

| 学 位 論 文 要 旨 | |
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| 氏 名 | Tshering Penjor |
| 題 目 | Elucidation of genetic relationships of <i>Citrus</i> and its relatives including Bhutanese accessions based on sequence of nuclear and chloroplast genomes (核および葉緑体ゲノムの塩基配列によるブータン在来系統を含むカンキツ属および近縁属の遺伝的関係の解明) |
| <p>The citrus fruits and their relatives are economically important and belong to subfamily Aurantioideae under family Rutaceae. This study analyzed genetic relationships of an extensive number of accessions (more than 100 accessions from 22 genera of the Aurantioideae) by using several methods, Sanger sequencing of chloroplast <i>rbcL</i> and <i>matK</i>, and RAD-Seq/ddRAD-Seq by the high-throughput sequencer.</p> <p>The phylogenetic data obtained from <i>rbcL</i> and <i>matK</i> supported the Swingle and Reece treatment of subfamily Aurantioideae as a monophyletic group. The Aurantioideae has been classified into two tribes, Clauseneae and Citreae, which is also consistent with the Swingle and Reece classification system. The phylogenetic data did not support the recent proposition that <i>Feroniella oblata</i> is merged with <i>Citrus</i> species. <i>Murraya paniculata</i> was similar to <i>Merrillia caloxylon</i> but different from <i>Murraya koenigii</i>. In the treatment of the genus <i>Citrus</i>, the results based on maternal sequences were in support of old “three true species” concept that citron, pummelo, and mandarin are considered to be basic species. However, the analysis could not differentiate <i>Fortunella</i> and <i>Poncirus</i> from genus <i>Citrus</i>.</p> <p>A candidate for the origin of some <i>Citrus</i> species (Gmitter and Hu 1990, Tanaka 1959) is the region from northeastern India to southwestern China. Because Bhutan belongs to this region, there may be rich genetic resources in Bhutan. With the aid of data based on <i>rbcL</i> and <i>matK</i>, this study characterized citrus accessions grown in Bhutan. The exploration first found that Ichang papedas are grown in Bhutan. The <i>matK</i> analysis also revealed that Bhutanese Ichang papeda relative is clearly different from preserved trees of Ichang papeda in Faculty of Agriculture, Saga University. The <i>matK</i> analysis showed that most of Bhutanese limes, locally known as "Kagati", was different from Mexican lime. Based on the conservation of heterozygosity, RAD-Seq analysis classified limes into two subgroups, Bhutanese and Mexican groups. The Bhutanese group was designated as a Himalayan lime. Forty-four accessions including Bhutanese accessions were analyzed ddRAD-Seq. This analysis supported the recent “four true species” concept that citron, pummelo, papeda, and mandarin are considered to be basic species. The ddRAD-Seq revealed that Himalayan lime was a probable hybrid of citron and mandarin, while Mexican lime was a probable hybrid of citron and papeda, the latter of which is now well established. In addition to Himalayan lime, the ddRAD-Seq analysis also showed that several other accessions were formed by previously undescribed combinations.</p> | |