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A White Paper from FOSS

FOSS Alphatec FN^{o} for the analysis of Hagberg falling number

A new alternative for the standardised method and a validation of the comparability of analytical results with the Alphatec FN^{o}

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Dedicated Analytical Solutions

Introduction

The Hagberg falling number method is widely recognized as the standard for determination of pre-harvest sprouting related weather damage in wheat, rye and other crops. Equipment for performing this analysis has long been dominated by one supplier with little innovation in the method or equipment. Recently, global leader in the food and agriculture analysis industry FOSS, entered this market with the Alphatec™ FN№, the first major innovation in instrumentation for analysis of Hagberg falling number for many years. Being a long established method, FOSS' main aim was to improve the usability and accuracy of the instrument while maintaining the ability to conduct the well-known Hagberg falling number method in line with existing industry methods and practice. As a result, it is critically important that any new instrumentation is able to "fit-in" with the existing population and produce analytical results that are comparable.

To demonstrate this, FOSS commissioned Curtin University in Western Australia to conduct a trial to assess the performance of the FOSS Alpahtec FN№ (Alphatec) against a population of commonly used existing instruments.

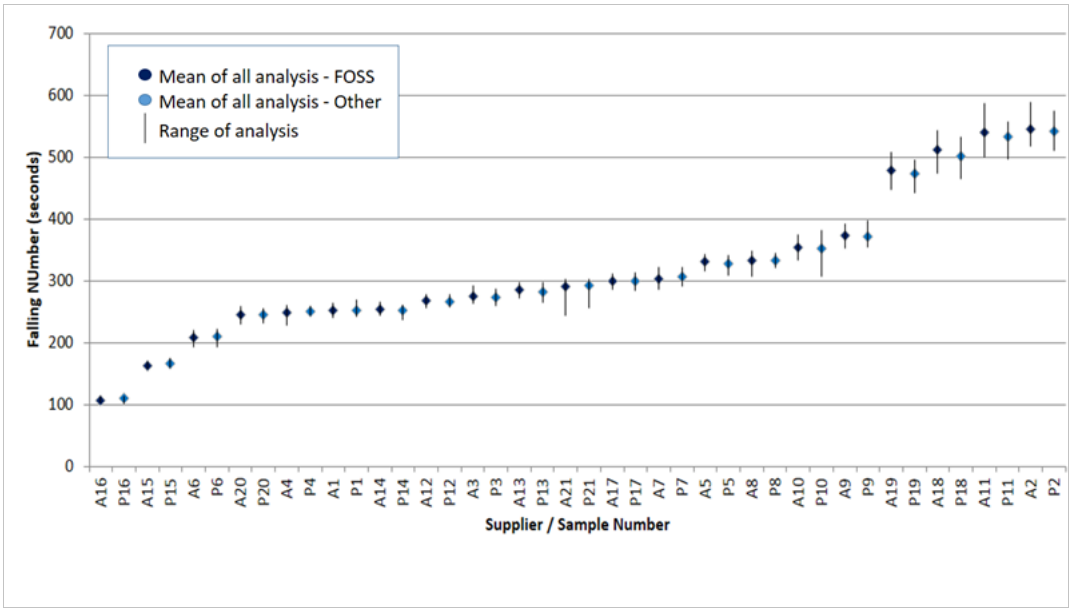
Trial Design:

The key aim of the trial was to assess how comparable results generated on one type of instrument was to those generated on the other. As a result, the trial was designed to be a) statistically valid and b) to remove as many sources of confounding error as possible while still using the instruments in a standard manner. To achieve this, care was taken with key elements such as temperature of the room, how the samples were prepared and stored etc. In addition, ancillary and sample preparation instruments like mills and shakers were limited to one of each to ensure any potential variability in these did not impact the overall results.

A total of 21 samples with Hagberg falling number values throughout the range commonly seen were analysed on 8 units of each type. Each sample was tested 3 times on each instrument and each sample was done in duplicate (both barrels) of the instruments. In line with recommended methodology, analysis was repeated if more than 5% variation was seen between each barrel. In addition, and in recognition of the fact that the thickness and weight of the glass tubes can have a major impact on analytical performance, glass tubes were weighed and pared to keep them alike. It was noted in the trial report however that this was only necessary for tubes originating from the existing supplier and that all FOSS supplied tubes were within accepted levels of variability and hence did not require pairing.

Results:

Figure 1. Results from trial



A summary of the results from the trial are displayed in Figure 1. This graph plots the mean value (the "dot") and the range (the vertical bar) for each sample tested on each instrument type.

Discussion

The study included rigorous statistical analysis and detailed discussion of those are available in the full report. Based on that analysis, the study concluded that the two instrument types showed no statistically significant difference, i.e. they can be considered statistically equivalent in 18 of the 21 samples tested. In the remaining 3 samples, a small but statistically significant different was seen. The authors noted however that 2 of these samples were at the lower end of the results spectrum (105 and 167 seconds) and the third at the higher level (512 seconds). The authors noted that at these levels, the first two were clearly damaged samples and were well below the critical levels of between 250 and 300 seconds which are commonly accepted limits between sprouted and sound wheat. The other, at 512 seconds, was well above this.

Conclusion

These findings demonstrate that the Alphatec and the results generated from it can comfortably sit within a population of existing instruments. It also demonstrates to the recipient of a result generated on an Alphatec that this result is unlikely to be, statistically speaking, any less valid than one produced on an existing instrument.

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