

Rains and Diseases

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Why one catches cold in rains but not under shower bath?

What makes people catch cough & cold when caught in rains, and why fog causes widespread plant diseases? Before we search the reasons for the relation between rains and diseases, we shall have to understand the formation of rain drops/snow in the clouds. We all know that the rains and snow are formed from the water vapor in the upper atmosphere. The water gets evaporated from the sea and land at atmospheric temperature and ascends upwards due to its lower density than the atmosphere at earth surface. The density and temperature of atmosphere decrease gradually at higher altitude. Ascend of the water vapor continues till the density of atmosphere matches with the density of water vapor and there it floats however; such ascend may further be influenced by the air currents in the upper atmosphere due to turbulences etc.

Now let us understand as to how rain drops are formed in clouds:

In order to change the state water molecules from vapor to liquid to snow, Dew Point plays an important role and depends on the relative humidity and temperature. Interestingly though that temperature at that altitude is sub zero, but still water does not liquefy or solidify due to typical physical properties of crystallization of water vapor. For formation of crystals there has to be a microscopic nucleus or seed on which the water vapor could start a phase change to form a crystal known as snow flake. Once the crystal formation starts it's a cumulative process as more and more water molecules accumulate in growth of the said crystal. The normal clouds formation is decided by the balance of the weight, cross section area of the crystal and upward pressure of the air currents to counter balance its weight. Naturally stronger be the upward air current larger be the size of the crystal. In case there are strong upward currents, these crystals, after colliding with other crystals in the process, can grow in size due to larger counterbalancing upward wind force. Whenever such weather condition changes the

clouds descend. The solidified crystal may melt and form water droplets due to surface tension and fall in the form of rain drops or snow crystals.

Now let us explore the nucleus responsible for vapor to crystal formation:

Upper atmosphere comprises trillions of micro particles in the form of micro meteoroids means cosmic dust, normal dust, smoke particle, and micro-organisms like pollens, viruses, fungi, bacteria etc. Other than micro meteoroid, remaining float in upper atmosphere due to upwards air currents throughout the year. Whenever a water molecule comes in contact with such micro particle, it settles on it and then many more molecules start to accumulate thus forming a crystal. So each crystal comprises single or multiple afore said particle and micro organism. When the climate is conducive for the formation of rain, the ice crystal descends and gets converted in to rain droplet, as described earlier. It means that inside each rain drop or crystal there is a micro particle or micro-organism. So the rain water/crystals are pure form of water is a myth. If one collects a bucketful of water and allow it to settle and then observe the residue under microscope, one would find multiple micro meteoroid and other micro organisms. It is known that many such micro-organisms can cause diseases like Flue, cold, cough etc. So when people get wet in rains, they are exposed to all such organism and those who are susceptible, fall ill. Likewise many people are allergic to pollen, dust etc. so during the rains or cloudy conditions they develop allergic symptoms like asthma. One would immediately appreciate that getting wet under shower may not develop such symptoms as the drops being artificially created having and having no foreign matter. Further this cycle of micro organism may a part of evolution meant for their transportation.

Now let us understand as to how fog is responsible for crop diseases:

During winter months or when the temperature is considerably low and relative humidity is high especially during early morning hours is conducive for dew formation. The water vapor in lower atmosphere, starts crystallizing on atmospheric micro particles and organism and form an opaque layer known as fog or smog. These are floating water

particles in the atmosphere. It has been also reported that many fungi, viruses, bacteria like *Pseudomonas Syringae* (a plant pathogen producing INA protein) present in the fog, release certain protein, enzyme in the fog water particle and increase its freezing temperature up to 4° C and thus water molecules becomes ice particles. When such ice particles settle on vegetations they freeze the leaves thereby destroying the plant tissue. The micro organism including fungi thus thrives on such dead tissues and cause widespread damage to the crops in the form of diseases like “rust” etc and. likewise people susceptible to asthma, allergy, and rheumatism may also suffer. It is been reported that the said enzymes bearing micro organisms use the fog for their propagations and transportation.