Testing causes of triploid oyster summer mortality across the northern Gulf of Mexico

WILLIAM C. WALTON & SARAH BODENSTEIN
AUBURN UNIVERSITY SHELLFISH LABORATORY,
150 AGASSIZ ST., DAUPHIN ISLAND, AL 36528
BILLWALTON@AUBURN.EDU
@AUSHELLFISHLAB
High Demand for Triploids

- Considered to have better summer meat quality & grow faster than diploids
- In 2014, triploids made up 91% of growers' plantings in VA.
- In 2017, of AUSL orders, 36 million triploid seed was ordered for farms in the Gulf, compared to only 6 million diploid seed.
Growing Concern about Triploid Mortality in Oysters

- Joey Matt & Stan Allen have conducted several years of work evaluating triploid mortality in eastern oysters, Crassostrea virginica, in Virginia.
- Cheney et al. (2000) found spikes of rapid summer mortality in triploids relative to diploids.
Concerns in Gulf of Mexico

- In 2016, oyster farmers reported very high losses of oysters. Many associated this with triploids.
- Prompted a quantitative study in 2016-2017 (Wadsworth et al. (2019))
Triploids Had Higher Mortality at All Sites

- By end of study, triploids had higher cumulative mortality at all four study sites in Alabama
- Notably, the spikes in mortality were not at the same time or to the same degree
  - No clear single cause
Given that Triploid Mortality Can Occur, Does a Farmer Affect That?

- Industry advice from Australia for *Crassostrea gigas* triploids was to ‘baby the oysters through the summer’
- Oyster farmers routinely impose:
  - Grading/tumbling (to sort by size and help shape and clean oysters), and;
  - Desiccation to help control bio-fouling
Farmer-Imposed ‘Stress’: Grading

- Grading/tumbling is done periodically to sort oysters by size.
- Also potentially helps shape the oyster and clean bio-fouling.
Farmer-Imposed Stress: Desiccation

- Routine desiccation is a method used to control bio-fouling
- AUSL recommends drying for 24-hours once per week under typical conditions
For this Study, Established Three Field Sites in 2018

SELECTED TO REFLECT VARIABLE GROWING CONDITIONS AND AREAS USED BY CURRENT INDUSTRY
Experiment Started April 2019

- Seven cages per site
- Six bags per cage
  - Three were diploid, three were triploid
- Stocked 75 live oysters per bag
Stress Treatments

- Tumbling
- Desiccation
## Stress Imposed Twice: May and July

### Tumbling
- Tumbled
- Not Tumbled

### Desiccation
- 0 hrs.
- 18 hrs.
- 24 hrs.
- 48 hrs.

### Stress Imposed
- 18 hrs.
- 24 hrs.
- 48 hrs.
- 0 hrs.
- 18 hrs.
- 24 hrs.
- 48 hrs.
At all sites, desiccation over 18 hrs. significantly decreased growth.
At Two Sites, Triploids Outgrew Diploids
In Alabama, Grading Reduced Growth only in Triploids
In LA, Triploids Had Statistically Higher Mortality than Diploids.
In LA, Stressors Affected Mortality but Did Not Interact with Ploidy
In AL, Stressors Affected Mortality but Did Not Interact with Ploidy
In MS, Significant Interaction between Grading & Desiccation, again with No Effect of Ploidy.
Conclusions: Growth

Triploid oysters had a growth advantage over diploid oysters, though this was affected by grading at one site.

Desiccation stress of 48 hours reduced growth rates regardless of ploidy.
Conclusions: Mortality

- Triploids experienced higher mortality than diploids only at one site (Grand Isle, LA).

- Ploidy had no interaction with either stress treatment.

- At each of the three sites, farmer-imposed stress treatments did affect oyster mortality, but there was no difference between ploidies.

- At two sites (LA and AL), grading and desiccation each increased mortality.

- At the other site (MS), an additive effect of stress was seen where the combination of grading and desiccation increased mortality.