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Nordic and world-wide perspectives

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Exposure to fungicides in vineyard cultivation: results from three ongoing Italian studies.

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Objectives

Vineyard cultivation is a traditional agricultural activity in Italy, which often leads to products highly prized in the global market. Vineyards protection needs the use of fungicides, which are applied by different techniques (tractor or manual spraying) according to estate characteristics (large flat, hill vineyard). Since exposure of vineyard workers may occur and their health might consequently be affected in the long term, rationally planned monitoring programs can drive prevention while avoiding unnecessary concern.

Methods

Three monitoring studies are ongoing in the Northern Italian regions of Lombardy and Piedmont: (a) exposure to Mancozeb of 15 workers of flatland vineyards; (b) exposure to mancozeb of 14 workers of steep-hill vineyards; (c) exposure to tebuconazole of 10 workers of steep-hill vineyards. Studies (a) and (b) use passive samplers on workers' own clothing to assess exposure in real-life conditions while study (c) uses the regulatory 'whole body' approach, whereby workers are dressed with a standardized underwear-coverall attire as the passive sampler for the measurement of dermal exposure. In all studies monitoring includes hand washing and pre- and post-exposure urine measurement of pesticide-specific metabolites. A complete collection of data including acreage, applied quantities, duration of tasks, technical information on employed agricultural machinery, is obtained in the field through an interview and field survey by a professional agronomist.

Results

In the vineyard sprayers who participated in studies (a) and (b) the amount of mancozeb on the working attire ranged from 25 micrograms to 26 milligrams (median 681 micrograms), corresponding to 0.13 - 740 micrograms / dm². Contamination of the underwear ranged from 0,17 micrograms to 0.6 milligrams, corresponding to 0.1 nanograms - 12 micrograms / dm² and indicating a permeation rate <1% for most workers who donned whole-body coveralls. Hand washing yielded from 4 to 2700 micrograms, which makes up almost 90% of skin contamination.

In the vineyard sprayers who participated in study (c) the contamination of the coverall ranged from 1.5 to 35 milligrams, corresponding to 5-400 nanograms / dm², with higher contamination in the lower half of the body and on the forearms, depending on the amount used and on the method of application (manual spraying > open tractor > cockpit tractor).

Underwear contamination ranged from 50 to 450 micrograms, corresponding to 0.1-6 nanograms / dm² and indicating a permeation rate <10% . Hand washing yielded from 50 to 2000 micrograms.

The results are merged into a database to data-mine the determinants of exposure (application techniques and protective devices). The final aim is to build 'exposure profiles' to forecast exposure at individual workers' and small-enterprise farm levels to assess the effect of specific technical prevention in a cost-effective way.