Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 05, Issue: 01 (JAN-FEB, 2025)
Available online at http://www.agriarticles.com

Pesticides Demystified: What You Need to Know About Pesticides

(*Punithavalli M[1], Balaji Rajkumar M[2] and J Berliner[3])
[1]Sr. Scientist (Agri. Entomology), ICAR-Sugarcane Breeding Institute, Coimbatore
[2]Sr. Scientist (Agri. Entomology), ICAR-IISR Reg. Stn., Appangala, Kodagu, Karnataka
[3]Sr. Scientist (Nematology), ICAR-Indian Agricultural Research Institute, Reg. Stn., Welington
*Corresponding Author's email: bjaasritha14@gmail.com

In India, agriculture crops are significantly threatened by pests, including insects, nematodes, rodents, and pathogens, which feed on various plant parts, causing harm or death to plants. Managing these pests requires knowledge of commercially available pesticides and their proper use. A balanced and sustainable pest control approach helps protect crops while minimizing negative impacts on human health and the environment. For holistic pest management, it is necessary for every Indian farmer to understand the different types of pesticides, their toxicity levels, and their effective usage. Hence in this following article, we are going to delve in to how to read the pesticide container to get information about the target organism, mode of action, toxicity levels etc.

Know to Read the basics of the Pesticide Container

Pesticide labels provide majority of the essential information required for a farmer. For instance, the container in the picture shows the name is the trade name given by the particular company. Just above the trade name the chemical name written as chlorantraniliprole 18.5% w/w SC. In which the chlorantraniliprole is the actual chemical used to kill the target insect, and 18.5 % is the concentration of the chemical and "SC" is formulation which stands for Soluble Concentrate. Here the farmer should know that different company sell same chemical compound in different names. For instance, chlorantraniliprole 18.5% SC is also available in different names like Coragen, Raise, Cogent etc. The toxicity level of the insecticide also mentioned as color from red to green with caution notes.

How to know the toxicity Levels of your pesticide?

The toxicity levels of pesticides can be easily identified by color coding, as indicated on every package. The coding is presented in a rhombus-shaped symbol, where the lower half shows the color, and the upper half describes the toxicity in words. Similar to road signs, each color code conveys a different meaning, as explained in the table below:

Color	Red	Yellow	Blue	Green
Toxicity	Extremely toxic	Highly toxic	Moderately toxic	Slightly toxic
Oral lethal dose	1-50 mg / Kg body weight	51-500 mg / Kg body weight	501-5000 mg / Kg body weight	>5000 mg / Kg body weight
Example (Image)				
Example (Name)	Monocrotophos	Quinalphos, Imidachloprid	Spinosad, spiromesifen	Chlorantraniliprole

This system ensures that users can quickly recognize potential hazards and take appropriate precautions during application.

How to identify the target organism of your pesticide?

The pesticide container is labeled as "Insecticide," indicating that it is effective only against insects and will not work on pathogens, nematodes, or weeds. Similarly, other labels may include:

Acaricide: Effective only against mites and ticks
Fungicide: For fungal pathogens
Bactericide: For bacterial pathogens
Nematicide: For nematodes
Rodenticide: For rodents
Herbicide: For weeds

These classifications help farmers select the appropriate pesticide for the specific pest group they are dealing with. However, within these pest groups—such as insects, mites, nematodes, fungi, bacteria, viruses, rodents, and weeds—there are thousands of different species in the agricultural field. Therefore, knowing the specific target species and the crop on which the pesticide can be used is crucial. This information is provided in the small leaflet typically attached to every pesticide container.

It is essential for farmers to consult an extension agent, such as an Agriculture Officer (AO), Horticulture Officer (HO), or any agriculture-related department in their region, to accurately identify the cause of disease symptoms observed in their fields.

How to know the Mode of Action of your pesticide?

Pesticides vary in how they act and eliminate pests. Their modes of action include:

1. **Contact insecticides:** The pesticide must come into direct contact with the pest, meaning it must touch the insect's body to be effective. For example, pyrethroids work only through direct contact.
2. **Systemic insecticides:** These are absorbed by plants and kill pests that feed on the treated plant tissues. For instance, imidacloprid is an example of a systemic insecticide. In some cases, when pests ingest treated plant material (stomach insecticide), the toxic compound is released, killing the target organism. An example is Bacillus thuringiensis (Bt), used for caterpillar control.
3. **Fumigants:** The insecticide, initially in liquid or solid form, is converted into a gas, which is inhaled by the insect or rodent, leading to its death. For example, aluminum phosphide is used as a fumigant against rodents.

Each type serves a specific purpose, ensuring effective and targeted pest control.

Information available in the Leaflet

The pesticide container always comes with a small leaflet, usually attached to the side, which most farmers tend to ignore. However, this leaflet contains some of the most valuable information regarding the pesticide, such as details on the specific target insect species, the crop for which the pesticide is recommended, and instructions for proper use. For example, the leaflet for the insecticide ***Chlorantraniliprole 18.5% SC*** specifies that it can be used to control stem borers (*Scirpophaga incertulas*) in rice. It also recommends an application rate of 30 grams per hectare, using 150 milliliters of the formulation mixed with 500 liters of water.

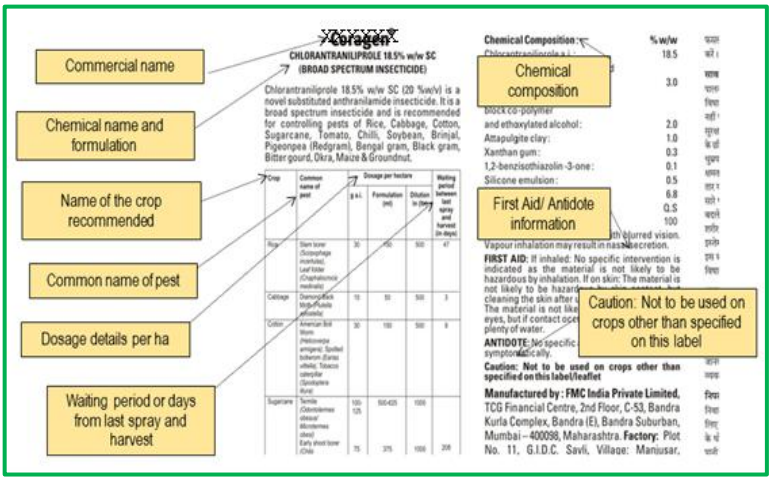

Figure 1: Leaflet comes with the insecticide container (Chlorantraniliprole 18.5% w/w SC)

Additionally, a waiting period of 47 days is advised before harvesting to ensure degradation of pesticide residues to safe levels. The leaflet also includes important safety information, such as precautions for storing pesticide containers and first aid guidelines. Reading these labels helps farmers comply with safety regulations and ensures both human health and environmental protection.

How to safely dispose a pesticide container?

The proper disposal of pesticide containers is considered crucial for environmental safety. The disposal instructions on the pesticide label must always be read and followed because they are legally required and provide detailed steps for safe handling. The pesticide contents should be completely emptied into the spray tank or mixing container. After this, 1/4th of the container should be filled with clean water, and all internal surfaces should be rinsed by shaking or rolling it. The rinsing liquid should then be poured into the spray tank, and the process should be repeated two more times. Once rinsed, the container (if plastic) should be punctured to prevent reuse and potential misuse. Finally, the cleaned container should be stored in a secure location, away from children, pets, and water sources, until proper disposal is possible.

Who Controls the Safe Use of Pesticides?

The information mentioned above is mandatory for pesticide companies to provide on the container and the attached leaflet. In India, the trade and use of pesticides are regulated by laws such as the Insecticides Act of 1968, the Insecticides Rules of 1971, and the more recent Pesticide Management Bill of 2020. The Directorate of Plant Protection, Quarantine & Storage (DPPQ & S) oversees these regulations, ensuring that pesticides are properly tested, labeled, and used according to safety guidelines. The Insecticides Rules of 1971 further specify standards for packaging, labeling, and the safe handling of pesticides. These regulations aim to minimize risks to humans, animals, and the environment while promoting sustainable agriculture.

What Happens When Farmers Use Pesticides Without Understanding the Above?

Misusing pesticides, such as applying them in excess or too frequently, can leave harmful residues on crops. These residues can pose health risks to consumers and contribute to the development of resistance in pests. Additionally, improper pesticide use can lead to resurgence, where pest populations rebound more vigorously because natural predators were also killed off. This makes pest control more challenging, costly, and less effective.

How to negate the effect of improper pesticide use?

To avoid problems like pest resistance and resurgence, farmers should practice pesticide rotation, which involves using different types or classes of pesticides over time. Additionally, newer pesticide molecules, which are more effective and environmentally friendly, should be used. By following Integrated Pest Management (IPM) strategies, which combine cultural, mechanical, and biological methods, farmers can sustainably control pests while minimizing harm to beneficial organisms and the environment.

Conclusion

Proper pesticide use is crucial for sustainable agriculture. By understanding the information on pesticide containers and leaflets, such as target organisms, toxicity levels, and mode of action, farmers can make informed decisions. Reading labels, adhering to recommended dosages, and following safety instructions help ensure that pesticide use remains effective while protecting human health, beneficial organisms, and the environment. Additionally, practices like pesticide rotation and Integrated Pest Management (IPM) are vital in preventing pest resistance and resurgence, promoting long-term agricultural productivity and sustainability.