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A Rust-Resisting Cantaloupe

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A Rust Resisting Cantaloupe.

PHILO K. BLINN.

The cantaloupe rust, or "blight" as it is called, has for a number of years inflicted serious injury to the cantaloupe industry in Colorado in the vicinity of Rocky Ford, and recently it is reported as being the cause of similar trouble in other cantaloupe growing sections of the United States.

The prevalence of the disease is largely affected by climatic conditions, yet in localities like Rocky Ford, where cantaloupes are continually grown, the soil becomes so infested with the spores that its development is as regular as the seasons, yet varying somewhat as to the loss it causes. In very dry seasons its development may not excite much notice, other than the dying down of some of the leaves in the centre of the hill, and perhaps a few yellow spots or specks on the leaves over the plant. On the other hand if the season is subject to rains and dews its development is very disastrous to the crop. Often before the plants reach maturity the disease so destroys the functions of the leaves that the cantaloupes prematurely ripen, and have no desirable qualities for table use and are a disappointment to everyone handling them. A few days of cloudy, wet weather will so precipitate the disease that the leaves and vines will go down as if swept by a blast from a furnace; the cantaloupes will become soft and wilted and if marketed will result in loss, though it sometimes happens that if rust strikes a field of cantaloupes at about the time the melons reach maturity it will so hasten the ripening that enormous yields are sometimes marketed in a very few days, when the prices are high, thus resulting in advantage to the grower. But invariably the same conditions which hasten the ripening of one field will also hasten others, and the shipments will increase beyond all proportion to the market demands, and at the same time the quality will decrease with equal rapidity and, before it is realized, the market is full of cantaloupes inferior in quality, and very disheartening returns are made.

The recurrence of these rust injuries seems to be more common with each succeeding season, and even the grower who by careful cultural methods or favored location escapes a serious attack, is still unable to get satisfactory returns, owing to the demoralized condition of the market due to melons from rusted areas. It seems evi-



Plate V. Two plants that grew in the same hill, one killed with rust, the other rust resisting.

dent that some effective remedy or means of control must be found to restore confidence in the melon crop.

The Cause of the Disease.—The cantaloupe rust or "Blight" so called, is the effect of a parasitic fungus which grows and develops on the tissues of the plant. It has been named "*Macrosporium Cucumerinum*," by Ellis and Everhart. It spreads and develops by means of spores that are carried by wind and other means and which develop when conditions are favorable. The idea that rain and dew cause the rust is true in the same sense that rain causes weeds,—it simply affords conditions favorable for development.

Investigations for Controlling the Disease.—In 1898, H. H. Griffin, of the Colorado Experiment Station, began investigations to control the disease. He carefully conducted field tests with sprays of different fungicides, and Bordeaux mixture gave promise of encouraging results, but owing to the rapid growing nature of the cantaloupe vines, and the frequency of spraying required, with its attendant expense, this plan proved impracticable.

By a series of tests, it became evident that the disease is not communicated by the seed, except as it might occasionally occur from spores accidentally lodging with the seed.

The next step was the development of a resistant strain of cantaloupes.

A Rust-resisting Cantaloupe.—In the summer of 1903 a close study of the cantaloupe fields was made to ascertain if any variation existed in the rust resisting tendency of the various strains of Rocky Ford cantaloupe. Owing to the different soil conditions and cultural methods on different farms, and the varying ages of the vines, conclusions were difficult to draw, as all the vines seemed to be affected with rust to some extent, and eventually all succumbed to its attacks, though several growers claimed to have cantaloupes that did not rust "like their neighbors."

In order to make a relative comparison of the point in question a small quantity of seed of five of the oldest and most distinct strains of seed, was secured from those who were propagating them. This seed was planted on a plat of ground that in 1903 had grown a very badly rusted crop of cantaloupes; two rows of each kind were planted May 9th, 1904, with a row of watermelons separating each variety to prevent their vines from intermingling. The whole plat had uniform conditions of culture in every particular and the vines of each variety made a very similar growth. About Aug. 1st the rust began to develop in the center of the hills, and it soon became evident that the disease was not making the same progress on all plants. Some of the hills in the rows planted with seed furnished by Mr. J. P. Pollock remained green throughout the season,



Plate I. Cantaloupe hill dead with rust.



Plate II. Cantaloupe hill resisting rust. Both views taken Sept. 24, 1904, on adjacent hills—J. H. Whittenburg farm.

and also produced the first ripe cantaloupe from the plat, Aug. 9th. A few days later the other strains gave a greater yield of early melons, doubtless due to the rust, which soon after destroyed all the plat except the hills mentioned.

These observations were verified in other fields planted with the Pollock strain. That of W. B. Ebberts, east of Rocky Ford, was an exceptionally fine field of cantaloupes, and revealed green hills here and there over the patch after all neighboring fields had been destroyed by rust. A portion of the cantaloupe field on Mr. J. H. Whittenburg's place, west of Rocky Ford, was planted with the Pollock seed and the balance with what is known as the "Blinn" strain. By Sept. 24th the portion of the field planted with the Pollock seed had many hills that remained green, when the balance of the field was brown and dead with rust.

Plates I and II fairly represent the contrast in the two portions of the field. These give views of adjacent hills. Plate II is a resistant plant, grown from the Pollock seed; Plate I a rusted hill from the other strain. There was also a remarkable contrast in the superior quality of the cantaloupes produced from the resistant hills; these were uniformly sweet and spicy and possessed excellent keeping qualities.

A quantity of seed from the rust resisting hills was selected to carry on the work of developing a rust resisting strain of cantaloupes.

During the past season, 1905, this resistant seed was planted on the same plat of ground upon which the experiments had been previously conducted, and which had grown in succession two very badly rusted melon crops, the idea being to develop the resistant strain in as adverse rust infested conditions as possible, to thus reveal the most strongly resistant plants.

The results of the past season were affected somewhat by the destructive hail of May 26th, yet fortunately by replanting, and with some hills which survived the hail, very encouraging results were obtained. Many who visited the plat were surprised at the great contrast between the rust resisting hills and those from ordinary seed.

Plates III and IV, views taken Sept. 20th, reveal the contrast not only in the vines, but also in the character of the melons produced on the respective hills. 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 hill the plants were almost devoid of leaves and the small melons were prematurely ripe, with thin, watery flesh, large, open seed cavity, and practically of no market value.

Plate V shows the contrast between two plants which grew in the same hill; one, entirely dead from rust, the other absolutely free from the disease—this view taken Oct. 1st. This hill was grown from a general selection of Pollock seed and reveals the necessity of individual plant selection to eliminate the reverting tendency of some plants.

Hills grown from the seed of one resistant cantaloupe produced nearly all resistant plants,—the whole row showing green except an occasional vine attacked by rust.



Plate III. Rusted hill, showing poor, undeveloped melons, taken Sept. 20, 1906

Field observations were again made to verify the existence of resistant plants in fields planted with Pollock seed, and in every instance the green resistant plants could be seen remaining over the field after the balance of the vines were dead with rust.

During the shipping season, before the vines had gone down with rust to any extent, several conspicuously resistant plants in the fields of Messrs. C. J. Cover, J. B. Ryan and I. D. Hale, were observed and marked for seed.

Each grower has reported that these hills remained green till frost.

The relative merits of the Pollock melon, and the interest created by the investigation of its rust resisting tendencies led many growers to plant it this past season, and many other growers are anxious for any evidence toward the improvement of the cantaloupe industry.

The fact that during the past two seasons, several names have been given to the Pollock cantaloupe, such as "Eden Gem," "Netted Rocks," and other suggestive titles, also that several Associ-

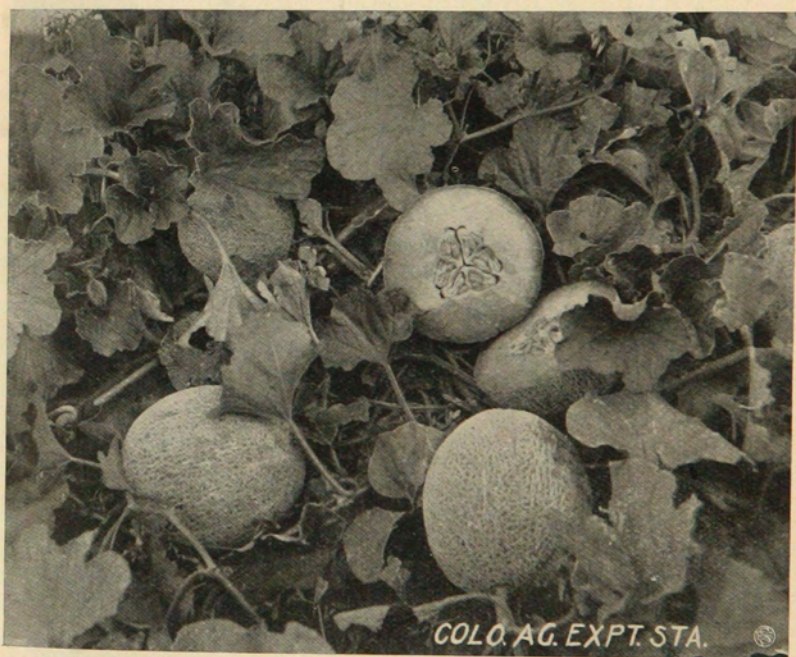


Plate IV. Rust Resistant Hill, showing fine qualities of netting and thick flesh, taken Sept. 20, 1905.

sions and commission men are insisting that their growers shall plant only this strain, seems to be good evidence of its practical merits.

In the light of investigation, the rust resisting tendencies of the Pollock strain, seem to offer the most immediate solution of the rust problem. With this object in view, we hope to induce the cantaloupe growers to consider rust and disease resisting plants as

an important feature in seed selection and lead them to furnish information that will assist in securing that end.

As a matter of information regarding this strain of cantaloupes, an inquiry was directed to Mr. J. P. Pollock asking for a short history of the cantaloupe while it was in his hands. The following is his reply:—

1908 Colorado Avenue, Colorado Springs, Oct. 6th, 1905.

Mr. P. K. Blinn,

Dear Sir:—

Yours at hand; I note what you say regarding the Pollock cantaloupe with pleasure, mainly because if you are correct in your conclusions as to its rust resisting qualities, I have been instrumental in doing good to the community.

Now as to its history; I began growing the strain nine years ago in Holbrook, my first experience in melon culture and farming in Colorado.

I got two lots of seed from Ellingwood and Houck, one at 50 cts. per lb. and the other at \$3.00 per lb.; the 50c seed grew large melons, too large, not one tenth being of a size to crate. The \$3.00 seed produced good cantaloupes, most of them good sized and very heavy netted, not a short melon but correct in length; I saved my seed selecting the proper size and netting,—you may draw your own conclusions as to whether there was cross fertilization producing the origin of my future strain.

The next year I planted at Rocky Ford; I had a fine growth of vines and setting of cantaloupes, I distinctly remember the heavy growth of vines. It was my first experience with plenty of water, and I over-watered and the rust struck the patch, and I had quite a failure; the whole patch was ruined and I was soon counted out at the platform on the score of rusted vines. However, I selected my seed from the patch, selecting a large sized melon with a white close netting, and a perfect cantaloupe as I remember it, in the midst of the rusted vines; I never had much trouble with rust after that, and in the light of your conclusions as to its rust resisting tendencies, I now believe, I unwittingly selected a rust resisting melon, as the rest of my crop were slick melons that failed to mature. Thereafter I always had my eye on that same type of melon in selecting my seed; it was a full large sized melon, with netting over the blossom end; not a long melon, but rather inclined to be short, but it had the qualities. By selection I reduced the size of my cantaloupes down till the last two years that I grew them they averaged well to crate nicely. I often thought of changing my stock of seed, but after going through the season, having very little trouble with culls or inferior melons and the quality seeming to me superior in comparison with anything I could get hold of, I stayed with it. I could easily see that they had peculiarities of their own compared with other cantaloupes.

Now if the using of my name in this connection meets with your approval, it is certainly satisfactory to me, and I will feel honored. Wishing you success in the work and asking for a copy of your Bulletin, I am,

Yours truly,

J. P. POLLOCK.

This bit of history reveals why this strain of seed shows resistant tendency; it has a line of selection to that end, though unintentional at the time. There is an old law in nature called the "Survival of the fittest," it applies to plants as well as animals; it simply means that in nature individuals that are able to grow and develop in the midst of adverse conditions are thus naturally selected to resist the attacks of their enemies. It is for this reason

that our native plants and weeds are so little affected by adverse conditions, while our cultivated crops are so susceptible. For many generations under cultivation, they have been developed for certain purposes, and the vital line of selection has been neglected. This is especially true in regard to some cultivated flowering plants; their existence depends entirely upon the care and protection of man. If they were left to their natural enemies, they would soon become extinct.

No work in connection with agriculture is so important in its results as that of *seed selection*. Too long it has been merely *seed*



Plate VI. Single plant that produced sixteen large cantaloupes.

saving, and if selection has been considered it has been along narrow lines, perhaps size, form or appearance has been considered at the expense of quality, or possibly it has been the quality at the expense of vitality.

A standard of perfection covering all the essential points in the development of a perfect cantaloupe would assist the grower in keeping his selection so balanced as to strengthen or build up any weakness, his strain of seed might reveal. To this end the following points might be considered as a schedule for selection.

SCHEDULE FOR SEED SELECTION.

P-rolific yielding,
 E-arly maturing,
 R-esisting tendency,
 F-orm, size and netting,—ideal,
 E-picurean qualities, sweet and spicy,
 C-avity, small, well filled,
 T-exture, smooth and firm.

While the field is growing, select and mark any individual plants that show exceptional merit along the lines of prolific yield, early maturity or resistant power. That such variation frequently occurs is plainly shown by the field observations of the past three years; many plants were observed which produced only three or four cantaloupes during the entire season, while in one instance, shown in Plate VI, sixteen large cantaloupes were produced from one plant, which would be a very large yield for three or four ordinary plants. The variation in maturing was revealed in the comparative test of the five strains of seed before mentioned. Ten days elapsed between the first ripe melon on one strain, and the first of another, although the rows were given uniform conditions.

The variation in resistant power has already been indicated.

One very important feature of the work of seed selection is the marking of individual plants which show desirable qualities. The seed should be saved separately, labeled and grown by itself, thus fixing in the strain these desirable traits.

In the past the seed saving has been too much from a general selection of the melons without regard to the merits of the vines from which they grew; and also a common error has been in giving too much attention to the external points of the melon without considering its internal qualities. This is well illustrated in Plates VII and VIII which show a choice pile of cantaloupes selected for outside appearance only; the other view shows some of the same melons cut in half revealing the undesirable large open cavity and thin flesh of some, and the solid, well filled cavity and thick flesh of others.

When the marked hills reach maturity the vines which reveal the most uniform sized cantaloupes of ideal form and netting should be taken as the basis for selection. That the size as well as other qualities is affected by seed selection is brought out in the letter of Mr. J. P. Pollock, in which he states that he "reduced the size down until they averaged well to crate."

There are many conditions which may affect size and to some extent each grower should study his soil from the standpoint of the melons which it produces, and govern his selection accordingly.

The netting of a cantaloupe has long been considered an attractive fancy feature and without question it is the essence of its



Plate VII. Pile of cantaloupes selected from outward appearance only.



Plate VIII. Some of the same cantaloupes showing contrast of internal qualities.

appearance on the market, and experience reveals that it has a value in protecting the keeping qualities of the melons on long shipments.

The words "Rocky Ford" scratched on the surface of a green melon appeared in the netting at maturity, thus showing that the netting of a cantaloupe is merely a tracery of callous formed by the natural cracking of the surface of the melon.

By observation and tests it is shown that a close netted melon does not lose weight by evaporation as rapidly as one less covered with netting, thus its keeping and shipping qualities are largely determined by the amount of netting on its surface.

Plate IX represents a former ideal Rocky Ford Netted Gem, a melon characterized by a close heavy netting divided by clear cut sectors. But the tendency of these stripes is to widen under careless selection, and in view of the superior keeping qualities of the "solid net," the old ideal is giving way to a type represented in Plate X which is a result of a cross of the Pollock strain and the melon shown in Plate IX, known as the "Blinn" strain. The form is more nearly perfect to fit the standard crates than the round type characterizing the Pollock strain, and its internal qualities are in keeping with the external appearance.

The eating qualities of a cantaloupe are the ultimate test of its perfection. A cantaloupe produced from a strong healthy vine and yet not having a sweet spicy flavor, should never be saved for seed.

The small cavity, solidly filled with seed, a thick flesh with smooth, firm texture, are obvious points in the value of a marketable cantaloupe. These with many minor points should be zealously guarded by the careful seed selector.

There is no absolute, fixed relation existing between the points of the above schedule. Thus, the selection of melons for resistant power only, will not insure netting or other qualities. On the other hand, an ideally perfect melon, if unable to resist rust, would be a failure; but careful attention to all these details in due proportion, will result in a melon like that shown in Plate X,—a cantaloupe having a "money basis."



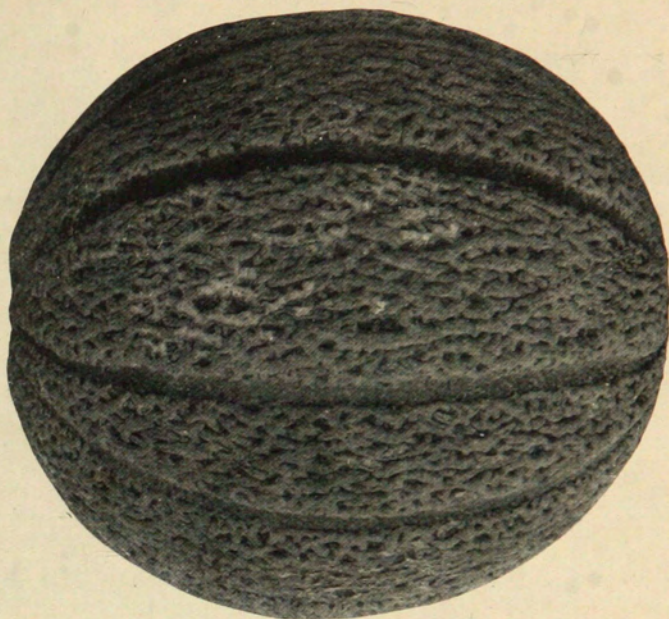
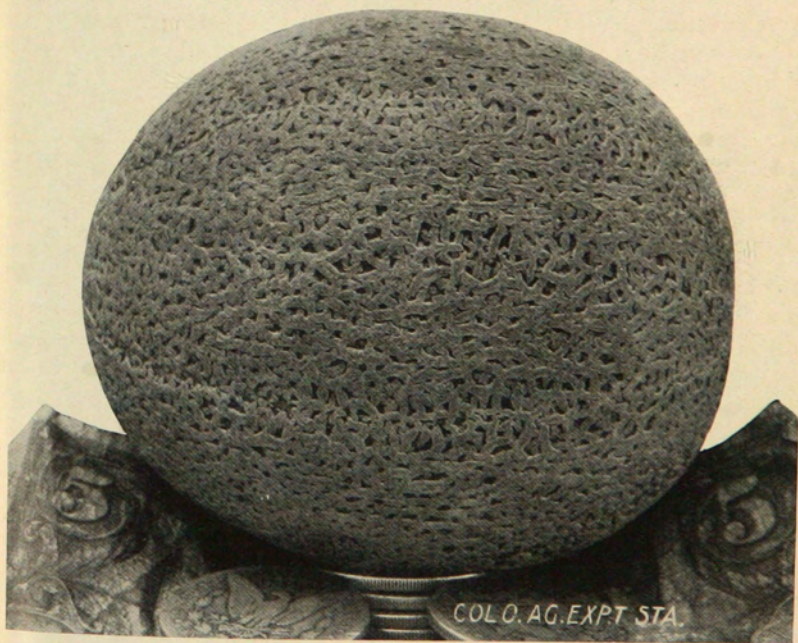


Plate IX. An old ideal of perfection. From Bulletin 85, 1903.



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Plate X. A perfect Pollock cantaloupe, selected for resistant tendency. "A cantaloupe with a money basis."