

THE UNIVERSITY *of York*

Department of Biology

CNAP

CENTRE FOR NOVEL AGRICULTURAL PRODUCTS
BIOLOGY TO BENEFIT SOCIETY



Seed of new improved varieties of *Artemisia annua*

developed by University of York, commercialized by East-West Seed

The CNAP Artemisia Research Project
Tackling malaria with fast track plant breeding

East-West Seed
Better seeds for better yield™



EAST-WEST SEED

East-West Seed

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partnership

**improving the supply of artemisinin
for essential anti-malarial treatments**

CNAP, at the University of York, has partnered with leading tropical seed company East-West Seed to produce Artemisia seeds in commercial quantities.

This new supply of improved seed will help build up a robust supply chain for the production of Artemisinin Combination Therapies (ACTs), the World Health Organisation recommended treatment for malaria.



East-West Seed

East-West Seed is market leader for tropical vegetable seeds in Asia. Using the most advanced technologies in vegetable plant breeding, East-West Seed creates value for farmers by producing Better Seeds for Better Yield™. The company's strategy is based on breeding suitable varieties that allow farmers to be more productive, thereby contributing to agricultural sustainability. East-West seeds are planted in the fields of over 30 million farmers worldwide. The company is Asia based with over 2,000 employees and 12 R&D stations in 7 countries. The company's success is based on living and working in the markets it serves.



"A good seed can change the lives of millions"

- Simon N. Groot, founder of East-West Seed.

A single small seed is the starting point of a development path in markets, farming systems and rural communities. Through our innovative products and services, East-West Seed sets off an entire chain of value creation.

The CNAP Artemisia Research Project

The project is using the latest genetic and analytical technologies to rapidly improve supplies of a vital malaria drug. With the help of molecular plant breeding, we have developed more robust, higher yielding varieties of an important medicinal herb: *Artemisia annua*. Artemisia is a source of the most effective cure for malaria and the new varieties will help meet increasing demand for affordable malaria medicines.

We are using molecular plant breeding and not GM to generate these new varieties.

The project is funded by the Bill & Melinda Gates Foundation.



The research is based in the Centre for Novel Agricultural Products (CNAP) at the University of York, UK where Professor Dianna Bowles and Professor Ian Graham lead a project team of molecular biologists, geneticists, biochemists, plant breeders and horticulturalists. The scientists have state-of-the-art facilities for chemical analyses, molecular genetics and bioinformatics.

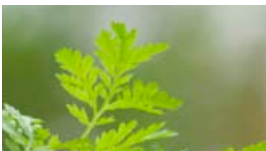
benefits of the partnership

seed of the new Artemisia varieties will bring a range of benefits:



Stabilise artemisinin supplies

farmers will be encouraged to grow more Artemisia, which will prevent shortage-driven price hikes.



Lower production costs

increasing the artemisinin content of the plant substantially reduces the costs of both cultivation and extraction.



Support small-scale farmers in less developed regions

by providing them with a more robust and profitable crop.



Reduce environmental impacts

by lowering the requirements for transport and the amount of solvent needed for extraction.



Support production of high quality ACTs

seed for the new varieties will be available for Artemisia growers.

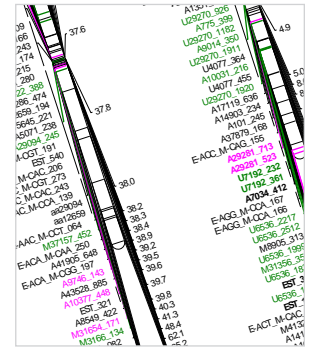


Contribute to increased efforts to tackle malaria

seed will be available to supply the increasing demand for ACTs.

faster plant breeding - a pipeline of potential

The genetic and quantitative trait loci (QTL) maps of *Artemisia annua* recently published in Science (Graham *et al.*, Science, 2010: 327 pp 328 – 331) represent a major milestone on the road to improvement of the crop. The QTL map accounts for a significant amount of the variation in key traits controlling artemisinin yield. Molecular markers allow rapid and early selection of plants carrying multiple beneficial QTL. This approach has led to the selection of elite parents and resulting hybrids that perform robustly and as a uniform high-yielding crop in field trials.



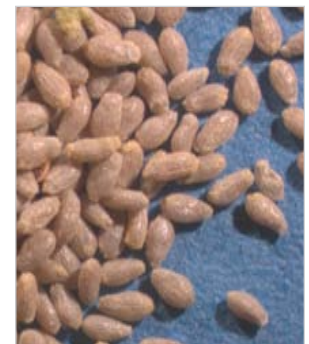
field trialling - performance testing

Extensive field trials in the commercial production centres of Africa and Asia have enabled the assessment of new varieties. These detailed analyses have ensured that the varieties developed for seed distribution will perform well when grown in different environments and under regional agricultural practices. Plants have been assessed for their yield, robustness and resistance to pests and diseases.



seed supply and distribution

Large-scale distribution of hybrid seed is expected in 2012, when a total of 15,000 hectares of *Artemisia* cultivation throughout Asia and Africa will benefit from the supply of the improved seed. Conservation of the project's germplasm will be maintained over the long term in tissue culture at Mediplant.





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