Invasions Across Boundaries -

Sahara Mustard in the Desert Southwest: Origins, Patterns and Impacts

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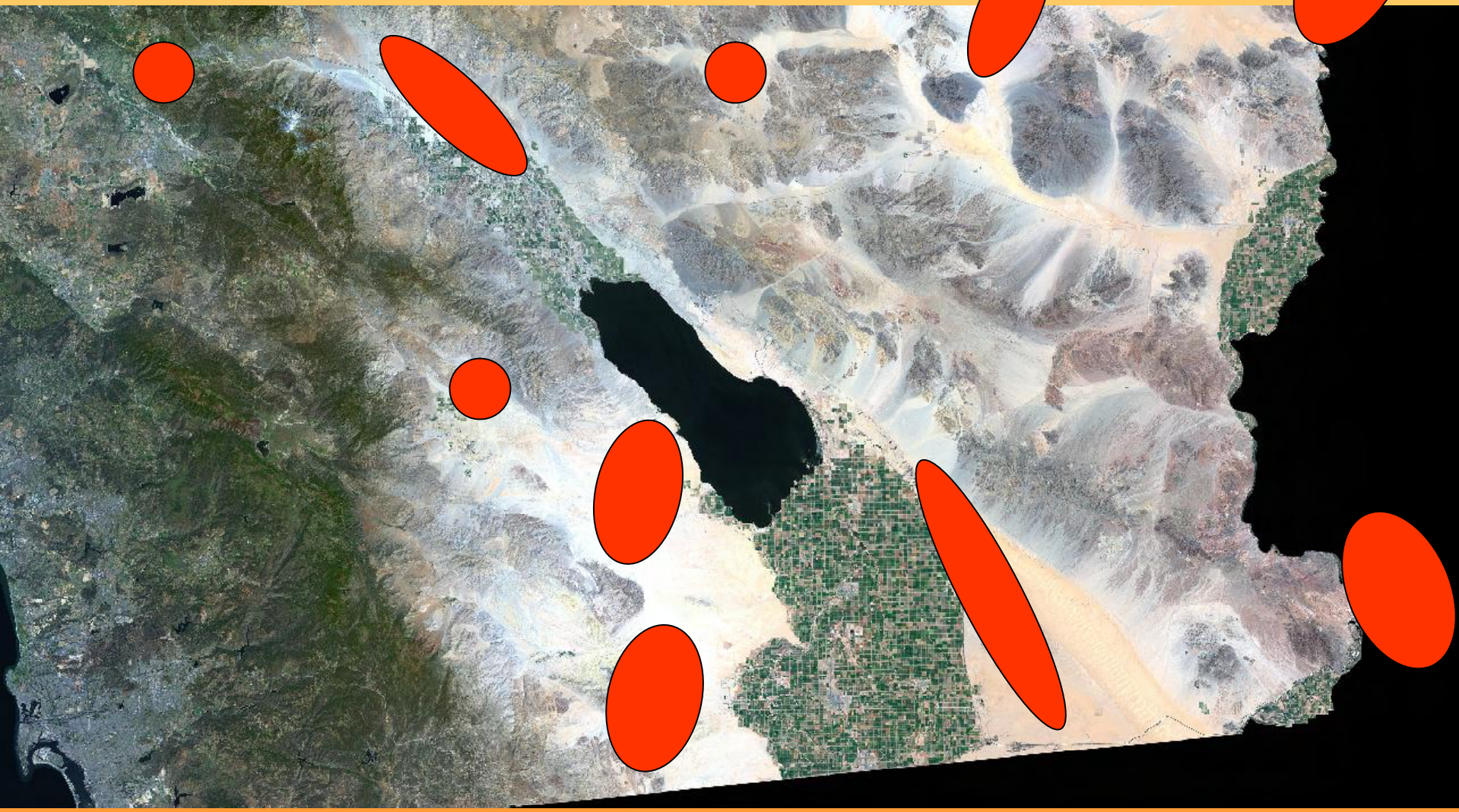
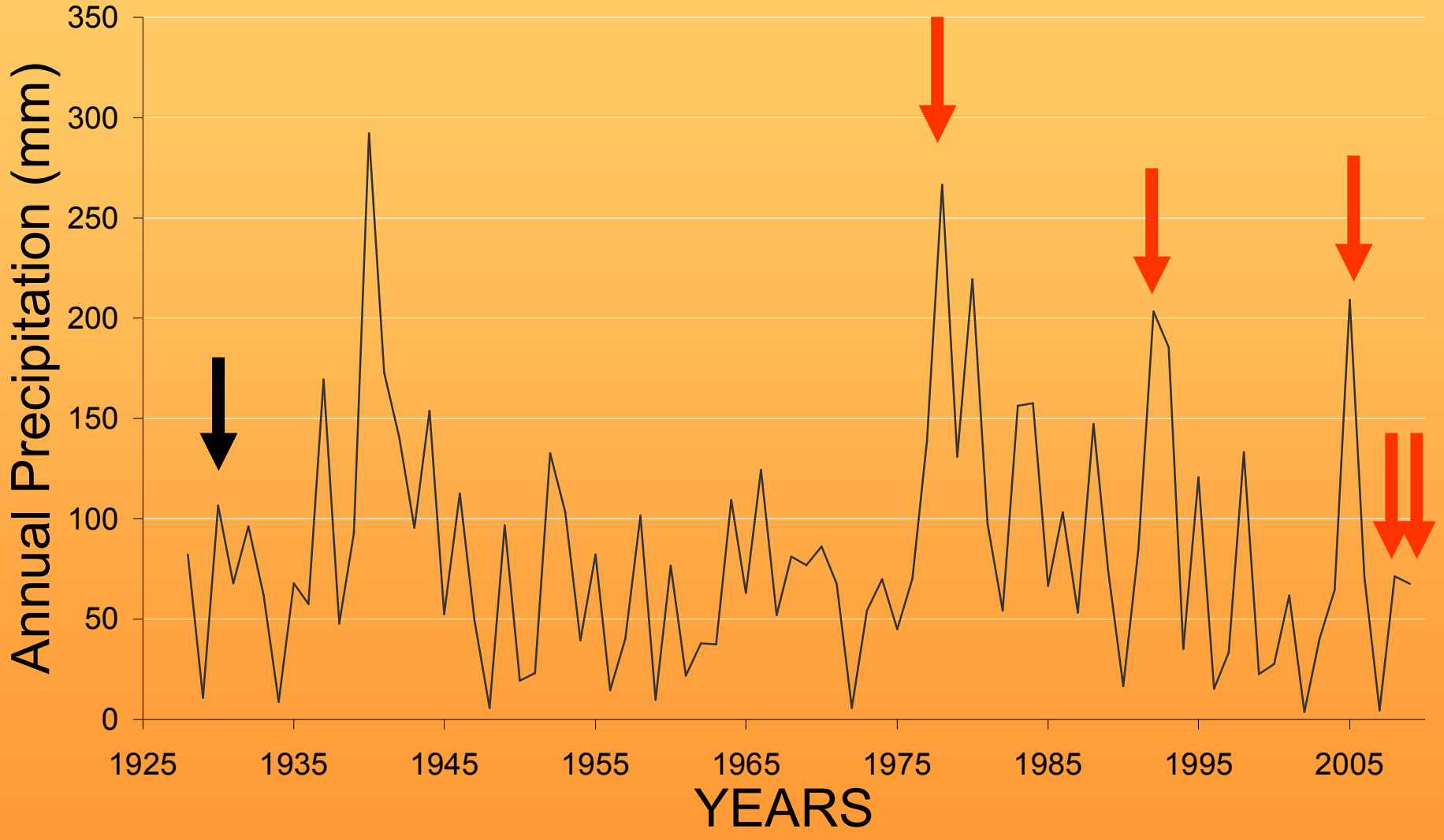
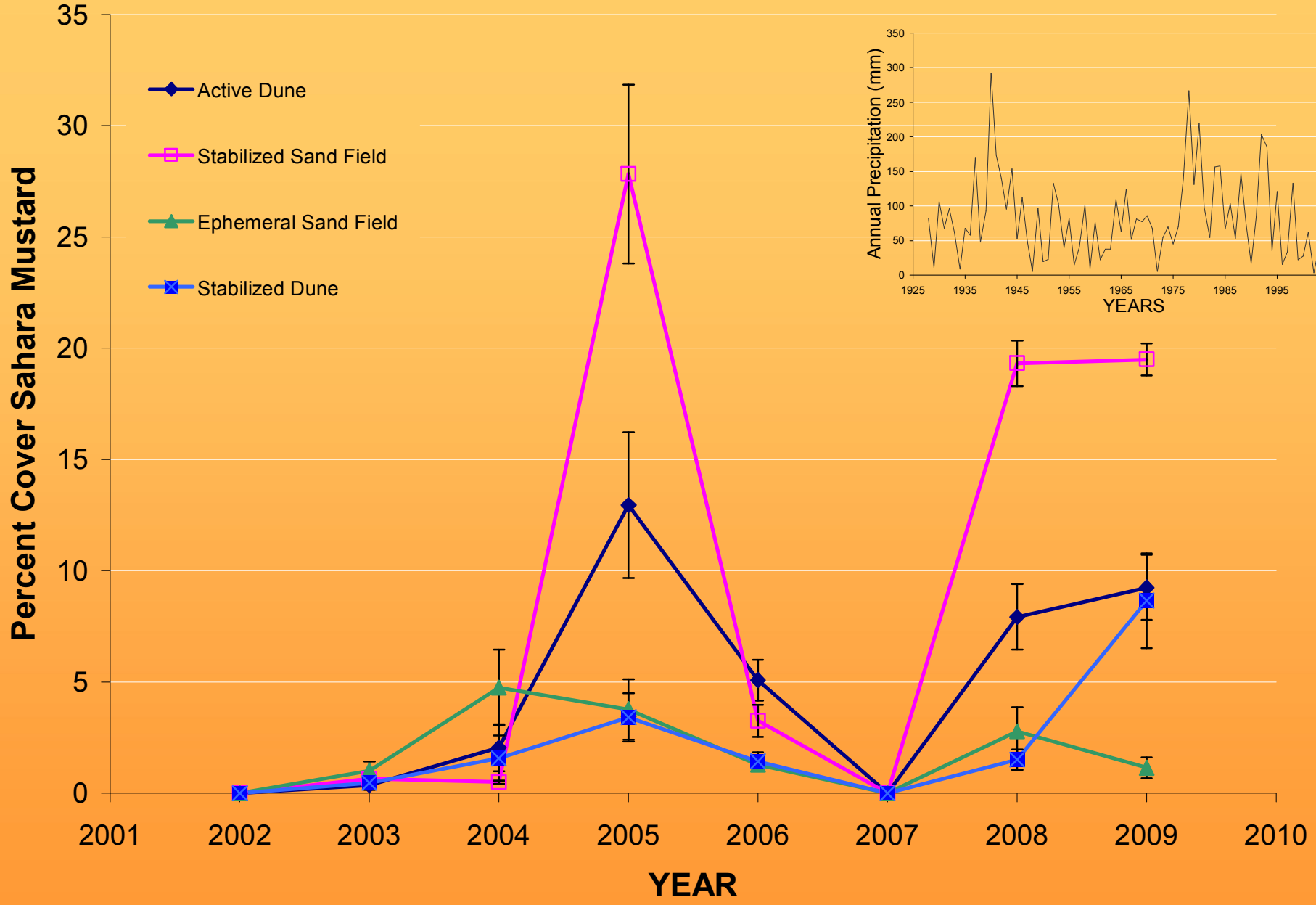
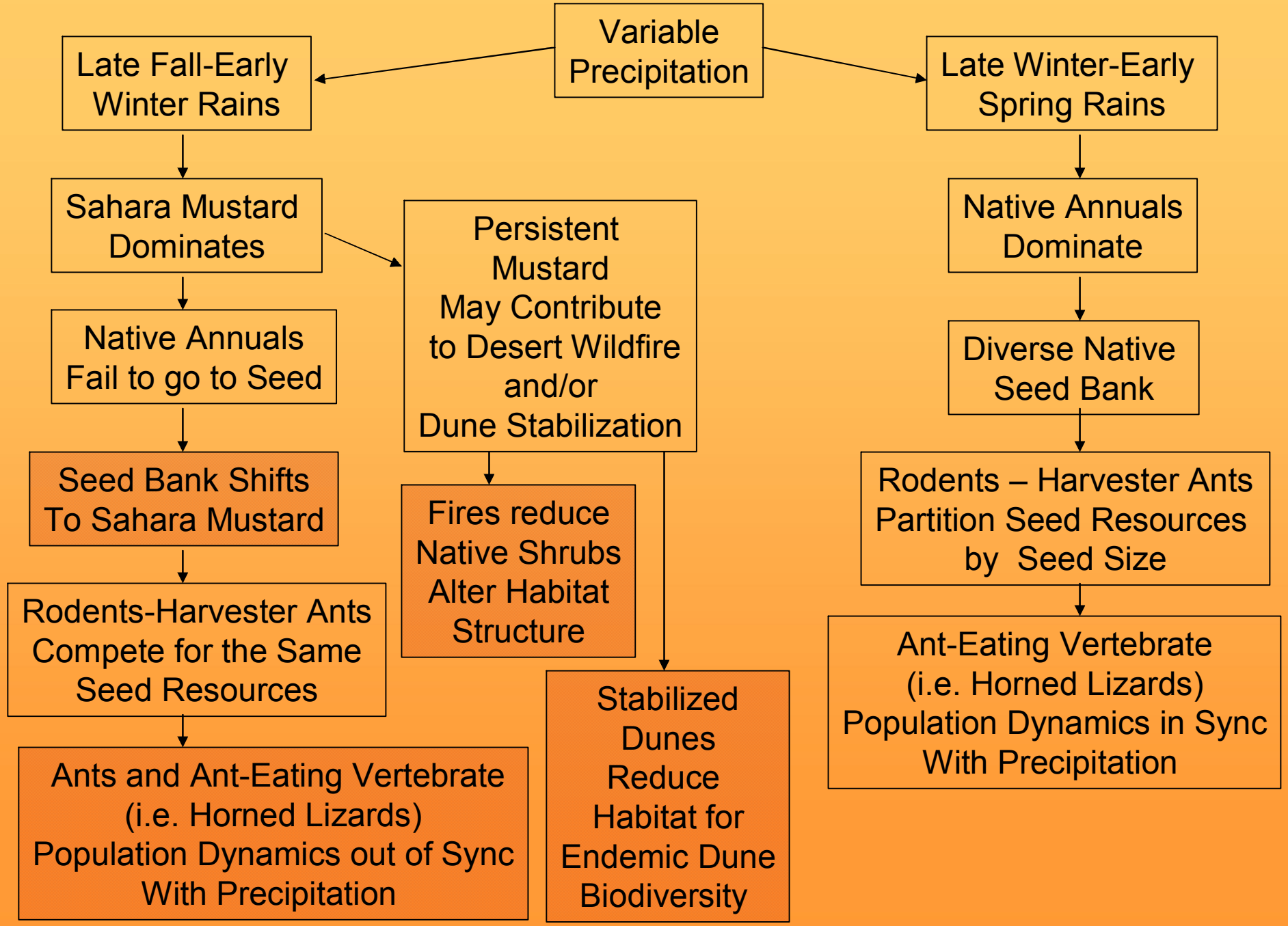
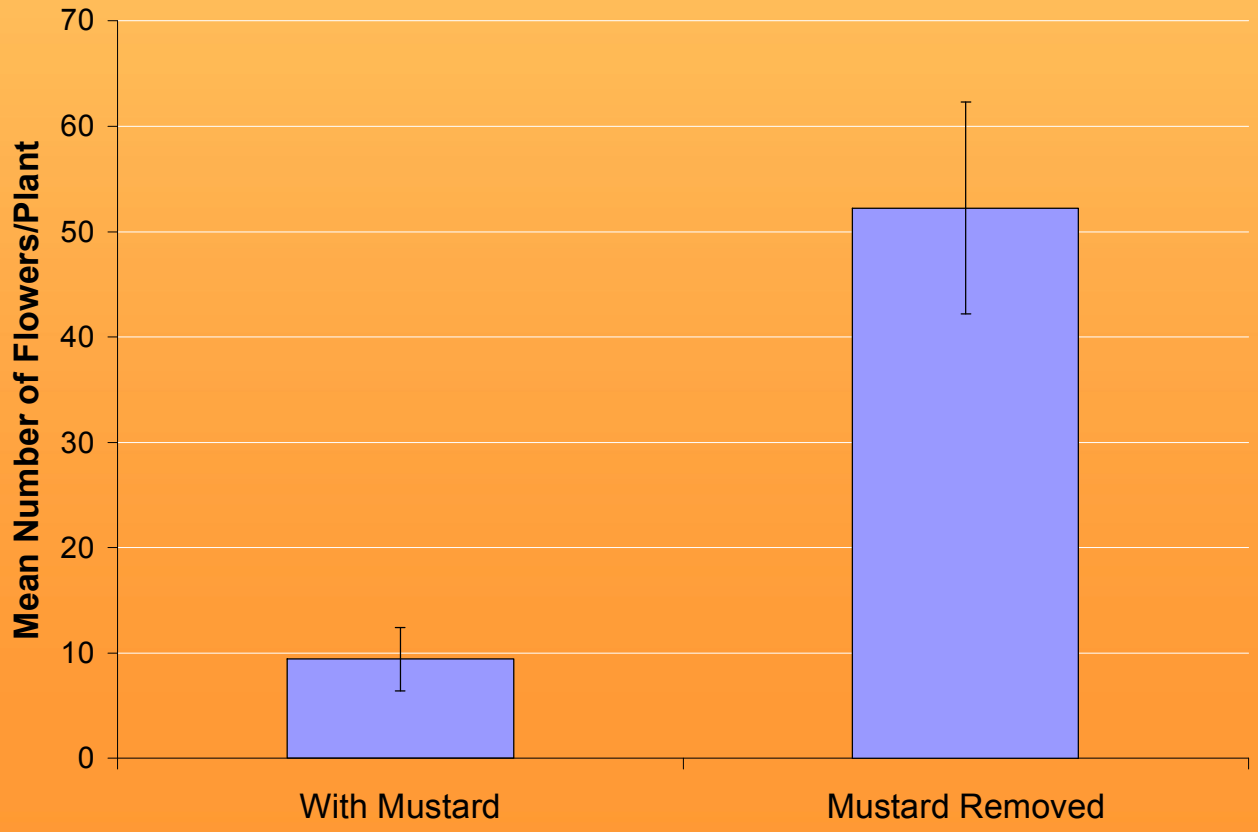
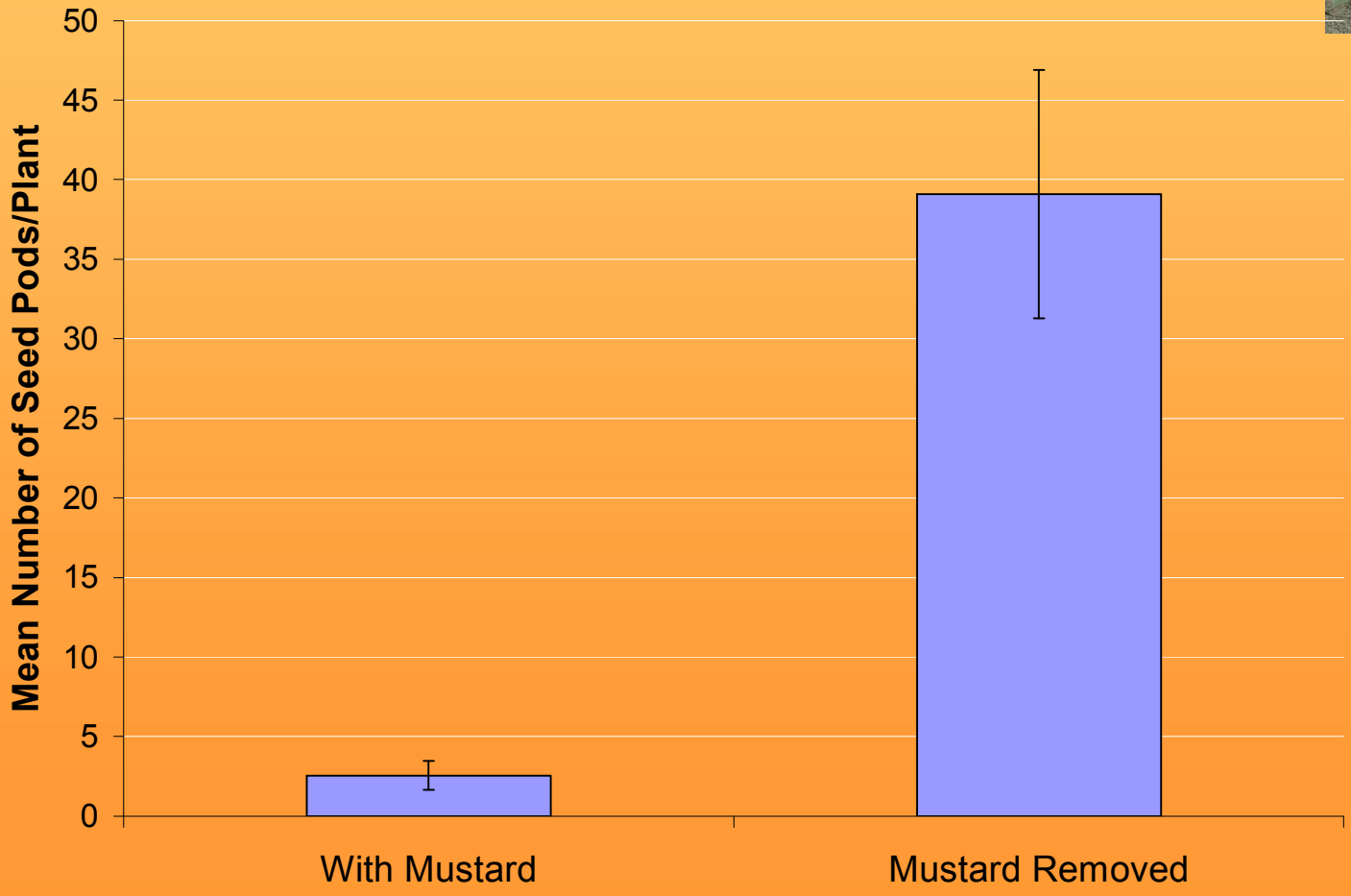


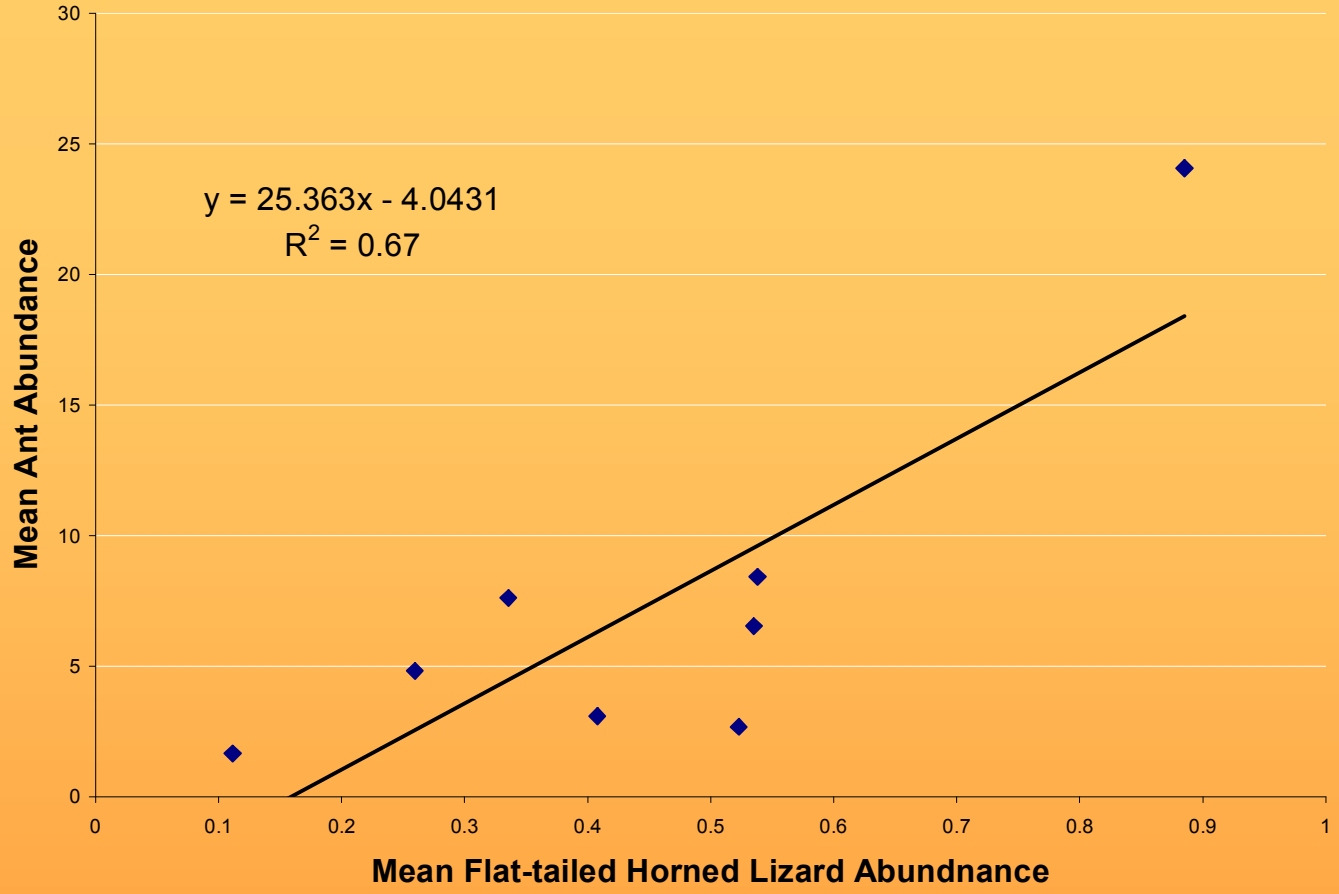

Annual Precipitation (mm)
350
300
250
200
150
100
50
0
1925
1935
1945
1955
1965
1975
1985
1995
2005
YEARS

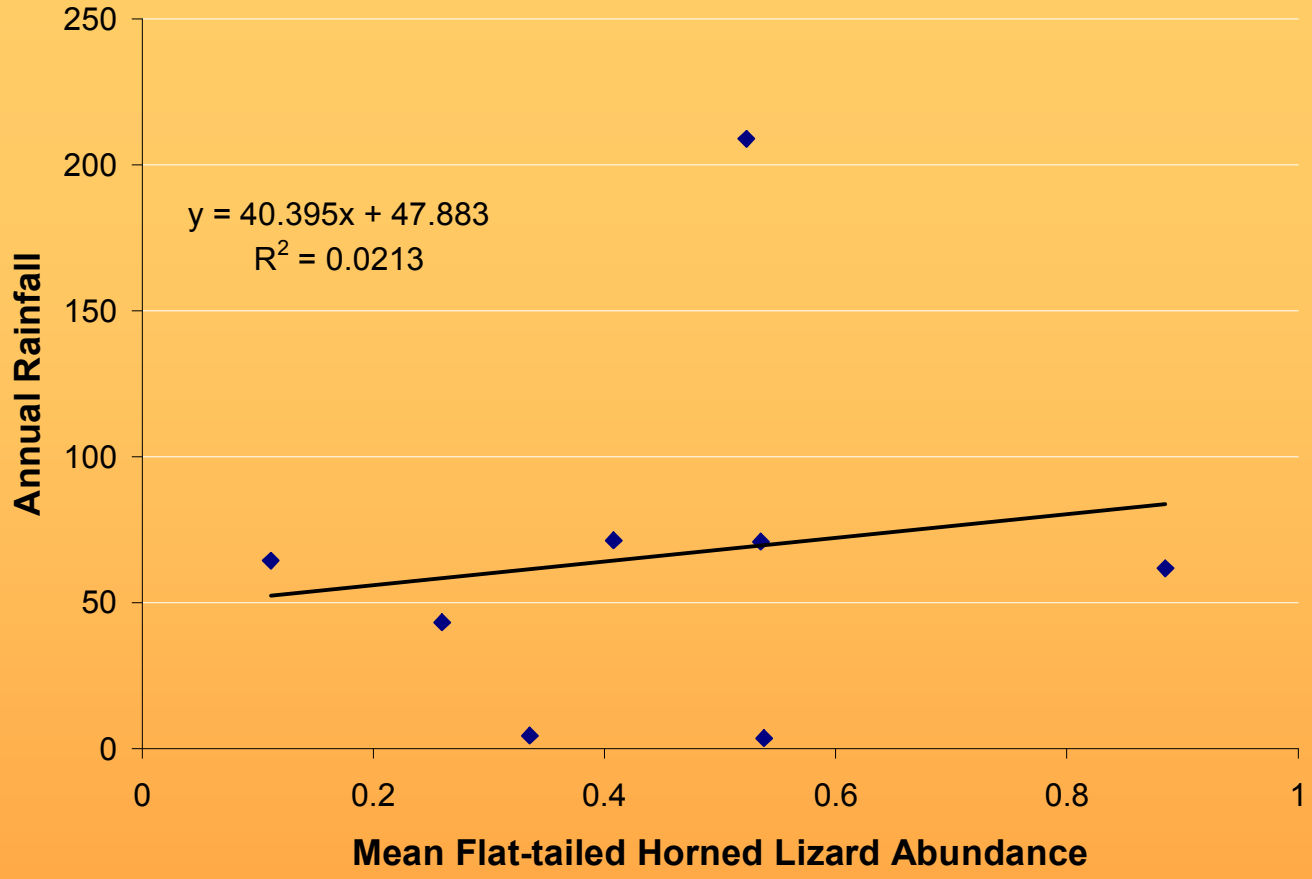

Percent Cover Sahara Mustard
35
30
25
20
15
10
5
0
Active Dune
Stabilized Sand Field
Ephemeral Sand Field
Stabilized Dune
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
YEAR
Annual Precipitation (mm)
350
300
250
200
150
100
50
0
1925
1935
1945
1955
1965
1975
1985
1995
2005
YEARS

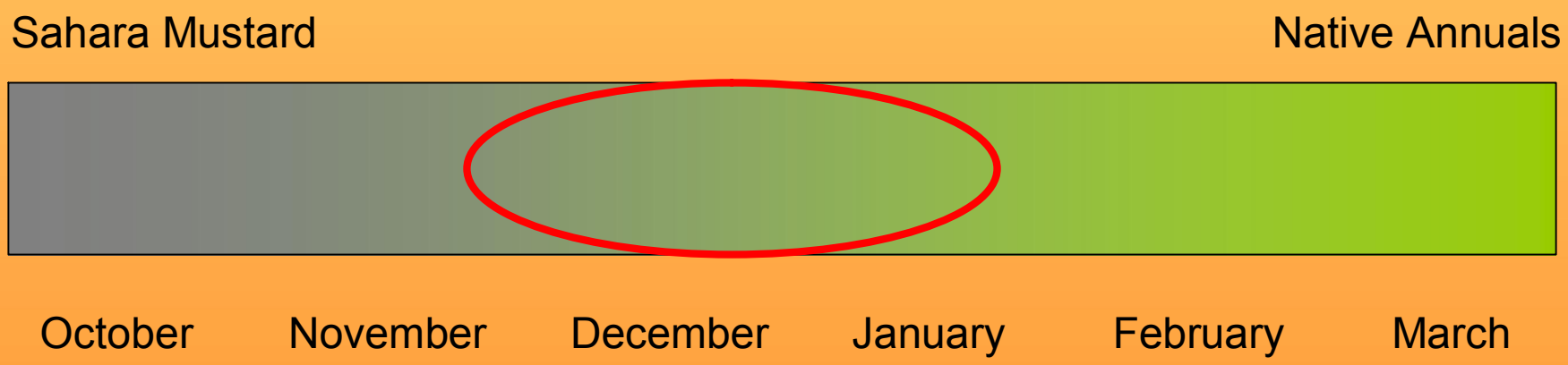

Variable Precipitation
Late Fall-Early Winter Rains
Late Winter-Early Spring Rains
Sahara Mustard Dominates
Native Annuals Fail to go to Seed
Seed Bank Shifts To Sahara Mustard
Rodents-Harvester Ants Compete for the Same Seed Resources
Ants and Ant-Eating Vertebrate (i.e. Horned Lizards) Population Dynamics out of Sync With Precipitation
Persistent Mustard May Contribute to Desert Wildfire and/or Dune Stabilization
Fires reduce Native Shrubs Alter Habitat Structure
Stabilized Dunes Reduce Habitat for Endemic Dune Biodiversity
Native Annuals Dominate
Diverse Native Seed Bank
Rodents – Harvester Ants Partition Seed Resources by Seed Size
Ant-Eating Vertebrate (i.e. Horned Lizards) Population Dynamics in Sync With Precipitation


Mean Number of Flowers/Plant
70
60
50
40
30
20
10
0
With Mustard
Mustard Removed


Mean Number of Seed Pods/Plant
50
45
40
35
30
25
20
15
10
5
0
With Mustard
Mustard Removed


y = 25.363x - 4.0431
R2 = 0.67
Mean Ant Abundance
Mean Flat-tailed Horned Lizard Abundnance
0
5
10
15
20
25
30
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


250
200
150
100
50
0
0
0.2
0.4
0.6
0.8
1
y = 40.395x + 47.883
R2 = 0.0213
Annual Rainfall
Mean Flat-tailed Horned Lizard Abundance


Sahara Mustard
Native Annuals
October
November
December
January
February
March

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