A PANAP Factsheet Series

Highly Hazardous Pesticides

Mancozeb

Hazard to children: **birth defects; developmental, immune and endocrine effects; later in life: cancer, Parkinson's disease, female reproductive problems.**

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Uses: dithiocarbamate fungicide; contains zinc, manganese (essential element but neurotoxic in excess); metabolites include ETU.

Residues: drinking water, food; manganese in hair of exposed pregnant women.[1]

Acute toxicity: eye irritation, skin rashes, dermatitis, nausea, dizziness.[2] Children have been poisoned in Nicaragua.[3] Commonly reported cause of poisoning in Tanzania.[4]

Chronic toxicity: liver, brain, kidney (rats).[5]

Neurological: damage to peripheral nerves with abnormal gait and loss of muscle mass (rats);[2] prenatal exposure alters developing brain (mice);[6] in other species neurodegeneration and behavioural changes.[7 8] Associated with Parkinson's disease.[9-11]

Cancer: US EPA probable human carcinogen; in rats tumours of thyroid, liver, pituitary;[2] mammary glands, ear, pancreas, bones of the head;[12] in mice foetal cells[13] and skin.[14] Associated with leukaemia,[15] melanoma[16] breast cancer risk.[17]

Genotoxicity: genotoxic in human cells.[18]

Endocrine disruption: causes thyroid damage, tumours and altered hormones;[2] associated with hypothyroidism and hyperthyroidism in women;[19] anti-androgenic.[20]

Reproduction: Ovarian toxicant.[21 22] Birth defects e.g. hydrocephaly, skeletal system defects in rats;[2] neural tube defects in humans.[23] Reduced female fertility (mice).[21] Induces a pre-malignant state in ovarian follicles;[13 22] increased length of menstrual cycle, missed periods.[24]

Immune: alters immune system response;[25-27] allergic sensitisation.[2]

Environmental effects: *Aquatic:* very highly toxic to fish and aquatic invertebrates; risk to freshwater fish and invertebrates; fish kills.[2]

Terrestrial: chronic risks to birds and mammals, including reproductive and potential endocrine disruption; toxic to some beneficial insects.[2 28]

Environmental fate: Can cause severe accumulation of manganese in soil, and ETU in surface water.[29]

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