TO BREED RESISTANT PLANTS.

Crops, Proof Against Insects or Disease Can Be Grown by the Farmer.

GUY ELLIOTT MITCHELL.

The farmer's too greatest foes are insects and plant diseases. He can, by a proper rotation of crops and fertilization, convert a poor into a rich soil, and he can stimulate plant growth by plenty of fertilization. By the same process he can keep down the weeds which rob his crops of nourishment and moisture. He can, to a great extent, overcome, with but little trouble, all the various smaller hindrances to crop growing—all but the bugs and the blight. These twain are hard to handle. None is so arrogant as to profess indifferent to their attacks. Not many years ago they were expected, not the less dreaded, especially the blights and the rots and the mildews; they were the natural visitations of providence. There was no use trying to combat them. If they came, they came. The farmer prayed that they might not come that year. Now, science has shown us that they can, in most cases, be overcome. If not overcome, they can be prevented. Yet the process is often fraught with great trouble and expense to the farmer.

Now suppose a man could develop a strain of plants so hardy that blights and rust would pass them by in disgust and so bitter and unsavory for a bug that the *hymenoptera*, the *coleoptera* and the other "toughs" of the insect trust would pass by and prefer to eat oak and hickory leaves? It would be a cinch for that man, would it not? He could sit in the shade and hire myrmidons to do his work, directing those close at hand in person and those at a distance by telephone. Such a condition may be possible. The man who gets in first would be the one to sit in the shade and reap the advantage. Eventually we would all get on to the scheme, and, unless the population of the world increased with accelerated rapidity, there would be an over-production of food products and prices would eventually get back to their present level, so that we would all have to work again.

The Department of Agriculture and some of the experiment stations have been working along this line of selecting resistant plants with the idea of at least giving the enterprising American farmer a good big start.

In the aggregate enormous crop losses—millions and millions—are caused by the attacks of insects and plant diseases. In dry weather insects are particularly abundant, and in wet weather plant diseases flourish, while in average weather both do the best they can to gather the crop ahead of the farmer. Many plant diseases and insects can be controlled by the various poisons, sprays, and cultural methods already discovered, but for some—as, for example, the rust of wheat, peach yellows, clover-seed fly, etc.—satisfactory remedies have not yet been discovered.

Some instances may be cited to show just what is meant by resistant or immune varieties and their value. Grapes furnish a striking example. European grapes planted in this country fail wherever the American grape-root louse is present, because the louse is able to attack and destroy the roots of these varieties. The roots of native American grapes are also attacked by the same louse, but are so hard and wiry that the louse can not destroy them. In other words they are resistant.

The unusual resistance of the Kieffer pear to blight has made it possible to grow this pear in the Southern States, where most other varieties fail because of blight. The variety of cowpea known as Little Iron has proved so resistant to wilt disease that in some fields it has survived when all other varieties have been killed. American gooseberries are but little subject to the mildew which seriously affects the larger English varieties when grown here. With nearly every crop grown, some of its varieties are more resistant or immune to some disease or insect attack than others.

Some varieties of the same plant are but little affected by a disease, while others are badly injured. Variations in this respect also extend to individual plants of a given variety. These facts have been utilized to some extent in the origination of the various so-called "disease-proof" varieties which have been introduced into culture—as, for example, the "rust-proof" varieties of wheat, oats, etc. As a rule, however, these varieties have not been developed by any systematic, scientific methods of selection and breeding, and although a few show merit, most of them have not measured up to the claims made for them. They have, however, served a very useful purpose in turning the thought of scientific and practical men as well, in the direction of the development of disease-resistant varieties with results which promise to prove of great practical utility.

POTATOES.

During recent years the disease resistance of potatoes especially has received attention by several of the agricultural experiment stations in the United States, notably those of Maine, Minnesota, and Vermont. A recent bulletin of the Bureau of Plant Industry of the Department of Agriculture, prepared by L. R. Jones, of the Vermont Station, summarizes and discusses this work, and that along similar lines abroad, as well as the experience of practical growers. Summarizing the results, Professor Jones draws the following tentative conclusions:

Disease resistance in potatoes is relative, not absolute, no variety known being wholly proof against late blight and rot. It seems related to general vegetative vigor, and is, therefore, in a measure dependent upon cultural and developmental conditions and tends to decrease with the age of the variety. It can be restored by originating new varieties from seed, especially of hybrid origin. Not all seedlings show superior disease resistance. * * *

Early varieties may escape the disease by maturing before it becomes epidemic, but when similarly exposed they are, as a class, less resistant than late varieties.

The source of seed tubers is a matter of importance, northern-grown seed giving plants the superior disease resistance in Europe. Seed from a crop that was not too highly fertilized is probably preferable. Possibly tubers are better for seed purposes if dug before they reach full maturity. High fertilization, especially with nitrogenous manures, lowers the power of the plant to resist both blight and rot.

So far as skin characteristics are an index, the red varieties with thick and rough skin seem more resistant as a class than the thin-skinned white varieties. So far as stem and foliage characters are concerned, the evidence favors the stem that is hard rough, and rather woody at the base and the leaf that is small, somewhat rough, and dark colored.

In America trials as to disease resistance have been conducted at some of the experiment stations, notably in Vermont, where experiments in breeding and selection for increased resistance are under way. These results have been correlated with information recently secured by a circular of inquiry addressed to a large number of potato specialists in the Northeastern States and in Canada. From these it appears that a wide variation is shown in disease resistance among the varieties now in cultivation in America, but that no one variety is preeminent.

Among those which have been widely tested, the following deserve mention as of the resistant class: Dakoto Red, Rustproof, Irish, Cobbler, Sir Walter Raleigh, Doe Pride, and White Beauty.

In tests made at the Vermont station in 1905 the following varieties showed marked resistance to blight on both sandy loam and clay loam soils: Keeper, American Wonder, Dakoto Red, Doe Pride, and Late Blightless.

Varieties having an upright habit of growth, moderately branched, with firm, hairy, medium-sized leaves are much more likely to prove resistant to late blight than are those with large, smooth, flabby leaves and decumbent stems.

The evidence at hand seems to justify the hope that the combined efforts of potato specialists working from both the practical and the scientific standpoints may soon result in the development of varieties of potatoes combining general excellence with a high degree of disease resistance.

CANTALOUPES.

A recent bulletin of the Colorado Station reports the discovery by a local grower of a rust-resisting cantaloupe which promises to be of immense value to the Rockyford cantaloupe industry. In this case seed of the Rockyford variety was purchased from five different seedsmen. They were planted and cultivated under similar conditions. When rust attacked the field just before the melons began to ripen, it developed rapidly and soon destroyed all the vines except those grown from the seed of one seedsman. Many of the hills from this strain of Rockyford seed remained green throughout the season and produced a good crop of melons. Further observations in the muskmelon fields of that neighborhood also showed that wherever this strain of Rockyford seed had been used many hills were unaffected with rust, while with other strains of seed of the same variety the vines were all dead.

The investigator selected a quantity of seed from the rust-resistant hills and planted them in comparison with ordinary seed. "On the rust-resisting hills the melons were hidden under a healthy growth of vines, and were large, solidly netted, with thick, firm flesh, small seed cavity completely filled with seed. On the rusted hills the plants were almost devoid of leaves and the small melons were prematurely ripe, with thin, watery flesh, open, large seed cavity, and practically of no market value."

In tracing back the history of this strain of seed it was found that some years before a seedsman had saved the first lot from a single healthy melon taken from a field of rusted vines. It had therefore been developed by the simple process of saving seed from the best melons produced by plants which withstood attacks of rust when surrounding plants were destroyed by this disease. What was thus accomplished by one farmer with one crop can probably be accomplished by other farmers with the same or with other crops, if they will be alert, while the crops are growing, to select and mark individual plants which show exceptional merit along the lines of prolific yield, early maturity, resistance to disease, or other desirable quality, and save seed separately from the plant showing such qualities. Marked variations which may be profitably utilized in this way are constantly occurring and are plainly evident on all farms.

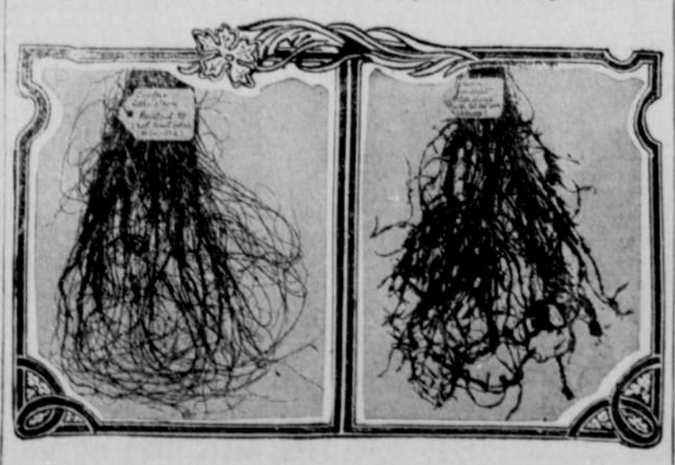
The point to be emphasized is that improvements in farm crop varieties nearly always trace back to individual plants. No one is in better position to notice these exceptional plants than the farmer. He is in his fields, garden, or orchard, every day, where these exceptional plants are produced. If one plant in a rust-infected wheat field stands up green and free from the disease, that is a plant to save seed from as the basis of a rust-resistant strain. If one hill of potatoes in a blighted field remains unaffected by disease, seed from that hill may produce a blight-resistant variety. If a squash plant is found that is distasteful to the squash bug, seed from that hill may produce squash vines which the bugs will not molest.

The important fact is that some plants are much more resistant to disease and insect attacks than others. It is a question of seeing the resistant plant and propagating from it. The farmer has as great opportunity for doing this as the seedsman.

Taylor Iron Black.

"IRON" COWPEA VS. "BLACK" AND "TAYLOR,"
Showing Comparative Resistance to Wilt and Root Knot.

"JACKSON" COTTON ON THE LEFT, "DRAKE" ON THE RIGHT.
Comparative Resistance to Wilt Disease.



Roots of "Iron" Cowpea, Resistant to Root Knot. Roots of "Wonderful" Cowpea, Attacked by Root Knot.

The gold money of the world is $4.61 for each inhabitant and the gold money in the United States is $16.33 for each inhabitant.

STYLES FOR WARM WEATHER.

Fashions for Heated Term are in Harmony with Comfort.

BY BERTHA BROWNING.

The summer fashions have become quite as settled as they are apt to during the season, and those wardrobes which are just preparing have the advantage of being exactly what is desired rather than an uncertain forecast. The woman who enjoys the cool breezes of her own veranda rather than the uncertain comforts of some other may utilize many a summer morning in fashioning pretty blouses of thin material and dainty little coats of lace or lingerie fabrics. It is the detail which makes up the fashionable wardrobes, and any woman who is clever with her fingers may make these small garments or accessories without a great deal of expense, and satisfy her desire for becomingness and style.

Summer gowns are real summer gowns this year, and Mistress Fashion seems to be more in Harmony with comfort than for some years past. Waists may be elaborately inset with lace or embroidered, but they are simply made and with lacey collars or low, round or Dutch square necks. Everyone is wearing elbow sleeves except those with scrawny arms, and for them there are sheer undersleeves which conceal any number of ugly lines. Guimps, too, are popular feature this year, and may be purchased reasonably in all manner of pretty styles or be made at home? Some of the daintiest effects are realized in the combination of Valencinnes and swiss or lawn.

The delicately colored slips are appearing again, and under the sheer white dresses are quite enchanting. A white embroidered Swiss over a pink

slip has a deep yoke of Dutchess lace inlet with Valencinnes. The skirt is frothy with frills and tucks of the self material and inset and cross-strapped with Valencinnes. The belt is of palest pink chiffon ribbon. Small capes are again looked upon with favor, especially the little mantles which go with three-piece suits or those of lace or lingerie fabric which grace thin summer frocks. The return of these is probably due to the return of the small bolero which has appeared in all manner of shapes and styles, the sleeves of which often resemble cape-like affairs.

The long gloves which are worn with short sleeves are held up in a novel way by wristlets of elastic covered with shirred ribbon and finished at the top with a buckle or tiny rosette of ribbon. These are worn just below the elbow or above wherever the glove is supposed to end. They hold the glove in place admirably and are a pretty addition to the toilette. The favorite color for these bracelets is black, but any color of glove is matched in these tiny accessories.

The population of the British empire is 400,000,000 and the area 11,908,378 square miles.

The greatest iron producing state in the South is Alabama. Virginia comes second, Tennessee third, Maryland fourth and West Virginia fifth.

The amount of property destroyed by fire in the United States in the last forty years is incalculable. More than one million buildings have been burned in the last ten years.

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Germany makes more than 1700 varieties of sausages.

The grape harvest of California is about 750,000 tons valued at $15,000,000.

Ink and fruit stains may be removed from white linens and cottons by soaking them for a few hours in kerosene, then washing in hot water.

Dew forms more readily on some colors than on others. It forms more readily on yellow objects, next on those that are green. It forms slowly on anything red, and most slowly on black.

Fat People

TO ALL SUFFERERS FROM TOO MUCH FAT A TRIAL TREATMENT WILL BE SENT AS A FREE GIFT BY SIMPLY ASKING FOR IT.

THE DANGEROUS SUMMER SEASON WITH ITS TERRIBLE AND EXHAUSTING HEAT IS NOW UPON US. EVERY OUNCE OF SUPERFLUOUS FAT IS BURDENSOME, UNHEALTHY AND BRINGS MUCH MISERY AND DANGER WHICH MAY MEAN DEATH.

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Civil Service	Building Contractor
Chemist	Architect's Draftsman
Textile Mill Supt.	Architect
Electrician	Structural Engineer
Elec. Engineer	Bridge Engineer
	Mining Engineer