Reciprocal crossing and morphological variability of interspecific [*Lilium xformolongi*] x *L. rubellum* and [*L. xformolongi*] *x L. martagon* hybrids.

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Introduction

In 2007-2008 a UROP project by Ms. Ellinor Opits began in Dr. Neil O. Anderson's laboratory. Her research was beneficial to further work being conducted by Dr. Anderson to obtain a lily that does not require vernalization, flowers continuously, and produces colored flowers. Vernalization is a wet, cold treatment requirement of most lily species In order to flower. *Lilium xformolongi* is a hybrid lily species between *L. formosanum* and *L. longiflorum*. *L. xformolongi* is unique because it does not require vernalization in order to flower, flowers continuously, and flowers in less than 1 year from sowing (Opitz, 2007). A lily with the same traits as *L. xformolongi* but with colored flowers would be more marketable than *L. xformolongi* which only produces white flowers (Opitz, 2007). By crossing *L. xformolongi* with other species of lily with colored flowers, such as *L. martagon* and *L. rubellum (*which is a more closely related species to *L. xformolongi* then *L. martagon)* , the goal of obtaining lilies that don't require vernalization, flower continuously, and produce colored flowers may be reached. I am currently performing the reciprocal cross between *L. xformolongi* and *L. rubellum*.

Materials and Methods

Twelve bulbs of *L. rubellum* 'Rosario' were placed in the cooler for vernaliztion on December 3rd (day 0). After approximately 6 weeks bulbs were removed from the cooler along with the F1 and F2 progeny of the *L. xformolongi x L. martagon* cross. All of these plants were then placed in the greenhouse for forcing. Morphological data was recorded and analyzed (ANOVA, Tukey's HSD) for all of the plants to determine variability in traits amongst the parental, F1, and F2 generations (Fig. 1). Due to pre-fertilization barriers that result from crossing different *Lilium* species, reciprocal crosses between *L. rubellum* and *L. xformolongi* were performed using the cut style method. This involves removing the style 10mm from the ovary and then placing pollen on the cut surface of the style(Janson, and Willemse, 1995). These may require embryo rescue.

Figure 1. F2 lily at anthesis—the stage at which pollen stainability and morphological data were recorded.

Table 1. Variability in mean values for several traits amongst parental, F1, and F2 generations (mean sep. w-in. columns)

Plant group	VBD	Flw date	Plant ht	Infl. ht	No. lvs	No. flws	No. shts	L:W ratio
Parental	92.3 a	118.7 a	74.1 a	7.6 a	66.4 a	4.0 a	2.6 b	4.7 a
F1	98.7 a	121.8 a	74.7 a	13.1 b	71.5 a	2.8 a	1.6 a	9.5 b
F2	105.2 b	132.8 b	85.1 a	16.0 b	87.7 a	4.2 a	1.3 a	7.1 ab

Table 2. % pollen stainability amongst parental, F1, and F2 generations (Incomplete)

Plant grp	% Poll st
Parental	84.7±0.5
F1	72.5±17.2
F2	77.2±13.1

Preliminary Results

All morphological traits except plant height, number of leaves, and number of flowers were significantly different ($p \leq 0.001$ ***)(Table 1). Mean separations for visible bud date and flowering date were significantly greater in the F2 than in the F1 and parental groups.

Conversely the number of shoots were greater among the parental group than the F1 and F2 (Table 1). For inflorescence height the average values were higher amongst the F2 group than the parental and F1 group. For leaf length width ratio the average values were lowest for the parental group and highest for the F1 group, and the F2 average value overlaps between the parental and F1 groups.

For percent pollen stainability the mean value was highest for the parental generation (84.7%) than the mean values for the F1 and F2 groups (Table 2). The data is currently incomplete because pollen stainability is presently being performed. Whether or not these average values hold remains to be seen. Majority of the reciprocal crosses between *L. xformolongi* and *L. rubellum* have been performed.

Whether or not embryo rescue will need to be performed has yet to be determined. If so, when the ovary appears as if it will abort (yellow in color), it will then be cut into 2mm discs and placed on a murashige-skoog medium of 10% sucrose for 30 days (Lim and Van Tuyl, 2006).

Literature Cited

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