

Innovative New Approaches to Reduce Economic Access Barriers to Artemisinin-based Combination Therapy

Fast track breeding of *Artemisia annua*

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project aim

To produce a cost-effective plant product which will stabilise supply and reduce production costs of artemisinin for artemisinin combination therapies

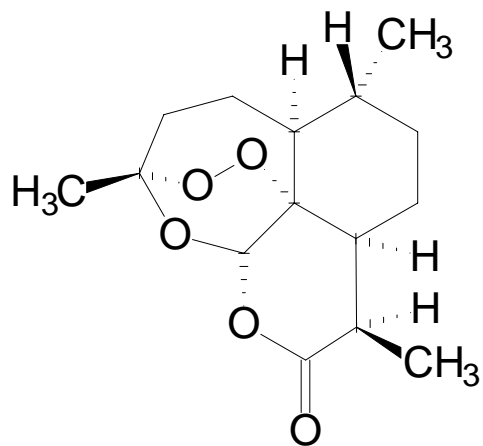
demand for artemisinin



the global demand for ACTs will continue to increase

over half of that demand must be met by *A. annua* plants even when alternatives succeed

improvement of the plant production system is a continuing requirement



clean technology

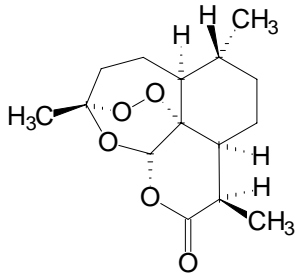
sustainable

high capacity

complex chemicals



Artemisinin made by plants



- *A. annua* is the only proven production system for artemisinin
- regulatory frameworks are already established
- the plant-based system has a known economy



However:

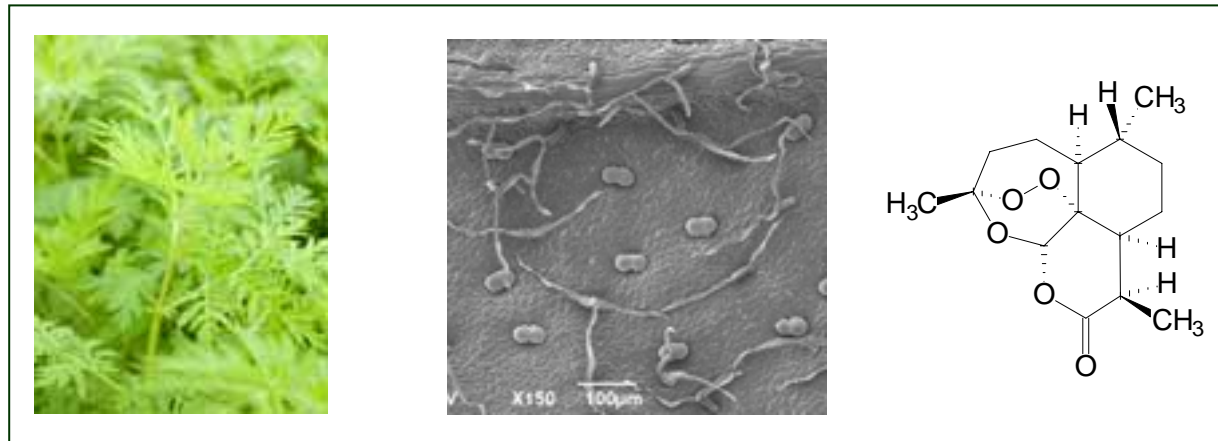
- yield in current varieties is low and unreliable
- the supply chain is not secure
- volatile prices and high production costs

High yield varieties will

- secure the supply of artemisinin
- reduce the cost of production

cheaper artemisinin

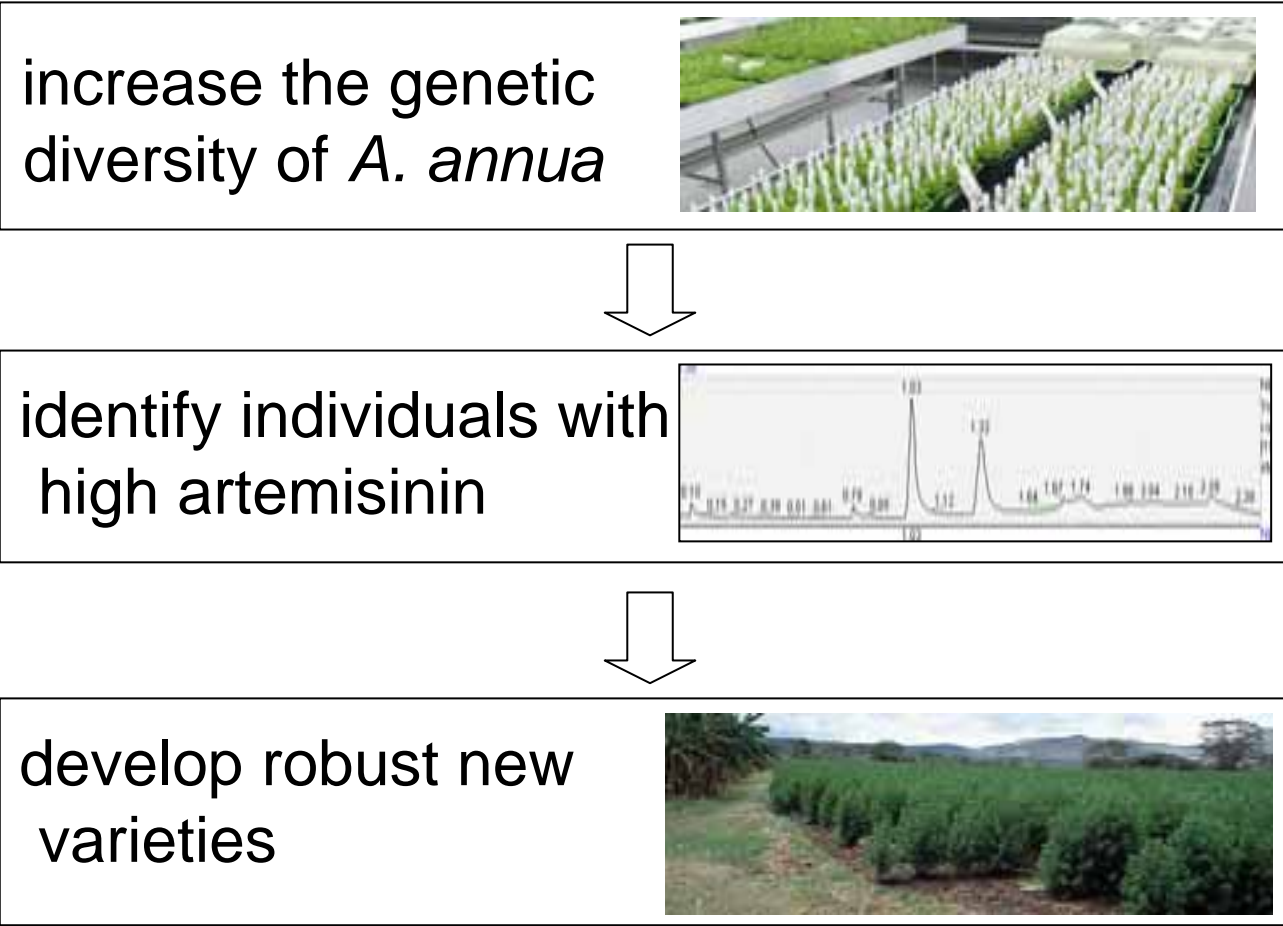
scientific strategy



plant artemisinin yield

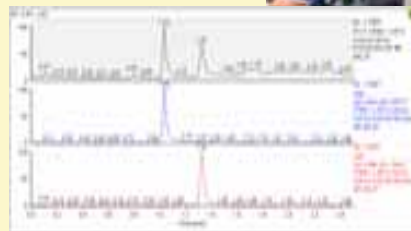
increasing the leaves on a plant
increasing the trichomes on a leaf
increasing the artemisinin per trichome

scientific strategy

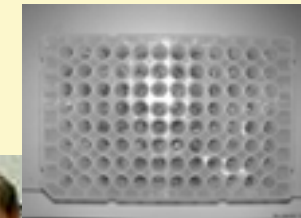


identify individuals with high artemisinin

Screen for
metabolites



Screen for
genes



timescale – probability increases with numbers screened
earliest likely date – autumn 2007

develop robust new varieties



- back crossing into wild type parent
- field trials and user-tests for new hybrid
- roll out of new variety

**timescale – 3 years from identification of high yielding individual
earliest likely date – 2010**

high artemisinin variety for ACTs

high yield F1 hybrids

- retain control of parents of the hybrid
- yield decreases in subsequent generations

controlled distribution

- seed provided only to contractors delivering to ACT manufacturers



Acknowledgements

Collaborators

Mediplant – sub-grantee

- Artemis variety
- Collection of *A. annua* accessions
- *A. annua* breeding and agronomics
- Field trials

Amyris biotechnologies

- Standards for intermediates

Jay Keasling (Berkeley)

- Access to EST libraries

Institute of one world health

- Facilitating

Geoff Brown (Reading)

- Standards for intermediates

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