Lotus Effect® -- Self Cleaning plants

The smoother a surface the less water and dirt stick to the surface. Correct?????

NO! Not with lotus plants and several other plants.

Why not? It all has to do with wetability --

Water repelling surfaces or non-wetting surfaces are called hydrophobic

Water forms nearly spherical drops and the contact angle is near 180°

Water loving surfaces or wettable surfaces are called hydrophilic

Water forms flattened drops and the contact angle is very low, less than 30°.

So what does this have to do with nanotechnology?

Dr. Wilhelm Bartholtt, Director of the Nees-Institute for Biodiversity at Bonn, Germany discovered that lotus leaves stay clean not because they are smooth but because they have microstructures and nanostructures that make the surface rather rough.

Two physical properties cause this non-wettability:

1. Very fine microstructures on the leaf surface repel water
2. Nanotstructures (1nm) on top of the microstructures are coated in a waxy substance making the leaves super-hydrophobic

Left: SEM image of surface produced within the project.
Right: SEM image of the surface of a Lotus leaf. (D. Chakarov, P. Holgerson)
A drop of water on a super-hydrophobic surface rolls, off, it does not slide. When the drop rolls, it also picks up any particles along the way making a clean surface.