

NOTE

Water Retaining Capacity of Some Seeds and Resins

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Resins and seeds have the property of absorbing water. Among the studied seeds and resins, viz., *Lepidium sativum* (A), *Hygrophila uriculata* (B), *Osimum basilicum* (C), *Azadirachta indica* (D), *Moringa oleifera* (E), *Moringa oleifera* has been found to have high water absorbing and retaining capacity. Moreover, *Moringa oleifera* with 2% copper sulphate solution when placed near the roots of the plant, the release of water was slowed down without any fungal attack.

Key Words: Water retaining capacity, Keen-Raczkowski box, Resins, Seeds.

Water is essential for all plant species. On the average, protoplasm contains 85–90% water and even the lipid-rich cell organelles such as chloroplasts and mitochondria contain 50% water. The water content of fruits is particularly high (85–90% of the fresh weight), as is that of soft leaves (80–90%) and roots (70–90%). Freshly cut wood contains about 50% water. The parts of plants having the least water are ripe seeds (usually 10–15%). Some seeds with large stores of fat contain only 5–7% water¹. All physiological processes in plants take place in the presence of water. The minerals from the soil, and the foods manufactured by the leaves, move after being dissolved in water, from the regions of absorption or manufacture to other parts of the plant.

Transpiration by leaves is the driving force for the movement of water in the plants. The amount of water lost by transpiration is surprisingly large. In recent years, an advanced method of water application called drip-trickly-daily has spread throughout the world. It is seen that drip irrigation plays a considerable role in the national agricultural economy and at the same time helps to use limited water resources more profitably. Though these methods save water without affecting the yield, water should be supplied daily in order to avoid water stress to the plants. So it was decided to use water absorbing materials for the sustainable supply of water for the plants. For this purpose the water retaining capacity of some resins and seeds was investigated.

In the study of the absorption and retaining capacity of water by plant seeds and resins of the following plants were selected:

Seeds: *Lepidium sativum* (A), *Hygrophila utriculata* (B), *Osmium basilicum* (C).

Resins: *Azadirachta indica* (D), *Moringa oleifera* (E).

Preparation of Plant Seeds and Resin Samples: The plant resins and seeds were purchased from Ayurvedic shops and dried in air. The air-dried samples were crushed in a porcelain mortar and sieved through a small sieve having round holes of 0.5 mm diameter².

Absorption and Retaining Capacity of Water: 20 g of powdered substance was taken separately in a previously weighed Keen-Raczkowski box of height 1.6 cm, diameter 5.6 cm and hole size 0.75 mm in diameter, spaced at 4 mm centres and a Whatmann No. 1 filter paper placed over the perforated bottom.

The box was placed for 24 h in a 500 mL beaker containing water. By this time equilibrium was reached and water was fully absorbed by the substance. The amount of water absorbed was found out. Then the box was removed, wiped outside and weighed. The physico-chemical parameters of the remaining water in the beaker were analyzed. The Keen-Raczkowski box with substance and absorbed water was placed over a glass plate and allowed to air-dry. The weight of the substance was recorded every 24 h until a constant value was observed. The amounts of water retained and lost were calculated. This procedure was also repeated by using a cotton bag.

Analysis of Water Sample: The residual liquids collected from the five samples were analyzed for free carbon dioxide, electrolytic conductivity, dissolved oxygen, biochemical oxygen demand, hardness, alkalinity and pH following standard procedures^{4,5}.

Fungal Activity: Fungal activity of the samples was studied by serial dilution and pour plates methods⁶.

Water Retaining Capacity using Keen-Razkowski Box

Azadirachta indica (D) and *Hygrophila auriculata* (B) absorbed water nearly same as their own weights. *Lepidium sativum* (A) absorbed water nearly 2/3 lower than its own weight. *Ocimum basilicum* (C) absorbed water nearly half of its weight. *Moringa oleifera* (E) absorbed water nearly 5 times its weight.

Lepidium sativum (A), *Hygrophila auriculata* (B), *Ocimum basilicum* (C), *Azadirachta India* (D) released water slowly, *Lepidium sativum* (A) and *Azadirachta indica* (D) released 50% of water; it took 5 days. *Hygrophila auriculata* (B) and *Ocimum basilicum* (C) released 50% of water; it took 7 and 8 days respectively. But *Moringa oleifera* released water very slowly and took 10 days to release nearly 50% of the water (Table-1).

Water Retaining Capacity using Cotton Bag

Azadirachta indica (D) absorbed water nearly same as its own weight. *Lepidium sativum* (A) and *Hygrophila auriculata* (B) absorbed water nearly double its own weight. *Ocimum basilicum* (C) absorbed water nearly 2/3 higher than its own weight. *Moringa oleifera* (E) absorbed nearly 5 times its weight of water.

TABLE-1
WATER RETAINING CAPACITY OF SEEDS AND RESINS

Days	<i>Lepidium sativum</i> (A)		Hygrophila auriculata (B)		Ocimum basilicum (C)		Azadirachta indica (D)		<i>Moringa oleifera</i> (E)	
	% of water retained		% of water retained		% of water retained		% of water retained		% of water retained	
	Keen Raczkowski box	Cotton bag	Keen Raczkowski box	Cotton bag	Keen Raczkowski box	Cotton bag	Keen Raczkowski box	Cotton bag	Keen Raczkowski box	Cotton bag
1st	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2nd	97.4	94.3	95.6	95.5	85.4	98.7	91.6	94.9	97.6	98.1
3rd	95.1	87.3	91.1	82.8	84.6	87.1	80.1	83.9	90.6	98.0
4th	89.3	67.6	85.8	71.0	67.8	73.7	68.2	69.7	84.8	86.8
5th	78.0	57.2	79.3	59.6	43.5	56.4	53.7	59.1	79.1	83.3
6th	64.6	48.2	70.7	51.8	39.2	51.9	42.6	52.9	72.8	79.0
7th	42.2	37.8	59.5	43.2	30.0	43.3	35.7	45.3	68.4	76.3
8th	38.0	26.5	50.3	35.9	17.7	36.9	28.5	41.0	64.6	73.5
9th	25.5	19.9	43.6	29.3	11.7	28.6	24.3	33.2	56.8	70.7
10th	16.8	14.1	33.9	22.7	6.6	20.3	23.3	31.7	51.5	66.9
11th	6.3	8.3	25.0	19.3	2.2	15.6	18.8	27.1	46.7	64.2
12th	—	6.2	18.4	14.9	—	13.4	11.3	21.1	41.8	61.5
13th	—	4.2	12.9	12.9	—	9.0	6.8	17.8	37.3	58.8
14th	—	0.5	7.3	10.3	—	6.8	4.4	14.4	35.1	56.0

The water desorbing tendency of *Lepidum sativum* (A), *Hygrophila auriculata* (B), *Ocimum basilicum* (C), *Azadirachta indica* (D) was slow. These substances desorbed 50% of water nearly in 6 days. But *Moringa oleifera* (E) desorbed 50% of water in 14 days. So the water desorbing tendency of *Moringa oleifera* (E) was very slow. *Moringa oleifera* (B) was found to absorb nearly five times its mass of water by both methods. Substances like *Hygrophila auriculata* (B) and *Azadirachta indica* (D) absorbed nearly double their mass of water. *Lepidium sativum* (A) and *Ocimum basilicum* (C) absorbed water less than their mass.

The fungal activity in the samples was arrested by adding 2% copper sulphate solution (Table-1).

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(Received: 24 February 2004; Accepted: 29 September 2004) AJC-3583