Analysis of the Essential Oil of *Dipsacus japonicus* Flowering Aerial Parts and its Insecticidal Activity against *Sitophilus zeamais* and *Tribolium castaneum*

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Water-distilled essential oil from the aerial parts of *Dipsacus japonicus* Miq. (Dipsacaceae) at the flowering stage was analysed by gas chromatography-mass spectrometry (GC-MS). Forty-six compounds, accounting for 96.76% of the total oil, were identified and the main compounds of the essential oil were linalool (11.78%), *trans*-geraniol (8.58%), 1,8-cineole (7.91%), *b*-caryophyllene (5.58%), Ŭ-terpineol (5.32%), *b*-selinene (5.15%), and spathulenol (5.04%). The essential oil of *D. japonicus* possessed contact toxicity against two grain storage insects, *Sitophilus zeamais* and *Tribolium castaneum* adults, with LD_{50} values of 18.32 μg/adult and 13.45 μg/adult, respectively. The essential oil of *D. japonicus* also exhibited pronounced fumigant toxicity against *S. zeamais* (LC_{50} = 10.11 mg/l air) and *T. castaneum* adults (LC_{50} = 5.26 mg/l air). Of the three major compounds, 1,8-cineole exhibited stronger fumigant toxicity than the crude essential oil against *S. zeamais* and *T. castaneum* adults with LC_{50} values of 2.96 mg/l air and 4.86 mg/l air, respectively.

Key words: Dipsacus japonicus, Essential Oil, Insecticidal Activity