NOVEL APPROACHES IN THE MANAGEMENT OF STORED PRODUCT INSECTS

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• INTRODUCTION

• LOSS BY STORED PRODUCT INSECTS

• NOVEL METHODS

• IMPACT

• CONCLUSION
INTRODUCTION

Stored product Pests

- Internal feeders
- External feeders

Storage losses in food grains

- Insects: 2.50 %
- Rodents: 2.50 %
- Birds: 0.85 %
- Moisture: 0.68 %
- Total: 6.53 %

(Maseeh, 1990)
Rice weevil (*Sitophilus oryzae*)
Curculionidae, Coleoptera
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Curculionidae, Coleoptera

LIFE STAGES
Lesser grain borer, (*Rhizopertha dominica*)
Bostrychidae, Coleoptera
Lesser grain borer, (*Rhizopertha dominica*)
Bostrychidae, Coleoptera
Lesser grain borer, *(Rhizopertha dominica)*
Bostrychidae, Coleoptera
Pulse beetle, (*Callosbruchus chinensis*, *C.maculatus*), Bruchidae, Coleoptera
Drug store beetle (Stegobium paniceum), Anobiidae, Coleoptera
Groundnut bruchid (*Caryedon serratus*)
Bruchidae, Coleoptera
Angoumois grain moth (*Sitotroga cerealella*, Gelechiidae, Lepidoptera)
Red flour beetle (*Tribolium castaneum, T.confusum*, Tenebrionidae, Coleoptera)
Saw toothed grain beetle (*Oryzaephilus surinamensis*, Silvanidae, Coleoptera)
Rice moth (*Corcyra cephalonica, Galleridae, Lepidoptera*)
CURRENT STATUS

“No Granaries can be filled with grain without insect in country like ours” - because of

- Field carry over infestation
- Cross infestation
What is happening now?

- Traditional practice at farm level - Sun drying
- Two-third of our grain production in farm and one-third only to Public Distribution System
Chittore bin
Made of stone slabs

Bamboo bin
Double walled
Polythene lined

Improved PKV bin
Green bamboo splits +
Mud plastering
Udaipur Coal tar
Drum bin

Pusa bin

Pusa Cubicle
Gunny bag storage

Storing in wooden and metal bins
Mud pots for storage of minimum quantities like seeds

Wooden boxes for storing grains
Importance of early detection of insect infestation in food grains

- Insect population density greater than 1/kg = serious potential risk in storage

- Zero Tolerance Limit

- If not detected early total loss within 4 months of storage
Novel Methods - Detection Devices

HOME
- Probe trap
- Pitfall trap

FARM
- Probe trap
- Pitfall trap
- Indicator device
- Two in one model
- TNAU Automatic Insect removal bin

WAREHOUSE
- UV light trap
- TNAU Automatic Insect removal bin
TNAU Probe Traps
PITFALL TRAP

Standard Pitfall Trap

TNAU Pitfall Trap
TNAU PITFALL TRAP
– Commercial Model
TWO IN ONE MODEL
INDICATOR DEVICE
TNAU AUTOMATIC INSECT REMOVAL BIN

Prototype of insect removal bin

Parts of the bin model
TNAU AUTOMATIC INSECT REMOVAL BIN

25 kg capacity

100 kg capacity

500 kg capacity
UV LIGHT TRAP

(Mohan, 1993)
New model UV light trap
TNAU stack probe trap
(India patent application No. CHE/1773/2008)
TNAU insect egg removal device
(Indian patent 198434)
TNAU STORED GRAIN INSECT MANAGEMENT KIT (NEW VERSION)

TNAU Insect Probe Trap
TNAU Pitfall Trap
Pulse Beetle Trap (TNAU Two-in-one Model)
Automatic Insect Removal Bin
Indicator Device
UV light trap for Grain Storage Godowns
Stack Probe Trap
TNAU Insect Egg Remover

For technical details: The Director, Agri-Business Development, Tamil Nadu Agricultural University, Coimbatore – 641 003.
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Website: www.tnau.ac.in / www.agritech.tnau.ac.in
For Commercial Details: M/S Melwin Engineering, 18/2, Gandhi Street, Bharathi Nagar, Podanur (PO), Coimbatore – 641 023.
Email: anithomascs10@gmail.com Ph: 94421 28170.
TNAU-KIT technology spread across the Country
TNAU-KIT technology spread across Tamil Nadu
Recent Invention – Insect Egg Removal Device

Indian Patent No. 198434
Trap for monitoring stored product insects in warehouse
RESULT

- Timely detection using the devices will help in timely control operation
- Prevents multiplication of stored product insects at all levels of storage
TECHNOLOGIES COMMERCIALISED

- TNAU – Probe trap
- TNAU – Pitfall trap
- Two in one model trap
- TNAU - Automatic insect removal bin
- Indicator device
- UV – Light trap
- TNAU Kit Box
- Egg removal Device
Popularization of Technologies

Grain/Seed saving technology centre

- Krishi grain/seed saving melas
- Training
- Demonstration
- On farm adoption

Extension activities for popularisation
- Use of print media
- Use of mass media like radio, TV

Agencies - State Dept. of Agriculture, SAU'S, ICAR and NGOs
IMPACT OF TNAU PROBE TRAP TECHNOLOGY IN TRIBAL REGION OF ADILABAD (ANDHRA PRADESH) by NGO - BASIX

- Reduced drudgery
- Reduced wastage of grains (3-5 kg / 4 months)
- Rs.20 to 30 saved
- Cost effective – Eco friendly
- Easy tool for cleaning grains
IMPACT OF TNAU PROBE TRAP TECHNOLOGY IN GORAKHPUR Dt. of UTTAR PRADESH by TATA KRISHI VIKAS KENDRA

- Chemical free
- Long lasting
- No side effects
- Beneficial, if used from the beginning the trap can be a control device
IMPACT OF TNAU PROBE TRAP TECHNOLOGY IN COIMBATORE Dt. of TAMIL NADU by TNAU McGill CIDA Project

- Chemical free
- Long lasting
- No side effects
- The only adaptable method
- Saves 3-5 kg for four months
- Cost effective
- Highly suitable for bin storage
IMPACT OF TNAU PROBE TRAP TECHNOLOGY IN COIMBATORE Dt. of TAMIL NADU by TNAU McGill CIDA Project
IMPACT ON SOCIETY

ядьак 2.5 lakh people using the TNAU trap

ядьак 200 SAU’s/ KVK’s using the TNAU Stored product insect management kit for teaching and training.

ядьак Introduction of TNAU Trap in Africa.
ядьак kindering the scientific temper of school children which led them to make TNAU Traps in plastic waste water bottles, which got them National and International awards.

ядьак Making TNAU Trap techonology as part of 11th std vocational Education curriculum in Tamil Nadu Schools which is being studied by around 25,000 students every year.

Name of the Firms/Exporters who use the trap

<table>
<thead>
<tr>
<th>Name of the Firms/Exporters who use the trap</th>
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<tbody>
<tr>
<td>M/s Madaus Pharmaceuticals PVT. Ltd. Goa, India</td>
</tr>
<tr>
<td>M/s Saraf Trading Corporation PVT. LTD, Cochin, India</td>
</tr>
<tr>
<td>M/s SKM Siddha and Ayurvedic, Tamil Nadu, India.</td>
</tr>
<tr>
<td>All Maha Foods International Pvt Ltd, Jasola, New Delhi.</td>
</tr>
<tr>
<td>Cadburys India Ltd., Dharapuram, Tamil Nadu, India.</td>
</tr>
</tbody>
</table>
AWARDS for TNAU–TRAP TECHNOLOGY
Impact on Students

Both Myself (Dr. S. Mohan) and my student received the Jawaharlal Nehru Award for our work on stored product insect management

JAWAHARLAL NEHRU AWARD (ICAR)  
GUIDE (DR. S. MOHAN) - 1994)

My student (Dr. P. Pratheep Kumar) - 2005)
IMPACT OF TRAP TECHNOLOGY
ON SCIENTIFIC TEMPER OF
SCHOOL CHILDREN

THE HIDDEN TALENTS
Farmers Innovativeness based on TNAU Probe trap

Making perforation for insect entry using needles neatened up

Making perforation with heated needles

Placement of trap in storage structure

Storage pest collect. Removing the trap from Pathheyam
Trap with Bottle
Bottle with trapped insects

Traps ready for placing in Pathayam

Storage pest insects
Insects trapped from a single trap
MY INVENTION KINDERED THE SCIENTIFIC / INNOVATIVE TEMPER OF SCHOOL CHILDREN

A beginning in sowing seeds of innovativeness / creativity in the minds of children for liberating them from illiteracy

School children from Dharmapuri, Tamil Nadu makes trap from waste plastic bottles (Idea came from my inventions)

School children from Gopichettipalayam, Erode, Tamil Nadu uses my idea on traps

A school childrens from Trichy creates record by winning 2 gold medals from IRIS (Intel) competition by using waste plastics for my making traps invented by myself
CONCLUSION

FOOD WITH HUMAN DIGNITY
- A SIGNIFICANT APPROACH

- A Grain/seed saved is a grain/seed produced
  Saving grain should start from every house
  Consume Good grain without contamination

- Every individual - Right to adequate healthy food & clean drinking water - basic right

- Shift of Emphasis from food security at the household level to nutritional security at the level of each individual
Popularisation of TNAU Insect Probe Traps in Africa
POPULARISATION OF TNAU INSECT PROBE TRAPS IN AFRICA
I. Field (On-farm) Test

Type of trap: Two-in-one model – Long or Short
Commodity: Pulses (Chickpea, peas, beans)
Pest species: Bruchids
Premises considered: Farmers – 3, Retailers – 3
Period of study: 45 days
Observation: Trapping of insects recorded every week
Damage (%): Recorded in the holdings at the end of the experiment
TNAU Traps in African farmers' holdings
# On-farm Results

<table>
<thead>
<tr>
<th>Premises</th>
<th>Total number of Bruchids trapped</th>
<th>Per cent Bruchid damage (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>Farmer 1</td>
<td>52</td>
<td>93</td>
</tr>
<tr>
<td>Farmer 2</td>
<td>33</td>
<td>59</td>
</tr>
<tr>
<td>Farmer 3</td>
<td>120</td>
<td>171</td>
</tr>
<tr>
<td>Retailer 1</td>
<td>24</td>
<td>35</td>
</tr>
<tr>
<td>Retailer 2</td>
<td>22</td>
<td>36</td>
</tr>
<tr>
<td>Retailer 3</td>
<td>36</td>
<td>47</td>
</tr>
</tbody>
</table>
AWARDS for TNAU-TRAP TECHNOLOGY
“A grain saved is a grain produced, 
A seed saved is thousands produced”. 
Thank you