The effect of Climate Change on Invasive Alien Plants in South Africa

Dr Roger Price
Agricultural Research Council:
Plant Protection Research Institute
The threat of invasive alien plants

The International Conservation Union (IUCN) and other international organizations recognize that invasive alien species are the second most important threat to conservation and biodiversity.
How did the invasive alien plants get into the country?

- As garden ornamental
- As barrier plants
- As forestry or agro-forestry species
- Unintentionally
Reason for introduction of invasive alien plants

- Ornamental: 55%
- Agriculture: 11%
- Barrier: 13%
- Forestry: 6%
- Cover/binder: 5%
- Unintentional: 9%
Legislation on invasive alien plants in SA

Conservation of Agricultural Resources Act (CARA)
Act 43 of 1983

National Environmental Management: Biodiversity Act, (NEMBA)
Act 10 of 2004
(Regulations not yet approved)
Risks associated with alien plants
Risks: Water

Gums, poplars, syringas, willows...
Risks: Watercourses

Long-leaved wattle
*(Acacia longifolia)*

Sesbania
*(Sesbania punicea)*
Risks: Biodiversity

Pompom weed (*Campuloclinium macrocephalum*)
Risks: Nitrogen fixation – soil enrichment

Pearl Acacia (Acacia podalyriifolia)
Risks: Tourism

Hakea sericea
Risks: Agriculture

Silverleaf nightshade/ satansbos
*(Solanum elaeagnifolium)*

Queen of the night *(Cereus jamacaru)*
Risks: spiny, block access

Torch cactus (*Echinopsis spachiana*)

Rosea cactus (*Opuntia fulgida*)
Risks: toxic, injuries

Oleander
*(Nerium oleander)*

Jointed cactus *(Opuntia aurantiaca)*
Risks: allergies

Bugweed (Solanum mauritianum)

Parthenium weed
(Parthenium hysterophorus)
Risks: forestry

Bugweed (*Solanum mauritianum*)

*Lantana camara*
Risks: pasture

Pompom weed
(Campuloclinium macrocephalum)
Risks: fire, followed by erosion
Risks: smothering vegetation

Cat's claw creeper (*Macfadyena unguis-cati*)
Risks: aquatic systems

Water hyacinth
(Eichhornia crassipes)

Red water fern (Azolla filiculoides)

Water lettuce (Pistia stratiotes)
Risks: water utilization

Salvinia molesta

Red water fern

Water hyacinth
Consequences of climate change on invasive alien plants

Anticipated climate changes:

- Hotter and drier in Western region
- Hotter and wetter along KZN coast
- Higher carbon dioxide levels
- Intense weather events will aid dispersal of weeds
Consequences of climate change

★ Effect on indigenous vegetation:
  • Climate no longer suitable for indigenous vegetation – local extinctions
  • Disturbance due to weather events – colonization by weeds
Consequences of climate change

★ Effect on invasive alien plants:
  ● Existing alien plants in SA mainly subtropical
  ● Will be better suited to changed climate
  ● Thrive on increasing disturbance
  ● Higher CO₂ levels will favour woody plants and C4 tropical grasses
  • Outbreaks of “sleeper weeds”
Origin of invasive plants currently in South Africa
Impact of climate change on Fynbos Biome

- Unreliable rain & hotter climate - local extinctions of unique flora
- Invasive Acacias will increase their range
- Water courses: prime targets for invasives
- Expansion of emerging weeds, e.g. cactus
- Increased fire risk
Fynbos Biome

Black wattle
(*Acacia mearnsii*)

*Cylindropuntia tunicata*
Fynbos: River courses

River red gum (*Eucalyptus camaldulensis*)

Water hyacinth (*Eichhornia crassipes*)
Fynbos: Lantana

Lantana
*Lantana camara*
Grassland Biome

- Invasion of tropical grasses
- Invasive cacti will spread
- Invasive *Prosopis* spp., and wattles
Grassland

Fountain grass (*Pennisetum setaceum*)

Queen of the night cactus (*Cereus jamacaru*)
Grassland

Pompom weed (*Campuloclinium macrocephalum*)
Grassland

Mesquite (*Prosopis* spp.)
Arid zone

- Increased invasions of Prosopis spp. and cactus
- Dominance of tropical C4 grasses
Bushveld region

★ Invasion of cactus
★ Diversity of trees will diminish, monocultures of mopane, etc.

Australian pest pear
(Opuntia stricta)
Subtropical regions

- Hotter and wetter climate will favour weeds of subtropical and tropical origin, e.g. pereskia, cat’s claw, chromolaena, parthenium, jacaranda, seringa.
Cat’s claw creeper
(*Macfadyena unguis-cati*)

Jacaranda
(*Jacaranda mimosifolia*)
Chromolaena (Chromolaena odorata)
Consequences

- Destruction of biodiversity, especially in Fynbos and grassland biomes
- Reduced carrying capacity of veld
- Invasion of satansbos & parthenium into marginal agricultural land
- River courses blocked, trees use lot more water
Impacts on biocontrol

- Variable impacts on current biocontrol agents – ranges may expand or contract, efficacy may increase or decrease
- Lantana biocontrol agents may do better along the coast in more humid conditions
- Hakea and Acacia biocontrol agents will suffer in the hotter and drier Western Cape
Conclusions

★ Possible remedial action:
  • Intensify national weed clearance efforts
  • Vastly increase biocontrol capacity
  • Information and awareness campaigns to landowners
  • Intensive climate modelling & economic impact studies
  • Intensive mapping of weed distribution
Thank you