P 10: *Peucedanum ostruthium* (L.) Koch: Morphological and phytochemical variability of twelve accessions from the Swiss alpine region

Jessica Heather McCardell[1], Julien Héritier[2], Xavier Simonnet[2], Christoph Carlen[3]

[1] Master Student in Crop Science, Institute of Plant, Animal and Agroecosystem Sciences, Swiss Federal Institute of Technology, Zurich, e-mail: jessicam@student.ethz.ch (corresponding author)
[2] Mediplant, Conthey, Switzerland
[3] Agroscope, Institute for Plant Production Sciences, Conthey, Switzerland

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Abstract

Ostruthin, a natural bioactive compound mainly occurring in the roots of *Peucedanum ostruthium*, is the focus of this study. *P. ostruthium* was collected from twelve locations in the Swiss alpine region and reared in an experimental field, subdivided into twelve lots over two years. In the spring and fall, a portion of each of the twelve accessions was harvested and separated into above and below ground plant parts. The dried plants were then extracted with 60 % ethanol using accelerated solvent extraction (ASE) and analyzed using high pressure liquid chromatography (HPLC).The above and below ground plant parts were then analyzed concerning their dry matter yield (DMY), their ostruthin concentration and their ostruthin yield. Focusing on ostruthin, it was found that the below ground plant parts harvested in the fall rendered the highest ostruthin yield. Furthermore, a variability concerning ostruthin among the twelve accessions was found. This variability among the accessions is of interest with regards to a breeding program used to develop a cultivar with a high ostruthin yield.

Keywords: Ostruthin, *Peucedanum ostruthium*, ASE, HPLC, breeding program

Introduction

Natural products or derivatives make up about one third of all medications (Asif, 2015). Ostruthin, a natural bioactive compound in the roots of *Peucedanum ostruthium*, has been found to have beneficial uses for a number of health related issues. The anti-proliferative activity of ostruthin could be of use in cardiovascular diseases (Joa et al., 2011); ostruthin's anti-mycobacterial activity could be of use in mycobacterial infections (Schinkovitz et al., 2003). In addition, as an acetylcholinesterase inhibitor ostruthin could also be of use in the treatment of Alzheimer's disease (Urbain et al., 2008).

The aim of this study was to analyze the differences between the spring and fall harvests of twelve accessions of *P. ostruthium*, with regards to DMY, ostruthin concentration as well as ostruthin yield of the above and below ground plant parts. The results of this study will allow for an identification of productive plants containing a high ostruthin yield to be used in a breeding program.

Materials and Methods

Plant Material

Twelve accessions of *P. ostruthium* from the Swiss alpine region were collected from the wild and reared for two years in an experimental field in Bruson (VS). Two harvests were conducted, one in the spring (May) and one in the fall (October) 2015. The whole plant was harvested and then separated into above and below ground plant parts, which were dried at 38 °C.

Accelerated Solvent Extraction and High Pressure Liquid Chromatography

The plant material was extracted with 60 % ethanol using an accelerated solvent extractor. The extracts were then analyzed qualitatively and quantitatively with high pressure liquid chromatography. The target compounds of the extract were identified through their retention time and quantified by comparing them to external standards.

Results

Plant Parts

The above ground plant parts of *P. ostruthium* contained ostruthin in amounts below the defined quantification level. By contrast, the below ground plant parts were rich in ostruthin. The following data refers specifically to the below ground plant parts.

Harvesting

The mean DMY of the spring harvest was 429 g/m^2 and 1150 g/m^2 in the fall harvest (Fig. 1).The mean ostruthin concentration in the spring harvest was 1.75 g/100g dry matter (DM) compared with the mean of the fall harvest with 1.41 g/100g DM (Fig. 2). The mean ostruthin yield was 7.5 g/m^2 in the spring harvest and 16.4 g/m^2 in the fall harvest (Fig. 3.). Therefore, the best method for acquiring ostruthin seems to be harvesting the plant parts in the fall.

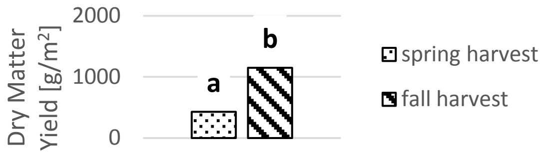

Fig. 1 Below ground plant parts: Mean dry matter yield of the spring and fall harvests for all accessions. ANOVA Tukey HSD p <0.001.

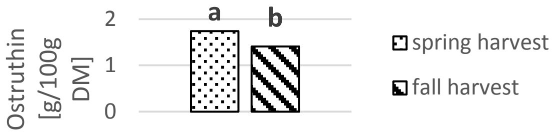

Fig. 2 Below ground plant parts: Mean ostruthin concentration of the spring and fall harvests for all accessions. ANOVA Tukey HSD p <0.001.

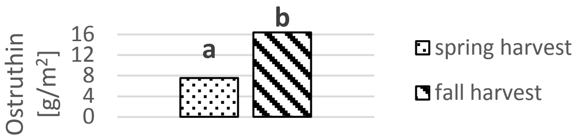

Fig. 3 Below ground plant parts: Mean ostruthin yield of the spring and fall harvests for all accessions. ANOVA Tukey HSD p <0.001.

Accessions

The DMY ranged from 277 – 630 g DM/m^2 in the spring harvest and from 773 – 1539 g DM/m^2 in the fall harvest. The ostruthin concentration varied from 0.87 – 2.27 g/100g DM in the spring harvest and from 0.94 – 1.94 g/100g DM in the fall harvest. The ostruthin yield ranged from 3 – 13 g/m^2 in the spring harvest and from 10 – 30 g/m^2 in the fall harvest. These results show that there is a variability in the accessions and as mentioned above, the fall harvest is the ostruthin rich harvest.

References

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