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iCons 4 Blogpost

The cat's out of the bag -- climate change is harming the world. It's basically going to make life harder for us all in the coming years. Everyone talks about how the ice caps are melting and how summers are going to be even hotter. But there isn't enough talk about how global warming is going to make people starve to death. The reality is that as time goes on, the demand for food keeps going up as the world's population goes up.

High temperatures make drought way more common, and that leads to oodles of issues in growing crops (Devereux 2007). Forage grasses (as mundane as they sound) are the key to feeding livestock, like cows and sheep. Without these plants, the agricultural industry is probably doomed (Jahanzad et al. 2016). For example, this coming growing season, many Californian farmers will have to significantly lower the amount of crops they plant to account for another year of intense drought due to climate change (Drought 2021).

So are we done for? Nope. Cue the superhero music!

Little bacteria that live on forage grasses are here to save the day! Or at least, that's what scientists believe. These heroes are called phyllosphere bacteria because they're found on the part of the plant called the phyllosphere (which is just a fancy name for the plant's leaves). Phyllosphere bacteria help forage grasses survive against our villain – drought.

How can our microscopic warriors protect crops against the evil forces of drought? In a few ways, actually.

Drought can make plants more likely to get sick, but 'good' phyllosphere bacteria can compete with harmful bacteria for precious resources, like food and water. That's right, not all bacteria are there to protect their host plants. Some of them are only there to cause disease and crop shortages, but our benevolent bacteria can stop them from doing that.

Phyllosphere bacteria can also prevent plants from drying up by making biofilms. Biofilms are what they sound like -- a film of biologically-made goodness that keeps moisture contained within leaves. Our warriors can prevent plants from getting dehydrated, which is just as important for them as it is for us.

Another way that our tiny superheroes help plants is by ensuring that they get in enough nitrogen. Drought conditions prevent plants from getting as much nitrogen as they require to survive and grow. Nitrogen is almost as important for plants as oxygen is for us humans.

Phyllosphere bacteria fix nitrogen, which means they convert nitrogen in the air to a form that can be used by plants.

How do they do something as cool as that? Through a fancy process called biological nitrogen fixation (BNF). BNF has been known to protect certain plants from drought by using a gene in bacteria called *nifH* (Li et al. 2019). Scientists want to figure out if forage grasses have phyllosphere bacteria that use this *nifH* gene. Knowing what bacteria are found on the leaves of forage grasses could potentially help farmers protect their crops from drought by providing them with a sort of 'probiotic' of BNF bacteria.

My research focuses on just this; finding out if phyllosphere bacteria on forage grasses can help save plants from drought. Samples of bacteria from forage grasses were taken, and their DNA will be looked at to find out if these bacteria really are the superheroes we hope they are. What I learn from my work could help us fare better against the effects of climate change in the future.

In other words, the results of my work could spark a new wave in agriculture that saves us from an impending food crisis. Receiving support from the IFPRI and other funding sources could provide the means to carry out this research, as well as jumpstart its applications in agriculture. This support could help provide the knowledge needed to deploy our microbial heroes against the international villain known as climate change.

References

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This blogpost was ‘modeled’ after this article: https://blogs.scientificamerican.com/life-unbounded/how-to-hop-on-an-asteroid/

One of the characteristics I tried to recreate from this article is more playful language that the average reader can understand and relate to. Generally, I made sentences and paragraphs shorter to account for shorter attention spans (as Scott was referencing). I also tried to explain jargon to a more general audience, as the article did using analogies. I used the metaphor of relating bacteria to superheroes and climate change/drought to villains. Additionally, I used tools such as rhetorical questions to engage the reader more.