METHODS IN BREEDING CEREALS FOR RUST RESISTANCE.

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In the last few years there has been much interest, both popular and scientific, in the selection and breeding of crops for resistance to disease. The plant breeder has given the subject particular attention and has made great strides both in methods of procedure and results obtained. His efforts have been directed towards crops of many kinds and it is not uncommon to hear that wilt-resistant melons, wilt-resistant cotton, blight-resistant potatoes, wilt-resistant flax, rust-resistant grains, etc., are being developed here and there through various methods and under many conditions.

Although methods in a broad sense may be similar, such as the selection of disease-resistant varieties, individuals from a variety, or hybrids from crosses between resistant varieties and varieties with other desirable characters, still there is a definite technique for each crop which must be mastered before accuracy and progress can be assured.

For the breeding of cereals for rust resistance various methods have been devised and used by Bolley at North Dakota, Biffen in England, the Cawnpore Agricultural Experiment Station in India, and by the United States Department of Agriculture in cooperation with the Minnesota Agricultural Experiment Station. These, the breeder finds, will be helpful when thoroughly understood. However, to understand and apply them he must be conversant not only with agronomy, but also be familiar with plant pathology: that is, in addition to knowing the varietal characteristics of the various grains, their physiology and adaptations to soil and climate, he must know the different rust species, the methods of wintering, the optimum periods of infection and development, the climate and soil conditions favorable and unfavorable to epidemics—in fact, all the important points in the taxonomy, life history and physiology of these diseases.

The first problem he has to meet is how to insure a rust epidemic on the breeding plats yearly in order that naturally rust-free years