

Abstract No. wetz0405

***In Situ* Wheat Endosperm Protein Secondary Structure Determination with Synchrotron Infrared Microspectroscopy**

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Beamline(s): U2B

Introduction: The high spatial resolution capability of synchrotron infrared microspectroscopy at beamline U2B was employed to obtain spectra in a high density grid pattern from the subaleurone endosperm of different hard wheat varieties including some experimental lines. Frozen sections were freshly microtomed, mounted on site and thaw mounted on BaF₂ windows for immediate analysis. One protein quality factor at maturity for the hard wheat class is related to the α -helix population among various protein secondary structures. A pinhole positioned in the beam before the microscope stage produced a 5 Fm diameter image plane mask. Spectra obtained for 5 Fm pixels in a 5 Fm step pattern included some that not only had mostly protein but they also avoided the scattering effect of the large starch granules that dominate the spectrum of the bulk endosperm. The good signal to noise ratio of spectra not affected by starch scattering allowed determination of the relative α -helix population by appropriate data treatment, modeling and peak area calculations. This knowledge at very early stages of the Kansas Agricultural Experiment Station wheat breeding selection process could allow targeting certain quality factors for end use. The differences in α -helix population among the hard wheat varieties analyzed indicates the potential importance of this determination for wheat breeding.