

Maize and weed flora dynamics on Amazonian Dark Earth

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Why is *TP* interesting?

- *TP* soils allow for the intensification of agriculture
- Thus, less reliance on virgin forest in slash-and-burn agriculture
- Knowledge about *TP* fertility has lead to the study of charcoal amendments in cropping systems

Extensive manioc cultivation on AS



Intensive horticultural crops on TP



Why study weeds on *TP*?

- Reports of greater weed pressure on *TP*
- *TP* may need to be fallowed because of weed pressure NOT declines in soil fertility
- No information available on weed diversity and impact in this system
- Increased weed problems with increased soil fertility in the tropics

Outline

- Maize experiment on *TP* and *AS*
- Weeds on plots managed with charcoal and other amendments

Maize experiment: Objectives

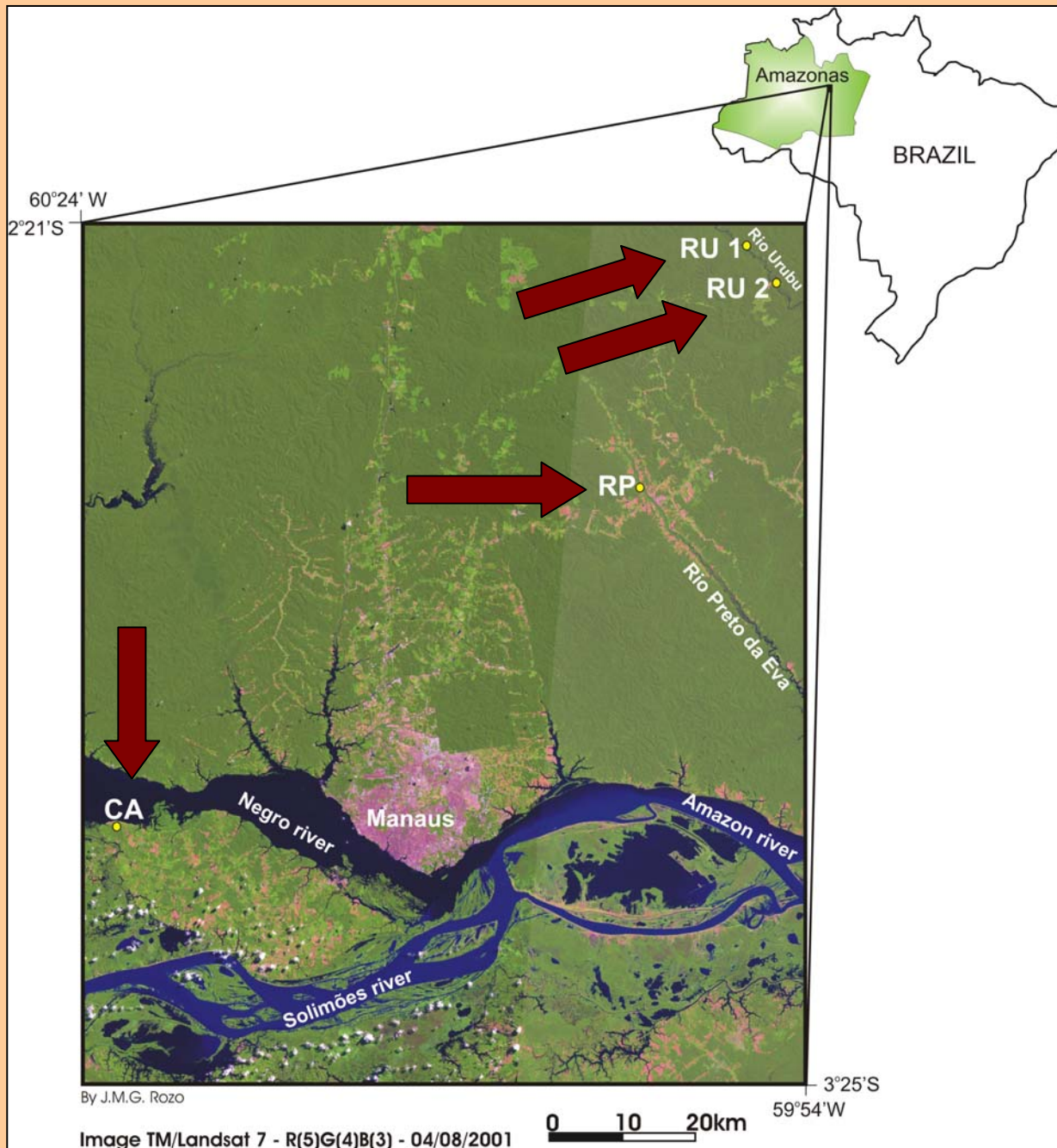
- To assess whether there are differences in weed populations between *TP* and *AS*
- To test whether weeds have a greater potential to reduce crop yields on *TP*

Hypotheses

- The total plant biomass produced on *TP* plots will be greater than on *AS*
- The crop will perform better on *TP* so the weeds will be suppressed
- The weed community on *TP* will differ from that found on *AS*

Methodology

- 4 locations, each with one plot on *TP* and one plot on *AS*



Methodology

- Local open-pollinated maize variety seeded
- 3 treatments in RCBD, with 3 blocks and 3 replicates:
 - Weeds only
 - Weeded maize
 - Weedy maize

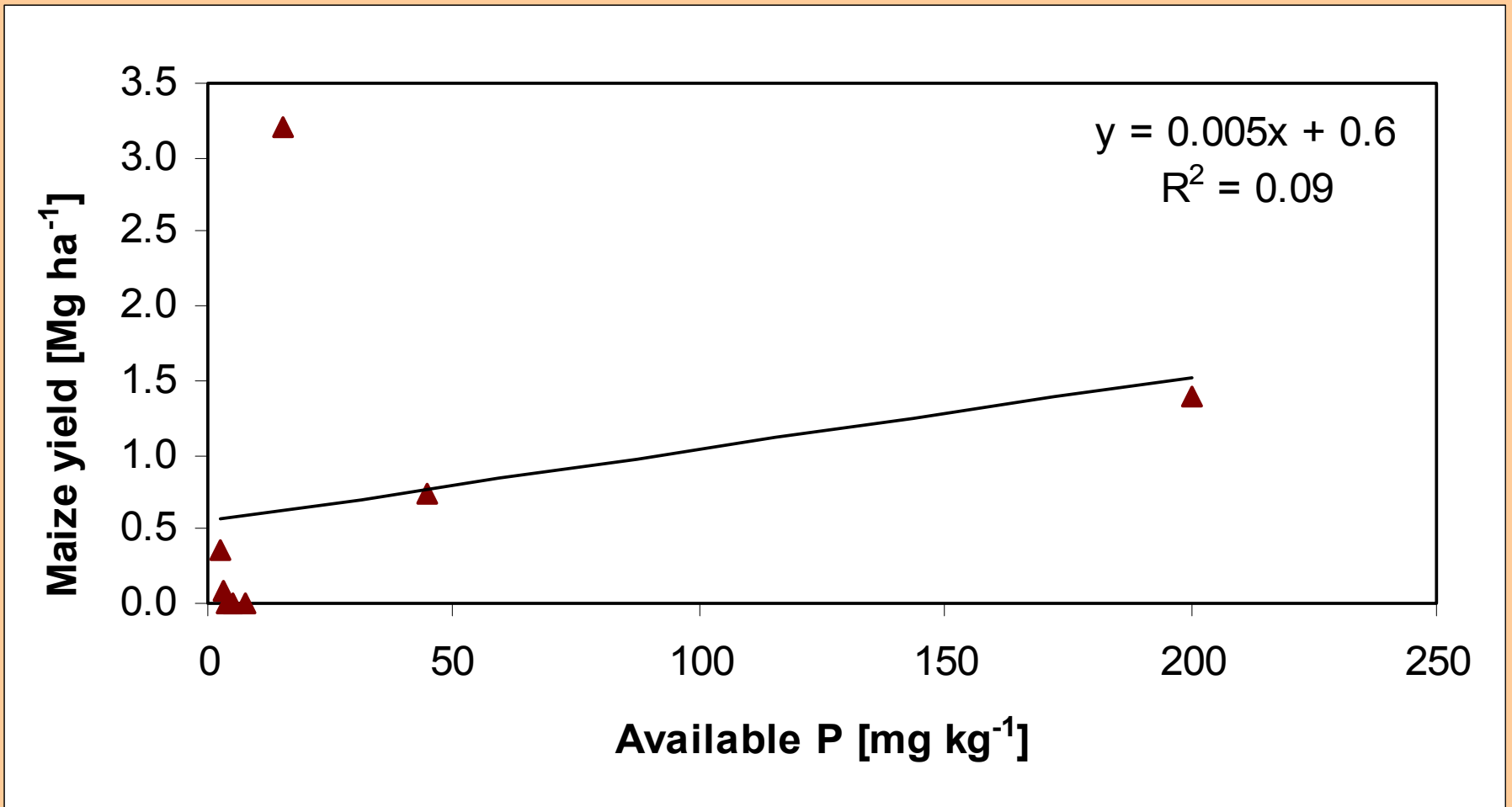
Methodology

- Plots surveyed monthly
- Maize and weeds harvested 4 months after planting
- Analyses of variance were performed

2 months after seeding

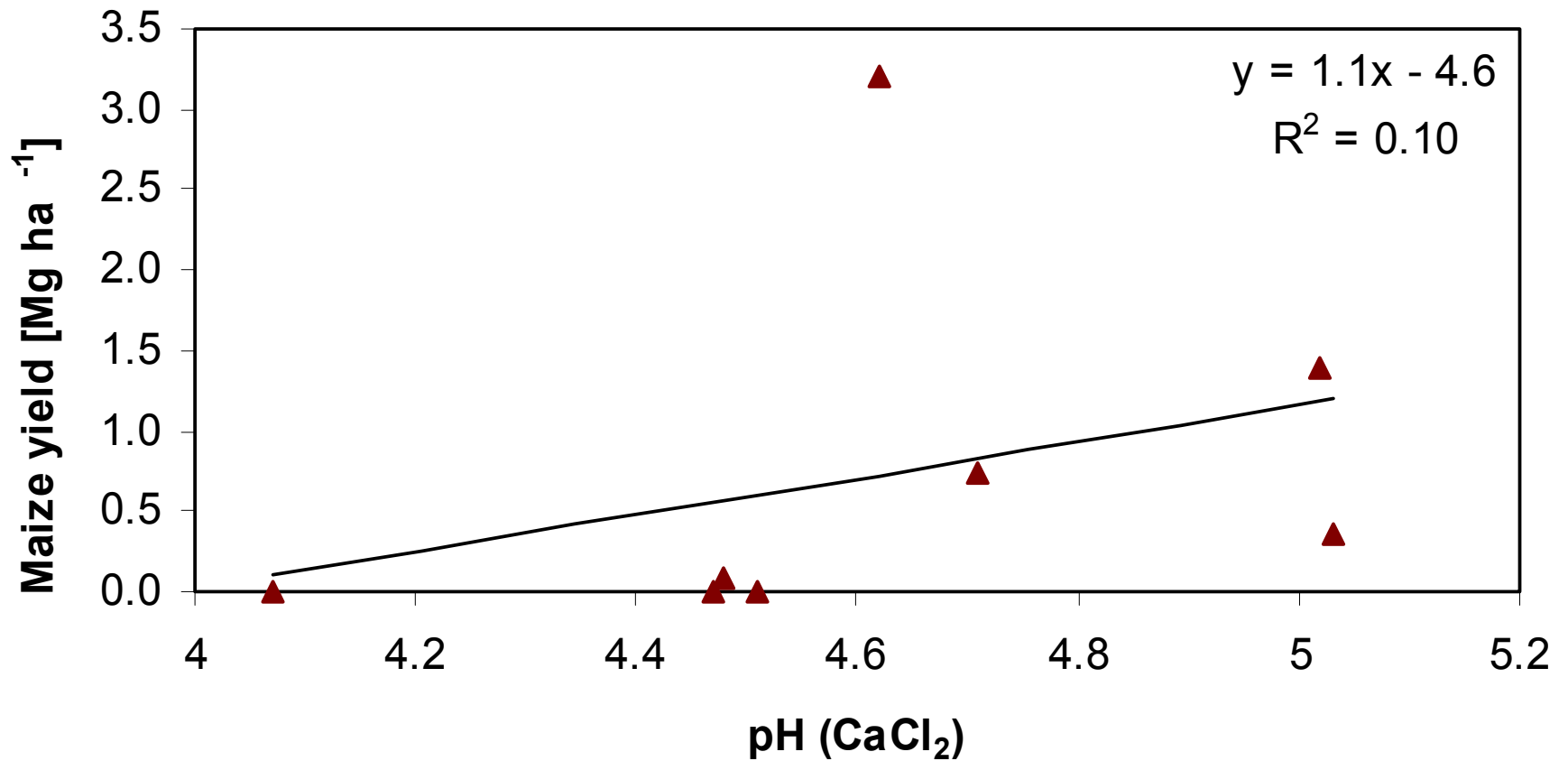


Results maize yield

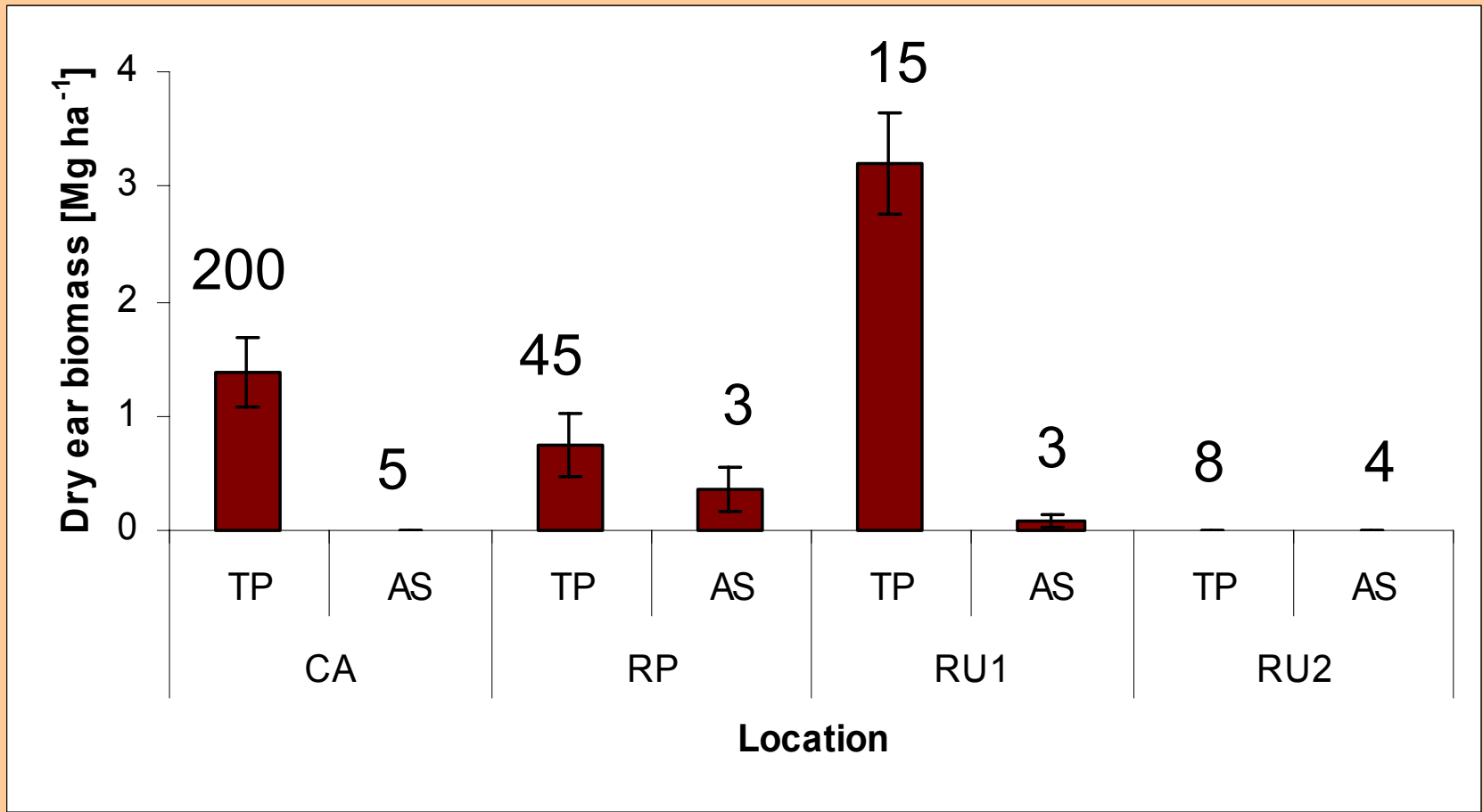


Results

maize yield



Maize dry ear yield (Mg ha⁻¹)



Plots on *TP* one month after seeding

CA



RP



RU1



RU2

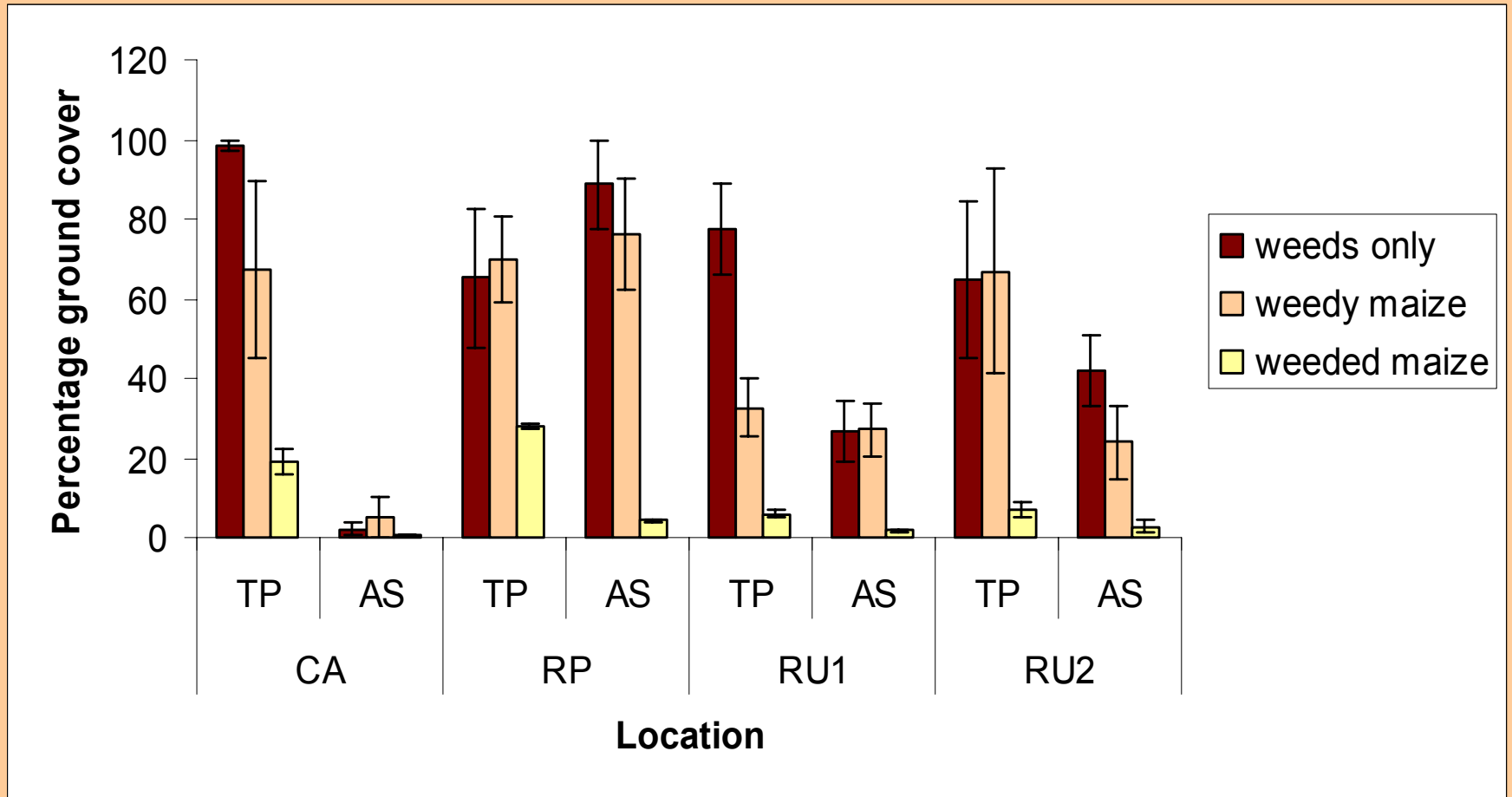


Results

weeds

- Differences in weed pressure were greater on sites where fertility differences between *TP* and *AS* were highest
- Fewer weeds in weeded plots

Weed percentage ground cover at harvest



Weed parameters

Parameter	Species richness	Similarity	Dominance	Legumes	Annuals
Significance <i>P</i>	< 0.001*	0.069	0.049	< 0.001*	< 0.001*
Unit	Number of species	Sorensen's index	% cover of two dominant species	% cover of leguminous species	% cover of annual species
<i>TP</i>	8	0.33	61	21	55
<i>AS</i>	4	0.17	73	4	17

* Also a location effect and interactions

Conclusions

- Biomass production was greater on *TP* than *AS*
- Better crop performance did reduce weed growth only at most fertile sites

Conclusions

- The weed flora on *TP* differed from that on *AS*
- This is due largely to differences in management
- With intensification of cropping on *TP*, weed pressure is likely to be similar to that of temperate, permanent cropping systems

Charcoal experiment: Objectives

- Assess differences in weed cover and species composition after the application of organic and inorganic fertility amendments on an Oxisol

Hypotheses

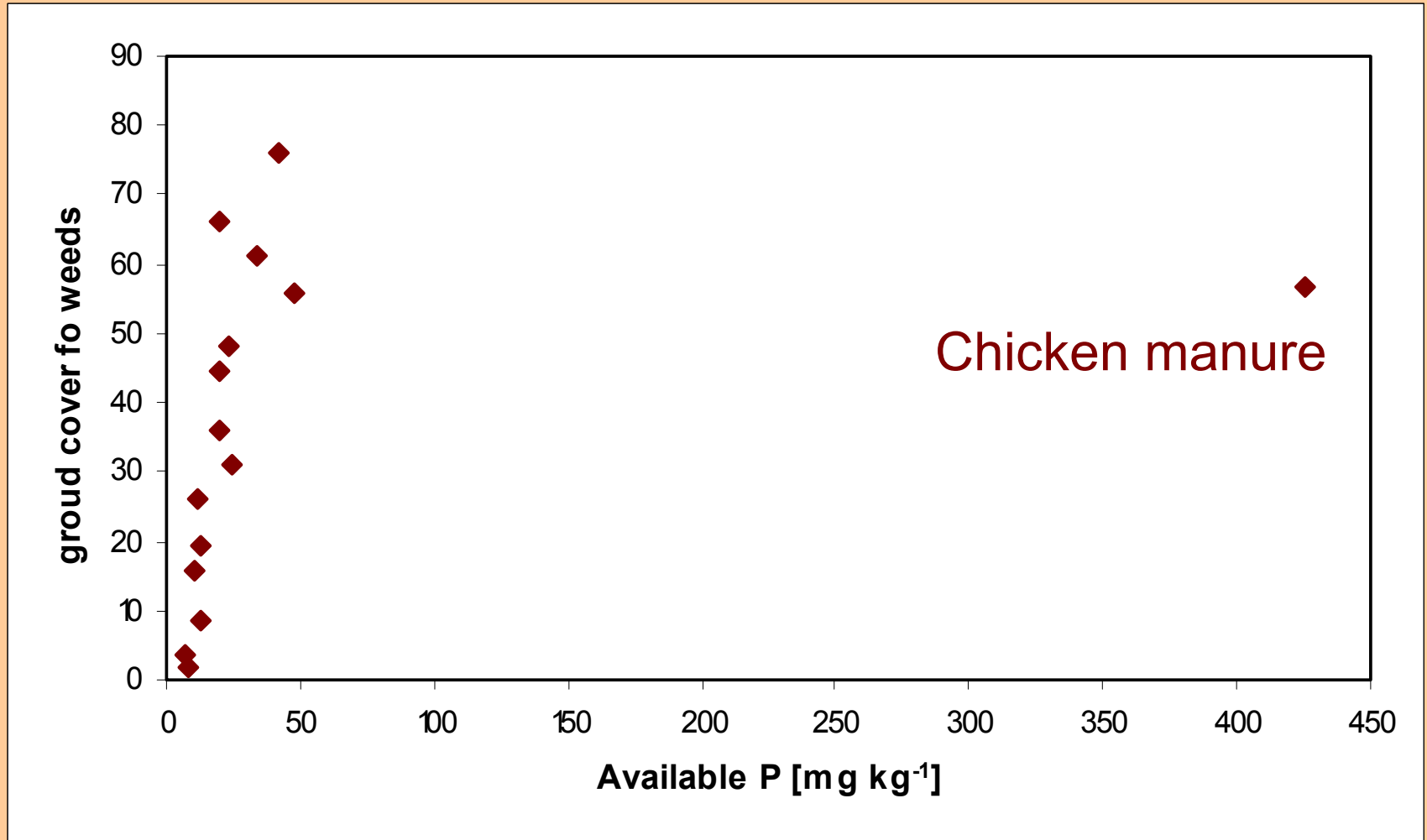
- Greater weed cover and species richness for plots receiving fertility-enhancing amendments
- No difference where only charcoal was applied

Results

Treatment	<i>n</i>	Cover (%)	% increase	Number of species	% increase
+ Fertilizer	25	57.2	40*	5.2	20*
- Fertilizer	25	17.1		4.2	
+ Chicken manure	5	56.8	53*	7.0	63*
- Chicken manure	5	3.8		2.6	
+ Compost	5	26.1	22*	5.0	48*
- Compost	5	3.8		2.6	

* $P < 0.05$

Results



Conclusions

- Weed cover and species richness increased with the addition of fertility enhancing amendments
- Charcoal only did not have an effect
- Synergistic effect when both charcoal and fertilizer added

Thank you!