Abstract: Dandelions can be thought of as little, yet sophisticated natural parachutes. The trick part in the design of dandelions is that this parachute does not need its canopy to be a continuous fabric. Instead, the hairs interplay with “fibers” of air to make an “invisible interwoven canopy.” Another interesting part of the dandelion-parachute design is that its seams consists of tapered, non-cylindrical cantilevers. The structural stability of these cantilevers play a key role in the dispersion of dandelion seeds. In order to understand better the mechanical behavior of dandelions, computational simulations and experimental studies are required. In particular, the computational modeling and simulation of dandelions require knowledge of some of its mechanical properties. The current project is aimed at presenting a novel method and device to be used to measuring properties such as Young’s modulus of elasticity, yield strength, Poisson’s ratio, and fracture strength.

A novel device was designed and manufactured to be assemble and connected to a Cole-Palmer’s Mark-10 test stand, with a 20 N load cell. There are two parts to the device, the lower jig and the upper jig. The lower jig is similar to a vice clamp that uses a combination of nuts and a bolt to translate the sliding plate. There is a rectangular-shaped protrusion from the top of the stationary and sliding plates to provide a suitable section to clamp down on the dandelion hairs. The upper jig was designed to encase this cylinder and was secured with nuts, bolts, and washers. Extruding down from the upper jig is a similar design to the lower jig. Together the upper and lower jigs clamp down on the upper and lower regions of the dandelion hairs and then the test stand is used to measure the tensile strength. Preliminary testing showed that the novel testing technique and device will be successfully used to measure the relevant mechanical properties of dandelion tissue, which will help advance our overall ongoing research goals.