

Apis mellifera L. and *Megachile* spp.
Important Insect-Pollinators of
Lotus corniculatus var. *japonicus* Regel in Cheju Island

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Lotus corniculatus var. *japonicus* Regel has been found through many parts of Korea. Nevertheless, the species seems not quite successful to establish itself in the peninsular part of the country, considering the scattered distribution and limited size of colonies (Moon 1992). However, many large colonies have been found in the Cheju Island (once known as Quelparta in Europe), which is the largest island and located at the subtropical southern end of Korea. The spacious grasslands, mild winter temperature and abundant pollinators may be also the factors supporting such successful colonizations in the island.

It was once mentioned that wild populations in the island should have intermingled with alien *L. corniculatus* that were introduced as a fodder crop for horses and cows, and that were subsequently escaped from cultivation (Moon & Kim 1992). As a result of inbreeding between heterogenous strains, many different types of the plants have been found from various aspects of morphology and phytochemistry (Moon, 1992).

To trace a mechanism to maintain the populations, I investigated with a prior interest in 1992 about what kinds of insects were associated with *L. corniculatus* var. *japonicus* in Cheju Island. Frequent and active visitors were found distinctively in Hymenoptera. Out of 12 hymenopteran species, two groups of bees *Apis mellifera* L. and *Megachile* spp. were detected as the most frequent visitors to the flowers. They were also important pollinators through a year.

The populations of the honey bee *A. mellifera* were also of heterogenous origins because they were annually imported for honey production and also as pollinators for glasshouse agriculture largely from Canada and Australia, and recently from China and New Zealand. However, the countries have also imported or exchanged the strains of *A. mellifera* between them or from the other sources. It is, therefore, hard to detect which strains of *A. mellifera* are most closely associated with the plants. But the bees of a slightly darker and pubescent populations were the most abundant and frequent visitors on the flowers of *L. corniculatus* var. *japonicus*. As far as I understood, such characters are those of Cossian strains that have usually their territories in cooler northern part of South Korea. They seem to stay longer and to enter more deeply into the base of flowers than the other strains of the bees. While they attend in nectaring, they hold the tip of flower keels with their middle and hind legs subsequently making the keels slightly opened. Then the pollens are mixed while the bees move their wings and thorax touching the tips of keels (Figure 1A).

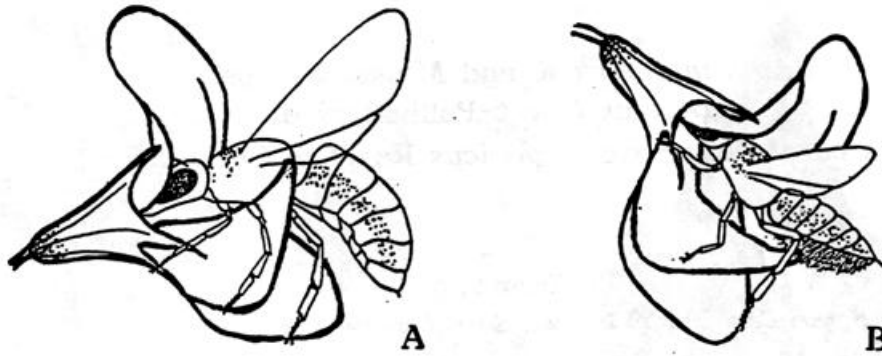


Figure 1. *Apis mellifera*(A) and *Megachile* sp.(B) visiting the flowers of *L. corniculatus* var. *japonicus* Regel

Megachile identified are *M. humilis* Smith, *M. analis* Nylander and *M. bicolor kigiana* Cokerell, but another 3 species were remained unidentified. The densely haired abdomens of *Megachile* species were most useful tools for mixing and exchanging pollens between the keeled flowers of leguminous plants (Figure 1B). They hold and press the base of flower keels during nectaring, which then became naturally opened slightly. Then the hairs of abdomen touch the keels as if they brush the keels.

The next groups of visitors, but less frequent, were largely found between bumble bees. They are, in turn of visiting frequencies, *Bombus ardens ardens* Smith, *B. koreanus* (Skorikov), *B. ussurensis* Radoszkowski, *B. opulentus* Smith, and rarely *B. consobrinus wittenburgi* Vogt. They used to stay only short on the plants and often visit simply the flowers rather than collect nectar.

On the other hand, it has been found, other than the hymenopteran visitors, a small number of aphids feeding on various parts of *L. corniculatus* var. *japonicus* ; *Acyrtosiphon pisum* (Harris), *Megoura viciae coreana* (Moritsu), *Aphis craccivora* Koch, *A. fabae* Scopoli, *A. gossypii* Glover, *Sitobion* spp. However, a large number of hunters and parasites such as ladybeetles, polispine, eurytomid and braconid wasps were found wandering between vegetations of *L. corniculatus* var. *japonicus*. Ladybeetles are often observed feeding on the small herbivores. Among them, routinely found and identified are *Coccinella septempunctata* L., *Henosepilachna vigintiotopunctata* (F.), *Serangium japonicum* Chapin, *Scymnus* spp.. They seem to be related with the aphids feeding on *L. corniculatus* var. *japonicus*. But it has not been investigated why so many kinds of parasitic and hunting wasps visit *L. corniculatus* var. *japonicus*. It should be interesting to study because they are unlikely to find their hosts or preys successfully on the plants.

Moon, T.Y. 1992, Cyanogenic polymorphism in the leaves of *Lotus corniculatus* var. *japonicus* Regel (Leguminosae) in South Korea, Korean J. Ecol. 15 (1):75-80
 Moon, T.Y. & J.H. Kim, 1992, The distribution records of *Lotus corniculatus* var. *japonicus* Regel in Korea, Lotus Newsletter (USDA) 23:24-28