

CULTIVATION OF FLOOD RESISTANT CROP OF *JATROPHA CURCAS* BY USING TEMPERATURE –INDUCIBLE PROMOTER

Shrankhla Bawaria

BS-MS, Department of Life Science, Indian Institute of Science Education and Research, Bhopal (India)

Email : shrankhlabawaria@gmail.com

ABSTRACT

Enhanced crop yield of *Jatropha curcas* in a challenging climatic condition like that in the country like India is very necessary when the entire world is in need of Bio fuel which is in very limited amount. In India it is mainly cultivated in Rajasthan, a state prone to flood and where the temperature drops down below 15°C which is not suitable for the cultivation of *Jatropha curcas*. With the objective of overcoming this problem to an extent, it is being proposed that the gene responsible for the lethality of the crops in lower temperatures (below 15°C) which is a result of flood should be found out using saturation mutagenesis. And after getting the responsible gene, the gene should be expressed under a promoter which is sensitive to temperature. As the temperature reaches below 15°C, promoter gets activated and it does not allow the gene to express and therefore the plant will not respond to the low temperature and the high level of water as well and therefore it would save all its metabolic function and will be able to survive the altered climatic condition which is flood and lower temperatures.

INTRODUCTION

Jatropha curcas is a species of Euphorbiaceae family. It is a native to the American tropics. It is cultivated in tropical and sub tropical regions around the globe. *J. curcas* is a poisonous semi-evergreen shrub resistant to high degree of aridity [1]. Its seeds are contain oil (35-40%) which is used as biodiesel fuel after processing. This biodiesel fuel is highly useful in a standard diesel engine. The plant can grow in wastelands and in sandy, gravelly, and saline soils. Since in India the suited climate is present in Rajasthan so this plant is primarily cultivated in this state for the commercial purpose. This plant do need water but only when it is germinating initially after that it does not need water. Less water favours the plant growth. And if the water reaches the extreme limit as well as the temperature drops down, the plants show decline in their growth rate. And it is well known that Rajasthan is pretty much prone towards flood condition and cold temperatures (below 15°C) [2], which is really abnormal for the plants to grow. In order to increase the survival rate of the plants in these challenging climatic conditions. The gene responsible the death of the plants in cold temperature and water level needs to be isolated. And this can be done by Saturation mutagenesis. It creates random mutations and those mutations can be selected by giving the required condition. For example, we want to select a gene responsible for the death of the plants in flood and low temperature condition. In that case, we would allow the mutants to grow in the particular conditions.

And the plants which grow in the adverse conditions show that they undergone the mutation in the responsible gene. Now after getting the gene responsible for the death of the plants in stressed conditions, next step is to silence that particular gene in the particular temperature and flood condition. This can be done by using temperature inducible promoter which will be activated when the temperature reaches below 15°C which is a result of flood. Since the promoter gets activated at lower temperature caused by flooding condition, it will not repress the expression the gene responsible for the lethality of the plants in adverse condition. And hence the plants will be able to survive in the stress condition and so the productivity will also be increased.

MATERIALS AND METHODS

Seeds from *J.curcas* will be taken and saturation mutagenesis will be done in these seeds using U.V rays or any other mean. Now these seeds will be allowed to grow in stressed condition (low temperature and flood). Now those mutants which survive in this condition will be selected. And the responsible gene will be isolated as it is giving the lethal phenotype to the plants under stressed condition. Now this gene will be fused with a promoter which is sensitive to temperature. And the seeds containing this mutation will be allowed to grow in the field. Now when the flood comes causing lowering in temperature, the promoter senses it and deactivates the gene due to which plants continue to be grown in stressed condition [3].

CONTROL AND LIMITATION

To find out the gene responsible for the reduced growth of plants under stressed condition, the environment provided after treating the seeds with U.V rays, should be very precise that is lower temperature as well as high water level. And in that case control will be the seeds without any mutation allowed to be grown in stressed condition. And in the cassette of temperature inducible promoter and the gene of interest, the control should be a normal regulatory promoter along with the gene which should die off when given with the stressed condition. Limitation of this protocol can be the seeds may not survive the consequences of saturation mutagenesis at all. In that case we would have to be a bit careful while shooting the seeds with U.V rays.

DISCUSSION

Although there are many measures are being taken to enhance the productivity of *Jatropha curcas* but using inducible promoter and enabling the crops to survive in the stressed condition happens to be more promising than any other measure. It does not need any expensive tool or chemicals which are really harmful for the same or the other crops.

REFERENCES

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