Rubber Trees Retransfer Nutrients to Adapt to Drought and Cold

Rubber trees (*Hevea brasiliensis*) were first introduced to tropical Asia at the end of the 19th century, and Xishuangbanna is a top rubber-producing region in China. Previous studies on rubber plantations have focused on the impacts of land-use conversion upon tropical biodiversity, soil and water conservation and local climate change. Little research has been done on the nutrient strategies of rubber trees, or the role of soil in these processes under drought and cold stresses.

Researchers from Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences recently investigated mature leaf and senescent leaf (leaf litter) nutrients, water-soluble soil nutrients and some aspects of soil microbes in monoculture rubber plantations of nine different ages (1 to 48 years) in Xishuangbanna. They chose four nutrient variables: total carbon (TC), total nitrogen (TN), total phosphorus (TP) and total potassium (TK) for the analysis of the leaf and litter-fall samples, and used changes in water-soluble soil-nutrient pools to examine nutrient re-translocation effects on soil nutrient properties.

They found that rubber trees demonstrated a clear re-translocation process. Facing annual drought and cold stresses, rubber trees' mature leaves re-translocated nutrients from the leaf senescence period to the deciduous period to adapt to environmental pressures in Xishuangbanna. Approximately 50.26% of leaf nutrients and 21.47% of the soil nutrients were redistributed to rubber tree bodies.

In the nutrient re-translocation process, soil not only received nutrients (N and P) from tree leaves, but also supplied nutrient (K) to the trees in their non-growth stage. Therefore, soil played a dual role, as nutrients supplier and free-withdrawing nutrient "bank" in those stages. Moreover, rubber trees started to absorb and accumulate nutrients before leaves began to wither and fall, rather than starting right after defoliation and before sprouting.

Their research, entitled "Rubber Trees Demonstrate a Clear Retranslocation under Seasonal Drought and Cold Stresses", has been published in *Frontiers in Plant Science*.

Schematic diagram of the hypothetical nutrient re-translocation processes of rubber trees from mature leaf period to deciduous leaf period.