Saharan mustard (*Brassica tournefortii*) Discussion Group
Leader: Matthew Brooks, USGS
Notetaker: Gina Darin

New information on ecology, impacts and control of Saharan mustard (powerpoint)**:**

1) Ecology
    a. Saharan mustard arrived in 1920s in Coachella Valley.
    b. Why does it do so well in the desert?
        i. R. Marushia's dissertation, UC Riverside, shows that Saharan mustard has an early and rapid phenology, which takes advantage of desert conditions.
        ii. Other desert species bolt, flower, and set seed later, when there isn't much water left over.
    c. Seed production- moderately sized plants can produce up to 16,000 seeds per plant, which is in ballpark of many weedy species, but far more than local natives
    d. Grows well in sandy soils or disturbed areas caused by fire, OHV's or roads.
    e. Spread:
        i. Spread of Saharan mustard away from a paved highway in Chemechuevi Valley in Spring 1999 was as far as 1500 m away, and studied again in 2009 as far as 6500 m away.
        ii. One vector of spread observed is dust devils, carrying plants miles into intact dessert.
        iii. Kangaroo rats cache seeds, but often don't recover them, which may explain clusters of seedlings
        iv. Siliques are explosively dehiscent, so managers may actually spread it if they manage too late.
    f. 2005 spring (300% annual rainfall) Saharan mustard was found in significant stands on mid-slopes and mountains, not just in sandy washes, which shows it's not limited to sandy washes and roadsides = wakeup call.
    g. How far north on east side? Up 395 up in Manzanar, so it's moving into the Great Basin
    h. How long are seeds viable? No studies, but black mustards seeds can be viable for 8 yrs.
    i. Density of Saharan mustard vs. natives during wet year was a negative relationship between density of Saharan mustard vs. natives may be evidence of competition. During dry year a positive relationship between two, maybe all plants trying to survive and likely environmental conditions determine densities (R. Marushia dissertation). Comment - 1st germinating individuals shaded out others. If use percent cover instead of density may get another picture.
2) Impacts

a. High biomass production in 2005 may promote fire spread, but not likely as much as annual grasses. Likely doesn't cause the fires, but where it occurs (along roadside) is coincident with where fire starts (along roadside).
b. Creosote over story may get more fire damage due to the Saharan mustard.

3) Control
   a. Previous control efforts limited to mechanical (hand-pull, hoe), bag and haul off site.
      i. Concerns with this approach:
         1. Seeds may ripen even after plant is pulled, so need to manage seed bank.
         2. Rosette vs bolting. Hard to pull basal rosette, so wait to bolting.
         3. Hand pulling can be shown to reduce Saharan mustard with successive years of control, but it's labor intensive, especially in rocky substrates and under brush.
         4. Also, mechanical methods creates soil disturbance.
   b. Current strategies
      i. Site led approaches - rare plant sites
         1. Lake Mead NRA – sandy soil endemic species project, repetitive control with mechanical methods multiple times per year since 2003
      ii. Habitat protection – dunes
         1. Mojave NP - prevent establishment in Kelso Dunes by pushing back Saharan mustard using herbicides 2,4-D and Dicamba spot spray post emergence
      iii. Vector sites – corridors
         1. Joshua Tree NP - road corridors, trying to reduce amount of seed production
      iv. Prioritize isolated patches
      v. Keep it out of uninfested areas
   c. Chemical control –
      i. Little herbicide testing has been done on Saharan mustard in natural areas, but mustards are on many labels.
      ii. 2, 4-D Dicamba has some soil residual activity, so if there's a rain and germination, may get more control, whereas glyphosate gives same results as hand-pulling.
      iii. Discussed USGS preliminary results of ongoing control experiments presented by Steven Ostoja (see powerpoint). Spring 2010 sampling at all 2009 treatments needed before conclusions can be drawn.

Attendees

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