Why do trees crackle in winter?

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Objective:

In a severe frost in the forest, a strange crackle is heard every now and then sound. The poet Nikolay. A. Nekrasov in the poem "Red-Nosed Frost" says that Frost walks through the forest and "hits the branches with a club. " This, of course, is only a fairy tale.

But why does the frost really crack?

So, let's figure it out and explain why trees drop their leaves for the winter and crackle like a plague in severe frosts.

Hypothesis 1

Trees crunch in winter due to the fact that their branches break. Why is this happening?

If there are leaves on the tree and a lot of snow falls or the snow is wet,

the leaves trap the snow and there will be a lot of it. Branches break under the weight of snow.

Trees

Why do the leaves fail to fall?

After a rather warm autumn, with a sharp change in temperature conditions, the rhythm of life was disrupted in the trees and they did not have time to shed all the foliage.

Why don't the branches of coniferous trees break under the snow?

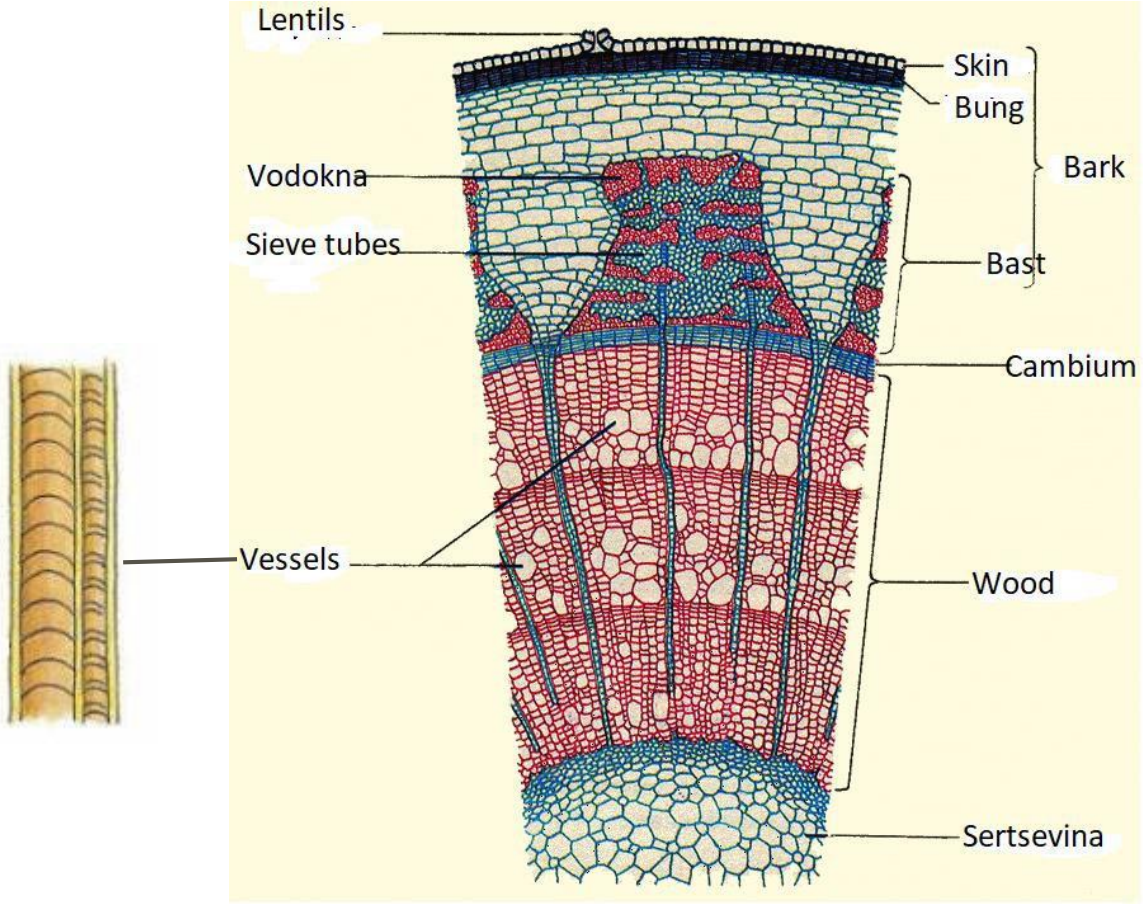
Branches of coniferous trees under the snow do not break due to the peculiarity of the arrangement of branches on coniferous trees - the branches are longer from below, and shorter from above. This leads to the fact that the snow rolls down, onto longer branches, from them - even lower and so on to the ground, without damaging the branches. In addition, the thin needles simply let the snow pass through them.

Hypothesis 2

Despite the fact that trees shed their leaves for the winter, slow down the movement of sap, there is still sap (water) inside the wood.

In extreme cold, juices freeze, and sap, like water (ice), expands and breaks the wood at the same time.

Tree trunk


Lentils
Skin
Bung
Bark
Vodokna
Sieve tubes
Bast
Cambium
Vessels
Wood
Sertsevina

Tasks:

1. Prove that the roots drink water.
2. Prove that the leaves are water-permeable.
3. Prove that the trunk contains water in winter.
4. Prove that water (ice) expands during freezing and can destroy.
5. Find out why gardeners control the lack of foliage on fruit trees during severe frosts.

The roots drink water.

Description of the experiment:

I placed it in a vessel with water in a volume of 200 ml. a shoot with a root. Oils were added to the surface of the water to prevent surface evaporation.

After a week, I measured the remaining amount of water in the vessel. 190 ml remain in the vessel.

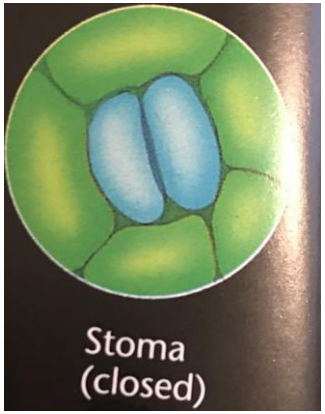
Calculations:

200 - 190 = 10 ml (the plant drank in a week)

Leaves let water through

Description of the experiment: I put a plastic bag on the vessel with the plant and waited a week. After a week, I noticed that water droplets formed inside the pocket that proves that the leaves evaporate water.

And how much water can a leaf pass through the stoma?



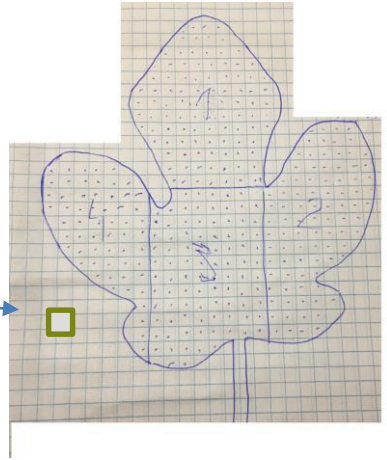
Calculations:

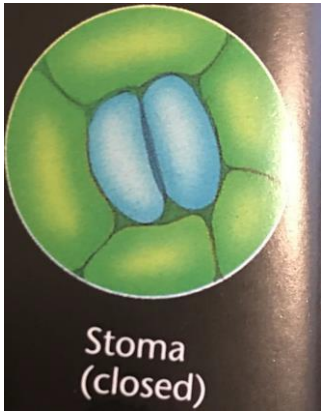
1. Let's calculate the leaf area:

1-101□, 2-90□, 3-93□, 4- 59□.

S□ = 0.5 * 0.5 = 0.25 cm2.

S leaf = (101 + 90 + 93 + 59) * 0.25 = 85.75 cm2=8575mm2





Leaves let water through

Calculations:

2. Let's calculate the number of stoma:

1mm2 contains approximately 300 stomates

8575mm2 * 300 = 2 572 500 stomates

3.Let's calculate the number of evaporated H2O molecules per 1 second

1 stoma – 10^15 H2O molecules per 1 second

2 572 500 stomates * 10^15 H2O = 25725*10^17 H2O per second!

Output:

With this experiment, I proved that the roots drink water that passes through the stem and leaves, which take the necessary minerals from it, and the leaves take the rest of the water to the surface.

Is there water in the trees in winter?

If you cut a tree in winter and weigh it, it turns out that:

1 cubic meter of wood weighs 660 kilograms. Weighing again after two weeks, we get the weight of the tree at 510 kilograms (approximately).

Conclusion: In two weeks, water evaporated from the wood and the weight of the tree became less, which proves that there is water in the tree trunk in winter.

But can water destroy?

The course of the experiment: Pour into a glass bottle of water, about 60 percent. I put the alarm in the freezer. Two days later, I took the bottle out of the freezer.

As you can see in the photo, the water has frozen and increased in volume. The ice came out throughthe neck and the bottle cracked.

Conclusion: In a similar way, water freezes in the vessels of the tree and can destroy them.

The problem of fruit trees.

One of the main problems in the winter season is the lack of moisture, so in the fall all nutrients begin to accumulate in the roots and core. The fact is that the leaves evaporate liquid very strongly, which is very wasteful in winter. Another reason why gardeners control that there is no foliage on fruit trees is a big risk for the branches. If fluffy snow falls, it will fall not only on the branches themselves, but also on their leaves, they could not withstand such a heavy burden and the branches break off.

All this leads to a decrease in yield or even death of trees.

Conclusion.

All trees need water, the roots help them to drink water, and the leaves then remove its excess. Trees need water all year round to sustain life. Although in winter they need it much less. Winter is a difficult time for trees. In severe frosts, the water in the trees freezes and, as we have seen from experience, it expands and destroys the vessels of the tree, which creates a character crunch. If there is a lot of such damage, then the tree may break, which is also accompanied by a crack.

Leaves that have not fallen are also a big problem for the tree. They evaporate water from the tree, which is not much in winter. Also, in heavy snowfall, the foliage retains snow on the crown of the tree, and under the heavy weight of this snow, the branches do not stand and break, which also creates a crackle.

The end