Geophysical Research Abstracts
Vol. 14, EGU2012-8369, 2012
EGU General Assembly 2012

87Sr/88Sr a useful tool for the identification of geographic origin of Styrian pumpkin seed oils?

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The authenticity and the geographic origin of Styrian pumpkin seed oil (PGI) a regional specialty needs to be protected, but the current specification of this high priced product does not include the proof of origin through analytical tools. As it turns out, this and many other products within the Protected Geographical Status (PGS) framework of the European Union, cannot be protected from fraud without forensic tools. In previous studies we were able to demonstrate, that distribution and content of trace elements in particular the rare earth elements, are useful parameters to discriminate Austrian from non-Austrian pumpkin seed oils and seeds. Unlike stable isotopes ratios (C and H), the trace element patterns are not influenced by changes in weather conditions and temperature during growing and harvesting cycle.

Though the study of the distribution of element traces can be used not only for the identification of the geographic origin with very useful PLS and PCA models but also can identify fraud through mixing with other oils, this method need to be validated by other means. Radiogenic isotopes, in particular the 87Sr/86Sr isotope amount ratio has been successfully applied to food and other products for forensic studies. In this study we determined the 87Sr/86Sr isotope amount ratio in pumpkin seed oils extracted from seeds of known geographic origin from Austria, Russia and China, as these are the largest producers, to see if significant differences occur and if they can be used as a forensic tool. Although the total area of the Russian and the Chinese crop fields are magnitudes larger than the ones from Austria, it turns out that the variance of the Austrian 87Sr/86Sr data is much larger than that from other sources. Reasons are the large diversity of the Austrian geology (pre-varsican, alpine to sub-recent ages of the underlying bedrock of the soils can be found), the small farm sizes and the small scale production. In Russia large farms are situated on homogeneous bedrock and are also influenced by sea spray. On the other hand, in China cooperatives collect and probably homogenize seeds from many small farms in a geologically relatively homogeneous area in China (Inner Mongolia).

Through these differences expressed in geology, farm size and production type, the radiogenic strontium isotopic composition is thus a useful and complementary addition to the existing classification method based on element trace contents and patterns but it cannot substitute the existing method.