

# Mockup Review: Rice Transplanter

## Orange B

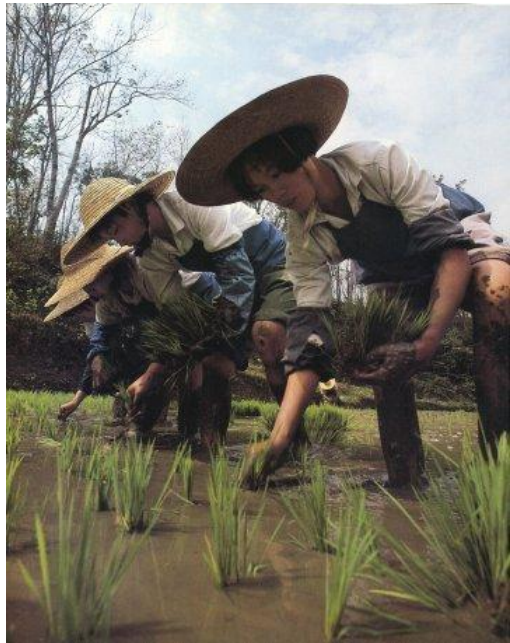
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# Mission Statement



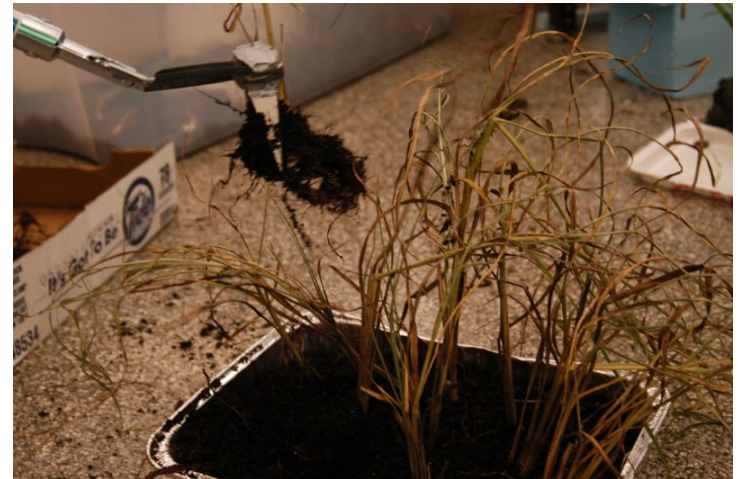
Create an ergonomic device that will eliminate back fatigue and injury among rice transplanting workers while increasing productivity



# Critical Issues



- Field conditions
  - mud consistency and water depth
- Planting tasks
  - picking shoots, inserting into mud, releasing and retracting
- Hand vs. automated loading
  - Hand: slower, but simpler design
  - Automated: faster, but presents higher probability of mechanical failure

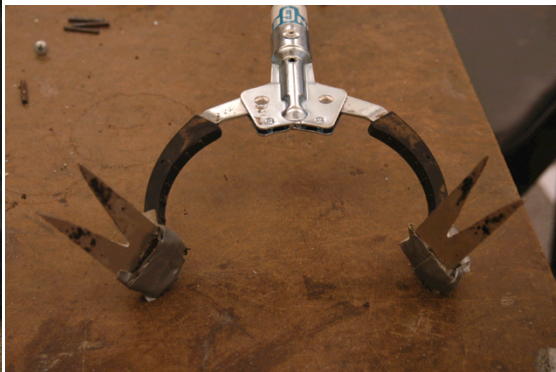
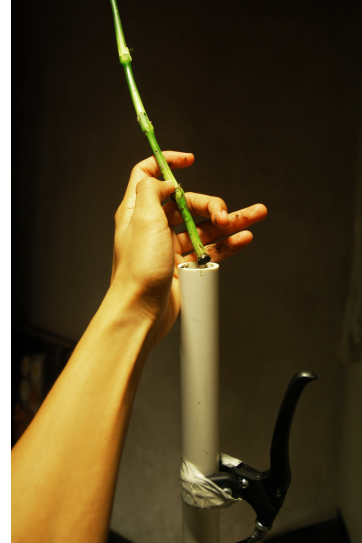


# What We Learned



## o Tube-loaded spike

- Rice shoots caught in tube when loaded
- Plants buoyant in water
- Moving parts clogged by mud
- Two hands for shoot preparation



## o Tongs-on-a-pole

- Tiresome over long periods of time
- Slow loading time

# Current Design



- Tong tips optimized for speed and accuracy
  - Tested multiple worker heights, tong tips
  - Measured speed to load and plant 1 rice shoot



Created holes that were too big



Avg time: 5.3 sec



Avg time: 4 sec

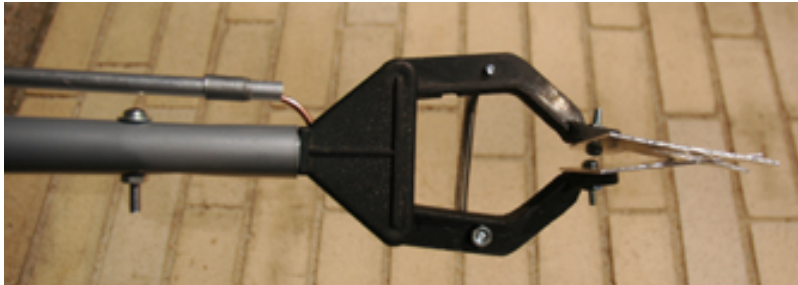
•Avg hand planting time: ~2-4 sec

Orange B

# Current Design



- Double-ended planter with support belt:  
Load rice shoot with one hand, spin down to plant rice



# Current Design



- Optional supporting belt: hands free when not planting, adjustable for different worker sizes



(a) load rice shoot



(b) rotate pole



(c) plant shoot



# Future Concerns



- Depth control
  - Water may obscure visual references when inserting rice into mud
- Human factors
  - Faster loading and planting
    - Our current solutions plant slower than by hand
    - Improve worker endurance
  - Safety
  - Ergonomics
    - Optimize length for different worker heights