3. BREEDING PLANTS FOR DISEASE RESISTANCE

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The control of plant diseases by means of immunity inherent in the plants themselves is one of the most alluring propositions in agricultural science, and breeding for disease resistance is one of the most attractive fields of work. With apparent disregard of the effect on the plant pathologist of the ultimate control of all diseases by means of immunization, breeding operations with this end in view appear to be proceeding with increasing momentum. One can scarcely name a disease-afflicted crop for which amelioration is not being sought through breeding operations directed toward the development of disease-resistant varieties.

Very much of the increased interest in breeding for disease resistance is doubtless due to better understanding of the diseases themselves. Very important in this better understanding of diseases are the discoveries that have been made in respect to physiologic forms of several important diseases. Considering rusts alone, at least 37 physiologic forms of stem rust of wheat and 12 forms of leaf rust are known. Four physiologic forms have been isolated in the rust of corn, two in the leaf rust of rye, and two in the leaf rust of barley. In several other diseases of different plants two or more distinct biologic forms are known.

The discovery of physiologic forms has tended to explain some of the aberrant results in earlier breeding operations. A disease-resistant strain sometimes was found to succumb to disease in certain years or when grown in a different locality. Explanations sometimes were offered that this was due to the effects of different environments. As the matter is now understood, it was often due to the presence of different physiologic forms of the disease to which the supposedly resistant strain was susceptible.

While the discovery of physiologic forms in pathogenic organisms has tended to clarify the problem, it has made it even more complex, at least from a psychological standpoint. Whereas in earlier days breeding was being done for resistance to a disease that was considered due to a single definite organism, today we are dealing with what amounts to an indefinite number of organisms. Resistant selections are found to be only partially resistant; or if they are resistant to all

1Discussion of paper by O. S. Aamodt on "Breeding Wheat for Resistance to Physiologic Forms of Stem Rust," presented at the meeting of the Society held in Washington, D. C., November 19, 1926.