

## CHROMOSOME COUNTS OF SOME PLANTS COLLECTED FROM WEST SUMATRA

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Chromosome numbers of some species belonging to Araceae, Balsaminaceae, Gesneriaceae and Orchidaceae distributed at West Sumatra were counted newly as a subsequent study of the previous reports (Okada, 1984, 1986).

### Materials and Methods

Fresh materials were collected from some areas of West Sumatra (Table 1). The identification of the species was mainly responded to Prof. Dr. M. Hotta. Voucher specimens were deposited in KYO.

Root tips were pretreated by 0.05 - 0.2%, sometimes 0.4%, colchicine aqueous solution in fields. In the case of *Impatiens gadutensis* distributed at the summit of Gn. (Mt.) Gadut, ca. 1500 m altitude from sea level, root tips could be incubated at less than 20°C. But, in almost all cases, materials could not be cooled for no equipment in fields. This is the main reason of rather high concentrations of colchicine solution. They were fixed by the mixed solution of EtOH : chloroform : glacial acetic acid = 2:1:1, namely modified Calnoy's fluid, for more than one night. All of the materials were, then, transferred into 70% EtOH. Following procedures for chromosome observations were almost the same as conventional techniques, except for the case of *Apostasia nuda*\*.

In the case of species of *Monophyllaea*, young flower buds were directly fixed by modified Calnoy's fluid without any pretreatments, and then transferred into 70% EtOH. Chromosome numbers were counted by pollen mother cells (reproductive cell division) or anther wall cells (somatic cell division).

### Results and Discussion

Results are summarized in the table 1. Aneuploid and polyploid chromosome numbers were reported for the species of the genus *Acorus* (Araceae), i. e.,  $2n=22, 24, 36, 44, 48, 110$  and etc. Some reports described infraspecific polyploidy of *Acorus calamus* (for example, Wulff 1954). An indivi-

Table 1. Chromosome numbers of some species collected from West Sumatra.

species	locality	2n
Araceae		
<i>Acorus calamus</i>	Ulu Gadut	36
Balsaminaceae		
<i>Impatiens albo-flava</i>	Ulu Gadut	14
<i>I. diepenhorstii</i>	Batang Barus	28
<i>I. eubotrya</i>	Batang Barus	28
<i>I. 'gadutensis'</i>	Gn. Gadut	14
<i>I. junghuhnii</i>	Muko Muko, Maninjau	14
<i>I. platypetala</i>	Airsirah	16
<i>I. 'talangensis'</i>	Batang Barus	ca.60
Gesneriaceae		
<i>Monophyllaea hirtella</i> *	Ladang Padi	20
<i>M. horsfieldii</i> *	Ladang Padi	22
<i>M. (hybrid)</i> *	Ladang Padi	21
Orchidaceae		
<i>Apostasia nuda</i> *	Ulu Gadut	48

\* The results on *Apostasia* and *Monophyllaea* were published at the magazines, *The Journal of Japanese Botany* 63: 344-350 (1988) and *Plant Systematics and Evolution* (in press), respectively.

dual belonging to *Acorus calamus* collected from Ulu Gadut was counted 36 chromosomes, which is a triploid level of  $x=12$ . Chromosomes at metaphase are very small, about less than 1  $\mu$ m. The chromosome counts in the genus *Impatiens* (Balsaminaceae) were reported for ca. 80 of 450 species in the world so far (for example, Khoshoo, 1955). According to those reports, it appears that there are serial aneuploid variations within the genus, i. e.  $x=3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18$  and etc (Zinov'eva-Stahevitch and Grant, 1985; Govindarajan and Subramanian, 1986), and  $x=8$  is a primary basic chromosome number for the genus (Rao *et al.*, 1986). Tetraploids of  $x=7$  and 8 were observed in some species. Species of *Impatiens* at West Sumatra in this study showed both euploid and aneuploid changes, that is diploid ( $2n=14$ ) and tetraploid ( $2n=28$ ) of  $x=7$  and diploid ( $2n=16$ ) of  $x=8$ . The chromosome number of  $2n=ca. 60$  of *I. 'talangensis'* may be an octoploid level of  $x=7$ .

It was one of the main objects for this expedition to analyze speciation mechanisms of the genus of *Impatiens* at West Sumatra. West Sumatra has 16 species of *Impatiens* (Hotta, in this report, p. 59). 8 of these 16 species belong to *I. albo-flava* group. Common pollen vectors visited them (Kato *et al.*, in this report). Some of them inhabit sympatrically (Table

Table 2. *Impatiens* species distributed at the same areas and its ecological notes.

locality	species	2n	notes
<b>Ulu Gadut</b>			
ca.200-1400 m alt.	<i>I. albo-flava</i>	14	on rock or on ground soil along stream in dense forest
<b>Gn. Gadut</b>			
ca.1400-1500 m alt.	<i>I. 'gadutensis'</i>	14	on moss bed under mossy forest
<b>Batang Barus, 'A'</b>			
Alahan Panjang, ca.1300 m alt.	<i>I. albo-flava</i>	14	along stream in dense forest
	<i>I. diepenforstii</i>	28	open spot, on rocky cliff, rheophyte
	<i>I. 'talangensis'</i> c.60 <i>I. pyrrotricha</i>	c.60	along stream in dense forest slope - ridge, on soil, flower size and red spot on side petals variable.
<b>Batang Barus, 'B'</b>			
Alahan Panjang, ca.1300 m alt.	<i>I. albo-flava</i>	14	along stream in disturbed forest
	<i>I. eubotrya</i>	28	open spot, patchy
	<i>I. 'talangensis'</i> c.60	c.60	along stream, on rock
<b>Airsirah</b>			
ca.1100 m alt.	<i>I. albo-flava</i>	14	along small stream
	<i>I. platypetala</i>	16	open area beside road
<b>Bt. Gadang</b>			
ca.1200 m alt.	<i>I. albo-flava</i>	14	along stream in disturbed forest
	<i>I. diepenhorstii</i>	28	near rapid stream, rheophyte
	<i>I. sp.</i>		along stream
<b>Maninjau</b>			
Muko Muko station, ca. 800 m alt.	<i>I. junghuhnii</i>	14	along small stream under hill forest

2). The natural interspecific hybrids were expected to find in the locations under these situations, however, sympatric species were in aneuploid and/or polyploid relation to each other, and seemed to prohibit gene exchange among the different species. For example, at surroundings of the water fall at Batang Barus, Alahan Panjang, the species with  $2n=14$  (*I. albo-flava*), 28 (*I. diepenhorstii*) and ca. 60 (*I. cf. 'talangensis'*) were observed, which were a diploid, a tetraploid and maybe an octoploid level of  $x=7$ , respectively. The similar phenomena appeared among the species at the other ravine of Batang Barus, at Bt. Gadang and at Airsirah. The situation is, however, extremely different in case of the relationship between *I. albo-flava* and *I. gadutensis*, which were similarly a diploid level of  $x=7$ . Both species seemed to inhabit segregatively. *I. gadutensis* suddenly appeared in our view at higher altitude from about 1400 - 1500 m of Gn. Gadut. Instead of former species, *I. albo-flava* is distri-

buted rather commonly along streams at lower altitude of the mountain. In any cases of *Impatiens* observed, the reproductive isolation systems by different chromosome numbers or by habitat segregation may take place effectively among them. Further detailed analyses are required for clarification of the speciation mechanisms within *Impatiens* at West Sumatra.

## References

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