Scientists say they have "unlocked key" to photosynthesis, a discovery that could help us meet food security demands. With this information, the food industry might be able to create a more sustainable supply chain, claims the study.

According to a study by the University of Sheffield, the structure of one of the components of photosynthesis has been found. This finding could lead to potentially redesigning the process in order to achieve higher yields.

Researchers say that this could be a breakthrough for solving some of our most urgent food security needs. By redesigning photosynthesis, which creates energy for plants and makes them grow, more crops could grow faster.

The study, published last Wednesday, reveals the structure of a thing called cytochrome b6f. This compound is a protein complex that influences plant growth in photosynthesis.

The team found that the protein involves an electrical connection between two other kinds of protein. Plant cell chloroplasts then convert sunlight into chemical energy.

Author of the study and PhD student in molecular biology and biotechnology Lorna Malone explained the details.

"Our study provides important new insights into how cytochrome b6f utilizes the electrical current passing through it to power up a 'proton battery'," she said.

Basically, this insight helps us understand how this compound is connected to other things within the process of photosynthesis.

As b6f is the "beating heart" of photosynthesis, it plays a crucial role, says supervisor of the project Dr Matt Johnson.

Then, this insight is important because "ultimately this reaction provides the energy that plants need to turn carbon dioxide into the carbohydrates and biomass that sustain the global food chain", according to Malone.

Scientists first determined the single-particle they were looking for - b6f - to conduct the study. Then they modeled it.

The photosynthesis modeling process

This model demonstrates an accurate representation of the protein. It also shows new

details that scientists have never seen before. Such details allowed researchers to better understand the additional role of cytochrome b6f in photosynthetic efficiency relative to environmental conditions.

This finding differs from other similar studies because it shows that the protein is a part of a "response mechanism". This mechanism "protects the plant from damage during exposure to harsh conditions such as drought or excess light". In the context of global warming and increasingly changing climate conditions, this serves as critical information.

"Previous studies have shown that by manipulating the levels of this complex we can grow bigger and better plants", explains Johnson about the implications of the study.

"With the new insights we have obtained from our structure we can hope to rationally redesign photosynthesis in crop plants to achieve the higher yields we urgently need to sustain a projected global population of 9-10 billion by 2050."