



# **FUNGICIDE RESIDUES: ESTIMATION AND MANAGEMENT**

- **FUNGICIDE:-** A fungicide is a specific type of pesticide that controls fungal disease by specifically inhibiting or killing the fungus causing the disease.
- **FUNGICIDE RESIDUE:-** Pesticide residue refers to the pesticides that may remain on or in food or in soil after they are applied to crops.
- The amount of initially laid down pesticide after application on the surface or substrate is termed as **deposit** while the amount of pesticide left over after a lapse of time may be referred as **residue**.
- It is expressed as parts per million (ppm).

(Gupta 1999)

# Related Terms

- **Persistence** – Period for which the pesticide remain unaltered.
- **Deposit** –Amount of initially laid down chemical after application on the surface.
- **Surface residue** – Amount of insecticide that remain on treated surface after a lapse of time.
- **Cuticular residue**- Residue found in the cuticular region of plant.
- **Harvest time residue**- Residue found in the substrate at the time of harvest.

# How pesticide residue occur in agriculture commodities

- Contamination of crop or animals exposed to chemical in the environment
- Intentional use of pesticide for protection of growing crops and stored products
- Unintentional exposure to pesticides such as would occur in crops, grown in soil treated previously or contaminated by foliar treatment of other crops grown earlier in the rotation

# Why to study fungicide residue ?

- For safety of food and health
- To reduce environmental pollution
- To study effect of residues on non target organisms

# REGULATION

- Each country adopts their own agricultural policies and Maximum Residue Limits (MRL) and Acceptable Daily Intake (ADI).
- Some countries use the International Maximum Residue Limits -Codex Alimentarius to define the residue limits; this was established by Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO) in 1963 to develop international food standards, guidelines codes of practices, and recommendation for food safety.
- Currently the **CODEX** has **185** member countries.

- MRL:- maximum concentration of a residue that is legally permitted or recognized as acceptable in, or on, a food, agricultural commodity or animal feedstuff as set by codex or national regulatory authority (mg/kg).
- ADI:-estimate of the amount of pesticide in food and drinking water which can be ingested daily over a life time by humans without appreciable health risk(mg/kg body weight/day).

# How to estimate of fungicide residue ?

- Residue of fungicide are present in micro quantities in the matrix. Hence involve a complicated procedure involving many step for their analysis. Analysis does not depend on high cost equipment like GC(gas liquid chromatograph) and HPLC (high performance liquid chromatograph). But based on series of cumulative operation like:-
  1. Sampling
  2. Extraction
  3. Clean-up
  4. Estimation



# SAMPLING

- Sampling can be defined as the procedure or step adopted to obtain a representative quantity from the large consignment, so that selected representative quantity can be handled conveniently.

# Sampling procedure for different food commodities:-

- **Vegetables and fruits:-** a sample of a fruit or a vegetable must be taken directly from the field or grower at the time of, or shortly after the harvest.
- In field sample should be collected randomly 10 areas from the field. Collect 0.5-1 kg portion each of these 10 areas and combine to form the sample.
- **Grains :-**grains are never sampled at the primary producer. Because residue on grains typically due to post harvest use of fumigants sample size of 5 kg should be collected
- **Animal feed:-** it include hay, silage, grains, bio product and commercial feed rations. Sampling procedure is typically selective not random. Collect 5 kg sample.

# CONTINUE

Type of food	Minimum amount of sample to collected
Medium sized Fruits and vegetable with weight between 25-250 gm	1 kg (at least 10 fruit )
Large sized Fruits and vegetable with weight more than 250 gm	2 kg (at least 5 fruit )
Dairy products like butter, cream, milk and cheese	0.5 kg
Spices (coriander,cumin)	0.25 kg
Cereals	1 kg
Animal feed (cotton seed cake) and fodder	1 kg, 5 kg
Water (running water)	15 kg
Soil	5 kg

Select the crop components of interest , reduce the size of the component parts, mix subdivide and systemically reduce the sample size 50 gm