



Agricultural revolution

The Green Revolution was started in the late 1940s by the American biologist Norman Borlaug. The basis of the Green Revolution largely arose from the development of technologies, such as synthetic nitrogen fertiliser, pesticides and modern irrigation techniques, combined with the production of novel cultivars, particularly wheat, maize and rice which were created through conventional breeding methods. While a great success in terms of increased productivity and, therefore, increased global food security, the Green Revolution had negative impacts. Biodiversity has been reduced because of the reliance on just a few high-yielding varieties of each crop requiring extensive use of pesticides.

By 2050, the global population is projected to be 50 % larger than at present, and global grain demand will most likely double. Therefore, further increases in agricultural yields are essential intensification of agricultural practices may affect important ecosystem functions via the loss of biodiversity, such as plant growth, pest control, pollination and decomposition processes.

In recent years, aiding pollination in some agroecosystems has resulted in reduced blossom drop and improved fruit set, leading to enhanced crop yield and quality. For example, the use of artificial beehives containing functional bumblebee (*Bombus terrestris*) colonies or other natural pollinators has expanded to a range of other crops, particularly in greenhouses, where artificial lighting, often inadequate ventilation, coupled with limited access for pollinators may compromise sufficient pollen transfer.

Genetically modified organisms

A range of genetically modified organisms (GMOs) used in agriculture have been produced through biotechnology. These include both pest- and herbicide-resistant plants, as well as crops with augmented nutrient contents, such as golden rice. The production and use of GMOs is not without controversy, and they are still heavily regulated in some parts of the world. One of the most widely used forms of genetically modified crops is referred to as 'Bt crops'. The plants produce the Bt toxin, which functions as an insecticide. However, resistance to the first generation of Bt cotton was reported to have arisen in a pest known as the pink bollworm, in 2009. This led to the production of a second generation of Bt crops which have multiple Bt proteins to overcome the problem of resistance. Now here is an increase in the prevalence of pests with sucking mouth parts, which are not affected by the Bt toxins. Another type of GMO that is often used in agriculture is herbicide-resistant crops such as Roundup Ready soybean and maize. These plants are resistant to glyphosate, allowing its use to reduce weed species in crop fields, thereby increasing yields. The application of biotechnology to agriculture is largely debated, and further research into both the positive and negative effects is required.

To be continued...

Soil Lovers say: The Green Revolution Has Been A Disaster For Farming

Ref: A Global Atlas of Soil Biodiversity p100