LadHyX Seminar – October 15th, 10:45 am

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Two physical examples of the strength of plants: the resistance of grasses to herbivores and the pressure of swelling chickpea seeds

In this seminar we would like two address two original mechanical effects observed in plants commonly found in crop fields.

First, we will show that grasses, a family of plants that emerged late in evolution, have mechanically evolved to survive the fast pulling of herbivores when they are grazing. Strangely, as can be experienced on a lawn, grass leaves can be extracted fully when slowly pulled, damaging the growing part... We will show that friction and elasticity explain this behaviour.

Second, we will deal seeds, constituting a granular media whose grains can change volume upon rehydration. When confined in between two steady solid walls, we found that a single chickpea seed could exert impressive values up to 3 kg of force when immersed in water. With many seeds confined in a piston chamber, we obtained a "chickpea motor" developing several bars. In tall silos, we observed a counter-intuitive effect during rehydration: an "inverse-silo effect", where the pressure in the stack increases exponentially towards the base of the stack, contrary to the usual silo effect where pressure saturates to a plateau.