Validating Texture Analysis as a Tool for Determining Bioplastic (Bio)Degradation

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Abstract : Plastics, due to their long lifespan, are becoming more of an environmental concern once their useful life has been completed. There are a vast array of different types of plastic, and they can be found in almost every ecosystem on earth and are of particular concern in terrestrial environments where they can become incorporated into the food chain. Hence bioplastics have become more of interest to manufacturers and the public recently as they have the ability to (bio)degrade in commercial and in home composting situations. However, tools in which to quantify how they degrade in response to environmental variables are still being developed -one such approach is texture analysis using a TA.XT Texture Analyser, Stable Microsystems, was used to determine the force required to break or punch holes in standard ASTM D638 Type IV 3D printed bioplastic "dogbones" depending on the thicknesses of them. Manufacturers' recommendations for calibrating the Texture Analyser are one such approach for standardising results; however, an independent technique using dummy dogbones and a substitute for the bioplastic was used alongside the samples. This approach was unexpectedly more valuable than realised at the start of the trial as irregular results were later discovered with the substitute material before valuable samples collected from the field were lost due to possible machine malfunction. This work will show the value of having an independent approach to machine calibration for accurate sample analysis with a Texture Analyser when analysing bioplastic samples.