

'Mini' Prong General Safety Advice



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Plant consumption

For customers using the Smart Greenhouse Kit in schools, normal safety guidelines should be followed for plant material grown under experiment conditions in science or other subjects: the food should not be consumed (there will be other hazards in these locations which pose a much greater risk).

For customers using the Smart Greenhouse Kit at home, plants which have developed healthily and look good for eating will be fine for consumption. We would advise that plants are washed thoroughly before use.

Potential corrosion of the Mini Prong in long term use

The Mini Prong soil moisture sensor is a resistive type of moisture sensor. The two electrode probes allow current to pass through the soil/growing medium, and then the connected micro:bit measures the potential difference across the electrodes to determine the moisture level. The higher the moisture level, the lower the potential difference and vice versa.

What this means is that the system is effectively carrying out electrolysis – copper atoms on the positive electrode are ionised and transported through the water in the growing medium, and then deposited again as copper atoms on the negative electrode. The gold plating on the electrodes will provide some protection against this, but even a tiny gap to the copper beneath will allow the process to begin.

Is it a problem?

In an independent study carried out to look at the impact on leafy vegetables of copper contamination in soil, four different types of leafy vegetable were grown in soil containing varying levels of copper contamination. Copper Sulphate was added to the soil, and copper was absorbed from this compound into the soil itself. The copper content was measured in the plants after they were harvested, to establish the level of toxicity to humans if they were consumed. It was noted that copper is good for plant growth – up to a certain amount – just as it is required for humans, for the lower concentration of copper in the soil, the plants actually grew much better.

The electrodes on the Mini Prong moisture sensor are being placed in an environment that is naturally corrosive for them, and is accentuated by the electrolysis taking place as they are used to measure the moisture level. It is expected that over time corrosion will take place. The accumulation of copper in a plant that has grown and developed well in the Smart Greenhouse, and is therefore viable for harvesting and consumption, would not contain anywhere near a toxic level of copper.

Prolonging Mini Prong lifetime

There are some measures which can be taken to increase the corrosion resistance of the electrodes. One of these is already done on the PCB itself – the electrodes have been coated in gold, which provides a good level of protection. However, over time, this gold coating can be worn away by chemicals naturally present in the growing medium (particularly soil). To increase the longevity of the electrodes further, soil moisture readings can be taken intermittently, rather than continuously – this reduces the amount of time the electrolysis can take place.

