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President Museveni's simplicity: Why all water is not safe for irrigation

Are you inventing a rain-making machine?"

A close relative and childhood playmate, now in Kampala - Grace Kiiza - teased me during my protracted doctor of engineering research in solar energy. She had learnt I was working on some solar-related invention and both of us were concerned about the changing climate of the country leading to droughts even in regions that had been 'wet' during our youth. Her question directly related to President Museveni's cycling to fetch irrigation water. In this and the next three articles, I explore means to get this water.

I start by pointing out that not all water is safe for irrigation, giving pointers as to which one to avoid – and how peasants could detect it. Then, I look at the more conventional sources. I will conclude the sourcing with an unconventional suggestion for the better off farmers, able to do subsurface drip irrigation.

Just like you could be poisoned by what you eat or drink, plants might die if their 'food and drink' through the roots is badly contaminated.

What is more, even relatively safe 'feeding' by irrigation in one season tends to contribute to poisoning in the next one. There are at least four ways of damaging the crop or its yield through irrigation.

First – using water with big amounts of dissolved substances, as would happen if sourced from some boreholes or from untreated industrial and household waste water.

In general, roots will 'struggle' to pull the water from most 'unwanted' substances, thus leaving the latter behind in the top soil. However, if the quantities are much, the roots will fail to pull the water – and the plant will die in spite of the irrigation effort.

Often, first irrigation efforts may not lead to crop death but subsequent ones add to salts left by previous irrigations and thus eventually kill the crop.

Peasants will know the water is salty by simple tasting but this can be dangerous. It is best to be advised by the agricultural staff. In absence of the staff, safety-conscious peasants might suppose that if they wouldn't drink it even when filtered, then it is not good enough for the plants either. In any case, they should be advised against continuous use of underground water (i.e. spring and borehole) each successive season in the same garden. Gardens irrigated by such water should be left fallow for a number of rainy seasons – so that the salts left behind by irrigation can be leached to lower layers underground before another irrigated crop.

There are 'naughty' salts which resist separation from water – and they force their way into the roots up the plant. Typical of these is our common salt and what constitutes it (Sodium and Chloride ions). These progress up to the leaves where unfortunately water has to leave them as it evaporates into the air – and they cannot follow it as vapour.

They accumulate and then kill the leaves, and hence the plant. This is the reason household water from the kitchen, the bathroom or from washing laundry should not be used for irrigation. The sodium part of our common salt goes a step further.

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If in big quantities in irrigation water, it aggregates the soil into small lumps around the roots – preventing more water from reaching them and also suffocating them.

One way of fighting this suffocation is by introduction of calcium in form of ground 'bone mill' in the soil so that lumps are not easily formed. My experience in Cape Town, however, shows that this attracts dogs to dig up the soil, and thus destroy the plants!

The third way of damaging the crop yield is through 'overfeeding' of the plant. Just like if you keep overfeeding, you will fatten in areas that are less useful – often limiting effectiveness of more vital ones. So it is with plants, irrigated with nutrient-rich water and fertilised at the same time.

This happens if the water is from a river in its mid to mature stages or is a runoff from an eroded hill. Which reminds me of my BAT days in the late 1980s to mid-1990s. Some tobacco farmers in then Arua's Terego and Maracha counties always resisted using company-supplied fertilisers because they claimed they were assured of good yields from nutrients washed from the hills.

I could not understand their logic then. But the truth is that over-fertilisation causes unwanted growths, delays maturity and for some crops e.g. tubers, fruits and leafy vegetables, leads to less marketable produce because of abnormal shapes, and unsightly deposits in otherwise saleable parts. The lesson here is clear: agricultural officers need to check the irrigation water and advise whether additional fertilisation is necessary. In case they don't, peasant farmers should go slow on fertilisers if the water has sediments.

Finally, we have seen that 'dirty' water with sediments can be 'good' as a source of plant food. Is it really good for irrigation?

Yes and No: Yes – if the water is flowing freely as in the Terego-Maracha hills example above. If, however, canals and ditches are conveying the water to the gardens, a problem of silting and blockages can arise.

In that case, it becomes more demanding on maintenance and may be uneconomical if the irrigated crop is of low financial value like most food crops.

What about if there is very little contamination – such as in melting glacier water of Rwenzori or stored rainwater? Again, 'Yes' and 'No': this time depending on the conveyance to the gardens.

If metallic pumps, tanks, piping and fittings are used, the irrigation components rust (corrode), increasing maintenance costs, and possibly making the system unviable.

If plastic systems are used, rusting is avoided and the water will be suitable for the job on hand. In valleys or for diverted rivers, using flood irrigation, it will also be acceptable.

This concludes what water to avoid for irrigation and under what circumstances.

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