

LETTER TO THE EDITOR

A New Approach to Breeding Plant Cultivars Resistant to Infections

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Abstract

Infectious diseases of farm plants cause losses as large as one-third of the world's annual yield. The existing methods for breeding infection-resistant plants give only a temporary effect. The recent concept of active susceptibility offers a novel approach to obtaining resistant cultivars. It assumes that plants and animals are only infected by the microorganisms whose genes are necessary for the host's vital activity. Therefore, the integration of these genes into the host genome may preclude the infection without any negative evolutionary consequences. Further studies are required to test the hypothesis and identify the microbial genes in question.

Keywords: plants, infectious diseases of plants, breeding of resistant cultivars.

Infectious diseases of plants are becoming an increasing concern. The world's agriculture bears tremendous losses from infectious diseases of plants (as much as one-third of the world's annual yield). At present, the agriculture of the United States alone loses billions of dollars every year due to plant diseases. Given the losses due to diseases of farm animals and the growth of the world human populations, humankind's prospects look rather bleak. According to expert assessments, global food deficit will be noticeable within the next 20–30 years, and, as some analysts say, the Third World War may begin "over a dish of soup." Therefore, the search for reliable methodologies of breeding plant cultivars and animal breeds resistant to infections is of primary importance.

The existing methods of breeding infection-resistant plant cultivars only give a temporary effect: most insusceptible hybrids soon develop the susceptibility to other infectious agents. In contrast, novel views on the mechanism of susceptibility to infectious microorganisms summarized in the active susceptibility concept [1, 2] offers a more natural and reliable approach to breeding infection-resistant plant cultivars. According to this concept, a host organism is only susceptible to a contagious disease if it needs products of certain genes of the disease pathogen (normally coexisting with the host in the form of healthy or asymptomatic carriage).

Therefore, the introduction of these genes of infectious microorganisms into the genome of the susceptible host plant should eliminate the susceptibility to the given microorganisms in the natural way, without negative evolutionary consequences, such as susceptibility to other infectious agents.

A patent application for the invention of the Method for Preventing Infectious Diseases of Plants, Animals and Humans, which, as applied to farm plants and animals, may be regarded as a method for obtaining infection-resistant cultivars and breeds, has been published [3]. The experimental testing, development, and implementation of this invention will require the expertise of specialists in different fields of biomedicine and will certainly face challenges, primarily the search for funding. Therefore, I would be grateful to all researchers who wish to take part in this project.

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Competing interests

The author declares no competing interest.

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