

April 28, 2009

## How growth location might affect a tree's healing properties\*

A first look at showy mountain ash and American mountain ash

### Purpose

See if the ingredients in showy mountain ash and American mountain ash vary with where the tree grows.

### About plant ingredients

Plants, like people, inherit certain features from their ancestors. Their genes determine what features they will inherit. We can think of the genes as a cookbook of recipes that the plant can draw on—such as the recipe for parts of a leaf or a root. Depending on where it grows, a plant might make more of some recipes than others. (This is called “gene expression.”) For instance, if the plant is growing in a cold spot, it might make more of the things that helps protect it against cold.

We think that a lot of the healing ingredients in plants are actually ones that the plant uses to protect itself against stressors in its environment, like cold or insects. If this is so, then plants that grow in higher-stress environments might have more healing effects than others. This is because the plant might respond to the stress by producing more of the healing ingredients than usual. To see if this is so, Anna Bailie has been testing showy mountain ash and American mountain ash for two kinds of ingredients. These two kinds are called “flavonols” and “squalenes.” Anna wanted to know if the same kind of tree might have more or fewer flavonols and squalenes depending on where it grows.

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\* This is a plain-language version of an article by Anna Bailie and others called “Using quantitative real time PCR to analyse antidiabetic phytochemicals in *Sorbus* spp., a traditional medicinal plant used by the Cree of Eeyou Istchee (James Bay, Quebec).” (Draft of April 23, 2009.)

### Why choose these two trees?

So far, the anti-diabetic plant project has found that showy mountain ash and American mountain ash have strong “antioxidant” effects. This means they help protect our veins against damage by bad particles. Showy mountain ash also seems to be good at fighting diabetes in rats. The scientists thought they knew what kinds of ingredients were good antioxidants. But when they looked, these two trees didn’t have much of those kinds of ingredients. Instead, they seemed to have a lot of two other kinds of ingredients, called “flavonols” and “squalenes.” So Anna focused on those.

The team collected samples from trees growing in five communities, going further and further north. They did this last August, since the elders told them that was the best time to collect the plants. In this study, Anna used a special kind of test on those samples to see if the northerly trees were making more flavonols and squalenes than the others.

### Do trees make more of some ingredients depending on where they grow?

Anna found that the further north the tree grew, the more flavonols and squalenes it had. Trees growing on the coast also seemed to have more of these ingredients than trees growing inland—even if they were growing at the same latitude. We think this means that trees growing in northern or exposed areas have to make more of these ingredients to cope with things like cold and a short growing season. This may give them more healing effect.

Anna also found that showy mountain ash had more of these ingredients than American mountain ash. This may explain why the elders prefer showy mountain ash as a medicine.

Finally, Anna found some differences in which parts of the tree make more of these special ingredients. It seems that, if a tree makes more flavonols than usual, it will do so mostly in its leaves. We think this is because a tree uses flavonols to defend itself against UV-B radiation from sunlight. On the other hand, extra squalenes tend to be added to the bark. The elders have told us that they mostly use the inner bark.

### Using both traditional knowledge and science to guide further research

Future studies should look at whether these differences are because

- the more northern trees actually have different genes (like having different recipes in their cookbook)
- the northern trees have the same genes, but express them differently (they have the same cookbook, but draw more on certain recipes from it)

These studies can be guided both by what Anna found out in this study, and by what the elders have told us. For instance, we already knew that the elders use mainly the inner bark. Now Anna's study has shown that the inner bark contains flavonols and squalenes. This suggests that future studies of what ingredients help diabetes should look at flavonols and squalenes. Similarly, the elders had told us that showy mountain ash makes a better medicine than American mountain ash. Now Anna's study tells us that this may be because showy mountain ash has more of these two ingredients. So future studies of these particular ingredients should focus on showy mountain ash rather than American mountain ash.