Team # 1

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Solar blanket Tray

Specifications:

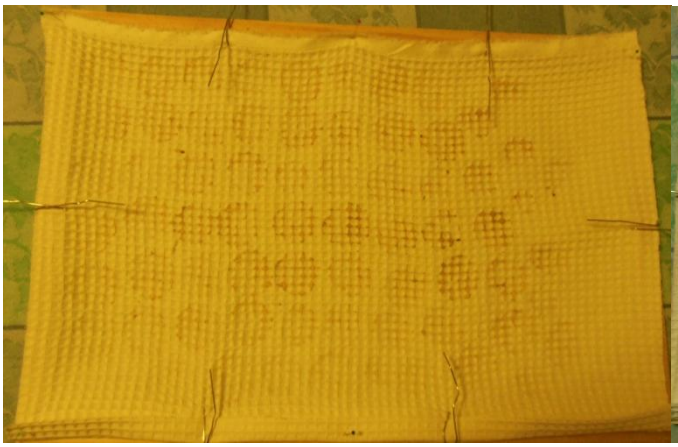
12”x18” wood qwith a .75” thickness nailed together at each corner.

2 Unfold paper clip hooks on each 18” side. 1 unfolded paper clip hook on each 12” side.

Cotton weave fabric covering the wooden frame held together by the hook and 4 pins in the corners.

Drying capabilities: How much water is lost in bananas for a drying time of 6 hours.

Mass of Bananas before drying (g)	8.5
Mass of bananas after drying (g)	2.0
Water lost from bananas (g)	6.5



Test report prototype # 1

Tests:

Four tests were conducted on the solar dryer tray

1. Cleaning Test

2. Weight test

3. Durability test

4. Cost

The cleaning test was conducted to see how easy is to clean the cotton weave fabric. This test was separated into two cleaning tests: with and without soap. The test consists in washing the cloth as any other normal cloth.

The weight test was conducted too see how much weight the solar tray could hold. The point of this experiment was to see if it can hold a large amount of fruit. To test this, we put several hammers (2 pound) on the solar dryer and lifted it to see how it would bend / break.

The durability test was conducted to test how well the solar dryer maintains its form with stress applied to it. The first part of this test was conducted alongside the weight test to see if it changes form with weight applied to it. The second part of this test was conducted to see how does the hooks and pins respond to a force applied to the fabric.

The numbers refer to how well it succeeded. A score of 5 meets all the expectations, whereas a score of 0 meets no expectations. The results are explained in the following tables.

Cleaning Capabilities
Without soap
3

Weight test
1 Hammer (2 pound)
2 Hammer (4 pound)
3 Hammer (6 pound)
4 Hammer (8 pound)

Durability test
Hammer test
Forces on the corners

Cost test
Fabric
Wood
Pins and clips

The solar dryer tray performed exceptionally well in terms of drying capabilities, but the tray still had several design flaws. The cleaning test showed that the cotton fabric does not become fully clean with water alone. Once soap was used to clean the fabric, it was clean and only had a little discoloration. The fabric returned to its original state after being cleaned with soap. Pictures before cleaning, after cleaning, and after cleaning with soap (Figure 1, 2, 3) are at the end of the report.

The durability test gives us the results we were expecting, the tray with 8 pounds is not going to resist a long time of use, but with the size the tray would have in the real design the weight of the fruit is not going to be more than 6 pounds.

Figure 1: Cloth before washing

Figure 2: Cloth after washing with water

Figure 3: Cloth after washing with soap

Prototype # 2

12”x18” wood frame with a 0.75” thickness and industrial staples in each corner.

4 unfold paper clips hooks on each 18” side. 2 unfold paper clip hook on each 12” side

Cotton weave fabric covering the wooden frame held together by 4 pins in the corners.

The cleaning capabilities are the same as prototype 1 because the cloth is the same.

Tests:

1. Weight test

2. Easy to manufacture

3. Durability test

4. Hairdryer test

We perform the weight, cost and durability test again because we change the design of the tray, but the cloth was the same so we do not repeat the cleaning and drying capabilities. The easy to manufacture test is necessary because one of the directions for the DEM project was that the product should be easy to assemble in Africa.

Weight test

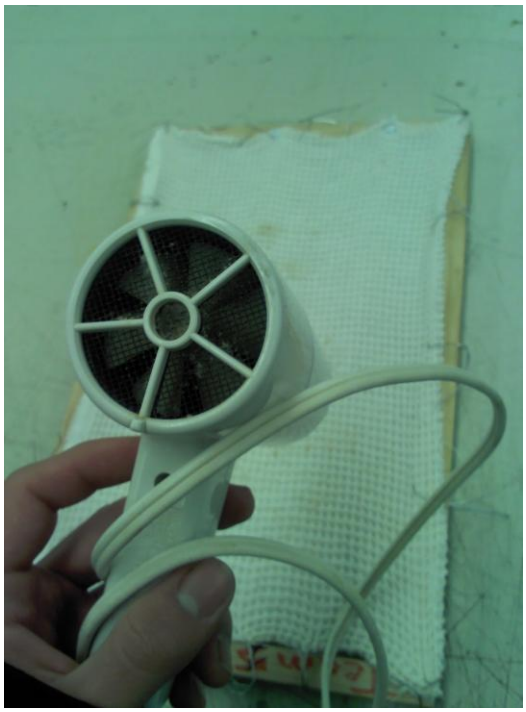
1 Hammer (2 pounds)
2 Hammer (4 pounds)
3 Hammer (6 pounds)
4 Hammer (8 pounds)

In the new prototype we use 4 clips in each 18” side and 2 on each 12” side, this improve and make it resist 8 pounds without a problem.

Easy to manufacture Test
Number of pieces<6
Easy manufacture design
Design time<4

Our design is very easy to manufacture, the woods came from the fabric with the wide and thickness we need. To assembly our tray the person needs to cut the wood in the size they need, use an industrial stapler and then use the clips to secure the fabric.

Durability test
Hammer Test
Forces on the corners

The new prototype was more resistant even in the corners.

Hairdryer test	
Mass of bananas and the tray before drying	72g
Mass of bananas and tray after drying	59g
Water loss from bananas	13g