



## Tadpole Shrimp Damage to Rice

### Background

Tadpole shrimp (*Triops longicaudatus*) is a crustacean adapted to live in vernal pools. Rice fields provide excellent habitat for this arthropod, which has been recognized as a pest of rice in California since the 1940s.

### Life Cycle

When rice fields are flooded, eggs in the soil rehydrate and hatch, as quickly as two days after the water is started. The first tadpole shrimp instars are very small and translucent, and very difficult to see in the water. As they grow, they become easier to spot; however, the coloration of their shell (carapace) allows them to blend with the soil. Young tadpole shrimp look just like adults.



Figure 1. Tadpole shrimp with a shell size of 4 mm, or about half the size of a rice seed, can injure germinating rice seeds.

Tadpole shrimp molt throughout their life. Their initial growth is quick, reaching When they reach the adult stage, they develop egg sacs under the shell. Eggs are laid in the soil, plants, and other substrate available in the water. Eggs require a dehydration period before hatching. Newly laid eggs therefore will not hatch unless the field is drained, let to dry, and reflooded. After fields are drained for harvest, tadpole shrimp eggs remain dormant in the soil. Next spring, when rice fields are flooded, eggs will float, rehydrate and hatch. Eggs hatch in installments, meaning that some of the eggs laid the previous year will hatch, but others will remain dormant in the soil and hatch only if they go through another dehydration-hydration cycle. Eggs can remain dormant in the soil for several years.

### Injury to Rice

Tadpole shrimp will feed on germinating seeds once they reach a shell size of about 4 mm (about half the size of a rice seed) (Fig. 1). They can reach this size as quick as five days after the water is started when temperatures are warm. Smaller shrimp are not able to injure the germinating seed. Larger shrimp will feed on the emerging coleoptile and radicle, cutting them completely and killing the germinating seed (Fig. 2). Once seedlings have a green spike (the prophyll), tadpole shrimp won't feed on them. However, they will feed on exposed roots. If seedlings are not well anchored, or if they are uprooted by wind, tadpole shrimp will feed on the roots, consuming them to the point where those seedlings won't be able to get established (Fig. 3).

## Management

The longer a field takes to flood, the more time tadpole shrimp will have to develop and reach a size that can injure rice as it germinates. Small fields that can be flooded quickly (in two to three days) can avoid tadpole shrimp injury by seeding soon after flooding. Monitor the seedling stage of development and tadpole shrimp size. Once seedlings have a spike and the root is well established, tadpole shrimp will not affect them.



Figure 2. Germinating rice seed with coleoptile and radicle consumed by tadpole shrimp, and tadpole shrimp egg on seed.

If tadpole shrimp shell is smaller than 4 mm, they won't injure rice; however, they can grow quickly, especially in warm weather. Monitor frequently and take action if tadpole shrimp shell is larger than 4 mm and seedlings do not have a spike yet.

Fields that are drained soon after seedling (Leather's method) are at low risk of tadpole shrimp injury. When draining the water, any young tadpole shrimp will be carried out the field by the water or will be killed once the field dries. Draining a field to kill tadpole shrimp works if the field is dried to the point that no standing water or puddles remain.

Insecticides can be used to control tadpole shrimp. Pyrethroid insecticides are highly effective. However, in recent years, control failures have been reported when using them. In those cases, other insecticides can be used, such as clothianidin, carbaryl, or copper sulfate. Always follow the label and use full label rates to avoid the development of resistance.

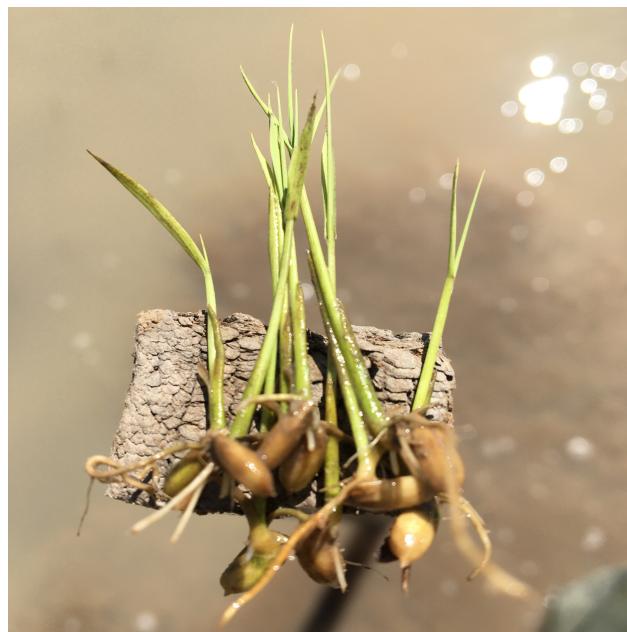


Figure 3. Tadpole shrimp will consume the roots of dislodged seedlings, preventing them from establishing.

## For more on this topic:

- ✓ Integrated Pest Management for Rice, Third Edition. UC Agriculture and Natural Resources.
- ✓ UC IPM for Rice: ipm.ucanr.edu
- ✓ Agronomy Research and Information Center-Rice: rice.ucanr.edu

## Agronomy Research and Information Center

<http://agric.ucdavis.edu/>



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2020