



SYNTHESIZE HERBICIDES AND EXTRACELLULAR POLYSACCHARIDE(EPS) CONTROLLED BY BLUE LIGHT INDUCTION SWITCH



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WHAT IS HERBICIDE:

Herbicide refers to a class of substances used to cause the complete or selective death of weeds that can destroy or inhibit plant growth.

HERBICIDES PLAY A HUGE ROLE IN PESTICIDES

INCREASE NATIONAL GRAIN OUTPUT

As the world's population increases, social pressures on food supply will increase, which could be achieved in part by increasing the use of pesticides to combat weeds and diseases that currently reduce crop yields.

HERBICIDES HAVE A HUGE PROBLEM RIGHT NOW

TECHNICAL PROBLEM

Undirected and uncontrollable

According to relevant research, "Only about 25%-35% of the pesticides sprayed from the application machinery can be deposited on the leaves of crops. Less than 1% of the pesticides can be deposited on the target pests, and only less than 0.03% of the pesticides can play a role."



THERE ARE PROBLEMS WITH HERBICIDES THAT ARE WIDELY USED TODAY

Glyphosate, one of the herbicides used most widely C3H8NO5P, is an organic phosphine herbicide and a broad-spectrum herbicide of internal absorption conduction.

RESISTANCE

Glyphosate is the number one selling herbicide in the world due to its excellent herbicidal activity combined with the widespread cultivation of herbicide-resistant GM crops. However, the problem of weed resistance has been very prominent due to the long time single and continuous use of weed.

WHY MORE SUITABLE ALTERNATIVES GLUFOSINATE AMMONIUM ARE DIFFICULT TO PROMOTE

THE DISADVANTAGE OF CURRENT SYNTHESIS METHOD

Although Strecker synthesis grass ammonium phosphonic technology has been mature, the process requires highly toxic cyanide and acrolein material. The demand of external environment is higher to protect the personnel safety in the operation. The target product glufosinate ammonium is difficult to be separated with by-products. The purification process is cumbersome.

OTHER PROBLEMS IN FARMLAND

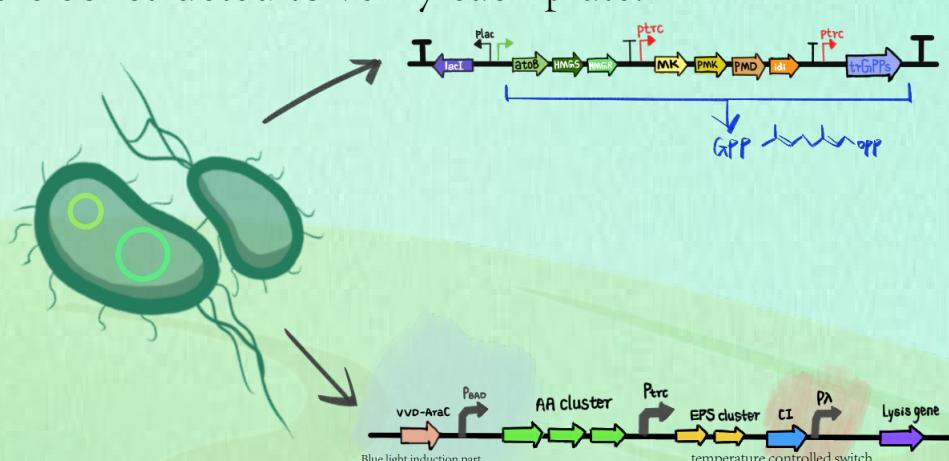
a lot of plastic film in the field will remain in the soil after harvest, which is difficult to degrade and cause damage to the soil. As the main component of plastic film is still plastic (polyethylene), with the spread of plasticizer storm, whether the plastic film can not settle will lead to the high content of plasticizer in the soil and affect people's health is still being tested.

FIELD TRIPS AND FAIR VISIT

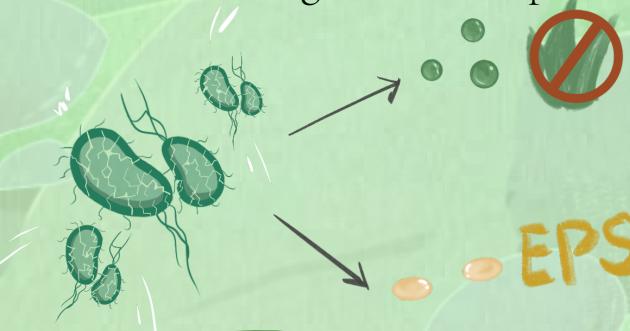
In this interview, we went to the Jiangshan scenic area in Shangluo City, deep in the Qinling Mountains, where the large-scale cultivation of Dianthus superbus L. called Qumai in China is underway. Due to the hot weather, we deeply felt the difficulty and hardship of manual weeding. Later, we had an in-depth interview with Ren Xiaofeng, a professional in Qumai planting. Learned about the disadvantages of spraying herbicides when planting herbs, and the huge cost of manual weeding if necessary.

DESIGN

In order to solve the above problems, we construct the plasmid II and plasmid VI: under the induction of blue-ray glucose is converted into a precursor of the synthesis of herbicide by plasmid II; the precursor to the herbicide we need, at the same time will be synthesized herbicide and on the basis of it to produce EPS, used for not only water but also prevent them from degradation to ensure the content of herbicide by plasmid VI. However, engineered bacterium don't lysis until the sun shines, when weeds multiply and the temperature rises, then release herbicides and EPS. In order to verify the above modules, different plasmids were constructed to verify each plate.



Plasmid I : Comparison blue light induced element with IPTG used to compare the efficiency of that blue light induced element;
Plasmid III : Be used to verify the synthesis of herbicide;
Plasmid IV : Be used to verify the synthesis of EPS;
Plasmid V : Be used to verify the temperature control part's efficiency to suicide, and according to the reference data, it will not completely kill the bacterium, but have some bacterium surviving, to realize circular regulation and production.



COLLABORATION

XJTech

In early April, Xi'an Jiaotong University and Southern University of Science and Technology jointly held a publicity event on campus, during which we stimulated the interest of students by distributing leaflets to introduce synthetic biology and igem, as well as previous year projects, and distributed questionnaires to conduct research on synthetic biology.

SEMINAR

In this meeting, we mainly learned about the projects of each team and discussed the modeling issues which we have a lot of confusion. We were pleasantly surprised to find that we have a strong correlation with iGEM project of Shenzhen University and have reached a certain cooperation.

HUMAN PRACTICE

INTERVIEW PROFESSOR

Through an interview with Professor Chen Kunming from China Agricultural University (CAU), he said: "I think it is meaningful to develop the engineered bacterium synthesizing glufosinate ammonium, but there are details that need attention and assessment" the output of glufosinate ammonium the production cost.

