

Suthana Ketmaro 2012: Polyploidisation for Restore Fertile of Curcuma Hybrid.  
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Horticulture. Thesis Advisor: Associate Professor Thunya Taychasinpitak, M.S.  
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Colchicine and oryzalin were treated to induce polyploidy as a means to overcome infertility in a Curcuma hybrid (*Curcuma sparganifolia* x *C. parviflora*). The treatments, administered to shoot clusters *in vitro*, consisted of colchicine or oryzalin at the concentrations of 0, 1, 3 or 5 mg/l for a duration of 48, 72 or 96 hours. The survival rate of shoots was decreased with increases in concentrations and durations of both colchicine and oryzalin applications, and both types of spindle inhibitor also had a negative effect on Curcuma shoot growth. When transferred to the greenhouse, the plants treated with high concentrations of oryzalin tended to have more shoots per pot. Exposure to both colchicine and oryzalin also caused several variations in the rhizomes and inflorescences. When the ploidy level of all the plants with irregularities was tested by flow cytometer, changes in chromosome number were only detected in those plants from the colchicine treatment groups that had larger rhizomes and bulged, rounded storage bulbs. Five mixoploid plants were found out of 6,060 treated with colchicine and oryzalin (0.08%). Pollen viability testing showed that the mixoploid plants had 57-72% pollen viability. The results of fertility tests by selfing and backcrossing with *C. sparganifolia* and *C. parviflora* showed that only 5% of the self-fertilized plants produced seed and 5-15% of the backcross fertilizations were successful. All the resulting seeds were cultured on synthetic medium to speed their development but only 3 seeds successfully germinated into new plants 2 from selfed plants and 1 from a backcross. Flow cytometry analysis revealed that 2 were tetraploids and 1 triploid. In addition to increasing the chromosome number, the colchicine and oryzalin treatments caused several variations, such as different sizes and shapes of bracts, thicker leaves and changes in inflorescences color to darker or paler shades of pink as well as white. However, when the next generation of plants was grown from the rhizomes, the change to white inflorescences was the only mutation that proved stable.

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Student's signature

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Thesis Advisor's signature