PLANT PATHOLOGY

Hardy Plant Parents Hunted

Disease-resistant varieties of flowers and vegetables are being sought around the world so that they can be crossed with commercially popular varieties.

By MARTHA G. MORROW

➤ A SEARCH for parents is under way. These wanted parents, of flowers and vegetables that will some day flourish in your garden, are needed because of their ability to resist disease.

From your own back yard, plant specialists go all over the world hunting disease-resistant and hardy plants that can be used in producing new and improved vegetables for our own country. They search for cantaloupes in India and Iran, for peas and watermelons in Africa and the Near East. To many parts of Asia they travel for onions, to South America for tomatoes, to Central and South America for beans and sweet potatoes, and to Europe and South America for Irish potatoes.

When an SOS is sounded by gardeners in a certain section of the country who fear that their entire crop may be wiped out by blight, the search begins. Hundreds and even thousands of varieties may be tried before one that is immune, or even highly resistant to the particular disease, is found.

When a resistant plant of one of the commercial varieties is discovered thriving in an infected field, the task of packing disease-resistance into a superior variety is relatively simple. But when a commercially worthless and practically inedible cousin must be used as an "ancestor," the task is much slower and harder.

As Good or Better

Plant breeders in every case aim to create a disease-resistant plant that is at least as good as the present commercial varieties, and perhaps a bit better. When a new variety can be grown on infected soil, for example, but is merely acceptable otherwise, the battle is only half won. Additional types must be created until superior plants are available.

This breeding of disease-resistant plants is often a cooperative undertaking. It is frequently initiated by the U. S. Department of Agriculture in response to a plea for help from growers whose fields are being devastated by wilt or mosaic.

The Department usually works along with state experiment stations. Sometimes the government experts specialize in hunting for disease-resistant varieties, trying to breed such resistance into edible plants. State agriculturists may then conduct experiments designed to discover more about the disease itself—what it is, how it spreads and chemical methods for controlling it. Seedsmen and local growers often help by testing the remodeled plants, particularly in infected areas.

"During the last three decades an ever-increasing effort has been made all over the country to control disease through breeding," states Dr. Victor R. Boswell of the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry of the U. S. Department of Agriculture.

"Not only do plant breeders attack these diseases that can be controlled only through creating new vegetables, but they also try to eliminate costly and troublesome spraying or other artificial controls," reports Dr. Boswell. "Where vegetables resistant to one or more diseases have been developed, we are now reluctant to put out new sorts that possess no resistance to those diseases."

Rust-Resistant Asparagus

An asparagus that would resist rust was one of the first plants bred specifically for disease resistance. Almost four decades ago, plants relatively free from rust were crossed with other promising varieties. Today their descendants are preferred not only for use in areas subject to rust, but also are grown extensively where no protection against rust is needed.

A wild Manchurian spinach was one of the first distant relatives to be brought from afar for use as a parent in overcoming a plant disease. After all commercial spinach varieties had been found susceptible to the devastating effects of the mosaic, this wild spinach, highly resistant to the disease, was located. It was crossed with a commercial type to produce an attractive disease-resistant spinach of good quality. One of the descendants of this Manchurian variety, Virginia Savoy, literally saved the fall and winter spinach-growing industry of the Middle Atlantic coastal states.

Tomato plants that were only partly resistant to wilt were the best plant breeders had to offer until 1940. About 1935 a wild tomato, virtually immune to the wilt, was found in Peru. But the fruit was small, only about as large as a currant, so the crop was of no value commercially. Its disease-resistance, however, was of great importance.

When this variety was crossed with one of the commercially popular varieties, the fruits of the hybrid were about as big as walnuts—still too small—but some of the hybrids kept the wilt-resistance of the small-fruited parent. The resistant selections were crossed to the large-fruited parent again and the resistant offspring selected. This was done three times, then large fields of the hybrids planted for further selection. In the remarkably short period of only four years (two generations per year) the Pan America variety, with sizable fruit, was created.

Many beans are now resistant to the common bean mosaic, but recently a new variety of mosaic arose to harass bean-growers. This fungus causes deformed leaves, interrupts the plant's growth, reduces the yield and may even kill the bean plant. A few varieties have now been developed that are resistant to the new virus, but the job of putting this resistance into more and more varieties continues.

Sweet Potato Difficulty

Sweet potatoes are particularly difficult to remodel because rarely, except in the tropics, sub-tropics and greenhouses, are seed actually produced. A number of good varieties have been produced for feed purposes, but so far no sweet potato that has disease-resistance as well as the shape, size, and color desired for home eating has been created.

The fight against diseases that destroy the beauty of flowers has not progressed as far as the battle against vegetable diseases. Here it is largely a case of the survival of the fittest, says Dr. S. L. Emsweller, also

TESTING DISEASE-RESISTANCE —Tomato plants are inoculated with a wilt fungus by immersing the roots in a water suspension of the disease organism.

BREEDING STOCK—The search for plant parents has uncovered this profusely fruiting potato.

of the Division of Fruit and Vegetable Crops and Diseases.

About two decades ago aster wilt became so widespread, for instance, that it threatened to wipe out entirely the China aster. The fungus, spread by tools, water and even the seed themselves, persists almost indefinitely. No drug or chemical is known to destroy it completely.

Today the aster is again gaining favor because seed that can be grown in infected soil is offered commercially. To develop wilt-resistant seed, test plants are given an extremely heavy dose of fungus. Those that survive supply seed for the next generation of plants to be exposed to the wilt. Their seed is ready for use around your home.

It is resistance, not immunity, that is developed in these plants. This resistance may be lost unless the plants are grown on infected soil and the selection process repeated frequently.

Some state departments of agriculture protect their flower growers by listing disease-resistant varieties. Other gardeners are tipped off by their local seedsman or neighbors that certain flowers cannot be grown in their vicinity.

Gladioli are attacked by corm rot, snapdragons are plagued by rust, and the beauty of chrysanthemums is dimmed by wilt and leaf spot. As plant breeders become more interested in flowers and as new, disease-resistant varieties are discovered, these and many other difficulties that be-devil flower growers will be eliminated.

Seeds of two varieties of corn, one of which is particularly resistant to bacterial wilt, and seeds of two types of China aster, one wilt-resistant, have been collected for you by Science Service. Just send 50 cents to Science Service, 1719 N St., N.W., Washington 6, D. C., and ask for the kit on disease-resistant plants.

Science News Letter, April 30, 1949

Heating *beehives* with electricity is under test in a northern state.

About half the American people do not know a single *cancer* symptom, a recent survey disclosed.

So-called *Newcastle disease,* now widely spread among American poultry flocks, seems to be less virulent in this country than abroad.