

the basis of improved varieties; the geneticist and the cytologist study the factors of inheritance that may be transmitted by these strains, and combine them with existing domesticated strains to produce improved varieties. Plant breeders at work in the Department are engaged in producing improved varieties of all types of field and garden crops. The great diversity of climate in Canada makes it necessary to have many varieties capable of producing satisfactory crops under varying conditions of soil, temperature, light, and moisture. For example, in order to produce a better Western Canadian forage crop, wheat is being crossed with *Agropyron* species of grasses. A variety that may prove highly desirable in one area may be quite unsuitable in another.

Marquis wheat has had a world-wide reputation for many years among the field-crop varieties produced by this Department. Unfortunately, this variety is susceptible to injury and destruction by black stem rust. In recent years, the plant breeders, with the assistance of the plant pathologists, have produced new high-yielding, rust-resistant varieties, and are continually searching for resistant varieties of still higher quality. The two outstanding features of the cereal-breeding work conducted by the Department are the contribution of genetics in guiding plant breeders in the production of varieties with the required characteristics, and the discovery by plant pathologists of the physiologic races of stem rust. About one hundred and fifty of these physiologic races of wheat stem rust have been discovered. Some are regional in distribution, some injure certain wheat varieties more than others, and some occur in one season and not in others. New races are discovered from time to time. It has been necessary therefore to study the characteristics of these physiologic races of rust, and to breed varieties of wheat resistant to all of the races that might affect the crops in the area concerned. This example is a striking illustration of the work of plant breeders and plant pathologists in producing agricultural plants resistant to diseases. Remarkable success has been achieved in a number of instances, and there is now the possibility that many plant disorders may be eliminated through the production of disease-resistant varieties.

Many diseases may be controlled by the application of fungicides. Researches that have been conducted over a period of years now make possible the publication of spray calendars for the control of diseases and insects, indicating to the farmer the time of spraying, condition of crop, and type of spray that must be applied to secure economical results. Regulations have been drafted and are now in force to further the production of strains of potatoes free from disease, and this work is being extended to seeds of cereal and vegetable crops.

The control of insect pests is one of the main problems that come with intensified farming. Forest insects, which present an enormous problem, also come under the purview of the Department. A protective service is maintained to prevent the introduction of foreign pests into Canada.

Control measures, developed by entomologists and chemists, include the use of contact sprays, poisons, and repellents. Thorough research on the life histories of insects also reveals the possibility of control by cultural methods. Entomologists and agronomists of the Department have worked out changes in methods of tillage, dates and rates of seeding, rotation of crops, and other cultural details that permit of an attack on the weakest link in the life history of the insect concerned. Cultural methods of control are of great importance in connection with crops grown on an extensive scale where poisoning and contact sprays would be uneconomic. A recent development that holds much promise is control by the use of parasites and predators. Stocks of parasites are multiplied in a laboratory maintained by the Department and released in areas where certain insect infestations are in progress.