The Presence of Antiretroviral Drugs in Crops Irrigated with **CONTAMINATED WATER**

Research finds that ARV drugs accumulate in various parts of the crops, including roots, stem, leaves, and fruits.

Antiretroviral drugs (ARVDs) have significantly improved the lives of people living with HIV/AIDS, reducing the morbidity and mortality associated with the disease. However, the use and disposal of these drugs have led to environmental pollution of water resources, often used for irrigation purposes.

Researchers from the University of KwaZulu-Natal investigated the potential risks associated with the use of contaminated water for irrigation purposes. The NRF-funded study evaluated the uptake of commonly used ARVDs in South Africa - abacavir, nevirapine, and efavirenz - from contaminated soil into different parts of crops and its subsequent accumulation in the food chain. The vegetable plants studied included beetroot, spinach, and tomato.

Using laboratory and greenhouse experiments, the study found that:

- The ARVDs were present in the soil and subsequently taken up by the crops irrigated with contaminated water.
- The ARVDs were found to accumulate in various parts of the crops, including roots, stem, leaves, and fruits.
- The total percentage of ARVDs found in the individual plants studied was mainly attributed to the abacavir which contributed 53% in beetroot and 48% in spinach. Efavirenz was the main contributor in tomato with 42%.
- There were high concentrations of abacavir in the spinach root, the spinach stem, and the spinach soil, while efavirenz showed the highest concentrations in tomato leaves and tomato fruits.

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Spinach roots accumulated more ARVDs than beetroot and tomato, however, the concentrations were not statistically different. A high relocation factor from root to stem and leaf was obtained in beetroot and spinach plants, while in the tomato plant, it was obtained from root to stem, leaf, and fruit. According to the researchers, the uptake of ARVDs in spinach and tomato plants may be influenced by the ARVDs molecules hydrophobicity, whereas in beetroot it may be other factors that could be as a result of the biotic processes.

> Bio-accumulation and bio-translocation of ARV drugs in crops poses a significant risk to human health.

According to the study, the findings suggests that the contaminated water used for irrigation can lead to the bio-accumulation and bio-translocation of antiretroviral drugs in crops, thereby posing a significant risk to human health. This is because the presence of ARVDs in the environment and the food chain can lead to the development of drug-resistant strains of the virus. Moreover, prolonged exposure to these drugs can cause severe health problems, including liver damage.

Given that South Africa faces water scarcity challenges - which often results in irrigation of crops using poorly sanitised water – the study highlights the importance of assessing the quality of water used for irrigation purposes. The researchers suggest that effective policies and regulations are necessary to ensure the safe use of water resources for agricultural purposes, and to protect public health and the environment. SM