

Hakalau Montane Forest Koa Plantations

high density *Acacia koa*

↪ ↑ N_2 -fixation ↓ foliar $\delta^{15}N$

↪ ↑ C_4 -grasses ↑ soil $\delta^{13}C$

Aboveground

Acacia koa

low C:N
leaf litter

fixed-N
to leaf
biomass

C_4 grasses

Soil

C_4 -carbon

nodule
 N_2 -fixation

NH_4^+

N_2

