Reconstruction and mechanisms of invasion of a diverse African savanna game reserve by the alien plant *Chromolaena odorata*

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Introduction

• Alien plants and land transformation are the most important causes of loss of biodiversity

• *C. odorata* rated as one of the most dangerous invaders worldwide

• Invades in tropical and sub-tropical parts of the world

• Has numerous of impacts on natural, semi-natural, agricultural and silvicultural landscapes
Invasion by *C. o.* worldwide

Grey: actually invaded
Black dots: potentially threatened

McFayden & Skarratt, 1996.
Examples of impacts

- Alters structure and diversity
- Impairs grazing and browsing
- Silvicultural problem
- Crocodile nesting sites
General invasion model

Years since start of invasion

Percentage invaded

Actual Invasion
### Invasion by Vegetation Type

#### Forest
- C/H
- C/E
- S/E
- F/S

#### Broadleaved Woodlands
- Cm
- Sa
- Ed

#### Fineleaved Woodlands
- Δk
- An
- Ab
- Tt

#### Thickets
- Ak/Dc
- Δc
- Ad
- Sa/Ct

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Phase 1 = -301.8 + 0.40200 * Rainfall
Correlation: $r = 0.83384$, $p = 0.000112$
Phase 2 = 171.09 - 0.1676 \times \text{Rainfall}

Correlation: \( r = -0.4895, p = 0.064022 \)
Phase 3 = 13.172 + 0.01188 \times \text{Rainfall}

Correlation: \( r = 0.03355, \ p = 0.064022 \)
Other factors tested

- Altitude
- Aspect
- Slope
- Rainfall variation between the three phases
Chi-square value

Year

Chi-square

P(0.001,1)


Chi-square value

Chi-square

P(0.001,1)
Conclusion

• Fast rate of expansion, with little or no lag period

• Different patterns of invasion for different communities

• Initially, invasion was driven by habitat factors (rainfall)

• As the invasion progressed, habitat suitability was superseded by a species characteristics, namely seed production
Management Implication

- Control in vegetation with Stepwise Invasion Pattern
  - reduce seed production
  - High cost per ha if cut-stump treatment is used

- Maintain large areas free of *C. odorata* – concentrate on areas that are relatively resistant to invasion
  - Low cost per hectare
  - Constant re-invasion from other vegetation types
References


• [www.worldmapper.org/index.html](http://www.worldmapper.org/index.html)