

A study of pigment affecting colored leaves

Purpose

To study how pigment contained in leaves changed before and after leaves change color

The method of experiment

Extract the pigment into the extraction liquid

Ex①: methanol: acetone = 3:1,

Ex②: ethyl ether,

Ex③: ethanol



(extracted liquid)

Compare the result of

Ex①③: paper chromatography

developer (petroleum benzene: Petroleum ether:
acetone = 4:1:1)

Ex②: thin-layer chromatography

developer (Petroleum ether: acetone = 6:4)

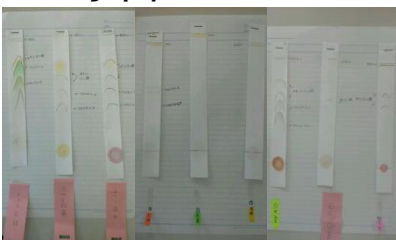


(paper chromatography)

then determine how leaves change their color.

Result(chromatography)

Paper chromatography



Thin-layer chromatography



Reference book

Suzuki et al., PHOTO SCIENCE Seibutsu Zuroku, Yasunari Hoshino, 2013 pp.52-53

Study

1, There are many kinds of pigment between 400nm and 500nm. So we could not distinguish pigment clearly.

But according to the results of chromatography, we inferred that carotene, chlorophyll a and b existed.

2, The wave length of the spectrum graph for maple in experiment 1 was between 400nm and 500nm, which was very different from that of maple in experiment 2.

3, The starting point of paper chromatography of green, yellow and red leaves in experiment 1, 3, all turned red, but they did not spread out. Also, the starting point of thin layer chromatography in experiment 2 did not turn red. From this, it could be inferred that the red pigment is anthocyan. It easily melts in the extraction liquid of experiment 1, 3 or ethanol, methanol and does not melt in developer, ethyl ether which is contained in green, yellow and red leaves.

4, According to the results of paper chromatography in experiment 1 and 3, we detected carotene in every leaf.

5, In experiment 2, we compared the spectrum of green, yellow and red maples.

We could detect it in yellow and red maples. So, we inferred that the green pigment, chlorophyll a and b disappeared and the yellow pigment and carotene appeared when leaves change color.

6, The results of paper chromatography in experiment 3 weren't very good.

It was caused by dilute solution or failure of



Conclusion

Every leaf contains chlorophyll a and b, xanthophylls, carotene and anthocyan mainly.

When leaves change color, chlorophyll a and b are decomposed.

And the leaves turn either the yellow of carotene and xanthophylls or the red of anthocyan.

If we had kept the concentration of pigment extraction liquid, we could have observed results more easily.