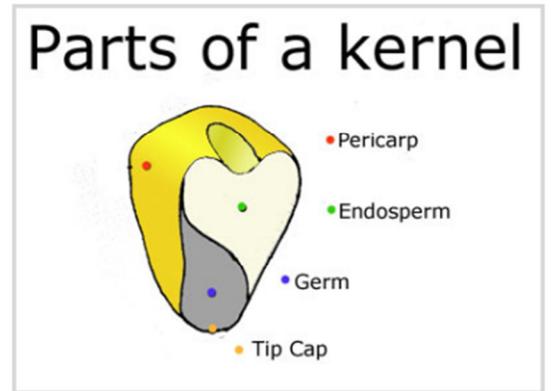


Why Does Popcorn Pop?

A popcorn kernel is a cereal grain (seed). It is made up of four major physical structures: (1) The **Pericarp (seed coat or outer hull)**: a hard outer thin covering. (2) The **Endosperm**: starchy part that forms the bulk of the kernel and consists almost entirely of starch along with smaller amounts of protein, fat, minerals and water. This water plays an important role in the popping process of popcorn. (3) The **Germ (embryo)**: The rudimentary (partially developed) plantlet within the seed. This is the structure that develops and grows into a new plant when it is planted. (4) **Tip Cap**: the part where the kernel joins (attaches to) the cob.



When the kernel is heated (to about 400 degrees Fahrenheit) the small amount of water (13-14%) stored inside the starchy endosperm turns into vapor (steam) causing it to expand (about 40 or 50 times its original size). As the water (steam) expands it puts pressure against the hard starch in the endosperm causing it to become inflated. Eventually, this causes the pericarp of the kernel to give way (to the pressure from the built up steam) causing it to explode (pop) as it flips inside out allowing the steam to escape and expose the soft white fluffy starch known as popcorn.

However, in order for popcorn to pop successfully, there must be certain ideal factors:

1. The amount of moisture (water) in the kernel must be between 13 to 14 percent. Although popcorn are usually harvested when the moisture content is between 16-19% (by mass), they are carefully cured or dried until the ideal moisture content is reached. Too little moisture and there would not be enough steam to carry out the popping process and if there is too much moisture, the popcorn will crack prematurely exposing a dense sphere with the starch not properly cooked rather than the ideal soft white fluffy popcorn.
2. The pericarp of the kernel must have high mechanical strength. That is, it must be very strong (tough). This is necessary to withstand (retain) the steam pressure buildup until it reaches the ideal pressure where the starch is cooked and it is strong enough to burst the strong pericarp wall of the kernel at the right time exposing the soft, white and fluffy popcorn.
3. The pericarp must not contain any cracks or any damage. If it does, then the steam will escape when it is heated preventing the build up of steam pressure that is needed to burst the pericarp of the kernel properly.
4. The temperature must be above 300 degrees F for the popcorn to pop. Popcorn has to be at a certain temperature (about 400 degrees F) so that it is possible for the steam pressure inside the kernel to buildup to the point where starch is properly cooked and it can pop (burst) the strong outer casing (pericarp) of the kernel.

