Promoting Germination of Seeds from Oriental Lily Hybrids: Effect of Developmental Stage and Scarification in Immature Seed

Mamoru Kusumoto and Yasuaki Takeda
College of Bioresource Science, Nihon University, Fujisawa, Kanagawa, 252-0813

Hiroshi Anzai
Junior College of Agronomy Nihon University, Fujisawa, Kanagawa, 252-0813

Jiro Furukawa and Eiichi Usui
Tokyo Rika Plant Institute, Nasu, Tochigi, 325-0022

INTRODUCTION

Hybrid lily cultivars with new characteristics have recently been developed from wide crosses by pollinating cut styles and embryo culture. We have tried many wide cross to produce improved cultivars. However, the life cycle in lily from crossing till anthesis takes several years and it was felt that shortening this long life cycle would increase breeding efficiency. In this research the most suitable seed developmental stage and promoting effect of scarification were studied for the efficient rearing of oriental hybrid lilies.

MATERIALS AND METHODS

Oriental hybrid lily crosses, *Lilium* 'Darling' × *L.* 'Trance' and *L.* 'Darling' × *L.* 'Miss Burma', were used as materials after crossing on 27 May 1994. Capsules containing immature seeds were harvested every 10 days from 40 to 70 days after pollination. Immature embryos for culture were excised under a microscope and scarified by pricking the upper and lower seed coats with a sharp knife. Murashige and Skoog nutrient medium (1962) supplemented with 30 g liter^{-1} sucrose and 4 g liter^{-1} Gellan gum was used. Medium pH was adjusted to 5.7 and a 10-ml aliquot was used per test tube (25 mm × 100 mm). All explants were cultured under 12-h day length, 2500 lx, and 25±1°C.

Table 1. Effect of development stage on germination of immature embryo ('Darling' × 'Trance').

Days after crossing	Number of plants	Number germinated	Germination rate (%)
40	10	2	20
50	10	4	40
60	6	5	83
70	5	5	100

Table 2. Effect of developing stage on germination of immature embryo ('Darling' × 'Miss Burma').

Days after crossing	Number of plants	Number germinated	Germination rate (%)
40	10	0	0
60	8	8	100

Table 3. *Effect of developing stage and scarification treatment on germination of* immature seed ('Darling' × 'Trace').

Days	No. plants	Control no. germinated	Germination rate (%)	No. plant.	Scarification no. germinated	Germination rate (%)
40	120	51	43	-	-	-
50	120	43	67	-	-	-
60	60	11	18	60	27	45
70	60	7	12	60	29	48

Table 4. Effect of developing stage and scarification treatment on germination of immature seed ('Darling' × 'Miss Burma').

Days	No. plants	Control no. germinated	Germination rate (%)	No. plant.	Scarification no. germinated	Germination rate (%)
40	120	20	17	-	-	-
50	99	56	57	-	-	-
60	60	19	32	60	50	83
70	60	9	15	36	22	61

RESULTS AND DISCUSSION

Tables 1 and 2 show that 60 or 70 days after crossing was the best for embryo culture. Tables 3 and 4 show that the treatment of scarification to immature seed 60 or 70 days after crossing remarkably promoted seed germination. The germination rate in the control seeds was highest at 50 days after crossing and decreased rapidly at later harvest dates. The decline in germination vigor might be caused by an inhibitor or hardening of the immature seed coat. We feel that scarification is easier and more practical than excision of immature embryos.

LITERATURE CITED

Murashige, T. and **F. Skoog**. 1962. A revised medium for rapid growth and bioassays with tobacco tissue cultured. Physiol. Plant. 15:473-497.

Kusumoto, M.1992. Embryo culture of plants—the object and method. Sanseido Science Study. 22:1-3.

Promoting Germination from Four Cross Combinations of Immature Oriental-Hybrid-Lily Seeds by Embryo Culture and Scarification Treatment

Yasuaki Takeda and Hiroshi Anzai
Junior College, Nihon University, Fujisawa, Kanagawa, 252-0813

Mamoru Kusumoto
College of Bioresource Science, Nihon University, Fujisawa, Kanagawa, 252-0813

Jiro Fukukawa and Eiichi Usui
Tokyo Rika Plant Institute, Nasu, Tochigi, 325-0022

INTORODUCTION

In a previous study on oriental-hybrid-lily seed germination it was ascertained that the most suitable developmental stage for embryo culture was 60 or 70 days after crossing. It was also shown for in vitro culture that scarification of immature seeds promoted germination of immature embryos. In this study we investigated whether the scarification method was also the best for four additional hybrid combinations.

MATERIALS AND METHODS

In this research four cross combinations were carried out between May and July 1997 (Table 1). Capsules from the four hybrid combinations were harvested every 10 days (between 40 and 70 days) after crossing and used for aseptic culture of immature embryos and scarification studies. Seed scarification was carried out by cutting seed coats near the embryo with scissors; this method was subsequently improved by pricking the upper and lower seed coat with a sharp knife. The medium was half strength Murashige and Skoog supplemented with 30 g liter^{-1} sucrose and 4 g liter^{-1} Gellan gum. Medium pH was adjusted to 5.7 and a 10-ml aliquot was used per test tube (25 mm × 100 mm). All explants were cultured under a 12-h day length, 2500 lx, and 25±1°C.

RESULTS AND DISCUSSION

Table 1 shows the germination results of the immature embryos from the four cross combinations. The rate of germination for immature embryos was low at 40 days but maintained a high level, 90% to 100%, with few exceptions between 50 and 70 days after crossing. From this data we believe that the most suitable time after crossing