A NEW BIOLOGIC FORM OF POWDERY MILDEW ON MUSKMELONS IN THE IMPERIAL VALLEY OF CALIFORNIA

I. C. Jagger[1/], T. W. Whitaker[2/], and D. R. Porter[3/]

In 1925 powdery mildew (Erysiphe cichoracearum D. C.) suddenly appeared on muskmelons in the Imperial Valley of California, and has caused serious injury to the crop since that time. In 1928 plants were found in mixed varieties from India which were highly resistant, usually being entirely free from mildew under Imperial Valley conditions, but occasionally showing rare, inconspicuous spots of mildew on the leaves. By crossing and backcrossing the leading commercial variety, Hale Best, with one of these resistant strains, a variety similar to Hale Best, but carrying the resistance of the melons from India, was developed. This was introduced in 1932 under the name Powdery Mildew Resistant Cantaloupe No. 50. This strain proved to have certain drawbacks but was grown commercially to a limited extent for a few years. Finally, further selection from No. 50 gave a much improved strain which was introduced in 1935 under the name Powdery Mildew Resistant Cantaloupe No. 45. This strain proved to be superior to previously grown varieties in several respects, in addition to being practically free from mildew. It came rapidly into commercial use, and was the principal variety in Imperial Valley in 1937 and 1938.

Until 1938 all plantings of No. 50 and No. 45 were practically free from mildew, occasionally showing, at most, rare, inconspicuous spots on the leaves. Early in the season of 1938 mildew was severe on all non-resistant varieties, but no mildew was noted on the No. 45 variety. In midseason, however, considerable recently developed mildew was observed in a few fields of No. 45 variety. During the remainder of the season mildew continued to develop on the No. 45 variety, apparently spreading out from the fields first noted until nearly all fields of the No. 45 variety showed from a little to considerable

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1/ Senior Pathologist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry.

2/ Associate Geneticist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry.

3/ Associate Olericulturist, California Agricultural Experiment Station.

mildew. Mildew attacked similarly several pure line selections of No. 45 variety in breeding plots, eliminating the possibility that the mildew in field plantings of the No. 45 variety might be due to mixing or crossing with non-resistant varieties.

The development and spread of the disease in the fields suggested that a new biologic form of mildew had appeared on Powdery Mildew Resistant No. 45 variety. Parallel inoculations were made using, on the one hand, mildew from the rather severely mildewed No. 45 variety, and on the other hand, mildew from a severely mildewed plot of a non-resistant variety in a field where the surrounding No. 45 variety appeared to be free from mildew. In three carefully checked trials on excised leaves floated on 10 percent sucrose solution in Petri dishes the old form of mildew, or form No. 1, collected from the non-resistant variety, did not develop on leaves of the No. 45 variety, although it developed abundantly on check leaves of non-resistant varieties. The new form of mildew, or form No. 2, which was collected from the No. 45 variety, developed equally abundantly on leaves of the No. 45 variety, and on leaves of non-resistant varieties. Similar inoculations of seedlings in flats produced heavy infection on leaves, stems and cotyledon leaves, which confirm the results obtained with excised leaves.

It seems certain that a new form of powdery mildew (Erysiphe cichoracearum D.C.) has appeared on the No. 45 variety in Imperial Valley. In 1938 there was considerable mildew in many fields of the No. 45 variety, but in marked contrast to the non-resistant varieties there was little or no defoliation of the No. 45 variety and little, if any, commercial loss. This gives some grounds for hoping that the No. 45 variety is somewhat resistant to the No. 2 form of mildew and that it may escape the serious injury which the non-resistant varieties suffer. However, in 1938 mildew appeared on the No. 45 variety considerably later in the season than on the non-resistant varieties, and the No. 45 variety might have been equally injured if it had been attacked at the same time.

In the rather extensive stocks of Cucumis melo L. grown in connection with breeding for mildew resistance, there were a few strains in the 1938 Imperial Valley field plots which seemed highly resistant to both forms of mildew. This needs to be confirmed by further tests for resistance to the No. 2 form of mildew.