

Protective masks assessment as tools for safety handling of selected agro chemicals during spraying

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■ **Abstract :** The pest and disease control is one of the major operations needed for getting higher yields in agriculture. Handling of pesticides has led to serious problems on environment and on pesticide handling agricultural workers. To prevent the operator against exposure to pesticides, the operator should wear the personal protective mask. In actual practice sprayer operators are not using these protective masks for various reasons. Therefore, a study was undertaken to evaluate commercially available five masks for their materials of construction, filtering efficiency, comforts in field usage (modified Corlett and Bishop scale) and breathing resistance was tested at Central Labour Institute (CLI) Mumbai as per BIS. The masks were found manufactured using foam pad, single and double layered poly propylene and cotton cloth as filtering materials. For preventing chlorpyrifos and endosulfan from inhaling air masks with double layered poly propylene with water repellent quality filter was found good with an average filtering efficiency of 87 per cent. Operator's opinion indicated that the mask made of flexible plastic body with cotton filter and exhale valve was giving higher wearing comfort, higher breathing comfort based on developed scale. The minimum breathing resistance was found in same mask as 0.68 m bar.

■ **Key words :** Ergonomics, Exposure, Masks, Protection

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The use of pesticides in agriculture is the most common way of controlling pests world-wide. Problems with the use of pesticides are usually worse in developing countries where many products which are banned are still in use. Spraying pesticides can be dangerous to humans. Pesticides may operate through hormonal or genotoxic pathways to affect male reproduction. They may penetrate the blood to potentially affect spermatogenesis, either by affecting genetic integrity or hormone production. Inhaling pesticide fumes and mists is a very common entry route of pesticides into the body. Absorption through the lungs is great and the sensitivity is high. Inhalation exposure is one of the easiest to prevent by wearing readily available adequate personal protective mask and it is generally a cheaper option. Garg (1996) studied five different types of available masks. Trials showed that operator felt uncomfortable in wearing all type of respirators. Lange (2000) stated that inappropriate use of respirators during low exposure concentrations might result in increased incidence and prevalence of disease due to physiological and psychological stress. Shaw and Abbi (2000)

stated that fabrics laminated or coated with plastic or rubber film provide excellent protection from exposure. Caretti *et al.* (2006) stated that significantly decreases in performance of worker were found with increased inhalation resistances. Anne and Susan (2008) surveyed and reported that 75 people were not using any respiratory protection device for spraying due to discomfort of wearing. Keeping the above points in view, studies were conducted to evaluate the regionally available five masks for their as filtering capacity and comfort for workers. The masks were tested at CLI Mumbai for their breathing resistance.

■ METHODOLOGY

Commercially available eight masks used by farmers during spraying were procured and five of them were selected for study. Three same configurations with other masks were neglected.

A cubical mild steel structure of size 3.0 m x 2.0 m x 2.0m was constructed on cement floor to test the masks under uniform chemical environment as shown in Plate 1. The volume