

**high density** *Acacia koa*

↑ N<sub>2</sub>-fixation

↓ *foliar*  $\delta^{15}N$

↪ C<sub>4</sub>-grasses

↑ *soil*  $\delta^{13}\text{C}$

*Acacia koa*

low C:N  
leaf litter

fixed-N  
to leaf  
biomass

C<sub>4</sub> grasses

Soil

C<sub>4</sub>-carbon

 $\text{NH}_4^+$ 

nodule  
N<sub>2</sub>-fixation

 $\text{N}_2$