

DEVELOPMENT, EVALUATION, PRODUCTION AND APPLICATION OF ECO-FRIENDLY NEEM BASED PESTICIDES – AN INDIAN EXPERIENCE



S.P. Dhua and Y.P. Ramdev
RENPA/UNIDO



India

- **Agriculture based economy**
- **Important inputs for increased production**
 - **Improved variety**
 - **Fertilisers**
 - **Pesticides**



Pesticides

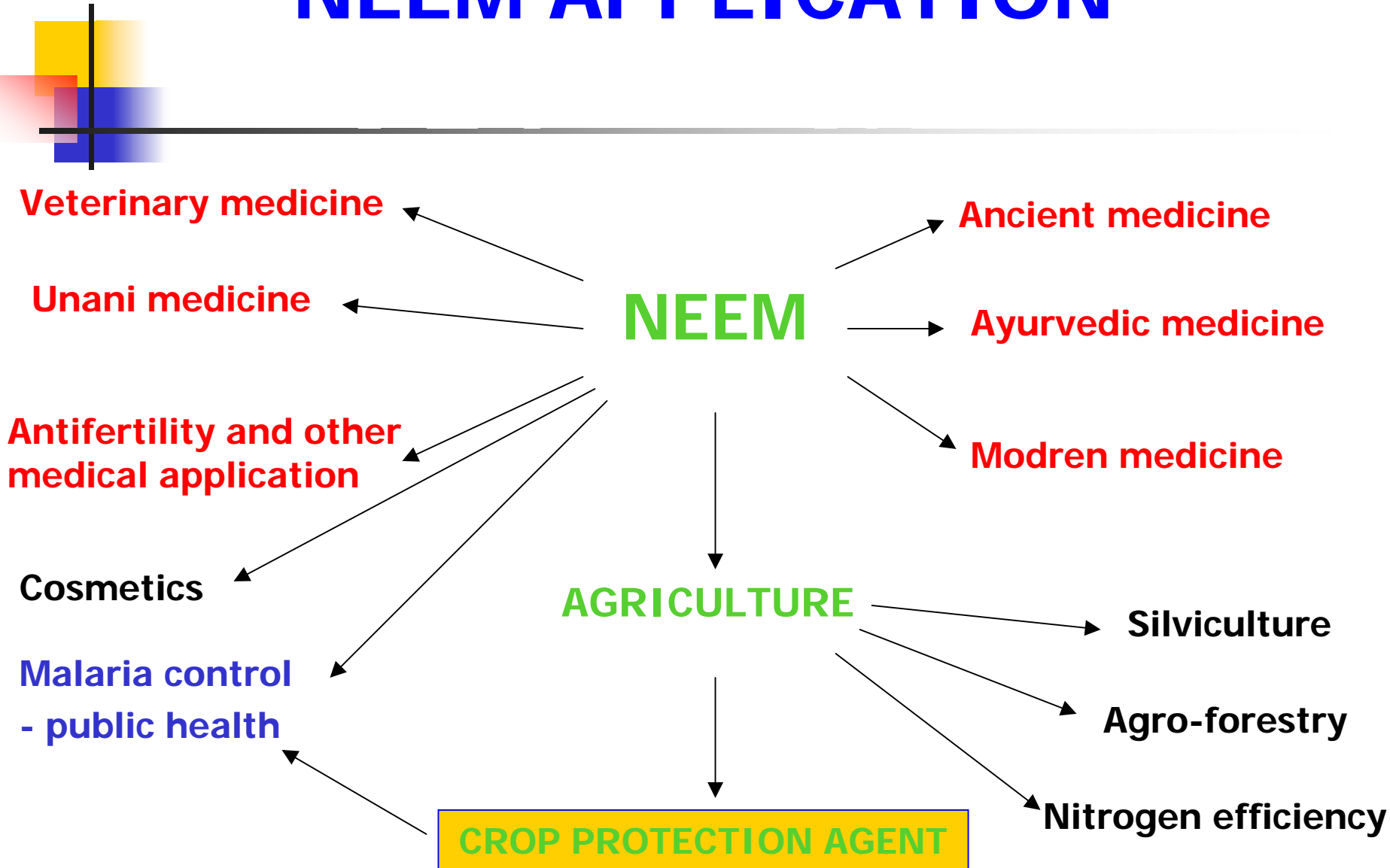
- **Toxic by nature**
- **India produces technical grade pesticides and formulations**
- **Used in agriculture operations and post-harvest storage and vector control programs**



NON-JUDICIOUS USE OF CHEMICAL PESTICIDES LEAD TO

- **Persistence**
- **Non-biodegradable**
- **Environment contamination /degradation**
- **Pest resistance**
- **Health hazard to human beings**
- **Ecological imbalance**

NEEM APPLICATION

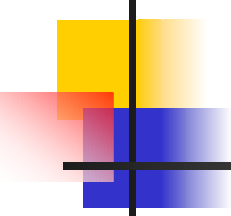




NEEM AS PESTICIDE

- Every part of the tree is bitter with wide range of activities against pests.
- Leaves, seeds, seed kernel, oil, cake, aqueous, or organic solvent extracts, partially purified fractions, azadirachtin-rich formulation, etc. have been tested and found effective against different pest species

ADVANTAGES OF NEEM AS A PESTICIDE

- 
- Contains various limonoids effective against 400 different varieties of pests
 - Widespread availability
 - Simple one-step preparation in farmers' homes
 - Low cost
 - Safe and environment friendly
 - Harmless to beneficial species of insects
 - Less prone to pest resistance



SHORTCOMINGS IN IPM RECOMMENDED NEEM PROCESS



GAPS

- **IMPROPER COLLECTION AND STORAGE RESULTING IN WASTAGE**
- **IMPERFECT PRODUCTION TECHNOLOGY**
- **LACK OF STANDARDISED ANALYTICAL PROCEDURES FOR QUALITY ASSURANCE**
- **FIELD TESTING/DEMONSTRATION FOR INTEGRATED APPROACH IN CROP PROTECTION**



OBJECTIVES OF THE STUDIES

- Develop and promote safe and biodegradable Neem based pesticides
- Encourage scientific collection and processing of Neem seeds
- Directly empower farmers
- Encourage sustainable agriculture
- Generate rural employment, especially for village women

SIMPLE TECHNOLOGY FOR PROCESSING NEEM AQUEOUS EXTRACT



- Scientific collection of fresh Neem fruits
- Depulping of fruits
- Drying of seeds
- Decortication of seeds to obtain kernels
- Grinding kernels into powder
- Mixing powder in water & adding of surfactant
- Overnight storage
- Spraying



INSTITUTIONAL ARRANGEMENTS

- **Executing Agency:** Department of C&PC
- **Implementing Agency:** RENPAP/UNIDO
- **Partner Institutions:**
 - Vivekananda Institute of Biotechnology (VIB), South 24 Parganas District, West Bengal
 - Neem Foundation, Nagpur, Maharashtra
 - Bidhan Chandra Krishi Viswavidyalaya (BCKV), West Bengal



KEY ACTIVITES

- **Establishment of two Neem Sheds**
- **Collection of Neem seeds through employment of village women**
- **Development of processing technology for Neem based pesticides**
- **Setting up of Demonstrations at Neem Sheds**
- **Organization of Training Programmes for farmers to transfer processing technology**

KEY ACTIVITIES AND ACHIEVEMENTS

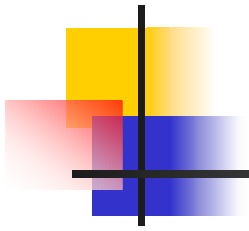
- Scientific Collection and processing of Neem fruits through participation of farmers' groups

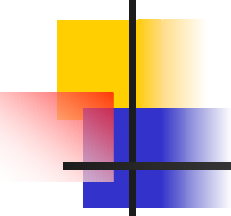


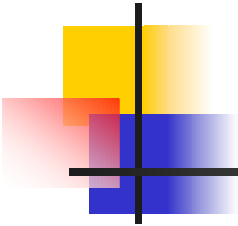
Fresh Neem fruit collection

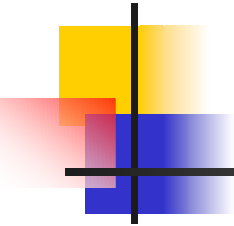


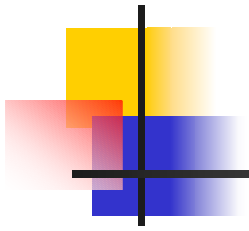
Depulping of Neem fruits











SOME TRIAL RESULTS....

Experiment No. -I

Title: Evaluation of Different Doses of Neem Kernel Aqueous Extract (NKAE) and Insecticides to control the Insects in Brinjal.

A. Details of Experiment

(i)	Design of Experiment	RBD
(ii)	Treatment Number	Six
(iii)	Replication	Four
(iv)	Total Number of Plots	Twenty four
(v)	Plot size	3 x 4 meters
(vi)	Crop	Brinjal
(vi)	Variety	Brinjal Local
(vii)	Date of Transplanting	24 / 02 / 2003

B. Details of the Treatments: The following treatments were selected.

T₁:- Neem Kernel Aqueous Extract (NKAE) with concentration 50 gm. Kernel powder in 1 litre of water plus surfactant.

T₂: NKAE with concentration 25 gm. Kernel powder in 1 litre of water plus surfactant (recommended dose of 1% of kernel weight)

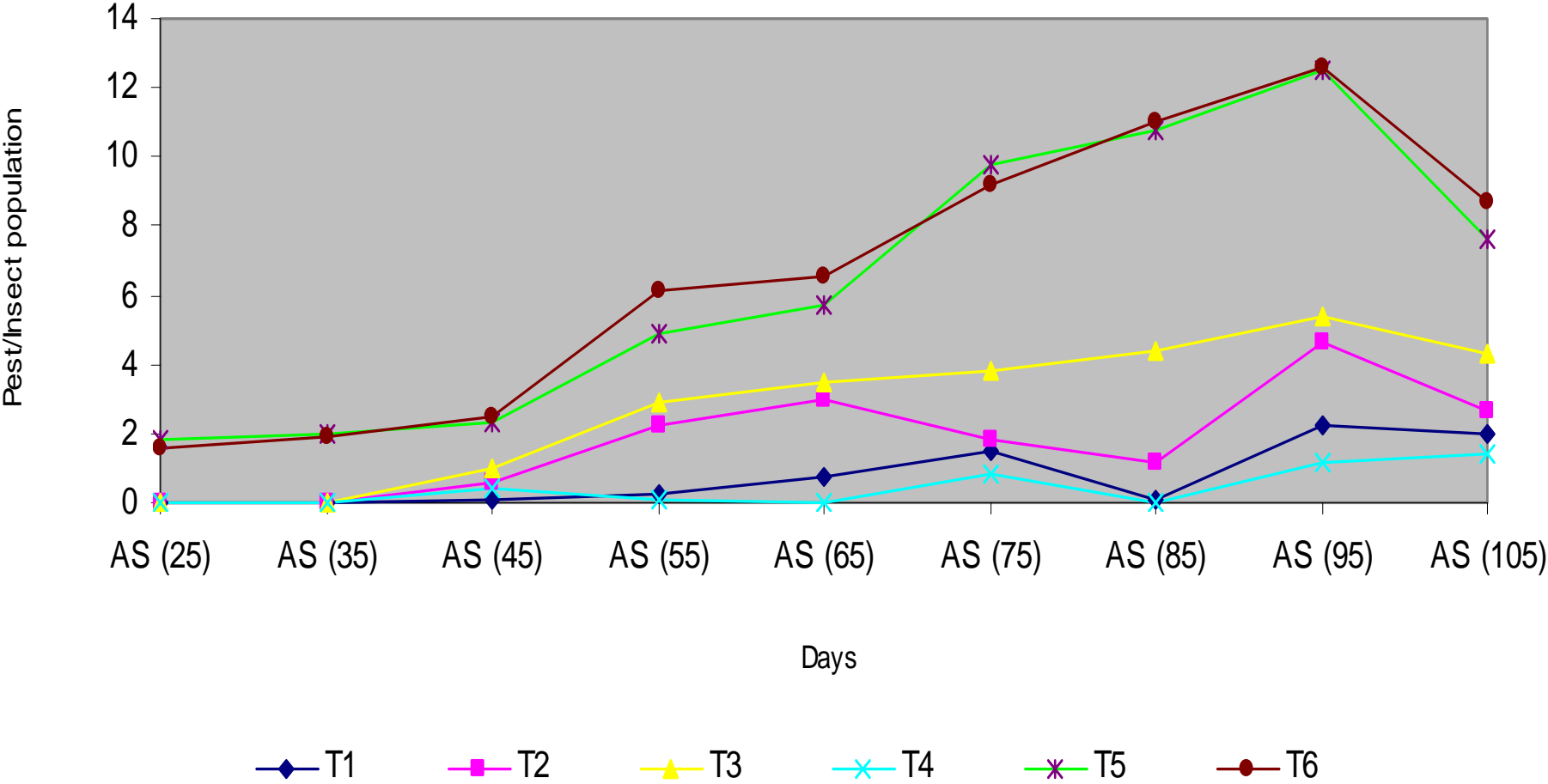
T₃: NKAE with concentration 12.5 gm. Kernel powder in 1 litre of water plus surfactant (recommended dose of 1% of kernel weight)

T₄: Chemical insecticides: Dichlorovos (Nuvan)

T₅: Water plus surfactant (recommended dose of 1% of kernel weight)

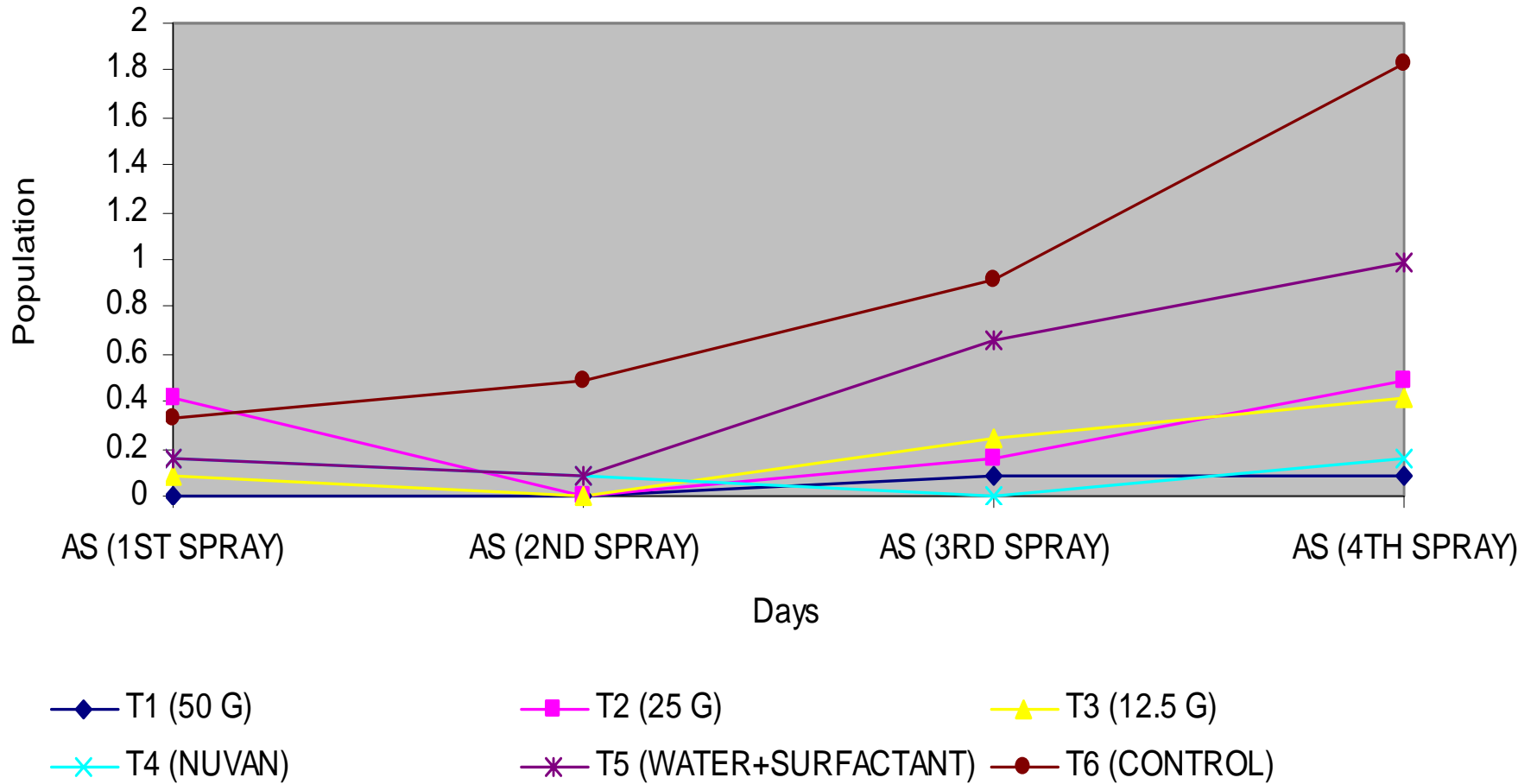
T₆: Control (water only)

Treatments effect on the population of *Amrusca bigutuiia bigutuiia* (Nymph and Adult) at 10 days interval of spraying in Brinjal.

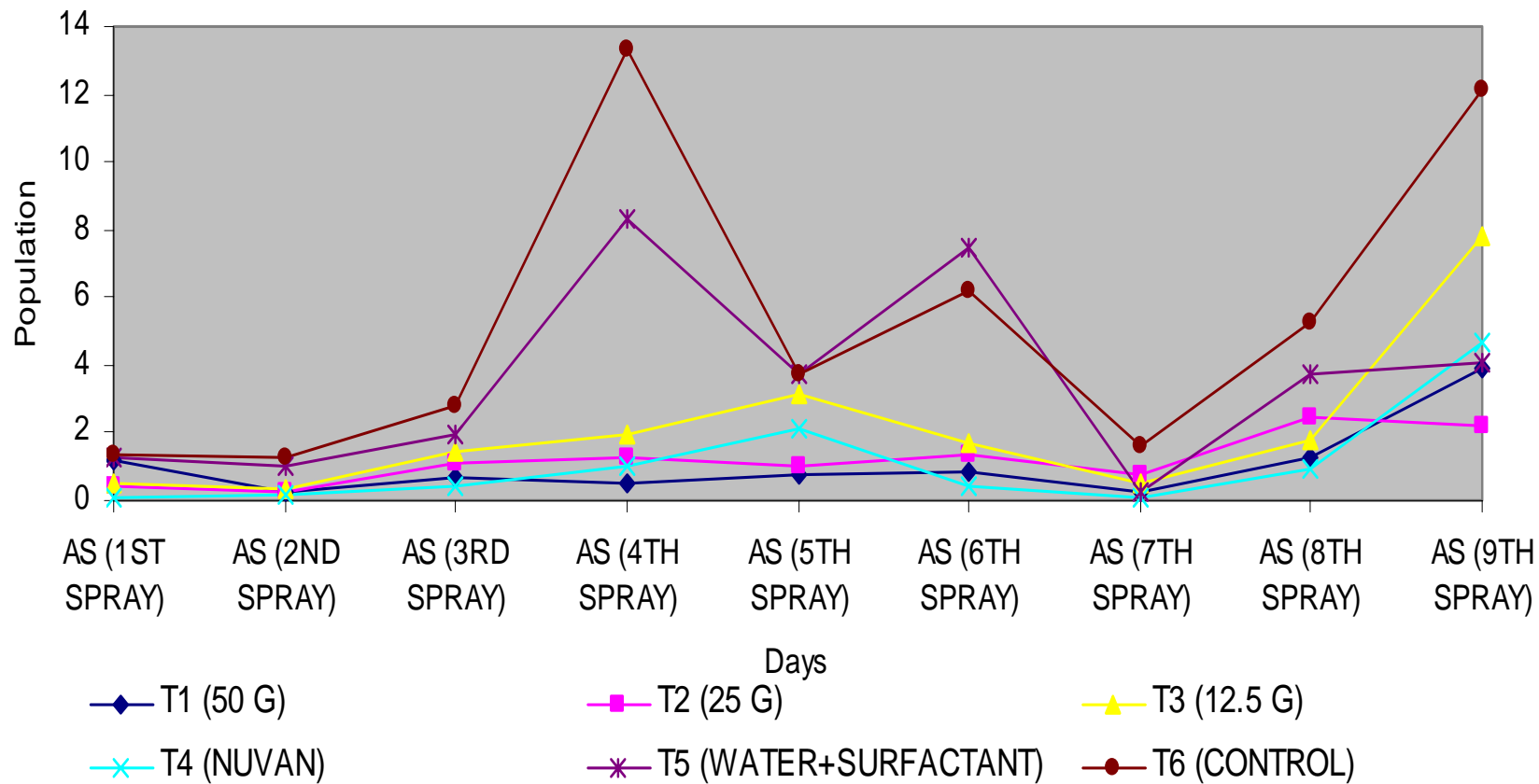


DAT = Days After Transplanting BS = 24 hours before spray & AS = 24 hours after spray

Effect of treatments on post-spray population of *Leucinodes orbonalis* in Brinjal



Effect of treatments on population of White Fly (*Bemisia tabaci*) in Brinjal



- Organization of **343** Training Programmes and farmers' meetings to transfer new processing technology



Training of farmers and extension workers

- Employment generated for **17,335** man days; **12427** for women and **4908** for men



Employment generation for village women and rural youth

- Around **1123** Field Demonstrations of Neem Kernel Aqueous Extract set up at village level

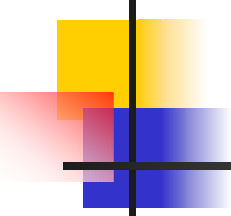


Field Demonstrations on farmers' plots



- Environmental Cost-Benefit Study of Neem pesticides underway at BCKV, West Bengal

- Household Survey of farmers
- Market Survey of pesticide retailers
- Scientific Trials to assess pest and yield impacts of NKAE
- Analysis of environmental impacts/benefits of Neem pesticides



Socio-economic studies of the NKAE based bio-pesticides have indicated a high return-cost ratio in neem based NKAE in comparison to the chemical pesticides.

The benefit cost ratio was high in Neem based pesticides in comparison to chemical pesticides application in crops namely brinjal, cabbage, chilli. In brinjal, it is **2.01** (neem based) vis-a-vis **1.77** (chemical pesticides)

NEEM SHEDS



THEME PARKS






END OF THE PROJECT SITUATION

- The neem sheds developed under the program are fully functional and have become self sustainable for meeting the requirements of the farming community
- There has been increased awareness & usage of ecofriendly, biodegradable crop protection agent viz. neem based pesticides
- The project has resulted in the establishment of a coherent networking at the grassroot level to provide all technical backup for promotion and production of neem based pesticides
- The project has empowered farmers, especially resource poor farmers, to make their own pesticide with less dependence on the costly persistent toxic chemical pesticides
- The project has resulted in increased participation of women and rural youth especially in the collection, storage and processing of neem seeds.



NEEM PROGRAMME – PHASE-II

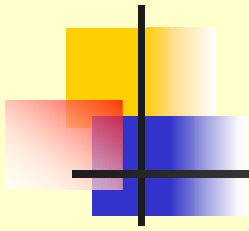
**PRODUCTION AND
PROMOTION OF NEEM BASED
PESTICIDES AS ENVIRONMENT
FRIENDLY, BIODEGRADABLE
ALTERNATIVES TO POPs
PESTICIDES**



Short Title : **Neem based pesticides**
Duration of project : **Three years**
Est. Starting Date : **April 2006**
Closing Date : **March 2009**
Executing Agency : **Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilisers, Govt. of India**
Implementing Agency : **Regional Network on Pesticides for Asia and the Pacific (RENPAAP)**

Project Sites/Participating institutions:

1. *Central Coffee Research Institute, Karnataka*
2. *Tocklai Experimental Station, Jorhat*
3. *Indian Cardamom Research Institute, Spice Board, Kerala*
4. *UPASI Tea Research Foundation, Tamil Nadu*
5. *Punjab State Council for Science & Technology*
6. *Vivekananda Institute of Biotechnology, West Bengal (VIB)*
7. *Neem Foundation, Nagpur. (NF)*
8. *Bidhan Chander Krishi Viswavidyalaya, Nadia, West Bengal (BCKVV)*
9. *Institute of Pesticide Formulation Technology. Gurgaon (IPFT)*
10. *Industrial Toxicology Research Centre, Lucknow (ITRC)*



Neem Shed
I
West Bengal

Neem Shed
II
Nagpur

Existing

Proposed

NEEM NETWORK

Neem Park-III
**North –Eastern
Region
(Tea)**

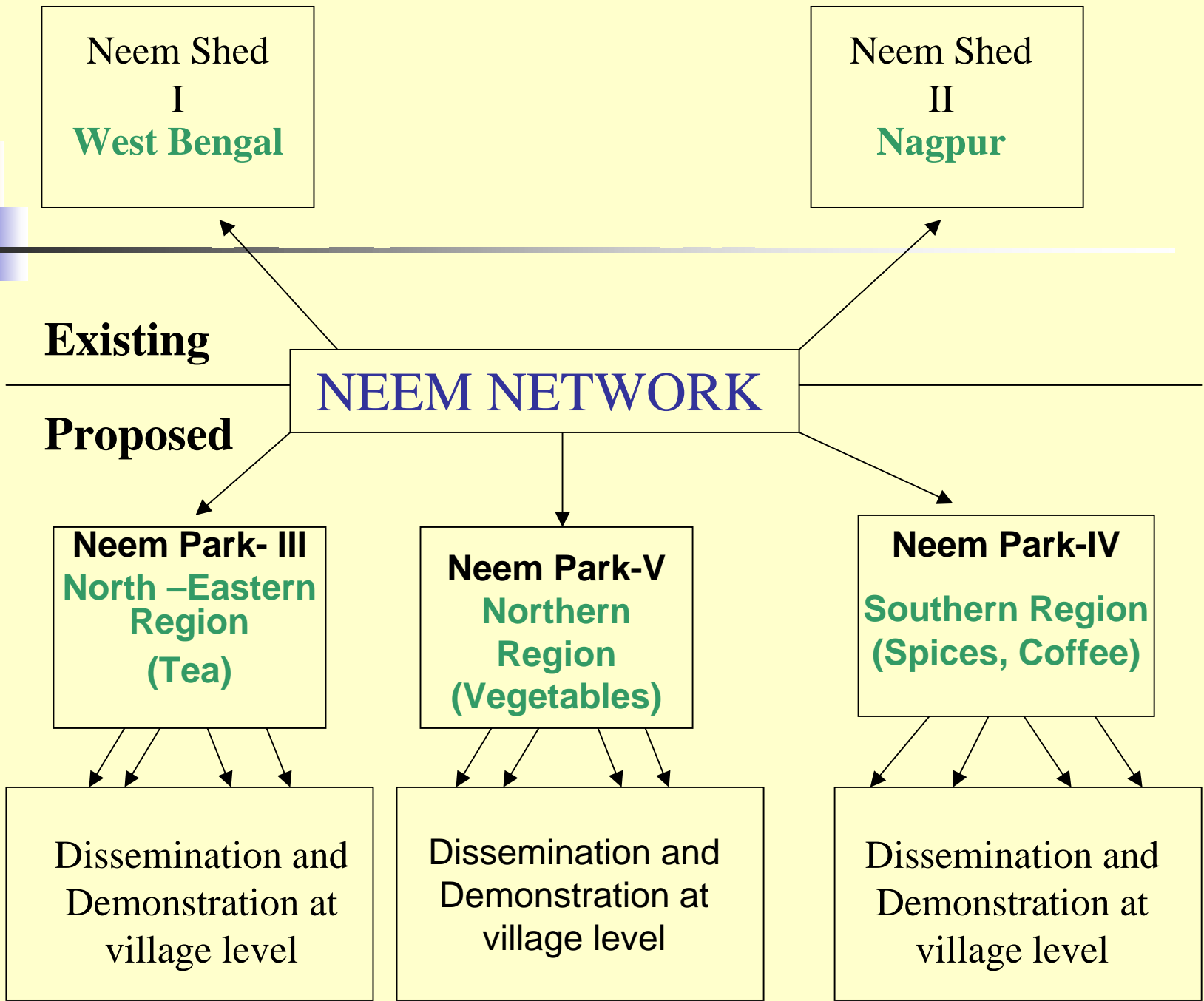
Neem Park-V
**Northern
Region
(Vegetables)**

Neem Park-IV
**Southern Region
(Spices, Coffee)**

Dissemination and
Demonstration at
village level

Dissemination and
Demonstration at
village level

Dissemination and
Demonstration at
village level



INDIA

States and Union Territories



Map not to Scale



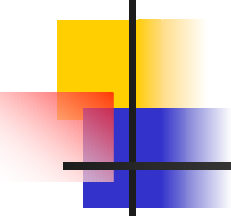
Plan of Work (Activities)

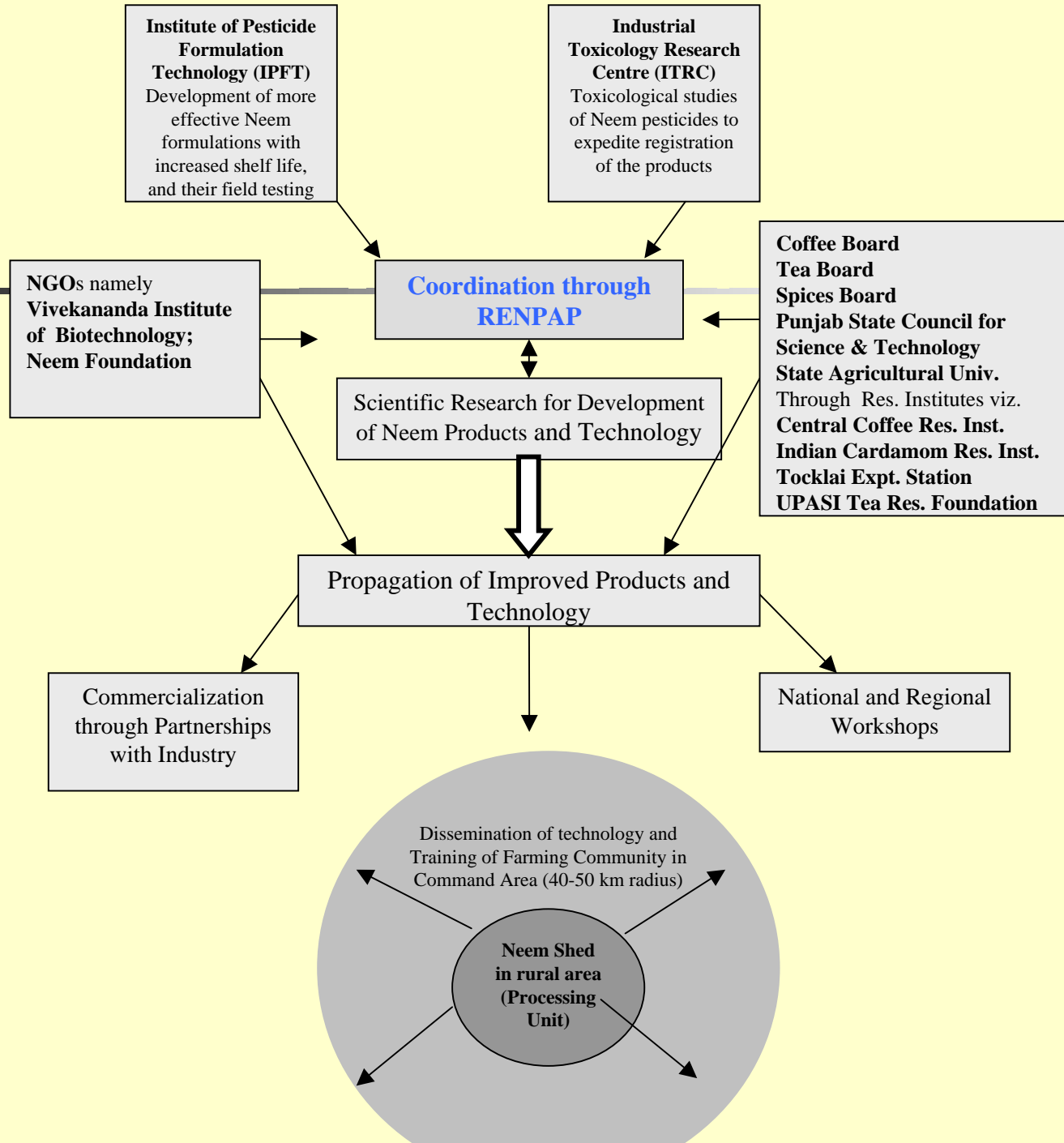
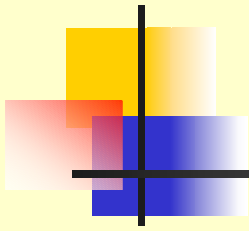
Workplan would include the following activities:

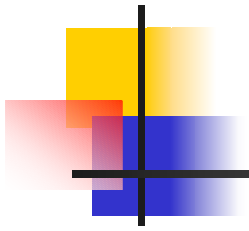
- 1. Establishment of Neem Sheds (Theme Parks) at new locations.**
- 2. Adoption of NKAE technology perfected under the project in the Integrated Pest Management Programme (IPM).**
- 3. Bioevaluation of Aqueous Neem Kernel Extract (NKAE) technology on wide range of crops including tea, coffee, spices, vegetables in different agroclimatic zones of the country.**
- 4. Organization of Cooperatives of neem seed collection and distribution at village level and Block level.**

Plan of Work (Activities)

Contd.

- 
-
- 5. Demonstration of NKAE technology on crops mentioned at 2 above.**
 - 6. Farmers field demonstration on different crops for wider coverage and acceptance of neem based pesticides by the farming community.**
 - 7. Shelf life stability of the NKAE under different conditions.**
 - 8. Generation of Toxicology data of the Neem based pesticide formulation developed with specific recipe and found effective for commercialization**





THANK YOU