Studies on Flower Color and Pigments in *Iris dichotoma* and *Iris domestica* Hybrid Progenies

Wenji Xu[1], Xiaoying Bi[1], Jiajun Lei[1]

[1]Shenyang Agricultural University, Department of Horticulture

Introduction

Both *Iris dichotoma* and *Iris domestica* have excellent resistance to cold, drought and poor soil fertility. The level of cold hardiness allows them to be unprotected for overwintering in Northern China.

The knowledge on how the content and type of anthocyanins determining the petal coloration of flowers will provide information for a comprehensive understanding of the flower color characteristics in hybrid progenies. Consequently it would be useful for breeding new Iris cultivars with various flower colors.

Objectives

To determine the inheritance pattern of flower pigments and anthocyanin components in hybrid seedlings.

Materials and Methods

❖**Plant materials:** *Iris dichtoma* with three different flower colors and *Iris domestica* were used as parents to obtain hybrid populations. The fresh petals of hybrids and their parents were observed and collected at the full-bloom stage in August, 2015.

❖**Flower color measurement:**

The fresh petal colors of all hybrids and parents were evaluated based on the Royal Horticultural Society Color Chart and measured by a Chroma Meter using the CIELAB system.

❖**Preliminary analysis of pigments:**

The fresh petals of each sample (~100 mg) were quickly ground in liquid N_2. The petal powder was extracted separately in 5 mL in the following three chemicals: petroleum ether, 10% HCl and 30% $NH_3 \cdot H_2O$.

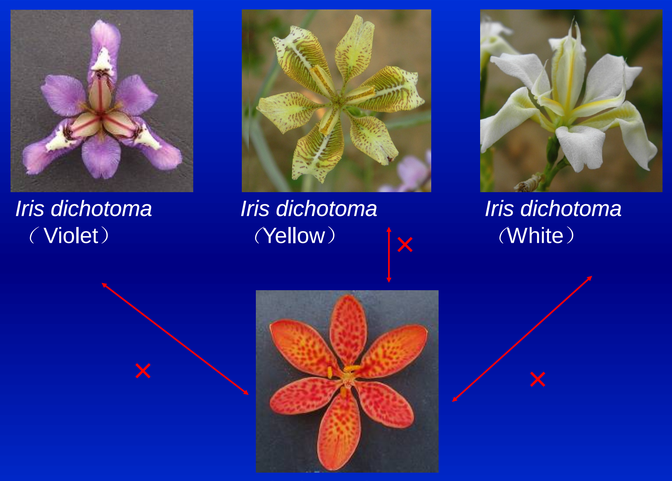

Figure 1. Parents of the inter-specific Iris hybrids.

Figure 2. Hybrid populations blooming in August in Shenyang, China.

Figure 3. Nine color groups and individuals selected from crosses.

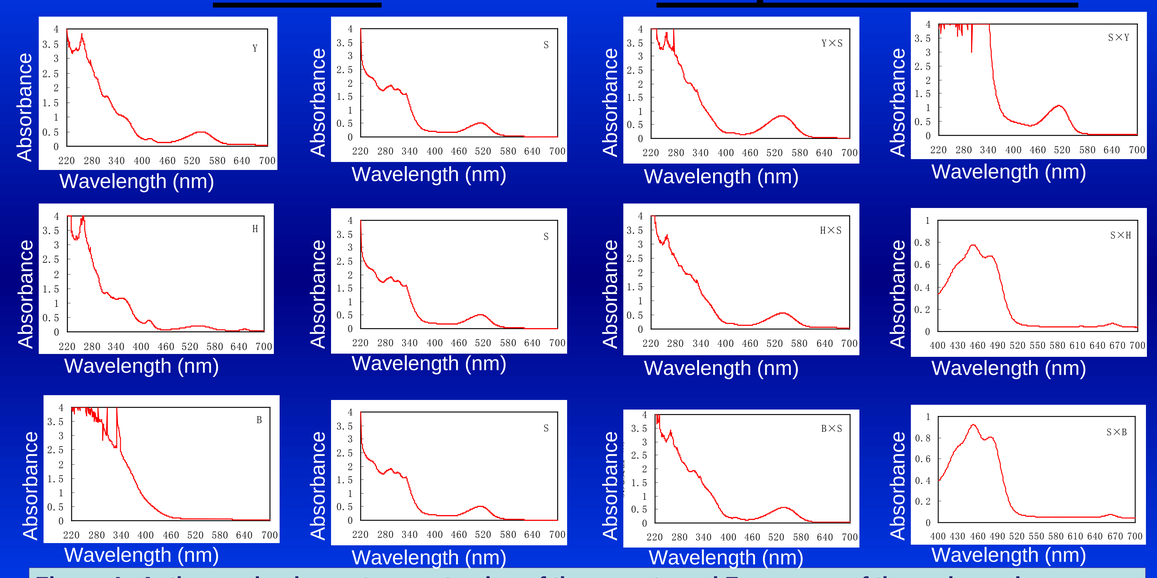

Figure 4. Anthocyanin chromatogram tracing of the parents and F_1 progeny of the reciprocal crosses.

Extraction reagent / Color class	Petroleum ether	10% HCl	25% $NH_3 \cdot H_2O$
Red	Yellow 7A	Orange-Red 33A	Yellow 11A
Orange	Yellow 5B	Orange-Red 32A	Greyed-Orange 163B
Pink	Colorless transparent	Orange-Red 33D	Yellow 7A
Purple	Colorless transparent	Red-Purple N57A	Yellow 7B
Violet	Colorless transparent	Red-Purple 68B	Yellow 2B
Brown	Yellow 5C	Red-Purple N66B	Greyed-Orange 163A
Yellow	Yellow 3B	Colorless transparent	Yellow 2A
White	Colorless transparent	Colorless transparent	Greenish Yellow 1B

Figure 5. Color reactions of petal extractions from different flower color groups.

Results

- When *Iris domestica* was used as a female parent, the F_1 and F_2 progenies derived from any of the *Iris dichotoma* parents had a similar color to their female parent.
- When *Iris dichotoma* (purple, yellow, white) was used as a female parent, the flower color of three F_1 progenies were purple, brown and violet, respectively, and the flowers of F_2 hybrids had large variations in colors.
- All individuals used in this study were categorized into 9 groups: purple, violet, red, pink, orange, brown, yellow, white and composite color.
- The petal extractions with petroleum ether indicated that only the red, orange, yellow and brown color groups contained carotenoids.
- The petal extractions with 10% HCl indicated that all color groups except the white and yellow groups contained anthocyanins.

Conclusion

- The genetic background of the populations correlated with different types of pigments (anthocyanins and carotenoids) and flower colors. This indicates that it is possible to genetically enhance the plant to create novel flower colors.