Guam project report: Data Description

Statistics, LSU

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1 Data Description

Trial began in July 2012 with the planting of at 240 trees with 8 foot tree spacing (Fig. 2).

Number of trees	240
Number of Blocks	3
Number of geography	10 for each block

Let's look at **block #1** with 20 pairs (4 trees for each pair):

Pairs	**Geography**	**Origin**	**Number of trees**
M1	Malaysia	Nat	4
M2	Malaysia	Nat	4
P1	Papua New Guinea	Nat	4
P2	Papua New Guinea	Nat	4
S1	Solomon Is	Nat	4
S2	Vanuatu	Nat	4
T1	Thailand	Intro	4
T2	Thailand	Intro	4
A1	Australia	Nat	4
A2	Australia	Nat	4
I1	India	Intro	4
I2	India	Intro	4
K1	Kenya	Intro	4
K2	Kenya	Intro	4
C1	China	Intro	4
C2	China	Intro	4
V1	China	Intro	4
V2	Vietnam	Intro	4
G1	Guam, Inarajan	Nat	4
G2	Guam, Ritidian	Nat	4

1.1 Original data: 6/20/2013

240 trees with 3 blocks. In the excel, **sheet 6-20-13**
"Height" and "diameter" were measured for each tree except 21 damaged trees.

240-21=219 data sets

1.2 Stand thinned: 9/9/2013

First thinning 9/9/13. In the excel, **sheet 9-9-13**
108 trees left

Measurements:

- height(m), height of the tree based on tallest stem
- diameter(mm) at breast height, Trunk/stem diameter at 1.3m above ground
- tree volume
  $(G/4)^2 \times H$ higher value better
- wind damage severity and rood damage severity
  1=none

2=slight(soil lifted, no roots exposed)
3=moderate (tops of some roots exposed, not broken)
4=sever (some exposed and broken, tree would likely survive if left alone)
5 = up-rooted, tree is not likely to survive
lower value is better

1.3 Stand thinned: 12/2014

We thinned tree from the trail again in Dec 201.
In excel, **sheet: 12-2014**
59 trees left.
Height (m) and diameter (mm) were meausured.

1.4 Typhoon dolphin: 2015

Tree destroyed by typhoon dolphin 2015, collected by fallen trees.
16 trees were not severely damaged by typhoon.
In excel, **sheet: Typhoon 2015**

2 Glossy of terms

- **Blocks**: complete groups of experimental units. Blocks design was used because there was a gradation in the soil depth going from very shallow for Block 1 to shallow for Block 3. Trees in block one would not be expected to grow as fast and would be expected to have a shallower root system.
- **Pairs**: trees pair together based on Geography similarites.
- **Geography**: Areas of the world where seeds were collected.
- **Origin**: Seeds were obtained from areas where the ironwood occur naturally (Nat) and from areas where the tree was introduced. Introduced trees were likely selected for lumber, paper, etc where natural tree were not. In the ACIAR Technical Report 58 of 38 international provenance trails it was reported that Natural provenances from Australia and the Pacific recorded the slowest growth.
- **Seedlot**: Identification number provided with the seeds from CSIRO (Australian Center for International Agricultural Research). These same seed lots were used in an international provenance trial. Details on these seeds and how these trees grew in various countries can be found in the ACIAR Technical Report 58
- **Replication**: Multiply planting of the same tree
- **Stem**: a trees truck
- **Thinning**: removal of trees to allow more space between tree and to removed dead or severely damaged trees.

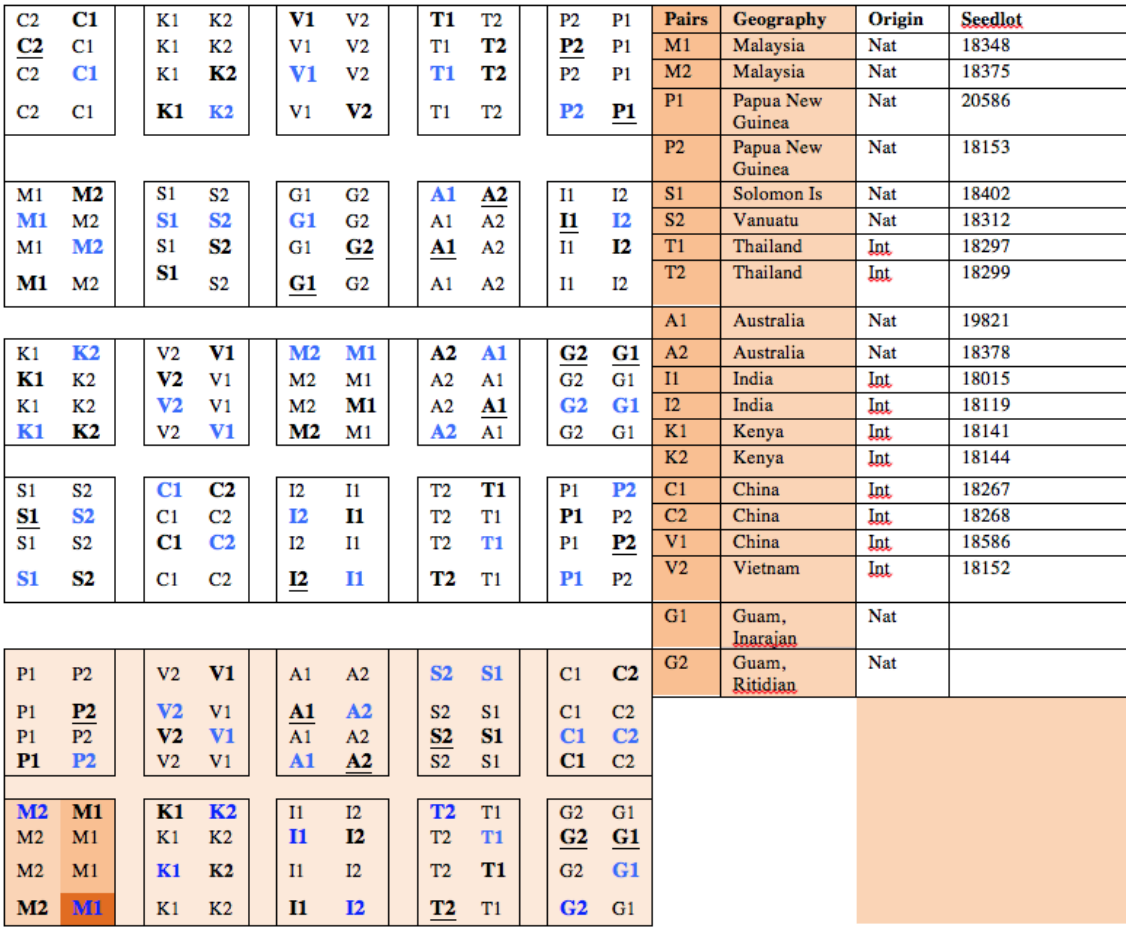
3 Purpose of the statistical analysis

To identify which trees are best suited for windbreaks on Guam. The following are general characteristics of good windbreak trees. Measurements we collected related to that characteristic.

- 1) The tree should be fast growing: stem diameter/dbh, stem height/height, and tree volume
- 2) The tree should have an upright habit (stem axis persistence, stem straightness)

- 3) The tree should provide resistance to wind: high branch density, long branches, and many branches
- 4) The tree needs an adequate production of cones and flower for the production of new trees: cones and flowers
- 5) Branches resistant to wind damage: branch damage
- 6) Low resistant to lodging: wind root damage, typhoon
- 7) Low resistant to wind damage to trunk: wind stem damage

4 Appendix: figures



Pairs	Geography	Origin	Seedlot
M1	Malaysia	Nat	18348
M2	Malaysia	Nat	18375
P1	Papua New Guinea	Nat	20586
P2	Papua New Guinea	Nat	18153
S1	Solomon Is	Nat	18402
S2	Vanuatu	Nat	18312
T1	Thailand	Int	18297
T2	Thailand	Int	18299
A1	Australia	Nat	19821
A2	Australia	Nat	18378
I1	India	Int	18015
I2	India	Int	18119
K1	Kenya	Int	18141
K2	Kenya	Int	18144
C1	China	Int	18267
C2	China	Int	18268
V1	China	Int	18586
V2	Vietnam	Int	18152
G1	Guam, Inarajan	Nat	
G2	Guam, Ritidian	Nat	

Figure 1: Figure 1. Plot diagram of 240 trees with 3 blocks

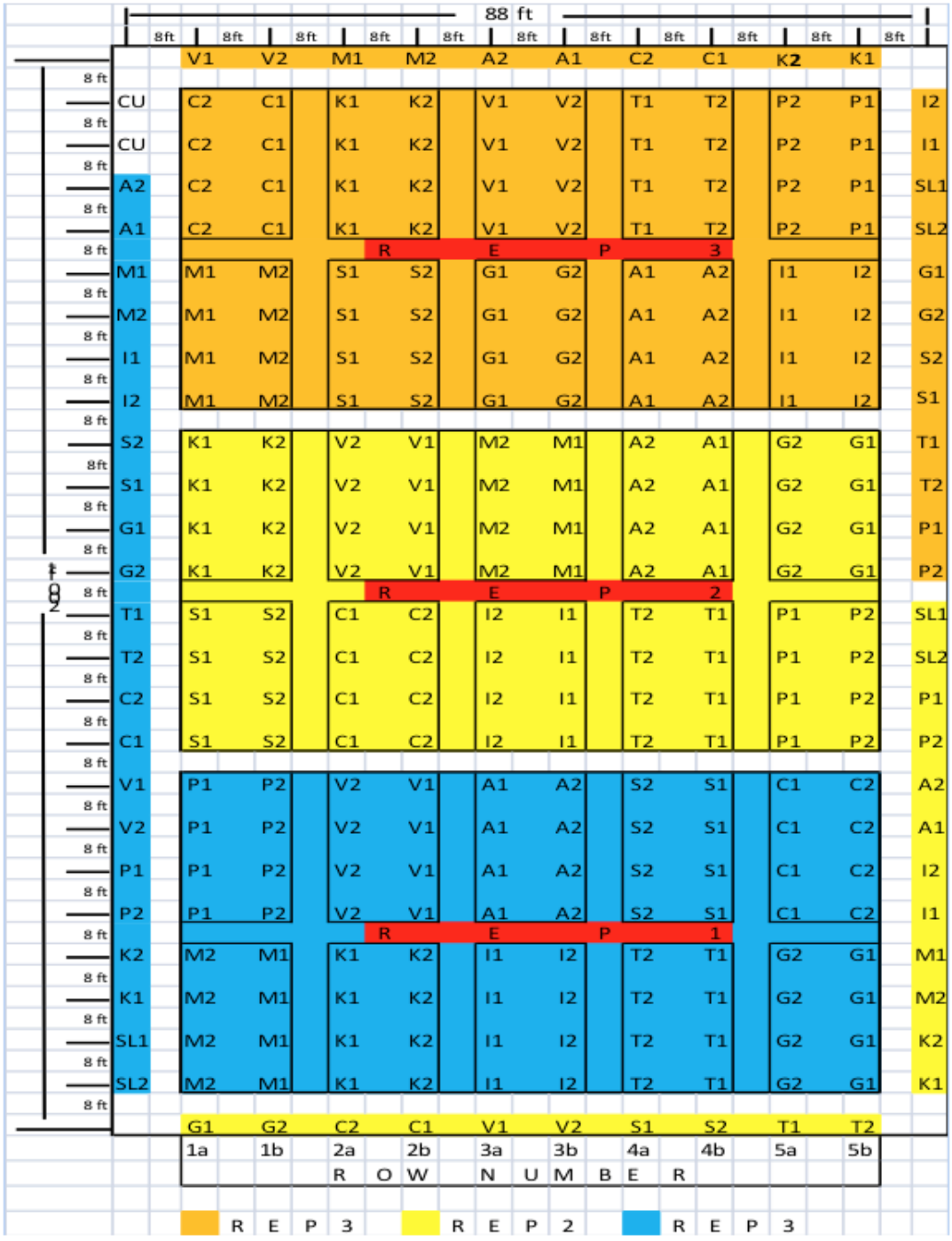


Figure 2: Figure 2. Guam ironwood provenance trial at Bernard Watsons farm. See Figure 1 to match tree geographical location with code.