Review of the PhD thesis „Biological activities and chemical content of *Glycyrrhiza* species

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PhD thesis contains 150 pages – Theoretical Framework 32, Materiáls and Methods 16, Results and Discussion 64, References 22. The study was carried out at the Department of Pharmacognosy, Faculty of Pharmacy, Charles University, and partly at the Institute of Clinical Imunology and Alergology, Faculty of Medicíne, and Laboratory of Pharmaceutical Chemistry, Institute of Pharmacy, Université Libre de Bruxelles. Author published 6 papers in journals with high impact factor, 1 in book chapter and 10 as congress presentation.

Licorice could be used for treatment of different diseases, cf. diabetes, tumours, ulcers bacterial infections, etc. Besides, it influences immune system and has important antioxidant capacity (flavonoids). Commercially added to chocolate, chewing gum, cigarettes and cosmetics.

The main objectives of the study were:

To determine the total content of phenols, flavonoids and tannins, and the free radical scavenging activity of extracts of *G. glabra, G. uralensis, G. echinata* and *G. pallidiflora* roots. Furthermore, to investigate the relationship between the total content of polyphenols and the antiradical activity.
To evaluace the free radical-scavenging and antioxidant effect of licorice infusion (*Glycyrrhiza glabra*) and its major constituents.
To investigate the variation in the chemical composition, free radical-scavenging and antioxidant activities of extracts of licorice obtained from *Glycyrrhiza glabra* plant collected at different harvest times during a one-year period. In addition, to investigate the correlation between chemical composition and biologial activities.

Te aims of the work are exactly formulated, the results of the experiments are clearly elaborated by meas of figures and graphs. The methods used in this part of the work represent up to day modern analytical methods.

Many results are important both from theoretical and practical aspects:

The free radical scavenging activity of the extracts from *Glycyrrhiza glabra* was evaluated and could be related with phenolic groups. Tannins and flavonoids were the major contributors to the free radical activity and may be a key parameter for food science and technology.
In vitro study shows that licorice infusion has antioxidant, pro-oxidant free radical scavenging activity.

The content of individual components of licorice varied at different harvest time and might be atributed to seasonal changes in temperature, humidity and light and different stage of plant metabolism.
The data emerging from this study represent an approach to determine the best time for harvesting licorice with optimal chemical and pharmacological properties.

Questions and remarks

1. Page 146 – the first paper is very long, 35 226 pages !!
2. Page 147 – the pápers have different mark: p., pp.
3. Why did you used just 4 year-old roots? The content of chemical and pharmacological compounds could also change in dependance on old of the plant.
4. Table 7. Page 97. What´s the reason for the dramatic changes in total phenols, total flavones and flavonols and total tannins in individual months?
5. Table 9. Page 104. What is the reason for the changes in antioxidant activity index, oxidation rate ratio and antioxidant activity coefficient in dependance on months?
6. Can you explain why the best antiradical and antioxidant effects were observed in licorice extracts from plants harvested in May and November?
7. To determine best time for harvesting licorice with optimal chemical and pharmacological properties is to perform greenhouse experiments at controlled growing conditions. Otherwise the chemical and pharmacological characteristic will be influenced by changes in temperature, humidity and global and UV radiations.

Conclusion

I evaluate PhD thesis of José Carlos Cheel Horna positively because it fulfils all requirements putting on dissertation. Therefore, after the successful defence of thesis I recommend to grant him PhD degree (§ 47, law 111-1998)

5. 12. 2010 Prof. RNDr. Bohumil Sikyta, DrSc