Tabunuco trees: together we are stronger:

http://wyrdscience.wordpress.com/2011/01/04/in-an-unpredictable-environment-trees-network-for-stability/

In an unpredictable environment, trees network for stability

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In the highly variable ridge, slope and valley mosaic that forms the Luquillo Mountains of northeastern Puerto Rico, *Dacroydes excelsa,* commonly known as Tabunuco, dominates the landscape. Though tropical forests are generally quite diverse and seen as ideal environments for plant growth, life in this rainforest can actually be quite challenging. Powerful hurricanes pass through the Caribbean annually and hit the Puerto Rican mainland every few years. Large swatches of the Luquillo forest were flattened several years back when hurricane Hugo struck in 1989. Aside from directly damaging or wiping out forest stands, hurricanes cause landslides that severly erode the already shallow, nutrient depauperate soils.

On steep, harsh slopes that experience such frequent disturbance, what allows one tree species to gain a competitive advantage over the hundreds of others struggling to survive? Rather than compete fiercely for limited resources only to be at the mercy of the next devastating hurricane, Tabunuco trees have adopted an alternative strategy- cooperation and resource sharing through root grafting.

Root grafting, the joining of neighboring tree roots to produce a network, is a phenomenon that scientists have been aware of for decades, though the extent of its occurrence and the benefits that it provides trees are largely unknown. In Tabunuco forests, however, root grafting is widespread and many of its benefits obvious.

Tabunuco trees grow in dense stands and will graft roots with neighboring trees as they mature, forming unions that comprise anywhere from two to over a dozen trees.

A clear advantage of this strategy in an environment that experiences powerful storms is structural stability.

Trees that have entered unions increase their base of support and are less likely to be uprooted during a wind event or landslide. In increasing their wind-firmness, individual trees boost their survival chances during a storm.

Fewer uprooting events also reduces the probability of a major landslide and helps ensure the retention of the surface organic matter that contains most of the forest's available nutrients.

Root networks can also improve soil conditions during the off-season. Densely packed surface roots form "organic benches" which trap leaves and other decaying plant matter rather than allowing these important nutrient sources be washed downslope. Roots aerate the soil, facilitating decomposition and nutrient flow. They also "prime" the surrounding soil for productivity by releasing sugary compounds that stimulate beneficial microbial activity (the interaction between plants and microbes in the root zone known as the "rhizosphere" is another fascinating topic entirely, which I will do attempt to do justice to in the future).

Scientists are now discovering previously undetectable advantages of Tabunuco grafting that underscore the high degree of sophistication and evolutionary purpose in the development of these networks. It is now known that root networks can actually serve as conduits for the transfer of carbon and essential nutrients between trees. This can provide an immense competitive advantage over non-networked trees. Tabunuco trees that receive the most sunlight and produce the most carbon through photosynthesis can transfer carbon to neighboring Tabunucos to ensure the long-term health and survival of the community. Individuals of less common species, such as the Caribbean palm and Colorado tree are excluded from Tabunuco networks and must compete for growth given only the resources available in the vicinity of their roots.

Though in Tabunucos root grafting precludes the need for inter-tree competition, it is theoretically possible that trees could use grafting for more selfish purposes. Ecologists have speculated whether trees can gain a competitive advantage over their neighbors by leeching a neighbor's nutrients, much as the fungal organisms that associate symbiotically with plant roots can become greedy and actually sap nutrients from their host under stressful conditions. Root networks may even serve as a conduit for disease or herbicide transfer, allowing trees that produce or tolerate a harmful compound to efficiently clear out their competitors.

Citation-
Basnet, K., F.N. Scatena, G.E. Likens, and A.E. Lugo. 1992. Ecological consequences of root grafting in tabonuco (Dacryodes excelsa) trees in the Luquillo Experimental Forest, Puerto Rico. Biotropica 25:28-35.