Production Protocols for Native Hawaiian Kakonakona Grass

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Introduction

- Kakonakona (*Panicum torridum*)
  - USDA accession # 9107361
  - Annual grass species
  - Dry lowland regions
  - Primary colonizer
Step 1. Seed germination

- Germination test
  - Dormancy can prevent viable seeds from germinating
  - Test for dormancy when seeds are acquired

Place seed in paper towel       Keep damp in light         Count germination (up to 10 days)

If no or low germination (0-5%) occurs, proceed to seed storage after-ripening
Step 2. Seed dormancy relief

- Storage conditions to dry and relieve dormancy
  1. 5 gallon bucket with air tight sealable lid
  2. Seedling heating pad
  3. Thermostat and probe for temperature control
  4. Bubble wrap around inside wall for insulation
  5. 750 g silica gel desiccant container
  6. Humidity indicator cards
Step 2. Seed dormancy relief

- **Storage conditions to dry seeds**
  1. Place seeds in bucket with silica desiccant canister and humidity indicator cards
  2. Seal bucket for 28 days to allow seeds to dry
  3. 1-gram sample of seeds will need to be dried to a finalized non-changing weight of 0.943 grams to achieve 6% moisture

\[
\frac{1.0 \text{ g} - 0.943 \text{ g}}{0.943 \text{ g}} \times 100 = 6
\]

2-3 Seed sampling operations may be required to reach 6%.

Conditioning container needs to allow for all seeds to be exposed to drying agent, cannot be over packed.
Step 2. Seed dormancy relief

• Storage conditions to relieve dormancy

1. Open buckets and remove desiccant canister

2. Re-seal bucket to make airtight

3. Turn on thermostat to 86°F

4. Leave seeds in bucket storage with heat on for 8 months to relieve dormancy
Step 3. Seed storage

- Storage conditions to maintain viability
  
  - After dormancy relief in bucket system
  
  - Seal seed bags/container with humidity indicator card and ensure airtight seal, double bag if necessary
  
  - Store at 41°F
  
  - Ideal humidity for storage of seeds is 12%
Step 4. Crop establishment

- Transplant production
  - Seedling and transplant preparation
    - Sunshine mix #4 potting mix
    - 38 cell seedling tray
  - Place 2-3 Kakonakona seeds on soil surface (do not bury)
  - Place in full sun outdoor conditions
  - Provide overhead irrigation to maintain damp soil in daytime and dry surface at night
    - Overwatering will cause fungal infection, killing seedlings
  - Thin to one seedling per planter cell after 3 weeks using scissors
Step 4. Crop establishment

- Transplant production of Kakonakona
  - After 40-50 days seedlings should be ready to transplant
  - Provide foliar fertilizer if seedlings appear yellow (Miracle Gro™ or similar)
Step 5. Establishment weed control

- Weed control methods to maximize establishment success
  - Site preparation to reduce weed seed bank
  - Directly after planting Kakonakona, apply pre-emergence herbicide to control weed germination
    - Ronstar® 2G over the top of transplants
    - Apply Ronstar 2G at 200 lbs. / acre
      - 2\textsuperscript{nd} application after 45 days if needed
Step 6. Seed harvest timing

• Harvest timing to optimize mature seed recovery

• Early harvest = immature seed
• Late harvest = seed losses due to shedding
• Visual cue at the start of anthesis to begin counting #days until harvest
• Anthesis = bright orange pollen sacks
Step 6. Seed harvest timing

Harvest timing to optimize mature seed recovery

Timing after anthesis

9 days in summer
June-July

12 days in winter
Jan.-Feb.
Step 7. Seed Cleaning

- Seed processing to produce pure seed (stage 1)

Westrup® LA-H

A. Hopper with whole air dried seed heads
B. Discharge door knob, set fully closed
C. #14 wire mesh mantle
D. Seed and small material into collection tray to further clean

Run machine at full power
Step 7. Seed Cleaning

• Seed processing to produce pure seed (stage 2)

Clipper® Office Tester

A. Hopper with discharge from Westrup LA-H

B. Top screen (1 x 1 mm)

C. Solid sheet bottom screen

D. Air blower set to 25% flow

E. Final collection tray with cleaned seed

Run until all material has passed screens
Step 7. Seed Cleaning Demonstration

Seed Cleaning Process for Hawaiian Kakonakona
Review steps

1. Seed germination test to check if seeds are dormant
2. Dry seeds to 6% with silica gel in sealed bucket for 28 days
3. Remove silica gel from bucket, re-seal bucket and turn on heating pad to 86°F for 8 months
    After 8 months dormancy relief in bucket, open bucket and seal seed bag/container and transfer to 41°F storage in refrigerator (12% humidity)
4. Establish transplants in seedling tray until 40-50 days old
    Fertilize if seedlings are yellowing
5. Weed control during establishment
    Site preparation weed flushing to reduce weed seed bank
    Ronstar® 2G applied over transplants at 200 lbs/acre
6. Harvest seeds 9 days after anthesis in summer and 12 days after anthesis in winter
7. Separate seeds from seed heads using Westrup LA-H and Clipper Office Tester machines
Thank you

Happy Planting

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