

## “The quino checkerspot fading with California’s Wildflowers”

Dr. Gordon Pratt

- The quino checkerspot disappeared from Orange County in the 1930’s
- Quino checkerspot belongs to a group of endangered Edith’s checkerspots
- Quino checkerspot habitat must have
  - Annual food plants that are members of the “Scrophularaceae”
    - Paraphyletic – not one group, part of a member group
  - Open bare ground with food plants and without large rocks
  - Nearby larger food plants that survive later into the season
  - Nectar sources for adult butterflies which are often species within the Asteraceae
  - Habitat for diapause, which is extremely important since larvae remain in diapause for many months and often years
    - They have shown to remain in diapause for 5 years, and sometimes even 30 years, waiting until the right conditions come about for them to come out of diapause
- Life history
  - Adults eclose (hatch out) normally in late winter through spring – late Feb through May – depending on elevation
  - Females mate and oviposit (lay eggs) upon their annual food plants, preferably on open bare ground
  - The larvae hatch after about 1-2 weeks and feed upon the plant oviposited
    - Later they move into the shade to find larger, richer plants in order to continue feeding
  - Once larvae reach a certain size or run out of food resources they enter diapause
- Food plants
  - Most common – *Plantago erecta*
  - Others – *Collinsia concolor*, *Antirrhinum coulterianum*, *Plantago pantagonica*, etc.

- Ovipositing
  - Oviposit in large clusters
  - Low lying, small leaves
  - Open space – warm sunlight in spring helps development
- Reasons for captive breeding
  - Previous attempts at re-establishing populations by moving adults in the 1940's and 1960's were unsuccessful
  - Captive bred larvae can be used for
    - Re-establishing populations after fires
    - Restore populations after habitat restoration
    - Re-establish seed banks of diapausing larvae in dwindling populations
  - For experiments to understand biology, particularly diapause
- Captive rearing methods
  - Maintain larvae in diapause from spring to winter
  - Start to grow *Plantago* flats in fall
  - Break larvae out of diapause in winter with *Penstemon* cuttings
    - Put the cuttings, wet paper towels, and larvae in diapause in a container – humidity for 10 days makes them break out
    - This mimics the conditions you would find in the field because they break diapause in winter after rains, and even faster after heavy rains
  - Set up new containers for the ones that return to diapause
  - Set up pupae in cages and allow adults to hatch
  - Mate adults and set up females on potted *Penstemon*
    - Keep males and females separate
    - Females are kept in a refrigerator – when the male is placed together with the female, the female won't resist the male because she won't be able to move as quickly due to being cold
  - Rear larvae to diapause
- Feeding larvae are reared in tanks
  - Once every 3-4 days the larvae are removed and the *Plantago* flats are exchanged with new *Plantago*

- Lights are placed over each tank since the larvae like to sun themselves
- Temperature is 55-70 degrees F
- Allow them to pupate
- Diapause experiment
  - Broke diapause on 1000 larvae
  - Released into a constructed habitat and followed throughout season
  - Habitat was watered weekly to improve conditions
  - Most likely to diapause on California buckwheat (not under rocks)
- Wildflowers are fading, effects quino checkerspots
  - Food plants are disappearing due to competition with non-native grasses
  - Nectar plants play a large role in egg production
    - Nectar sources are far less than they once were