J. Indian Chem. Soc.,
Vol. 85, November 2008, pp. 1-2

NOTE

Some phenolic compounds in Himalayan Knotweed

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Manuscript received 19 November 2007, revised 24 April 2008, accepted 3 June 2008

Abstract : The extracts from leaves, roots and flowers of Himalayan Knotweed (*Persicaria polystachya* (Meissner) H. Gross) were analysed by HPLC and CE (capillary electrophoresis). Catechin, quercetin, quercetin-3-rhamnoside (quercitrin), quercetin-3-D-galactoside (hyperoside) were detected.

Keywords : Catechin, quercetin, biologically active compounds, *Persicaria polystachya, Polygonaceae*, Knotweed, CE, HPLC.

Introduction

Himalayan Knotweed (*Polygonaceae*) is taxonomically connected with *Reynoutria* genus. Himalayan Knotweed is included in the genus *Persicaria* in the sect. *Rubrivena* and differs from other sections in pollen and inflorescence morphology[1]. This species is native to Asia. Its occurrence is connected with the disturbed habitats[2]. Himalayan Knotweed was found in the Czech Republic[3]. Its distribution is very rare[4] as compared to *Reynoutria* species[5,6]. The Japanese Knotweed (*Reynoutria japonica*) and Chinese Knotweed (*Polygonum multiflorum*) are used in the traditional Chinese folk medicine[7,8].

The underground organs of Japanese Knotweed mostly contain stilbenes, as resveratrol and piceid (glycoside of resveratrol)[9–13]. The Giant Knotweed (*Reynoutria sachalinensis*) and Chinese Knotweed contain anthraquinones[14,15]. The leaves of the Giant Knotweed are used as fungicide[16,17]. The dominant compounds from aboveground parts of *Reynoutria* (Houtt.) (*R. japonica*, *R. sachalinensis*, *R. x bohemica*) are quercetin and caffeic acid derivatives[18]. These species contain the biologically active substances with estrogenic activity[11,12,19,20]. Dominant phenolic compound in methanolic extract from Chinese Knotweed is 2,3,5,4′-tetrahydroxystilbene-2-*O*-β-D-glucoside[15].

Negi *et al.*[21] reported aliphatic ester, pentacosanyl heptacosanoate, β-sitosterol, β-sitosterol-β-D-glucoside, quercetin and quercetin-3-*O*-L-rhamnopyranoside. Present communication deals with the determination of some phenolic compounds in the above- and underground parts of this plant.

Results and discussion

The Himalayan Knotweed contained a large number of flavon-3-ol glycosides in the above-grounds part of plant. We supposed, that they are predominantly derivatives of quercetin (UV spectra) and so we analysed aglycone quercetin after acid hydrolysis by CE. We determined that the Himalayan Knotweed content a great many of total quercetin (see Table 1). These results are similar to the content of total quercetin in Knotweed plants (*Reynoutria* Houtt.)[22]. Quercitrin is one of the dominant phenolic compound, but it was determined only in the inflorescences. We did not detect rutin in the extracts from the above-grounds parts. Free quercetin was noticed as trace amount. The extracts from roots did not contain detectable amount of quercetin derivatives. The contents of some phenolic compounds are presented in Table 1. When we compared *Reynoutria* with the Hima-

Table 1. Content of phenolic compounds in extracts of Himalayan Knotweed [$mg/g_{dry\ weight}$]

Plant part	Catechin	Total quercetin	Quercitrin	Hyperoside
Inflorescence	10.9	16.3	7.0	1.3
Leaf	12.7	19.3	x	1.8
Root	3.3	x	x	x

x – Under detection limit.

layan Knotweed, we did not detect stilbenes in any extracts, but identified catechin and hyperoside (not reported earlier).

The Himalayan Knotweed belongs to plants with high content of phenolic compounds, especially flavonols. Catechins and flavonols are important antioxidants.

Experimental

Plant material : The leaves, flowers and roots of Himalayan Knotweed were collected from four localities in Železná Ruda district (Šumava Mts., Czech Republic, EU) in September 2005.

Botanical nomenclature of the species is problematic. *Persicaria polystachya* (*Meissnor*) H. Gross was identified according to Flora of the Czech Republic[23] and applied taxonomical nomenclature was associated according to Key to the Flora of the Czech Republic[24].

Analysis on HPLC : The material was dried in the laboratory temperature (in shade), pulverized and extracted with 90% methanol. Leaves, flowers and roots were extracted and *analysed separately*.

The samples were analysed using HPLC with DAD detector on Phenomenex Luna C18 column, in water-acetonitrile gradient with the addition of *o*-phosphoric acid at 25 °C. Phenolic compounds were detected at 220 nm. The spectra were recorded in the range from 190 nm to 600 nm.

Analysis on CE : The total quercetin was analysed after acid hydrolysis methanolic extract and concentration on the SPE columns (RP 18). Total quercetin was analysed by capillary electrophoresis with UV-Vis scanning detector, fused-silica capillary, at 25 °C, 20 kV. The running buffer (pH = 9.2) contains 10 mM Na-tetraborate, 10 mM boric acid, 20 mM sodiumdodecyl sulfate, 15% (v/v) of methanol. Quercetin were detected at 270 nm.

Acknowledgement

This research was supported by the grant MSMT OC D28.001 and by the Research Intention of ISBE AS CR AV0Z60870520. The authors are also grateful to Daniela Brůhová, Jan Mikulka and Miloš Král for their help with plant collection in the terrain and to Václav Němec for his critical revision of the manuscript.

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