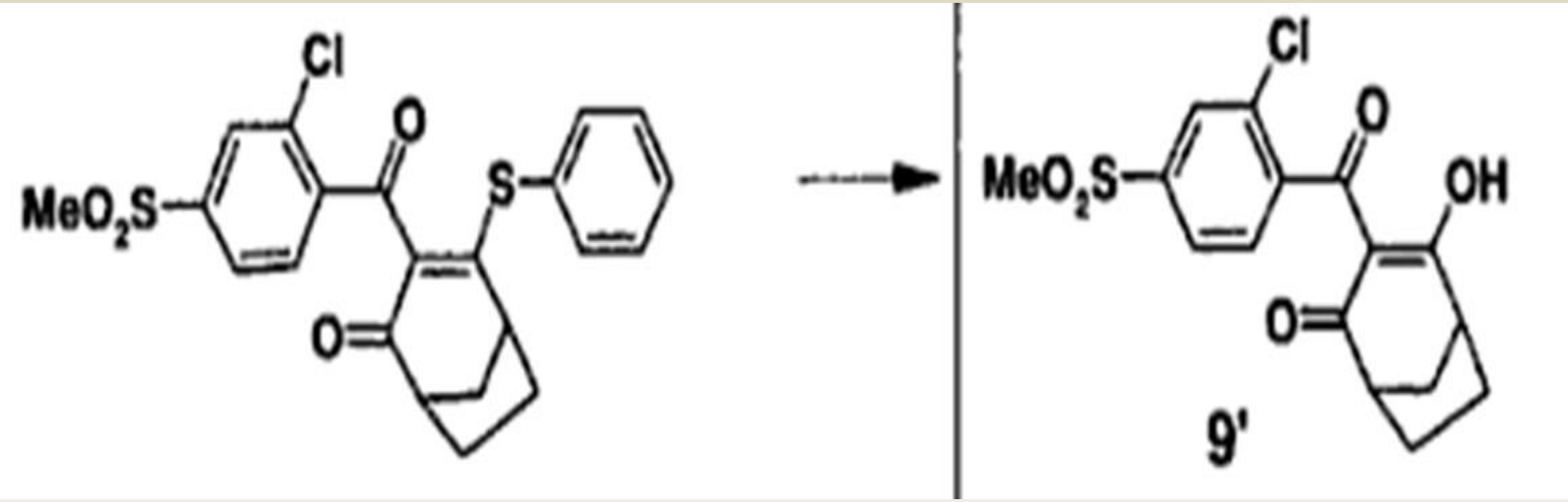
- Benzobicyclon:
  - HPPD inhibitor
  - Excellent toxicological and eco-toxicological profile
  - Extremely safe to rice
  - SDS looked at benzo in the US a decade ago, but did not see a fit due to competitive ALS chemistries

Benzobicyclon is a Pro-drug



Benzobicyclon

Herbicidally active metabolite

Hydrolysis metabolite is the actual herbicidal compound

Gowan Product Update for 2015 LATMC

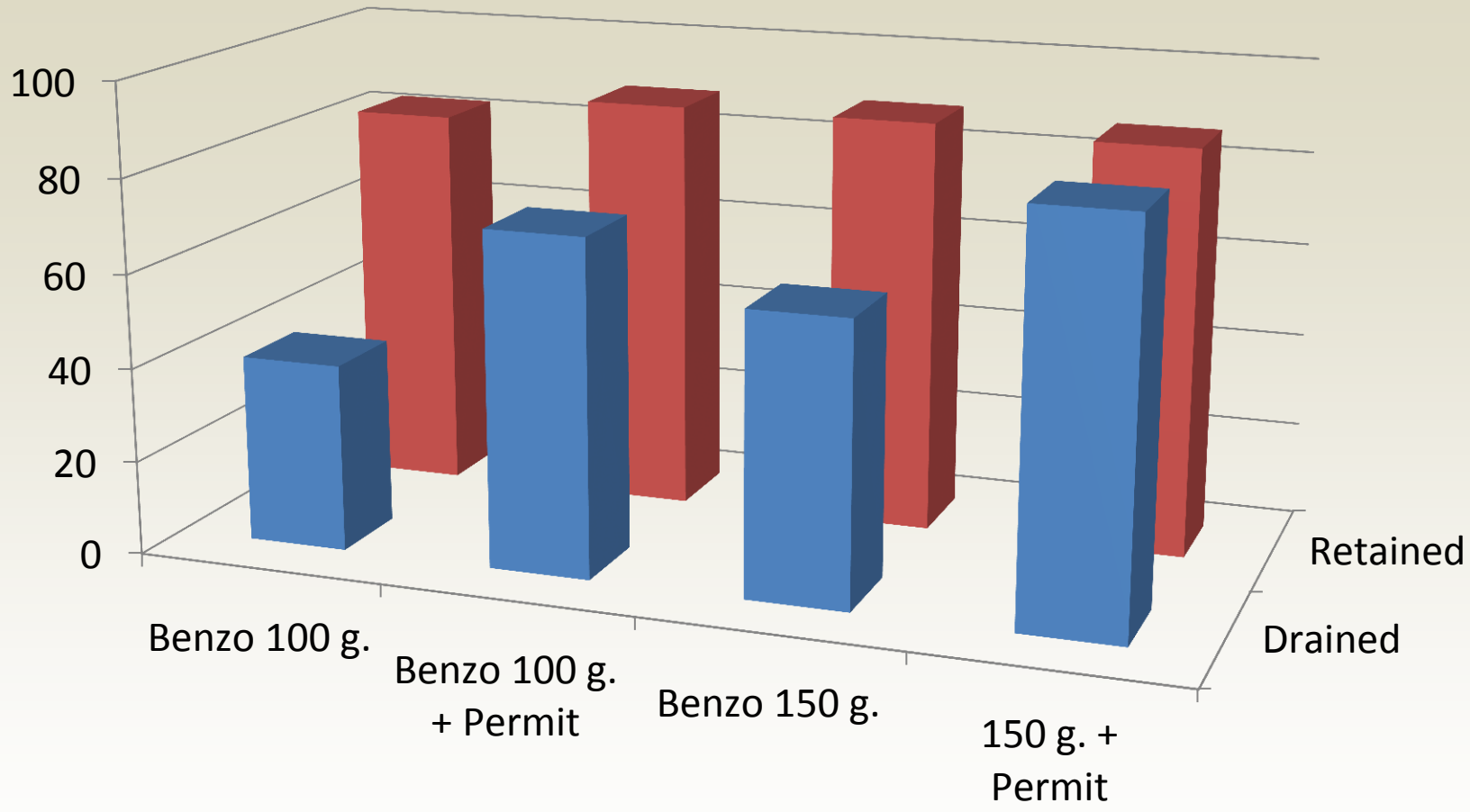
- Post-Flood Application of Benzobicyclon in AR
  - Dr. Jason Norsworthy (Univ. of Arkansas)
  - Two durations of flood following application:
    - Drain at 3 DAT, re-establish flood on next day
    - Retain flood indefinitely
  - Two rates of benzobicyclon (GWN-10235)
    - 100 and 150 g. a.i./A.
    - Applied with COC (1% v/v)
  - Permit (0.67 oz./A.) applied to one half of each treated plot
  - Each treatment replicated 3 times

Gowan Product Update for 2015 LATMC

- Post-Flood Application of Benzobicyclon in AR
  - CL 152 rice treated with Command (PRE) at planting (4/22/2014) and Newpath (Mid-POST) pre-flood on 5/15/2014.
  - Treatments applied 3 days after flood (6/10/2014). Flood depth of 3 – 4 in. was maintained in the trial.
  - Weed spectrum of barnyardgrass (3-5 in., 4 leaves), yellow nutsedge, rice flatsedge (2 in., 3-4 leaves), northern jointvetch (3-4 in., 2-3 leaves), dayflower, California arrowleaf and ducksalad

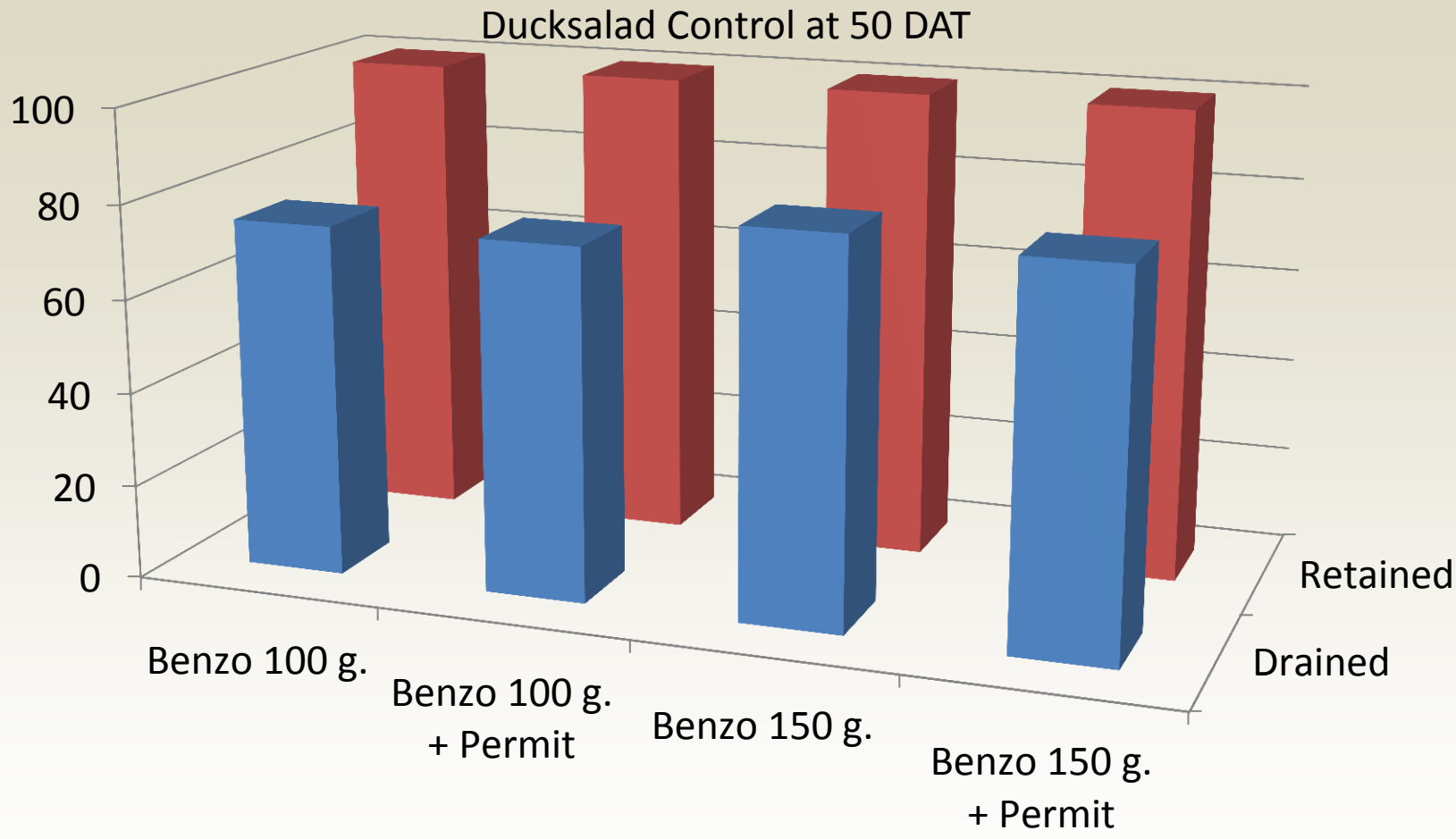
Post-Flood Application of Benzobicyclon in AR

Barnyardgrass Control 62 DAT



Jason Norsworthy, Stuttgart, AR (2014)

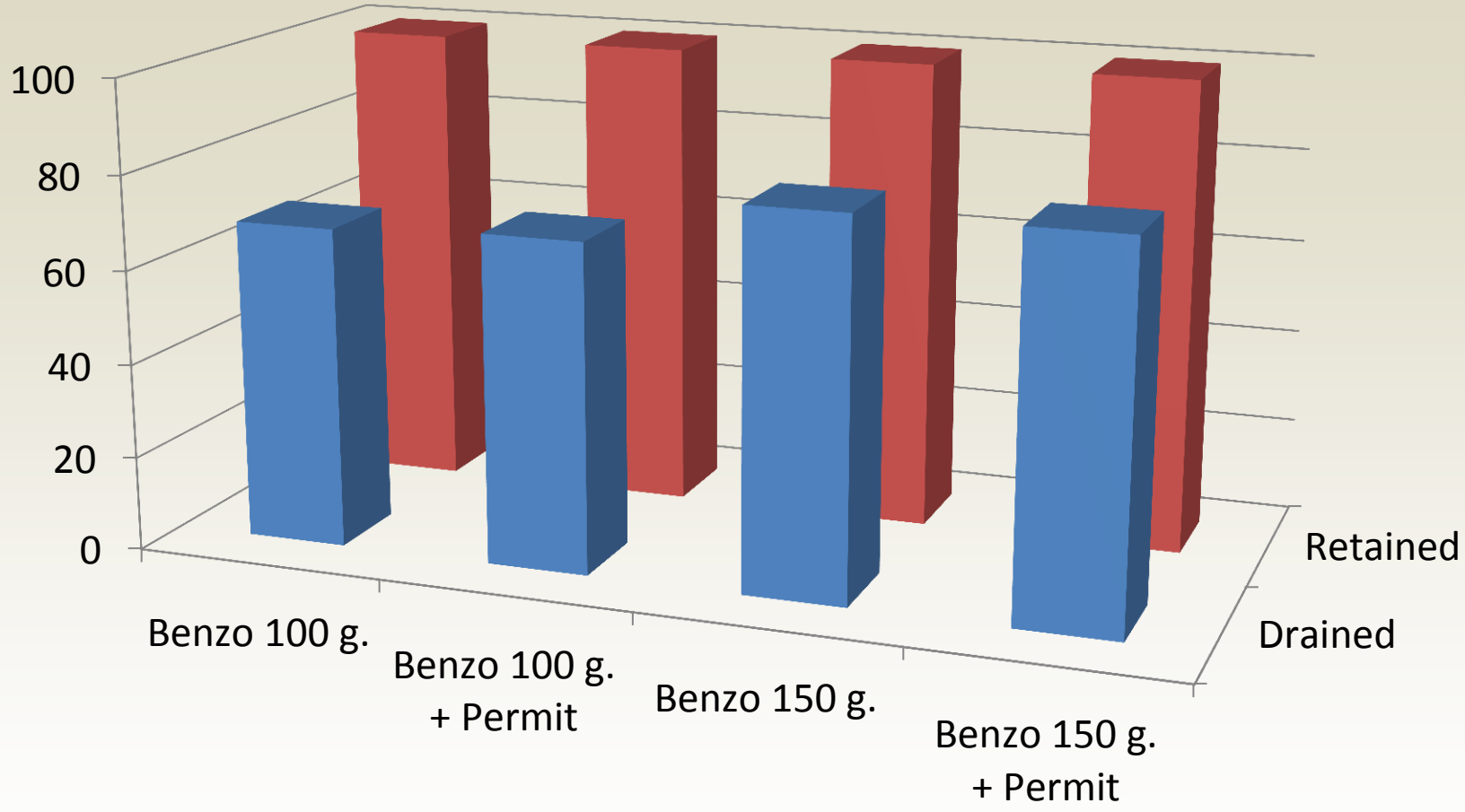
Post-Flood Application of Benzobicyclon in AR



Jason Norsworthy, Stuttgart, AR (2014)

Post-Flood Application of Benzobicyclon in AR

California Arrowhead Control at 50 DAT

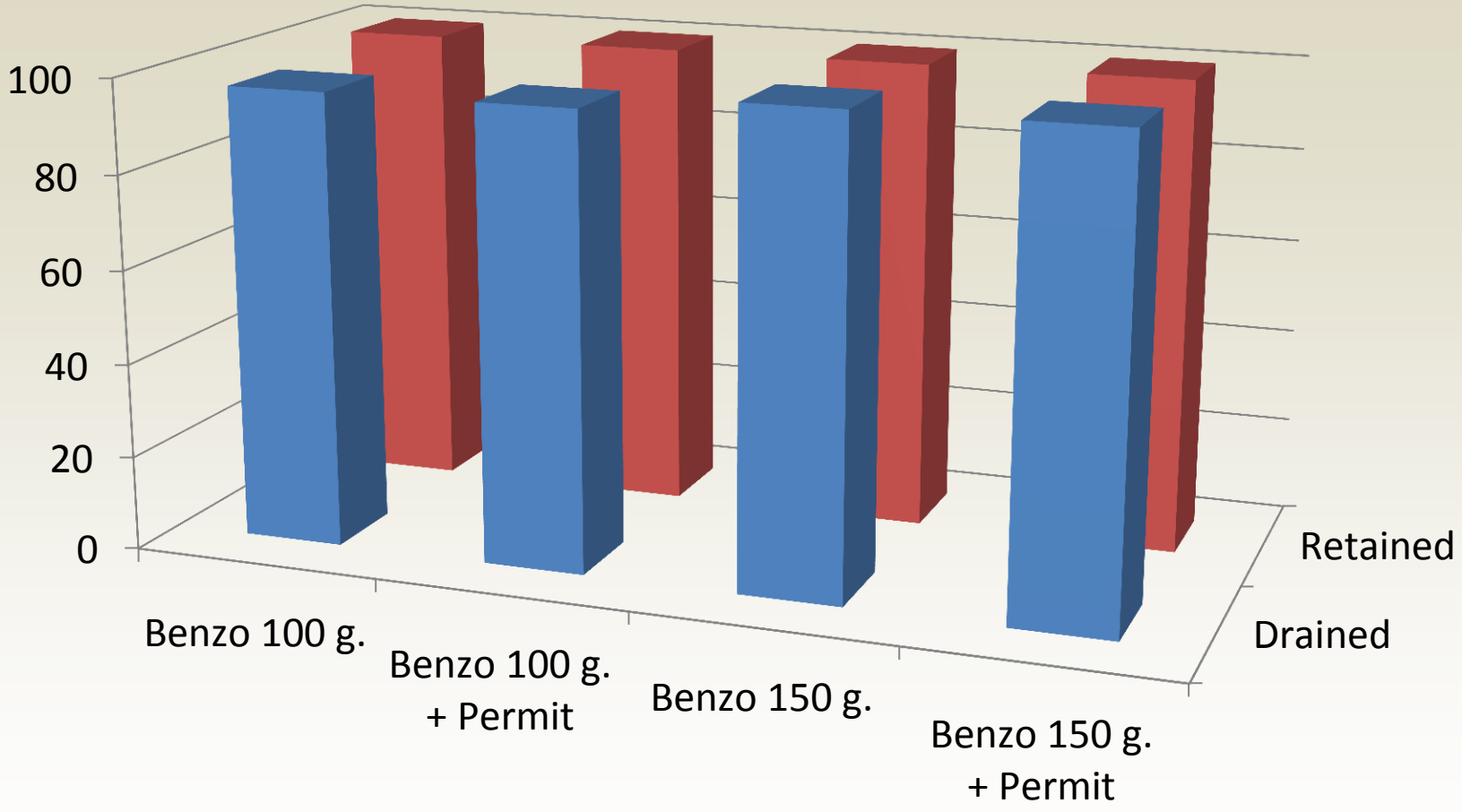


Jason Norsworthy, Stuttgart, AR (2014)

Gowan Product Update for 2015 LATMC

Post-Flood Application of Benzobicyclon in AR

Yellow Nutsedge Control at 62 DAT



Jason Norsworthy, Stuttgart, AR (2014)

Post-Flood Application of Benzobicyclon in AR

50 DAT

East end of plot

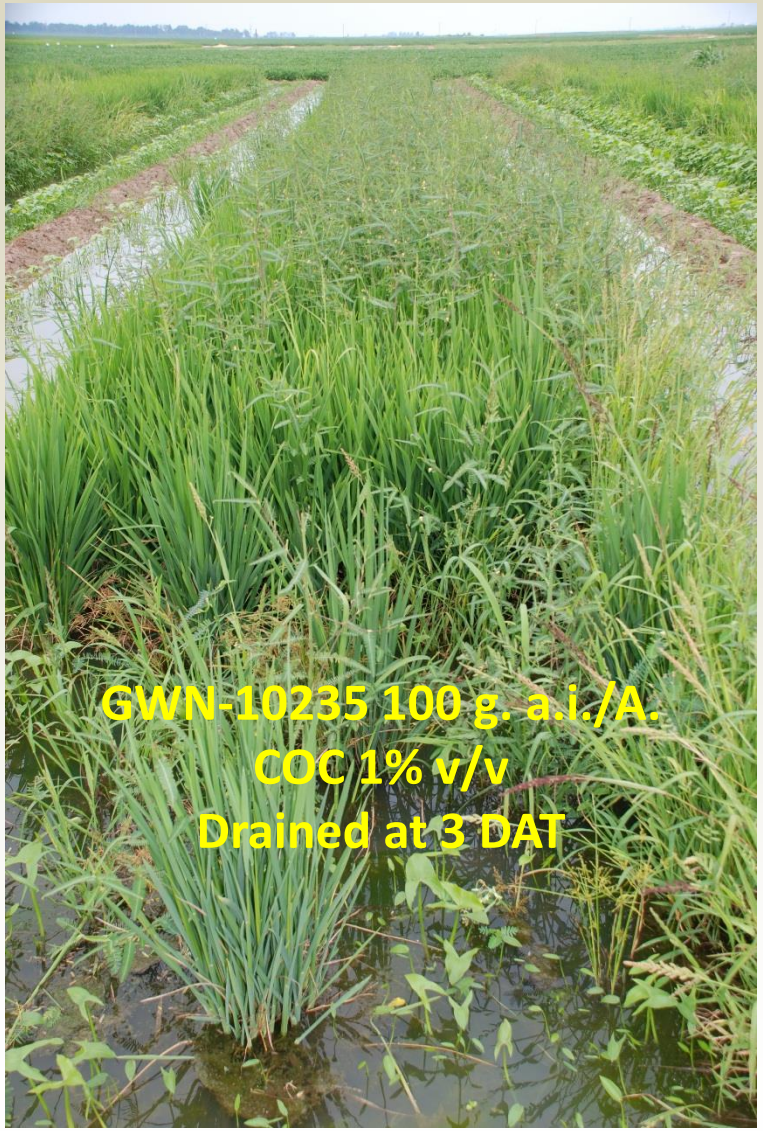
Untreated Check (3 DAT Drain)

West end of plot

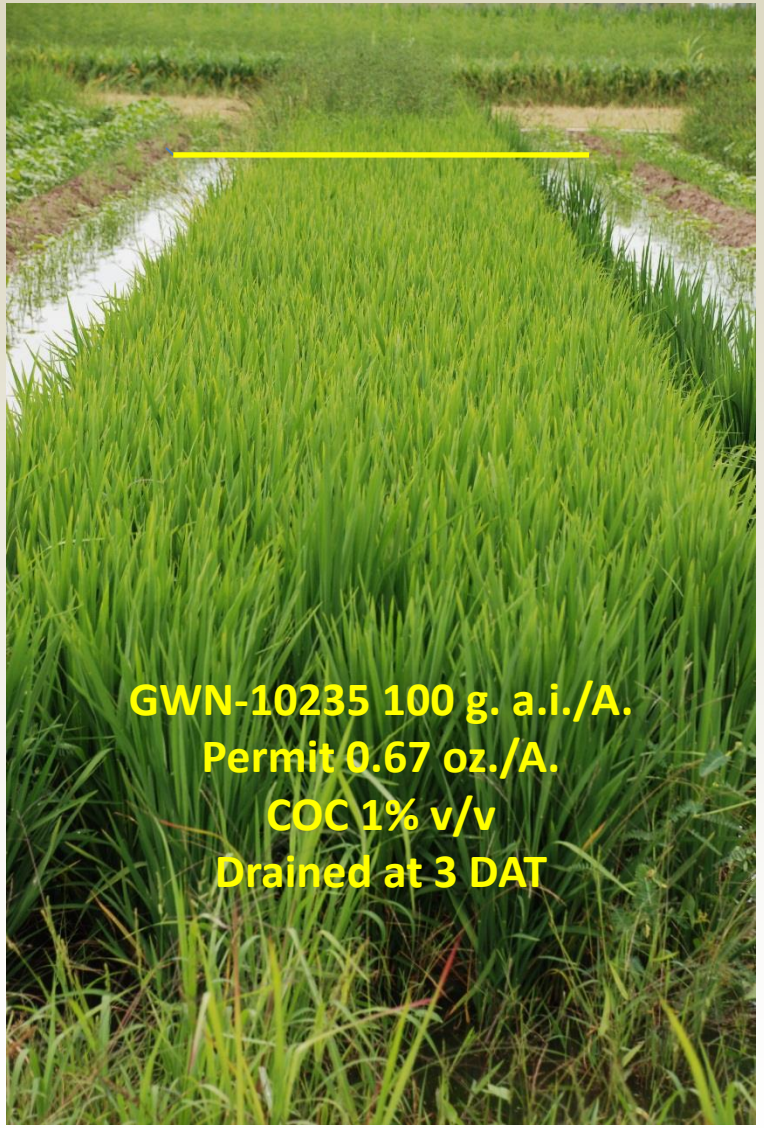
Post-Flood Application of Benzobicyclon in AR

50 DAT

Rep 1



East end of plot



West end of plot

Post-Flood Application of Benzobicyclon in AR

50 DAT

Rep 1

East end of plot

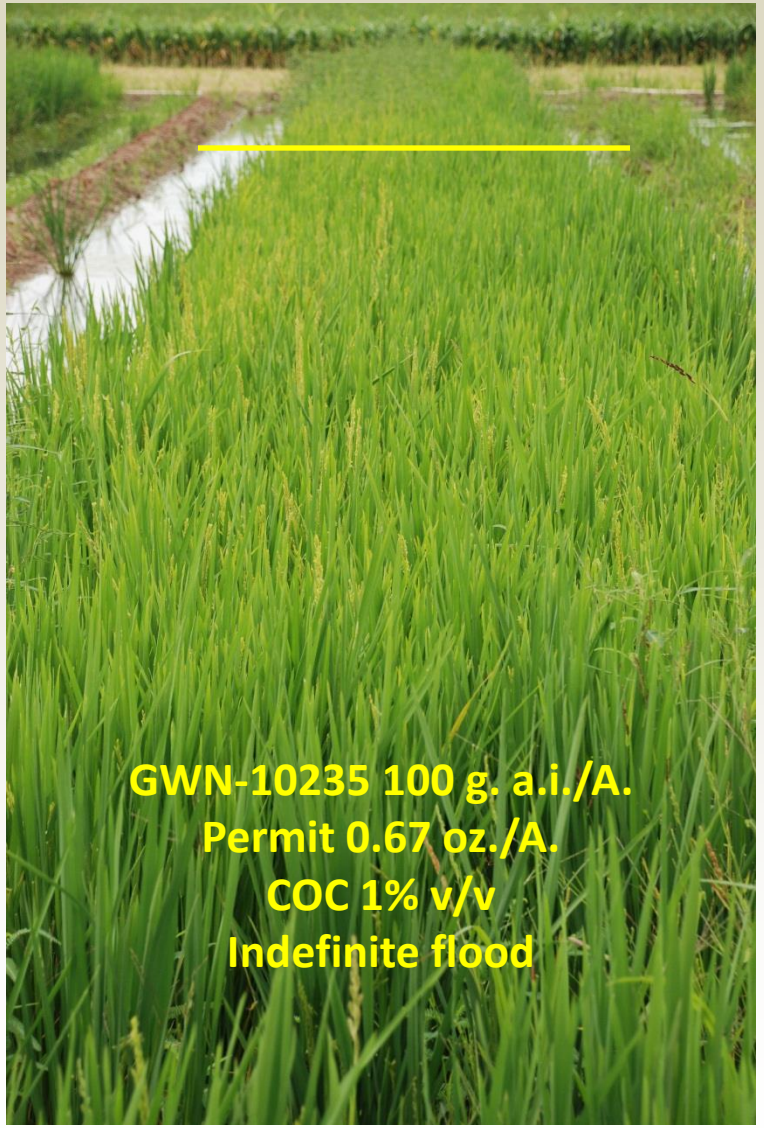
West end of plot

Post-Flood Application of Benzobicyclon in AR

50 DAT

Rep 1

East end of plot

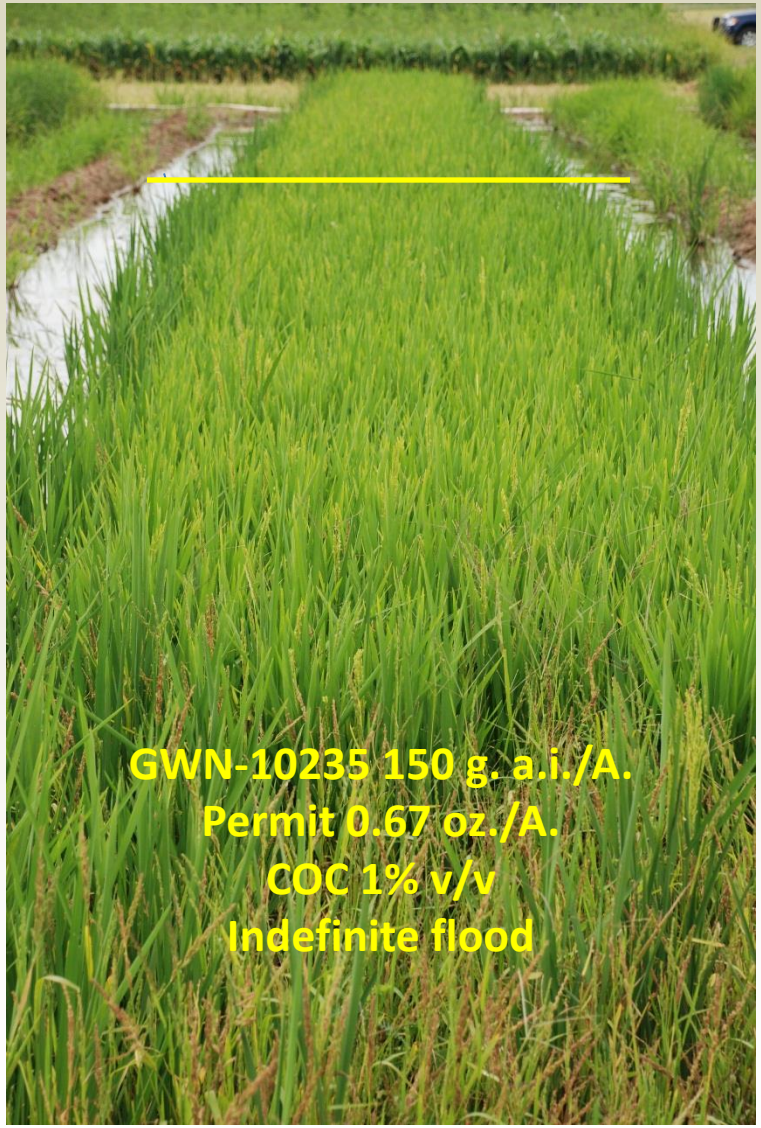


West end of plot

Post-Flood Application of Benzobicyclon in AR

50 DAT

Rep 1



East end of plot

West end of plot

Post-Flood Application of Benzobicyclon in AR

- **Conclusions:**
  - Addition of Permit to benzobicyclon significantly enhanced control of large grasses, sedges and broadleaf weeds
  - When applied alone, 150 g. a.i./A. of benzobicyclon exhibited improved weed control over 100 g. a.i./A.
  - Holding the flood indefinitely increased control over draining at 3 days and immediately re-flooding

- **Formulation Development**
  - Numerous formulations have been tested in the US for the last four years
  - A granular formulation is planned for California and will include halosulfuron for increased grass control and wider spectrum
  - The formulation of choice for the Mid-South has been a stand-alone SC
  - A high strength WDG formulation is being developed for the Mid-South that will combine benzobicyclon and halosulfuron

Gowan Product Update for 2015 LATMC

- **Registration Status**
  - Benzo was submitted concurrently to the EPA and CDPR in December
  - Benzobicyclon was submitted as a reduced risk pesticide
  - Butte® (3% benzobicyclon + 0.64% halosulfuron granular formulation) was the only product submitted
  - If granted reduced risk status, the technical and Butte registration should be granted in Q2 2016.
  - If not granted reduced risk status, the registrations should be granted in late Q4 2016.
  - The Mid-South registration package is expected to be delivered to EPA in late 2016.

Gowan Product Update for 2015 LATMC

- **Proposed Label:**
  - Water-seeded rice: Apply with “permanent” flood.
  - Drill-seeded rice: Apply after establishment of “permanent” flood. Deep water is beneficial to activity.
  - Rate of Rogue: 100 – 150 g. a.i./A. benzobicyclon with the equivalent of 0.67 – 1.0 oz./A. Permit
  - Surfactants: NIS or COC
  - Water-hold: Minimum of 3 days, the longer the better
  - Weeds controlled:
    - Grasses: *Leptochloa*, *Echinochloa*, *Panicum*
    - Sedges: Annual and perennial
    - Broadleaves: *Sesbania*, jointvetch, ducksalad, arrowhead, “exotic aquatics”


Questions?