Short Communication

Interspecific hybrid between *Camellia japonica* cv. Chochidori and *C. chrysantha* produced by embryo culture

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Between common camellia and golden camellia, hybrid plant was produced by embryo culture. The most proper season for embryo culture was late July just prior to embryo degeneration. The leaf colour, shape, serration, venation and root colour of hybrid plant were similar to its pollen parent, golden camellia.

Key words : *Camellia chrysantha*, *Camellia japonica* cv. Chochidori, embryo culture, interspecific hybrid, yellow camellia.

Introduction

The golden camellia (*C. chrysantha*) is most promising material to breed yellow common camellias (MIYAJIMA *et al.*, 1985, XIA, 1984, XIA and CHANG, 1982). To obtain interspecific hybrid, the embryo culture was practicable between *C. japonica* cv. Chochidori and *C. chrysantha*.

Materials and Methods

Camellia japonica cv. Chochidori was pollinated with *C. chrysantha*. Young embryo was excised and planted to MURASHIGE and SKOOG's medium with naphthalene acetic acid (0.5-1.0 mg/l), kinetin (0.1-0.5 mg/l), yeast extract (0-1 g/l), sucrose (30-80 g/l), solidified with agar (8.0-8.5 g/l). For the following subculture, ANDERSON's medium was adopted (ANDERSON, 1984). *In vitro* plantlet was acclimatized and air-grafted to *C. sasanqua* cv. Tachi-kan.

Results and Discussion

1. Development of embryo

Table 1. Development of intact embryos of *Camellia japonica* cv. Chochidori pollinated with *C. chrysantha*

Date of observation	No. of embryos observed	Developmental stage of embryo			
		Degenerated	Globular	Torpedo	Plumule & Radicle
June 5	8	6	1	1	0
June 20	2	0	2	0	0
July 13	4	1	2	0	1
July 24	41	0	0	36	5

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In *Camellia sinensis* and also in *C. chrysantha*, the development of zygote pauses at globular stage (BUSCHMANN, 1914, KAPIL and BALA SETHI, 1963, LIAN 1986, TOMO *et al.*, 1958, WU, 1960). In *C. japonica*, the delay of embryo development at the globular stage was also observed. The *in vitro* culture of globular embryo was failed. The suitable chance of embryo culture was just prior to the degeneration of endosperm (Table 1 and Fig. 1).

2. Embryo and cotyledon culture

Six embryos out of 45 young embryos began to grow and produced many globoids. By dividing them, 65 explants were subcultured. Out of them, 21% formed roots or shoots, or the both (Fig. 2). The normal and rapid growth of embryos, and also the increase in the number of plantlets were promoted by the addition of polyvinylpyrrolidone (K-90) (5 g/l), GA₃ (5 mg/l) and N⁶-(Δ^2 -isopentenyl)adenine(=2 ip)(0.2-0.5 mg/l) (BENNET and SCHEIBERT, 1982, KATO, 1985, 1986, SAMARTIN *et al.*, 1984, 1986, ZHUANG and LIANG, 1985).

3. Hybridity

Interspecific hybrids between *Camellia pitardii* var. *yunnanica* and *C. chrysantha* by embryo culture (LIAN *et al.*, 1986), and *C. vietnamensis* and *C. chrysantha* by cotyledon culture (NADAMITSU *et al.*, 1986) were previously reported. Both mother plants were hexaploid and *C. chrysantha* was diploid. Both parents and the *in vitro* plant of this study were all diploid (2n=30). Then, precise analysis will be needed to ascertain the hybridity of this *in vitro* plant just karyomorphologically.

However, our *in vitro* plant showed morphological proof derived from its pollen parent, *C. chrysantha*, such as : bright brown young leaf, long and narrow leaf shape, wide angle of lateral vein branching, reddish root (Table 2 and Fig. 3). This would be the first report of producing a diploid interspecific hybrid with *C. chrysantha*.

Fig. 1. Schematic representation of the development and degeneration of embryo and endosperm in the seed of *Camellia japonica*, open pollinated (left) and cross pollinated (right)

- I : Resting embryo at globular stage
 - II : Development of endosperm
 - III : Beginning of the degeneration of endosperm
 - IV : Development of cotyledon accumulating stock reserves.
Hybrid embryo scarcely develops afterwards.
 - V : Fulfillment with cotyledon. Hollow cavity is frequently observed in the hybrid seed.
- IV and V are the most appropriate occasion for hybrid embryo culture in *Camellia japonica* cv. Chochidori.

Fig. 2. Production of *in vitro* plants by embryo culture of *Camellia japonica* cv. Chochidori pollinated with *C. chrysantha*.

A : Initiation of shoot primordia on the slice of cotyledon of hybrid embryo.

B : Globoid formation and shoot sprouting.

C : Several globoids at various stages of shoot and root differentiation.

Fig. 3. Fully expanded leaves of *Camellia japonica* cv. Chochidori (A), hybrid (B), and *C. chrysantha* (C).

Table 2. Leaf character of *Camellia japonica* cv. Chochidori, *C. chrysantha* and their hybrid

Item	<i>C. japonica</i> cv. Chochidori	Hybrid		<i>C. chrysantha</i>
		<i>In vitro</i> plant before acclimatization	Air-grafted plant after acclimatization	
Length/Width	2.2	1.8	2.5	2.4
M. W. P. R. ¹⁾	70	46	65	50
Angle of lateral vein to midrib	49.8	68.2	59.1	71.1

¹⁾ M. W. P. R.: Maximum Width Point Ratio ; The relative position of the most wide part to the entire leaf from base (0) to apex (100).

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胚培養によるツバキ品種蝶千鳥と金花茶との種間雑種の作出

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現在の園芸ツバキに欠けている黄色花品種を育種するため, ツバキ品種蝶千鳥に金花茶を交配した. 交配種子は胚乳の発達が悪く普通より早くに胚乳の崩壊・吸収が進行するため, 雑種胚の周囲に中空部分が生じ, 遂には子葉の発達が座止し, 死に至るものと考えられた. 球状胚以前の段階では胚培養による雑種作出には成功しなかったが, 胚乳が崩壊する直前に交雑胚を摘出して培養したところ, 目的の雑種植物を得ることに成功した. 本植物体の染色体数は両親のそれと一致し, 体細胞で 30 であった. 本植物体の外部形態上の特長としてあげられるうち, 1. 芽出しが茶色い, 2. 葉身が細長いうえ細かな鋸歯を葉縁全体につけている. 3. 葉脈の分岐角度が中肋に対して平均 59.1 度と大きい, 4. 根が赤く着色する, などの諸点は, 花粉親の金花茶の特長を強く受継いでいる.