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| **Introduction Page 2**  "*The biochemical effect of caffeine on plants (and animals) is well known, so much so that caffeine is often used as a tool to investigate processes affecting a variety of cell functions. Caffeine is a calcium release inducer. That means that adding caffeine to cells causes internal calcium to be released. This can result in a wide array of effects as calcium is used in plant cells for a number of purposes. The well-defined action of caffeine makes it useful, because basically, if you see an effect when caffeine is added, the effect is presumed to involve calcium release and/or membrane permeability. For example, recent literature investigating haptonema coiling and cellular differentiation used caffeine to identify calcium efflux and permeability changes as playing a role in these plant processes. Another apparent affect of caffeine on plants may be a role in UV protection. This effect may be mediated through calcium as well. All plants have a requirement for calcium which affects the permeability and organization of membranes. Calcium is also required by alpha-amylase, an enzyme involved in the hydrolysis of starch. Calcium can be used for detoxifying oxalic acid, which becomes insoluble and non-toxic to the plant protoplasm when calcium is bonded onto the acid. Some algae deposit calcium externally, as a by-product of obtaining carbon dioxide for photosynthesis, and are responsible for a large proportion of reef-building. Adding caffeine in appropriate doses would lead to symptoms similar to calcium deficiency including stunted growth. (Not mentioning that adding caffeine, or anything else, in high doses could result in more immediate toxic effects. For example, caffeine solutions may be overly acidic, so that the result seen is a pH effect, rather than a direct effect of caffeine. These potential problems must all be taken into consideration in designing the experiment.) Calcium deficiency is seen in plants as a general disorganization of cells and tissue, which is consistent with its role in membrane organization. Growing tips may be* *particularly affected resulting in stunted growth of leaves and roots because calcium is poorly transported from older to younger shoots. Both effects are reflected in the general health of the plant which may succumb to a variety of diseases as secondary infections take hold. For example, blossom-end rot in tomato fruit is often attributed to calcium insufficiency. Caffeine application is likely to mimic these effects."*4  Here we can see a scientific explanation of results that caffeine causes in plants. If plants wold need calcium, they can use caffeine molecules if we were to water them with caffeine solution. Caffeine molecules might react with the molecules in plants in the same way as calcium would do. In this way the plant will not need to use calcium, because it will have enough supply of caffeine molecules.  "*There was a paper published some time ago which suggests caffeine inhibits the process of* ***cytokinesis*** *in plant cells - the last part of mitosis where the two daughter cells split their cytoplasm and organells before a cell wall forms to fully separate them."*5  Putting caffeine in the soil might make it difficult for cells to divide, and it may require more energy for the cells to divide. And if it will slow down the rate of cell division, maybe the roots will be not very long. The good side of it is that if the roots will not be very long that we can grow plants in small pots and their roots will have enough space for them to grow and not form a huge bundle. On the other hand � the leaves may not grow large enough and the plant will be doing poor. Also � the roots will not have enough surface area for the plant to absorb the nutrients it needs. But let�s not forget the structure of caffeine molecule � it is close to the one of adenine, and it might give the plant a lot of energy � for the process of making ATP and for DNA structure � 2 main things in the life of plant.  "*Regarding* ***methylxanthines*** *- a family of chemicals of which caffeine is a member. Many plant-dervied methylxanthines function as antimicrobial factors and naturally-occuring insecticides."*6  That is a good thing because we all want our plants to be protected from all the diseases and insects that may cause the plant�s development to slow down. We don�t want the plant to waste energy on putting forces on recovering from the damage caused by the insects or recovering from diseases � especially the fruits and vegetables � we don�t want our food to have any diseases in it. The best way would be if the plants would not have any damages at all. So if we will put the caffeine solution in the soil � it might protect plants from certain things that we don�t want it to have.  ([BACK](http://docs.google.com/introduction.html))([NEXT](http://docs.google.com/intro3.html))  [[Home](http://docs.google.com/home.html)][[Introduction](http://docs.google.com/introduction.html)][[Hypothesis](http://docs.google.com/hypothesis.html)][[Procedure](http://docs.google.com/procedure.html)][[Data](http://docs.google.com/data.html)][[Conclusions](http://docs.google.com/conclusions.html)][[Bilio/Links](http://docs.google.com/biblio.html)]  [[2001 Projects](http://docs.google.com/index.html)][[2000 Projects](http://docs.google.com/AP2000/index.html)][[1999 Projects](http://docs.google.com/AP99/index.html)][[1998 Projects](http://docs.google.com/AP98/index.html)] |