

Chapter 11

Recent Advances to Enhance Yield of Artemisinin: A Novel Antimalarial Compound, in *Artemisia annua* L. Plants

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Abstract Malaria is probably as old as mankind and continues to affect millions of people throughout the world. Today, some 500 million people in Africa, India, Southeast Asia, and South America are exposed to endemic malaria, and it is estimated to cause one and half million deaths annually, one million of which are children. As a consequence, effective therapeutic agents against malaria are continuously being sought, especially against those strains of *Plasmodium falciparum*, which have become resistant to nearly all antimalarial drugs, including chloroquine and quinine. In the absence of reports of artemisinin resistance in malaria parasite, WHO now recommends the use of artemisinin-based combination therapies (ACTs) with formulations containing an artemisinin derivative. Artemisinin, a sesquiterpene endoperoxide lactone, is isolated from the shoots of *Artemisia annua* L. plants. Apart from a novel and potent antimalarial drug, artemisinin and its derivatives are also used in therapies against hepatitis, leishmaniasis, and schistosomiasis. Artemisinin also possess lethal activities against cancerous cells, fungi, and bacteria. It has also shown to be immune-suppressant in mammals and a potent herbicide. Despite of its immense commercial value, the production of artemisinin is not cost-effective because of its low concentration (0.01–1.1 %) in the plant. Moreover, its de novo synthesis is complex, uneconomical and gives low yields. Further, classical breeding and selection techniques have failed to develop high-yielding strains of *A. annua* L. plants. Efforts are therefore, needed to elucidate the complex pathway of artemisinin biosynthesis and its biochemical and molecular regulation. Non-conventional approaches have to be developed to

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