WINTER RHUBARB

CULTURE AND MARKETING

REGINALD BLAND

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BY

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SAN LUIS REY, CAL.
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FOREWORD.

This little book was first undertaken in response to a number of requests for information on the culture and marketing of Winter Rhubarb.

It has been difficult to restrain the scope of this work within the limits necessarily imposed by lack of time, because the subject has not hitherto received the treatment its importance merits. The natural temptation has been to proceed to the full elaboration of this curiously neglected subject. This would require so much more time than the writer can command at present that he has been compelled to choose between the alternatives of early publication of the present rough sketch or an indefinite postponement to allow a fuller and more finished treatment. The accumulation of inquiries has led to the rather reluctant choice of the former alternative.

This is the only apology offered for the inevitable shortcomings of the book, especially as regards the lack of more historical and statistical information, which shortcomings it may be possible to remedy at some future time by issuing a second volume.

No apology is made for the introduction of matter controversial of "plant-breeders'" claims. Effort has been made to confine all statements to strictly first-hand experience and, whatever the possibility of error in one's judgment, the fact that hearsay evidence has not been admitted without confirmation has done somewhat to limit that possibility.

The lengthy quotation from Mr. P. M. Kiely's "Southern Shipper's Guide" has been introduced in the chapter on marketing because the matters dealt with therein are essential to our subject. As illustrating the point of view of the best class of commission merchants, it was deemed best to include this as a direct quotation.

If subsequent editions of this book are found desirable,

effort will be made to broaden the treatment of its various subjects. To this end the writer earnestly solicits the correspondence of all whose experience has led to conclusions differing or concurring with his own as here set down. It is recognized that diverse soil and climatic conditions may require methods of treatment or culture wholly outside of the writer's personal experience and any information on these matters will be most gratefully received.

Chapter I.

RHUBARB—AND WINTER RHUBARB.

Rhubarb *(genus Rheum)* belongs to the *Polygonaceae* or Buckwheat family. This is the sole family in the order, *Polygonales,* but comprises such widely differing genera as Smartweed, Knot Grass, Buckwheat, Sorrel, Dock and Rhubarb.

There are said to be about forty different species of rhubarb, covering a wide range of growth, form, color and inflorescence. They are all supposed to be natives of Central Asia, their natural range having extended from the Himalayas to parts of Siberia and Western Asia, one species, *Rheum Rhaponticum,* our familiar garden rhubarb, being native as far west as the Valley of the Volga.

It has been cultivated for thousands of years in China and Tibet for a medicine derived from its dried and prepared roots. It had a place in Chinese materia medica as early as 3000 B. C. and for its cathartic, astringent and stomachic qualities was exported considerably to Europe for several centuries past. In the latter half of the 18th century rhubarb culture was tried experimentally in England by an apothecary named Hayward but, though he succeeded in producing a fair quality of medicine, being awarded silver and gold medals by the Society of Arts, still it was far inferior to the imported article and not much commercial development was made. The true Rheum Officinale or medicinal rhubarb was securely guarded in the sacred land of Tibet as was also the process of preparation.

The plant had appeared in England a couple of centuries before Hayward's time, little use having been made of it however, though it is stated that the leaves were used as a potherb in the days of good Queen Bess. This use must have had its limitations. I am minded of a gentleman who, passing my ranch some years ago, paused to marvel at the rhubarb and ended by taking an armful home to his wife.

About a week later he drove in, looking exceedingly pale and spirituelle. Answering my inquiry as to his health he said, "No, not exactly sick, but well, you know, I guess we didn't fix that rhubarb right, or mebbe we et too much, us not being used to it." It developed that he had removed the stems and fed them to the pigs and that his wife had prepared the leaves by boiling them like spinach. They both being hungry, had eaten heartily of their "spinach." As the gentleman said, "You know, it didn't taste half bad." From his further relation, however, I have concluded that rhubarb greens could never become so very popular for a steady diet —not even in Queen Elizabeth's day.

Its present familiar culinary use, making sauces, pies, puddings and other desserts from its cooked stems with the addition of sugar, is of comparatively recent date.

About fifty years ago Rhubarb was introduced on quite a large scale into the United States, being widely heralded as the "Great American Wineplant." This exploitation was naturally destined to end in a fizzle because the average sugar content of rhubarb stems is less than two-tenths of one per cent and buying sugar to make the alcohol had its disadvantages against the competition of the grape, which manufactures its own sugar. But while the craze lasted a wide distribution of the plant was made, particularly through the New England States. For a time promoters vied with one another in the "production" of new and surprising "varieties," brought about by the natural variability of rhubarb seedlings. As in more recent times, those early propogators would talk mysteriously about selection and breeding and hybridizing, claiming that the wonderful variety they had produced had been born of back-breaking toil and midnight oil spread over a long series of years of patient experiments—"until at last," etc. They had long, thin rhubarb; short, fat rhubarb; giant rhubarb; dwarf rhubarb; rhubarb smooth, rough, tender, tough, green, yellow, pink, red, purple, plain, striped, spotted, and (but this I am constrained to doubt) ringstraked! If these last did

exist I can readily believe they must have been bred by Jacob's system—"when they came down to drink." Fancy prices indeed were paid for these fancy "varieties"—until the bubble bursted, whereupon the wineplant market became inactive, in fact, it died. Naturally interest languished. Besides, certain serious matters engaged the attention of the nation about that time so that there was probably not much worrying over "wineplant."

But surviving the national vicissitudes, from war to wineplant, one venerable institution endured unshaken. I refer of course to the Great American Pie. The thrifty and inventive New England housewife was quick to discover a virtue in the disgraced and rejected wineplant and as "Pie-plant" it entered upon a career, less spectacular but more enduring than its former one, for now instead of being condemned for its deficiency of sugar it was for that very reason glorified. After a winter of cellar-stored and frozen vegetables, buckwheat cakes and syrup, mince pies and pies made from fruits "put up" in syrup the previous summer—altogether a diet which hardly needed the added fuel of close, artificially heated air (not forgetting the intimate part played by flannel underwear) to beget a very flame of desire for things fresh and acid—after even the supplies of preserved fruit had dwindled and given out, except in the larders of the most prudent—Friend Rhubarb achieved his destiny by sending up his crisp shoots into the smiling sunshine of the earliest spring. The first rhubarb pie of the season marked a festival day and spring house-cleaning was in order.

Of course a money value soon attached to this first rhubarb and extravagant prices were paid for that which appeared earliest on the market. Methods were devised for forcing it in cellars and hot houses and fortunes were made by those who engaged in this trade. Still great labor and expense was entailed and little effort was made to supply any but local markets.

In about 1895 Mr. Luther Burbank introduced a winter

growing rhubarb from Australia, where it was known as Topp's Winter Rhubarb. About five years later the stock resulting from his experiments was sold by him to the trade in 1900, under the name of Burbank's Crimson Winter Rhubarb. I am unable to find any record of Mr. Burbank's actual experiments in this connection, but subsequent study of the plant has proved that it is not a hybrid.

It is evident that a good selection was made from Topp's seedlings, being thereafter fixed in the usual manner by root division. The plant so produced had a wonderful potential value and California is certainly greatly indebted to Luther Burbank for its introduction.

This is evidently a distinct species—it differs from the summer varieties of rhubarb in several important characteristics. The principal physical difference is in its root system. The hitherto familiar varieties have a thick, fleshy lump of root substance, formed very close to the surface of the ground, from which the crowns originate, the annual feeder-roots forming a distinct system. On the other hand, with Winter Rhubarb the fleshy substance of the central root extends gradually into the main feeders, giving a long, tapering habit to the permanent root. This is evidently the basis of its most important and valuable characteristic, that of perpetual growth. Whereas in other varieties the life of the entire plant retreats in the fall to the fleshy lump of root, which then becomes dormant for the winter, in Winter Rhubarb there is no actual dormant period.

In addition to these differences, Winter Rhubarb is far superior in quality to other sorts. Its stems have not the woodiness and stringiness so familiar in summer rhubarb, especially as the season advances. Its skin is so thin and tender that it is never peeled for cooking. Furthermore, its flavor is more aromatic and less astringent and the acid content is more fruit-like. This may be due to its carrying a greater proportion of malic (apple) acid and less of oxalic and tannic acids. This makes it a perfect substitute for acid fruits at all times of the year. When rightly prepared

it is never cloying, a factor which undoubtedly has much to do with its ever increasing popularity.

Owing to its habit of perpetual growth it produces abundantly at all times of the year wherever conditions are favorable. Even where checked by severe frosts its recovery is immediate, as soon as the weather moderates. It can nearly always be picked before any summer rhubarb is ready and in the spring will recover from picking and produce another full stand in from six to eight weeks. It bears a heavier tonnage per acre to a picking than summer rhubarb and besides has the market to itself before its rival appears.

The leaves are produced from clumps or crowns at, or very near, the ground level. A single root will carry a number of crowns, ranging from one to as many as twenty or more. It is usually undesirable to carry more than six or eight crowns at most, as with a larger number the stems are apt to be small and weak.

Each successive leaf is at first covered by the stipule, a membrane-like extension from the axil of the leaf next preceeding. Aided by the growth of the older stem, the new leaf breaks through the enclosing capsule, emerging in quite an advanced stage of development. Packed in a thousand tiny folds, once it is free of the capsule it starts to unfold, often in good growing weather attaining a height of three or more inches in a single day.

In favorable weather and under good conditions each leaf attains maturity in about two weeks. Under such conditions a new one will come out every week. About four weeks after maturity each in turn becomes old, fades and finally withers. Thus after a full stand has been made, each crown will normally have a new-forming leaf, one half grown, three to five mature and one or more old ones. This stand will then remain nearly constant, each old stem being replaced by the production of a new one.

After a series of these leaves, usually ranging from 20 to 50 or more, comes the concluding effort of this particular

crown, which is the hollow seed stalk surmounted by its cauliflower-like bud cluster. The stalk shoots up rapidly and is soon decorated with a great festoon of tiny non-petaled flowers. It grows to a height of 5 to 8 feet by the time the seeds ripen.

The plant is renewed by the formation of new crowns. In the axil of each leaf stalk there is developed a small bud or eye. Normally these remain dormant and eventually shrivel and disappear from the naked eye, but when the natural course of development of the new leaves is interfered with by some injury to the tender heart of the crown or terminated by the production of the eventual seed stalk, one or more of these buds sets in to grow and becomes a new crown. These grow through the same cycle as the parent crown and faithfully duplicate the characteristics of the original in every particular.

One feature common to all varieties of rhubarb is variability when grown from seed. Winter Rhubarb seedlings seem to run much truer to type than summer sorts, but the tendency to variation still persists. From these natural variations all new kinds have been originated, as among the mixed offspring of any one plant there are nearly certain to be a few plants which are superior in one or more points to their parent. Some plant dealers claim to have produced new varieties by hybridizing but it is very doubtful if such hybridisation has ever taken place, either by accident or design. This doubt will be shared by anyone who will examine the flower. Self fertilization appears to be the rule and I believe the chances to be almost infinite against an accidental hybrid. Manipulation of the tiny bloom is all but impossible and we have further evidence that out of several hundred thousand seedlings of the first generation from the supposed hybrids, there is not one reversion. Furthermore, there is no variety of rhubarb extant which cannot be more than accounted for in the writer's own experience of simple seed selection.

All plants produced by subdivisions of roots and crowns

are very nearly true to type in every respect, possessing both the virtues and the limitations of their parent. For this reason all attempts to establish a fixed type by developing some one superior plant are in a measure self-destructive. This subject will be discussed more thoroughly in the chapter on propogation and development. For the present it may be briefly stated that the best system of development appears to be a combination of seedling selection and subdivision, working towards a *general* type of the best *average* standard. This is especially true as regards commercial plantings, where the one all-important criterion is the net profit on the investment.

Chapter II.

SELECTION OF THE LOCATION.

Broadly speaking, Winter Rhubarb can be successfully grown in the kitchen garden, for home or neighborhood supply, in nearly any location in California. The only limitation is the extreme cold of our higher altitudes. Unless specially protected it is liable to be killed by long continued freezing, though it will survive a sharp freeze of as low as 10 degrees if not of too long duration.

On a small scale, even the most refractory soils can be so managed as to produce good rhubarb. Having the crop laid low by an occasional freeze or even losing a few months benefit from it in the dead of winter is a comparatively small matter against its value in the home garden, against summer rhubarb.

However, all who would make a success of the commercial production of Winter Rhubarb should first make themselves familiar with its natural limitations as viewed from the commercial standpoint.

The first and most important consideration is the extreme range of heat and cold. Almost as important is the factor of mean temperatures. Other essentials are soil adaptation, water supply and drainage.

Clearly, there can be no hard and fast lines laid down between various combinations of these different factors. Still, the ideal conditions for perfect success can be described and the dangers absolutely to be avoided can be indicated. The reader should then apply his own judgment as to the safety zone between the two extremes wherein Winter Rhubarb can be grown with the assurance of profit.

It must be considered, for a proper commercial appraisal, strictly from the standpoint of a single crop or picking. This statement will be objected to by those enthusiasts who prefer to view the subject in the light of its rosy possibilities. It is a very pleasing indoor sport, if you have the time to indulge in it, to take pencil and paper and

figure out the possible (to the enthusiast, probable) profits on an acre of rhubarb. What can be simpler? Given an acre with 5,808 plants averaging 5 pounds to the picking, you have 29,040 pounds at one time. Allowing three pickings to the winter season you have 87,120 pounds. Then be generous and require only a profit of one cent a pound on your undertaking and you are charmed to find that you have cleared the sum of $871.20 from a trifling piece of ground some 209 feet square. Possibly you are of a grasping disposition and decline to be contented with less than three cents a pound profit. A stroke of the trusty pencil and behold, you have $2,613.60. If still unsatisfied just intensify your culture and force your patient plants to double their output and presto,—you have produced $5,227.-20. You think you might do fairly well with 100 acres or so of that sort of pasture.

Leaving such aureate visionings for the glittering prospectuses of those who have stock to sell to "back-to-the-landers," it is better to stick to hard facts, which, while less alluring, will pay more dividends.

These fabulous returns may not be impossible. They are merely, according to our present information, highly improbable. The commonest error comes in applying the results of garden conditions to an estimate of field production. With rhubarb, as with anything else, a greater production per plant can be made on a small scale than on a larger one.

It will be well first to define a standard by which to measure a commercial valuation. A fair basis for this is to be found in the California Agricultural Experiment Station Bulletin No. 121, entitled, "Some Things the Prospective Settler Should Know." The average gross income from the chief farm crops in the United States is income from the chief farm crops in the United States is given as 16 per cent of the capital invested. It is assumed that a competent farmer is entitled to expect a gross in-

come of 25 per cent on his total investment. The following tables will show the application of this principle.

Table 1.

Land and appurtenances, water etc.	$200.00	per acre
5,800 rhubarb plants @ $40.00 per M	232.00	per acre
Planting and caring for same 1 yr.	28.00	per acre
	$460.00	
	25	per cent
Gross yield required to justify inv.	$115.00	

Table 2.

Land, etc.	$500.00	
5,800 plants @ $80.00	464.00	
Planting, etc.	46.00	
	$1000.00	
	25	per cent
Gross yield required	$250.00	

It will be seen that Table 1 figures land as cheap as it is likely to be found suitable for our purpose. Table 2 places land as high as necessary to compare with the most profitable field crops, being the value of the most productive lima bean land on the southern coast. $115.00 to $250.00 per acre, gross, varying according to the relative capital invested, but in no case to be less than 25 per cent of the total investment, should therefore be taken as the absolute *minimum* to *safely* justify the undertaking from a strictly business standpoint. It should be assumed that this minimum return is to be made on one single picking per year. Then such soils and situations should be avoided as will not assure this return, year in and year out. All that is made above these figures is pure "velvet," looked at commercially, and (like chickens) velvet should be counted after the season is over, not before it begins.

A selling price of 3c per pound at the farm may be counted on in the proper season. 25 per cent to 65 per cent more can often be realized but 3c is a safe basis for an estimate. To make $250.00 gross per acre will require 8,333 pounds @ 3c, or an average of less than 1½ pounds per plant. This should be the least yield to justify growing Winter Rhubarb on an investment of $1,000.00 per acre. A greater or less capitalization will demand a proportionally larger or smaller return.

In the late spring and through the summer, rhubarb is very plentiful, as are all kinds of fruits and vegetables. Consequently during that time very little rhubarb can be sold except by those who are close to large markets and can so afford to sell very cheap.

The first limitation, then, is determined by the time of year at which the necessary production can be commanded. To be absolutely safe in finding a ready market at a good price, the main picking should be finished by the end of March. Rhubarb is sold after that date—often a great deal and often at good prices—but the value of rhubarb marketed in the early spring, prior to April, can be relied on. After that time returns become more speculative.

To be able to finish picking by April 1st, requires at least six weeks of growing weather previous to that date; that is, for the production of a full stand. A frost of 26 degrees is as low as the stems will endure without injury and once stems are spoiled it takes time to grow new ones, so the first point in the ideal location is freedom from freezing temperatures after February 15th. Winter Rhubarb should not be planted in a location liable to frost below 26 degrees after February 15th. King, in "The Soil," states that the germs of the nitric ferment do not develop nitric acid from humus when the soil temperature falls below 41 degrees and cannot work to much effect until the temperature reaches 54 degrees. Therefore a prevailing soil temperature above 54 degrees after February 15th, may be taken as the second important factor in the ideal location.

The ideal soil for Winter Rhubarb is a deep, rich, well-drained sandy loam. Such soil will naturally be from 5 degrees to 10 degrees warmer than a heavy undrained soil with the same location and exposure. Winter Rhubarb should not be planted where there is hardpan closer than three feet from the surface, on account of its deep rooting habit. It is better to avoid even deeper hardpan unless the soil is positively known to be well drained, as on the slope of a hill, or when drained artificially as with tile. It must not be planted on sour land. If drainage is good but the land still slightly acid a liberal application of lime should be given before planting. Rhubarb should not be planted in adobe or heavy clays which crack open when drying.

In a region of scanty rainfall, such as Southern California, provision must be made for irrigation. Winter and early spring picking will seldom need irrigation except in years of actual drought, but in a semi-arid climate one or two summer irrigations will be necessary to prevent serious set-backs, if not even loss of plants.

Winter Rhubarb should not be planted where summer temperatures run above 120 degrees because from that degree of heat upwards there is increasing risk of losing plants by cooking in the sun.

To recapitulate; the ideal soil and situation for Winter Rhubarb is a deep, rich, well-drained, sandy loam soil, located where the temperature does not rise above 120 degrees in the summer nor fall below 15 degrees in the winter and where after February 15th there is freedom from sharp frosts and a prevailing soil temperature above 54 degrees. This last condition can often be attained by planting on a slight southern slope, provided the soil is sufficiently free and deep. Irrigation must be looked out for where rainfall is scanty.

Under these ideal conditions, with good plants and correct culture, the spring picking should make double or treble the production necessary to justify an investment of $1,000 per acre, or from $500.00 to $750.00 gross. The better the

conditions, especially as regards mild winters, the more will be made in actual winter pickings and some can always be sold—sometimes a great deal—after March. Such additional returns constitute the "velvet" which lends a peculiar fascination to the rhubarb business.

As previously stated, there can be no hard and fast lines drawn in working out suitable combinations. An unfavorable location may be largely offset by especially good soil conditions and vice versa. If in doubt, it is best to experiment, planting, say a quarter of an acre, taking the result as a guide for subsequent operations.

It is probable that the practical range of Winter Rhubarb may be vastly increased by the use of open mesh shade tents such as are used in culture of Shade Tobacco. Extremes of heat and cold can be greatly modified and considerable relative humidity maintained by this means. It is a little early to positively recommend this but some very encouraging experiments are under way. The main question is the justification of the increased investment. The cost of tenting is about $200.00 per acre and the life of the tent is about two years, making the per acre expense $100.00 per year.

Some locations are especially favorable for winter cropping, notably those on or very near the coast. In addition to the mildness of the winters, the fogs are a great stimulant to rhubarb.

I should mention in passing that in the freak freeze of Jan. 6th and 7th, 1913, our temperature here in the San Luis Rey Valley went down below 10 degrees. I began shipping again Feb. 12th, just five weeks after my fields had been laid flat by the freeze, and was unable to find any plants killed by their severe experience. This seems a very fair test of their endurance of cold, as well as of their quick recovery afterwards.

Chapter III.

PREPARING THE FIELD.

Take a rhubarb plant, either fresh from the ground or from three to six weeks later. Put it out in the field—anywhere. Plant it in any way except upside down. If there is moisture in the ground the plant will grow.

It seems almost enough to say that any sort of preparation suitable for any crop will do for rhubarb. Certainly the better the field is fitted and prepared for any crop, the better it will be for rhubarb. As a study of standard methods of garden and field preparation, Prof. Wickson's "California Vegetables" is invaluable. It is, or should be, at the right hand of every up-to-date gardener. The chapters on climate, soils, irrigation, drainage, cultivation and fertilization will give reliable guidance for general gardening practice in California.

At the same time it is proper to accentuate certain special practices which, applied to preparation for rhubarb, are certain to pay a good profit on such increased expense as they may entail. Most important of these is deep plowing. It is of great advantage to the plants if they can root freely straight downward from the start.

Where irrigation must be practiced it is of great importance to prepare thoroughly for the easy and effective application of the water. Even with a running start, water will not flow readily up-hill in this climate and any man who has done much fighting water over humps and hollows does not need to be told that it saves money to have the land properly laid out before planting.

The best paying factor in preparing for rhubarb is to fertilize liberally with manure before plowing. This is not essential, especially if the soil is very rich in the beginning, as the necessary fertilizer can be applied subsequently if inconvenient to do so before plowing, but even with the richest soil it will be found a distinct advantage if it can be done. A heavy application of manure, well worked in be-

fore planting, will probably be all the fertilizer needed for two full years,—undoubtedly will be if a leguminous crop be grown between the rows in the summer.

The best method, in the writer's opinion, is to apply the manure evenly with a manure spreader, then to work it into the top soil thoroughly with a disk or cut-away. Next, plow shallow and leave the field rough to the weather until shortly before planting, at which time the deep plowing should be given and the surface quickly fitted as if for a seed bed.

It has been common practice with summer rhubarb to plow ditches, filling them with manure, plowing the dirt back on top of the manure and then planting either above or alongside of this buried dungheap. Rhubarb is a gross feeder and needs a large amount of nitrogen. It is also very sturdy and can probably endure closer proximity to large masses of manure than any other vegetable. Still it is surely sounder agriculture to incorporate the fertilizer thoroughly through the soil in as fine a state of division as practical. I find that with thorough mixture of manure and soil the plants do better from the start and besides form stronger and more symmetrical roots than where manure is applied clear without mixing.

Where this method is used it is best to use fresh manure. If it is applied roughly and plowed in raw it is decidedly safer to use manure which has been composted or which has at least gone through its first fermentation. This precaution should also be taken when the manure is applied after the plants are growing.

When well worked into the soil, liberal application is of much greater importance than the actual intrinsic quality of the manure. Its main value lies in the store of humus it will furnish, which on fermenting in the soil forms humic acid which in its turn makes the essential plant food already in the soil in the highest degree available. In addition to this, humus acts as a reservoir both of water and of unused plant food and its mechanical effect is always beneficial,

making lighter soils more retentive and heavier soils more open and free and better aerated. For these reasons where manure is not available, straw, leaves, brush, grape pomace, refuse from fruit and vegetable canneries, etc. may be used to very good advantage.

Neither manure nor any of these substitutes should be applied without available irrigation except at such time of the year as sufficient moisture is certain. Without moisture the proper fermentation will not take place.

One ton of manure to the acre is better than none. Ten to fifteen is usually applied and gives excellent results. These results gain proportionately with increasing quantity of manure up to at least 40 or 50 tons per acre. Besides making the requisite proportional gain in tonnage, the grade and quality are so greatly improved as to command a better price generally on the market.

In preparing for rhubarb there are sometimes things which may be done to transform an otherwise unsuitable location into a good one. For example, where tile drainage is practical an otherwise impossible location can often be made especially valuable for rhubarb. In such a case the time to install the drainage system is before planting the rhubarb—not after. The same observation applies to such grading as may be done to fit a field for necessary irrigation.

On the other hand, if the selected situation is in itself satisfactory, there are occasions where the simplest sort of preparation would be better, for instance, in order to take advantage of a favorable season. Also, a prospective planter may be confronted with the alternatives of planting quickly so as to get a long growing season to establish his plants before winter or postponing the planting for another year to allow for preparation. If his situation is such that extensive works such as draining, levelling, etc., are unnecessary he would be financially ahead to go forward with his planting as early as possible, with no further preparation than a good deep plowing and working down the

surface, leaving the application of manure until later. Under this system it is better to apply no manure until the plants have been established for about three or four months, after which the manure spreader can be driven astride the rows and the fertilizer well cultivated in.

Chapter VI.

PLANTING.

Planting can be done at any time of the year in favorable situations where the winters are mild and the summer heat is not excessive. The best planting time is from February to June, the best time of all being about April 1st. In districts of highest summer temperatures earlier planting is better, as the plants will then have time to become firmly established before they are called upon to endure the heat. It is not advisable to plant before February except in an especially mild and open season or in a locality where very favorable winter conditions prevail. On the other hand, wherever the summer heat is not too intense, as for example, near the coast, June and July are excellent months for planting. It may be taken as a general principle that the quicker a plant can establish itself after transplanting, the better root system it will develop and the more thrifty it will be when picking time comes. For this reason planting in times of natural "growing weather" is always best.

Mark out the rows five feet apart. If narrower than this it will be necessary to cease cultivation too soon. It is unlikely that any gain will be made with wider space to offset the loss in number of plants to the acre.

If the ground is not sufficiently moist, furrow out and irrigate down the rows, harrow, smooth, and mark again lightly for planting.

There is only one important point, peculiar to Winter Rhubarb, to be strictly observed in planting. The plants should be set at such depth that the junction of root and crown stands as nearly as possible at the level at which the ground will stand after the plants have become established. It is well to plant about a half inch higher out of the ground than the apparent level of the ground when planting, as subsequent cultivation will tend to build up the ground a trifle higher on the rows. Accord-

ing as the crowns are buried or the roots exposed, the plants become less efficient. Deep burying is apt to induce a tendency to mildew and moldy stalks. Exposed roots are practically certain to produce dry or woody stalks and a generally feeble growth.

A good method of planting, probably as efficient and economical as any, uses two men, one to make the holes and the other to set the plants. Use a long-handled, narrow spade, thrusting it vertically into the ground on the mark and moving the handle back and forth enough to accommodate the plant, then setting it in the ground about three inches away from the first hole and pressing the earth toward the plant. The man who sets the plants in place assists in firming the soil about them with his hands, being watchful of the proper planting depth. Two active men can easily plant 600 plants an hour by this method.

Some recommend wet planting, using water to settle the soil about the plants, but I have found it much better to depend upon soil water (capillary moisture) wherever practical, rather than to actually wet the plants. Of course *ample* moisture is essential and, until thoroughly established with new permanent root systems, the plants must not be allowed to suffer for lack of moisture, so if planting has been deferred too long, irrigation must be given, both immediately before planting and as soon thereafter as may be necessary to keep the soil moist—*not wet.*

It is a good plan, when atmospheric conditions tend to dry the crowns, to throw a light mulch of loose soil over them after planting. This can be done handily by cultivating, using a pair of horse-hoes to throw up a ridge, just high enough to barely cover the exposed crowns. If heat is intense a straw mulch is better than the earth mulch.

The root carries a considerable store of material for the manufacture of new leaves and will go on sprouting even if left lying in the open air. This peculiarity sometimes deceives a beginner into thinking that his plants are "taking hold." But it is below ground that the real work

takes place. Almost immediately after planting, if conditions are right, the root begins to send out tiny feeders. I have noted this, exceptionally, within 24 hours from planting. More usually they first become apparent about the third or fourth day. These first feeders are very delicate in structure, silvery white and nearly transparent. They are nearly all water, with an infinitessimal proportion of solid substance. When rubbed between the fingers they practically vanish. When in this condition, if the soil becomes dry for even a very short time, all those little feeders will disappear and new ones will have to be made. After a time, varying from two weeks to two months according to conditions, a few of these begin to thicken where they emerge from the old root and the characteristic root substance begins to grow out along the tiny thread. From this point on, development is very rapid and in a very short time thereafter the plant may be said to be established and becomes very hardy and able to endure an extraordinary amount of abuse.

From the foregoing it will be seen that proper moisture and temperature conditions for the first few weeks after planting will have a great bearing on the rapidity with which plants will establish themselves and consequently on their natural thrift.

Whether seedling roots or root subdivisions are used, in either case the process is the same and care should be taken that the plants are not subjected to any false starts. They will recover from even a number of false starts but each successive effort will be weaker and therefore no interruption of growth should be permitted.

These suggestions for preparation and planting are given for field conditions. For garden planting, where no more than a few dozen plants are wanted, a more intensive plan should be followed. A trench should be dug, 1½ feet by 2 feet wide. This should be half filled with a mixture of fresh manure and soil, tramped down hard, then filled up with clear soil and settled with water. No other fertilizer

should be applied for three or four months after planting.

The best spacing in the row seems to be about eighteen inches for field planting. In a garden bed, such as just described, a space of two feet between plants will be better.

Chapter V.

CULTURE.

The first culture of Winter Rhubarb is not essentially different from that of any other field or garden crop. Thorough but shallow cultivation, elimination of weeds and preservation of adequate soil moisture are principles which apply here as elsewhere. Such care should properly begin as soon as planting is finished and continue until within three to six weeks of the main picking. It is generally inadvisable to enter the field with a cultivator or to disturb it in any way for at least three weeks before such main picking. Even if rains come or irrigation is necessary during this period of laying the crop over, it will not be necessary to cultivate because the leaves will shade the ground sufficiently to prevent much evaporation of moisture and baking of the soil. Frequent cultivations, two and a half to three inches deep, will prevent the development of any considerable root work within that depth. This will also provide aeration and facilitate nitrification at the same time as conserving moisture. As picking time approaches, cultivation is discontinued in order to allow the feeders to develop in every available particle of the surface soil. This is also done with a view to avoiding injury to the perfecting stand of stems.

The function of every rhubarb crown is at last to produce a seed stalk. This function runs counter to our design, for we are concerned only with the stems of the leaves—which are merely incidental to the main purpose of the plant. If the plant is allowed to mature its seed stalks without check it rapidly deteriorates. The production of the enormous seed stalk is a great drain on the vital resources of the plant, going so far as noticeably to cause the root to shrink. Besides this, new crowns are then usually developed, often in greater number than the weakened plant can effectively support.

For this reason the seed stalks are removed when from one to two feet in height, continuously during the entire period, beginning *after* the plants are established, three or four months from planting, and up to the time when the field is finally laid over. A sharp knife should be used, cutting off the entire crown which has seeded, below its lowest leaves, unless it is desirable to produce a few more crowns, in which case the stalk alone should be cut, close to the leaves. The latter method should always be used in case the plant has only a single crown, which has gone to seed. If the entire crown is removed from such a plant it may not survive the shock and, if it does, it is likely to produce its new crowns from dormant eyes quite a ways down the root, thus making a buried crown.

Seed stalks should never be cut or interfered with until after the plants have been in the field three to four months and are thoroughly established. There is no way of knowing just how near a given crown may be to seeding so when any considerable planting is made there is certain to be a proportion of the plants which were nearly at the point of seeding before they were taken up or subdivided for transplanting. Bear in mind the classical injunction given little Bopeep when her sheep were late to supper, "leave them alone," and they will probably come through alright. The new crowns they form will naturally be slower reaching a usable size than their mature neighbors but they will be ready in time, possibly just about the time that some of the others have wearied of single blessedness and undertaken to raise a family.

This whole seed stem question can best be learned by practical experience. Seeding being inevitable, as it is, the problem consists in turning that habit to our best advantage. Generally speaking, there is considerable advantage in the variations in time of seeding among the plants in a field, as thereby the danger is avoided of having all the plants seeding just at the time it is most desirable to sell rhubarb.

As only large, quick-growing leaf stems (the incidental

by-product of the plant) are wanted, plenty of nitrogen must be supplied except to the richest of soil. Rhubarb is the grossest of gross feeders, hence it is almost impossible to supply too much available nitrogen except from the standpoint of commercial economy. Of course the other elements, potash, phosphorus, lime, etc., must be present in adequate measure in order to enable the plant to assimilate great quantities of nitrogen. However, its requirements of these elements are not heavy and it is probable that any fairly rich soil contains enough in itself for many years of rhubarb. Where manure is used freely as the main source of nitrogen there is always a surplus of the other necessary elements.

The main reason for recommending manure for the nitrogen supply is that the humus thereby added to the soil becomes a reservoir for the retention of that elusive element. The important part played by humic acid in making all the elements available must not be forgotten, nor the improvement in texture of soil which follows the proper application of manure. In addition to thorough admixture with the soil, the only caution to be observed in heavy manuring is to make sure that there is good drainage so that the land will not be soured. However, it is assumed that drainage has been considered as a pre-requisite of rhubarb planting.

In the absence of available manure, any organic waste substances which will produce humus can be used with good effect, the preference being always for such as carry the highest percentage of nitrogen. Where such materials are used it will of course be necessary to devise methods of application to suit their differing structure.

It will often be found advantageous to use nitrates to finish off a crop, especially if the supply of nitrogen has become depleted. The deficiency of nitrogen shows quickly in stunted growth and a yellowish cast to the foliage. Application of nitrate is very satisfactory even when plants are in rich ground and appear to be doing very well, always stimulating them to heavier growth and finer texture. I

have found Nitrate of Lime best for this kind of forcing. It has all the good qualities of Nitrate of Soda and is safer for the plants. Unless considerable care is taken in using Nitrate of Soda, the plants may receive a set-back which may more than offset the stimulation. There is no such danger with Nitrate of Lime, which has the additional virtue that a certain amount of its lime content is in a form immediately available as plant nutriment. The remainder of the lime is a valuable soil amendment and aids nitrification. Apply at the rate of 200 to 250 pounds to the acre, sprinkling near the plants and cultivating immediately. The most effective results seem to come when applied about four to five weeks before picking.

Where irrigation is necessary, whatever is good local practice for vegetable crops is equally correct for rhubarb. During the period that young plants are establishing themselves, three to four months after planting, and through the time of maturing a crop, six to eight weeks before picking, ample moisture must be maintained continuously to get best results. In irrigating it should be remembered that the water that runs off the land does harm, not good. Every soil has its own limit of capacity to hold capillary, or soil, moisture which a careful irrigator will learn by experiment. Saturation beyond this point can bring no good result and often in close, heavy soils, or if too long continued in any soil, will cause actual damage from smothering by the free water shutting off the air supply of the roots.

Irrigation should, of course, always be followed by cultivation as soon as the ground can be properly worked. Never cultivate mud.

If necessary to irrigate within the last three weeks before picking, do not cultivate, even if the water has to be run over again to save the ground from baking. It is most unlikely to bake, owing to the dense shade of the spreading foliage, and it is best to leave the ground undisturbed for that time.

Clean cultivation is best for the first summer after the

plants are set out. Beginning the second summer, cultivation may be very well dispensed with, especially where the following described system of green manuring can be practiced. The plants should be encouraged to take a rest during the summer. Where they can be made to do so they will bear heavier and require less fertilizer the succeeding winter and spring.

After the spring picking is off, in March or April, and as the plants are entering upon their second summer in the field, some *leguminous* cover crop may be sowed thickly in the space between the rows. Vetches are probably the best if they can be made to grow well at that time of the year. Cowpeas, soy beans, or any other legume may be used. When any of these are grown for the first time, be sure to inoculate. Directions for inexpensive inoculation may be found in California Agricultural Experiment Station Circular No. 87.

This sort of summer cover crop may appear at first sight to be somewhat opposed to accepted practice, so it is well to give a word of explanation. Resting the plants in the summer is an important factor towards net profits—more and better production at less expense. But where the field is left without cultivation, weeds have full sway and enough damage and extra work may ensue to offset the benefit of leaving the field idle through the summer. On the other hand, a good cover crop will keep down the weeds and in addition, if a legume is used, will add nitrogen (our great essential nutriment) to the soil instead of further depleting the supply as the weeds will do. When finally put down and worked into the ground, this crop will keep up the desired humus—rounding out the argument in favor of this practice for Winter Rhubarb.

When the cover crop has reached the right stage for green manuring, one to three weeks before blossoming, mow down the entire mass, rhubarb and all. Cover this by plowing six or eight inches deep on each side of the rows, within three or four inches of the plants. Use a plow with a long mold-

board so as to throw a good ridge between the rows, covering the green stuff as thoroughly as possible. A large, sharp, rolling coulter will be necessary, both to slice the cover for a clean furrow and, by having a large one and setting it deep, to make the incidental root pruning as smooth and clean as can be.

Where practical, an irrigation should be given just before this cutting down and plowing so as to hasten decomposition. As soon as the right stage of decomposition has been reached, cultivation should begin. Cultivate so as to work the ridge down into the open furrows and leave the ground level again. The first cultivations should be done with a disc attachment. After the trash has been worked up enough so that it will not drag and clog the cultivator teeth, use chisel or narrow shovel attachments. Make the first few cultivations as deep as possible. After thorough tillage, reduce the depth of cultivation to 2½ or 3 inches.

This plowing should be done in July or August; *never later than August,* as some months must be allowed after such severe root pruning for the development of the new feeder system.

This will be found to be the cheapest way of buying nitrogen and should be done wherever practical.

After three or four years in the field it is best to take up the plants, subdivide and replant with single strong crowns. This work should be done in the early spring, as soon as possible after the last picking. Planting should be done in a new piece of ground, well prepared in advance.

Rhubarb is practically free from pests and diseases. Its rapid growth, vigor and large stalks and leaves render it nearly safe from injurious attacks of insects and it seems to have no natural enemies. In the eastern States, summer growing varieties are sometimes troubled by the Rhubarb Curculio or Snout Beetle and the Rhubarb Flea Beetle. On the Pacific Coast no damage has yet been reported from either of these insects.

The California Station reports on three insects said to

include rhubarb in their dietary, the Apple Leaf Hopper, the Western Army Worm and the Hop Flea Beetle. Outside of this report I have not seen or heard of these insects attacking rhubarb, though I have seen the leaves eaten by the Twelve Spotted Cucumber Beetle (*Diabrotica Soror*). I have never seen any particular damage done, as the leaf development is so rapid that the plants run away from the beetle.

One year I was visited in the fall by a black aphis. Have never heard of this attacking rhubarb elsewhere except in one instance. As soon as this appears, simply pick the affected plants down, burning the leaves or dipping in a barrel of poison solution. Then wet the plant with its remaining sprouts thoroughly with the dip, or better, spray with strong pressure. Use "Black Leaf 40," a 40 per cent preparation of Sulphate of Nicotine. A half pound can will make 50 gallons of the proper solution.

It is a good rule if aphis appears anywhere to get rid of it immediately without waiting to see what it will do, for one thing is most certain, that it will multiply and replenish the earth—with aphis—and inconceivably fast. Happily they are very easy to detect. When they start in on a plant they stay on it until they simply crowd themselves off. Take the first few plants they attack and it is easy to get rid of them. There seems no reason to believe them especially fond of rhubarb. It is likely that these attacks came when their natural pasture was lacking.

In long continued warm, damp weather the stems may be affected by mildew, especially if planted a little too deep. Sulphur is recommended for control. Use finely powdered flowers of sulphur and apply thoroughly.

Chapter VI.
PICKING AND PACKING.

Stems should not be picked until the plants have been set out for at least four months. A good development of foliage is essential to the formation of a sturdy root system such as is needed for the heavy duty to be required of the plant later on.

So far, the most valuable and dependable market has been developed in the early spring, principally through the months of February and March; therefore it is best to design all field operations so as to have the maximum stand of rhubarb within that period.

After the plants have been over four months in the field and until the time for laying the crop over for the main picking, as described in the chapter on culture, a certain amount of continuous picking is permissible and even desirable. Such continuous picking must, however, be done in accordance with the natural habit of growth of the plants in order to carry them to a point of highest efficiency at the spring picking.

When seed-stemming is practiced as previously recommended, removing crowns which have seeded when the stalk is from one to two feet tall (except as noted in the case of single-crowned plants), each such crown will frequently yield from two to four excellent stems. These are often among the most vigorous stems in the field and seed-stemming should provide a small supply of a very attractive pack, which will usually find a profitable local market even when other fruits and vegetables are plentiful.

As winter approaches the demand for rhubarb increases and prices improve. This condition can be met by picking the largest and best crowns, without disturbing the smaller ones. All the crowns of a given plant are of different ages, hence of different degrees of maturity and development. When picking in this way do not pick down entire plants. It will pay better to leave the smaller crowns, which

will keep on growing if not disturbed and will conserve the vitality of the plant better than if it is entirely defoliated. However, all the old outer leaves should be removed from the crowns which are picked as if they are left on they seem to cause the plant to slacken in its growth.

When the main picking is ready *and shipments have been arranged for*, take everything in sight. That is, take all *good* rhubarb. Never let your heart grieve over leaving old and faded stems in the field. Similar to a palm, a rhubarb plant will have many leaves which are past their prime and are deteriorating. Ordinarily, after a proper period of growing weather, good crowns should carry an average of about four good stems apiece. For every new stem produced, the oldest of this preceeding series begins to fade, thus keeping the number of vigorous stems practically constant. Exceptionally a larger number of perfect stems will be found on a crown, due to some obscure cause favoring nutrition of that particular plant. Some times a burst of fine "growing weather" will increase the average over the entire field. On the other hand, a long continued cold spell will naturally retard the development of new growth, while it does not seem to delay the aging of mature stems, and will thereby reduce the plant average and the total stand. This emphasizes the necessity of certain caution in the selection of location, as earlier pointed out.

But, much or little as it may be, if you remember that you have just as much rhubarb as you have *good* rhubarb and do not attempt to pick more than this, you should never have difficulty in marketing your production during the proper season.

At this final picking there is no advantage in cleaning the old leaves from the plants. Simply take every good stem in sight and pass on. Some advise leaving immature stems, as being more perishable. This is a mistake, as has been proved by cold-storage tests on the keeping quality of rhubarb. When decay finally sets in, the oldest stems are the first affected. The youngest stems endure the longest of

all. The only ground for leaving small immature stems is the mere matter of size. If not too very small, a certain amount of lighter stock should go into the fanciest pack so that the retailer can make weights. Where correct culture and ample fertilizer have been given there is small danger of there being too much of this light stock.

Care is necessary not to break the stems when picking. There is just the least knack about this that is hard to properly describe but which anyone can catch in a few moments trial. The stems should come away, quite cleanly as a rule, from the thin, semi-circular edge where they join the crown. Never pack broken stems. When an accident happens, just throw the stem away—and be more careful next time.

Pile the picked leaves from two rows in the space between, laying the piles crossways of the row and with the leaves all pointing the same way. Do not make the piles too large. These directions are given to facilitate topping.

Topping should be done immediately after picking, or as soon as possible, as the leaves should not be allowed to wilt on the stems. About an inch of the leaf should be left on the stem in the form of a duck foot. Use a rather heavy, large knife, keeping it very sharp. The acid dulls the blade very rapidly, so a good whetstone carried in the pocket is a time saver.

The topper goes down the rows, facing so that his knife hand is on the same side as the leaf-ends are laid. Kneeling or squatting to the pile, as he tops the stems he drops them in a new pile between himself and the first pile. With a little practice and simplifying the necessary motions, this work can be done with great rapidity and neatness. Toppers should be instructed to make a practice of scattering the piles of leaves as soon as each pile is topped.

Following the topping, the piles are again gone over and the stipules removed from the bases of the stems. This can be done when topping, but when heavy picking is done and saving time is an important object it will be found more efficient and cheaper to make a separate operation of it. The

stipules should always be stripped off by the fingers, never trimmed off with a knife.

The piles are then gathered into large field boxes, containing 60 pounds or more, laying the stems in the boxes with the leaves all pointing the same way, and hauled to the packing shed. Here they are washed and are then ready for packing.

In these various operations it is important that the stems be handled with reasonable care, especially avoiding scraping or chafing them. The skin is so tender that rubbing with sand or grit will cause tiny scars, making a dirty looking pack. With the least care in handling, this damage can be avoided.

Speed, hence cheapness, of picking and topping depends more on size of stems than anything else. A grade that runs 4 stems to the pound will cost less than half as much to handle than one that runs 8 to the pound. This is an additional argument in favor of generous fertilizing. Besides the increased yield of superior quality, expenses are reduced, to the great advantage of the net profits.

Packing arrangements will vary according as the picking is done on a large or a small scale. Up to about 2,000 pounds a day the simplest plant will suffice. A bench and frame for making boxes, scales, a slatted or grated bench for washing and packing, a hose, a bench for nailing up the packed boxes and a place to pile them, will furnish comfortably for a packing plant of small capacity. Where it is necessary to pack car lots from a single ranch and a capacity of 10,000 pounds a day is needed, a little thoughtful planning of these essential arrangements can be made to result in an appreciable saving in packing cost.

There are two styles of packing in use in California, locally and for shipment to eastern markets, the "solid-pack" in apple box, with a standard weight of 40 pounds net and the special rhubarb crate designed by the Southern California Rhubarb Growers' Association, carrying 30 pounds net. The Pioneer Fruit Company, who handle practically

all the eastern car lot shipments from Northern California and whose good work in this connection will receive attention in the chapter on marketing, insist on the solid pack. At the same time there is much in favor of the Southern California 30 pound crate, when properly handled, especially in express shipments. This crate is made with sides of half-inch lumber, 7¾x24 inches and ends of quarter inch, 7¾ by 12 inches. Top and bottom each consist of four slats of quarter inch, 2½x12 inches. These parts, known as "box shook," are to be had from the box factory for $8.75 per 100, f. o. b. cars. Paper must be provided to line top and bottom. This should be very heavy, tough and non-absorbent and should be cut to size, 11¼x24 inches. The paper costs about 1 cent a box.

In the solid pack the box is made of a length to accommodate the average stem and all longer stems must be cut off. Very few stems have to be cut for the 24 inch crate. By distributing the stems well in packing the crate a very nearly solid appearance can be preserved.

In packing Fancy Rhubarb for express trade I use a 15-pound crate made just the same as the 30-pound, but half as deep. The especial advantage of this in fancy trade is that it insures the grocer a quick clean-up of fresh stock so that he has no waste.

Boxes and crates should always be packed a little extra weight, say one pound in a 30-lb. box. Care should be taken to distribute the largest and most attractive stems throughout the box so that when the rhubarb is finally on sale it will look equally good until the last pound is sold. The rhubarb should be clean and the entire package finished up neatly. The shipper's name and address should always be neatly stamped or stenciled on each box, as well as the name and address of the consignee.

As illustrating a few of the essential details in preparing rhubarb for market I give the following letter recently written to a gentleman who had purchased plants from me last year to set out an acre. He found difficulty in market-

ing his rhubarb and wrote for advice. I asked for a sample of his stock, which came in due time and, on opening, disclosed at first glance a condition which was in itself sufficient to account for any selling difficulty. Printing this may seem a bit superfluous, repeating, as it does, a good deal of the preceding matter—but the fact that this letter was necessary, under the circumstances, is evidence to me that these things cannot be too strongly accentuated, even if necessarily by repetition.

San Luis Rey, Cal., Feb. 18, 1915.

Mr.....

Redlands, Cal.

My Dear Mr.....

I have just examined, with great interest, the rhubarb samples you sent me.

It is evident that, under the conditions, your rhubarb has done very well and, if you handle it rightly, should bring you a very fair return.

At the same time it is forcibly brought to me that some details of handling, which are so familiar to us as to seem natural, will require fuller explanation than would have occurred to me as necessary.

The main criticism of the samples is in regard to your topping—or removing of the leaf. You have used a dull knife and have cut with a slanting stroke, cutting through a portion of the stem. This gives an appearance of being roughly whittled to a point. The proper method—and the one which preserves the stem best—is to use a very sharp knife, cutting square across the base of the leaf about an inch from where the veins diverge from the stem. This leaves a sort of "duck-foot" effect. Topping should be done within a few minutes after picking, before the leaves begin to wilt, otherwise considerable of the moisture of the stem

is transpired through the leaf, impairing the keeping quality of the rhubarb. When topping is done as prescribed, leaving a small section of leaf, the cut portion dries and seals over very quickly retaining the juice of the stem, besides giving a uniformly neat finish.

You will find that many of the leaves grow up very crisply from the stalk, with the lower lobes small, crisp and rather folded inwards. These will be topped with a single swift stroke with your sharp knife, square across. Other leaves grow with rather drooping lobes or with the outer veins spreading at a wide angle with the stalk. Such will require another stroke or two to trim them neatly.

Use a fairly heavy butcher knife. I use an eight-inch blade by preference. Keep it at a razor-edge and carry a good whetstone in your pocket. Touch it up on the stone two or three times an hour when topping steadily.

The stipules adhering to the base of the stems should be removed before the final washing. I don't know that this makes any difference to the rhubarb, but it makes a great improvement in the appearance of the package and appearance is the first and most important factor in marketability.

Furthermore, of the 34 good stems in the sample, ten had been broken off in picking. With reasonable care this can be avoided. If you are watchful you will learn to be suspicious of a plant whose stems are liable to break and, giving yourself the benefit of the doubt, grasp the stem well down at the base and endeavor to detach where it springs from the crown. You may be unable to escape an occasional accident but with due caution these should not come to more than a fraction of one per cent of your total picking and you should make a rule not to allow a single broken stalk in your pack.

Nearly all the stems were badly chafed and scarred. Their appearance was as if they had not been washed but had been brushed off dry. Do not handle the stems more than absolutely necessary, especially before washing. In such handling as must be done, pick them up and lay them

down without letting them slide through the hands as, when there is dust, grit or sand adhering either to the stems or your hands, rubbing is certain to chafe and mar the delicate outer skin and makes your pack look old and dingy.

Always wash your rhubarb perfectly clean before packing and pack it wet. It will thus retain its freshness much longer.

The quicker you can get your rhubarb into the box from the growing plant and the sooner thereafter it can be opened for sale at the grocer's, the better business you will do.

Further analyzing the sample marked "two stems each from nine consecutive unfertilized plants," I find these eighteen stems weigh 3¼ pounds. Four of these stems only averaged one ounce apiece. Taking these out left fourteen stems weighing just 3 pounds, or a little heavier than 5 stems to the pound. My own experience teaches that an excellent and strictly fancy pack can be made with 5 stems to the pound. Personally, I aim never to send out lighter than an eight stem pack. Seven is fair and six is a good commercial pack. Five stems to the pound is fancy and four can be properly called extra fancy.

Those four stems which only weighed ¼ pound altogether should be omitted from your pack. They hardly contribute enough weight to pay for the bother of picking, topping, washing and packing them and certainly not enough to offset the improved grade you would have by leaving them out. Besides this, it is evident that those two plants have had a hard time of it for some reason or other and will probably do enough better for being left undisturbed to pay for such rhubarb as you might take from them now. This will hold true even if they have to be left until next year to realize from them.

The sample of sixteen stems from "eight adjoining plants fertilized with one light application of horse manure," weighs 3 pounds 14 ounces—or very nearly a 4 stem pack,

showing a gain of almost exactly 25 per cent in average weight of stem in favor of the single light manuring.

This is a very clear cut example of the established fact that fertilizing is a double-barreled proposition. It increases the yield sufficiently to pay back the cost with big interest and at the same time improves the grade, making this increased production more saleable.

You are right in doubting the marketability of the old and pithy stems. Of course it gives pain to a thrifty soul to witness what seems to be waste. But as these old stems are returned to the soil they do not represent so much waste as might at first appear. Under proper growing conditions the plant is being continually renewed from within, keeping the supply of marketable stock fairly constant.

Must give you a word of caution in regard to seed-stalks. Remember that the seed stalk is the final effort of every individual crown, after which new crowns are developed from the buds in the axils of the leaves. Cut the seed-stalks as you say you are doing (but better when about 3 feet high) if you want to develop more crowns, but when a plant has as many crowns as you want, say 4 to 6, it is better to remove the entire crown by cutting or breaking it off, leaves and all.

I will ship you a packed box of rhubarb such as I am now supplying to my trade. Examine this carefully, noting the application of the principles I have pointed out. Then pick and pack another sample and ship me. If any points have been missed we can straighten them up in short order.

Yours very truly,

REGINALD BLAND.

Chapter VII.
MARKETING.

The ancient recipe for rabbit pie begins, "First catch your hare." The first instruction for profitable marketing of Winter Rhubarb is, "First, produce your rhubarb." Proper culture means the production of fancy rhubarb which, nicely handled and packed, is very easy to sell during the rhubarb season.

It has not always been such a simple matter. The earlier years of attempts to market Winter Rhubarb covered a series of discouraging experiences and bitter disappointments. There never was a dream that bore fairer promise more barren of fulfillment. The thing looked so good—so reasonable! Small wonder that many, lured by such glittering bait as $1,000.00 to $1,500.00 per acre profits the first year after planting," hastened to invest their small savings or even go into debt for these gold bearing plants. The plants were purchased, magnificent rhubarb was raised and then—the awakening! The wholesale grocers looked askance at rhubarb offered them in midwinter. Evidently the wonderful tales of world-wide markets clamoring for carloads of Winter Rhubarb had not reached them! Retail grocers were almost equally mistrustful of the new product and with good reason, for that maker of markets, the ultimate consumer, was slow to make up his mind that he even wanted to sample the stuff until his spring-time hunger forced him to it and while he waited—the rhubarb wilted. When the grocer finally had to dump out half a box of rotten rhubarb he was naturally in no great haste to repeat the dose. The rhubarb grower sadly closed up his ledger in red ink and retired from business—that is, the most of them did. Some plowed out the fair deceiver. Others left their patches of rhubarb to the mercy of the elements and, surviving its neglect and the drain on its food supply by its companioning weeds, their prized rhubarb struggled on to a

miserable growth of spindling stems which were again offered for sale the following winter. Meantime a fresh crop of planters had been drawn into the enticing business, to repeat the pathetic experiences of their predecessors.

But there was some relief to this sordid and sorry picture. Among those who went into Winter Rhubarb were some who were more aggressive, more resourceful and farther sighted than the average. While compelled to temper their expectations in accordance with actual conditions, they nevertheless contrived to make sufficient returns to justify the undertaking and so kept up their fields. In the meantime, by dint of continued offerings from year to year, a very satisfactory local market was gradually built up.

Still, much more rhubarb was produced than home markets could consume and some scattering efforts were made to ship to eastern cities in carlots. All these efforts were unsuccessful for the same reasons which had caused California markets to develop so slowly, though some small experimental shipments brought good returns.

Finally the problem was solved. Looking back over the history of this work, the solution appears so natural and inevitable that we are inclined to wonder that it was not earlier thought of.

In the eastern States rhubarb is the first edible open-air plant available after the grip of winter is broken. Combining a fruit-like acid and flavor it is relished and prized above any other food in the early spring. It has become a fixed national habit to look for it at that time of the year and on account of the supply being limited relative to the demand it then commands a fancy price.

This early spring market invited the entrance of California rhubarb and heavy shipments, made just anticipating the eastern crop, became profitable. With this as the entering point of the wedge, the shipping season was gradually extended, starting each year a little earlier and increasing the range of distribution through wider territory, until

now there is a period of over two months before eastern rhubarb appears, during which time California rhubarb is sold in carlots in fine shape. This has crowded the time forward until now practically all of February and March the market is lively in the east and present indications are that within another year or two the month of January will be added to this period.

The first shipments of summer growing rhubarb varieties from California do not reach the east until the second week of March, or within a range of one week earlier or later than that time, so the earlier shipments are entirely Winter Rhubarb. This gives the grower of Winter Rhubarb who is so situated as to be able to make his first picking by the first of February the opportunity of disposing of two full pickings, thus giving this business a renewed impetus—this time with the solid ground of an established market under it.

From May to November, inclusive, it is not worth while to expend any great effort in trying to sell rhubarb and, besides, the plants need rest. After connections have been established to take care of the winter and spring production, it will pay to keep in touch with them during the summer, for it will often be found that a small supply of fancy rhubarb can be kept going profitably through that time. There are many people who like rhubarb for its own sake and are ready for it at all times of the year.

Little development has yet been made of eastern markets for rhubarb in the months of December and January, though during those two months the highest prices of all can be obtained from small fancy express shipments. These are pioneering the way at present and, as stated above, January bids fair to be soon included in the period of heavy shipments. December will probably eventually be included, judging from the way our express trade is building up, and when it is, the most favorably situated Winter Rhubarb

growers will be able to send out their three pickings in good seasons.

These large marketing developments were only made possible by large operations. The best results have been achieved by co-operative efforts, both rhubarb associations and vegetable growers' associations. When you are in a position to ship co-operatively with other growers who will engage to keep their grade up to a high standard, you then have practically nothing to do but to grow your fancy rhubarb, deliver it to your association and draw your money. In Alameda County is the San Lorenzo Rhubarb Growers' Association, said to comprise 87 per cent of the northern acreage. An association of rhubarb growers was started in Southern California some years ago, while the market was still in its infancy, but failed to survive the discouragements of that period. Undoubtedly a re-organization will be effected in the near future owing to the example set by the brilliant success of the northern association. For the present its place in Southern California is taken by various vegetable associations, who have recently been marketing rhubarb very successfully. As an instance, I have just at hand a report of the Orange County Vegetable Association, dated Feb. 14, 1915, stating that they had just sold a car of Winter Rhubarb in Chicago for $2.00 per box. This being six and two-thirds cents a pound should net the growers very nearly five cents f. o. b. cars.

Co-operative marketing associations handling mixed products are springing up all over the State and observing the way the question is being taken up by the various Farm Bureaus, it is a safe prediction that we are at the threshold of an era of co-operative marketing of general products in California.

Reference to the success of the San Lorenzo Association would be incomplete without mention of the really splendid work done by the Pioneer Fruit Company (who contract with the association for their entire product), in

working up the distribution of California spring rhubarb throughout the eastern markets.

Commencing in 1909, when they only had two markets in the east which would even consider buying any rhubarb, they shipped small lots in mixed cars in an experimental way. The experiment was continued along the same lines in 1910, in which season they succeeded in netting the growers an average of 43 cents per packed box. These are 40-pound boxes, so the margin of profit to the growers was very small.

Modest as these early returns were, they showed a promising field and in 1911 the company undertook shipments in carlots, shipping in that year over 30,000 boxes (68½ cars) for which the growers averaged .798 per packed box. In 1912 they shipped 104,000 boxes and averaged 83 cents; in 1913, 80,000 boxes (short crop), averaging .977; in 1914, 80,000 boxes, averaging $1.103 net to the growers and also cleaned up all the poor rhubarb to the canneries at from $25.00 to $35.00 per ton.

In a communication addressed to the writer, Feb. 1, 1915, their president, Senator Chas. B. Bills, stated: "This season we will probably net about $1.25, for we have made such a distribution of this stock that we now have more customers on our books than we have rhubarb; and only fourteen packages of our total shipments last year were consigned. The balance all sold f. o. b. Every grower knew what the f. o. b. prices were and consequently knew what we were getting for the stock, less our charges."

The San Lorenzo Association, aided by the efficient distribution of the Pioneer Fruit Company, have borne the greatest part in establishing the market for California rhubarb on a sound basis.

If you are isolated or in a locality where co-operative shipments are not practical, postage stamps cost only 2 cents apiece and one will take your message to the farthest corner of the United States. Shipments of small standing

orders direct to retailers are very practical. As these should be made on a monthly account basis, it is important to look into the financial standing and reputation of firms before addressing them. This can best be done through a mercantile agency such as R. G. Dun & Co. or the Produce Reporter. If your business is not large enough to warrant subscription to one or both of these agencies, just go to the nearest Wells Fargo agent and ask him for the name of the Route Agent who covers the territory in which you are situated. From him you can get, without cost, lists of wholesale and retail grocers of best standing in any city you wish and frequently he will be in a position to render even more valuable service.

Sample shipments are effective in placing new orders, but be sure that your subsequent shipments are always up to the mark of the samples you send out. I have done much of this sort of business and have been fortunate enough never to lose an account. A practical development I have made of this work is to correspond with a commission merchant in a city where I have a few retail customers, and to turn their orders over to him, at the same time giving him "the exclusive" for that city. This has always resulted in establishing a nice trade.

There is very little risk involved in shipping to reputable commission houses, when the shipper does his part by sending only first-class stock, well packed. Never send inferior rhubarb to market. There are times when poor rhubarb, badly packed, blunders into a market that happens to be short against a lively demand and, through no virtue of its own, finds a temporary sale at a good price. These exceptional instances do not count against the broad fact that such rhubarb is most likely to prove a drug on any market. The culture which has been described will always result in a heavy yield of the finest rhubarb and none other than a strictly fancy grade should ever be considered.

Good soil and plenty of manure, correct culture of good

plants, altogether make fancy rhubarb. This packed attractively—and, above all, honestly—gives you a choice article to sell. Sell co-operatively wherever possible. Where this cannot be done at the start, write your letters and send your samples. Start early, go slow at first and be persistent. With these few simple rules you are bound to succeed.

A page from the writer's personal experience may be helpful as illustrating what can be accomplished in marketing from an isolated situation.

Prior to 1911 I had given considerable attention to Winter Rhubarb and thought I knew both the plant and the market. I did know the plant—on a comparatively small scale and also knew the Los Angeles and San Francisco markets fairly well. I was informed by several parties whom I considered reliable that Winter Rhubarb was being successfully shipped to the east in carlots and finding a great demand on the markets there. I finally decided to undertake the rhubarb business on a rather extensive scale, planning to work exclusively on a carlot basis to eastern markets. This decision was principally shaped by the excessive land values prevailing within a radius of twenty-five to thirty miles of Los Angeles. It seemed better business to settle in a more isolated location and put in a larger acreage of less expensive land.

After considerable search, I finally purchased land in the San Luis Rey Valley, about 45 miles from San Diego and 90 miles from Los Angeles, developed water and planted about 25 acres to Winter Rhubarb. By November, 1911, the rhubarb was making great headway and I commenced negotiations looking to the disposal of my anticipated crop. Each party I approached passed me on to some one else, so I finally was forced to the conclusion that the eastern market story was a myth. I made a flying trip to the east, meeting the leading commission merchants in the largest cities. I found California rhubarb unknown except for March shipments made by the Pioneer Fruit Co., and those were just in their infancy and none too successful at that time.

I found one firm in Chicago who thought a Christmas carload could be handled and shipped them a car in December. The shipment was a failure, but instructive. When the car was opened, the first boxes sold at 8½ cents per pound but selling was slow and prices declined within a few

days, the first hundred boxes averaging 6 cents per pound. Sales became slower as the rhubarb got older until the car was finally closed out nearly two months after picking, at an average selling price of a shade under 3 cents a pound.

The lesson taught in this experience may be summed up in one word, **distribution.** If our rhubarb could have been scattered widely enough to have sold it all out immediately on arrival, in other words, if there had been efficient distribution, it would have yielded a net return of from 5 to 6 cents per pound, f. o. b. cars.

For a time matters looked dubious, as I did not feel able to take the heavy chances involved in shipping in such large packages into markets which needed educating.

Realizing that the failure of this carlot had been primarily due to lack of distribution, whereby the matter was inevitably reduced to a deal in old, faded, wilted rhubarb, I decided to make some investigation of possible express trade direct to retailers. My main talking point was, "fresh from the field" to the grocer, giving him a strictly fresh stock which he could clean up quickly and eliminating waste. With this idea I wrote a few letters to retail grocers in Arizona. The first return mail brought me a few orders, showing that the idea was appreciated. I then got up a little circular and had letters printed in a multigraph shop and started my campaign.

By this system I sold over $4,000.00 worth of rhubarb in the first year from about ten acres. This is not a very brilliant showing but is given as an example of an escape from a difficult situation in an isolated location by a means within the reach of anyone. Several factors contributed to keep this return down; one, a freeze by which I lost several weeks out of the best season. The principal factor was the experimental nature of this early work, learning when my trade wanted their main supply and learning to manage my fields so as to have the rhubarb at the proper time to match

their requirements. At the same time, the total investment here was barely $400.00 per acre, so this modest return was actually 100 per cent on the proportionate capitalization, consequently there was no ground for complaint after all.

This was pioneering work but served to open markets where commission merchants had previously been apathetic. Since that first year I have gradually placed nearly all my rhubarb with reliable commission merchants and have narrowed my territory as the market has improved until now I ship almost exclusively to Texas and Missouri.

These are entirely express shipments and net me an average of over 4 cents per pound, f. o. b. cars, from December to the middle of April, being based on selling prices ranging from 7 to 10 cents per pound, wholesale. This is evidence that here is a great opening for carlot shipments by freight as soon as acreage is developed sufficient to supply the necessary rhubarb. The saving in transportation charges would amount to from 2 to 2½ cents per pound and experience has proved that fully ten times as much rhubarb can be sold at 5 to 7 cents, wholesale, as can be sold at 8 to 10 cents.

Every effort should be made towards organized or co-operative marketing. Men's gifts run in different directions. If a man is a good farmer it is usually because his gift lies that way. His highest efficiency will come through the developing of his own especial talent and not being forced to try to make a salesman—likely a poor salesman—out of a good farmer. From every angle the argument is all in favor of co-operation.

The following suggestions, quoted from P. M. Kiely's "Southern Fruits and Vegetables for Northern Markets," will be found useful by intending shippers.

"SHOULD PRODUCERS ORGANIZE TO MARKET THEIR PRODUCTS?

"Most of the receivers of perishable products will answer this query in the affirmative, because a great many

valid reasons may be advanced to show the benefits arising from organization. The pioneers in successful organization were the fruit growers of California. In the early stages of their efforts to grow fruits and vegetables for distant markets, they were beset by obstacles difficult to surmount. The item of distance to paying markets and the question of transportation and rates called for the ablest men in the industry. Powerful corporations had to be handled in the interest of the producer; living rates, faster time and improved methods were demanded, and the railroads saw the wisdom of yielding, as the concessions tended to largely increase their business every year—and the enormous traffic which followed is no longer news to anybody.

"The further from market the greater the need of getting together, as the risk increases with the distance. In this connection, the routing and distribution of the goods becomes very important, and cannot be successfully handled without organization. Wherever there is any considerable number of growers or shippers, steps should be taken towards organization. Elect officers to direct affairs for the coming season. Good, responsible, experienced firms should be selected to handle your products in every city you desire to reach.

"Such firms are bound to take better care of your interests than of individuals, because there is more at stake and the merchant realizes that if he makes a mistake or at any time misleads you in his advices, he is likely to be dropped for somebody else. One telegram or letter serves all—and the labor saved at both ends, by dealing with one man instead of twelve or fifty, becomes apparent. The commission man charges the association 7 instead of 10 per cent, and it really pays him better, because of work and time saved.

"In dealing with transportation companies and other corporations, your claims would receive attention where the

individual would fail; recalling the old adage that in 'Union there is strength.' In buying your packages, fertilizers, seeds or anything else needed by the community, you can secure better terms than an individual. All sorts of concessions are made to such bodies, the profits being greater and the risks less—all of which is natural and customary in every channel of trade. Incidentally, the isolated shippers at the smaller shipping points are protected to a beneficial extent, as the unions and larger bodies elsewhere, who are posted daily by wire, in a great measure even up and save all the markets.

"IN REGARD TO PACKING.

"Growers and shippers of fruit cannot realize, unless they were here to see it opened, how it injures the sale and depreciates the value of their goods to find inferior fruit mixed in, and covered up, in good fruit. Put in no inferior fruit of any kind. We know it is difficult to watch pickers where a great many are engaged, especially inexperienced hands, but the successful grower will take timely steps, whatever his hurry, to guard against such a serious mistake. Topping off, putting on top all the good fruit in the box, is also a mistake, and its injustice must be apparent to the most indifferent. Let the surface represent a good average of the contents, but no effort should be made to practice a deception. It injures the man most who practices it.

"Remember your name or stencil number is on the packages, and the buyer commits to memory very readily the brand which deceived him.

"Some of the crooked brands are so well known in this market that it is difficult to find a buyer for them, even at a big reduction. Every dealer is trying to secure the best trade, which can only be accomplished by having nice, uniform fruit. We repeat, let your fruit run straight and do not injure your reputation by trying to deceive anybody.

Packing is a most important part of the business and cannot be studied too closely, and you cannot get out of the business what it is capable of yielding unless your packing is done as it should be.

"It is proper to state that the demand for cheap or inferior products, either fruits or vegetables, has fallen off to a wonderful extent the past five or six years. Of late years there has been very little demand for anything but first-class goods. In former years cheap goods were not so neglected. The peddlers and cheap class that formerly bought second-hand products now look for better stock at better prices. Take strawberries, tomatoes, cucumbers, etc., which come in steadily during the winter and early spring, only strictly choice can be sold to advantage. Anything the least bit 'off,' either in quality or condition, is not wanted, because the peddlers and cheaper class do not take out such goods in winter. It is very difficult to place such even at half price or less. Shippers and growers should govern their actions accordingly. There is money only in the best stock. These remarks apply to all markets.

"BREAKING DOWN THE MARKET.

"Remember, the market is never broken down by **good** fruit. It is the great quantity of **poor** fruit that oppresses the market and forces down prices. We are as interested in sustaining the market and prices as you are, because when prices are down we get nothing for our labor, and hence we urge more good stock and less poor and indifferent stuff. How much more profitable and satisfactory to get $20.00 net from ten packages fruit, than to get only the same sum from twenty packages.

"Remember, the packages used for poor fruit costs as much, and the freight, drayage and all expenses just as much on the inferior as on the best goods—reducing the net

proceeds to a mere trifle. No profit can be made shipping poor perishables of any kind.

"RECEIVERS UNJUSTLY BLAMED.

"As a sample of how commission men can be unjustly censured, we will relate an experience of our own which occurred recently. One of our Missouri apple shippers, whom we esteem very much for his liberal patronage, made a shipment which we reported by wire same day received—as in bad order, slack barrels, specks, faulty fruit and bad packing generally. On receipt of the wire he replied we must be mistaken, that it could not be his fruit. We telegraphed him to come down on the first train, and if we were wrong would pay the expenses of the trip, an offer he accepted. We showed him his fruit, which he admitted was his, opened some barrels not yet touched, and found them about same as those complained of. He expressed a great deal of surprise at its condition and how it depreciated in value in such a short time. He saw then very forcibly the result of rough handling of fruit which should be carefully hand-picked, and the poor economy in hiring cheap, green hands for the picking and packing of his apples. He admitted the fault lay chiefly with the help, who did not follow his instructions in packing. His trip paid him and ourselves, too.

"HINTS TO SHIPPERS.

"A number of shippers, the new ones especially, when they receive a stencil, regard the number on it as the street number of the firm sending it out. This number really represents the shipper's address—being placed in our books opposite his name as soon as sent out. Each has a different number. His address on the package in addition to stencil number is therefore superfluous.

"The stenciling should be on the cover of the package, serving as it does, to keep the right side up. Such packages as strawberry cases should also be branded on both ends.

"If you have no stencil, a lead pencil can be used to write the firm's address, and your own should follow, writing the word 'from' between them.

"A shipper frequently borrows his neighbor's stencil, and uses it without notifying his commission house, or scratching or leaving off the number. You can see how this will complicate matters. Your neighbor will get the returns, and if he refuses to settle with you the commission house must pay twice or incur your everlasting displeasure.

"If there are any empty boxes in a crate, always make lead pencil note of same on cover; and if two or three varieties are in same package, as is sometimes the case, indicate it in the same way.

"In the midst of the fruit season every commission house is driven to death and has no time to either write or ask for explanations. If you do not hear from your shipment promptly, you may consider something is wrong; so send in a few lines asking and giving explanation in connection therewith.

"When shipping by freight always notify consignee by sending receipts or otherwise.

"Never use large or irregular nails for fruit boxes or crates; such spoil the appearance of the package and injure the sale.

"A common error by shippers is that of waiting too long before ordering their fruit boxes. They are often detained on the way, and frequently the box factory is crowded with orders and you must wait, and your fruit is spoiling in the meantime.

"Saturday is always the poorest day in the week to sell to advantage, as no shipments are made on that day. Thursdays and Fridays are about the best selling days, the outside order trade on such days being heaviest, and local dealers also buy largely on Thursdays and Fridays, all being at home at their places of business retailing on Saturday—

their big day of the week. No business in the produce district Saturday afternoon.

"Avoid as far as possible getting goods into market on Saturday evening or Sunday morning. They will keep much better in the country than in the city. Monday morning the market is usually a little bare, and Sunday night shipments strike a good market generally.

"SUGGESTIONS TO SHIPPERS.

"1. When making consignments always write your Commission Merchant, stating what shipped, number of packages, whether by express or local freight, date shipped, road shipped by, contents, etc.

"2. If shipment consists of a carload, always wire the car number and initials of car and name of road car will be delivered over at destination, so consignee can know where to look for car and what car to look for, as some cities have four or five roads over which a car can arrive.

"3. It is always best to insert on bill of lading the name of delivering line.

"4. In shipping draft bill lading attached or order notify, shippers will avoid confusion and in good many cases severe losses by inserting on the bill of lading the clause 'Permit inspection without surrender of bill of lading.'

"5. Shippers will make money by advising their merchants what the correct rate of freight on their shipments is, and will greatly assist in preventing over-charges by sending bills of lading with the rate inserted.

"6. In case shipments are diverted after having been made, the house to whom shipment was originally made should be always advised promptly.

"MIXED CARS.

"Mixed cars should be shipped whenever possible. Crops maturing about the same time could be shipped to

better advantage in this way. A mixed car can be sold quicker than can straight cars of anything. Take the commission house who has the usual following of grocers, butchers, market men and small dealers—they all handle a variety of such goods, and if they can secure all at one store it is to their advantage to do so. It's a convenience to both buyer and seller.

"COLLECTING FOR LOSS OR DAMAGE.

"The work of collecting from the express companies for damage to goods while en route, or loss through rough and hurried handling at transfer points or after arrival at destination, or through long or unreasonable time en route, or shortage in contents of packages, which occasionally appears, should not be as difficult to collect as heretofore. These companies are now under the jurisdiction of the Interstate Commerce Commission, are common carriers, and must recognize all proper claims of their patrons.

"We recall one occasion where we filed claim against the Adams Express Company, and after waiting for a long time—after repeated calls for settlement, we were informed they had lost the papers in the case. When a firm is thus deprived of the only weapon they can use, they are practically helpless. The express ticket, on which notations were made of the damages or loss, is the vital part of the evidence. Hence, in presenting your claim, file a duplicate and not the original, which may be useful later."

Before leaving this marketing chapter we must pause to pay our respects to those beguiling sources of misinformation, the "price currents" or "produce reports" published by the daily newspapers. The best that can be said for these is that they make a very rough diagram of a general market tendency in staples and seasonal products. Anyone who has had experience in selling any special line of produce will realize the full force of this without further comment,

but for the benefit of those who have not had such experience it should be stated that the current prices quoted are hopelessly unreliable and misleading. Often a high price will be quoted day after day when there is not a single package being sold for more than half the published price and, just as often, quotations will be published far below the actual sales. Grades and classifications are often mistreated, prices for inferior or damaged stock being given as representative of a certain variety while another variety may be quoted on the basis of a few sales of fancy stock.

At the present season (March) summer rhubarb, "strawberry," etc., makes its appearance and figures largely in price quotations, usually quoted higher than most actual sales. Under these circumstances "Crimson Winter" becomes a rather misleading term, as it is frequently applied to the inferior stock of that variety but quoted without distinguishing the grade. My experience has proved that the conscientious grower and shipper of Winter Rhubarb has nothing to fear from the competition of summer varieties, no matter what "the papers say." As an example of this, with "strawberry" rhubarb quoted at 4 cents per pound and "Crimson Winter" at 2½ cents to 3 cents, I have received 5 cents for mine and in addition have had the satisfaction of receiving word from my consignee that other commission houses were purchasing my stock because they had customers who knew what my name meant when stamped on a rhubarb crate and who insisted on getting that package. Fancy rhubarb and an honest pack is beyond competition. Neither name of variety nor price-current quotations will have much effect on your sales-account check.

Chapter VIII.

PROPOGATION AND DEVELOPMENT.

Rhubarb is grown either from planting seed or root division. It is well for every grower of Winter Rhubarb to understand the essentials of both these methods because the best improvement and development of quality and yield can be made by each grower for himself. This does not mean that the "specialist" is to be dispensed with. Quite the contrary. There are a multitude of details to be observed in handling seed and in root work, all of which are susceptible of great improvement. The necessary experience and study are only practical for one who is specialising on the subject. The skill and knowledge developed in his special training enable him to sell plants cheaper than one who lacks the same training can grow them for himself. At the same time, every grower's soil and climatic conditions differ in greater or less degree from those of every other and, with a reasonable amount of original experiment, it will be possible for him to develop the strain best suited to his own environment.

It is impossible absolutely to standardize any given set of valuable characteristics in rhubarb. All efforts along narrow or hard-and-fast lines will bring disappointing results when applied to practical field conditions. Such narrow plans find a parallel in those of the breeders of so-called "fancy stock." Fancy stock breeding has had its day and no longer interests real people. **Utility** is now our slogan, and we are working for hens that lay more and heavier eggs and cows that give more and richer milk. Of course we cannot crowd this parallel too closely. The idea is, that the type of rhubarb has not yet been produced which will not prove a limitation if too strictly followed. Furthermore, it is evident from what we already know of rhubarb, that no such fixed type will ever be found.

Broadly, we should concern ourselves with essentials,

leaving the superficial traits to one side as of secondary, if any, importance. The essentials are nutrition, temperature range, number of leaves in the seed stem series, tendency to multiply crowns, and form of growth. Color, marking and shape of stems are superficial qualities and should never be used to base selections, nor even considered except secondarily.

Uniform coloring and marking have no bearing on marketability. Rhubarb is rhubarb and if it can line a pie acceptably very little else matters. Vividness of color, fine texture of skin, crispness, size of stems, all are vital qualities in the market, but these are all dependent upon good culture—plus our first essential quality, nutrition.

Taking up these essentials in more detail, nutrition is the first and most important factor for development. The ability to transform an abundant provision of plant food and water rapidly into a heavy growth of leaf and stem is the first test of a rhubarb plant.

The faculty of a plant (which is satisfactory as regards nutrition) of functioning through a low temperature range is also an important basis for selections of Winter Rhubarb. Many a fine, thrifty plant, selected from its good appearance in March or April, may be found in January or February with nothing to recommend it. For this reason selections should be made on a basis of growth in the cooler months.

The third and fourth essentials are very closely associated. Usually, the fewer leaves in the series the more will crowns multiply. Therefore a balance between the two extremes is the most desirable object. Probably the best method in this selection is simply to cull out and reject those plants which multiply most freely, leaving further selections on this basis until after considerable study of the proportion best suited to the locality.

It is commonly thought that the tendency to seed stem

is variable in a given plant, according to the season or other factors. I have come to the conclusion, after extensive observation and close study, that every rhubarb plant has its own fixed and pre-determined number of leaves in the series from bud to seed. This can be learned by keeping a record of the number of leaves produced in this series on all the crowns of a plant and further confirmed by careful dissection of a crown within eight or ten leaves of seeding. On dissection the series of leaves will be found cunningly nested, each within the stipule of its predecessor, finally, after becoming microscopically small, disappearing in a drop of jelly-like substance at the center of the crown. When within eight or ten leaves of seeding, this series will be found to terminate in a miniature seed stem, showing that at least in as far as those eight or ten leaves are concerned, no condition or influence brought to bear on the plant could add to or take from their number. Cull plants will sometimes be found among seedlings which will have no more than ten leaves in their entire series, so that they never have a chance to develop a single sizable stem before they seed. On the other hand, some plants have a surprising number of leaves in their series. I have a few plants, now nearly five years old, which have never seeded yet and most of which have never developed one additional crown.

Therein lies the weakness of a selection from plants with an abnormally long series. Their slowness to multiply places their total yield far in the rear of plants which will normally develop several strong crowns.

Selections based on form of growth may well be left to the last. The most desirable form is that which grows up straight and with the base of the leaf stem rather lightly attached to the crown. Still, this is not of sufficient importance to offset any lack of the other more important good qualities.

The most desirable types, selected for their superiority in these essential qualities, should be multiplied by root di-

visions. In addition to this, some cuttings from the best plants of all should be set out in a special plot and given the best of garden culture. These should not be picked but should be allowed to ripen their seed. They should be rogued severely, taking at least half the bloom of every branch. As the seed ripens, tie paper caps on the stalks so as not to lose or scatter any seed. Place a numbered stake at each plant and keep a memorandum of its general description. Put the ripened seed from each plant in a separate bag numbered to correspond with the stake. When the seed is sowed, place a stake with the proper number with each row so that when you come to make your next selections you will have a pedigree started.

While variation is an essential of the rhubarb nature and will never be bred out, still heredity bears the most important part in improving types. A plot planted with the seedlings of any selected plant will always bear a strong family resemblance to its ancestor, so while narrow lines cannot be maintained, still **general averages** can be bred for with a satisfactory gain in each successive generation.

The inevitable variations which will persist through a system of development based on seed selection(with the most satisfactory types multiplied by root divisions) is a great advantage of itself. These small variations give a range of adaptability to varying conditions, causing a field of seedlings to make a better average, hence a greater total, tonnage than a field of the parent plants developed as a fixed type of straight root divisions.

For one thing, selection of any **single** plant for the fixed type for universal planting is hopelessly handicapped by the fact that in respect of the prime essential quality, that of nutrition, the plant will re-act differently with altered conditions. Nutrition is the core of its very being. According as that quality is affected a plant will vary so widely as to be unrecognizable in its changed aspect. This is true of all plant life, but more especially does it apply to a plant such

as rhubarb, the very soul of whose most desirable qualities is rapid, lush, unchecked growth. Furthermore, all variations which gradually make their appearance in subdivisions have a constant tendency along lines of degeneration. This is noticeable in a long series of root propogation in a given locality, but seems to be more accentuated when successive generations of cuttings are planted under diverse conditions of climate, soil, or culture. The stock so developed becomes deficient in its power of acclimatization or adjusting itself to changed environment. Unless the change is in every respect a change to more favoring conditions than its original location the plant will degenerate and once such degeneration sets in, it cannot be worked out through further subdivisions. As a striking example of this law, Bailey points to the potato, "varieties of which, in ten years or less, become so mixed in their characters, through rapid variation and deterioration, that we must return to seedling productions for a new start." The law holds good with all plants which are multiplied by dividing abnormally developed parts; all its variations tend to cause it eventually to run out by degeneration.

This fundamental weakness of the attempted fixed type runs counter to the over development of any arbitrary selection. Still the broad fact remains that we reduce rhubarb variations to their least range by root division and so can temporarily extend our best types by that method to the great advantage of field production.

Topps Winter Rhubarb, of Australia, is the parent stock of California Winter Rhubarb. The four years it was studied and developed by Mr. Burbank barely covered two possible generations, in the line of direct descent. Out of his experiments he selected the plant he sold to the trade in 1900, Burbank's Crimson Winter Rhubarb. Mr. J. B. Wagner purchased his first Crimson Winter plants in the fall of 1901 and his famous Giant was evidently one of the first

seedlings from these first plants, as he states that it originated with him in 1903—barely time for maturing one generation. Contrary to Mr. Wagner's opinion, this "Giant" is not a hybrid. None of its seedling offspring in any succeeding generation have shown any recessive characters. The conclusion based on this evidence is incontrovertible.

It follows that with such improvement in not more than three consecutive generations we have evidently a wonderfully plastic material to work with for future improvements. It is also evident that we must pick ourselves out of the rut we have gotten into in respect to our blind acceptation of the standards set by the very limited selections thus far made.

The two best starting points today are Burbank's Crimson Winter (not his "Giant") and Wagner's Giant Crimson Winter. The latter is the better plant in two important respects; it is very slow to seed stem, that is, it has a very long series of leaves (almost to a fault) and it makes, under favoring conditions, a phenomenally thick, heavy stem. The Burbank has much in its favor as a starting point for new selections in that its effective temperature range is distinctly lower than the Wagner and besides it is more prolific in its crown multiplication. When given a proper chance by correct culture and plenty of fertilizer its stems, while not as thick as the Giant, leave nothing to be desired from a market standpoint and when so grown its satiny texture and brilliant color are far superior to the Giant or in fact any other field grown rhubarb.

From the foregoing it will be seen that it will hardly pay to purchase seed except from a given selected plant with which one is personally acquainted. We cannot yet state positively how far the environment of the parent plant affects the variability of its offspring, but such evidence as we have indicates that environment is the most important factor in the accentuation of hereditary tendencies, so we must know our selected plant to be well nourished through the period of its seeding. After planting seed it takes a year

to mature a plant, consequently it takes two years to complete a field test. For these reasons it is best to purchase roots or root cuttings to begin with. If planted before July, either of the two varieties named will give a good crop the following winter and spring and their performance during that period will furnish the needed data for selections of parent plants for future breeding.

Before planting any selected seed, experiments should be made with some waste seed in order to get practice in controlling the moisture. Rhubarb seedlings are very liable to damping off in their earlier stages and must be watched very carefully over the critical period.

Plant one inch apart and not over an inch deep, covering with very fine soil. Transplant when two inches high to a new bed, setting plants four inches apart in rows twelve inches apart. Plant out in the field the following spring. Do not have the seed bed too rich but the second bed should have the finest of preparation and be well enriched with well rotted manure.

The simplest and most uniformly successful method of subdivision is by strong crowns. Dig up the plants to be divided and, using a very sharp knife, cut out sections of the root about six inches long, each bearing a complete crown at the top. The leaf stems should of course be first cut off, leaving about an inch on the crowns. The root sections should all carry the root bark continuous from end to end on at least one side. With proper care all such sections should grow. An especially desirable plant can be multiplied very rapidly by propogating the buds which grow in the axils of all the leaves. For this a small section of crown and root substance is dissected out with each bud and after drying slightly these tiny sets are rooted in sand boxes, afterwards being transplanted twice, the same as seedlings. The main difficulty is in preserving just the right balance of moisture so that they will neither dry out nor damp off. Even with the utmost care and skill it seems impossible to avoid a con-

siderable percentage of loss in this delicate work and only the most desirable and valuable plant will justify the care necessary to succeed in it.

The scope of one's experiments will naturally depend in great measure upon the proportionate part rhubarb bears in his farming. Still there is no reason why every garden should not be an actual experiment station on a larger or smaller scale. If we have the right point of view there is nothing to prevent the greatest successes springing from the smallest or most obscure sources.

CONCLUSION.

Looking back over these pages I am constrained to add a few words by way of explanation.

The most of what is here set down represents the concentrated results of several years' experience and many points are so briefly phrased as to appear almost dogmatic. With more time at my disposal I could probably have given you a more interesting book by writing more of the detailed experiments and experiences leading up to the conclusions here given. Still, while the book could have undoubtedly been made more entertaining to you and in every way better from a literary standpoint, it is after all just intended to be a practical manual of Winter Rhubarb culture and its ultimate value to you will depend solely upon just how practical you find its directions to be.

The effort has been made, upon the whole, to stick strictly to rhubarb, leaving such matters as depend on general agricultural principles to be gotten from the ample sources of information available to all. Consideration of many relatively small and unimportant factors has been left to the natural experience of anyone who engages in this work, as being their quickest and best instructor. The main

thing is to save you from going wrong on vital matters—and if that much is accomplished it may be that the very brevity of the book may stand in its favor.

One thing in particular I am so anxious to drive home that I am going to re-accentuate it in this parting talk. The **possibilities** of profit in Winter Rhubarb are tremendous. Some are right now making fortunes in it and, now that the east has at last been opened to it, the next few years will bring wealth to many more. With the improvements to be brought about by future selections there will undoubtedly be returns actually made far in advance of even our present idea of its possibilities. In the face of all this I say, "Don't go into Winter Rhubarb expecting to make $1,500.00 nor $1,000.00 nor $500.00 per acre nor any **disproportionate** return on your investment!" If you go into it with the idea of making $1,000.00 per acre and tie yourself up in any way so that you cannot afford to lose, then beware—for you will surely lose. On the other hand, if you base your expectations on the reasonable proportionate return of 25 per cent on your investment, even up to a total investment of $1,000.00 per acre, if your location is right, if your plants are right, if your culture is right and if you handle your crop right, you are more **certain** to make the expected return on Winter Rhubarb than any other field or garden crop and you will **probably** make 50 to 75 per cent and **possibly** much more.

Another caution for intending planters—don't start in too heavy. An experiment based on a few plants amounts to practically nothing, so it is hardly worth while to experiment with less than a quarter of an acre. On the other hand, an experiment on the scale of several acres is also pretty sure to be misleading. My personal advice to a beginner would be not to set out more than an acre the first year, no matter how well able to afford more, unless you are already a successful gardener or farmer.

These words of caution are especially directed to our city dwelling friends who feel the pull, "back to the land." They are the ones most prone to make rash and expensive experiments based on paper plans and I should deeply regret being in any way the unwitting instrument of some of the sad consequences of this sort of farming which I have seen.

REGINALD BLAND.

San Luis Rey, March 1, 1915.