



VII. POLLUTION AND URBAN GARDENING

What is the extent of pollutant contamination in city gardens? This is one of the crucial questions being asked about urban agriculture. In an attempt to answer this question, a series of experimental analyses were undertaken, during both summers of operation, on the effects of air borne pollutants on samples of vegetables grown on the project rooftop.

During the first summer, preliminary tests were done on unwashed swiss chard, lettuce and cabbage for lead and cadmium contamination. The sample analyses were undertaken at the Department of Renewable Resources, Macdonald College. Test results are included.

During the second summer, a somewhat more extensive testing program was carried out. This time analyses were done by the Research Centre of Domtar Limited, located in Senneville, Québec. Rooftop washed and unwashed lettuce and swiss chard as well as unwashed beets were compared with similar country produce planted and harvested at the same times. In addition, rooftop and country soil samples were tested. Grocery store lettuce, swiss chard and beets (all washed by them) were used as additional controls. The data obtained is included.

There does not appear to be a general trend emerging from the data available from the two series of tests. Perhaps the only conclusive statement to be made is that leafy vegetables should be washed before consumption in order to reduce contamination levels. Of the 11 vegetable samples tested during the second summer, only 3 contained lead beyond a trace. Two out of five rooftop samples contained more than a trace of lead. These were unwashed lettuce at 2 parts per million and unwashed beet leaves at 13 parts per million. Both unwashed country and rooftop beet leaves revealed measurable lead contents. The soil samples tested had significant amounts of lead in them with the country soil containing some eight times more lead than the rooftop soil. There was no correlation discernable between lead content in soils and lead content in the vegetable leaves however. This corresponds with other studies which have shown that lead in soil is not noticeably fixed by plants. There is room for speculation as to why the country soil contains more lead than soil exposed to a downtown environment.

Earlier fertilizer applications could have caused this high lead reading. Duplicate testing was done on the soil samples to verify the recorded contamination levels.

It is not entirely accurate to compare the results of the different analysis undertaken by the two laboratories. Different testing procedures were used in each case. The Renewable Resources Laboratory used a flame spectrophotometry analysis after extraction of the samples with hydrogen chloride. The Domtar Research Centre Laboratory used a technique involving atomic absorption after digestion of the samples in a perchloric acid solution.

The pollution testing was limited in scope. In order to obtain statistically verifiable results, it may be necessary to do several hundred sample tests of every possible combination, i.e. washed and unwashed, city and country, rooftop and ground level, for each vegetable type grown. Lead content in samples can vary widely, thus the reason for a large number of tests. This is borne out by the various laboratories undertaking mercury and other contaminant testing in Canada's mid-north.

An underlying factor in the whole issue of lead contamination is that there is little agreement as to what should be considered dangerous levels for human consumption. The Centre for the Biology of Natural Systems at Washington University, St. Louis, Missouri has done considerable research in the field of heavy metal contamination.



This group appears to have undertaken the only definitive studies that purport to contain reliable data. However very little has been done specifically relevant to urban gardens. What indications there are reveal that results can vary widely from area to area.

Further study in this area is recommended.

TEST RESULTS

1. Analysis of vegetables grown on rooftop in downtown Montreal during summer of 1975.

| | <u>Lettuce</u> | <u>Swiss Chard</u> | <u>Cabbage</u> |
|--------------|----------------|--------------------|----------------|
| Lead (Pb) | 56.4 ppm | 24.6 | 12.5 |
| Cadmium (Cd) | 0.76 | 0.44 | 0.33 |

"As expected the data confirms high Pb levels although probably highly significant amounts of Pb would be removed by thorough washing.

The Cd levels are tolerable and are only slightly higher than corn grown here on the farm in a relatively uncontaminated environment. Again, washing might be most beneficial in removing the contaminant."

- Renewable Resources
Macdonald Campus of McGill University

2. Analysis of vegetables and soils, comparing the rooftop in downtown Montreal with other situations, with respect to lead levels.

| | |
|--------------------------------------|--------------------|
| Unwashed country lettuce | trace (1) ppm |
| Washed country lettuce | none detected (1) |
| Grocery store lettuce washed by them | none detected (1) |
| Rooftop lettuce unwashed | 2 |
| Rooftop lettuce washed | trace (1) |
| Grocery store swiss chard | none detected (1) |
| Rooftop unwashed swiss chard | none detected (1) |
| Rooftop washed swiss chard | trace (1) |
| Country beets unwashed | 4 |
| Grocery store beets washed by them | trace (1) |
| Rooftop unwashed beets | 13 |
| Country soil | |
| Rooftop garden soil mix | 12 |
| | 98 |

- Domtar Ltd./Research Centre
Senneville, P.Q.

