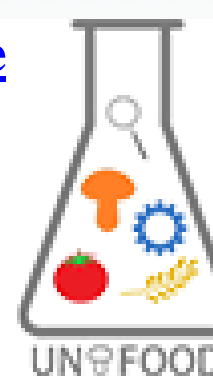




VARIATION IN SOME ESSENTIAL ELEMENTS AND ANTIOXIDANTS CONTENT IN ORGANICALLY PRODUCED SPELT AND MAIZE GRAINS



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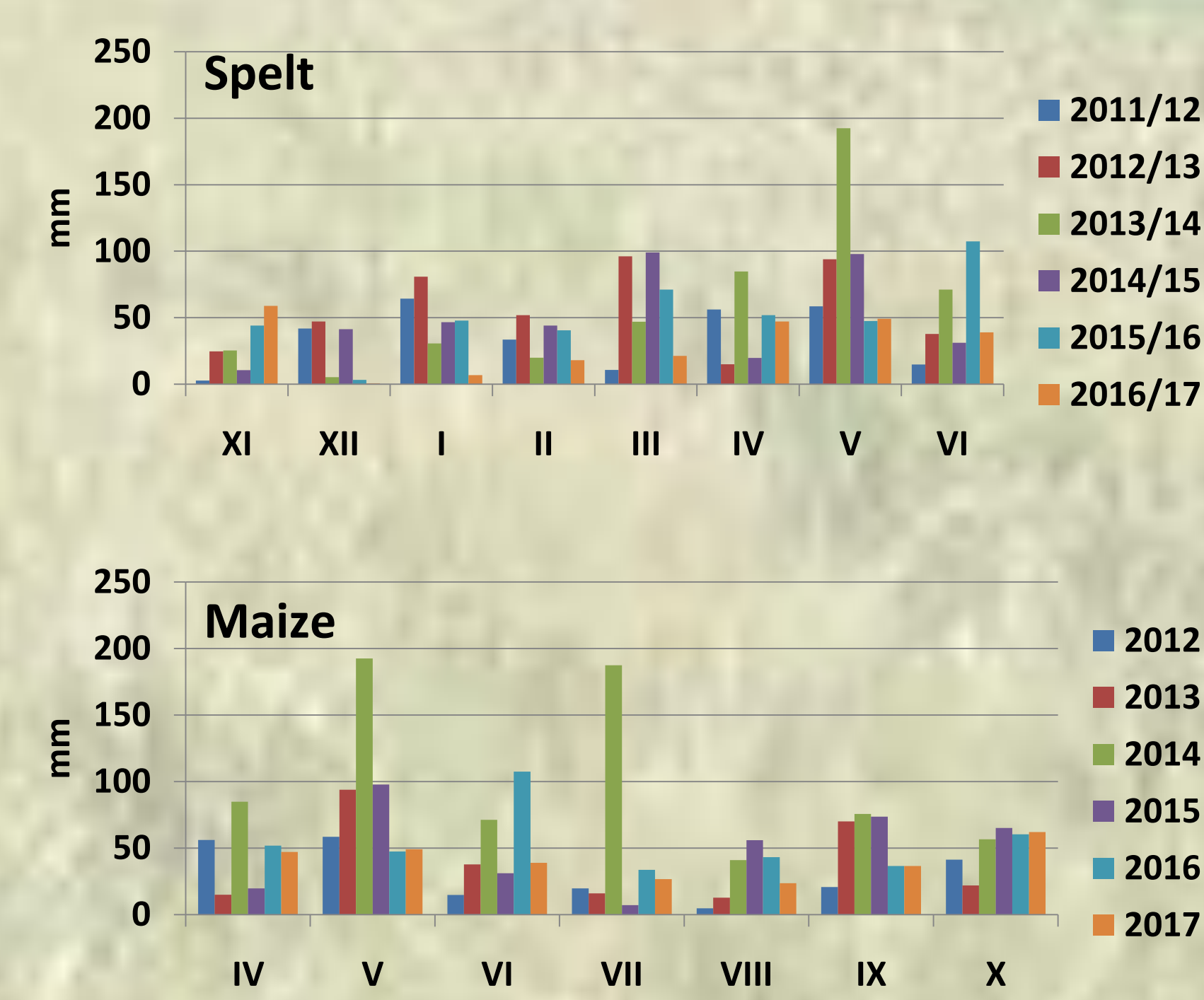
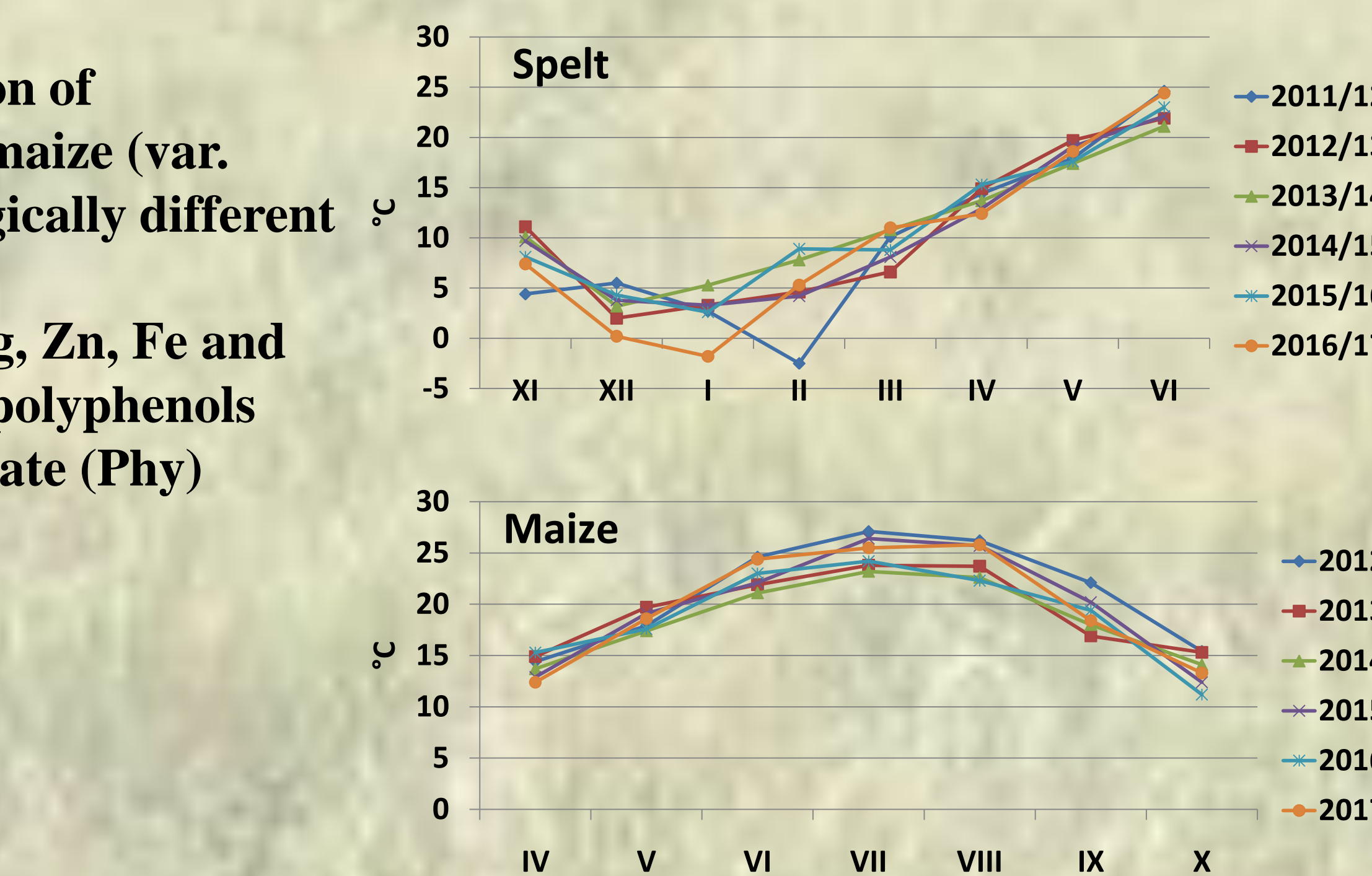
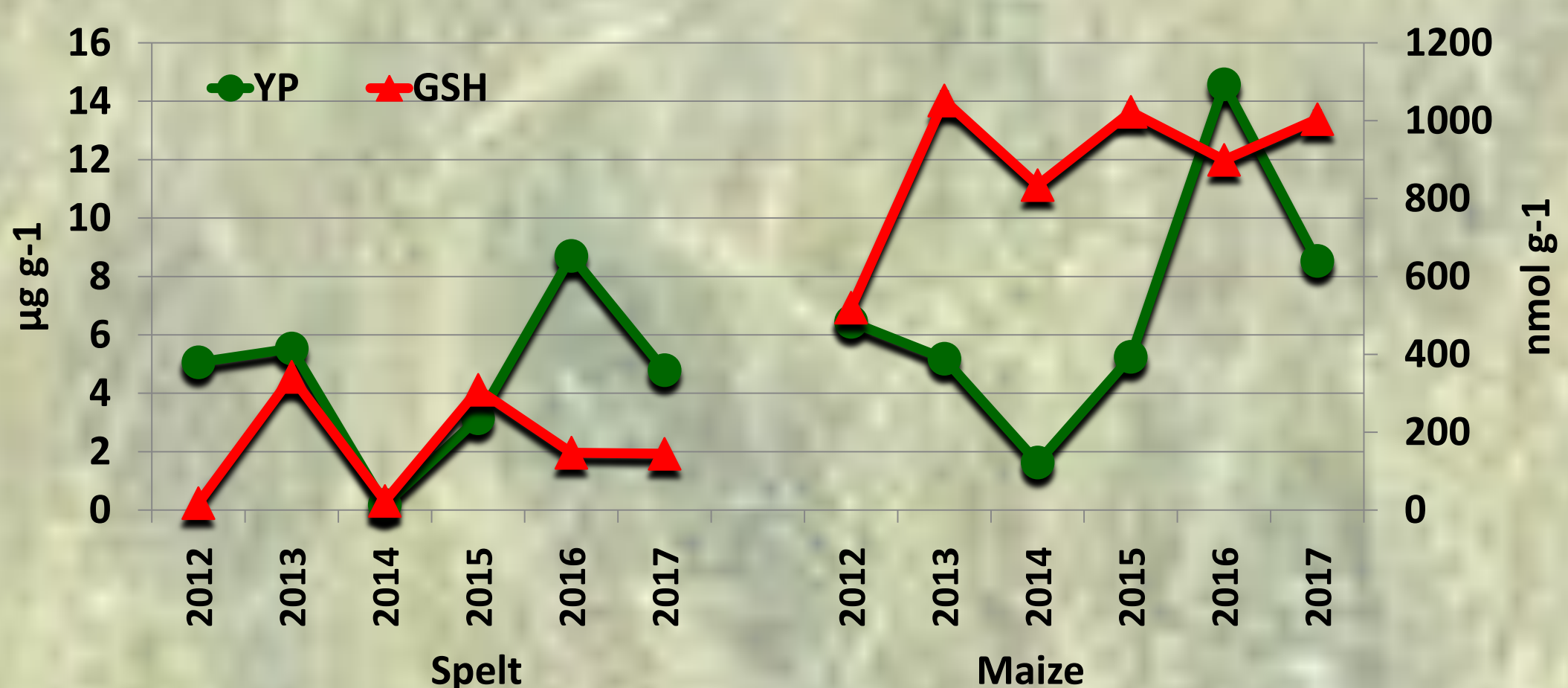
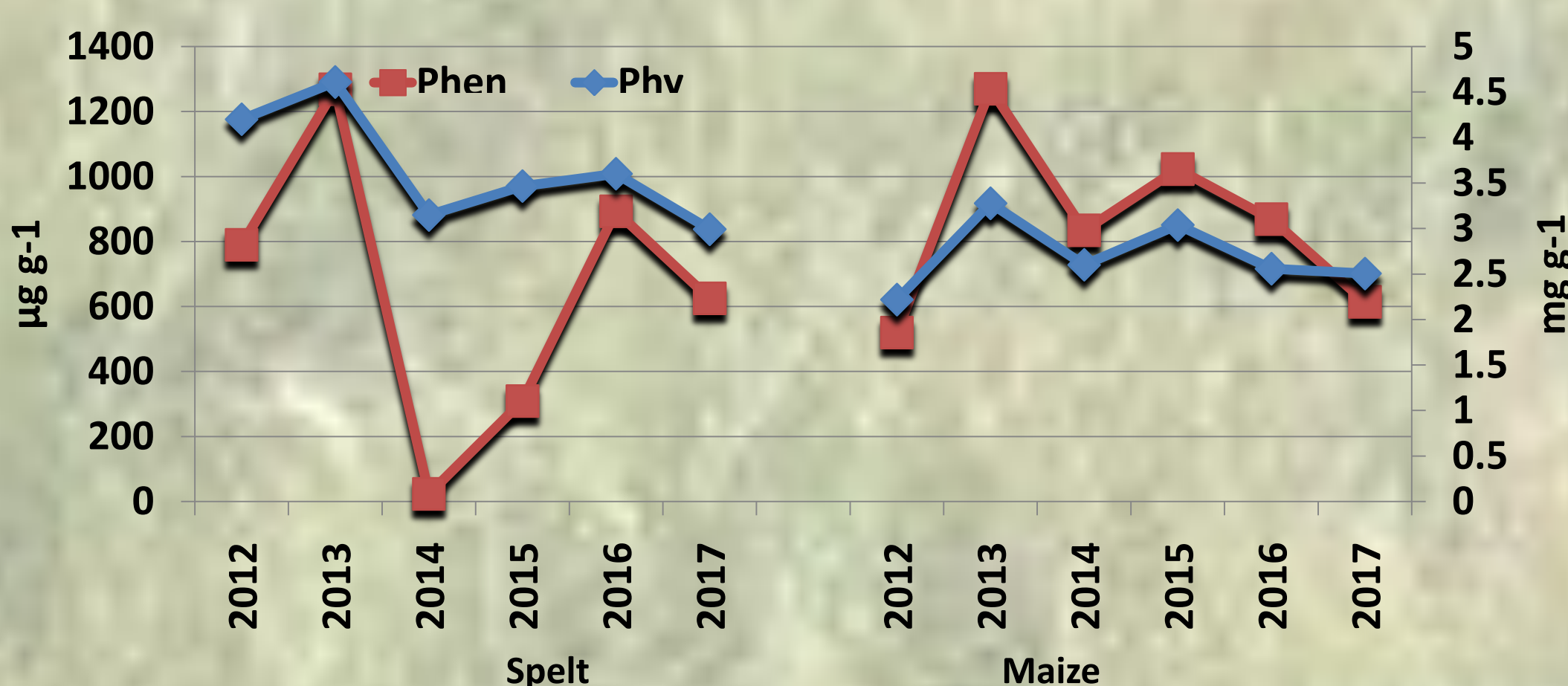


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Climate change significantly affects agricultural production. Frequent variations and extremes in meteorological factors, affect not just yield, but also grain composition of produced crops. Organic crop production has many challenges, particularly under the rain-fed conditions, when water supply is limited and crops could be additionally subjected to the harsh environment. Nevertheless, organic production is environmentally friendly system, contributing to the production of nutrient dense food.

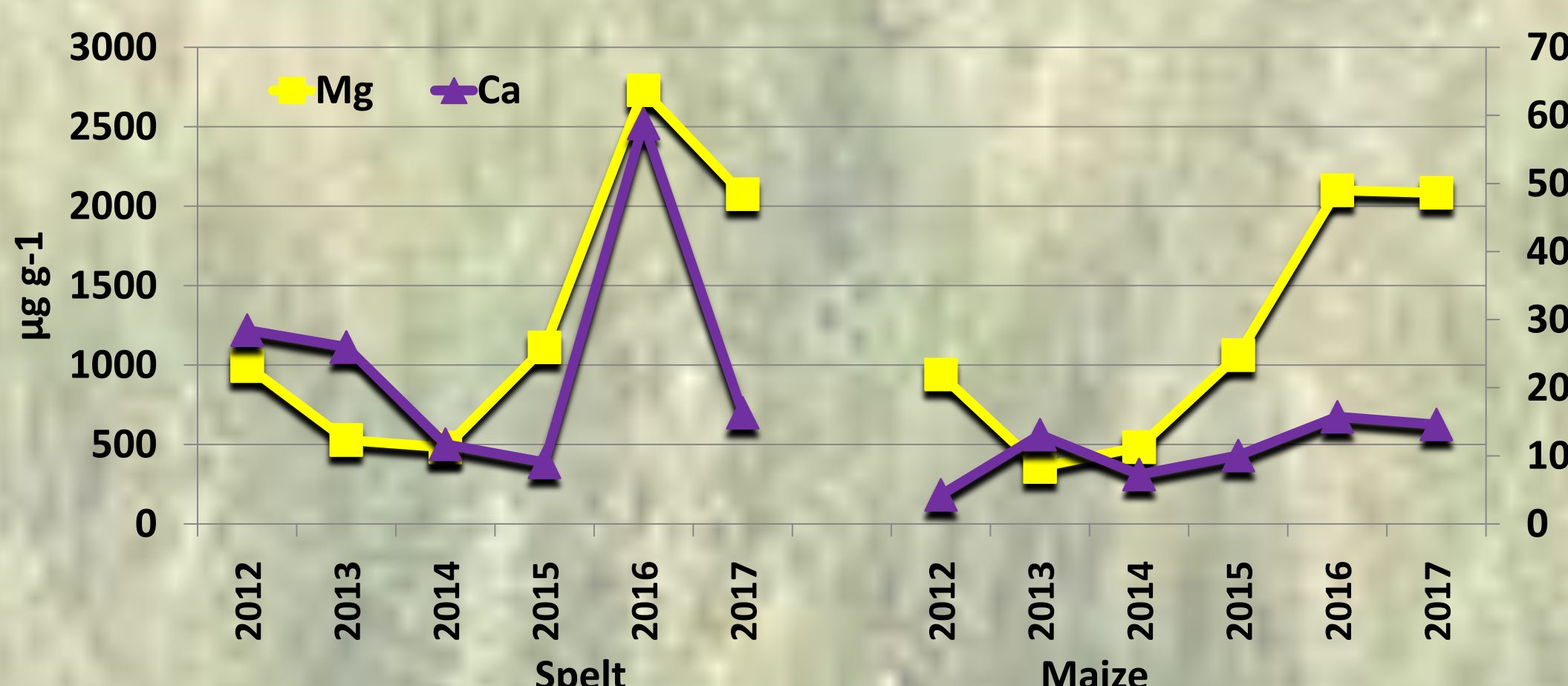
Aim of the research was to follow variations in grain composition of organically produced spelt wheat (var. Nirvana) and red grain maize (var. Rumenka) during 2011-2017 period, which included meteorologically different seasons.

Analysed grain components included essential elements: Ca, Mg, Zn, Fe and Mn (determined by ICP-OES), as well as antioxidants, such as polyphenols (Phen), yellow pigments (YP), total glutathione (GSH) and phytate (Phy) (determined spectrophotometrically).



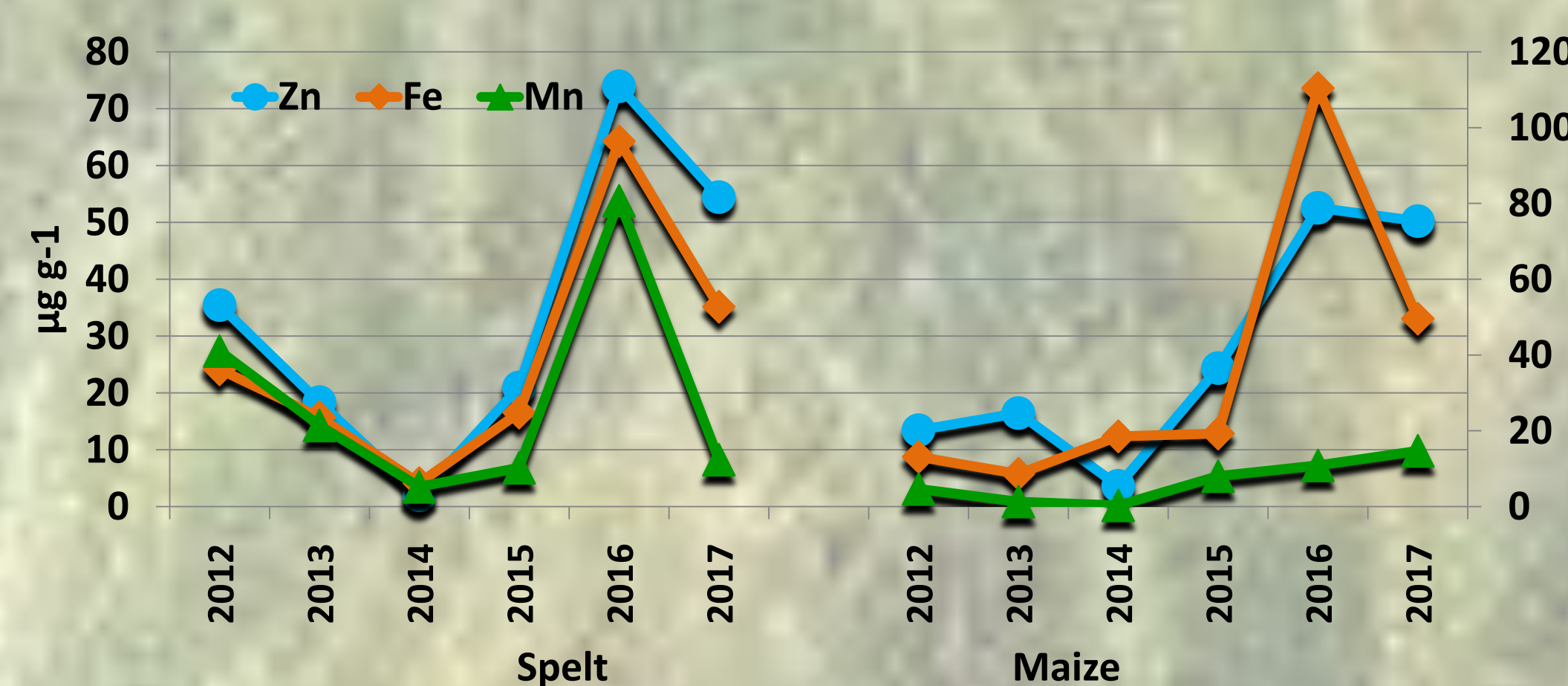
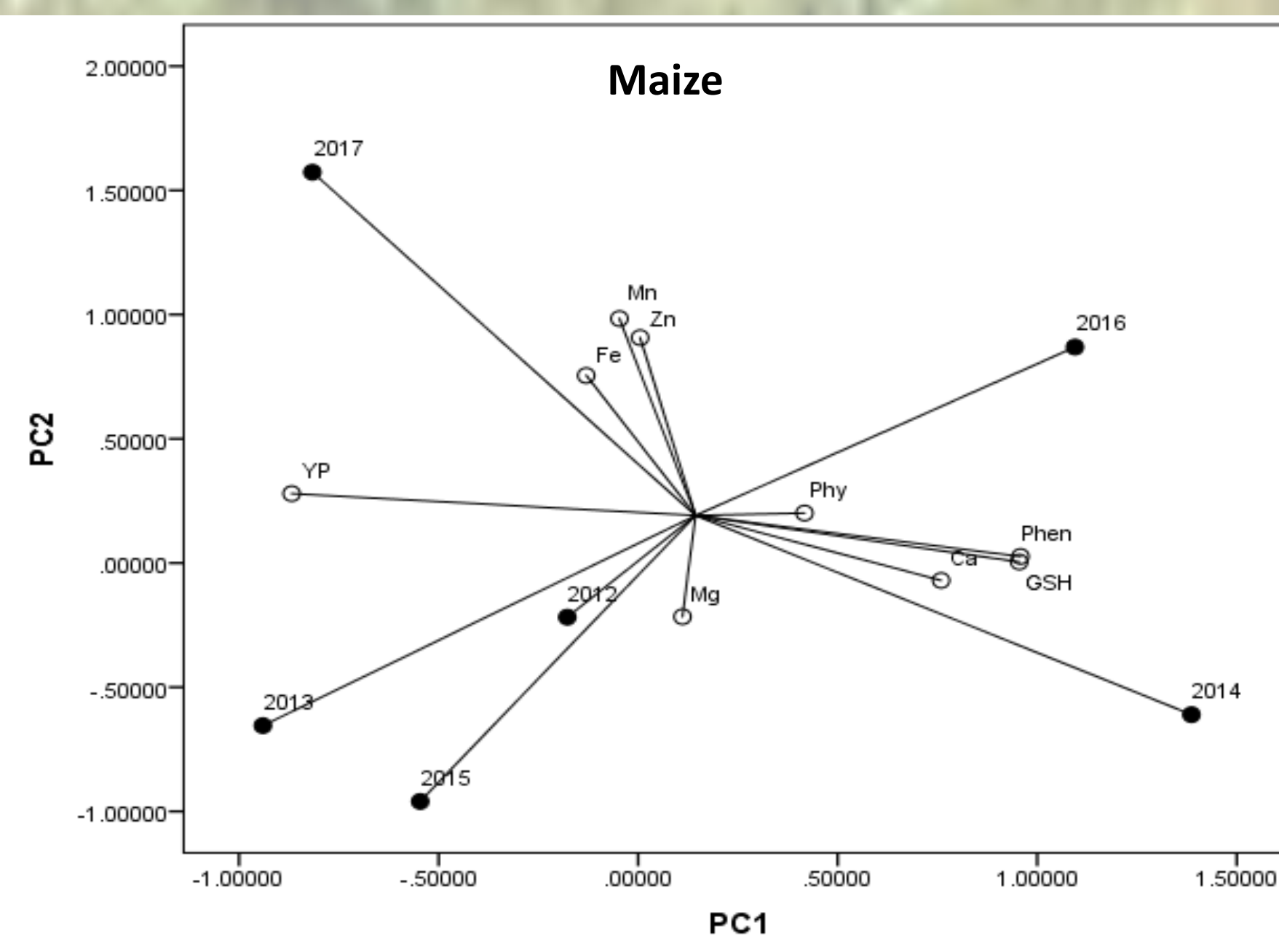
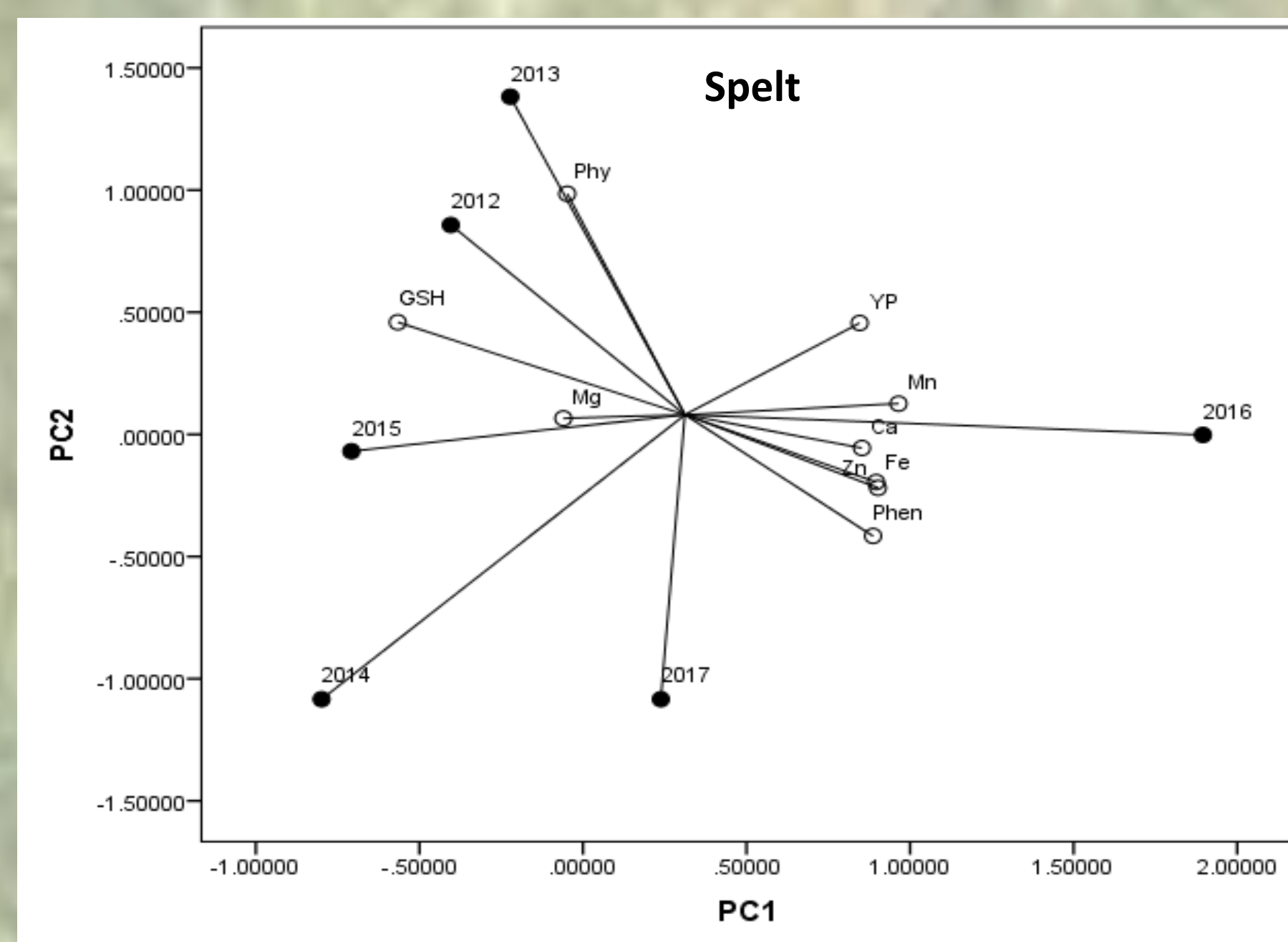
Meteorological conditions present during 2012-2017 period for growing cycles of spelt and maize

Results revealed that the lowest concentrations of polyphenols, YP and GSH and slightly reduced Phy in the grains of both, spelt and maize were present during the season with extremely high precipitation, as 2014 was. Nevertheless, drier seasons had positive impact on the accumulation of all examined antioxidants and the highest values were obtained during meteorologically optimal years.



Based on the content of essential elements, 2014 was also important for reduced Mg, Fe, Zn and Mn accumulation in spelt grain. For maize, seasons with drought (2012 and 2013) were significant for reduced accumulation of all examined elements.

Principal component analysis revealed that drier periods present during grain filling induced high variations of GSH, Phy and Mg concentrations in spelt grain, as well as high variations of YP, Mg, Fe, Mn and Zn concentrations in maize grain.



The highest values of all essential elements were noticed in 2016 and 2017, seasons with relative uniform precipitation distribution and optimal temperature during grain filling periods of spelt and maize.

CONCLUSION

Growing season is an important factor affecting nutritional quality of organically produced crops - spelt and maize. Drier seasons are favourable for antioxidants accumulation, while optimal seasons, in term of temperature and equality in precipitation distribution are favourable for essential elements accumulation in grain.