# Super Tree Glue: An Investigation and Characterization of an Innovative 4-in-1 Combo Material for the Treatment of Tree Infection

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In 2018, Super Typhoon Mangkhut left a trail of tree destructions in many Asian cities. Branches of stricken trees were later chopped, resulting in many untreated trees' cross sections being left infected by fungi which further weakened the trees posing serious risks to the public. At present, tree treatments mainly address just one single problem and are rather invasive, e.g. spraying the fungi with drugs which cannot provide physical support to defects, while reinforcing branches with metal plates cannot cure tree infection. To address these problems, we investigated the possibility of modifying the biocompatible of poly(vinyl) alcohol (PVA) using metal salt $CaCl_2$ as treatment materials (super glue), then covering it with carbon fiber cloth to support tree defect afterwards. Results show that PVA modified with 10% $CaCl_2$ possesses comparable adhesive strength as commonly used wood adhesive, Soy Protein Isolate (SPI). It also offers a stable release of drug, Cu (II) $SO_4$ (8.8mg/ml), which meets the standard dosage in farming. Modified PVA can retain 60% of water, which offers a sustainable and continuous release of drugs. We also found that, when treated with the super glue, a clear zone displaying anti-bacteria property. Furthermore, treated defect-branches showed significant high flexural modulus in three-point bending tests. Finally, we successfully applied the glue on real tree defects effectively without the use of special tools. In conclusion, PVA super glue provides a 4-in-1 treatment, including physical protection, wound defects filling, stable and long-term drugs release, furthermore reinforces the strength of weakened tree branches.

**Awards Won:**