

## MANUAL FOR FARMWOMEN TO REDUCE PESTICIDAL HAZARDS



**DR. S.K. SRIVASTAVA AND DR. HEMA PANDEY**



**NATIONAL RESEARCH CENTRE FOR WOMEN IN AGRICULTURE  
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)  
BHUBANESWAR, ORISSA**

# **MANUAL FOR FARMWOMEN TO REDUCE PESTICIDAL HAZARDS**

Dr. S.K. Srivastava and Dr. Hema Pandey



National Research Centre for Women in Agriculture  
(Indian Council of Agricultural Research)  
Bhubaneswar (ORISSA)

**Published by :**

Director

National Research Centre for Women in Agriculture,

P.O. Baramunda, Bhubaneswar - 751 003

**Compiled by :**

Dr. S.K. Srivastava and Dr. Hema Pandey

Phone : 91-0674-2601012, 2600276, 2600947

E-mail : nrcwa@ori.nic.in, dir@nrcwa.org

Web : <http://www.nrcwa.org>

**Printed at :**

Capital Business Service & Consultancy

B-51, Sahid Nagar, Bhubaneswar - 751 007

Phone : 0674-2545484

## FOREWORD

The world is confronted today with the problem of poverty, hunger, ill health and illiteracy on one hand and continuing deterioration of the environment as the life support system of human being on the other. Due to the significant increase in the human population, and the consequent increase in the amounts of food and grains produced, many small-scale farmers adopted the use of pesticides as a means of pest control. Chemical control forms the prime and foremost method for the management of insect pests of agricultural and horticultural crops. The use of pesticides is being done indiscriminately for production of different crops, fruits and vegetables, which contaminate them to a great extent and resulted severe contamination of our soils and water system, emergence of powerful pests which are resistant to chemical pesticides, increased cancers, birth defects and other ailments in humans. According to the World Health Organization (WHO) approximately one to two million persons are affected every year because of pesticides. Considering such ill effects of pesticides, both the scientists and planners realized the need to reorient the methodology and efforts to overcome these significant yield limiting factors. The hope for a better and safe future for mankind lies in empowerment of more than 80% economically active women which are engaged in agriculture and allied activities and considered as back bone of our agriculture. We all wish to live in an environment free from any kind of pesticidal hazards. But very few of us are aware and concerned about its reduction. Women energy is needed to shape the new millennium for economic globalization. Third World women have a special role to play in terms of food and health security. This publication "Manual for Farmwomen to reduce pesticidal hazards" will be of immense use for Farmwomen to combat with various ill effects of chemical pesticides.

**Authors**

Raising crop production by increasing the area under plough no longer appears to be possible in India. Available alternatives left from these areas to enhance crop intensity and productivity per unit area as well as per unit time is owing to the adoption of the improved scientific crop production and protection technologies for achieving food target to feed the rapidly growing global human population. Plant protection is an essential input for sustaining the agricultural production by protecting crop damage due to pests by judicious use of pesticides. Women in India play a prominent role in agriculture. More than eighty percent of economically active women are engaged in agriculture. Population of farmwomen in Bangladesh, Bhutan and Nepal is up to 90%. Farmwomen are best equipped with strength, determination and indigenous knowledge but are not aware of modern technological innovations especially judicious use of pesticide applications. Therefore they are often exposed to various ill effects of pesticides. When using pesticides, safety is critical. Always read and follow pesticide label directions exactly. The label is a legal document. Using pesticides in ways other than listed on the label may result in legal action.

Look specifically for the following:

- plants that may be treated;
- application rates and timing;
- application methods;
- toxicity level: warning, caution, danger;
- precautions to take when applying;
- danger to other animals or nearby vegetation;
- environmental concerns;
- timing relative to harvest;
- instructions to physicians when poisoning occurs;
- disposal and cleaning of clothing used during application;
- disposal and storage of all pesticide chemicals.

## Pesticide Toxicity

Pesticide toxicity is measured most often by  $LD_{50}$ . This is the dose of a toxic substance required to kill 50% of a test population of animals. It is an estimate of toxicity.  $LD_{50}$  is the abbreviation for "median lethal dose." The lower the  $LD_{50}$ , the more toxic the substance. A high  $LD_{50}$  means that more of a substance is required to make a toxic dose. Rotenone has an  $LD_{50}$  of 132. Malathion's  $LD_{50}$  is 1375, while table salt has an  $LD_{50}$  of 3750. From this one can see that rotenone, an "organic" pesticide, is much more toxic than malathion or salt.

LD<sub>50</sub> only indicates the acute toxicity or immediate effect of a substance. Also of concern are the long-term effects, called chronic toxicity. This is of much greater concern to applicators handling chemicals on a daily basis. The hazardous effects of pesticides among farmwomen may be reduced by their skill development following various precautions.

### Precautions during purchase of pesticides

- Every pesticide container is marked with different colour of toxicity triangle. Note that red stands for extremely toxic; yellow for highly toxic; blue for moderately toxic and green stands for slightly toxic.
- Purchase only required quantity for single application in specified area or purchase only the amount you will use in one growing season.
- Avoid purchase of pesticides without proper labels.
- Do not purchase pesticides after expiry date.
- Do not purchase leaking containers, loose, unsealed or torn bags.

### Precautions during storage of pesticides

- Avoid storage of pesticides in house premises.
- Do not touch with naked hand and keep them away from children and livestock.
- Never keep them together with food or feed/fodder.
- Keep only in original container with intact seal.
- Do not transfer pesticides to other containers.
- Do not expose to sunlight or rainwater.
- Do not store weedicides along with other pesticides.
- Pesticides should be stored in their original containers in a locked cabinet. The storage location should not be exposed to heat or cold. Liquid pesticides should never freeze.

### Precautions during handling of pesticides

- Read the label on the pesticide container and leaflet carefully and follow the instruction written there.
- Never carry/transport pesticides along with food materials.
- Avoid carrying bulk-pesticides (dusts/granules) on head, shoulders or on the back.
- Prepare spray solutions as per requirement. Avoid mixing of two or more insecticides.
- Arrange the equipments required for application well in advance including personal protective equipment viz. clothing that cover arms, legs, nose and head; gloves and boots that cover hand and feet; hats and handkerchiefs or clean cloth as face masks to protect the hairs, eyes and nose and respirations to avoid breathing mist or vapour.

- Never work alone while handling of extremely and highly toxic pesticides bearing red and yellow toxicity triangle.
- Never leave pesticides unattended; children or animals may be affected.
- Measure and mix required quantities accurately.
- Never eat, chew, drink, smoke, rub eyes or face while working with pesticides.
- Do not use the mouth to siphon a pesticide from the container.
- Use clean water for preparing spray solution in order to avoid clogging of nozzle.
- Do not mix granules with water.
- Do not smell the pesticides.
- Concentrated pesticide must not fall on hands or other body parts while opening sealed containers.
- Avoid spilling of pesticide solution while filling the sprayer.
- If you are exposed to pesticides during mixing or application, wash immediately and follow label instructions. Pesticides contacting the eyes, nose or ears should be rinsed with water.

### Precautions in the use of equipment

- Different types of plant protection equipments are generally used viz; hand sprayers and atomizers, hand compressed sprayer, knapsack sprayers, tractor mounted sprayer, motorized knapsack mist blowers, ultra low volume or controlled droplet applicators, fogging machines, hand carried dusters, hand carried granule applicators, power duster, aerial applicators (aircraft sprayers), injectors and fumigation equipments. Hence, it is essential to select appropriate kind of equipment according to need.
- Use the correct applicator. The label will provide specific instructions. You must have separate sprayer equipment for herbicides and insecticides. Herbicide residues in a sprayer used to apply insecticides or fungicides may damage plants.
- Do not use a leaky, defective equipment.
- There are various types of hydraulic energy nozzles used in sprayers viz; cone jet nozzles used for foliage sprays; flat pan nozzles-used for spraying in flat surfaces and in aerial spraying impact nozzle or floor jet-mainly used for herbicide application; adjustable nozzle and swirl nozzles-used for spraying in two different directions. Therefore, select the right type of nozzle according to requirement.
- Do not blow or clean clogged nozzle with mouth. Use old toothbrush tied with the sprayer and then clean with water.
- Do not use same sprayer for weedicide and insecticide.
- Clean the equipment after use with soap water.

- Check pump, nozzles etc. before going to the field for spraying.
- Equipments should be washed thoroughly with plain water and add some oil to any type of sprayer pump before storage.
- Grease and lubricants should be applied to joints and surface wherever required to protect rust.
- All spraying equipments should be kept locked and away from children, food items and farm animals. Proper care should be taken to prevent rats from nibbling at hoses and other parts.

### Precautions during application of pesticides

- Identify and count the ratio of beneficial insects before the application of insecticides.
- Learn the Economic Threshold Level (ETL) of pests in various crops, because it is the level of pest population, which can cause considerable damage and required control measure. Population, below ETL need not to be controlled.
- Never use lower or higher dose and dilution of pesticide. Apply only at recommended dose and dilutions.
- Wear protective clothing when applying pesticides. This includes long-sleeve shirt, long pants, shoes, socks, rubber or neoprene gloves, protective eye gear and a respirator or dust mask when necessary.
- Avoid dusting or spraying during peak visiting hours of pollinators.
- Do not apply on hot sunny days or strong windy days. To avoid exposure to pesticides, apply when there is no wind that will cause pesticide drift.
- Mix only enough of a pesticide to complete the job. Mixing exposes the applicator to the most concentrated form of the pesticide. Special care is required. Carefully measure concentrates with measuring spoons or cups reserved and labelled for that use only. No chemicals should be mixed together unless the label says they are specifically compatible.
- If more pesticide is mixed than is needed, it should be applied to plants that are on the label. Never pour a pesticide down the drain or storm sewer. Rinse the sprayer with fresh water, applying the rinse water to plants that are listed on the label. A second and third rinse is recommended.
- Do not apply just before or after the rains.
- Perform dusting in early morning and spraying in afternoon in non-windy and sunny period.
- Spraying or dusting should be done in the windward direction, taking care to see that there are no animals, people or animal feed nearby.
- To avoid contact with the spray or dust walk in the field through non-treated crops. Backward movement in field is safer during application of pesticides.

- Avoid entry of children, workers and animals in field immediately after the spray. Demarcate the field applied with pesticides.
- Learn about the waiting period of each insecticide. Fruits, fodder and vegetables should not be picked before waiting period.
- Containers, drums, buckets etc. used for mixing pesticides should not be used for domestic purposes.
- Use metal seed dresser or earthen pots or polythene bags for seed dressing.
- Do not open the lid or the cover of polythene bags, earthen pots immediately after seed treatment in order to avoid the inhalation of pesticides.
- Do not add water in any type of seed dresser.
- Do not use left over treated seed either for human or animal consumption. Therefore, treat the seed only in required quantity.
- Do not take up spray or dusting work with empty stomach.
- Do not spray or dust more than four hours at a time in a day.
- During nausea, tiredness, headache, giddiness and vomiting one must stop spraying or dusting immediately.
- Wash the hand and face with soap immediately after application.
- Change the clothes immediately after application of pesticide and take a bath in fresh water. Decontaminate personal protective equipment before another application of pesticide.
- Clothing exposed to pesticides should be washed in detergent and hot water. Wash protective clothing separately from other laundry.
- Keep records of pesticide applications for reference should problems arise. This also helps you remember the date of application for the days before harvest in edible crops.

### **Precautions for disposal of empty container and unused pesticides**

- Empty containers should be crushed with a stone or stick and buried deep into the soil away from water resources so as to prevent contamination of surface water or groundwater.
- Empty containers should never be used for any purpose.
- Left over spray solution should never be drained in ponds, well, irrigation canals or water lines. Throw it into a barren isolated area.

### **Precautions for pesticidal poisoning**

- The fundamental principle of safety in the use of pesticides is to prevent poisoning by exercising aforementioned precautions. But the importance of taking safety precautions while handling and applying pesticides is often under-estimated by the

farmwomen resulting pesticidal poisoning. Nervousness, headache, dizziness, dilated eyes, giddiness, nausea, blurred vision, weakness, cramps, diarrhoea, sweating, excess salivation, vomiting, rapid heart beat, discomfort in chest, fatigue and weakness are major symptoms of pesticidal poisoning.

- Pesticide poisoning occurs from direct contact with the pesticide. This includes absorption through the skin, mouth, nose and eyes. Pesticides will soak into clothing and cause prolonged skin contact if the clothing, including leather or canvas shoes and gloves, are not removed immediately.
- During any symptoms of poisoning, drink one glass of warm water with two spoonful salt or one gram zinc sulphate or inject 1/10 gram Acomorphene Hydrochloride followed by vomiting under medical supervision.
- After cleaning of stomach by vomiting use any one antidote viz; Atropine Sulphate or Diacetayal Monohexane or Pyridine Aldizymate for organophosphate or carbamate poisoning; Vitamin-K for anticoagulant poisoning; Calcium Gluconate for organochlorine poisoning and Amyl Nitrate for poisoning of calcium cyanide and hydrogen cyanide under the supervision of a registered medical practitioner.
- During senselessness do not try for vomiting and contact with Doctor for stomach cleaning. After cleaning of stomach, force to drink one table spoonful with water the following Universal Antidote
  - (i) Powder of burned Double Roti (Charcoal) - 2 Part
  - (ii) Concentrate tea (Tannic acid) - 1 Part
  - (iii) Milk of magnesia - 1 Part

Some important information in tabular form is given below in order to reduce the Pesticidal Hazards. According to recent report of DARE Govt. of India, following surprising results of pesticide residues have been found.

| Name of commodity     | Sample percentage |
|-----------------------|-------------------|
| Vegetable             | 61%               |
| Fruits                | 48%               |
| Spices                | 40%               |
| Vegetarian human food | 11%               |
| Non veg human food    | 15%               |
| Cow milk              | 65%               |
| Honey                 | 51%               |
| Ground water          | 59%               |
| Surface water         | 65%               |

## Pesticides Banned

| Sl.No. | Name of the Pesticide                                    |
|--------|----------------------------------------------------------|
| 1.     | Aldicarb                                                 |
| 2.     | Aldrin                                                   |
| 3.     | Benzene Hexachloride (BHC)                               |
| 4.     | Calcium cyanide                                          |
| 5.     | Captafol 80% powder. Use banned w.e.f 17.7.2003          |
| 6.     | Chlordane                                                |
| 7.     | Chlorobenzilate. Use banned w.e.f. 17.7.2003             |
| 8.     | Cicomochloropropane                                      |
| 9.     | Coper Acetoarsenite                                      |
| 10.    | Dieldrin. Use banned w.e.f. 17.7.2003                    |
| 11.    | Endrin                                                   |
| 12.    | Ethylene Dibromide. Use banned w.e.f 17.7.2003           |
| 13.    | Ethyl Mercury Chloride                                   |
| 14.    | Ethyl Parathion                                          |
| 15.    | Heptachlor                                               |
| 16.    | Maleic Hydrazide. Use banned w.e.f. 17.7.2003            |
| 17.    | Menazone                                                 |
| 18.    | Mehtomyl 12.5%                                           |
| 19.    | Mehtomyl 24%                                             |
| 20.    | Nicotine Sulphate                                        |
| 21.    | Nitrofen                                                 |
| 22.    | Paraquate Dimethyl Sulphate                              |
| 23.    | Pentachloro nitrobenzene (PCNB)                          |
| 24.    | Pentachlorophenol (PCP)                                  |
| 25.    | Phenyl Mercury Acetate (PMA)                             |
| 26.    | Phosphamidon 85% SL                                      |
| 27.    | Sodium Methane Arsonate (MSMA)                           |
| 28.    | Tetradifon                                               |
| 29.    | Toxafen                                                  |
| 30.    | Trichloro acetic acid (TCA). Use banned w.e.f 17.7.2003. |

## Restricted Pesticides

| Sl.No. | Name of the Pesticide             |
|--------|-----------------------------------|
| 1.     | Alumimum phosphide                |
| 2.     | DDT                               |
| 3.     | Lindane                           |
| 4.     | Methyl bromide                    |
| 5.     | Methyl Parathion                  |
| 6.     | Methoxy Ethyl Mercurious Chloride |
| 7.     | Sodium cyanide                    |

## Identification of Toxicity Level of Different Insecticides

| Sl. No. | Toxicity level   | LD <sub>50</sub> value mg/kg body weight |                  | Colour of Triangle/ Identification mark on the packing of pesticides |
|---------|------------------|------------------------------------------|------------------|----------------------------------------------------------------------|
|         |                  | Oral                                     | Dermal           |                                                                      |
| 1.      | Extremely Toxic  | 1-50                                     | 1-200            | Human skull in between the cross of two bones. Dark Red Triangle     |
| 2.      | Highly Toxic     | 51-500                                   | 201-2000         | Yellow Triangle (Poison)                                             |
| 3.      | Moderately Toxic | 501-5000                                 | 2001-20,000      | Dark blue Triangle (Danger)                                          |
| 4.      | Slightly Toxic   | More than 5000                           | More than 20,000 | Green Triangle (Attention)                                           |

## Waiting Period of Different Insecticides

| Sl.No. | Name of the Insecticides | Waiting Period in Days |
|--------|--------------------------|------------------------|
| 1.     | Aldrin                   | 10 to 20               |
| 2.     | Dialdrin                 | 20 to 30               |
| 3.     | Carbaryl                 | 8 to 10                |
| 4.     | Chlordane                | 14                     |
| 5.     | Diazinon                 | 12 to 50               |
| 6.     | DDVP ( Nuvan)            | 2 to 7                 |
| 7.     | Dimethoate               | 7 to 14                |
| 8.     | Endosulfan               | 12 to 14               |
| 9.     | Heptachlor               | 5 to 7                 |
| 10.    | Lindane                  | 3 to 7                 |
| 11.    | Malathion                | 10 to 20               |
| 12.    | Phosphamidon             | 20 to 30               |
| 13.    | Phorate                  | 30                     |

## Economic Thresholds Level of different pests for different crops

| Sl.No.             | Name of the Pests         | E T L Level                                                                                                     |
|--------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Cotton crop</b> |                           |                                                                                                                 |
| 1.                 | Aphids                    | 15% of plants infested.                                                                                         |
| 2.                 | Jassids                   | 1 nymph per leaf.                                                                                               |
| 3.                 | Thrips .                  | 1 per leaf or 15-20% of plants infested                                                                         |
| 4.                 | Whiteflies                | 8-10 adults or 20 nymphs per leaf.                                                                              |
| 5.                 | Mites                     | 10 per sq cm.                                                                                                   |
| 6.                 | <i>H. armigera</i>        | 10 eggs per 20 plants.                                                                                          |
| 7.                 | <i>H. armigera</i>        | 7 larvae per 20 plants, or 5% damaged plant parts.                                                              |
| 8.                 | Spotted bollworm          | 5% damaged plant parts or 10 larval units per 20 plants.                                                        |
| 9.                 | American boll worm        | 1 egg or larva/plant                                                                                            |
| 10.                | Nematode                  | 1-2 larva/g of soil                                                                                             |
| 11.                | Rodents                   | 15 live burrows/ha                                                                                              |
| <b>Rice crop</b>   |                           |                                                                                                                 |
| 1.                 | Green leaf hopper         | 1-2 insects / sq.meter at nursery stage                                                                         |
| 2.                 | Gallmidge                 | 1 silver shoot (gall)/ sq.meter at nursery stage                                                                |
| 3.                 | Stem borer                | 1 moth or 1 egg mass/ sq.meter at nursery stage                                                                 |
| 4.                 | Blast                     | 5% disease severity at nursery stage.                                                                           |
| 5.                 | Leaf folder               | 2 freshly damaged leaves/hill at planting to pre-tillering stage                                                |
| 6.                 | Yellow stem borer         | 5% dead-hearts or 1 egg mass or 1 moth/ sq.meter at planting to pre-tillering stage                             |
| 7.                 | Gall midge                | 1 gall/sq meter in endemic areas or 5% affected tillars in non-endemic areas at planting to pre-tillering stage |
| 8.                 | Brown plant hopper        | 5-10 insects / hill at planting to pre-tillering stage                                                          |
| 9.                 | Green leaf hopper         | 10 insects/hill at planting to pre-tillering stage                                                              |
| 10.                | White backed plant hopper | 10 insects/hill at planting to pre-tillering stage                                                              |
| 11.                | Rice hispa                | 2 adults or 2 damaged leaves/hill at planting to pre-tillering stage                                            |
| 12.                | Leaf folder               | 2 freshly damaged leaves/hill at mid tillering stage                                                            |
| 13.                | Stem borer                | 10% dead heart or 1 egg mass /sq meter at mid tillering stage                                                   |
| 14.                | Gall midge                | 5% silver shoots at mid tillering stage                                                                         |
| 15.                | Brown plant hopper        | 10 insects/hill at mid tillering stage.                                                                         |
| 16.                | Green leaf hopper         | 10-20 insects/hill at mid tillering stage                                                                       |

| Sl.No.                    | Name of the Pests                                         | E T L Level                                                                                  |
|---------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 17.                       | Hispa                                                     | 2 adults or 2 damaged leaves/hill at mid tillering stage                                     |
| 18.                       | Blast                                                     | 5-10% disease severity at mid tillering stage                                                |
| 19.                       | Bacterial leaf blight                                     | 2-5% disease severity at mid tillering stage                                                 |
| 20.                       | Sheath blight                                             | 10% or more affected tillars at mid tillering stage                                          |
| 21.                       | Tungro                                                    | 1 affected hill/sq.meter at mid tillering stage                                              |
| 22.                       | Stem borer                                                | 1 egg mass or 1 moth /sq meter at panicle initiation to booting stage.                       |
| 23.                       | Leaf folder                                               | 2 freshly damaged leaves/hill at panicle initiation to booting stage                         |
| 24.                       | Green leaf hopper                                         | 20 insects/hill at panicle initiation to booting stage                                       |
| 25.                       | Brown plant hopper                                        | 15-20 insects/hill at panicle initiation to booting stage                                    |
| 26.                       | White backed plant hopper                                 | 15-20 insects/hill at panicle initiation to booting stage                                    |
| 27.                       | Blast                                                     | 5-10% leaf area damaged at panicle initiation to booting stage                               |
| 28.                       | Bacterial leaf blight                                     | 2-5% disease severity at panicle initiation to booting stage                                 |
| 29.                       | Sheath blight                                             | 10% or more tillars affected at panicle initiation to booting stage                          |
| 30.                       | Brown plant hopper                                        | 25-30 insects/hill at flowering and after stage                                              |
| 31.                       | Climbing cutworm                                          | 4-5 larvae/sq meter at flowering and after stage                                             |
| 32.                       | Gundhi bug                                                | 1 or 2 bugs/hill at flowering and after stage                                                |
| 33.                       | Blast                                                     | 5% leaf area damaged or 1-2% neck infection at flowering and after stage                     |
| 34.                       | Sheath rot or brown spot or slight panicle discolouration | 2-5% tillars affected at flowering and after stage                                           |
| 35.                       | Sheath blight                                             | 10% or more tillars affected at flowering and after stage                                    |
| <b>Pigeon pea crop</b>    |                                                           |                                                                                              |
| 1.                        | Pod borer                                                 | 2-3 eggs/5 twigs or 1 larva/2 plants or 1 larva/plant at flowering stage or 5-10% pod damage |
| 2.                        | Plume moth                                                | 5 larvae/10 plants                                                                           |
| 3.                        | Spotted pod borer                                         | 5 larvae/10 plants                                                                           |
| 4.                        | Pod fly                                                   | 5 larvae/10 plants                                                                           |
| <b>Urd and Moong crop</b> |                                                           |                                                                                              |
| 1.                        | Blue beetle                                               | 4 beetles/meter at seedling stage                                                            |
| 2.                        | Green semilooper                                          | 4 larvae/meter at flowering stage                                                            |
| 3.                        | Tobacco caterpillar                                       | 10 larvae/meter at pre flowering stage                                                       |

| Sl.No.                | Name of the Pests | E T L Level                        |
|-----------------------|-------------------|------------------------------------|
| <b>Groundnut crop</b> |                   |                                    |
| 1.                    | Defoliators       | 25% damage on leaf area            |
| 2.                    | Spodoptera        | 2 larva/plant                      |
| 3.                    | White grub        | 1grub/sq meter                     |
| 4.                    | Jassid            | 15-20 jassids/plant                |
| 5.                    | Leaf miner        | 2-3 larvae/plant                   |
| 6.                    | Rodents           | 15 live burrows/ha                 |
| <b>Sunflower crop</b> |                   |                                    |
| 1.                    | White fly         | 8-10 adult /leaf or 20 nymphs/leaf |
| 2.                    | Jassids           | 15-20 jassids/plant                |
| 3.                    | Gram pod borer    | 5-6 moth/ pheromone trap           |

**LD50, Acceptable Daily Intake (ADI), and Maximum Residue Limit (MRL), of Different Pesticides**

| Sl. No. | Pesticide        | LD 50(Rats) (mg/kg) | ADI (mg/kg/day) | MRL (Fruits) (mg/kg) |
|---------|------------------|---------------------|-----------------|----------------------|
| 1.      | Carbaryl         | 250                 | 0.01            | 5.0 - 10.0           |
| 2.      | Carbendazim      | 15000               | No ADI          | 2.0 - 10.0           |
| 3.      | Carbofuran       | 8 -14               | 0.003           | 0.1                  |
| 4.      | Chlorothalonil   | 10000               | 0.03            | 0.05 - 5.0           |
| 5.      | Cypermethrin     | 500                 | 0.006           | 1.0 - 2.0            |
| 6.      | Deltamethrin     | 140                 | 0.01            | 0.01 - 0.05          |
| 7.      | Diazinon         | 385                 | 0.002           | 0.5 - 0.7            |
| 8.      | Dimethoate       | 250                 | 0.02            | 1.0 - 2.0            |
| 9.      | Dithiocarbamates | >5000               | 0.005 - 0.02    | 1.0 - 5.0            |
| 10.     | Endosulfan       | 45                  | 0.0075          | 2.0                  |
| 11.     | Ethion           | 208                 | 0.005           | 2.0                  |
| 12.     | Fenitrothion     | 630                 | 0.004           | 0.5 - 2.0            |
| 13.     | Fenvalerate      | 630                 | 0.06            | 2.0                  |
| 14.     | Lindane          | 12                  | 0.01            | 0.5                  |
| 15.     | Malathion        | 500-1500            | 0.02            | 0.5 - 2.0            |
| 16.     | Monocrotophos    | 190                 | 0.0006          | 0.2 - 1.0            |
| 17.     | Methyl parathion | 14 - 24             | 0.001           | 0.2                  |
| 18.     | Phorate          | 2 - 4               | 0.0002          | 0.1                  |
| 19.     | Phosphomidon     | 17 - 40             | 0.002           | 0.1 - 0.2            |

There are number of species of plants which possesses pest control action in many ways and their use may be exploited by the farm women to reduce pesticidal hazards and for the safe environment. Type of pest control action found in plant species and trees with insecticidal activity are summarized below:

### Type of pest control action found in plants

| Sl. No. | Pest control action | No. of species of plants | Sl. No. | Pest control action | No. of species of plants |
|---------|---------------------|--------------------------|---------|---------------------|--------------------------|
| 01      | Insecticidal        | 1053                     | 09      | Fungicidal          | 100                      |
| 02      | Antifeedant         | 230                      | 10      | Bactericidal        | 04                       |
| 03      | Repellent           | 225                      | 11      | Molluscicidal       | 06                       |
| 04      | Growth inhibitor    | 32                       | 12      | Herbicidal          | 14                       |
| 05      | Attractant          | 27                       | 13      | Antiseptic          | 35                       |
| 06      | Rodenticidal        | 29                       | 14      | Fish poison         | 147                      |
| 07      | Acaricidal          | 02                       | 15      | Arrow poison        | 90                       |
| 08      | Nematicidal         | 58                       | 16      | Poisonous           | 69                       |

### Trees with insecticidal activity and their active ingredients

| Tree species (common name)                               | Plant part(s)/ product(s)      | Active principle(s)                                                                            | Activity                                                                  |
|----------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <i>Albizia lebbbeck</i> Troll. (Desi Siris)              | Seed, leaf, pod, bark and root | Caffeic acid, alkaloids and quercetin                                                          | Insecticide                                                               |
| <i>Anacardium occidentale</i> Scarrone (Cashew)          | Shell oil                      | Phenolic compounds                                                                             | Insecticide                                                               |
| <i>Annona squamosa</i> (Custard apple)                   | Stem, leaf and semi-ripe fruit | Annine                                                                                         | Insecticide                                                               |
| <i>Azadirachta indica</i> (Neem)                         | Leaf, seed and seed oil        | Azadiractin, nimbidin, salanin, meliantrol, and other bitter principles (tetranorterprenoids). | Antifeedant, oviposition deterrent, Insect Growth Regulators, Insecticide |
| <i>Butea monosperma</i> Koen Roxb. (Flame of the forest) | Flower extract                 | Chalcones and auroncs                                                                          | Termiticidal                                                              |
| <i>Hardwickia binata</i> Roxb. (Anjan)                   | Heartwood                      | Mopanol and epicatechin                                                                        | Antifeedant                                                               |
| <i>Madhuca latifolia</i> Roxb. (Mahua)                   | Seed and seed oil              | Saponins                                                                                       | Repellent, Insecticide                                                    |
| <i>Melia azedarach</i> (China tree, Bakain)              | Fruit and seed                 | Meliacin                                                                                       | Antifeedant, Insecticide                                                  |
| <i>Pongamia pinnata</i> L. (Pongam; Karanja)             | Seed and seed oil              | Karanjin                                                                                       | Repellent, Insecticide                                                    |

***Contact for Training and consultancy on -***

- Training methodology for trainers
- Impact analysis and evaluation
- Development of project proposals
- Integrated farming system and
- Low cost eco-friendly pest management
- Agricultural and allied enterprise building for economic empowerment
  - Organic farming
  - Floriculture, Vermiculture, Vermicomposting and Apiculture
  - Ornamental fisheries and backyard pisciculture
  - Post harvest storage and value addition of fruits, vegetables and flowers
  - Quality seed production
  - Phenyl making, coir toys making, chalk making and candle making

***For any information please write to:***

The Director, National Research Centre for Women in Agriculture,  
(Indian Council of Agricultural Research),  
Opposite Kalinga Studio, P.O. Baramunda,  
Bhubaneswar, Orissa - 751 003.

Phone : 0674-2600947, 2601012, 2600276

E-mail : [nrcwa@ori.nic.in](mailto:nrcwa@ori.nic.in), [dir@nrcwa.org](mailto:dir@nrcwa.org)

Web : <http://www.nrcwa.org>



# NATIONAL RESEARCH CENTRE FOR WOMEN IN AGRICULTURE BHUBANESWAR

