

Genetic modification, gene therapy, insect resistance management: Evolutionary tools for sustainability

Solving societal challenges in food security, emerging diseases and biodiversity loss will require evolutionary thinking in order to be effective in the long run. Inattention to this will only lead to greater challenges such as short-lived medicines and agricultural treatments, problems that may ultimately hinder sustainable development, argues a new study published online today in *Science Express*, led by University of California, Davis and the Center for Macroecology, Evolution and Climate at the University of Copenhagen.

For the first time, scientists have reviewed progress in addressing a broad set of challenges in agriculture, medicine and environmental management using evolutionary approaches, approaches that consider species' evolutionary histories and the likelihood of rapid evolutionary adaptation to human activities.

The study finds an urgent need for better implementation of these approaches, for example in managing the use of antibiotics and pesticides in order to reduce the escalating problem of resistance evolution. Furthermore, current efforts are found insufficient to reduce the accumulating costs from chronic disease and [biodiversity loss](#), two challenges ultimately caused by exposure to food and environments to which people and threatened wildlife are poorly adapted.

The study also assessed the potential for less commonly implemented strategies including gene therapies to treat human disease, the breeding of "climate change proof" crop varieties, such as flood tolerant rice, and translocating exotic strains for ecological restoration and forestry that will be better adapted to near-future conditions.

Many evolutionary solutions are already at hand

Whereas we might have to wait for new solutions from human gene therapy, genetic engineering of crops and development of new medicines to replace old ones, many innovative solutions based on applying evolutionary biology already exist. For example, farmers in the United States and Australia have used planting of pest-friendly refuges to delay evolution of insect resistance to genetically engineered corn and cotton. These genetically modified crops kill certain pests, but without refuges the pests quickly adapt. Providing refuges of conventional plants has been especially effective for suppressing resistance in the pink bollworm, an invasive pest of cotton.

Read the full, original article: [Evolutionary tools improve prospects for sustainable development](#)