

# **SEED EQUILIBRIUM MOISTURE RELATIONSHIPS**

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- Water exists as solid (ice), liquid or vapor
- At the temperature at which seeds are stored in Africa, only liquid and vapor phases of water are important
- If liquid water is introduced into an enclosed vacuum space at constant temperature, evaporation takes place until equilibrium vapour pressure is reached.

- Let us say at temperature  $T_0$ , equilibrium vapour pressure is  $P_0$ .
- If the water is in an air space or is in contact with air at temperature  $T_0$ , the water evaporates into the air until the partial pressure of water vapour is  $P_0$ ; the equilibrium vapour pressure at temperature  $T_0$ .

- The equilibrium vapour pressure increases with increase of temperature.
- Seeds contain varying quantities of water. If instead of water we introduce seeds into a vacuum space or an air space, the equilibrium vapour pressure developed at temperature  $T_0$  is  $P_e$  where  $P_e < P_0$ .
- $P_e$  depends on the temperature, the nature of the seeds and the seed moisture content.

- We define a parameter water activity (air) as follows:
- $A_w = P_e/P_o$
- At a given temperature,  $a_w$  depends on the nature of the seed and its moisture content
- Water activity of a seed can be interpreted as availability of water to microorganism.
- It is 1 when the water is completely available and 0 when is completely unavailable, i.e. it varies between 0 and 1.

- A minimum value of water activity is required for spoilage microorganisms to grow on stored seed.
- The minimum value of water activity for moulds is 0.70 – 0.90.
- For cereal seed, this corresponds to a moisture content of 14.0 – 20% while for peanuts it is 8.5 -15%
- Each seed has a specific relationship between moisture content and water activity.
- In all cases water activity increases with increase in moisture content, and vice versa.

- Seed must therefore be dried and stored at a moisture content that corresponds to a water activity that does not exceed the minimum required for spoilage by microorganisms.
- Seed absorbs or loses moisture depending upon the relative humidity of the surrounding air. Seed Enterprises Management Institute
- If the relative humidity (decimal) is less than the water activity it loses water through evaporation and if it is greater than the water activity it absorbs water vapour from the air and its moisture content increases. University of Nairobi

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**THANK YOU**

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