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The genus *Liriope*: Phytochemistry and pharmacology

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[ABSTRACT] *Liriope* (Liliaceae) species have been used as folk medicines in Asian countries since ancient times. From *Liriope* plants (8 species), a total of 132 compounds (except polysaccharides) have been isolated and identified, including steroidal saponins, flavonoids, phenols, and eudesmane sesquiterpenoids. The crude extracts or monomeric compounds from this genus have been shown to exhibit anti-tumor, anti-diabetic, anti-inflammatory, and neuroprotective activities. The present review summarizes the results on phytochemical and biological studies on *Liriope* plants. The chemotaxonomy of this genus is also discussed.

[KEY WORDS] *Liriope*; Liliaceae; Chemical constituents; Biological activities

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Introduction

There has been a long history in the discovery, cultivation and utilization of medicinal plants in most developing countries. Even nowadays, the people there still rely on medicinal plants for primary health care directly or indirectly. Among the well-known medicinal plants and herbs, species from genus *Liriope* play an important role in protecting the well-being of Asian people. According to 'Flora of China', genus *Liriope* (Liliaceae) mainly consists of 8 species that are distributed in subtropical and temperate zones, such as China, Japan, Vietnam, and Philippines [1-3].

Various species of genus *Liriope* have been used as traditional medicines for treating various diseases. As perennial plants, *L. platyphylla* is a well-known herbal medicine for the treatment of asthma and bronchia and lung inflammation [4-5]. The effects of its root extracts in preventing obesity, diabetes, and neurodegenerative diseases have also been proven recently [6-9]. As substitutes for *Ophiopogon japonicus*, *L. muscari* (Duanting Shanmaidong) and *L. spicata* (Hubei Maidong) are widely used as remedies for various inflammation-related diseases, such as pharyngitis, bronchitis, pneumonia, and cough, and cardiovascular diseases [4, 9-12]. *L. graminifolia* has been used as a popular remedy for the treatment of cancer [13]. Besides, modern pharmacological studies have demonstrated the biological activities of *Liriope* plants for the treatment of gastrelcosis [14], as well as neuroprotective [14], hepatoprotective [14], anti-inflammatory [15], antibacterial [16] effects. Therefore, the documented information on medicinal use of *Liriope* plants provides valuable clues for the further bioprospecting and clinical applications [17].

As an effort to facilitate the related therapeutic and pharmacological research of *Liriope* plants, this review comprehensively describes their chemical compositions and pharmacological and biological activities. The chemotaxonomic significance and further research prospects are also discussed.

Chemical Constituents of *Liriope* Plants

A total of 132 compounds (except polysaccharides [7]) have

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been isolated and identified from various *Liriope* plants so far. These constituents are of five categories, namely, steroidal saponins, flavonoids, phenols, eudesmane sesquiterpenoids and the other components (Figs. 1, 2, 3, 4, and 5 and Tables 1, 2, 3, 4, and 5). Among them, steroidal saponins are the dominant constituent in *Liriope* plants.

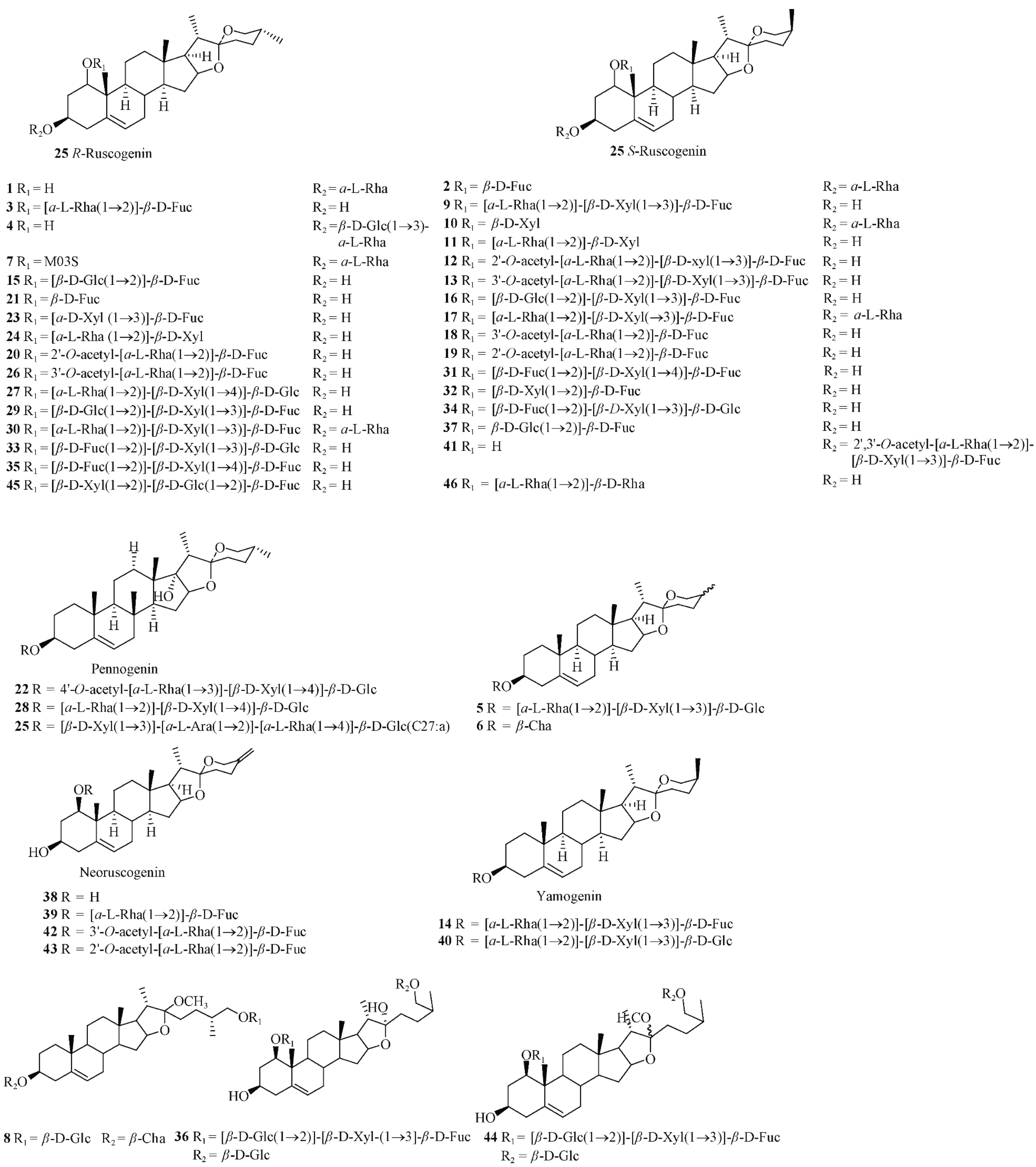

Fig. 1 Structures of steroidal saponins from genus *Liriope*

Phytochemical studies on *Liriope* plants have led to the isolation and structural characterization of 46 steroidal saponins (Table 1). From the subterranean part of *L. platyphylla*, 10 steroidal saponins have been isolated (compounds **5** and **6** were mixed steroidal saponins) [18]. In addition, 21 steroidal saponins have been isolated from *L. musacari.* To our surprise, there are three furostanol sponins **(8, 36** and **44)** in *L. platyhylla* which are previously reported to be abundant in *Ophiopogon* plants.