



**FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES**

**TECHNIQUES IN PLANT PROTECTION MSH-304**

## LECTURE 01

Pesticide application plays an important role in pest management. Proper technique of application of pesticide and the equipment used for applying pesticide are vital to the success of pest control operations. The application of pesticide is not merely the operation of sprayer or duster. It has to be coupled with a thorough knowledge of the pest problem. The use of pesticides involves knowledge not only of application equipment, but of pest management as well. The main purpose of pesticide application technique is to cover the target with maximum efficiency and minimum efforts to keep the pest under control as well as minimum contamination of non-targets. All pesticides are poisonous substances and they can cause harm to all living things. Therefore their use must be very judicious. The application techniques ideally should be target oriented so that safety to the non-targets and the environment is ensured. Therefore, proper selection of application equipment, knowledge of pest behaviour and skillful dispersal methods are vital. The complete knowledge of pest problem is important to define the target i.e., location of the pest (on foliage, under the leaves, at root zone etc). The most susceptible stage of the pest for control measures will help to decide the time of application. The requirement of coverage and spray droplet size depends upon the mobility and size of the pest. The mode of action of pesticide, its relative toxicity and other physicochemical properties, help to decide the handling precautions, agitation requirement etc. Further the complete knowledge of the equipment is necessary to develop desired skill of operation, to select and to estimate the number and type of equipments needed to treat the crop in minimum time and to optimize use of the equipment. Thus the following aspects must be considered for a successful pest control programme.

A. Knowledge of pest problem: - Where is the pest location? : To define the target. - What is the most susceptible stage for control? : To decide the time of application. - What is the mobility of the pest? : To define the coverage requirements and droplet size. B. Knowledge of pesticides: - What is the mode of action? : To define the application technique. - What is the phytotoxicity? : To define the calibration requirement - What is mammalian toxicity? : To take up necessary precautions in handling. Plant Health Engineering Division, NIPHM Page 2 C. Knowledge of formulations: - What is the solubility? : To define the agitation requirements. - How should it be

mixed with water? : To collect suitable measure and water buckets and tools etc. D. Knowledge of techniques & equipments: - How should it be operated and maintained? : To operate the equipment without field troubles. - What are the capabilities? : To estimate sufficient number of equipment needed. - What adjustments are necessary? : To get an optimum use of the equipment. - What technique is to be adopted? : To select suitable equipment.

## OBJECTIVE OF PESTICIDE APPLICATION

The objective of the application of pesticide is to keep the pest under check. The pest population has to be kept suppressed to minimum biological activities to avoid economic loss of crop yields. Thorough killing of pest or eradication of pest is neither practical nor necessary. The objective of pesticide application besides keeping the pest population under check should also be to avoid pollution and damage to the non targets. The success of pest control operations by pesticide application greatly depends on the following factors:- 1. Quality of pesticide 2. Timing of application 3. Quality of application and coverage Different types of pesticides are used for controlling various pests. For example Insecticides are applied against insect pests, Fungicides against crop diseases, Herbicides against weeds etc. in order to protect the crop losses. But it is essential that besides choosing an appropriate pesticide for application it has to be a quality product i.e., proper quantity of pesticide active ingredient (a.i) must be ensure that the quantity is maintained in production and marketing of pesticide formulations. The application of pesticide is very successful when applied at the most susceptible stage of the pest. If the timing of pesticide application is carefully considered and followed, the results will be good pest control and economy. Therefore for large area treatment careful selection of equipment becomes necessary so that within the available 'Time' the area could be treated.

Plant Health Engineering Division, NIPHM Page 3 Even though good quality pesticide is used and optimum timing for the application of pesticide is also adopted; unless the pesticide is applied properly it will not yield good results. Therefore, the quality of application of pesticides is very important in pest control operations. Adherence to the following points can ensure it: 1. Proper dosage should be applied evenly 2. The toxicant should reach the target 3. Proper droplet size 4. Proper density of droplet on the target The dosage recommendation are generally indicated for acre or hectare e.g. kg/ha or lit/ha or gm ai/ha. It should be properly understood and the exact quantities of the formulated pesticide should be applied. Pesticides are dispersed by

different methods like spraying, dusting etc. For spraying of pesticides different types of nozzles such as hydraulic, air blast, centrifugal and heat energy type are used. Water is a common carrier of pesticides but air or oils are also used as carriers. Selection of proper droplet is an important consideration. The shape, size and surface of the target vary greatly. For spraying against flying insects, the hydraulic nozzles will not be effective. Here we need fine size spray particles to remain airborne for longer time. However, for weed control operation usually the requirement is drift free application or coarse spray droplets. Adequate number of spray droplets should be deposited necessarily. For fungicide application the number of droplets deposited per unit area should be more and may be for translocated herbicide application it can be less in number. It may need fewer numbers of droplets to be deposited in case of highly mobile (crawling) insect pest. The pesticides are formulated in liquid form, dust powder or granule forms such that it makes possible to apply small quantities of pesticides over large area. Some of the pesticides are applied as low as few gram a.i. per hectare. Therefore adoption of proper Application Technique is vital for uniform depositing of pesticide. The method of setting the pesticide application equipment to ensure even distribution of certain quantity of pesticide over the desired area is called Calibration.