Observation of Pine Tree Decay with SFM1

Observation of Pine Tree Decay with the SFM1 Sap Flow Meter

Pine death is a recently recognised problem in Japan.

In 2011, to observe the possible process of decline and death in the sap movement, we installed two SFM1 Sap Flow Meters which can measure the sap flow at two different depths at the same time on two Red-Pine trees, (healthy tree and unhealthy tree).




(Healthy Tree) *(Unhealthy Tree)*

Choice of Pine Trees for Observation

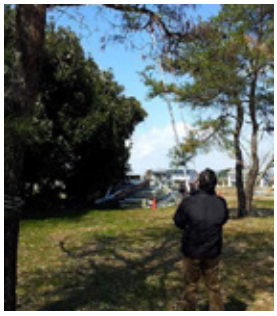
The two trees were chosen by the pine-resin test, it is a famous Japanese test to judge the pine tree's health and condition.

In general, the disease is cause by the nematode Bursaphelenchus xylophilus.

To confirm the unhealthy tree is going to die by the nematode, we collected seven branches and some sapwood from six points on the trunk and then test the samples by the Baermann funnel technique.

We found nematodes present in the trunk that faced north but couldn't find any nematode from the branches and trunk that faced south.





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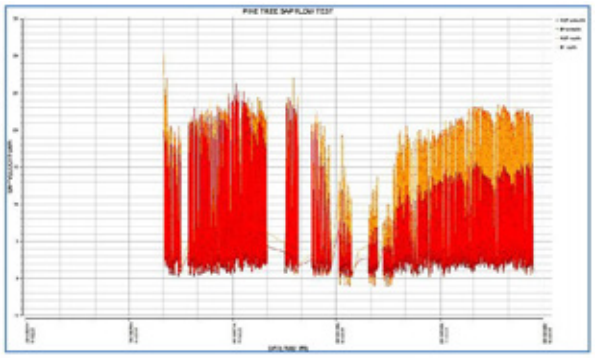
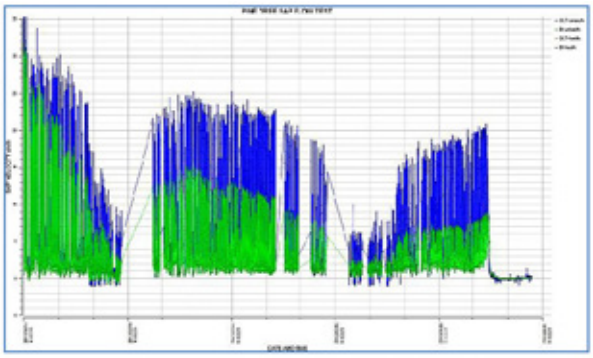
Healthy Tree (Left) and Unhealthy Tree (Right) Data from SEPT 2001 - SEPT 2013





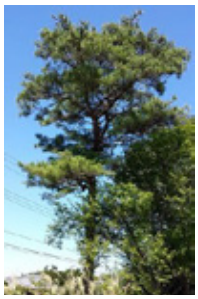
Healthy Tree September 2001 - September 2013

September 2011

March 2012

September 2012

March 2013



Sept. 2013

Unhealthy Tree September 2001 - September 2013

September 2011

March 2012

September 2012

March 2013

Sept. 2013

Sept. 2012 Close-Up

Sept. 2013 Close-Up

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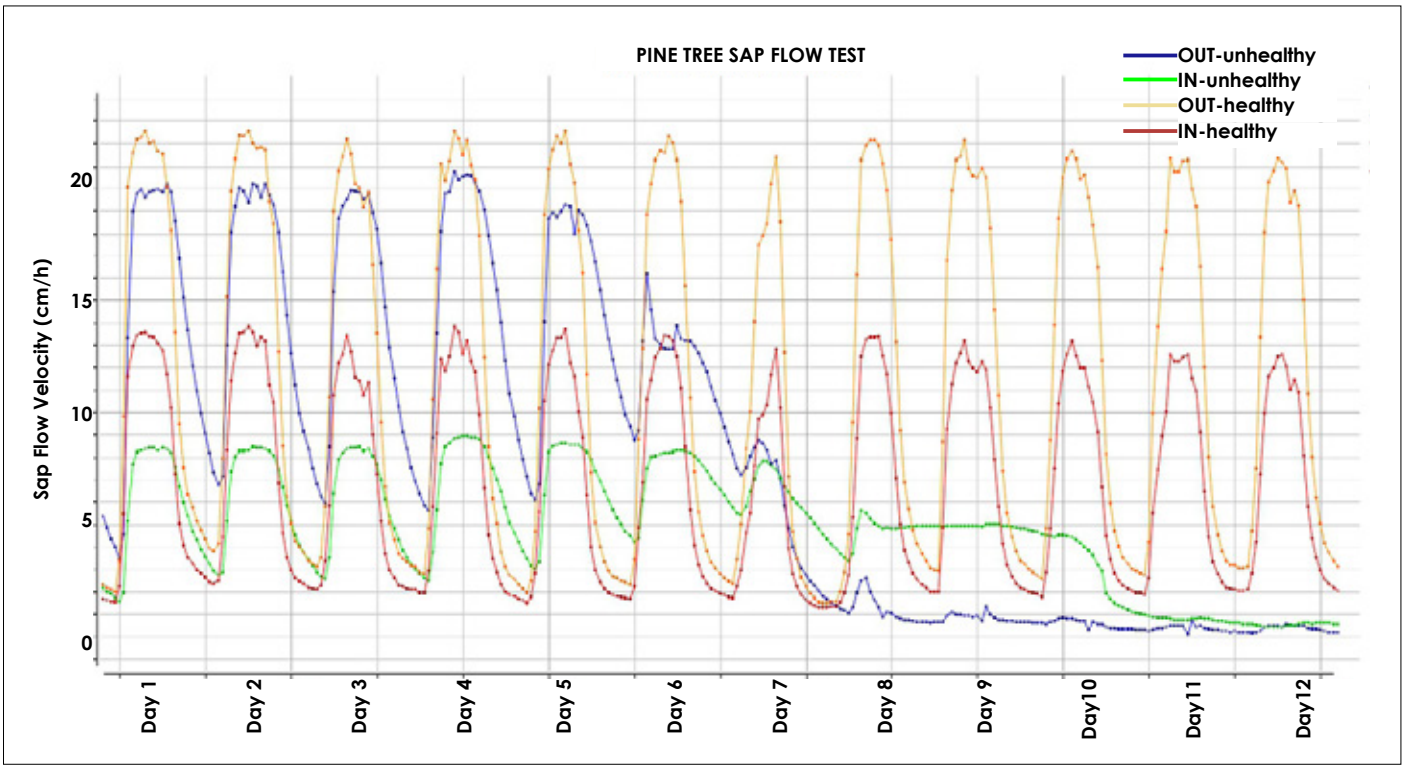
According to the whole data, the sap flow of the unhealthy pine was getting lower year by year. The sapflow data in 2013 of the healthy tree also shows the inner sap flow was getting lower. However, it seemed the decay was also affected. Interestingly, the sap flow before tree death shows it was decreasing gradually.



If we set a minimum of four SFM1, we could get the data of the decay process from the north part of the tree. To conclude the tree death, SFM1 measurement will give more specific data than an appearance check. This time we carried out the BAemann test to confirm the existence of the nematode but it was hard to find the existence.

Most of use cannot always confirm the existence by the Baermann test because we don't know enough about the ecology of the nematode. SFM1 is not a detector of the existence of the nematode, though the sap flow measurement will be able to prove a tree decay. Further knowledge is needed to prove the existence of nematode but SFM1 is an appropriate tool for the pine death investigation.