

# ***Post-Albizia Control Successional Patterns and Dynamics to Inform Management***



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# Why bother managing/controlling albizia?

Replaces native forests

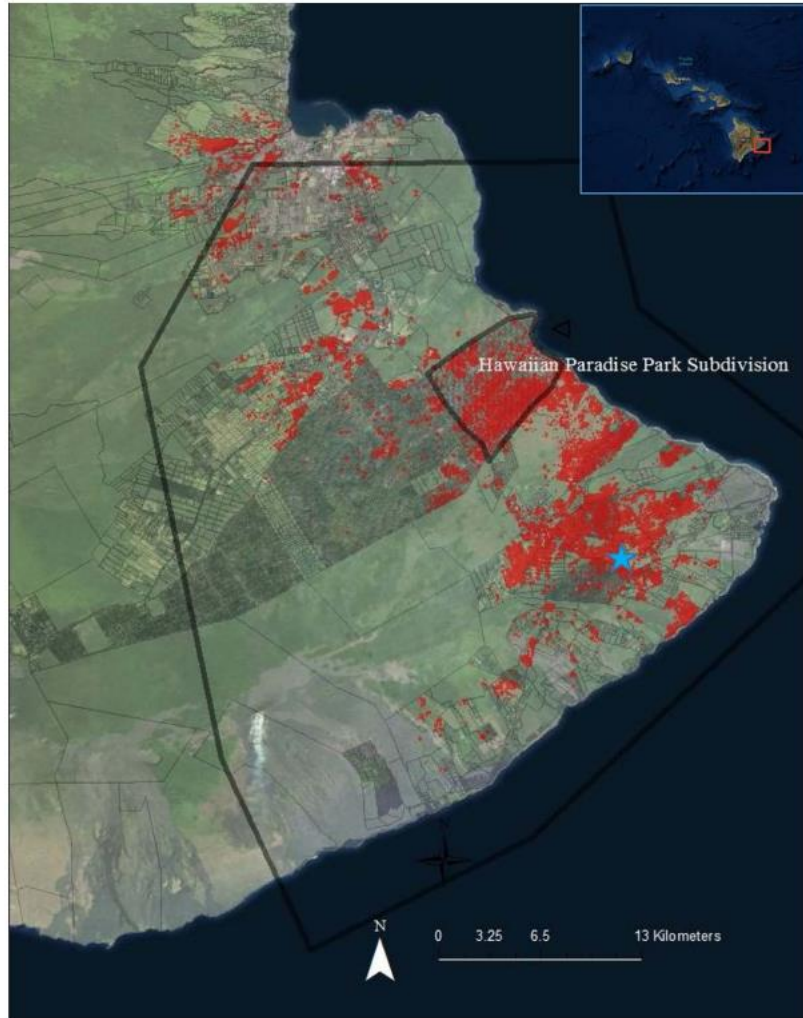


Damages infrastructure & property

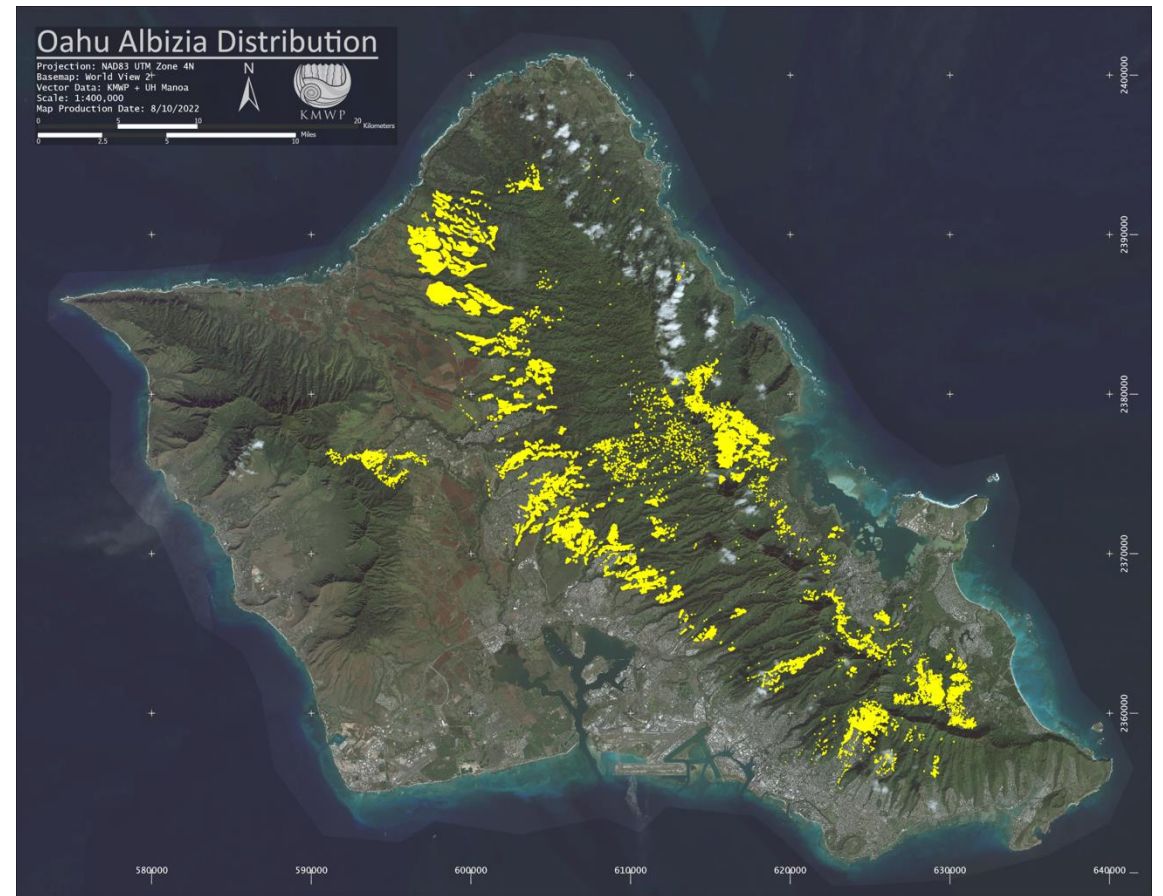


Obstacle to sustainable agriculture





**Fig. 1.** A map of 2009 albizia cover (in red) and 2013 tax map key data outlining property boundaries in the Southeastern portion of the island of Hawaii. Our analysis was conducted at two scales delineated with black lines: the Puna District and the Hawaiian Paradise Park (HPP) subdivision within the District. The blue star indicates the first location where albizia was planted by state foresters in the Puna District. Sources: ESRI, DigitalGlobe, GeoEye, Earthstar Geographic, CNES/Airbus DS, USDA, USGS, AeroGrid, IDN, and the GIS User Community. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



# Milestone Herbicide Application: concentrated, low-volume “Hack and Squirt”



Non Hazard Trees:  
\$3.50 per tree

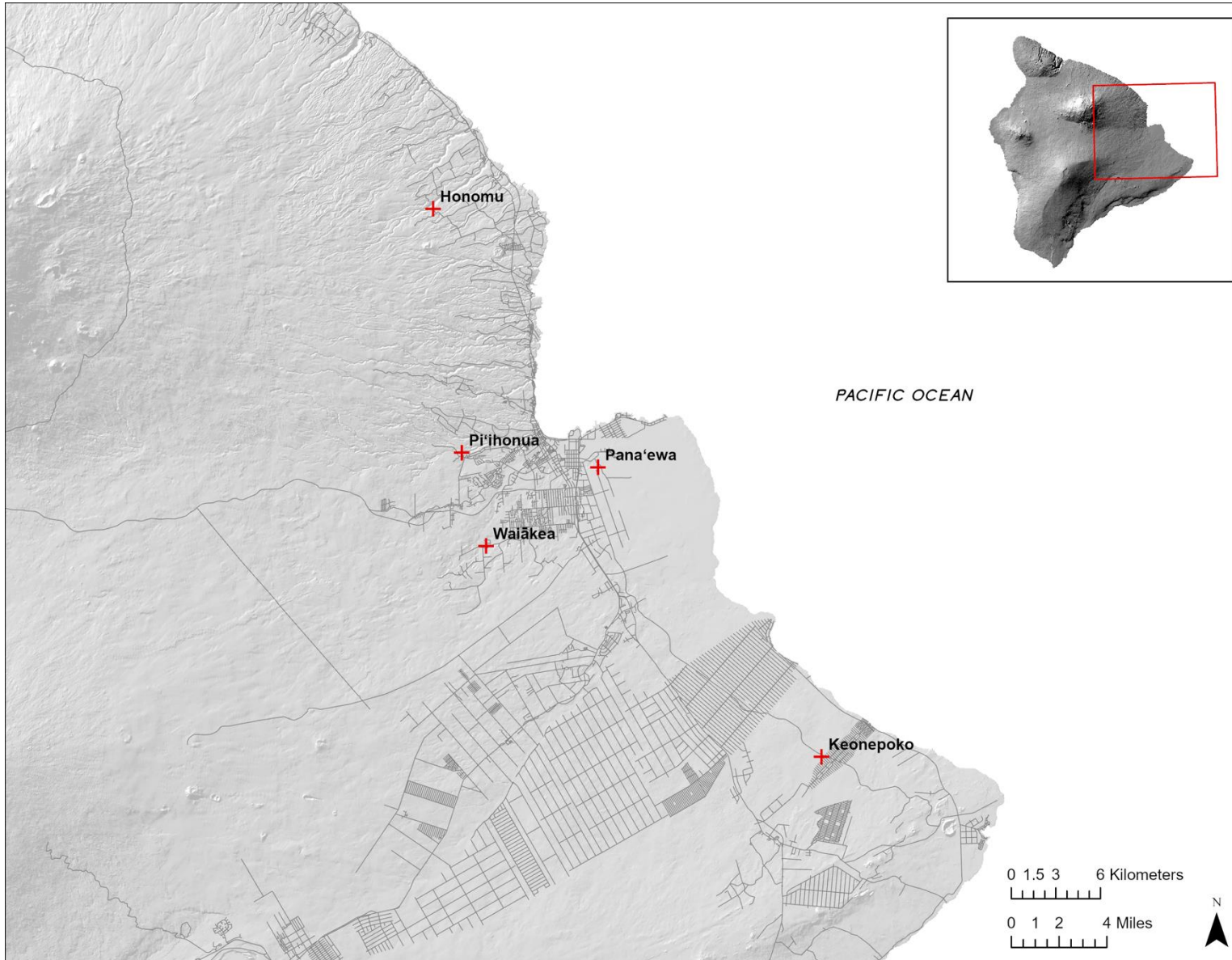


# What happens to the ecosystem after you kill albizia stands?

Post-control forest succession:

- Leaf litter inputs.
- Nutrient (esp. N) dynamics.
- Understory vegetation response.
- Albizia seedling recruitment.
- Tree and coarse wood decomposition.





**Table 1.** Names, locations, and environmental characteristics of study sites.

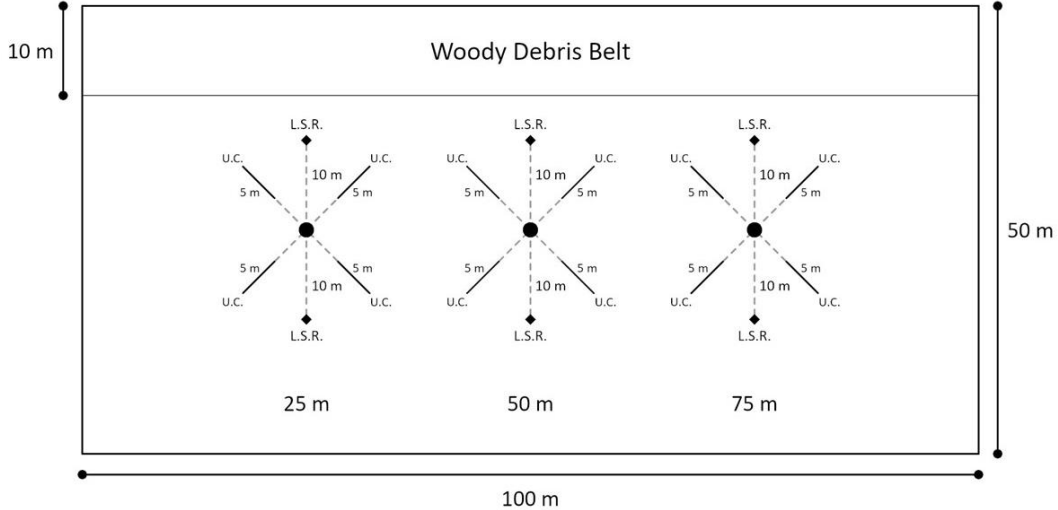
Site Name	Land Manager	Location (UTM: 5Q)	Elev. (m)	Volcano, Substrate Age (YBP)
Keonepoko	DOFAW	0297311 m E, 2163750 m N	84	Kilauea, 200-750
Panaewa	DHHL	0285439 m E, 2179341 m N	28	Mauna Loa, 750-1500
Waieka	Private	0277996 m E, 2175744 m N	225	Mauna Loa, 750-1500
Pi'ihonua	DHHL	0276635 m E, 2181622 m N	274	Mauna Kea, 5-10 x 10 <sup>3</sup>
Honomu	Private	0274641 m E, 2196537 m N	378	Mauna Kea, 65-75 x 10 <sup>3</sup>

# Akaka Falls Time Series before and after Milestone herbicide application treatment

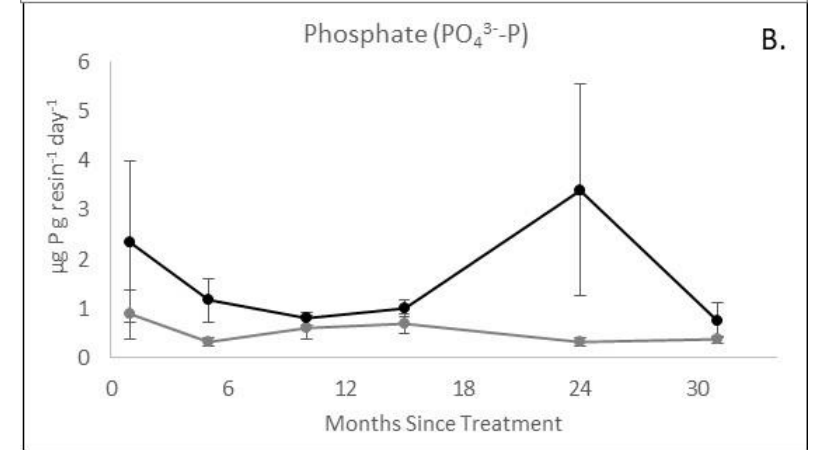
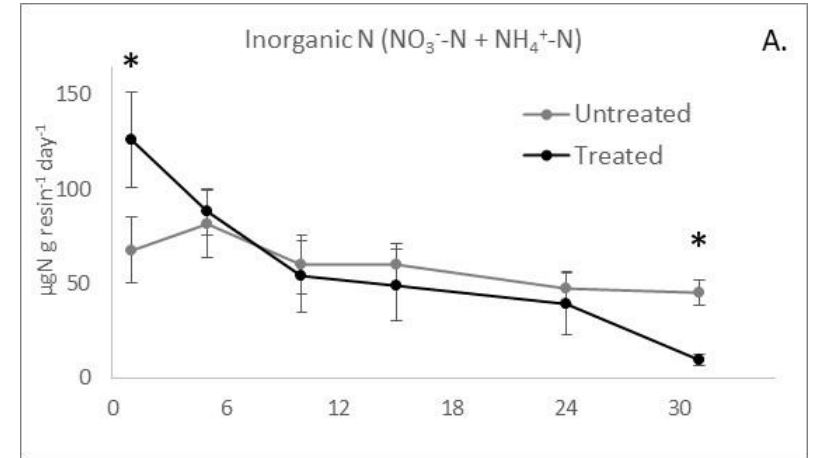
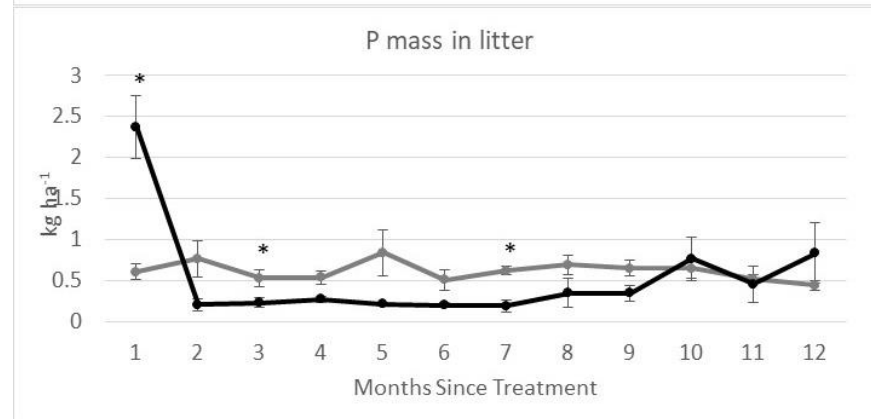
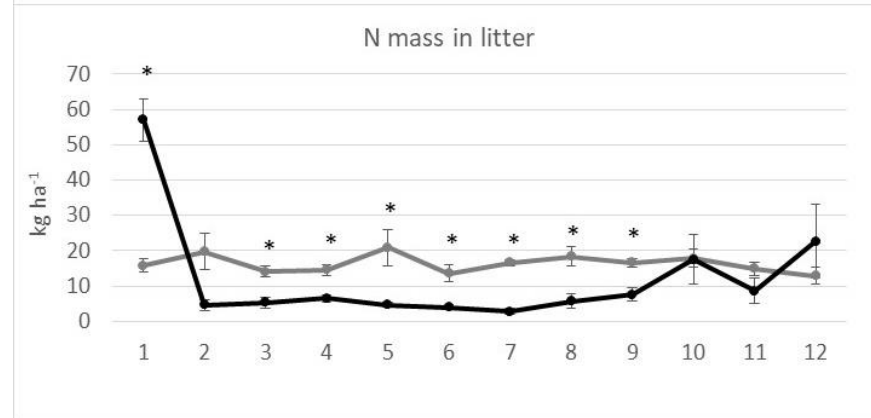


Before Treatment

After Treatment

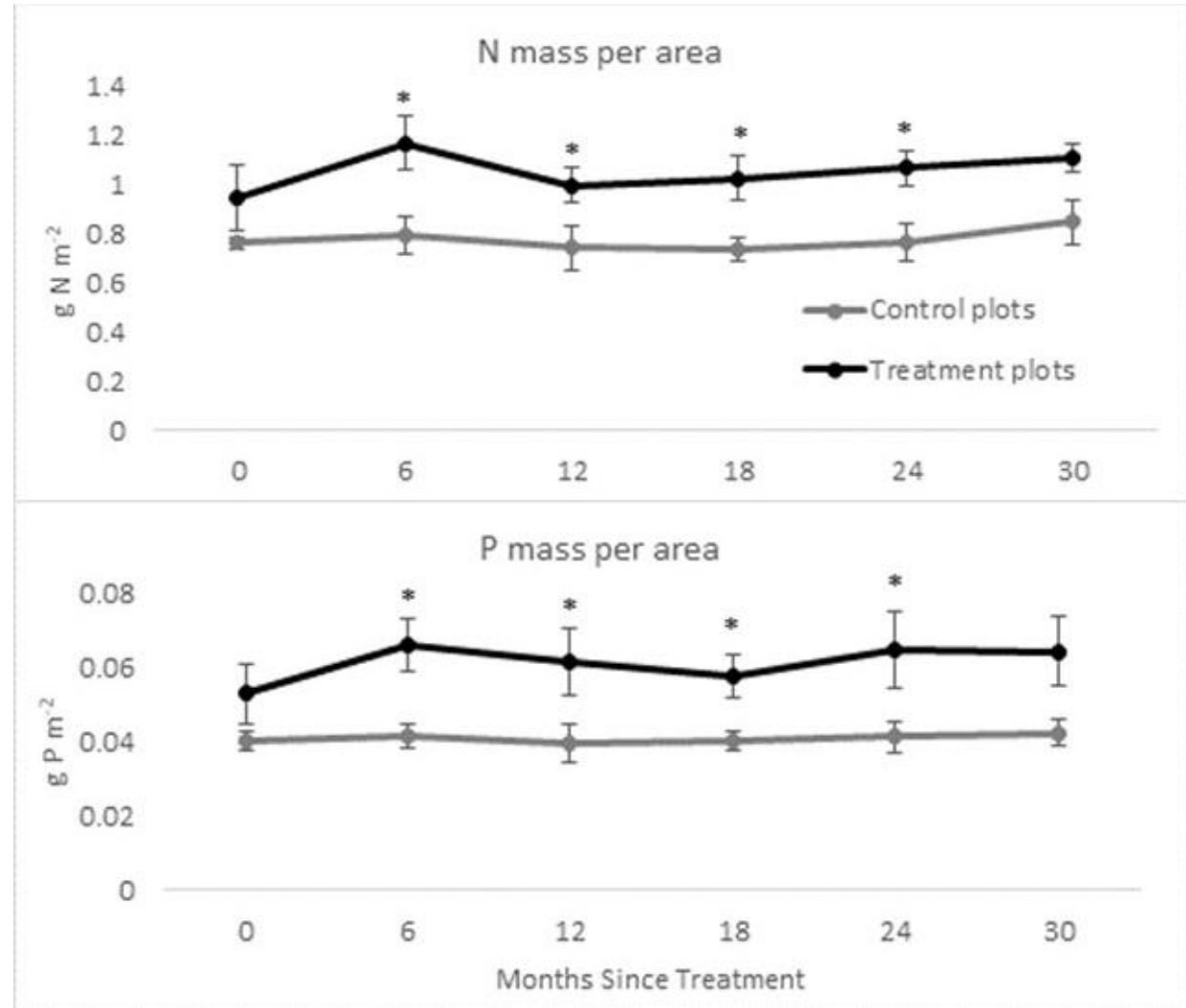






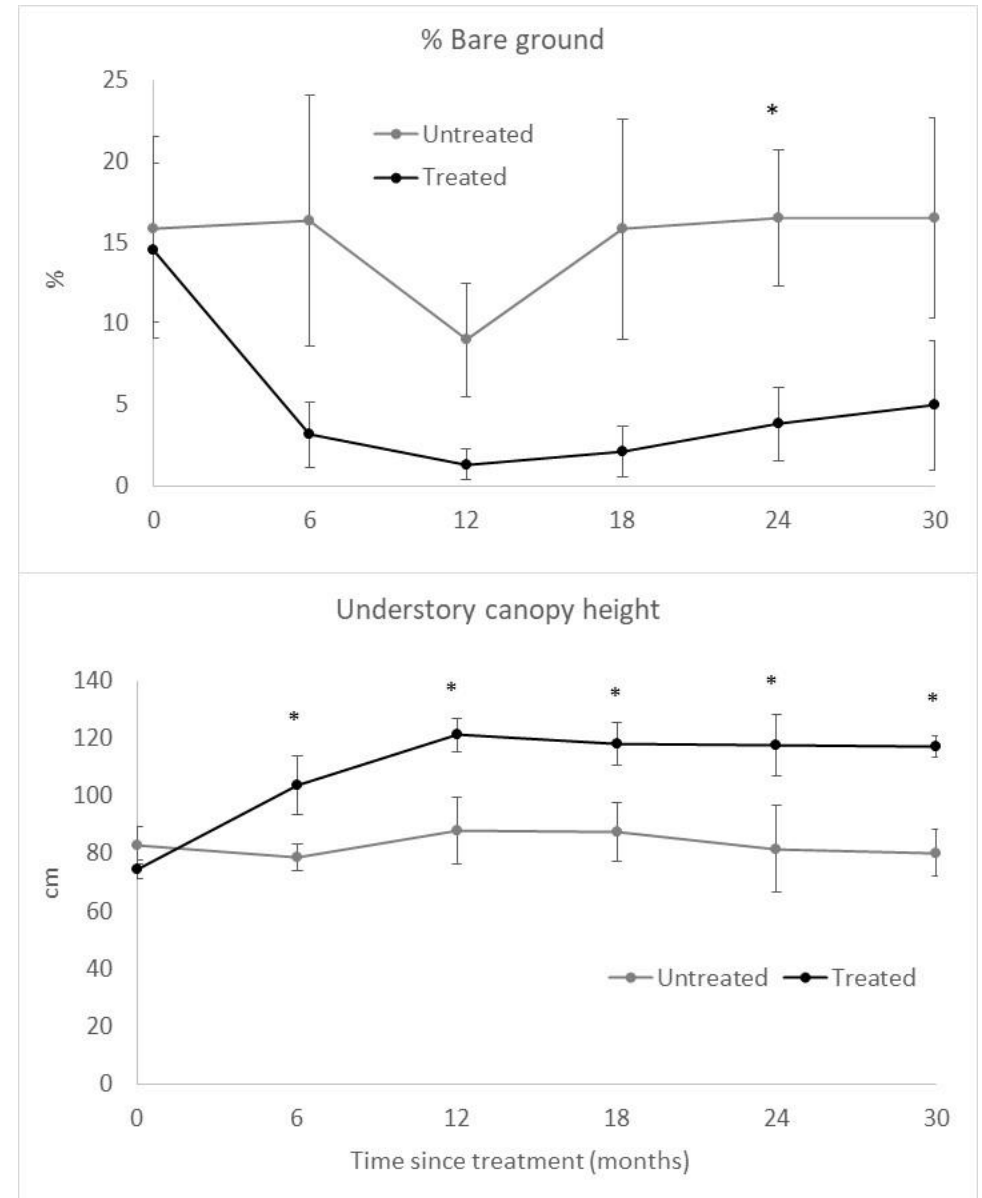


## Foliar nutrients



Used *Clidemia hirta* as a nutrient bioassay across all sites

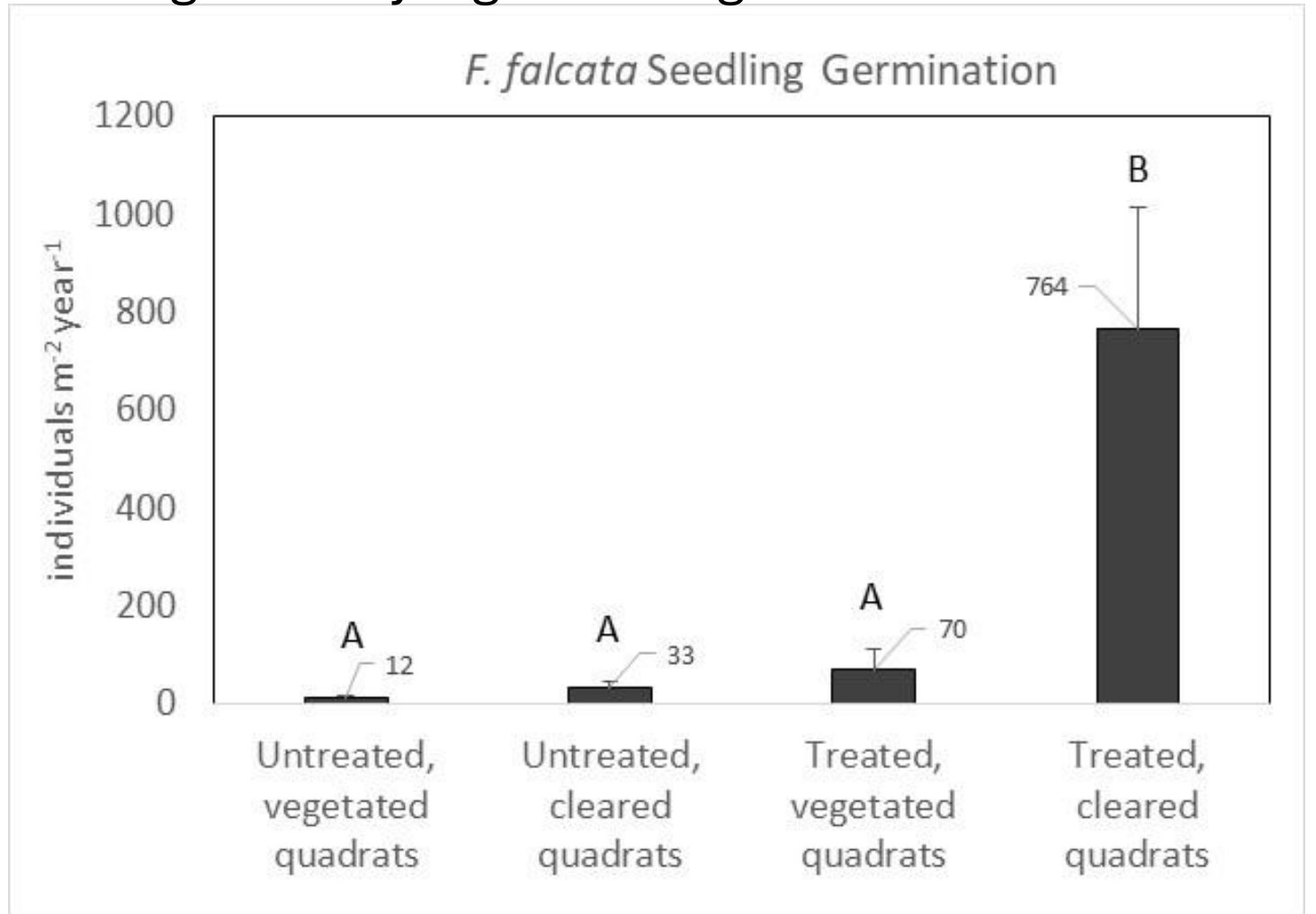
Herbaceous understory “bounce back” after albizia treatment (BUT it’s all non-native weeds!)



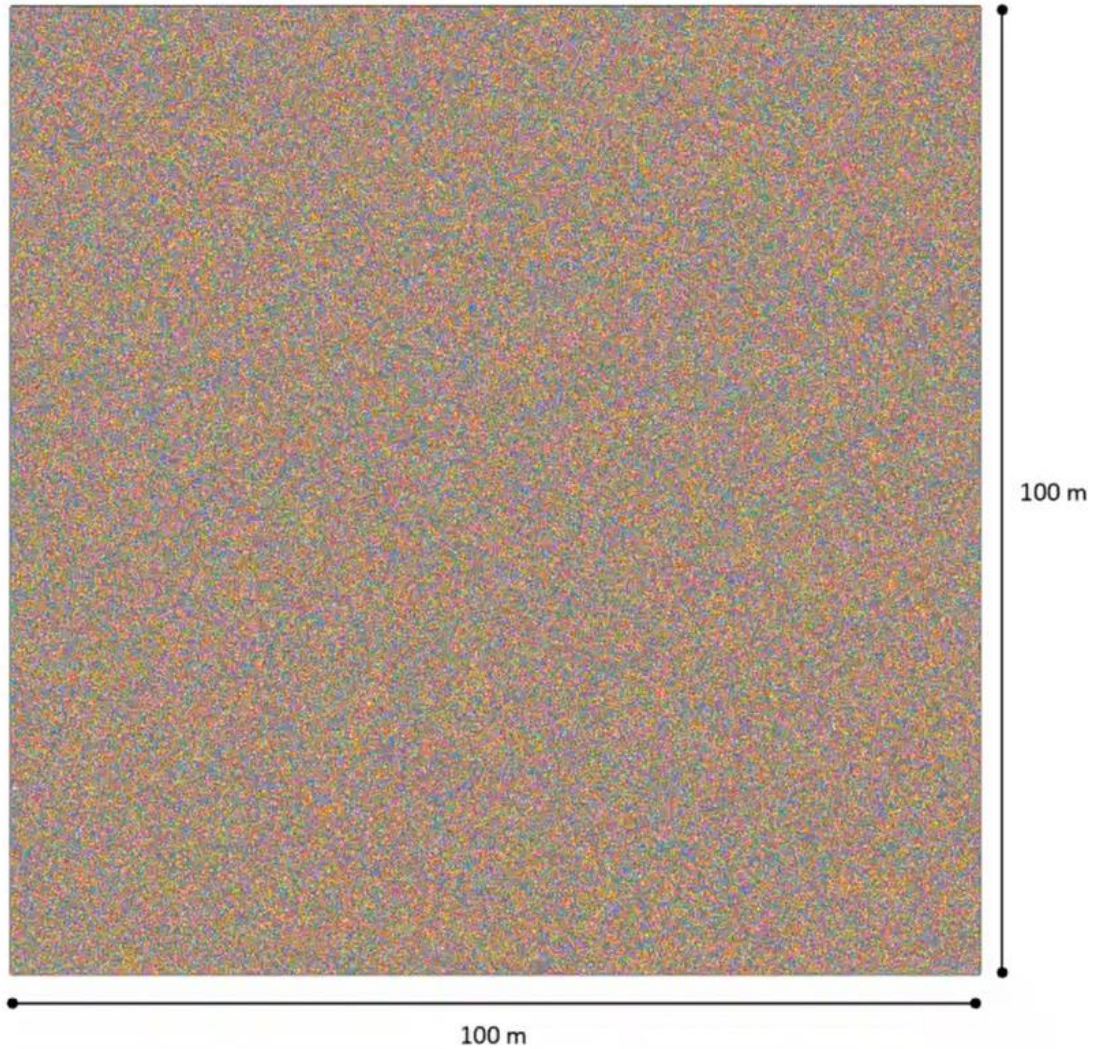


Shade: low albizia germination.

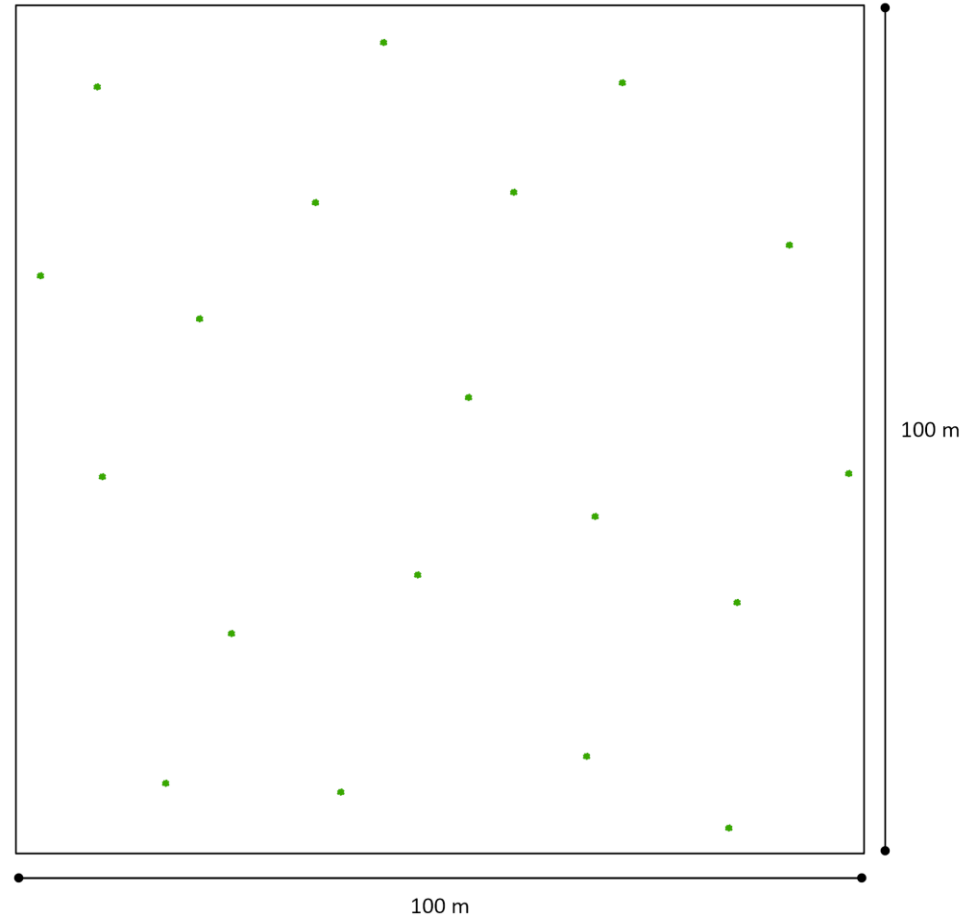
Sunlight: Crazy high albizia germination!



Potential albizia germinant density  
(7.64 million individuals  $\text{ha}^{-1} \text{y}^{-1}$ )



Documented albizia sapling density:  
(19 individuals per hectare over 3-year monitoring period)



**Table 2.** Criteria used to classify *Falcataria moluccana* snags into decay classes

(after Raphael and White 1984).

Decay class	leaves	twigs	branches	limbs	trunk
1	present	present	intact	intact	intact
2	absent	present	intact	intact	intact
3	absent	mostly intact	intact	intact	intact
4	absent	mostly broken	mostly intact	intact	intact
5	absent	absent	mostly broken	mostly intact	intact
6	absent	absent	absent	mostly broken	mostly intact
7	absent	absent	absent	absent	mostly broken
8	absent	absent	absent	absent	absent



# Takeaways:

- Albizia – even large ones – are easily, efficiently, & cheaply killed.
- High nutrient + light availability after albizia control creates great growing conditions for “wall to wall” understory growth.
- Rapid & vigorous understory growth **prohibits** albizia seed germination and return to albizia stand dominance.
- Albizia trees fall apart in a relatively rapid and orderly fashion – decomposition is mostly complete within 4 years.
- Need to explore purposeful plantings (e.g., natives, canoe plants, and agroforest species) before, during, or after albizia control to promote succession to safe, healthy, productive forest landscapes.