

Genesis and Survival Chance of Autotriploid in Natural Diploid Population of *Lilium lancifolium* Thunb

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Abstract : Triploid *L. lancifolium* have a wide geographic distribution. By contrast, diploid *L. lancifolium* have limited distributions in the islands and coastal regions of the South and West Korean Peninsula and northern Tsushima Island, Japan. *L. lancifolium* diploids and triploids are not sympatrically distributed with other lily species or ploidy lines in West Sea and South Sea Islands of the Korean Peninsula. This observation raises the following questions: 'Why have autotriploid *L. lancifolium* never been observed in those isolated islands?', 'What mechanism excludes the occurrence of autotriploids, if they arise?'. To determine the occurrence and survival of triploid plants in natural diploid populations of tiger lily (*Lilium lancifolium*), ploidy analysis was conducted on natural open-pollinated seeds produced from plants grown on isolated islands, and on hybrid seeds produced by artificial crossing between plant populations originating on different Korean islands. Normal seeds were classified into five grades depending on the ratio of embryo/endosperm lengths, including 5/5, 4/5, 3/5, 2/5, and 1/5. Triploids were not observed among seedlings produced from natural open pollinations on isolated islands. Triploids were detected only in seedlings of underdeveloped seed grades(3/5 and 2/5) from artificial crosses between populations from different isolated islands. The triploid occurrence frequency was calculated as 0.0 for natural open-pollinated seedlings and 0.000582 for artificial crosses(6 triploids from 10,303 seedlings). Triploids were produced from crosses between isolated populations located at least 70 km apart; no triploids were detected in inter-population crosses of plants originating on the same islands. Triploid seedlings have very low viability in soil. We analyzed factors affecting triploid occurrence and survival in natural diploid populations of *L. lancifolium*. The results suggest that triploids originate from fertilization between plants that are genetically isolated due to geographical isolation and/or genotypic differences.

Keywords : *Lilium lancifolium*, autotriploid, natural population, genetic distance, 2n female gamete

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