Search for Salt Tolerant Mutants of Bacillus

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Introduction:

- It is well known that most living organisms need an optimum environment to thrive. Bacteria in general cannot survive after a certain level of NaCl conc.
- However it may be possible that by some genetic mutation, bacteria may acquire the capability to withstand adverse level of salinity. The aim of our work was to identify such type of mutations.

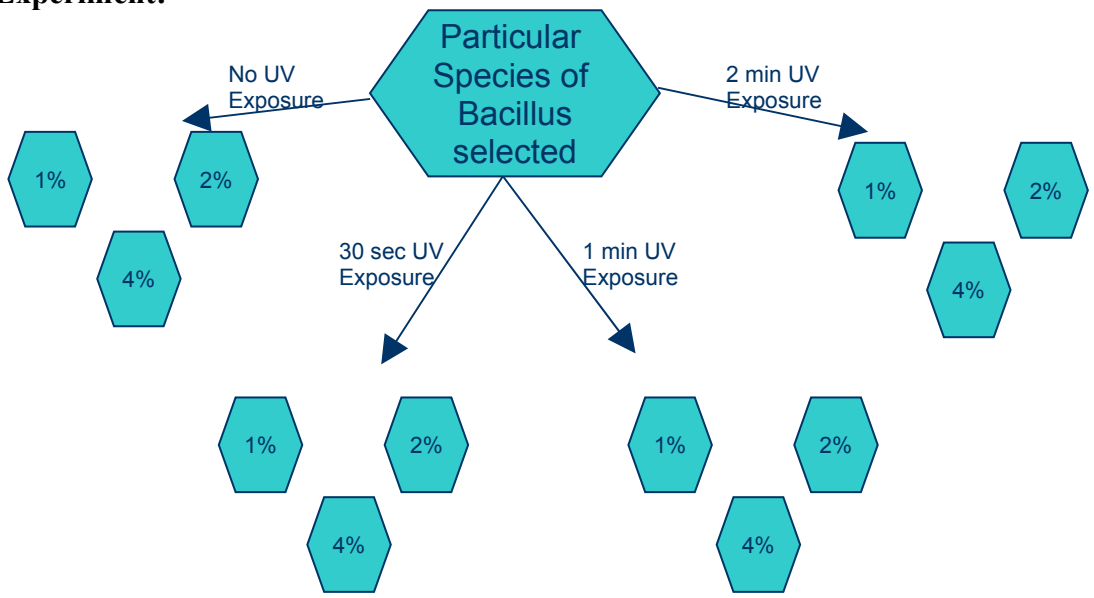
Motivation:

- Many species of bacteria have immense utility in agriculture. However in case of agriculture in saline soil, the soil environment is not at all conducive to any sort of bacterial growth.
- Our aim was therefore to isolate an agriculturally useful bacterium having salt tolerance capabilities.

Choice of the bacteria:

- Initially we selected Cyanobacteria, because of its agricultural importance. But due to time constraints, it was difficult to work with cyanobacteria. So we used a widely available strain of Bacillus as a base for our preliminary study.

Experiment:

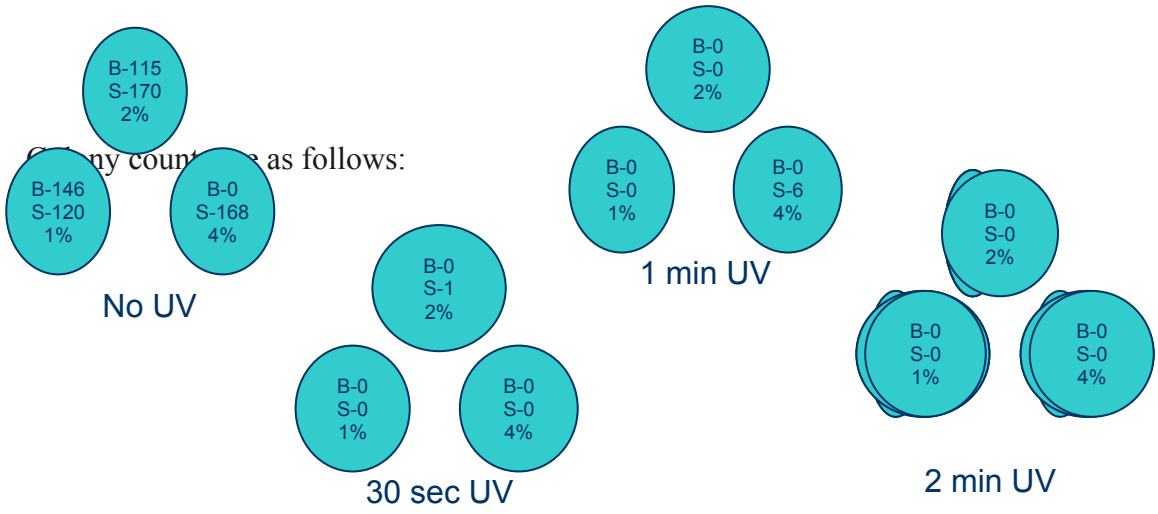


- A particular species of bacillus was selected. It was then plated in four sets of three plates having NaCl concentration of 1%, 2% & 4% respectively.

- One set was not exposed to UV, while the remaining sets were exposed to 30sec, 1min & 2min of UV respectively.

Results:

- After 15hrs the unexposed bacteria showed plenty of growth in media containing 1%, 2% & 4% NaCl.
- One important observation was that in the unexposed plates, containing 1% & 2% NaCl two types of growth were noted. One type of colonies were larger and cloudy in nature, other was much smaller.
- In the unexposed plate having 4% NaCl only the smaller ones showed growth.
- However growth rate of the larger variety was in the order-
  plate having 1% >plate having 2% NaCl>plate having 4% NaCl
  in the unexposed case.
- In the plates exposed to UV, no large colonies were seen. Only one type of colonies were present. This implies that the larger variety did not survive the UV damage.



Conclusions:

- From the unexposed plates two things are evident:
- i) The bacterial sample used was not of a single variety. It was a mixture of two strains.
- ii) Secondly, we used maximum salt concentration of 4%. But it was found that the bacteria with smaller colonies were pretty tolerant to 4% NaCl. Infact they showed halophillic tendency.
- From the UV exposed plates we got a few mutants.
- At 30 sec UV exposure only the plate having 2% NaCl showed growth of the small colonies.
- At 1 min exposure the plate with 4% NaCl showed growth.
- At 2 min exposure no growth were seen.

Utility:

- The salt resistant variant of the bacillus if it can be isolated will have tremendous applications.
- As we know the role of various types of symbiotic bacteria are crucial for the survival of various agricultural plants.
- But unfortunately most of these bacteria can't tolerate salty conditions. That means that agriculture is virtually impossible in saline areas. So if such a salt resistant bacterial strain can be isolated it would be very much useful. Even if we can get a bacterial strain which is not agriculturally useful but has the salt tolerance capability then this salt tolerance gene can be transferred to another strain which is useful.

Future Work:

- Future work would be to isolate the salt tolerant mutants for further studies and characterization.

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