

International Conference on

# Food Safety and Regulatory Measures

August 17-19, 2015 Birmingham, UK

## Effects of origin, genotype, harvest year and their interactions on stable isotope, multi-element and near-infrared fingerprints in wheat”?

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Agricultural products reflect characteristics of their environment and physiology through organic or non-organic compounds in the organisms. The geographical information in each region not only includes the geologic feature, soil type, latitude and altitude but also the meteorological factor such as temperature, precipitation and air humidity, the latter can be uncertain factor along with inter-annual change. Other than geographical origin and cultured year, genotype and the interaction of genotype and environment might also influence the geographical traceability fingerprints in foodstuff, all the factors above might bring the complexity and uncertain factor to figure out the effective fingerprints. A three consecutive experiment with ten genotypes of wheat were grown in three different regions (Zhaoxian of Hebei province, Huixian of Henan province and Yangling of Shaanxi province) of China during the 2010-2012 growing seasons, totally 270 wheat kernel samples were collected in harvest time. The stable isotopes ( $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$  and  $\delta\text{D}$ ), multi-elemental compositions (Mg, Al, Ca, Mn, Fe, Cu, Zn, As, Sr, Mo, Cd, Ba, Pb) and near-infrared spectra (950 nm to 1650nm) were analyzed in order to investigate the effects and contributions of wheat origin, genotype, harvest year and their interactions on fingerprints in wheat kernels. Combined with analysis of variances, all the fingerprints were significantly influenced by wheat origin, genotype, harvest year and their interactions, but  $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ ,  $\delta\text{D}$ , Mn, Sr, Mo, Cd and wavelength ranges of 975-990 nm, 1005 nm, 1200 nm, 1300-1340 nm, 1355-1380 nm were found to be closely related to wheat origin, a robust discrimination model was established subsequently using the screened indicators. This could provide powerful theoretical basis for geographical traceability of wheat and other foodstuffs of botanical origin, even mixed with different genotypes and different years.

### Biography

Guo Boli has researched on food geographical origin and contamination traceability using the techniques such as stable isotopic fingerprint analysis, elemental fingerprint analysis, NIR and chemical compositions analysis. The technologies can be used for protecting the products with Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) in Europe, and Geographical Indications (GI) in China from fraud. Also they can be used to trace the contamination source and prevent the disease or hazards from spreading. More than 70 articles were published in *Food Chemistry*, *Journal of Agriculture and Food Chemistry* and other Journals, 4 books such as *Technology of Beef Geographical Origin Traceability*, *Research of plant origin food contamination traceability*, *food safety introduction and food safety control in China* were published.

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