

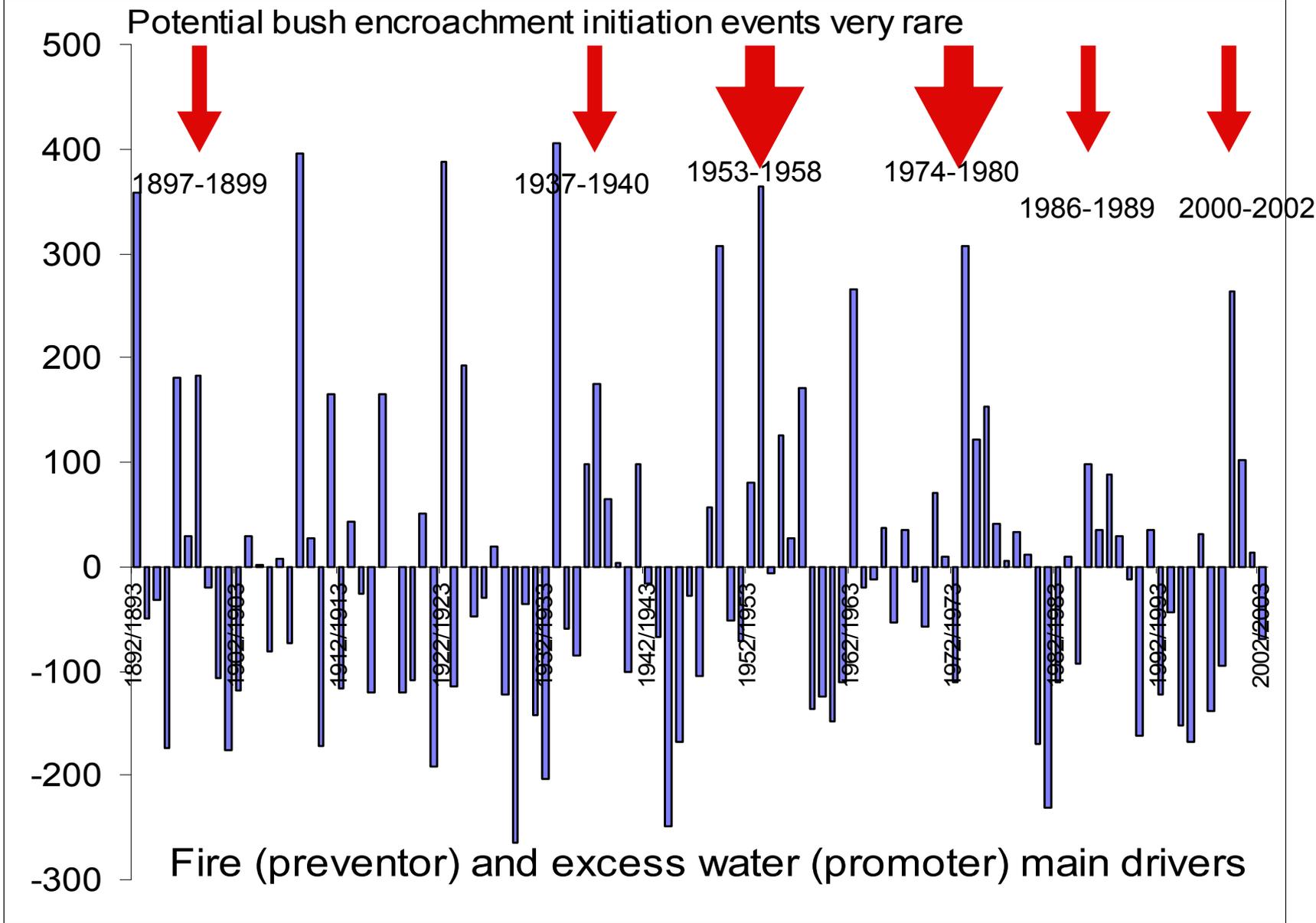
The dynamics of *Acacia mellifera*, implications for bush encroachment management.

Joubert, D.F., Smit, G.N



Hypotheses:

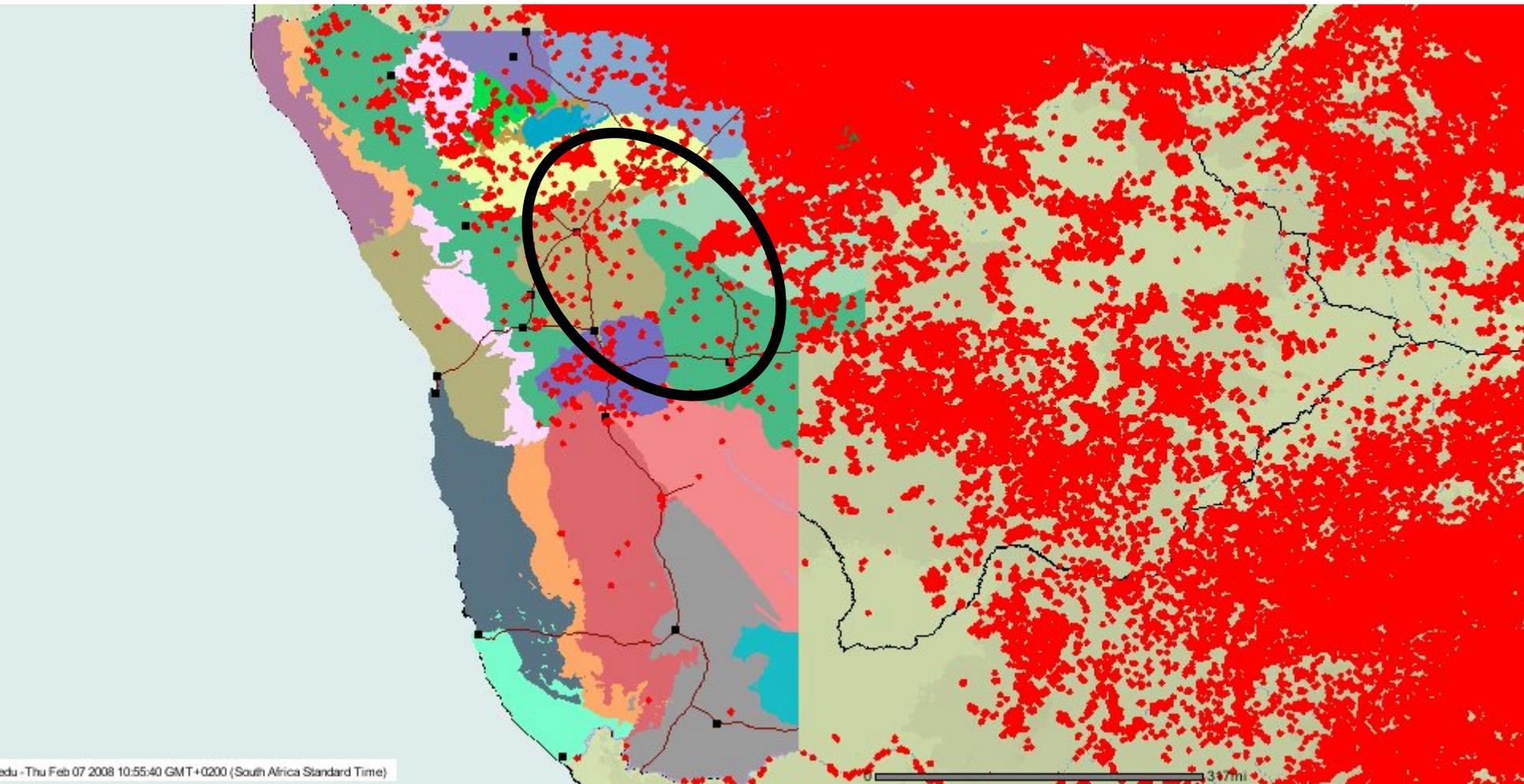
1. *En masse* seed production occurs in only excellent rainfall years
2. Vigorously growing climax grasses can outcompete seedlings (reduce vigour; increase mortality)
3. Fire is effective at an early stage of establishment in preventing the transition, ineffective as a control measure with established shrubs
4. Browsing by small herbivores may significantly thin establishing thickets



↓ = transition 3 events if 3 years are required



FIRES IN NAMIBIA SINCE 2000



Study site





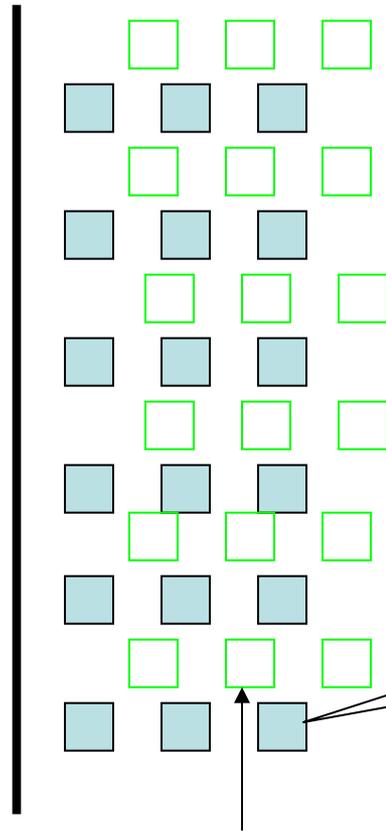
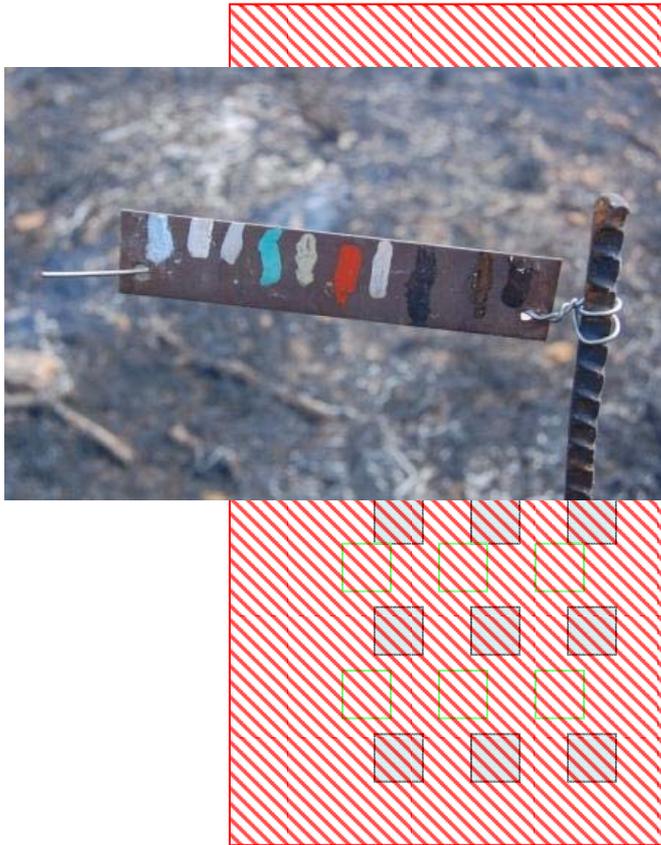


Fire

Methodology

Chi square

Control



control

Competition/browsing



Soil water potential (gypsym blocks)
Soil nutrients

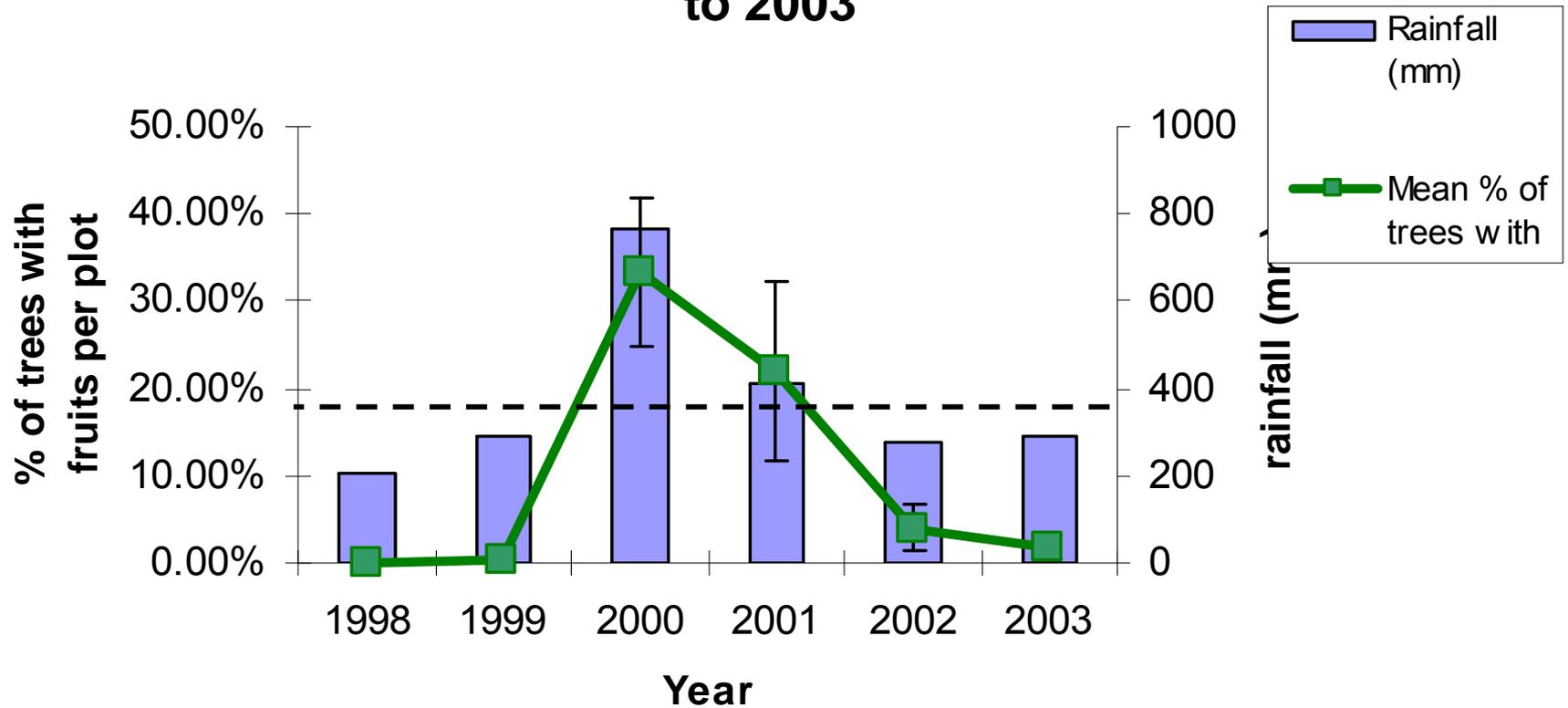
X 4 ("climax" veld)



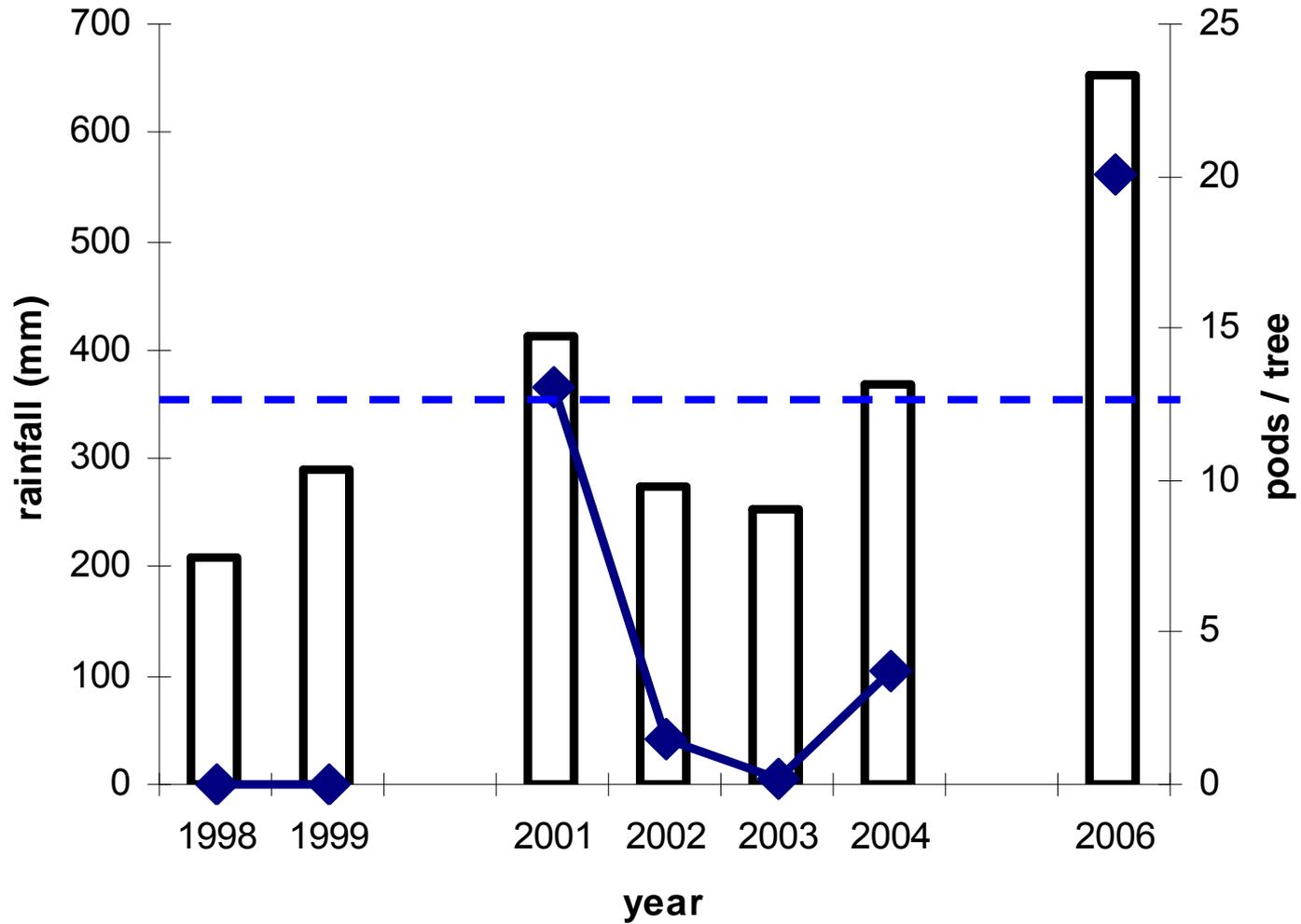
Results: Seed production



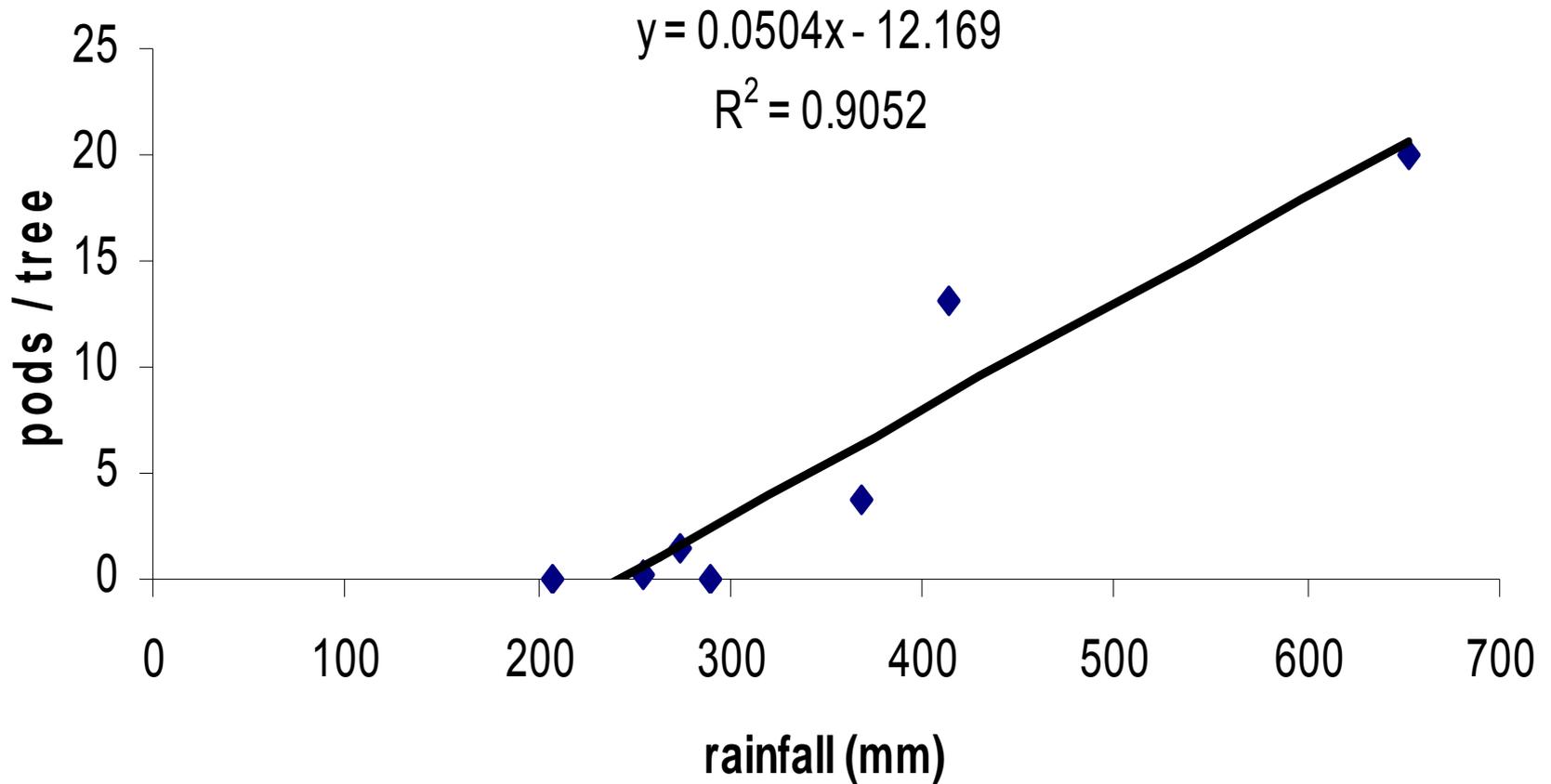
Percentage of trees with fruits and rainfall from 1998 to 2003



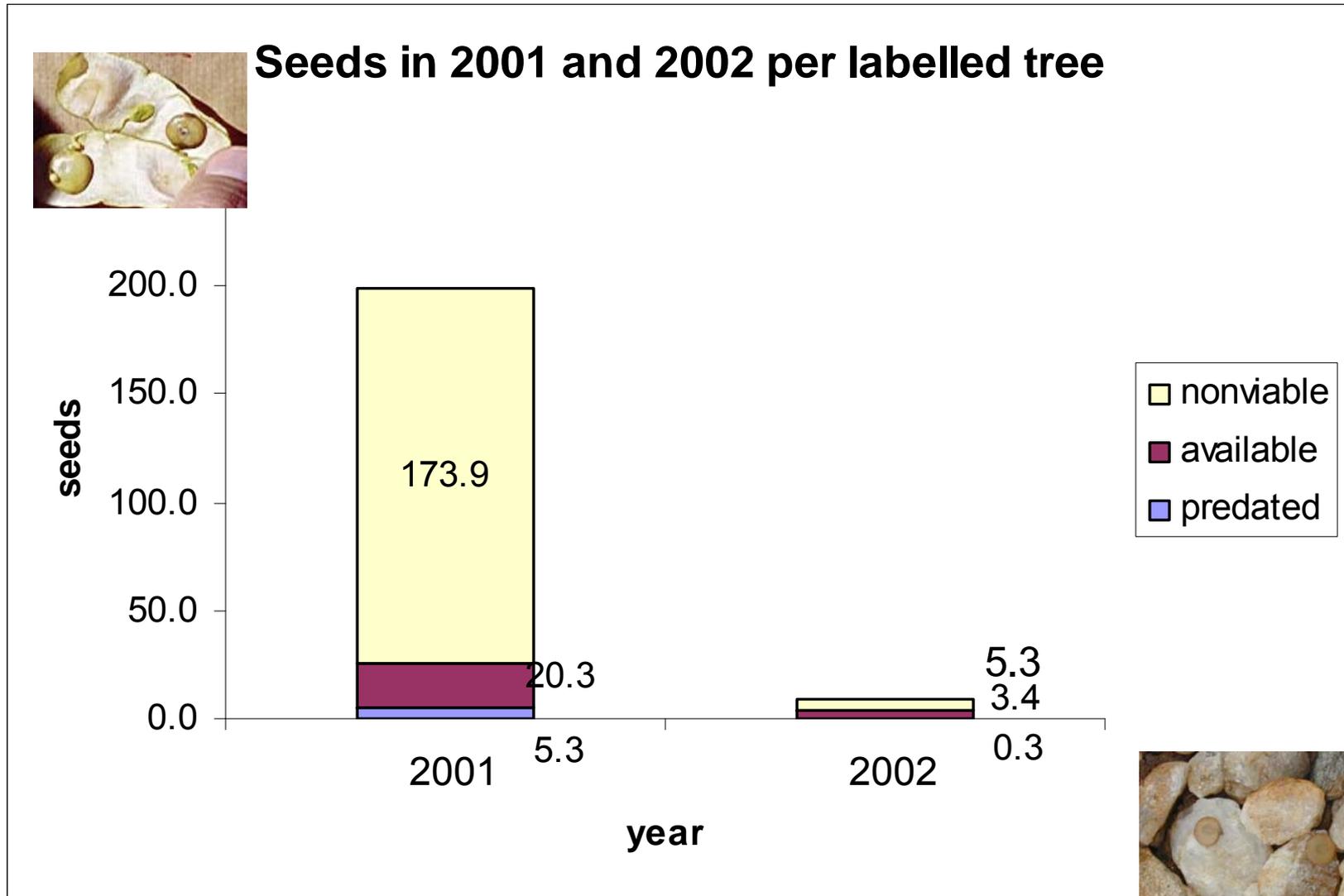
rainfall and pod production per year



Pods / tree in relation to rainfall



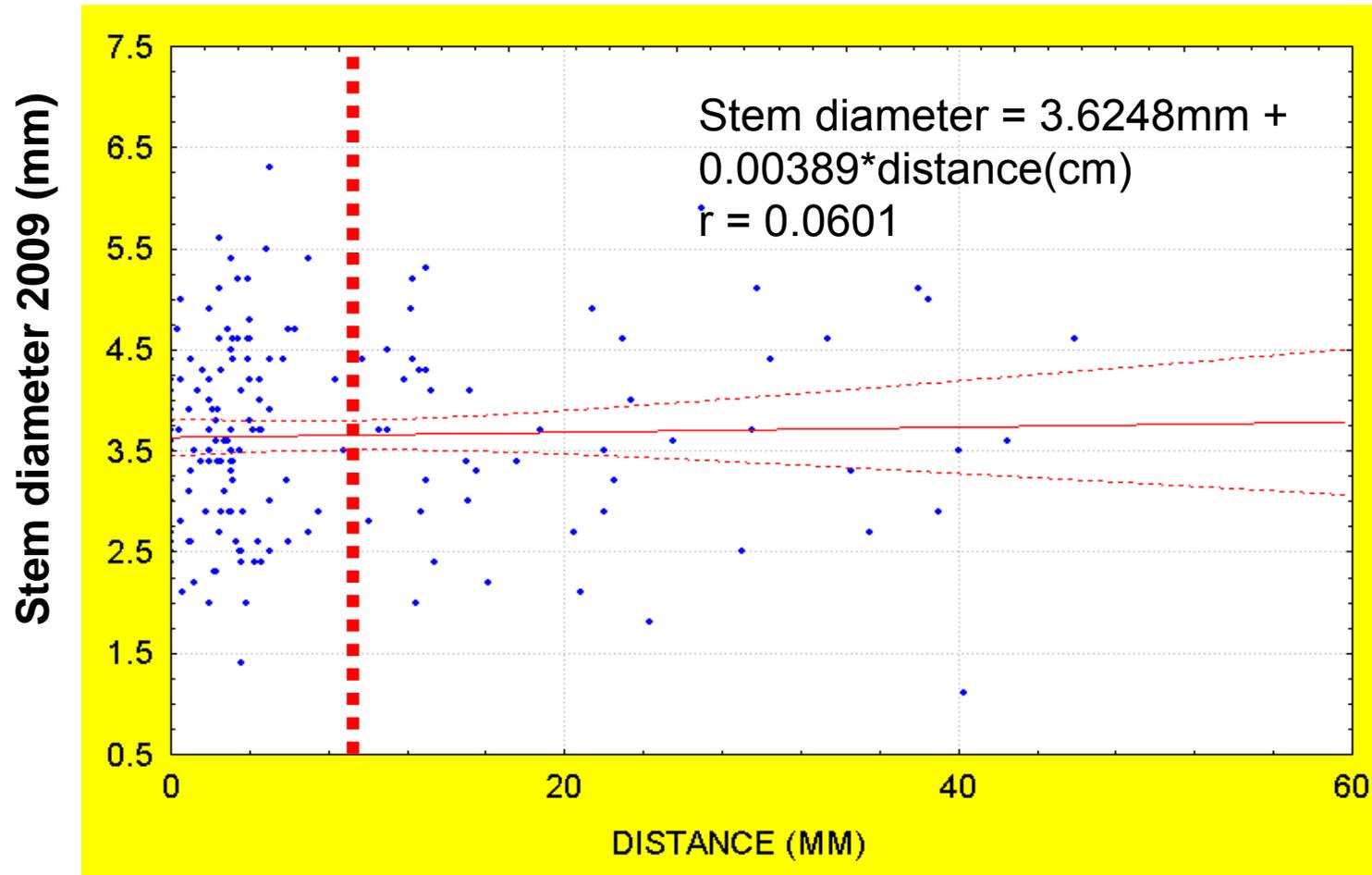
Available seeds per tree after pre dispersal predation for 2001 and 2002



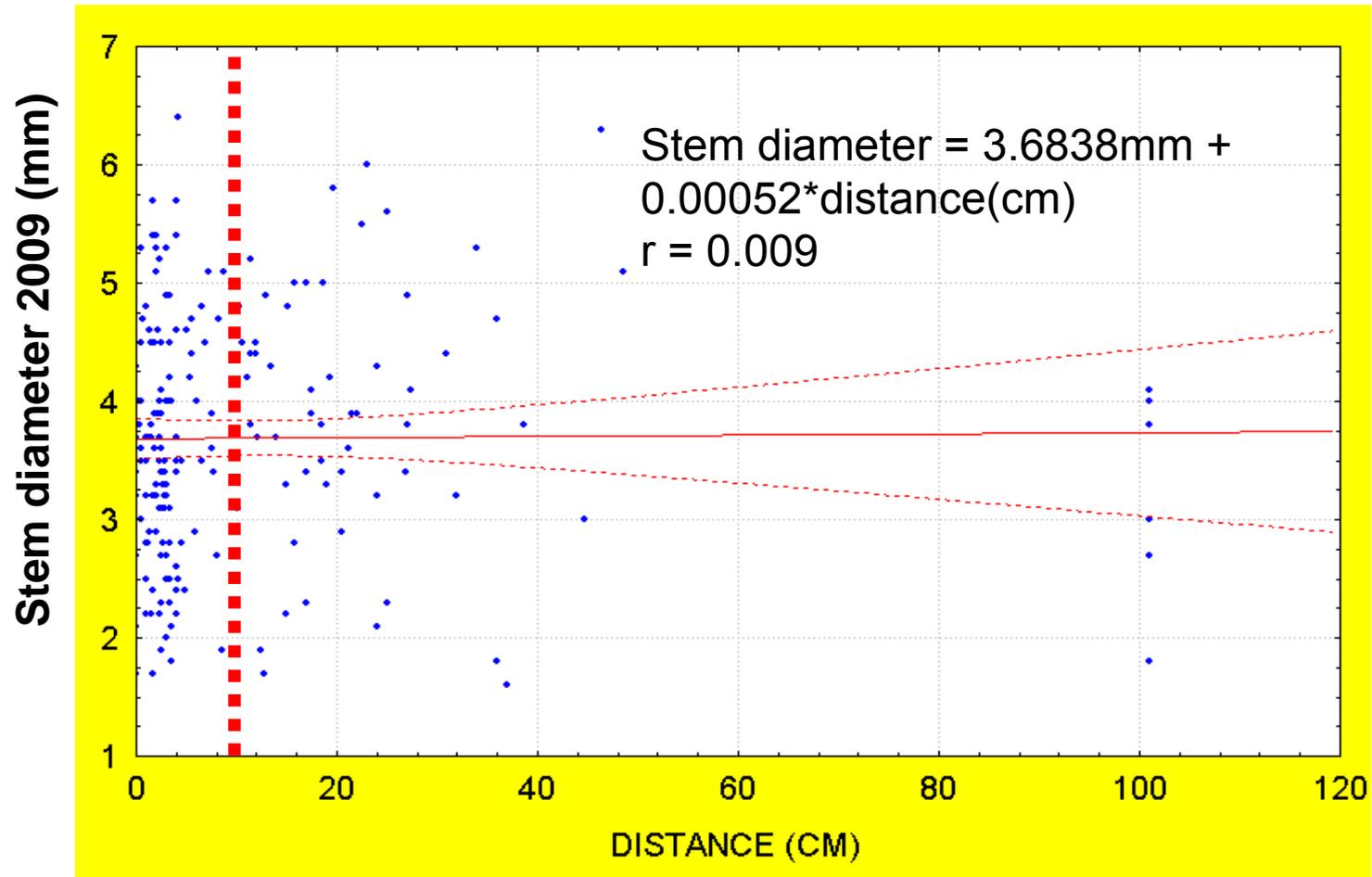
Results: competition



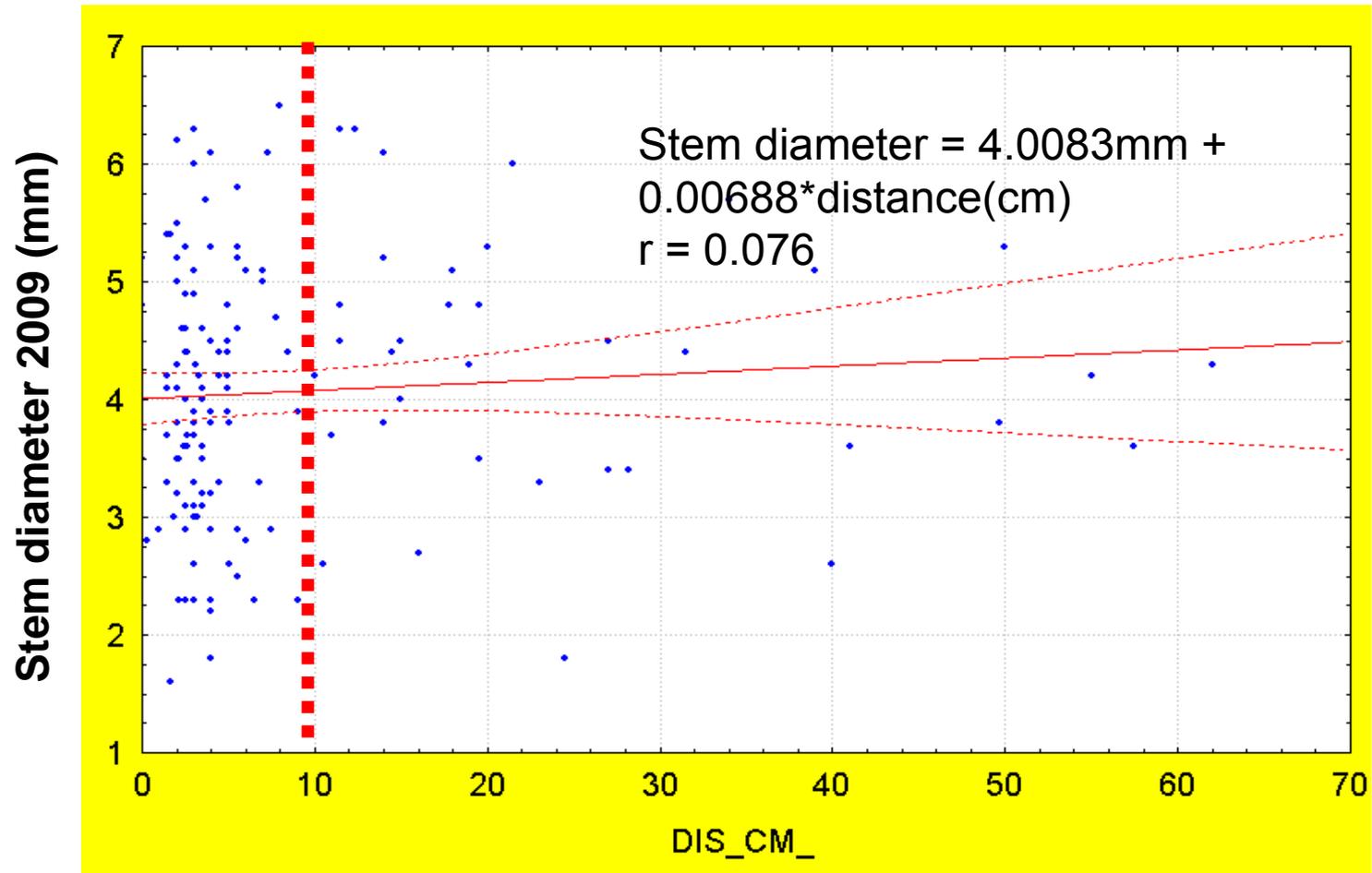
Results: competition (*A. pubescens* unclipped)



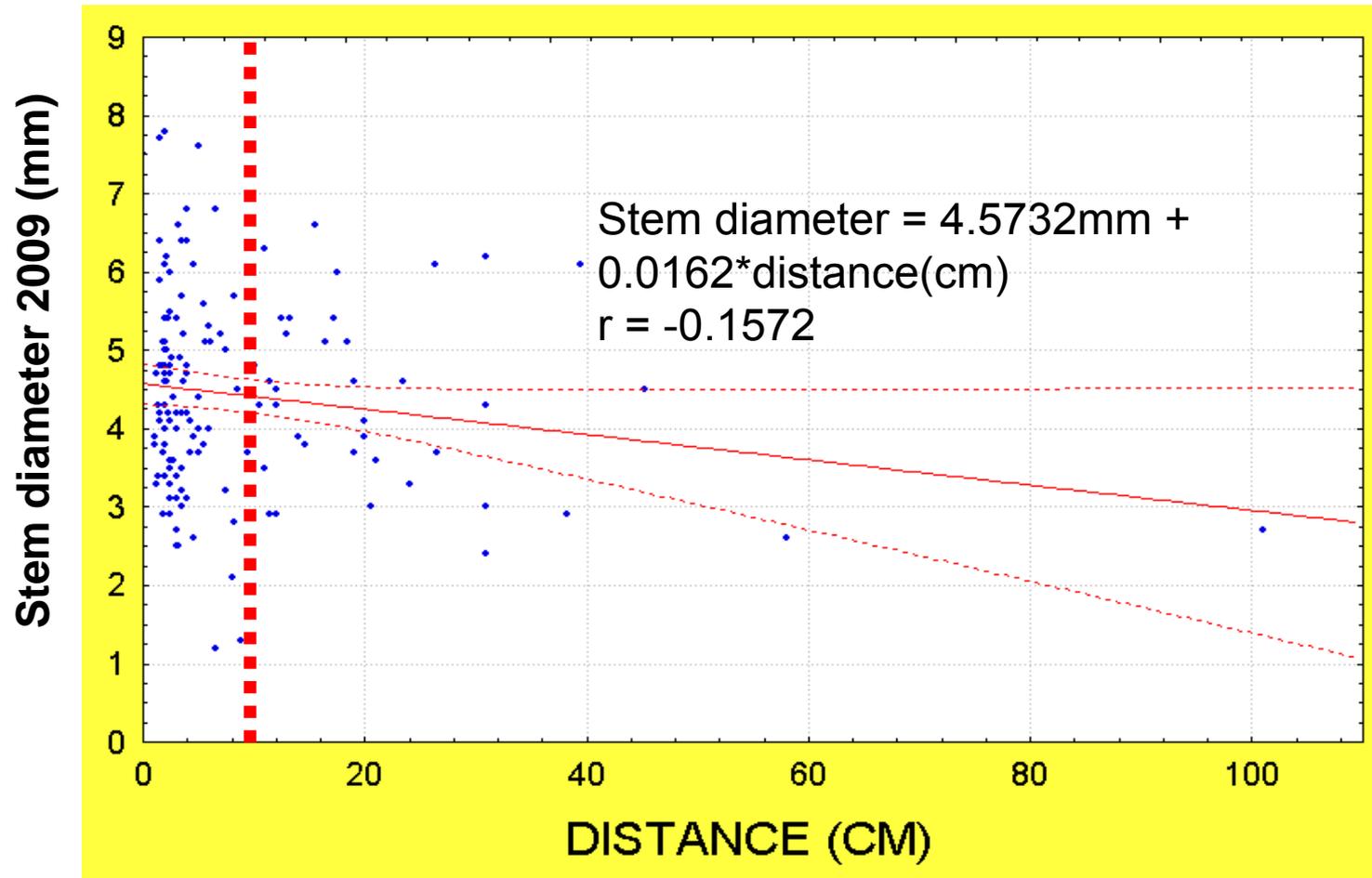
Results: competition (*A. pubescens* clipped)



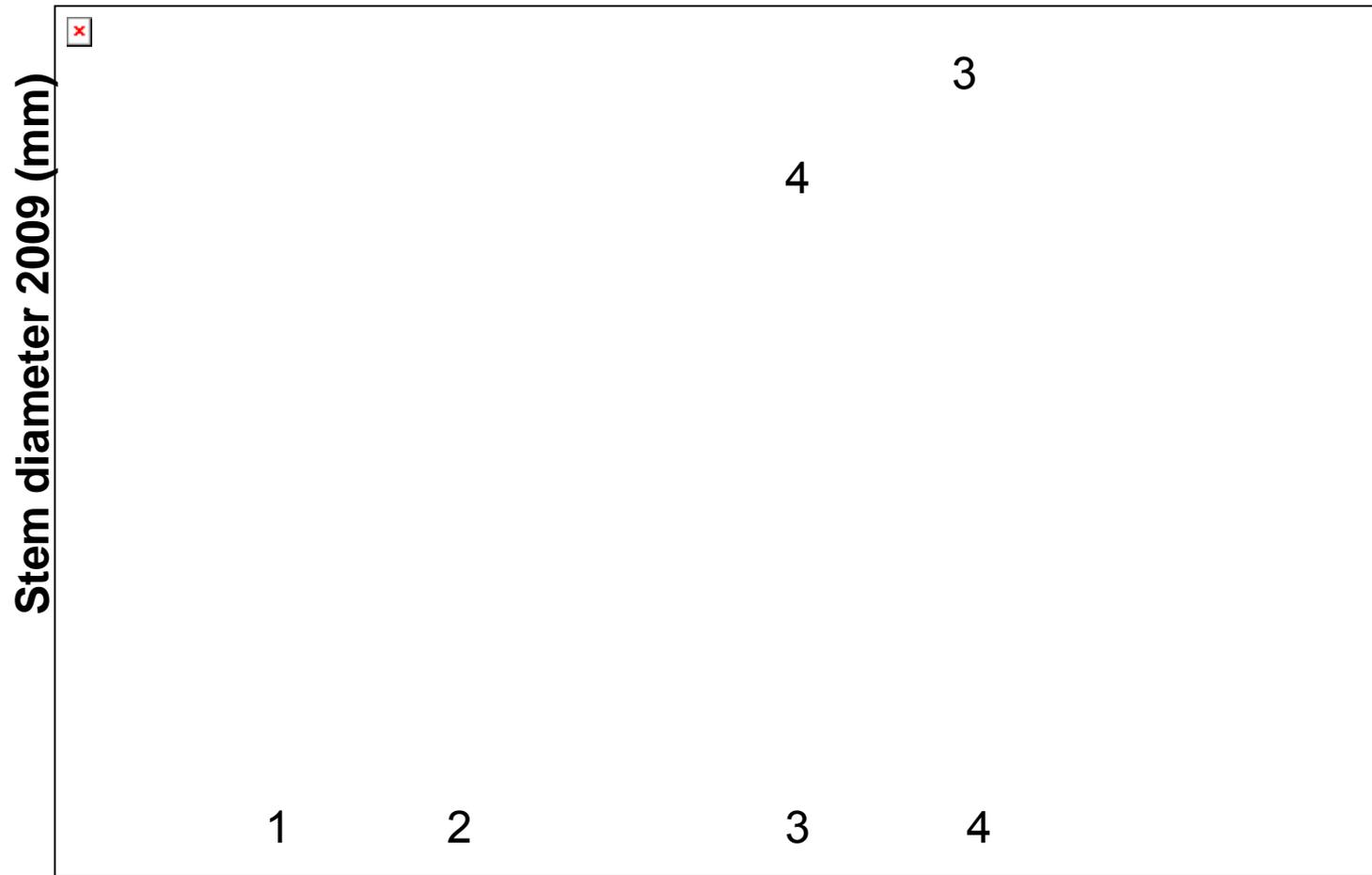
Results: competition (*S. pappaphoroides* unclipped)



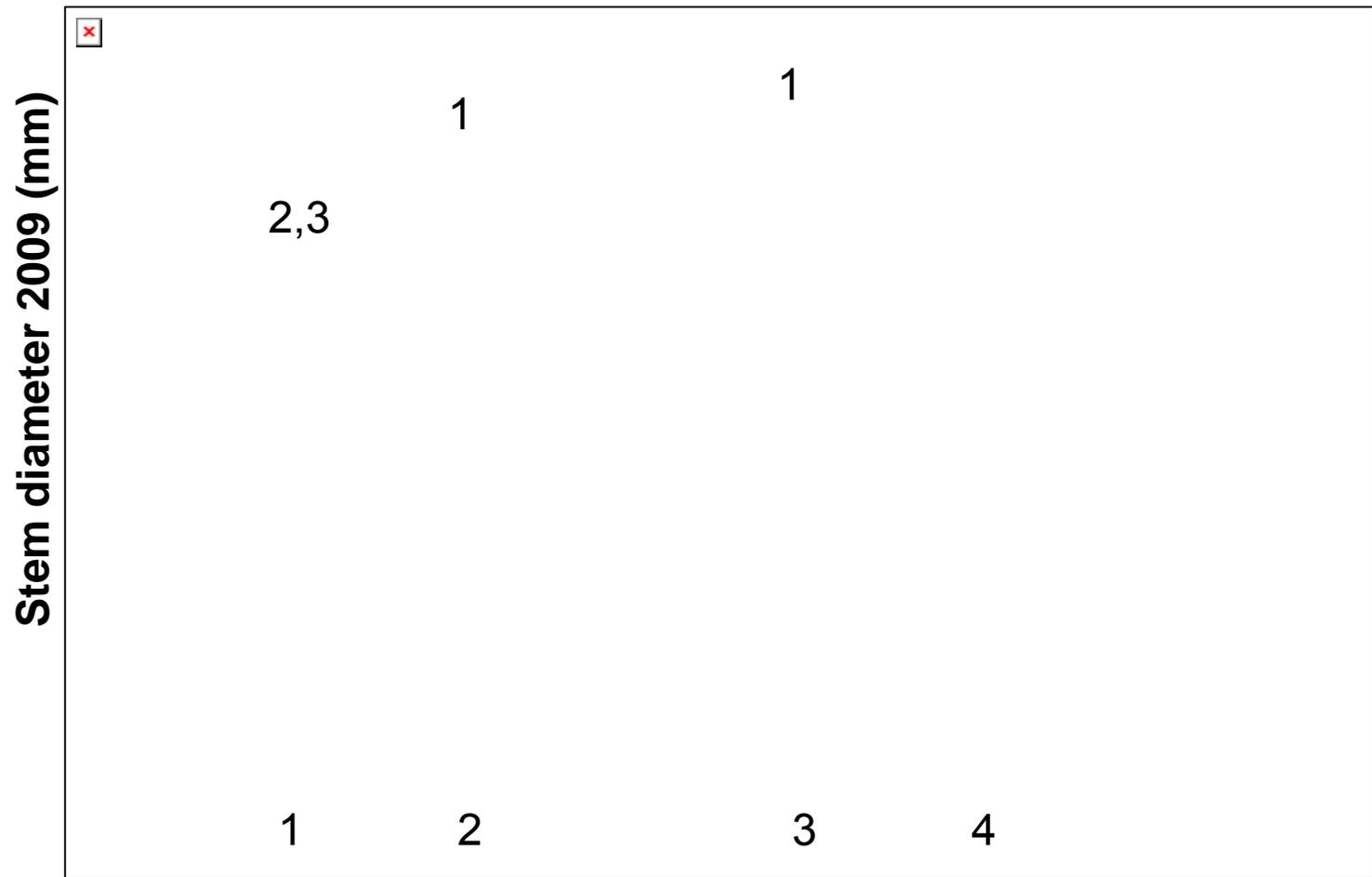
Results: competition (*S. pappaphoroides* clipped)



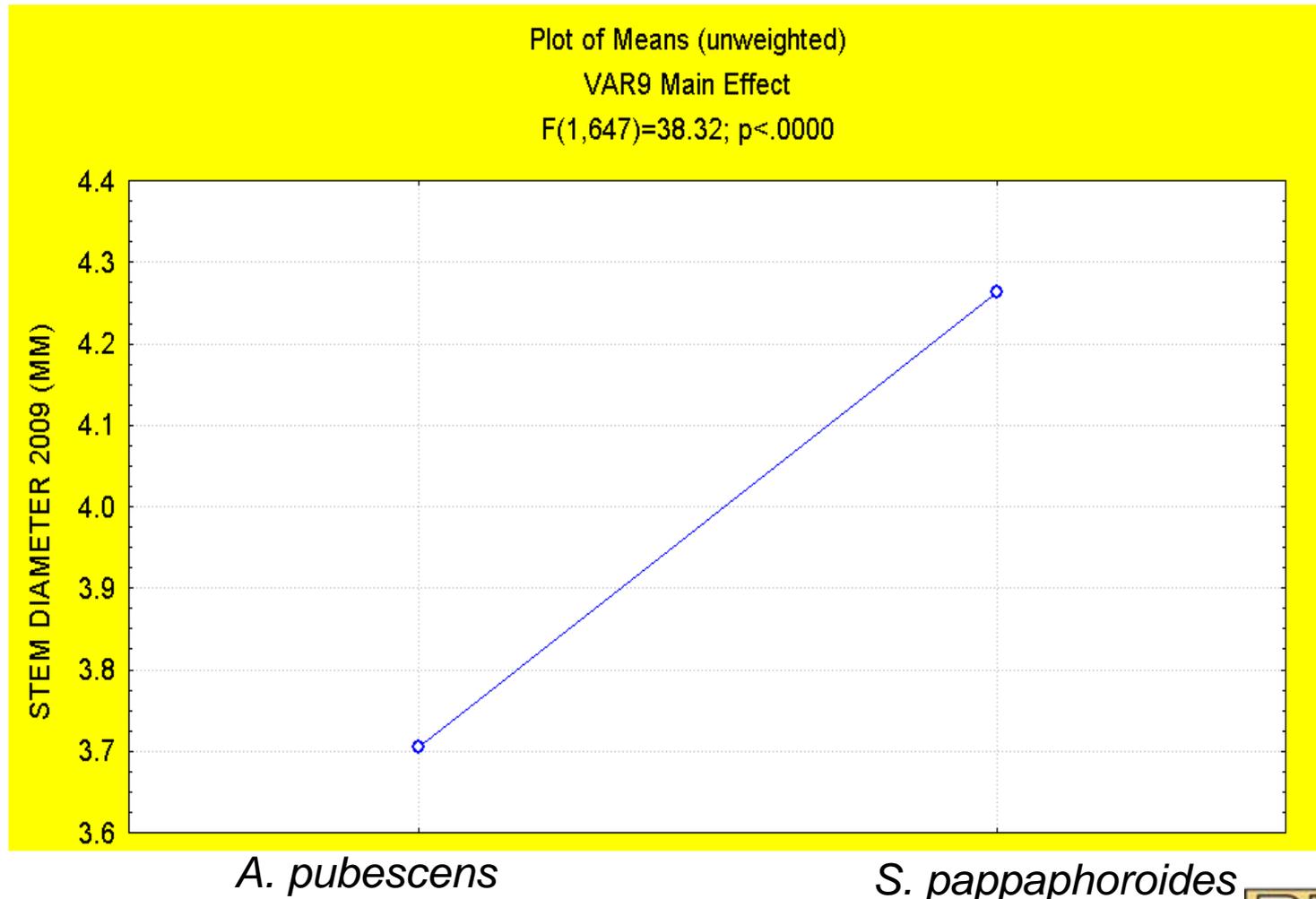
Results: competition (*A. pubescens*)



Results: competition (*S. pappaphoroides*)



Results: different grasses provide different competitive effects?



Results: competition



- Soil moisture
- Soil nutrients
- Root distribution and architecture
- “minor” perennials

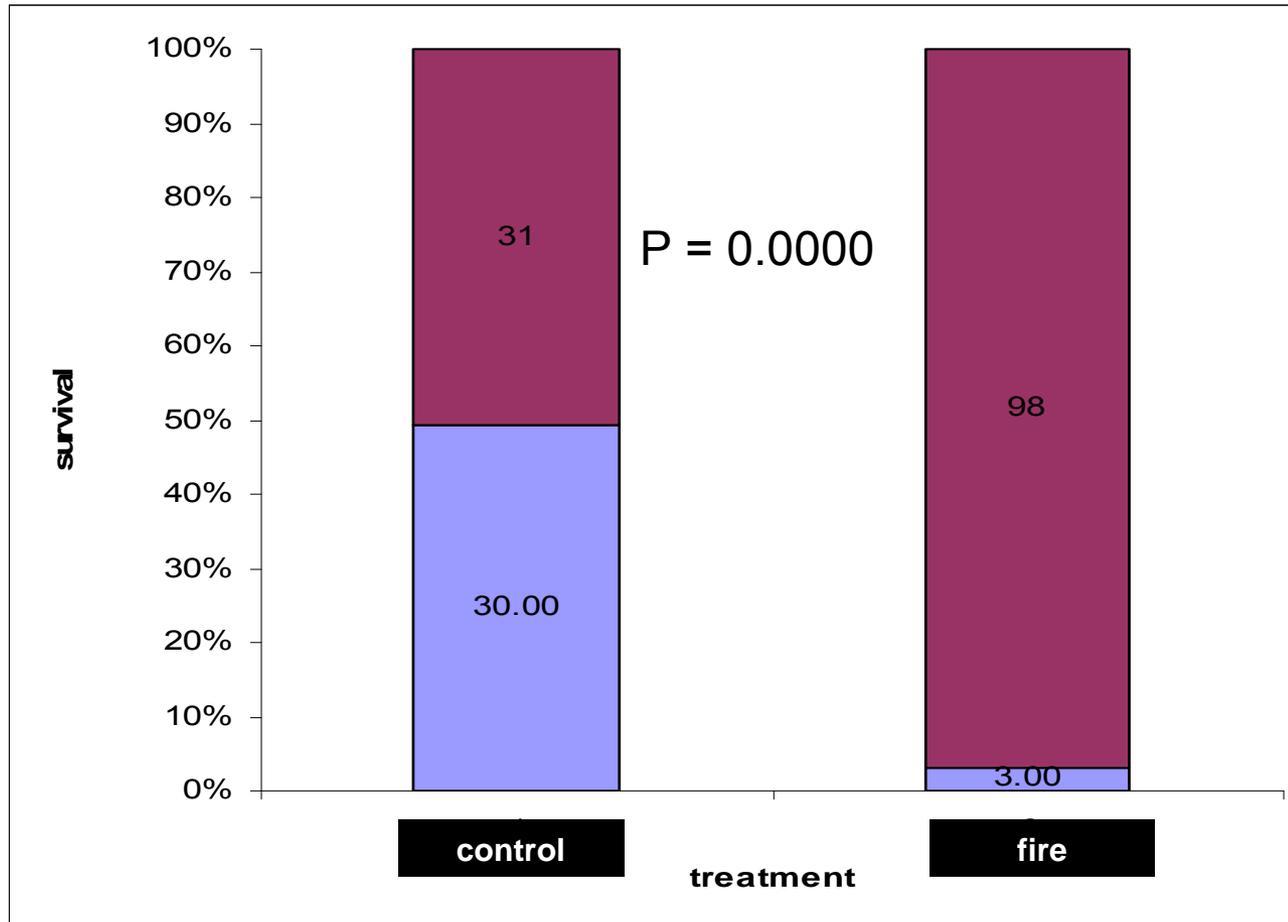
Results fire



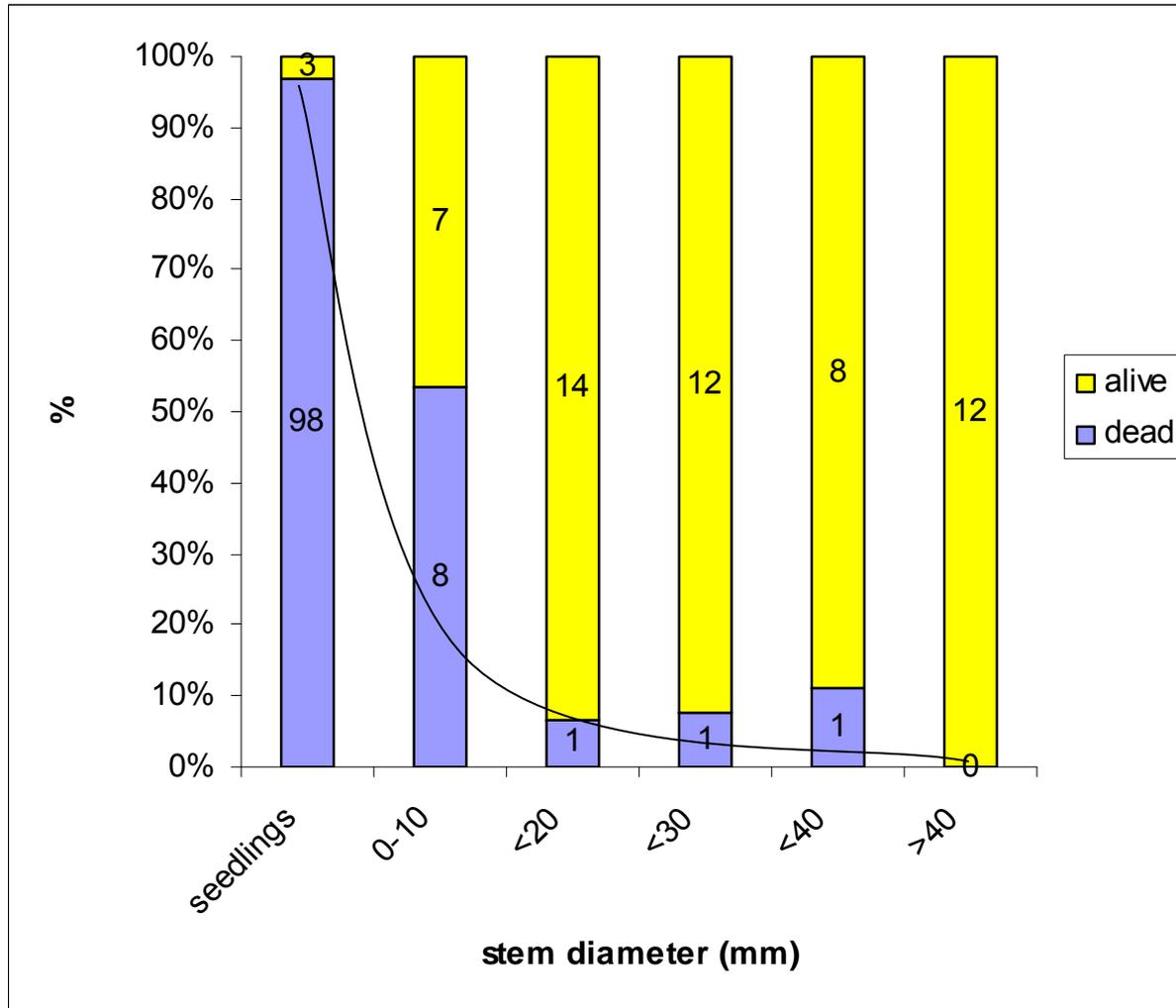
Larkin Powell



Results: fire + seedlings



Results fire



Results browsing: seedlings

Survival Feb 2008 – June 2009





SAPPLINGS



Conclusion

- Hypotheses:
- Generally true, situation more complex
excellent rainfall years
- Not convincing! Subtle reduction of
vigour?
- Fire is effective at an early stage of
establishment. **Major driver!** Fire as a control measure
with established shrubs
- Brown **Thins thickets out!** may significantly
thin

Adaptive and preventative management

dynamics	management
1. Infrequent establishment (fruit production, short term seed banks)	Monitor
2. Grass competition generally “weak”	Monitor; maintain a healthy sward for..
3. Fire effective in killing seedlings and saplings	Fire, Should be used where seedlings and saplings are present
4. Hares and other small browsers could significantly thin out establishing thickets	Maintain healthy populations of small browsers (habitat, reduced poaching)
5. Saplings and mature trees are drought sensitive and prone to fungal infections	Use these opportunistically to reduce costs of, for example, arboricides
6. Slow growing	Fire may be effective for longer periods

Acknowledgements

- Polytechnic of Namibia
- BIOTA South
- University of Namibia
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- Krumhuk Farm
- Researchers who have contributed to the knowledge of bush encroachment
- All the people that helped me in the field, and with advice
- Co-authors of a paper on the conceptual model

Thank you

