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**ARUNDO DONAX L. AND ITS USE IN THERMAL  
INSULATION IN ARCHITECTURE TO DECREASE  
THE ENVIRONMENTAL POLLUTION**

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## SUMMARY

The Government pay attention to population problem.

The substances which used in thermal isolation whether artificial or natural may lead to environmental pollution. Also gases which used in cooling and in building conditioning specially upper floors of buildings lead to pollution.

The used materials in thermal isolation cost a lot of money. The study of scientists approved the bad effect of those substances on the health of different organisms and man by environmental pollution.

Arundo Donax L. used in many industries which used locally as in formation of fens of gardens, baskets making and in agriculture.

Also, it is used in formation of clarenittes and flutes. It is used in some places in roofing of houses mixed with palms trunks and trees. Some persons allow grapes to grow on cubes formed of Arundo Donex L. and this lead to some sort of isolation.

Arundo Donax L. grows in excess at banks of rivers and canals in different governorates as Klaubia, Gharbia and Monofia. "Grass Weeds" book mentioned many places of growing as America, Africa, Europe, Asia, Australia, New Zeland and Pacific.

Now the scientists, allover the world, try to use local natural materials in thermal isolation.

### **Water absorption by Arundo Donax L.:**

The mean value for water absorption by Arundo Donax L was 52.6% after immersion in H<sub>2</sub>O for 24 hs at room temperature of 23°C.

### **Properties of Arundo Donax L as thermal Isolator:**

We took 7 samples to measure "K" (thermal conductivity coefficient) by fixation the thickness of samples and changing the number of layers and directions

A - 2 layers  $\theta = 90^\circ$   $K = 0.063$ ,

2 layers  $\theta = 45^\circ$   $K = 0.074$

2 parallel layers  $K = 0.152$

B - The best position of layers of Arundo Donax by putting them perpendicular to each other with  $\theta = 90^\circ$   $k = 0.063$  for 2 layers of Arundo Donax L with thickness 4 cm.

When we compare our results with that of other studies on non-renewable materials as Styrofoam with  $k = 0.028$ .

### **Density of Arundo Donax L:**

Density about 234 kgs/m<sup>3</sup>.

### **Determination of the tensile strength of Arundo Donax L:**

By using 6 samples.

The lowest strength 1.59 kgs/cm<sup>2</sup>

The highest strength 5.06 Kgs/cm<sup>2</sup>

The mean strength 3.28 kgs/cm<sup>2</sup>

In our study, we try to know the natural and mechanical properties of Arundo Donax L and the possibility to use it in thermal isolation.

Arundo Donax L belongs to Family Cramineae. It is one of 800 types of Arundo. Its original place is the area of the Mediterranean sea.

It is present since Ancient pharaohs and they drew them on their building's wall as a decoration unit.

In our study we mentioned other studies about Arundo Donax L whether locally or outside as mentioned in text books, journals and internet.

We study physical and mechanical properties of Arundo Donax L as follows:

- We took 21 samples of Arundo Donax L from the bank of Ryah Monofi at Monofia. We took their length, diameter and thickness of each internode.
- We found that the perimeter, diameter and thickness are inversely proportion when we ascend above the sea surface.
- The length of the internode is variable. It begins small near surface of the earth.
- The moisture content of Arundo Donax L:

The mean value of moisture with time was 12.11 % after natural dryness for 3 months after cutting. They were put in oven 100°C for 24 hs.

### **Determination of bending strength of Arundo Donax L:**

The lowest strength	9.14 kgs/cm <sup>2</sup>
The highest strength	23.7 kgs/cm <sup>2</sup>
The mean strength	13.25 kgs/cm <sup>2</sup>

### **Determination of compressive strength of Arundo Donax L:**

The mean value in different samples 6.78 kgs/cm<sup>2</sup>.

### **Determination of bearing strength of Arundo Donax L:**

The mean value in different samples 2.72 kgs/cm<sup>2</sup>.

### **Recommendations:**

- 1 - By studying the physical and mechanical properties of Arundo Donax L and the different strength which can be tolerated by it we can recommend its uses as thermal insulater. It is cheap, material, renewable source with less pollution to environment.
- 2 - Proper cultivation of Arundo Donax L by using modern techniques to obtain the best types of the plant.
- 3 - Encouragement of different industries which depends on Arundo Donax L. This will lead to creation of new jobs infront of workers.