

Mission: Lower cost of malaria treatment

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By utilizing government funding, Jamia Hamdard and Ipca Labs are working on Artemisia annua L plants with high artemisinin (anti-malaria) content through genetic modulation of key enzymes

Shutterstock 1644957 With drug-resistant falciparum malaria continuing to evolve and spreading worldwide, artemisinin-based combination therapies (ACT) have become the centerpiece of global malaria control over the past decade

Malaria is endemic in the South East Asian and African countries, where socio-economic conditions of the population are poor and people cannot afford the cost of ACTs. Working in this direction to reduce costs of ACTs, Mumbai-based Ipca Labs, in collaboration with New Delhi-based Jamia Hamdard (a deemed university), initiated a project to enhance the artemisinin content in Artemisia annua L. plants through genetic modulation of the key enzymes. The commercial production by the company at a large scale can help in slashing down cost of artemisinin-based drug therapies in a major way.

The project funded by the Department of Science and Technology (DST), Government of India, and Ipca Labs was commissioned under an institute-industry collaborative program. Jamia Hamdard has so far received 97.64 lakh from these agencies as funds for the project. While Jamia has a bigger role to play in the research, Ipca Labs is focused on the use of therapies and their commercialization.

The artemisinin is commercially produced from Artemisia annua L. plants with an artemisinin content of 0.01-1.0 percent. The Jamia research team, with the help of Ipca Labs, has developed a novel strain of A annua L. through bioengineering the mevalonate and artemisinin biosynthetic pathways by over-expressing hmgr and ads genes encoding key enzymes of these pathways. The bioengineered strain of A annua had around 160 percent higher leaf biomass and 90.91 percent artemisinin as compared to the mother variety (received from Ipca Labs).

Currently, the stability and inheritance of trans hmgr and ads genes in the newly developed strain of *A. annua* L. plants and also the parameters related to growth and yield of artemisinin in this variety are being evaluated. It is being expected that the metabolic engineering approach pursued in this study will lead to the development of novel variety of *Artemisia annua* L. with artemisinin content more than 1.5 percent. This variety can be patented and released to the farmers for mass scale cultivation and will ultimately lead to higher production of artemisinin.

“In my opinion, efforts should be made by government agencies and the biotech industry to run projects on the PPP model. This will facilitate the major projects leading to the development of products, which ultimately benefit the public at large and support the growth of biotech industry. It will also help to increase the knowledge base and the economy of the country,” said Dr M Z Abdin, project head, working at Jamia Hamdard University. “To carry out major research projects like the present one, the funds received from the government and the industry are extremely essential. They are used to hire manpower, chemicals, consumables and instruments. These components are important for the successful completion of the project.” said Dr Abdin.

The way forward

Due to the short supply of artemisinin, the cost per treatment course of ACTs (108.70) over conventional antimalarial drugs (4.60) is high. Consequently, the prices of these drugs are subsidized with government funds or with funds obtained from charitable organizations. The subsidy, however, cannot be a permanent solution of the problem. Therefore, the increase in content of artemisinin will surely address the issue.