

# WINTER RHUBARB— AND OTHER INTERESTING EXOTICS

THE POSSIBILITIES WHEN PLANTS ARE BROUGHT  
FROM THE TROPICS

**T**HE story of the development of the Winter Rhubarb was told in an earlier chapter. It will be recalled that the plant came to me from New Zealand, and that in its original form it had a small and inconspicuous stalk and was of slight commercial value. It will further be recalled that by selective breeding I developed the stalk until it was of large size and of exceptional succulence.

Meantime, the changed conditions of another hemisphere, with the transposition of seasons, disturbed the habit of bearing of the plant in such a way that it ultimately became practically a perpetual bearer, its time of greatest productivity, however, being the winter season. After the Winter Rhubarb had been developed and put upon the market, I continued my experiments in selective breeding as well as in hybridization. The

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new rhubarb, as was stated in the earlier chapter, proved variable when grown from seed.

The tendency to winter bearing, however, was pronounced, whatever variations the plant might show as to other qualities.

In more recent years I have continued the development, and have produced new varieties of the Winter Rhubarb that differ so markedly from the original one as to merit introduction as separate varieties.

The new rhubarbs have been developed by crossing the Winter Rhubarb with various races of ordinary rhubarb, in particular with the improved variety known as the Burbank Giant. The crosses were made mostly with the use of the Winter Rhubarb as the pistillate parent, but reciprocal crosses were also made. The progeny, as is often the case with hybrids, showed great vigor of growth.

The individuals varied as to many of their qualities, and I presently sorted out no fewer than thirty-six different types, all of them of gigantic size.

The best of these has been introduced under the name of the New Giant Crimson Winter Rhubarb.

### QUALITIES OF THE NEW RHUBARB

Not only does the improved Winter Rhubarb

## **Burbank Rhubarb**

*The story of Mr.*

*Burbank's development of the Winter rhubarb and its improved variety, the Giant Winter rhubarb, has been told in another volume. It will be recalled that the progenitor of the Winter rhubarb came from New Zealand, but took on new capacities for development under the changed conditions of the California soil and climate.*



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produce stalks at all seasons of the year, but these stalks are of such quality as to give this rhubarb a place apart among garden vegetables.

The stalks have the pleasant taste of berries, and they altogether lack the tough stringy quality of the ordinary rhubarb.

Meantime the stalks are as large as can be conveniently handled and shipped, being two or even three feet in length, and from an inch to an inch and a half in thickness. The beautiful crimson color of the stalks adds to their attractiveness.

An important quality of the improved Winter Rhubarb is that a plantation can be obtained from a few plants in a fraction of the time required to stock it from older varieties. It is only necessary to dig up the plants in the fall, September being the best month, dividing them with a sharp knife, cutting them into the smallest possible bits which have even a single bud and a fragment of a root.

Each fragment will make a big, hardy, and productive plant in a twelve month; and it often happens that the smallest fragments will produce the largest plants.

Another way to propagate the plant, if you do not wish to injure the old plantation, is to dig away the earth around the plant and cut out little V-shaped pieces of the roots, one or two inches long, with a sharp knife, including a bud. Each

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of these pieces will make a big plant in the course of the year, and the old plant will produce larger stalks, though in somewhat reduced number, as the result of this treatment.

In this way a plantation of the Giant Winter Rhubarb may be extended indefinitely without injury to the old crop.

Of course, the new plants grown thus from pieces of root or from root bulbs will reproduce absolutely the qualities of the original plant.

If an attempt is made to extend the plantation by sowing seed, a good deal of variation must be expected, as this plant, like so many other cultivated ones, is not fixed for reproduction from seed. In the matter of winter bearing, however, all the seedlings will reproduce the qualities of the parents. The seedlings may vary in size, quality, form of leaves, and somewhat as to color of stalks and various minor points; but never in the matter of winter bearing.

They will reach their time of fullest productivity in midwinter, several weeks before the ordinary rhubarb begins to be productive.

The plants fruit the first year from cuttings or when raised from seed, and two generations a year from seed to seed can be raised by forcing in the California climate; but of course such forcing is not recommended.

## Another Bed of Burbank Rhubarbs

Although the first  
Winter rhubarbs were  
developed by selection, Mr.  
Burbank subsequently  
used hybridizing experi-  
ments, with good results.  
He has experimented with  
a great variety of rhu-  
barbs, and has found this  
plant a tractable and a  
peculiarly interesting pu-  
pil. Observe the prolific  
and compact growth of the  
specimen here ex-  
hibited.



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Unfortunately the Giant Winter Rhubarb is not hardy enough to grow except in regions where the eucalyptus, the orange, and the fig can be grown out of doors. I am working with the plant in the expectation of producing hardier varieties, but for the present it must be confined to warm climates, unless it is grown in the greenhouse. It is reported in the East that the new Winter Rhubarb does not respond well to the forcing methods of the greenhouse, so I do not recommend it for that purpose, although I see no reason why it should not grow under greenhouse conditions, as a cool greenhouse may practically duplicate the conditions of California where the plant is at its best.

It will not stand soaking with water for any length of time, but in our California soil there is absolutely no loss from any cause, the Giant New Rhubarb being a much surer producer than any other variety of the tribe.

### FORCING THE RHUBARB

It is well-known that the ordinary rhubarb may be forced in the greenhouse, and made to produce out of season by first freezing the roots. Curiously enough, after this treatment, the root develops its stalk, granted the right conditions of soil, almost equally well in the dark.

Mention is made of this possibility of forcing

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the rhubarb by inducing abnormal conditions lest a statement of the earlier chapter in which the habits of the new variety are explained should be misinterpreted.

I referred there to the impossibility of changing the habits of the ordinary rhubarb, and permanently extending its period of bearing, by merely altering the conditions of cultivation. It is of course possible to cause almost any plant to germinate out of season by greenhouse treatment. Such treatment, however, has no influence on succeeding generations.

The plant caused to grow out of season merely responds to the abnormal surroundings in which it is placed, and will immediately revert to the habits of its tribe when placed under normal conditions.

But the crimson Winter Rhubarbs in all the perfected varieties produce their main crop in the winter, and continue productivity throughout the entire year, because of the reappearance of a latent tendency to perennial bearing; and this revived tendency is thoroughly fixed. As already stated, plants retain this tendency when grown from seed, however they may vary in other regards. So there is no analogy whatever between the winter-bearing habit of these new rhubarbs and the abnormal habit of winter bearing that may be forced on an





### *Burbank Asparagus*

*It is almost superfluous to say that Mr. Burbank has not neglected so popular a garden vegetable as the asparagus. In point of fact, this plant, like practically all the other garden favorites, has come under Mr. Burbank's guidance, and has shown marked improvement through selective breeding. The picture suggests the quality of this improved Burbank variety.*

*The stalks here shown are as succulent and savory and tender as they look.*

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individual plant of the old variety by growing it under hothouse conditions.

Incidentally, the fact that the old rhubarb to be forced successfully in the greenhouse must be frozen furnishes another interesting illustration of the value of a period of absolute rest or dormancy for a plant, and will suggest analogies with other cases of the same kind elsewhere cited. Seemingly the tissues of the plant root, having been frozen even for a brief period, have no way of estimating the length of time during which they have remained dormant, and thus are ready to respond to the climatic conditions about them when thawed out. So, finding themselves in the atmosphere of the springtime, they begin their regular springtime growth.

In a sense, the artifice of the gardener may be said to fool the tissues of the plant, and to cause it to take on an altogether abnormal activity.

But, as just stated, this result applies only to individual plants, and no one thinks of developing a race of Winter Rhubarbs in this way.

### MIXED HEREDITIES

The habit of perpetual bearing, as manifested by my perfected varieties of Winter Rhubarb, was explained as a development based on the comparatively recent residence of the ancestors of the plant in a tropical climate. The fluctuating tem-



### *South American Peanuts*

*The peanut, notwithstanding its popular name, is not regarded as a nut, but is in reality borne on a leguminous plant, and therefore rather closely related to the peas and beans. The picture shows a specimen of a variety of peanut from South America that Mr. Burbank has taken in charge to see if anything notable can be done with it.*

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peratures of the globe in successive ages—a time of tropical warmth being succeeded by an ice age—resulted in subjecting the plant at different periods to wide extremes of temperature.

A vast number of species were in this way wiped out of existence.

But those that survived developed powers of resistance which were in many cases subsequently lost when the plants migrated to the tropics, or when tropical conditions prevailed; but which remained as latent influences in the germ-plasm, susceptible of being brought out again under proper conditions of hybridization.

Thus, in order fully to understand the anomalous habit of the new Winter Rhubarbs, it is necessary to recall that their immediate ancestors came from another hemisphere, and that traits of their latent heritage from remote ancestors both of tropical and sub-Arctic habit were brought to the surface under influence of the new conditions of environment to which they were transplanted; and the further influence of new crosses and of constant selection through many generations.

All in all, the new Giant Crimson Winter Rhubarb is a plant that presents points of interest for the student of heredity and for the practical plant developer, no less than for the practical horticulturist. And for the latter—whose interests, of

Another View of  
the  
South American  
Peanut

The great range of variation shown by these South American peanuts suggests indefinite possibilities of improvement through selective breeding. Even in the first generation or two considerable improvement has been observed, and Mr. Burbank expects that marked development will occur in the course of a few succeeding generations. In his hands, the peanut seems likely to prove as tractable as the peas and beans.



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course, are those of the public at large—the new rhubarb has been declared to be “the most valuable vegetable production of the century.”

The merit of that characterization we need not discuss; but no one who has seen the new Giant Rhubarb is likely to dispute that it is a plant of altogether exceptional interest.

### SOME ESCULENTS AND AN ANOMALOUS SOLANUM

The rhubarb is one of the few plants in which the edible portion, for which the vegetable is prized, consists of the leaf stalks.

There are a good many other vegetables, however, in which the stalk of the leaf, along with the leaf itself, becomes a more or less valuable food product. Such, for example, are the cabbage and its allies, the lettuce, and some others that we have already considered, as well as the spinach and the celery.

A familiar example of a plant whose stem furnishes a valued food product if cut at an early stage, before it puts out its leaf stalks, is the asparagus.

These plants have interest from the standpoint of the experimenter and all present certain opportunities for improvement. I have grown them all, and have done something in the way of selective breeding with most of them, but these experiments have been relatively insignificant as compared with

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my work in other lines, and there is little to record in connection with the work with either the spinach, celery, or asparagus that would have novelty or value. The methods of growing these plants are well known, and there is opportunity for development of new varieties either along the lines of selection or of hybridization.

But the rules of selective breeding, as already given and repeatedly illustrated in connection with other vegetables, will sufficiently guide anyone who wishes to work with these.

There is a tropical plant of a quite different order, however, to which I shall merely refer, because I myself have not experimented with it very extensively, but because work of considerable interest has been done with it by others, that will illustrate the possibilities of development of tropical plants even when grown in relatively inhospitable climates. The plant in question is the not unfamiliar *Solanum* known as eggplant. Very interesting work in experimental breeding has been done with this relative of the potato and tomato by Professor Byron D. Halsted of the Experimental Agricultural Station of New Jersey. It involves no principles, however, that have not been fully expounded in connection with other plants, and for details of the work the reader may be referred to Professor Halsted's annual Bulletins.

## A Field of Celery

The picture gives a very good idea of the best method, or one of the best methods, of packing the celery with dirt for bleaching. The celery plant in its normal condition contains a mildly narcotic principle, and it is necessary to bleach it completely before it is fit for the table. The experiments that Mr. Burbank has made with the celery have been chiefly in the way of selective breeding, without crossing.





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The nightshade family has other members seemingly worthy of development, that have been given scant attention.

One of the most interesting of these obscure relatives of the potato and tomato and eggplant is the not unfamiliar but seldom cultivated plant known as the Ground Cherry, sometimes dubbed also Husk Tomato.

### THE INTERESTING GROUND CHERRY

The little plant in question belongs to the genus *Physalis*, and it has numerous close relatives that inhabit various parts of the world. One of these, the *Physalis alkekengi*, or strawberry tomato, has been under cultivation for a long time. The fruit is small, yellow, sweetish, and insipid. Other species have been received from Japan and Korea, and also from India.

I have grown several varieties of the common species of ground cherry from time to time for the past forty years.

In general the fruit of the plant appears to be a curious misfit, the husk not being large enough to contain the fruit when ripe, and thus splitting open to expose the fruit itself, which thus becomes subject to cracking and splitting.

I have attempted through cultivation and selection to remedy this fault; and I have also attempted to cross the ground cherry with other

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species, but I have had no success in either direction.

I have made hybridizing experiments not only with the common species and the foreign ones already mentioned, but also with other species from the west coast of Mexico, and from Arizona and Texas. But hitherto I have been unable to secure a single hybrid.

The plants grown from the seeds received from my collector, Mr. Walter Bryant, in Western Mexico, have husks of the most delightful fragrance. The aroma clings to the husk for months. It has no connection with the fruit itself. This form has proved the most difficult of all the ground cherries to germinate from seed, or to grow after the plants are produced. It is well worthy of attention, even if grown solely for the fragrance of the husks. But in addition to this, the fruit is of good quality.

It is about the size of the ordinary ground cherry, but a little more orange in color.

Even at the present stage the fruit of the ground cherry is sometimes used for making pies, puddings, and preserves. The Peruvian species in particular produces a great quantity of superior fruit. There is sufficient variation between the different species to afford abundant material for development. If hybridization could be effected, there is every reason to suppose that greatly



### *A Cousin of the Cabbage*

*The kale plant is a very close relative of the cabbage, being, in point of fact, one of several related plants that have probably developed from the same wild stock, greatly modified through long generations of cultivation. Of the various cabbages, kale is perhaps the least generally known. For that very reason it should have exceptional interest for the amateur worker in the vegetable garden.*

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improved varieties of the ground cherry could be developed.

The lack of success of my hybridizing experiments should not be considered as by any means definitive. My final success in hybridizing two species of this particular family after unsuccessful experiments extending over a quarter of a century will be recalled in connection with the story of the development of the Sunberry. There is every reason to suppose that experiments systematically carried out would result in finding different members of the ground cherry tribe that could be hybridized.

And the prospect of producing a really notable fruit from such a union—a fruit not unworthy of a relative of the potato, tomato, and sunberry—seems particularly good.

### IMPROVING THE PASSION FLOWER FOR ITS FRUIT

There is another vine, known everywhere by name at least, and famed for its flowers, that has fruit possibilities that have been almost totally neglected. This is the celebrated Passion Flower, a plant represented by a few species of tropical and sub-tropical habitat, of which two at least wander as far north as the southern portion of the United States.

The name Passion Flower was given to these plants by the early Spanish missionaries, because

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they thought they saw in the blossoms an emblem of the crucifixion.

According to an early description of the blossoms, the filaments were thought to resemble a blood-colored fringe suggesting the scourge; the column in the center was said to represent the cross; the filaments on which the pollen sacs were borne, three in number, represented nails; and a peculiar arrangement of floral organs encircling the top of the blossom did service for the crown of thorns.

To complete the picture five spots or stains of the color of blood found on the petals were said to represent five wounds.

That the symbolism might lack nothing of completeness, it was noted that the leaves of the plant were shaped like the head of a lance or spear; and that there are round spots on the leaves that might be taken to represent the thirty pieces of silver, the price of the betrayal.

The merits of this symbolic characterization need not concern us. But doubtless the name served to draw unusual attention to the flower, although the intrinsic merits of the flower itself are of a high order. As a hothouse vine, it has been cultivated everywhere, and is often regarded as an important acquisition. Meantime it runs wild as a trailing vine in regions where the win-

## The Egg Plant

These specimens suggest very vividly the wide range of variation in the fruits of the egg plant of different varieties. Such variation always suggests inviting possibilities for the plant developer. The egg plant responds readily to the efforts of the gardener, and no small degree of interest attaches to the efforts to isolate and fix varieties of peculiar form.



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ters are not too severe; and in some regions it is so abundant as to be considered a weed, notwithstanding the beauty of its flower.

The genus *Passiflora*, to which the Passion Flowers belong, is made up largely of vines and shrubs, but there are a few members that grow to the size of trees.

The best flowering varieties are strictly tropical, and do not thrive in the northern climates. But, on the other hand, the species that bear the larger and more edible fruits are relatively hardy. Doubtless there is a casual relation between these facts. Possibly the tropical species do not find it difficult to propagate their kind, and have not found it necessary to develop succulent fruits. In any event, it is fortunate from the standpoint of the plant developer of the temperate zones that the fruit-bearing members of this particular tribe are the ones that are hardy enough for introduction in our climate.

In point of fact, the common species of the Northeastern United States, locally known as the Maypop, is so thrifty a plant that it becomes a very troublesome weed.

It spreads in all directions by its underground root stalks, and it roots very deeply. It is almost as difficult to eradicate as the perennial morning-glory. Deep plowing of the soil is about the only

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method of destroying it when it is once introduced. But this very thriftiness may become an advantage, once the plant has been sufficiently transformed to assume position as a valuable fruit bearer.

This common Maypop was the plant with which my experiments in developing the fruiting possibilities of the Passion Flower began. But my interest soon extended to other species, including the best Australian varieties of at least three species, and a number of new species from South America that were not named by my collector and have not been identified.

One of the most promising Australian species is known as *Passiflora edulus*. It produces a much larger quantity of fruit than the Maypop, but is less hardy than that plant. Several of the South American species are too tender to be grown even in California. One of these, known as *Passiflora ceurules*, bears a fruit about the form and size of a small watermelon, yellowish-green in color, with an attractive edible pulp. I have cultivated this species, but it has not entered to an important extent into my experiments, because of its extreme tenderness.

The fruit of the species with which I have chiefly worked is usually about the size of a hen's egg.





### *Passion Flower in Bloom*

*The passion flower has great popular interest because of the curious configuration of its essential parts, and the symbolical meaning associated with them in the minds of the superstitious. In Mr. Burbank's garden, however, the passion flower is cultivated not so much for its blossom as for its fruit. Varieties are being developed that give good promise of producing a fruit of marketable quality.*

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The usual color is orange-yellow, but some varieties have a purplish tinge, and a purple pulp. Some of the species of the Southern Hemisphere are recognized as producing valuable fruit, particularly for combination with other fruits, having a pleasing and unique flavor. But the fruit of the Maypop has seldom been considered worth picking.

My experiments with the passion flowers began about 1895. I found it not difficult to grow the plant from seeds received from different regions. It is only essential to keep the ground warm and moist. There is an astonishing difference in the growth and vigor of the different seedlings. Moreover, some of the vines produce ten or even twenty times as much fruit as others, and the flavor of the fruit varies from exquisiteness to entire insipidity. Some specimens have a large amount of edible pulp, while others are made up almost entirely of skin and seeds.

The seedlings usually bear during the second year, or at latest the third.

The fruit does not ripen to advantage unless the weather is very warm.

So from the outset I selected those seedlings that bore earliest in the season, attention being given also, as a matter of course, to the size and flavor of the fruit, and to the attractive qualities

## *Flower and Fruit on the Same Plant*

*This interesting picture shows the Passion Flower bearing blossoms and green fruit and ripe fruit at the same time. This interesting peculiarity suggests that when the fruit is developed it will have an exceptionally prolonged season. Many different species of passion flower have been utilized by Mr. Burbank in hybridizing experiments, in his effort—which give every prospect of success—to develop a valuable new type of fruit.*



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of the flowers—for I had in mind a plant that would have not only great value as a fruit bearer, but also a recognized place among ornamental vines.

The passion flowers show wide range of variation, and thus furnished at the outset abundant material for the operations of the plant developer.

But in addition to this I found it easy to hybridize the different species, thus ensuring further variation. The pollen sacs and the pistils are very prominent, and it is easy to effect pollenization by removing the prominent bright colored stamens from the flowers of one and dusting the yellow pollen on the prominent pistils of the other.

I have given particular attention to hybridizing the Maypop with the Australian species, *Passiflora edulus*, already referred to. I thought it would be possible to combine the good fruiting qualities of the Australian species with the hardness of the American species. The fruit of the former has a thick, hard, shell-like covering over the pulp, and a fragrant and highly flavored interior. That of the latter has a thin, husk-like covering, with a minimum amount of edible matter.

Cross-fertilization was readily effected, and the experiment gives every promise of a successful issue.

Several hundred hybrids that have not yet

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borne fruit are now under observation. Not all of these are hybrids of the Maypop and the Australian Passion Flower, but the seedlings of this cross at present appear to be most promising. The work has not been under way long enough to give anything like final results. But what has been done indicates that it is at least worth while to continue the experiments.

Indeed, there seems to be little doubt of a thoroughly successful and satisfactory issue.

Possibly it may be necessary to bring other species into the combination through further hybridization, but the material at hand is ample, and the fact that almost every variation may be found among the seedlings gives full assurance that if the experiment is carried out with sufficient zeal, it will be possible to assemble the best qualities of the different species in a new variety.

The renewed vigor given by the hybridizing of species from different parts of the world will tend to increase the size of both the plants themselves and their fruit, and the quality of the fruits already secured leaves it scarcely open to doubt that the final product will be of positive value.

*—Every plant on earth is here  
to serve our purposes—if we  
but train it in the service.*

## A Bed of Camassias

The camassia is, as a glance at this picture will show, a plant having no small measure of interest as a producer of ornamental flowers. But it has also an edible bulb; and Mr. Burbank is endeavoring to improve this bulb in size and quality. The measure of success already attained is shown in succeeding pictures.

