PREDICTING MALTING QUALITY IN WHOLE GRAIN MALT COMPARED TO WHOLE GRAIN BARLEY BY NEAR INFRARED SPECTROSCOPY

*CASSANDRA K. BLACK AND JOSEPH F. PANOZZO

Agriculture Victoria - Horsham, Victorian Institute for Dryland Agriculture, Private Bag 260, Horsham, 3401 Australia

Predicting quality traits using near infrared (NIR) spectroscopy on whole grain samples has gained wide acceptance as a non-destructive, rapid and cost effective technique. Barley breeding programs throughout southern Australia currently use this technology as a tool for selecting malting quality lines.

For the past 3 years whole grain barley calibrations have been developed at VIDA to predict malting quality traits in the early generation selections of the breeding program. More recently calibrations for whole grain malt have been developed and introduced to aid in selecting malted samples at the mid-generation stage for more complex malting quality traits.

Using the same population set, barley and malt calibrations were developed to predict hot water extracts (EBC and IoB), diastatic power, free α-amino nitrogen, soluble protein, wort β-glucan and β-glucanase. The correlation coefficients between NIR predicted values and laboratory methods for malt were all highly significant ($R^2 > 0.84$), whereas the correlation coefficients for the barley calibrations were lower ($R^2 > 0.57$) but still significant. The magnitude of the error in predicting hot water extract, diastatic power and wort β-glucan using whole grain malt was reduced by 50% when compared with predicting the same trait using whole grain barley. This can be explained by the complex nature of attempting to develop calibrations on whole grain barley utilising malt data. During malting, the composition of barley is modified by the action of enzymes throughout the steeping and germination stages and by heating during the kilning stage.

Predicting malting quality on whole grain malt is a more reliable alternative to predicting whole grain barley, although there is the added expense of micro-malting the samples. The ability to apply barley and malt calibrations to different generations is an advantage to a barley breeding program that requires thousands of samples to be assessed each year.