through price enhancement, but not by pounds of gain or cheap utilization of feed. If bought cheaply enough, they may return a profit in conversion of cheap roughage.

As the cowman is the basic cattleman and the returns from his years of effort, care, attention, and investment are the foundation of good times or bad in the cattle industry, he can not under normal conditions afford to raise the lower-grade feeders. The wide price spread between the several grades—choice, good, medium, and common—indicates the possibilities for loss if he does not choose wisely in all of his production operations. The feeder-cattle buyer, on the other hand, is merely a converter of raw products (unfinished cattle and corn or other concentrates) into finished articles (fat cattle and beef) and is therefore a manufacturer. He estimates final returns and compares them with present differences in price, as a guide to determine whether he should buy and feed better grade feeders or the poorer grades; and whether lightweight or heavyweight animals will consume his feeds with the greatest profit to him and the least financial risk.

JAMES K. WALLACE.

SUGAR-BEET Disease Called Curly Top Limits Production

The curly-top disease of sugar beets, which is a virus malady transmitted by the leaf hopper *Eutettix tenellus*, continues to be a limiting factor in many of the beet-growing areas of that part of the United States west of the Rocky Mountains. The seasons of 1924 and 1926 were characterized by disastrous losses due to this trouble in Idaho and Utah. The year 1925 was marked by a very destructive outbreak in California. It is perfectly evident, therefore, that this as well as certain other adverse factors must be controlled before the beet-sugar industry in the far West can become stable.

The beet-growing areas which have suffered most from curly top are those of the States of Washington, Oregon, Idaho, Utah, the western slope of Colorado, Nevada, and California. Occasionally cases of the disease have been noted east of the Rocky Mountains, but the leaf hoppers have not been found in abundance except in the southern part of this great area. It seems clearly demonstrated that limiting climatic factors have prevented the insect from becoming established in northern Colorado and invading the sugar-beet sections of the Middle West. The distribution and seriousness of the disease of course correspond to the occurrence and abundance of the leaf hoppers.

Time of Planting and Good Farming Helpful

The only measures which have thus far been put into practice in the effort to obviate the curly-top losses are based on observed habits of the leaf hopper and the fact that the susceptibility to the disease shows a sort of negative correlation with age. The study of these two features of the problem has made possible intelligent recommendations as to the time of planting most advisable. In general, planting as early as is feasible is best, but in certain restricted areas postponement of planting until after the flight of the leaf

hoppers from their natural breeding grounds has proved more effective.

In addition to adjusting the time of planting to suit regional conditions, attention to good agricultural practices recognized as indispensable to successful farming is especially important in curly-top areas. The grower who gets the extraordinarily large crop under normal conditions is usually the one who has the highest yield in a severe curly-top year. The larger a beet plant is when exposed to infection the less injury it will suffer. It is, therefore, very important that sufficient moisture, a high state of fertility, and proper physical condition of the soil be maintained in order to facilitate rapid growth in the early stages of the plant. Where an abundance of water is available, frequent irrigation is usually advisable throughout the season, because one of the effects of the curly-top disease is

FIG. 230.—Resistance to curly top of sugar beets. Note the contrast between the resistant strain, rows 12C and 13C, and the check rows of a commercial variety between them and to the right. All were similarly exposed to infection

to kill back the long side roots so that the beet has to depend on the fresh rootlets which do not attain sufficient length to secure water from as wide an area of soil as do healthy plants. Frequent irrigation also greatly benefits the growth of the healthy plants and those in the early stages of the disease.

No Control Yet Discovered for the Leaf Hopper

The way to control the curly-top disease which would at first appear most obvious would be to eliminate the agent responsible for dissemination of the virus, namely, the leaf hopper. Needless to say, extensive efforts along this line of attack have been made. Poisonous and repellent dusts and liquid sprays have been tested. Various methods of trapping and of directly killing the insects have been tried. Studies have been made of the natural enemies already

present in the infested areas, and search has also been made to some extent for parasites in foreign countries. The results of all this work have not encouraged the hope that a way of eliminating or effectively controlling the leaf hopper will be developed.

Resistant Strains

Because of the fact that the prospect of controlling the leaf hopper does not seem hopeful, the only alternative left is to manage in some way to so handle the beet crop that profitable yields can be obtained in spite of the disease which the insect spreads. The most satisfactory way to accomplish this result is through the development by selection and breeding of strains highly resistant to the disease. Work in this direction has been in progress for several years, and the progress made is decidedly encouraging. (Fig. 230.) The method of procedure is to select from very severely affected fields the relatively few and scattered individual plants which are by comparison only slightly injured by the disease. Seed is then produced from such mother beets and the resulting progeny exposed to severe curly-top conditions. In addition to this work, many strains of sugar beets selected for desirable characteristics other than curly-top resistance have been purposely exposed to the disease. Similarly, practically all the known commercial varieties and also a fairly extensive lot of selections of the wild beet from Europe have thus been tested. The results so far obtained indicate that no strain or commercial variety produced heretofore without regard to curly-top resistance is satisfactory from the viewpoint of resistance to this disease. It therefore appears that the only hope is to produce the desired strains by selection and breeding. Enough progress has been made along this line practically to assure the eventual accomplishment of the desired results.

EUBANKS CARSNER.

SUGAR-CANE Cream a New Product of Commercial Value

The economic condition of a section of the Southern States is partly or totally dependent upon sugar cane as an agricultural product. The consumer of the present day prefers the pure white refinery sugar, which has resulted in the abandonment of the manufacture of the plantation granulated sugar to a large extent. The change in the taste of the consumers is reflected likewise in the manufacture of sirup. The Georgia type of sirup apparently is slowly displacing the Louisiana sirup, so that as the old plantations are handed on to the newer generations no little effort is made to meet these changing conditions. These factors are necessitating the adoption of a new program for the industry.

One phase of this program is cultural, and steps have already been taken to replace the old and faltering varieties of cane with promising, hardier, and disease-resistant types. The other phase is strictly a technical one, embodying means of utilizing the cane crop more efficiently. The principle of diversification in the manufacture of sugar products is already established in a majority of the factories, and they are equipped to manufacture a number of the old standard products—raw sugar, plantation granulated, yellow clarified