Germination characteristics of tropical & subtropical species

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120 ISTA accredited seed laboratories

- about 6 testing predominantly tropical and subtropical species
Queensland Seed Technology Laboratory (AU02)

- field crops
- tropical grasses & legumes
- tropical native species including shrubs & trees
• location
• technical expertise
• species popularity
• legislation – mining industry
Many of these species are “difficult to tame”

many have seeds which are

• very small
• extremely chaffy
• carry appendages
• extremely dormant
• not in the ISTA Rules
A few examples of species we test which are not currently in the ISTA Rules for Seed Testing

- *Aristida* species (Spear grass) - Poaceae
- *Astrebla* species (Mitchell grass) - Poaceae
- *Cochlospermum fraseri* (Native Kapok tree) - Bixaceae
- *Chrysopogon fallax* (Golden beard grass) - Poaceae
- *Erythrophleum chlorostachys* (Cooktown Ironwood) - Fabaceae
- *Gyrocarpus americana* (Helicopter tree) - Hernandiaceae
- *Heteropogon* species (Tangleheads) - Poaceae
- *Livistona muelleri* (Queensland Dwarf Fan Palm) - Arecaceae
ISTA Rules germination prescriptions and methods for breaking dormancy are useful

• some work for us

• some do not

• other methods need to be determined by ‘in house’ trial & error testing
Obtaining Pure seed

• feel each seed – *Heteropogon, Aristida, Cenchrus*

• use light box – *Pseudopogonatherum*
Acacia platycarpa

Germination method
BP 20 ≤ > 30°C

Control
Normal 20%, Hard seed 76%
FUS 4%

Chipped
Normal 95%, Hard seed 4%
Dead 1%

Seed

Hot water treated
Normal 30%, Hard seed 66%
FUS 4%

Acid treated 3 hours
Normal 92%, Hard seed 6%
FUS 2%
Astrebla squarossa

Germination method
Embedded 20 ≤ > 35°C
KNO³

Seed

Embedded seedlings at 7 days

Germinated seedling removed from embedded tray
**Aristida inaequiglumis**

Seed with awns

Seed showing spear-like basal end

Awns twirling and pegging seed down

Germination method
Embedded 20 ≤ > 35°C KNO³

Embedded seedlings

Germinated seedlings at 7 days
Brachiaria decumbens

Germination method
TP 20 $\leq > 35^\circ C$
KNO$_3$

Seed

Acid treated 15 minutes

Control
Normal 42%, Hard seed 58%

Acid treated
Normal 86%, Hard seed 14%
**Cenchrus ciliaris**

Germination method
Embedded 20 ≤ > 35°C
KNO₃

Control – Embedded seedlings
Normal 10%, FUS 78%
12% Dead seed

Predried at 40°C – 10 days
Normal 75%, FUS 10%
15% Dead seed
Chloris gayana

Germination method
TP 20 ≤ > 35°C
KNO₃-Light

Seed

100 seeds per blotter

Weighed replicate 0.25g
Chrysopogon fallax

Germination method
BP 20 ≤ > 35°C

Seed

Germinated seedlings at 7 days
Cochlospermum fraseri

Germination method
TP 20 ≤ > 30°C

Seed

Control
Normal 2%, Hard seed 94%
FUS 4%

Hot water treated
Normal 2%, Hard seed 76%
FUS 22%

Acid treated
Normal 89%, Hard seed 6%
FUS 2%, Dead seed 3%
Ectrosia schultzii

Seed removed from outer coat

Germination method
TP 20 ≤ 35°C KNO₃

Germinated seedlings at 10 days
**Erythrophleum chlorostachys**

**Seed**

**Germination method**
SR 20 ≤ > 30°C

Towelling for added moisture

**Boiling water, cooled – repeated 3 times**

Normal 76%, Abnormal seedlings 15% Dead seeds 9%

**Germination method – white paper in towel**
**Gossypium species**

**Germination method:** 1 cm of water in bottom of container & air gap in top of plastic cover

**Control**
Normal 80%, Hard seed 20% at 4 days

**Germination method**
BP 20 \( \leq \) 30°C

**Water method**
Normal 99%, Abnormal seedlings 1% at 4 days
Gyrocarpus americana

Seed
Germination method
SR 20 \leq >30\,^\circ\text{C}

Towelling for added moisture

Outer coat removed

Control
Normal 0\%, Hard seed 100\%

Normal 2\%, Hard seed 98\%
Normal 60%, Hard seed 30%
Abnormal 10% at 35 days

Water soak 3 days

Acid treat 6 hours

Normal 85%, Hard seed 5%
Abnormal 10% at 7 days
Heteropogon triticeus

Seed sample

Seeds showing twisted awns (tangleheads)

Single seeds removed from outer coat

Seed removed from outer seedcoat
Germination method
Embedded 20 $\leq > 35^\circ$C
KNO³

Seedlings - Awn removed

Seedlings with awn

1 Seeds with outer structures intact – nil germination
2 Outer seed structures removed – germination increases
**Iseilema vaginiflorum**

Germination method
BP 20 ≤ > 35°C  
KNO³

Seed sample showing seed: 1

Seed with outer structures intact

Germination method

1 Seeds with outer structures intact – nil germination
2 Outer seed structures removed – germination increases
Livistona muelleri

Germination method
SR 20 ≤ > 30°C

Towelling for added moisture

Seed

Seed soaked in water 72 hours

Germination method

Germinated seedlings at 21 days

Normal 80%, Hard seed 11% Dead 9%
**Pseudopogonatherum contortum**

Germination method:
TP 20 ≤ > 35°C-Light
KNO₃

Seed sample

Single seeds

Germinated seedlings x 3 magnification
Stylosanthes guianensis

Germination method
TP 20 \leq 35°C

Seed in coat
Control

Normal 14%, Hard seed 85%, Dead 1%

Acid treated seed

Normal 88%, Hard seed 6%, Dead 6%
**Themeda triandra**

**Germination method**
Embedded 20 ≤ > 35°C
KNO³

1. Seed sample
2. Seed in glume (1) and seed removed from glume (2)

Embedded germination

Single germinated seedling
Triodia pungens

Germination method
TP 20 ≤ >35°C
KNO³-Light

The question is how to do better?
Weighed replicates?

Germinated seedlings and dead (empty seed) at 10 days
Hopefully by now you more clearly appreciate the difficulties we face very few tropical & subtropical species “give up their dormancy easily”

‘in house’ trial & error provide successful recipes
So
the most obvious conclusion must be:
IF ANYONE WANTS TO SWAP A TEMPERATE LAB FOR A TROPICAL LAB

SEE ME!!