomato	Sticky trap /vota trap	20 acres	60days

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