Augmentium Design Notes & Trial

Broad design features

- A tent like structure
- Poles made from water pipes and fittings will support the structure
- This could be made to be in the form of a dome, box or semi circular frame structure, the shapes need to be simple in order to be made form available materials
- The majority of the surface needs to be covered by a durable material such as canvas
- A small section of the surface needs to have a mesh 1.5mm to allow beneficial insects out
- In addition the surface needs a material tube which enables collected fruit to be placed into the structure
- The structure needs to resist the orchard environment and not be moved around by the wind which would enable fruit flies to escape
- Weight can be added by filling the pipes with sand or building pockets in which stones can be placed.
- Able to dismount for off season storage
- Will need a floor to prevent larve from entering soil

Ideas for Materials

Ideally all the materials would be locally available and affordable

For the surface

1. Canvas for the sides and roof or sacks
2. Mosquito netting for the mesh
3. Poles can be made from electric or water plastic tubing using L and T junctions to form the connections between pipes

Suppliers a hardware store could supply the pipes contentions and mosquito mesh

Canvas would need to be supplied by a material

Velcro could be used to enable the panels to be removed washed and dismantled when not in use.

Questions which need prototype to confirm:

1. Cost of different designs
2. Quantities of materials needed
3. Resistance of different materials
4. Ease of construction and potential to build a ‘flat pack’ to ease transport

Design 1 Semi circular tunnel

Advantages

Modular so can be added to

Low to ground reducing wind resistance

Efficient use of material

Shape of material required to cover easy to cut

Disadvantages

Unlikely to be able to obtain a corner fitting needing to combine a T with an L this was over come by:

The tension from the bent middle hoop caused the square base to warp. A simple twine lasso was used to keep the form. However ideally in a finished product this would be done by an additional piece of pipe. Due to time constraints this was not done.

Materials for a 1.5x1m

Item	n	length	total	Note
Arch	3	120	360	thin guage plastic pipeing
Base	6	75	450	as above
T connection	6		6	will need glue
L connection	4		4	as above
End cover	2	2250	4500	area of fabric required
Top cover	1	33646.5	33646.5	area of fabric required

Suggested improvements

This design was the easiest and best of the trial

The hoops could be made larger

The placement of the entrance for fruit needs to be assessed.

Design 2 Cylinder

Advantages

Easier to construct out of the parts available

Easy to increase and decrease size by adding to the circumference of the cylinder

Disadvantages

Odd shape

Wasteful of material to cover

Stress on linkages from bending into shape could have a negative impact upon durability

Makes smaller designers more difficult as the bending is greater

Materials for a 2m diameter x1m high

Item	n	length	total	Note
rings	8	157.08	1256.64	thin guage plastic pipeing
upright	4	100	400	as above
T connection	4		4	will need glue
side cover	1	62832	62832	area of fabric required
Top cover	1	7853.98	7853.98	area of fabric required

This design was not completed due to a second person being needed to assist with the bending of parts in to the desired shape, and time.

Design 3 Dome

Advantages

Provide large floor area

Natural heap

Strong

Very versatile design enabling lots of different sizes to be constructed simple to assemble.

Disadvantages

Poor utilisation of covering material

Difficulty shapes to cut well

Materials for a 2m diameter x1m high

Item	n	length	total	Note
rings	4	157.08	628.32	thin guage plastic pipeing
dome pole	4	315	1260	as above
T connection	4		4	will need glue
4 way	1		1	will need glue
side cover	1	62832	62832	area of fabric required
Top cover	1	7853.98	7853.98	area of fabric required

Suggested improvements

Initially it was though where the 2 hoops meet in the middle a X junction would be used. However the only available one (see picture below) was of as different gauge pipe meaning the pipe needed to be altered to fit. This would have caused additional weakness at an important part of the structure so was omitted instead the 2 hoops were tied where they cross.

Notes form experience building the trial:

Durable canvas like material is difficult to obtain however the durable heavy 100% shade netting available from Game is ideal and more cost effective.

The fittings are not designed to be under stress caused by bending, as such the circular designs although easy to construct and make best use of the fittings available have a question over durability.

More thought needs to be given on how the material fixes to the frame to provide a tight fit and seal.

The structure will also need to be emptied after the season so the structure cannot be completely sealed.

Due to time constraints only cheap fly netting could be used

Design of the trial:

A minimum of 5 sites which include larger and smaller farmers and resource poor/rich farmers.

A 50m radius would give 7850m2 cover for each (ie max distance to carry fruit) or 0.79 Ha

75m 17,650m2 or 1.77Ha

100m 31,400m2 3.1 Ha

Factors to explore:

the different in labour required to collect and place in augmentoria compared with burying and bagging

Monitoring of fruit fly populations and if possible beneficial insect populations to assess impact.

Density of placement 1 every 2-5 acres is feasible but would not necessarily provide the distribution of beneficial insects required

Supporting equipment such as baskets to convey fruit

Functional life.

Target cost per unit of US$25 is ambitious

Item	Cost	Notes
Narrow gauge plastic piping	9	3m lengths
T junction	3	
L junction	3	
X junction	5	Different gauge for hot water, not available for same gauge
Thick Material	13	Only for trousers and still too thin, 1 yard 30 yard roll bought
100% Shade netting	29	Available form Game