CANTALOUPE CULTURE

A Treatise on Cantaloupe Growing, under Irrigation in Colorado by

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NOTE.—Copious extracts have been taken from Colorado Experiment Station Bulletins Nos. 95, 104 and 126, by the same author, in the preparation of this treatise; also a number of halftones from the same bulletins have been used by permission.

FIRST EDITION

PLATE 1.

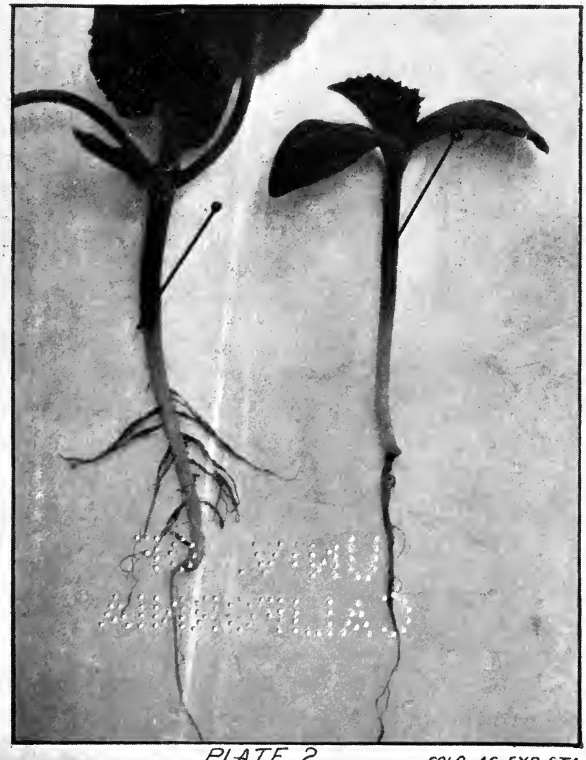

PLATE 2. COLO. AG. EXP. STA.

Plate I—Cantaloupes at right grown after alfalfa. At left on worn out soil.
Plate II—Root System of Cantaloupe Seedlings.

Cantaloupe Culture

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INTRODUCTION

The Cantaloupe has long been a favorite in the home garden, when conditions are favorable to its growth, and in recent years the growing of this fruit for market has assumed the proportions of a great industry in certain favored localities of the country; in districts like Rocky Ford, for instance, which annually ships from ten to twelve hundred cars of the fruit, and seed sufficient to plant a hundred thousand acres, are grown and marketed every year, and in the aggregate a very large area is being devoted to this crop throughout the United States.

The cantaloupe seems to thrive in rather a wide range of soil and climatic conditions, being grown to some extent in almost all of the states, although from the standpoint of money returns, the area of very successful cantaloupe culture is somewhat limited, yet it appears that it is more the question of cultural care, disease and insect pests, or favorable marketing facilities which determine the success of the industry in a given locality, rather than the specific soil or climatic conditions.

Many people who attempt to grow cantaloupes secure indifferent results, because they do not realize the needs of the crop, nor seem to appreciate the fact that judgment and skill are required to meet the conditions. The questions of seed, soil, planting, cultivating, moisture, combating pests, picking and harvesting are all pertinent factors in successful cantaloupe growing.

One of the most important points connected with the industry is in maturing the crop early, for here as elsewhere, "the early bird catches the worm," the high prices received for the first cantaloupes in a district, offers a great reward to the grower who is able to mature his crop a few days in advance of his neighbors. It is not uncommon in the vicinity of Rocky Ford for an extra early field to net a return of from two to three hundred dollars per acre, and it is in anticipation of such results that the grower plants his seed; but as the season advances it soon becomes evident that the many vicissitudes which constantly beset the crop, has caused many to fall behind in the race, and it is only a few who by chance or good judgment are able to secure the early crates.

Many factors that influence the development of the crop are beyond the control of the grower, but there are many elements that are within his power, and of these we wish to speak, not with a view to giving specific rules which would insure a crop of cantaloupes, for the varying conditions on different farms and different seasons would preclude that, but we hope to present the information that has grown out of observation and experience, which will reveal the facts and principles that can be applied where conditions will fit, and which may lead some growers to greater success in growing cantaloupes.

CLIMATE

Climatic conditions within certain limits are essential to successful cantaloupe culture, and the consideration of this topic may answer many questions as to the adaptability of some sections for melon growing. First, there should be a **long, hot summer,** with about five months free from killing frosts, with a daily maximum temperature between 80 and 95 degrees during June, July and August, with a night temperature seldom falling below 60 degrees; four months may mature good cantaloupes, but with so short a season, frost would probably cut short the profits of the crop, unless, as is done in some of the northern states having too short season, the plants are started under frames in sods or paperbands; Second, there should be plenty of bright sunshine, without excessive rainfalls; this will secure good quality and lessen the liability to the attacks of fungus troubles, that are so often fatal to the melon crop in rainy sections or regions of heavy dews; without doubt the clear bright sunshine and the arid conditions of Southeastern Colorado, accounts for the high flavor and the fine qualities found in the Rocky Ford cantaloupes as is evidenced in the poor quality in the cantaloupes with an abnormal rain fall, which sometimes occurs.

Sunlight is very essential to the full development of cantaloupes, for the quality is perceptibly inferior in shaded spots; the dry atmospheric conditions cause rapid transpiration of the moisture, from the leaves, thus inducing a quick movement of sap or plant juices which increases the power to carry and deposit plant foods, thus developing and concentrating the spice of flavor and producing the very highest qualities.

It is conceded by all experienced cantaloupe growers, that the cantaloupe thrives best in a warm, sandy loam; clay loam and other types of soil may produce a good crop if the tilth and fertility are good, but heavy soils are apt to be cold and backward, causing lateness in maturing, and it is also generally believed, that the nature of some types of soils seriously influences the form, size and other qualities of the cantaloupe. It is true, however, that the average size will vary in different seasons; in seasons of very favorable growth the cantaloupes will run to a large proportion of "jumbo melons" (larger than standard) in seasons less favorable, there will be more small or pony sizes. An actual test of a crop on a piece of land, is the **best** proof of the fitness of the soil for that crop; for while a chemical analysis may theoretically seem favorable, in practice it may prove otherwise.

There are many factors that may influence the results; but in general the land that will grow other vine crops, such as cucumbers, pumpkins and squash, will probably grow good cantaloupes.

Soil for cantaloupes should have good drainage, both surface and subsoil, and in irrigated regions the land must have a uniform slope or grade so that the water will run even, without soaking or flooding the hills; if there is one point above another in cantaloupe culture that needs special emphasis, it is the caution against **oversoaking** or **flooding** of the surface of the field; this will be further discussed under the

Plate No. 3—Leveling Land, and Fining the Soil.

topic "Irrigation," but the point must be held in mind in many of the operations, and in selecting the field, to have it will drained on the surface as well as the subsoil.

If no detrimental soil conditions, like seepage or alkali, exists, the question of fertility is usually the most important one in relation to the soil; barnyard manure is an old standby, and cantaloupes of all crops will respond as well to well-rotted-compost better than any form of commercial fertilizer, but experience of the most convincing sort has shown that soil cannot be made to produce good cantaloupes indefinitely, year after year, by applying manure and artificial fertilizers.

Aside from fertility there are also the questions of plant diseases, soil bacteria, and unbalanced food supply. **Crop-rotation** has proven to be the most practical and adequate means of preserving not only the proper fertility, but the nearest approach to securing uninfested soil conditions, hence, crop rotation becomes an important phase of cantaloupe culture.

Alfalfa, to the western ranches occupies the same place that clover does to the eastern farmer, or the cow pea to the southern planter; these crops for their respective sections, provide ideal soil fertility and tilth for the cantaloupe. In Colorado alfalfa sod is the ideal soil preparation for cantaloupes, and a comparison of the results on alfalfa sod with even well manured old land will convince the most skeptical. Plate No. I. Experience has demonstrated that early matured cantaloupes can hardly be expected on soil following a heavy fertility consuming crop, like sugar beets or corn, a good **late crop** being the usual result. Nearly

all the fine records of early yields and high prices have been made on soil that was in a perfect state of tilth and fertility.

Soil **can** be made **too rich** in applying manures, and the principal point in the application of fertilizers is to have a reasonable amount, and well incorporated in the soil, and in the case of barnyard manure, to have it well rotted. In Colorado, manuring in the hill, has been found to have no advantage over the broadcast method, owing probably to the wide spreading root system of the plant; **commercial fertilizers have not been profitably used in Colorado.**

PREPARING LAND FOR CANTALOUPES

The secret of getting soil in that ashy, mellow condition so desirable for cantaloupes, is one largely of experience, for handling soil in the same manner on different farms will seldom get the same results; one may be a clay, the other a sandy loam. The texture and the previous cropping has much to do with the way soil can be handled. In general, there must be moisture in the soil during the winter to secure the mellowing effect of the frost, and the soil **must not** be handled too wet. If clay or adobe "packs," it will dry hard and lumpy; real sandy soil can be handled wet with less risks than other soils. The soil should be friable so that the harrow will pulverize it without clogging as it does in mud, and yet not so dry as to leave the field full of clods.

Before plowing, the soil should be well disked for two reasons. First, to thoroughly mix the soil with any fertilizer previously applied and second, to pulverize the soil on the surface, so that after the work of preparation is complete, the bottom of the furrow will be as finely prepared as the top. Plowing for cantaloupes is usually made to the depth of five or six inches; in the arid region the plowed land must be closely harrowed behind the plow, to prevent too rapid drying of the surface, and should be closed up by fineing the soil on top; this is usually accomplished with the steel harrow with the teeth turned nearly flat, or with a float or land leveler, a fine dust mulch will check evaporation, and thus conserve the soil moisture, to enable a more thorough harrowing to complete the preparation. Preparing the land some time before planting is advisable as the soil becomes settled, and the seed will germinate more readily and a more uniform stand will be secured. The soil should also be harrowed after **cold spring rains,** to check evaporation, which will tend to aid in warming up the soil. Before laying out the rows to plant, while the surface of the soil is dry, the field should be carefully leveled with a land leveler; See Plate No. 3; removing all the high points and filling the hollows and deadfurrows, so that in irrigating the water will run uniformly without flooding the rows, or over soaking any of the hills.

About planting time, the field is laid off with a marker in rows five to six feet apart, in the opposite direction to the rows to be planted, which are laid off with the irrigation furrows, in the best direction for water to run, the irrigation rows are usually made about the same distance apart, usually six feet, these furrows can be made with a single shovel plow or a two row marker or furrower, shown in Plate No. 4. In the non-irrigated regions these furrows could serve for surface drainage after heavy rains.

Plate No. 4—Marking Out Cantaloupe Rows, with Two-row Marker.

SEED TO PLANT

The question of **seed**, its variety, and the selection and breeding behind it is of utmost importance in growing a crop of cantaloupes for market; being as essential to success as is the selection of the variety of fruit trees to be set in a commercial orchard; the markets have certain demands for certain kinds of fruit, and the grower must meet that demand. A market may become educated to take a new fruit of merit, but it will not be forced to take what may be the misfortune of the grower to produce. There are local demands for several varieties of muskmelons and cantaloupes, but the development of cantaloupe growing, as an industry, has been since the introduction of the Netted Gem type of melon; its small, uniform size adapting it for packing in crates for long shipments, while its fine flavor, its quality and attractive appearance have been other points in its favor. Unquestionably it is one of the best varieties grown, but doubtless there is confusion in the minds of many who see the long lists of varieties published in some of the seed catalogues, of different strains, but which in reality is but one type of cantaloupe. Each seed firm, commission house or grower having named and renamed their particular strain until the original identity has been lost; but regardless of what might be said, or has been said, along this line, there are really but few strains of the Rocky Ford Netted Gem type that deserves the distinction

of a different variety name. By this, one should not infer, that it makes little difference what strain is planted. In the breeding of livestock, an animal may be a Shorthorn or a Jersey, yet be absolutely worthless to head a herd; it is the question of the individual merit of the animal, and so with the cantaloupe; there must be a system of seed selection which recognizes the **individual plan** as the unit of selection, to give value to the seed, and not merely a name applied to attract the buyer.

Cantaloupe seed cannot be judged by its appearance, for fine looking seed can be saved from worthless stock, nor is the price paid for the seed a sufficient test of its value, for great quantities of seed are bought from cull piles and unmarketable cantaloupes at an insignificant price at first, but after passing through the hands of several seed jobbers, it gradually assumes a price that would seem to warrant it being good seed, by the grower who does not suspect its true character until a seasons' labor may have been lost.

The seed jobber can seldom reach the standard advertised until the seed breeder and the seed grower stands back of him. Contract seed, mis-labeled seed, substituted orders, renamed varieties and extravagant claims have shaken the confidence of many growers; a competent seed breeder should be able to guarantee the seed he produces as to **variety, purity and general qualities,** and the seed firm that deserves the confidence of growers must deal in reliable seed all the time.

There has been a great awakening on the subject of improved seed selection for all crops and the cantaloupe grower who does not keep pace with the advance of knowledge in this line, must expect to fall short in his profits. Seed breeding means more than the selection of seed from an average crop, **that would tend only to produce average results.**

The same laws that govern the breeding of animals also control the improvement of plants. Any fair minded man will acknowledge that thoroughbred animals are more profitable than scrubs, or even average stock, and the same is true of pedigreed plants. But we must get the true conception of seed selection,—not the idea of the uninformed farmer who, with his wife spent their evenings for many days, selecting seed corn from a lot of shelled corn that he had purchased for feed. And the man, who selects his cantaloupe seed at the packing shed is almost as far wrong, for the **plant** that produced the seed has not been considered.

Scientific plant breeding and seed selection are based on two **fundamental factors** that cause variations in plants,—**Environment** and **Heredity.** The ever changing conditions of soil and climate, and cultural care will effect the qualities of plants, and the different combinations of these influences may produce from the same seed, under different conditions very contrasting results,—it may be ideal, or undesirable; for this reason a crop producing fine specimens under favorable conditions does not prove conclusively that the crop should be saved for seed, for the weak heredity that may be present, under more adverse conditions, might disclose the serious defects. Hereditary tendencies **cannot** be determined before hand by the appearance of the seed, nor from the perfect specimens from which it may have been saved.

Plate No. 5—Planting Cantaloupes with a Hand Planter.

Heredity is a subtle, unseen force, difficult to understand, and which can only be determined by the **performance** record of the seed tested under a wide range of conditions, or better still by selecting a number of fine specimens and saving the seed of each separately, and then growing all under uniform conditions of soil, climate and cultural care; this will largely nullify the effects of environment, and the variations thus disclosed, may be reasonably ascribed to heredity and the selections made accordingly.

Experience has shown that certain plants, like some individual animals possess strong hereditary power to reproduce uniformly, a desirable trait or character, while other individual plants have poor reproducing traits, and for seed purposes are really worthless.

Seed breeding is practical; it is not a theory or a fancy, but a reasonable, result-producing process. The most successful farmers are giving it careful consideration, nor does the improvement of seed add a burden of labor and expense; but comes as an added asset to the growers wealth, and increases his pride in his crop.

Comparatively few men are capable of producing their seed for if they are growing cantaloupes for market, their time and attention must be occupied with the crop, and to select, cut and cure high grade cantaloupe seed requires no little **training** and **experience**, and some little equipment.

The grower who buys his seed should deal directly with a reliable breeder who is qualified, and is making a specialty of growing the crop for seed; a grower should not submit his seed order for **"lowest bid"** if he expects good seed. He must be willing to pay as much, at least, for the seed as the cantaloupes from which it was saved, would bring had they been marketed, in Colorado that would mean from one to two dollars per pound, as it requires at least a standard crate to save a pound of select seed.

The seed from the arid region in high altitudes has proven to be superior to seed grown in the humid sections, both for vigor and early maturity. The big cantaloupe growers from California and the Southern states realize this, for they look to Rocky Ford each year for their cantaloupe seed, and all testify that they get earlier and more uniform cantaloupes from the Rocky Ford grown seed.

PLANTING AND SECURING A STAND

The first requisite in planting cantaloupes, is to have the weather **warm,** for warmth and moisture are the two essentials in seed germination. Many growers make the mistake of planting while the ground is yet cold, with freezing temperature occurring every few nights. If perchance the days are warm enough to germinate the seed, the plants are stunted and make a slow tantalizing growth, should they be so fortunate as to escape these late frosts of spring.

As a general rule, a few days before the latest freeze may be expected, is as early as it is safe to plant. At Rocky Ford, May 1st, marks the usual date of the latest frost, but even then there are risks to run, as killing frosts have occurred as late as the tenth of May, or even later. It is **common** for cantaloupes planted as early as the tenth of May to begin to ripen as soon as the earlier planted seed, so as a rule it is not to much advantage to plant very early; the **grower,** must be the judge in regard to his soil and climate.

There are two systems of planting cantaloupes,—the **drill-row** and in hills. In the hill system, the field is check-rowed like corn, to permit cultivating in each direction, the rows usually being laid off five to six feet apart, and the hills about the same distance in the rows. By dropping eight to ten seed to the hill, it will require about a pound of seed to plant an acre. It is advisable to plant plenty of seed in order to secure a good stand, allowing for the attacks of the cutworms and other destructive agencies.

There are two methods of planting cantaloupes in hills,—with a hoe, and with a hand planter, commonly called a "snapper" shown in Plate No. 5. The rotary type of this form of planter is usually the most satisfactory, but some modifications are usually necessary to fit it for dropping cantaloupe seed.

Plate No. 6—Planting Cantaloupes with Garden Drill.

By filling the holes one of the regular corn dropping plates with lead, then by boreing out with a three-eights drill bit and by testing and enlarging the holes it can be regulated to drop quite well; the seed box will also need close fitting, to prevent the thin flat seed from leaking out. A block or stop should be attached to the blades at about the depth to plant, about one and a half inches, this will insure uniform depth, which is essential. Great care should be exercised to have the depression or hole formed in the soil by the thrust of the planter, filled or leveled with the foot; otherwise the seed will dry out, field mice will more readily find the hills, and a hard dash of rain will form a hard chunk, or crust right over the seed. The surface of the soil should be **dry** to insure good work with the planter. A man with some experience can plant from three to five acres per day with a planter, while one acre per day is about all that can be accomplished with a hoe.

The principal argument for the hill system of growing cantaloupes, is the economy in labor, for more of the weeding and hoeing can be done with a horse.

In the drill system the rows are usually put about the same distance apart, but the seed are sown in drill rows, the seed being dropped every two or three inches; this method requires about two to three pounds of seed per acre. The seed is sown either with a hand drill, shown in Plate

No. 6, the horse planter or the sugar beet drill is used in the Rocky Ford district. The important point is to get the seed dropped uniformly, and the drill set to plant at a uniform depth,—not over one and a half inches; as soon as the plants are nicely up they should be thinned to single plants, far enough apart to permit hoeing between. After the danger from insect injuries is over, and about the time the first blossoms appear, the plants should be thinned again to one plant every two feet, on the average; the tendency at this point is to leave the plants too thick, especially if the plants are extra fine. The most advanced plants are selected, which is the cause of the drilled fields usually maturing earlier than the hill planted, and the earlier development usually compensates for the extra cost of the increased amount of seed, and the added labor of thinning.

The essential points in planting are to get the seed planted at a uniform depth, and at a uniform distance from the irrigation furrow; to have the soil fine and firmed just right, to skillfully conserve and apply moisture, and to keep a crust from interfering with the young seedlings.

In the arid regions the seed is usually planted about one-half inch deeper than it is expected the plants will come through, in order to hold the moisture line to the seed. When the seed is well sprouted the hills are raked off with a garden rake, removing the crust and any clods that might interfere. Sometimes the field is harrowed across the rows with good results, especially where the rows are drilled in. This matter of "raking off" and keeping the surface fine over the hills is a **very important point** to be observed in securing a good stand.

IRRIGATION

The moisture problem in cantaloupe growing is a very important one. Some times in the humid sections, there is too much water, and it becomes the question of how to save the crop, but little can be said here, except to select well drained fields for the cantaloupes and provide the field with furrows, like the irrigation furrow, to carry off the excess rain water, and to plant on somewhat raised hills or ridges.

In the arid sections the moisture for the crop as a rule depends on the irrigation furrow, and the skill of the grower to so manipulate the soil and water. Too many look upon irrigation as a simple process of running water through the rows, or over the ground, paying little or no attention to the **needs** or **demands,** or the dangers of flooding or oversoaking the land. When soil is completely saturated with water, the air is practically all driven out and the soil settles, which defeats the very object and purpose of plowing and the other work of soil preparation, which will dry hard and nothing but frost can ever mellow it as before.

Plate No. 7—Irrigating to Germinate Seed, Without Flooding.

The application of water to all such crops as cantaloupes should be by sub-irrigation, that is, the moisture should soak through the soil to the plant or seed, from the irrigation furrow, without the surface of the soil, except in the furrows coming in contact with the water; this is essential, not only for the needs of the plants, but also the same amount of water will serve a longer time, the needs of the plants, the water rights in some ditches makes it necessary to conserve the moisture as long as possible.

In order to supply the moisture uniformly to the seed along the row, the seed must have been planted at a uniform distance from the water line, about four to six inches, to insure uniformity in the soaking of the rows, the rows should be "logged" out, or smoothed out with a short piece of log about the size of the furrow; this will cause the water to run through quickly, and by regulating the amount in each row, the rows will become uniformly wet without flooding or soaking the ground. Plate No. 7 shows a field being properly irrigated, to germinate the seed. When the water can be gotten through the rows quickly and the amount regulated to supply the row about as fast as it soaks in the soil, the upper and lower parts of the row will become wet at about the same time and amount, with practically little water wasted.

The idea is to soak the rows until the water has fully reached the seed, while the surface over the hill remains nearly dry; **this is ideal con-**

ditions for **germination** and is sufficient for the needs of the plants in all the early irrigations. Later the rows can be soaked till moisture shows on surface back to the plants as in Plate No. 8.

Under Colorado conditions, one irrigation after planting, and one again about the time the plants are coming up, is ordinarily all that is required until after the first cultivation, after that irrigation and cultivation alternate each other every week or ten days, the exact number of times depending on the weather and soil conditions.

The amount of irrigation necessary to secure the best results in cantaloupe culture, is subject to so many varying factors, that it is impossible to lay down an exact rule. In the first place, the cantaloupe does not thrive in a wet soil, as evidenced by the injury and poor quality of the crop in seasons of excessive rain. The needs of the crop in the first stages are very small, and as light watering as possible to secure the needed moisture, is best; then as the plant developes the amount of irrigation should be increased, **light, frequent irrigations,** rather than heavy soakings at long intervals has proven to be the best plan.

When the vines are nearly grown and set full of developing fruit a heavier irrigation is then needed by the plant, but as soon as the fruit have reached their growth, light waterings should again be the rule; to insure the best quality, little if any irrigation should be applied during the picking season, just enough to prevent severe wilting; it is at this time that the cantaloupe "rust" fungus makes its appearance, and moisture and dews are favorable to its development.

The dryer the season, the better the quality in cantaloupes, is an axiom that should induce more careful irrigation among cantaloupe growers in the irrigated sections.

The relation of irrigation to early setting of cantaloupes is a somewhat mooted question; there are growers who argue the use of frequent irrigations during the setting period in order to secure a good set, but others prefer to keep their vines dry, even allowing them to show the need of moisture before they will permit irrigation during this stage.

It is evident that the season and climatic conditions have more to do with the setting of fruit than the watering; there are experiences that might seem to support both theories; yet continued observations would indicate that a grower is not warranted in following either course to the extreme, but rather the medium plan of providing just enough moisture to secure an even, healthy growth all the way through, would seem to be most favorable condition.

An excess of water in hot weather is apt to induce a heavy growth of vine at the expense of early "sets" due to the rank growth, and such succulent growth is also much more liable to succumb to the attack of diseases and insect pests.

CULTIVATION AND CARE

If there is a secret in getting early cantaloupes, it is in growing them from start to finish in such a way that the growth is not checked

Plate No. 8—Letting the Water Soak More as the Plants Grow.

at any time. The cantaloupe does not seem to have the power to rally from a check in growth or an injury of any kind; the set back, not only hinders the production of early fruits, but seriously affects the size and yield of the cantaloupes. There are numerous instances where unfavorable conditions of some kind, have checked the growth, in some part of a field that was planted and otherwise handled the same; invariably that portion of the field will show marked difference in size, netting or other qualities. The best promise of a good crop is a prompt and steady growth from germination to maturity.

The seedling period is the critical time in the development of a crop of cantaloupes, for it is at this stage that the check in growth usually occurs, from cold weather, high winds, lack of moisture or the attacks of insects.

A knowledge of the manner of growth of the root system and development of the seedling, will in a measure explain the reasons for the steps taken and the precautions that are necessary at this time in handling the crop through this important period.

Plate No. 2, represents two cantaloupe seedlings, the one on the right revealing the plan of the root system that first develops when the seed germinates; it penetrates almost directly down from the seed while the stem or radical is pushing its way to the surface. These little roots seem to form a temporary support for the plant during the first two or three weeks, for up to this time the stem from the seed point to the top of the ground is smooth and white, with no evidence of the lateral

roots which are shown on the stem of the seedling to the left in the picture.

The second root system develops from the stem about the time the fifth leaf appears, or four to five weeks after germination; these roots seem to form the main feeders of the plant, for the growth of the plant is almost insignificant until it feels the impulse of this larger and better root system. The question of good early growth and maturity almost hinges on the success of the farmer in supplying the conditions that will favor the early and proper development of this lateral, or main root system. It seems evident that the depth of planting and the manner of managing the soil in the hill has an important relation to the early development of these lateral roots. Experience teaches that seed planted much over two inches in depth are slow and difficult to germinate, being weakened by the long stem that is necessary to reach the surface, and on the other hand, if planting is too shallow, the seeds are apt to dry out, or if rain follows a crust will form, which must be removed, and that often exposes the seeds that are not planted at a sufficient depth, with fatal results, or leaves the plant with too shallow a stem support, it is then whipped and wrung by the high, drying winds or exposed to the attacks of the cucumber beetle.

Seed will germinate readily when weather conditions are favorable, if planted at about the depth indicated by the white portion of the stem of the seedling on the left in Plate No. 2.

When the seed leaves are nearly to the surface, the hills should be raked off, removing any crust or dry lumps which may obstruct the little melon plant. Plenty of seed should be used to provide against a loss in handling the hills, or from the attacks of insects. It also affords a chance to select the thriftiest individual plants when the thinning is done. Owing to the injuries from the striped cucumber beetle, the thinning should be delayed until the plants have about the fifth leaf, when the beetle will not do much more injury, the extra plants in the hill should be destroyed by pinching or cutting off the stems, as pulling them out may disturb the plants to be left.

HOEING

Hoeing the hills is of great importance, but it should be done with skill both as to the time and in the manner it is done, for careless hoeing is a common error; if the seed has been properly planted in mellow soil and the irrigation properly applied, there is no reason for deep hoeing in and close to the hill, as it only disturbs the plant and dries out the soil; weeds can be destroyed by rather shallow hoeing.

The dry, cloddy soil on the surface of the hill, should be removed and replaced with fine mellow soil drawn up from away from the hill, hilling up the plants as much as possible; even to almost covering the two seed leaves, this will protect the plants from wind, and insects to a large measure; but the most important feature of this process is the holding of the moisture well upon the stems, affording the best condition for a long base for the development of the roots, as well as supplying the plant with moisture. If on the other hand, the soil in the hill is loosened up with the hoe and not hilled up by drawing the loosened soil to the plant with the hoe, the hill will usually dry out, and only a short portion of the stem be in moist soil to induce root development.

PLATE 3.

PLATE 4. COLO. AG. EXP. STA.

Plate No. 9—Showing Development of Cantaloupes. Photo Taken July 2.
Plate No. 10—Same Field Two Weeks Later.

CULTIVATION

A thorough preparation of the soil before it is planted to cantaloupes will very much lessen the necessity for so much cultivation afterwards, but a good deal depends on frequent and thorough tillage during the early stages of the growth of cantaloupes, at first it should be deep and thorough, but not close enough to disturb the plants; the cultivations should be more shallow and further from the hills as the plants develop. The grower who cutlivates deep and close to the hill because the vines do not prevent this, is cutting off roots, setting back his crop more than he is doing good. He should understand the growth of the roots, for they form the counterpart of the vines on the surface, only they ramify the soil more thoroughly and to a greater distance than the length of the vines, so it is easily possible to damage the crop by careless cultivation. Plates Nos. 9 and 10 gives a conception of the root system which must exist to produce the rapid increase of growth in so short a time. The first was taken July 2, 1904, and represents the growth of about eight weeks, the next was taken at the same spot just two weeks later, examinations in the soil between the rows will reveal the tiny rootlet very thick, four to five inches deep, hence surface tillage after the vines start should be the rule.

TOOLS USED IN CANTALOUPE CULTURE

The fourteen-toothed cultivator, with a steel weeding knife bolted across between the two back teeth, so as to run just below the surface, an inch or two, has become the most popular tool for cultivating on land clean of alfalfa roots or trash. This gives ideal tillage, and practically kills all the weeds except in the hills.

On alfalfa sod where the crowns would gather on the knife it is not so pleasant to use yet it will do very satisfactory work, but here the five-toothed cultivator is usually used; this tool is also used to furrow out rows by closing it up and placing a large shovel on the rear shank. When the cantaloupes are "laid by" (cultivated and furrowed out the last time) the irrigating furrows are made somewhat larger than before and they should be "logger out" so that water can make its way through the rows after the vines have covered the ditches, it is also a good plan to lay the vines around out of the furrows once, to train them as much as possible away from the furrows; this will keep many of the cantaloupes out of the ditch, though the vines will eventually nearly cover the ground.

INSECT ENEMIES

We will discuss this subject from the grower's standpoint only simply mentioning the methods that have proven to be the most successful under Colorado conditions. Doubtless in other states there are other pests and other conditions to influence the results.

No sooner has the seed germinated, than the struggle for existence begins; an effectual precaution is to plant plenty of seed, scattering it well in the hill, and even replanting before it is evidently necessary,—usually some replanting is required anyway. Crop rotation also, is often a good way of avoiding infested fields, in fact, "prevention is better than cure," in fighting insects and plant diseases.

The destruction of insect-harbors, such as weeds, old vines and plants, should be given more consideration, and the cultivation of the fields in the late fall, winter and early spring, will destroy many eggs and insects that pass the winter in the soil,—grasshoppers and cutworms for instance.

The little striped cucumber beetle is doubtless one of the most common enemies the melon growers have to combat. A long list of remedies have been suggested and tried, but the best method is to keep the soil in the hill as fine as possible even to putting dust on the hill and thus prevent the beetles from depositing their eggs on the stems as the plant pushes itself through the cracks of the soil that would otherwise occur if the soil in the hill were not soft and fine; dusting the hills with air slacked lime, through a common gunny sack, or spraying with the bordeaux mixture as soon as the plants appear are the best remedies. Tobacco, ashes or any dust bath are good repellants.

The cucumber beetle is easily frightened, and continual cultivation will often do much to keep the field clear until the plants reach a stage where the beetles will not do much injury.

The melon aphis is doubtless the most serious pest that the cantaloupe has to contend against in many places, and one against which resistance is least effectual where conditions are favorable to the aphis.

Fortunately for the growers in Colorado, the natural enemies of the aphis usually hold them in check quite effectually; the lady-beetle, the Syrphus flies and the lace-winged fly are the principal enemies to the aphis, some seasons a little parasitic fly destroys many aphis.

The only effective measure seems to be a careful watch of the fields to destroy the first plants found to be infested with aphis, as it seems that only a few insects are able to pass the winter, and they seem to spread from a few isolated points, and if these can be destroyed by finding them and burying them, early, has seemed to be the only plan to adopt, as spraying and fumigation has been tried by the most competent experts with very unsatisfactory results.

The introduction of the natural enemies, like the lady-beetles has been tried in California with some promise, but this plan is in an experimental stage as yet. The necessity of supplying the enemy as soon as the aphis appears, makes this plan rather impractical for the grower.

Destroying the winter harbor or host plant of the melon-aphis would seem to be the best measure to adopt if possible; this winter harbor has not fully been determined for some points.

Permission Colo. Exp. Sta.

Plate No. 11—Two Plants that Grew in the Same Hill, One Killed with Rust, the Other Rust Resisting.

Plate No. 12—1. A Vine Rusted on Check Row. 2. Adjacent Vine Showing Resistance to Rust.

PLANT DISEASES

Crop rotation, seed selection, or breeding for disease resistance offer the best means of controlling plant diseases; the spraying of the crop with the Bordeaux mixture or other fungicides is about the only other means at hand. In Colorado, spraying has not proven as successful as is reported to be in other states, doubtless due to different climatic conditions.

Careful control of irrigation seems to offer one means of lessening the attacks of some of the fungus troubles in the arid sections.

HARVESTING

After all injuries to the crop have been explained and remedial measures suggested, there still remains one great cause of poor returns from the cantaloupe crop, viz.,**careless** and **unscrupulous methods of marketing.** When cantaloupes are scarce and sales are quick, there seems to be no power on earth that will stay the hand of the average grower as he pushes his crop onto the market, with the encouragement of advices from his progressive (?) commission merchant; together they have produced a glutted market with inferior products, instead of protecting the markets with a quality that would increase consumption, they simply let it fill up with everything and anything, and neither the grower or the consumer is benefitted. It is common for growers to admit that they are shipping cantaloupes that are not fit to be eaten, and it is not strange that a similar complaint comes from the consumer.

PICKING

When green or over-ripe melons are allowed to go onto the markets, the trouble usually is in the picking; careless or mistaken ideas often prevailing. There is a very narrow limit in the stage of ripeness that a cantaloupe can be picked and have it in the right condition for distant markets. On one hand, it can not be picked so green as a tomato or lemon, and still ripen during shipment to fair quality, nor, on the other hand, can it be allowed to show any distinct color of ripeness, like an apple, without it becoming too soft on long shipments.

It should be ripe enough so the flesh will be sweet when cut open, yet too hard to be eaten for a day or two; it requires skill and experience to determine the proper stage.

Jocularly, it has been said, "The cantaloupe has three stages in three days,—green, ripe and rotten." This expresses the fact that there is a very short period for marketing the crop in good condition, yet if picked at the proper stage, handled right, under refrigeration it can be shipped to distant markets in quite normal condition.

It is hard to describe to a novice, just how to detect the right stage to pick a cantaloupe; there is first, a very slight change of color in the interstices of the netting, hardly enough, however, to attract the attention of the inexperienced; second, it is tried with a pressure of the thumb or forefinger, when it should "slip," that is, separate in the same manner as when real ripe, but requiring some little force but not enough to break the stem or flesh out, conditions of the vines, and climate will at times vary the picker's judgment to some extent; but by cutting occasionally a melon the point can be decided. It is **very essential** that pickers be **carefully instructed,** and **closely watched,** for the good returns should not be expected from green, or overripe cantaloupes.

PACKING

The fruit should be carefully handled, not bruised, or roughly shaken to loosen the seed cavity, they should be hurried to the shade and crated as soon as possible; the cantaloupes should be carefully graded before crating, not only as to size, but for condition of ripeness; for there will always be some a little too ripe which must not be crated with the green-ripes, or the markets will suffer. In grading, the ripe melons can often be marketed in local or nearby markets, and the ones just right reserved for the long distance shipments.

In crating, the layers must be uniform, and tight, but not so crowded as to crush or bruise the flesh, yet there should not be a loose melon in the crate if it is expected to carry well.

The crate has been the standard package for long distance hauls. The standard crate of forty-five cantaloupes has been most popular, but there is a tendency now for different sized crates, so that a better grade of packing is possible; as it is impossible to find cantaloupes that will run absolutely uniform, the different seasons will change the proportion of standard to "jumbo" or "pony" cantaloupes, and it is not possible to crate the different sizes and make a uniform pack.

Plate No. 13—Type of Old "Netted Gem."—Colo. Exp. Sta.

HISTORY OF SOME OF THE STRAINS OF ROCKY FORD CANTALOUPES

The Netted Gem variety was introduced from France, about 1880, and it was this variety, grown at Rocky Ford, Colorado, that at once popularized the cantaloupe, on account of the exceptional fine flavor and marketing qualities of this cantaloupe as grown under Colorado conditions. The general type of this cantaloupe is shown in Plate No. 13, a closely netted type with clear cut sectors, as a rule small in size, averaging about one and a quarter pounds, green fleshed shading to yellow at the seed cavity, of a very sweet spicy flavor.

In the early history of the industry, the growers around Rocky Ford purchased their seed from eastern seed firms, but on a number of occasions badly mixed seed was the result, and different growers began to save their own seed, while all of the "Gem" type of cantaloupe, different growers had different conceptions of the ideal type, with these different ideas of selection, and possibly some cross fertilization from the mixed lots of seed, there developed several quite distinct strains of the now popularly known variety of Rocky Ford Netted Gem; some with a solid net, that is, uniformly netted all over, without the clear cut sectors and there were various other distinguishing traits.

About 1900 the "melon rust" became serious, and the Colorado Experiment Station, instituted several experiments in spraying, and in 1904 began the investigation to develop a disease resistant strain of the Rocky Ford variety. A comparative test of the different strains were tried under uniform conditions, and it was found that one strain that had been developed by Mr. J. P. Pollock revealed the desired trait to a marked degree, the report of these investigations has been reported in the Colorado Bulletin No. 104.

THE RUST-RESISTANT POLLOCK

An interesting history of this strain from Mr. Pollock, who had retired from cantaloupe growing, is reprinted from the above named bulletin:

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 Hauck, 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 overwatered 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 satisfatcory 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 these conditions.

Mr. Pollock has since informed the writer that the large cantaloupe referred to in his letter was a salmon colored fleshed one, and the well netted one was the regular green fleshed type of the Gem strain. As the Pollock strain has always shown a mixture of both green and salmon type of flesh, it seems reasonable to suppose that this strain was the direct result of cross fertilization between the two strains Mr. Pollock had, and may also account for the resistant tendency of this one strain, while all other strains tested revealed no resistant tendency whatever.

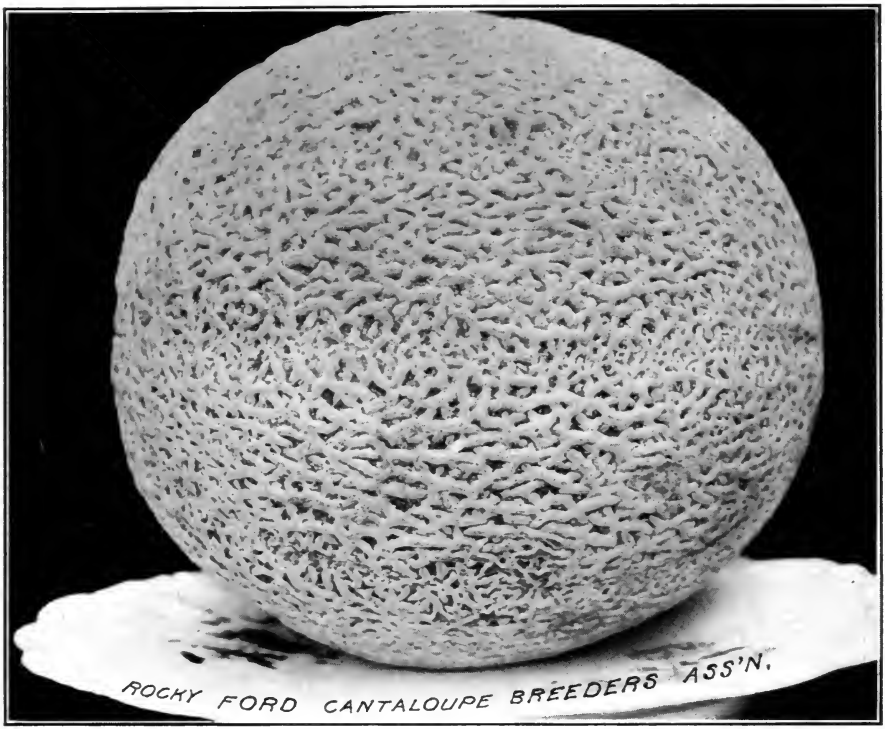


Plate No. 14—Blinn's Rust-Resistant Pollock.

Plate No. 14, is characteristic of the Pollock cantaloupe well netted, entirely covering the whole surface, it has a small seed cavity as a rule, and is one of the best of shippers, the many desirable qualities of the Pollock strain, naturally brought it into popular favor, and it has been renamed by several parties, "The Rust-resistant," the "Eden Gem," "Netted Rock", and "Ironclad" are some of the names it is sold under. This cantaloupe is inclined to run to standard and "jumbo" sizes rather than to "pony." The quality of the flesh is exceptionally fine grain, sweet and spicy. There are both green and salmon colored flesh found in the usual strain of Pollock, but the strain developed by the Experiment Station was selected for the green colored flesh as at one time it was thought to be superior to the salmon colored flesh, but recently it has been found to be an individual plant trait, and some of the finest flavor is found in the salmon fleshed. The Rocky Ford Cantaloupe Breeders' Association has isolated one of the salmon fleshed Pollock, known as Pollock No. 25, which is shown on the cover of this work. It is hard to conceive a more attractive type of cantaloupe. The colors in this colored plate are true to this strain, and this particular strain has shown the highest points of all desirable qualities. The Pollock strains are inclined to make a rather slow growth at first, but eventually grow a very heavy vine, but are about a week later than some other strains but the disease resistance of the plant has made it the most desirable variety to grow where there is danger of the fungus troubles in rainy sections.

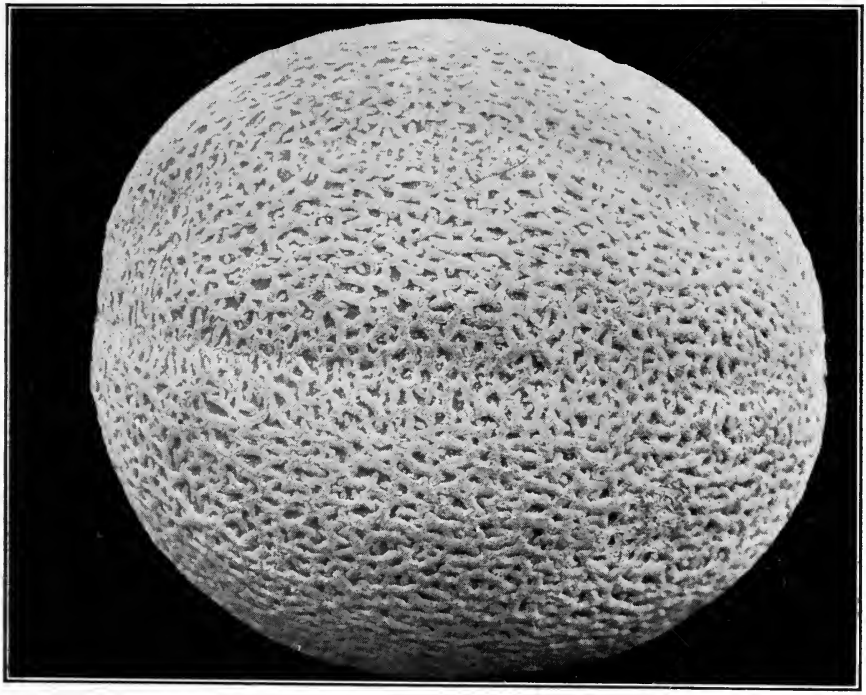


Plate No. 15—The Ryan's Early Watters.

Aside from the Pollock strain, there is another strain of the solid netted type, that is extensively grown on account of its very early maturity, this known as Ryan's Early Watters; in its general appearance it is almost identical with the Pollock, a typical specimen being shown in Plate No. 15. This strain has made the best record for money returns on account of its early maturity. It germinates a very vigorous plant that sets fruit early, and seems to mature its crop in a short period of harvest, often only covering ten to fourteen days of harvest period. The large yield of early cantaloupes when prices average high, is the strong point in favor of this strain. It begins to ripen about August first at Rocky Ford, while the Pollock is almost ten days later. The color of its flesh is green shading to yellow at the seed cavity, flavor much the same as the Pollock it is little more inclined to the open seed cavity, and will usually succumb to the Melon "rust," which makes this strain or variety better suited to the regions where this trouble is not a serious drawback. These two above mentioned strains constitute the principal varieties grown in the Rocky Ford vicinity, with one exception, a melon of the Osage type. This cantaloupe originally came out under the name "Defender" from the United States Department seed distribution. This has been renamed, "Burrell's Gem", "Osage Gem," and "Pink Meat."

This cantaloupe has been grown in different states, but its tendency to crack open when nearly ripe has been objectionable to it. Under Colorado conditions it has made quite a reputation. The flesh is deep salmon color with a very small seed cavity, it has exceptional fine keeping quality, it

has a very solid flesh when first ripe which requires several days to mellow up. It has a decided flavor distinct from the Gems.

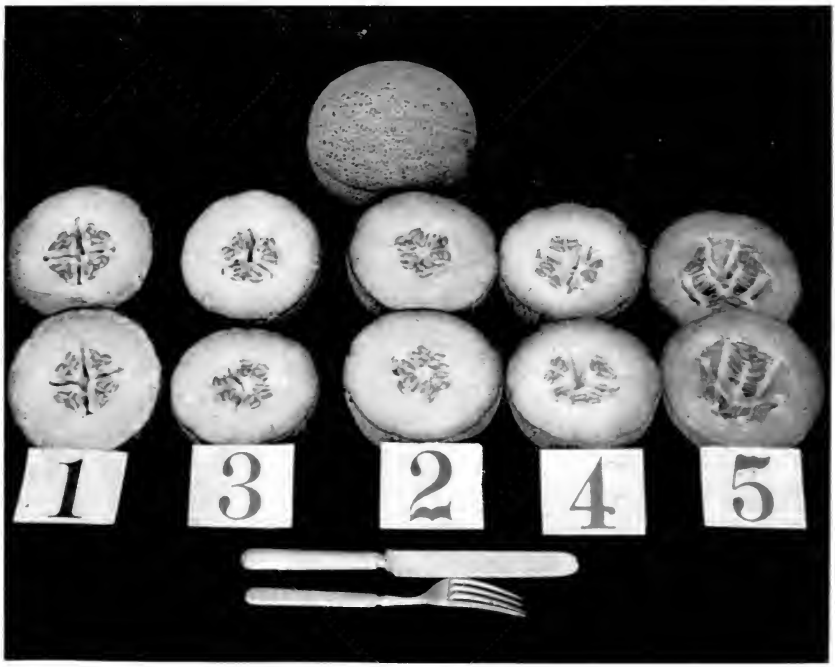
It is a late maturing strain, and is quite subject to the "rust" and the tendency to crack are the principal drawbacks to the strain.

Over a hundred varieties of cantaloupes and muskmelons have been tried in the tests on the Experiment Station at Rocky Ford including many of the foreign introductions and not any have shown a superior trait to those above mentioned.

There are several artificial crosses that have been made, between the Pollock and the Early Watters with a view to combining the disease resistance and early production of the two, one of these crosses made by the Rocky Ford Cantaloupe Breeders' Association, known as Early-Rust-Resistant No. 2, is a very promising hybrid, for two years it has shown as early maturity as the Watters strain and as disease resistance as the Pollock. The melon is very much a combination of the two strains, except it is green fleshed like the Watters.

There is also several crosses of the Osage type with the Pollock and Ryan's Early Strain, these have not been grown long enough to determine the results.

To those who may be interested in making cantaloupe hybrids we reprint the methods of artificial fertilization from Colorado Experiment Station Bulletin No. 126, Cantaloupe Breeding.



Colo. Exp. Sta.

Plate 16—Contrasts in Internal Qualities. Selections from Different Individual Plants.

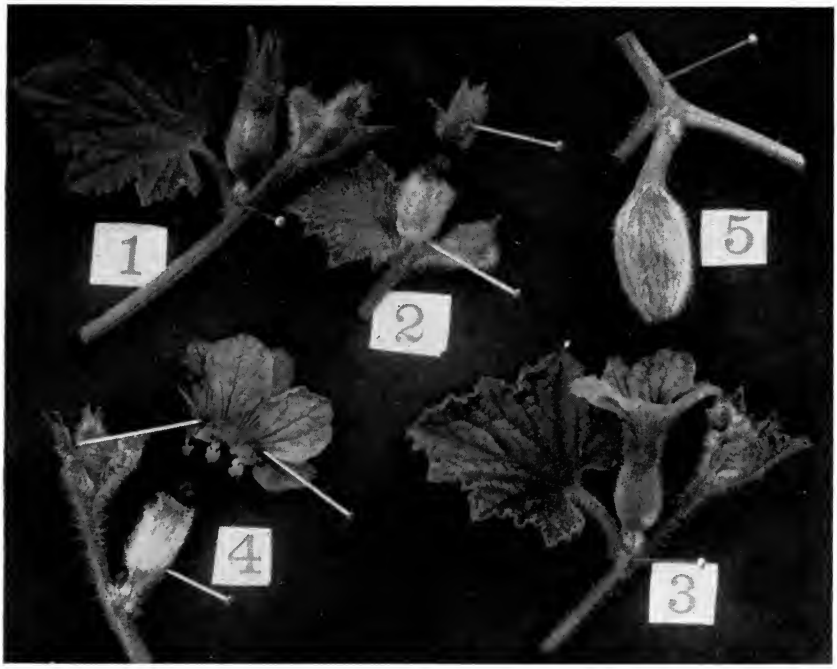


Plate No. 17—Artificial Cross-Fertilization.

1—Bud 24 Hours Before Opening. 2—Bud Emasculated. 3—Bloom Just Opened. 4—Calyx and Corolla Removed, Showing 3 Anthers Attached. 5—Set Developing. Colo. Exp. Sta.

The Rocky Ford cantaloupe is quite the exception to most of the cucurbitaceous plants like the cucumber and many other varieties of melons, which have their stamens and pistils borne in separate flowers, while the Rocky Ford variety is hermaphroditic, that is the stamens and pistil are produced in one flower. It also has purely staminate flowers produced in great profusion at the intersection of nearly every branch.

It is evident that cross-fertilization is readily possible, yet the arrangement of the flower and the results of observation would indicate that self-pollenization is quite as common or more so.

The pollen of the cantaloupe flower has been found to ripen about the time the flower is opened and the pollen is usually shed at this time, which is usually early in the morning; to fertilize the flower and have the results of known origin, it is necessary to find the bud about twenty-four hours before it opens (Plate 17, No. I), which can easily be told by observation; in this stage it should be emasculated, before the pollen lobes are ripe. By cutting around the base of the corolla and calyx, the two may be removed with the stamens attached, leaving the pistil free and exposed. (Plate 17, No. II and IV.) A small paper sack is then tied over the stem to protect the pistil from foreign pollen until the following morning, when the stigma will be at about the same stage, as if the flower had not been disturbed, and ready to receive the pollen.

The desired pollen is introduced from a fresh opened flower, by pulling off the corolla the stamens are exposed, showing the ripe pollen grains which are transferred by touching the ripe pollen lobes to the pistil or stigma until it is well covered with the yellow pollen grains. The paper sack is then replaced for several days until development begins.

OFFICERS OF

The Rocky Ford Cantaloupe Seed Breeders' Association

ROCKY FORD, COLORADO

INCORPORATED 1909

PHILO K. BLINN .	President
JAMES B. RYAN . . .	Secretary
CLEM V. RYAN . .	Treasurer

An Ideal Seed Cavity.

Cantaloupe Seed a Specialty

ARE YOU INTERESTED IN HIGH-GRADE SEED? **If you are,** THE ROCKY FORD CANTALOUPE SEED BREEDERS' ASSOCIATION can furnish you with the best Rocky Ford cantaloupe seed, that experience and systematic efforts have been able to produce.

The need of this organization was suggested by the many letters of inquiry for a reliable source of cantaloupe seed, that have continually been coming to the Colorado Agricultural Experiment Station.

This Association has no official relation with that institution, except that Mr. P. K. Blinn, Field Agent, and for many years the Cantaloupe Specialist was instrumental in forming this association. It was the results of the work on the Experiment Station in breeding the Rust-Resistant cantaloupe on the **basis of individual plant variation,** that forms the foundation of the system of seed selection that is behind **all** the seed sold by this Association; which is ENTIRELY PRODUCED BY THE FEW MEN WHO WERE SELECTED BY REASON OF THEIR EXPERIENCE AND ABILITY AS SEED GROWERS TO FORM THE ASSOCIATION. The membership is restricted, and the organization is NOT a seed jobbing concern.

The plan is to develop and produce pedigreed cantaloupe seed and to sell only such.

SATISFIED CUSTOMERS ARE STOCK-IN-TRADE in the seed business, and high grade seed, and the results they produce will secure them.

The Association furnishes a certificate with all their seed which identifies its source, and the breeding and selection behind the seed insures the results.

Seed Certificate

OF

The Rocky Ford Cantaloupe Seed Breeders' Association

Rocky Ford, Colorado

Cantaloupe Seed accompanied by this Certificate, signed and sealed, with the package unbroken, is guaranteed to have been produced by this Association, in accordance with the most approved method of seed breeding. SEED FROM THIS ASSOCIATION IS SOLD ONLY WITH THIS CERTIFICATE, AND EACH SACK OF SEED IS SEALED WITH A LEAD CAR SEAL, (except when sent in the mail.) The purchaser is hereby assured of first grade selection, of a pure strain of cantaloupe seed of the

.....Variety. No.....

This stock of seed has had at least two years of tests, for heredity. It was grown from registered stock seed, and selected from a field grown exclusively for seed; the requirements for this selection were standard size, solid netting, prime texture and flavor, with no defects that could injure the seed or the crop to be grown from it. The germination of this seed is as good as experience and good equipment can produce.

In testimony whereof, the Seal of the Association and the signature of its officers are affixed, this.....19.....

.....President.

.....Secretary.

PRICE QUOTATIONS AND INFORMATION

The Association is making a specialty of two general types of Rocky Ford Cantaloupes. An early maturing strain and the Disease-resistant strain. They offer the following strains, and retail prices, **prepaid,** to any part of the United States.

Price per oz.

Rust-Resistant Pollock, green fleshed.....$1.50 per lb., 15 oz.
For cut, see Plate No. 14.

Rust-Resistant Pollock, salmon fleshed.....$1.50 per lb., 15 oz.
For cut, see outside cover colored plate.

Ryan's Early Watters, green fleshed .....$1.50 per lb., 15 oz.
For cut, see Plate No. 15.

Early-Rust-Resistant, Hybrid No. 2.....$2.00 per lb., 20c oz.

A limited amount of select watermelon seed:

Kleckley Sweet .....$1.00 per lb., 10c oz.

Dealers or Melon Growers' Associations desiring to purchase at wholesale, will please write for quotation stating the amount they desire.

In ordering, **please remember remittance must accompany order,** unless arrangements have been made otherwise.

We will book orders and hold for shipment, or will forward by Express C. O. D. where 10 per cent of money is sent with the order.

We will not attempt to meet prices of other concerns, the price we ask is reasonable, with the quality we furnish. Those desiring "grade" seed at lower prices, had best look elsewhere for their seed.

Owing to the existence of several cantaloupe growers associations being organized here at Rocky Ford, mail intended for the Cantaloupe Seed Breeders' Association should be addressed to **James B. Ryan, Secretary, Rocky Ford, R. F. D. No. 3, Colorado, to avoid delays.**