

1 Introduction



We are making upcycled crayons using unwanted items.

Upcycled Crayons Made from the Petals of Removed Invasive Plants

Coreopsis lanceolata



1 weeks later

Even with the same yellow color, there was a big difference in color retention.

Hypochaeris radicata



1 weeks later

Objectives

- 1 To find the differences between the pigments in the petals of *C.lanceolata* and *H.radicata*
- 2 To clarify the usefulness of the pigments of *C.lanceolata*

2 Comparison of Color Fastness in Crayons

Method

The colors are applied to Kent paper, placed under two different conditions, and examined for changes:

- (1) inside a light-shielded box, and
- (2) by a window exposed to natural light.



Results and Discussion

	after painting	in a window sill		in a dark box	
		8 days later	4 month later	8 days later	4 month later
<i>Coreopsis lanceolata</i>					
<i>Hypochaeris radicata</i>					

While the color of *C.lanceolata* lasts for a long time, the color of *H.radicata* fades when exposed to light and oxygen.

3 Comparison of Plant Dyes

Method

1. Place the petals in water and heat them.
2. Add the silk cloth and continue heating.
3. Soak the cloth in a mordant solution (alum solution).
4. Rinse off the mordant with water, return the cloth to the dye bath, and heat again.
5. Rinse thoroughly with water.

Results and Discussion

Silk cloth	<i>Coreopsis lanceolata</i>		<i>Hypochaeris radicata</i>	
	after dyeing	4 month later		
		in a window sill	in a dark box	after dyeing



While *H. radicata* did not dye even silk, *C. lanceolata* was able to dye not only silk but also cotton. This demonstrates the potential usefulness of *C. lanceolata* as a dye source.

4 Pigment Separation by Thin-Layer Chromatography

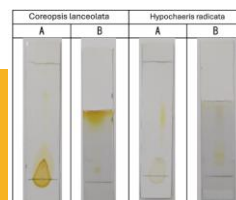
Method

TLC was performed using the combinations of extraction solvents and developing solvents shown in the table below.

	extract liquid	developing solution
A	acetone	petroleum ether : acetone = 7 : 3
B	methanol	Acetic acid : Water : Butanol = 1 : 1 : 3

Results and Discussion

C.lanceolata contains water-soluble flavonoid pigments, *H.radicata* contains fat-soluble carotenoid pigments.

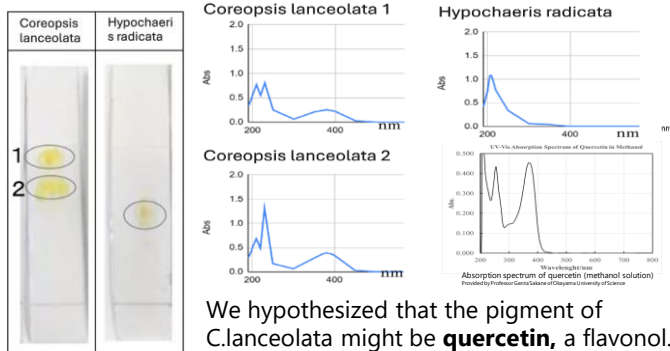


5 Identification of Pigments by Absorbance Measurement

Method

- 1 Separation was performed by varying the composition of the developing solution (acetic acid : water : butanol = 4 : 1 : 5).
- 2 The spot was excised and extracted with methanol, and the absorbance of the extract was measured.

Results and Discussion



We hypothesized that the pigment of *C.lanceolata* might be **quercetin**, a flavonol.

6 Conclusions

- 1 We demonstrated the usefulness of the pigment of *C.lanceolata*.
- 2 The pigment of *C.lanceolata* is considered likely to be quercetin, a type of flavonol.

References

- Masaaki Aoki (2022). The Science of Natural Dyes. Nikkan Kogyo Shimbun
Hitoshi Yasuda (1980). The Mystery of Flower Colors. Chemistry Education. Vol. 28, No. 1, pp. 54-58
National Museum of Nature and Science (2025). "Flavonoid Collection." (<https://www.kahaku.go.jp/research/db/botany/flavonoid/>)
Aoki Yamazaki (1991). Mother and Child's Plant Dyeing Notes. Bijutsu Shuppansha

Acknowledgments

This research was supported by Professor Genta Sakane of Okayama University of Science.