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**TRIALS WITH
COMMERCIAL VARIETIES
of
CANNING PEAS**

Agronomy Department

AGRICULTURAL EXPERIMENT STATION
of the

South Dakota State College of
Agriculture and Meehanic Arts

Brookings

DIGEST

Ten commercial strains of eight different varieties of canning peas were tested in duplicate plots at Brookings in 1926.

The seed conformed to varietal descriptions and computed yields in this representative area in a season not exactly favorable were as high as the average production in the country for ordinary years.

As an average for all strains tested, inoculation of seed with proper nitrifying bacteria increased the yields of canning peas 5.96 per cent; and of green harvested vines 23.7 per cent.

Differences in yield from different varieties so far as the same were significant for a single season were apparent in the fact that the green weight of threshed vines was greater from the later varieties in this test than from the earlier varieties.

Peas for canning are frequently seeded with a wheat drill, on well prepared land, remaining without further cultivation except that it is well to go over the land after seeding with a smoothing harrow. The harvesting is done with a mower with or without vine-lifting attachments.

The threshed vines for peas for canning should never be returned directly to land where peas are to be seeded, on account of diseases peculiar to the given crop.

The refuse vines from pea canneries, and the refuse cobs and husks from sweet corn that may be canned in the same factory as an auxiliary product are valuable as feeds for livestock.

The business of seed pea production comprises a business of itself considered distinct from the production of peas for canning.

Trials With Commercial Varieties of Canning Peas

A. N. Hume

THE summer of 1926 proved to be abnormal, not only for peas but for other crops, and for some time during the growing season it was thought that no attempt would be made to make record of the yields of the varieties of peas. Moreover, as green peas have not been a customary crop, the Department was not in possession of machinery for threshing. For these two reasons it was attempted to secure computed yields from the several varieties by harvesting aliquot parts of the several plots of peas by hand, and to compute yields in pounds per acre of shelled peas and of green threshed vines. It is well understood that the coefficient of variation is wide when yields of one single year are considered; also that the method of harvesting and computing yields in the present instance leaves room for large probable error; although the possibility remains that such error would be smaller than that which might be created by the use of threshing machinery unadapted to the purpose. With this explanation, the results of this single year of testing varieties of canning peas are recorded. They will supply information concerning this crop that arises from several quarters. Also, the statements herein contained will not prevent the addition of further information and amplified tests.

The variety test reported in the present bulletin was conducted cooperatively with the Commercial Club of Brookings in that the seed of the several varieties was secured by that organization. The plots were seeded and cared for and the work of harvesting and computing yields was all cared for by the Agronomy department of South Dakota State College.

Varieties of Canning Peas

The principal purpose of conducting the variety test was to obtain some first hand information under South Dakota conditions about the yields which might be secured from the different varieties of canning peas in common use. A sufficient amount of commercial seed was ordered from seed companies that were known to handle seed for sections of the country where canning peas are generally grown. The manner of making this original order was simply to request the seed companies, who presumably had knowledge of the varieties of seed that were most in demand, to include such varieties in the order. The names of varieties thus secured were: Alaska, Rogers Winner, White Marrowfat, Green Admiral, Perfection, Horsford's Market Garden, and Advancer. In addition to the commercial varieties purchased directly from seed companies, small quantities of three varieties were secured from Ontario Agricultural College and these were also included in the variety test. These varieties were Canadian Beauty, Potter, and O. A. C. No. 181.

Early Varieties

The variety known as Alaska produced a little stronger yield **ALASKA** at Brookings this season than others. It is also the leading canning pea that is utilized in the United States.

The seed of Alaska peas are rounded, almost spherical; usually somewhat pitted with occasional seeds wrinkled. The color is green, occasionally shading to grayish-green. One of the reasons why the variety

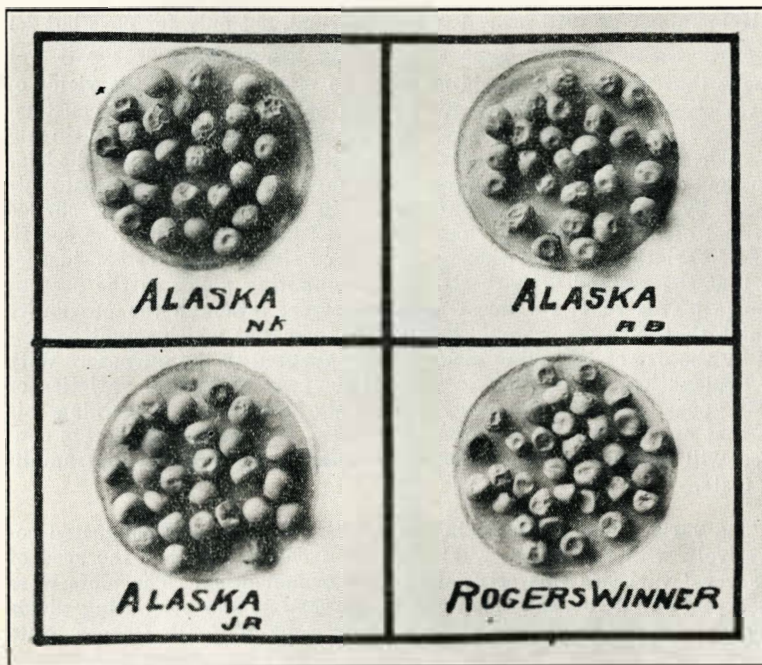


Fig. 1.—Commercial seed of Alaska from three seed companies and commercial seed by Rogers Winner which is the same type. Alaska is the prevailing early variety.

Alaska is in favor with canners is that this color of the seed remains fast and uniform after the peas were processed. Seed of Alaska that is light yellow is considered an impurity, although rarely the light color is due to bleaching from wet weather at harvest time. The number of seeds per pound in Alaska is computed at 2,400.

In connection with the Alaska variety as with others it should be kept in mind that although there are some general seed characters, it is impossible to identify the variety from these characters alone. The seed of the rogues of this variety is indistinguishable from its normal stock. Alaska vines in typical areas grow 18 to 24 inches in height. They are comparatively slender in growing habit. In the case of typical vines, the peduncles or pod stems are short. The pods themselves are straight-backed to slightly curved with ends occasionally recurved.

The blossoms are generally borne singly; sometimes in pairs. Alaska peas begin to blossom about the tenth node. Foliage is not very abundant. The leaves are medium in size; with color light green.

The Alaska peas in the present trial occupied about 75 days from date of emergence (May 16) to the time they were harvested (July 31). Apparently, that is a longer time by at least four or five days than would usually be required for the growing of canning peas in this locality, due to the backwardness of the season of 1926. Wisconsin Bulletin 382 reported that at Ashland Station the time of emergence to full maturity for Alaskas averaged 62 days.

The length of time required for growing different strains that are called Alaskas varies by several days and certain of these are classified as late strains of Alaskas. These are ranker and less determinant in growth. Some difference in time of growth was noted in the strains under trial at Brookings.

The Alaskas which were produced at Brookings in 1926 from commercial seed could not easily be characterized from the standpoint of characteristics except that in case of all plots the relative length of vines was short and vine growth was less luxuriant than in the case of nearly all other varieties.

This variety is said to average the smallest in seed
ROGERS WINNER of all early pea varieties. The seed is green in color, usually symmetrical in shape. Some types are flattened. The seed varies with regard to pittedness, ranging from smooth to decidedly wrinkled.

As far as type and size of vine are concerned they vary little from that of the Alaska and the finished product is of the same class. It was noted in the plot records of the present trials that the vine growth of Rogers Winner was relatively slight; if any difference even more so than that of Alaska.

Later Varieties

Seed of the Admiral are closely set in the pod and
GREEN ADMIRAL have a very square appearance. In Wisconsin bulletin 382, they are listed as the smallest seed of any commercial varieties except two, one of which is the early variety, Rogers Winner. The number of seeds per pound is 2764.

Green Admiral is quite distinct as to vine type; the height is about 29 inches. Vines are as slender as those of Alaska. The pods are borne well toward the top of the vine which avoids waste in handling. The podding habit is determinant.

The Admirals seeded at Brookings in both instances were of green color with all practically pure green seeds. The Green Admiral is a comparatively new strain; the kind formerly grown having been ordinarily cream to green in color with a large proportion of cream colored seed. Admiral peas produced more small sizes than the larger sweet canning varieties.

The time from emergence to date of podding for this variety was 54 days and from emergence to date of harvesting, when they were at the right stage for canning, was 75 days.

Perfections seeded at Brookings were distinctly wrinkled **PERFECTION** in character and of a green color, not particularly uniform. The variety is more uniform than some others which might result from the fact that Perfections are a selection from the Advancer variety. The season for growing them is listed as about 73 days.

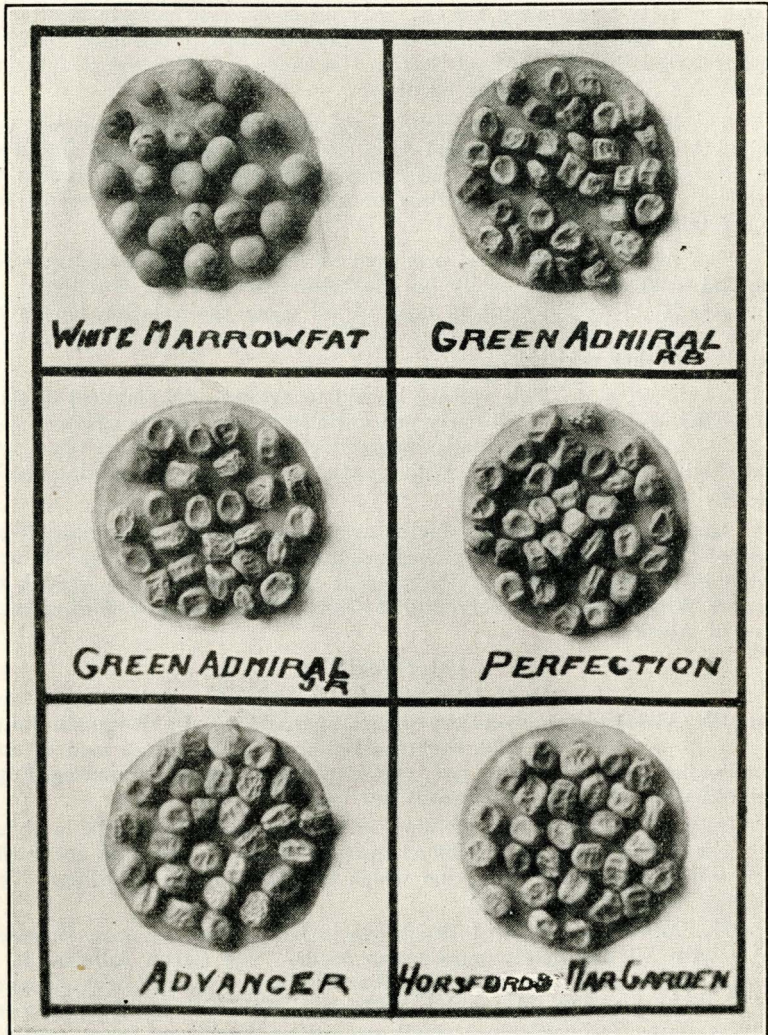


Fig. 2.—Commercial Samples of later varieties included in the trials.

The vines are about $19\frac{1}{4}$ inches in height and the pods are borne in pairs with a slight tendency to curve and with apex slightly deeper. The dates of emergence and maturity indicated that Perfection required about

53 days from emergence to podding and about 75 days from emergence to harvesting which was the case of the Admirals.

HORSFORD'S MARKET GARDEN The seed of this variety is deeply wrinkled and green in color which shades to light green. It is noticeable from the seed put out in the present trial that the size is relatively large; averaging 2,250 per pound.

The vines are stocky and erect in habit of growth to an average height of 20 inches, with development of large dark green leaves. This variety stools freely. The pods are straight-backed and are produced in pairs close to the top of the vine. The last nodes are close together which makes the pods come near the end of the vine.

The date of emergence of Horsford in the present trial was May 16; the variety required 52 days to the time of podding and 75 to the date of harvesting, when they were at the right stage for canning.

The color of seed in Advancers, like that in Horsford, is **ADVANCER** green, often shading lighter and occasionally even to cream color. The size of the seed in the strain put in at Brookings was similar to Horsford. The seed is wrinkled with the square shape, resulting from crowding in the pod, strongly marked. The height of the vines is about 19½ inches. The number of seeds per pound for Advancer is listed as 2340. Vine type in Advancer is stocky and fairly leafy with pods borne singly and also borne close to the top of the vine. The pods are curved at the back with a decided taper to the end of the pod.

The season from emergence to maturity at Brookings this year was 77 days, which is the same dates for Horsford's in this instance, although Advancer is listed as an earlier variety than Horsford.

WHITE MARROWFAT 1253 among varieties which were grown before the advent of the viner and it is asserted in the bulletin that White Marrowfat is a variety too long in vine, requiring too long a season to ripen; and that it has accordingly largely dropped out. This was borne out by the comparatively large growth of vine in the plots of this variety at Brookings where the vines measured two feet in length. The seed of the strain put in at Brookings appeared larger than that of any other in the test; also not wrinkled, spherical, and slightly pitted. The color varied from very light green to cream color.

Canning Varieties Differ from Field Peas

In former years, and to some extent recently, the so called Canada field peas have been familiar in South Dakota. Varieties so designated have the botanical characteristics of the canning peas described. Those familiar with the Canada peas will recall that they are mostly small seeded, smooth varieties, appearing somewhat like the Alaska variety so far as seed is concerned, although the peas are even smoother than that variety. Canada peas are sometimes called Prussian Blue. They do not have the advantages for canning that are found in Alaska; they do not mature their crop altogether and tend to have all stages from blossoms to dry peas on the plants at the same time. This is obviously a very objectionable characteristic from the standpoint of handling them with machinery. Even though they might be so handled, they would be almost impossible to grade.

Yields from Varieties at Brookings in 1926

It will be obvious to anyone acquainted with the yields of crops in various seasons that the results secured from varieties of canning peas in a single year should not be considered as representative of long-time averages. Among other things, the amount of rainfall previous to the growing season for the year was below the average, and the conditions for germination and early growth was unfavorable. Seeding was delayed until May 3, which was later than the date of seeding expected to give optimum yields.

Size of Plots

The variety test was put in on one of the numbered acres, West Farm, Brookings. The standard size of plots for all varieties except three was 95 feet in length by 6 feet in width. Three varieties which were secured later were insufficient to put in that large an area and it was necessary to put in these three varieties in smaller plots. All varieties put into the plots of standard size were put in in a series of eleven plots in succession with the length of the single plots extending north and south and the series numbering from east and west. Then the series was put in in duplicate, thus making two plots of each variety.

Seeding was accomplished on a well prepared seedbed with the use of a Superior grain drill, which is a machine often employed in areas where canning peas are commonly grown although a special pea seeder is sometimes used. In connection with seeding peas, it may be well to state that the amount of seed recommended in areas where the crop is grown successfully is large, heavy seeding being the rule. Standard quantities are 3.5 to 4.5 bushels per acre of Alaska, and 4 to 4.5 bushels of Horsford Market Garden. Even heavier rates have been employed by some growers.

Growth and Harvest

It has been mentioned that seasonal conditions previous to seeding were unfavorable and that fact will explain the unevenness of growth that was present in the plots. Much of the seed put into the ground failed to come up at all and consequently weeds gained much headway and doubtless the yields were much lower on that account than would be expected in ordinarily favorable seasons. Accordingly if one were attempting to estimate the yields of canning peas which might be secured in this somewhat representative area, one would be justified in assuming that the yields secured this year were relatively low.

Computing the Yields

The yields of peas which are put down in Table I were arrived at by harvesting and weighing two small representative areas from each of the plots. These areas consisted of strips one foot wide running east and west across the variety plots. The vines, with the peas at the stage for canning, were pulled by hand. After being harvested in this manner, they were carried immediately to the Crops laboratory and weighed green. After that, the pods were picked off by hand and the canning peas shelled out and weighed. The yields of vines were arrived at by difference. After securing the weights of green hulled peas and vines separately, the yields per acre were computed for the several plots.

Table I gives the computed average yields of the several commercial strains secured from different sources according to variety names. These are also classified in the table as early or late varieties. Only varieties which were secured from commercial sources and which were tested in duplicate plots are put down in the table.

TABLE I.—Average Yields of Canning Peas and Vines from Early and Late Varieties Produced at Brookings, Season 1926, Pounds per Acre. Arranged from Table III.

Variety Name	Source of Seed	Yield of Threshed Vines (green)	Yield of Peas (for canning)
EARLY			
Alaska.....	Rogers Bros.....	6670.0	2192.0
Alaska.....	Northrup King.....	7678.0	1990.00
Rogers Winner.....	Rogers Bros.....	6420.0	1990.0
Alaska.....	Jerome Rice.....	4754.0	1500.0
LATE			
White Marrowfat.....	Northrup King.....	15824.0	2408.0
Lge. White Marrowfat	Henry Dreer.....	13560.0	2136.0
Green Admiral.....	Jerome Rice.....	14578.0	2094.0
Perfection.....	Jerome Rice.....	12190.0	1508.0
Horsford Mkt. Garden	Rogers Bros.....	15424.0	1484.0
Green Admiral.....	Rogers Bros.....	12192.0	1340.0
Advancer.....	Northrup King.....	11676.0	1320.0

No attempt is made to draw very critical conclusions from the yields in Table I. They are valuable mainly for the purpose of getting some idea of the amount of canning peas produced in a representative area of eastern South Dakota under conditions like those of 1926.

It is generally expected that larger yields will be secured from late varieties than from early varieties. It will not be possible to establish that as a fact from the yields of Table I, although these yields are in accord with the statement as far as the production per acre of green vines is concerned. It may be noted by casual inspection of the yields of threshed vines from early and late varieties that those from the latter are at least double those of the former. Such inspection of yields of green peas will also reveal the fact that a number of the highest come from late varieties even in 1926 when such varieties may have been at a comparative disadvantage.

In order to compare the yields with those that are expected in other areas the following statement is quoted from Farmers Bulletin 1255:

"The yield of peas to the acre varies with the variety and the conditions under which the crop is grown. It may range from a crop failure to more than 2½ tons of shelled peas. The average yield in the United States each year for a four-year period was 1600 pounds, 2000 pounds, 1600 pounds, and 2000 pounds of shelled peas per acre for the years 1917-1920 inclusive. As a general rule, the yield of the smooth or early varieties is smaller than that of the wrinkled or late varieties. From figures gathered during the past several years in the states of New York and Wisconsin, it has been found that the yield of the early varieties range from 860 pounds to 2400 pounds per acre and of the late varieties from 1000 pounds to 3250 pounds per acre."

The yields of green peas computed and recorded in Table I are as high or higher than the average yield just indicated. It should perhaps be mentioned that the peas on three or four of the plots at Brookings were a little riper at the time of harvesting than is considered optimum

for canning peas and that the degree of maturity may have caused the yields in pounds per acre to be slightly higher than they would have been had the peas been picked greener. When the peas are raised and harvested for canners under contract, the tendency for the canner is to insist that the peas shall be delivered as young as it is possible to use them; while with other things equal the grower finds it to his advantage to leave the peas on the vines as long as practicable in order that they may grow and increase in weight.

Inoculation

It is generally understood that the varieties of peas in this test as well as a good many others are legumes and accordingly have the capacity of bearing root nodules within which bacteria may live which have the power to take nitrogen from the air and transfer it to the plant. Generally speaking, the various varieties of peas grown in the field and garden are provided with some inoculation by bacteria which are carried on the seed when it is planted. It occasionally happens, however, that such is not the case and that after the peas have arrived at sufficient size, very few if any nodules are found on the roots. It is difficult to be certain without trial whether inoculation is necessary or desirable in the case of this and other legume crops.

In the trial of varieties made at Brookings, the seed used for the first series of variety plots on the East side of the acre was drilled in without inoculation and seed of the same varieties for the duplicate series on the West side of the acre was inoculated. The inoculant consisted of gelatinous material in a 6-oz. bottle. The directions for treating the seed stated that the contents of the bottle should be rinsed out with cool water and the liquid made up to one pint and strained through a cloth sieve to remove the lumps of jelly. The culture liquid was then poured over two bushels of seed in such a manner that each seed was moistened and the seed were planted as soon as they were sufficiently drv.

Table II summarizes the yields of the several varieties on a basis of comparing the inoculated and uninoculated plots of the same varieties.

TABLE II.—Yields of Green Peas and Green Vines from Inoculated and Uninoculated Seed. Arranged from Table III.

Name of Variety	Source of Seed	Yields in Pounds Per Acre					
		Green Peas Canning		Green Vines Threshing		Increase per A. For Inoc.	
		Inoc.	Uninoc.	Inoc.	Uninoc.	Peas	Green Vines After Threshing
Green Admiral.....	Jerome Rice.....	2668.0	1520.0	19908.0	9248.0	1148.0	10660.0
Green Admiral.....	Rogers Bros.....	916.0	1764.0	12004.0	12380.0	*848.0	*376.0
Advancer.....	Northrup King.....	1176.0	1464.0	9496.0	13856.0	*288.0	*4360.0
Alaska.....	Northrup King.....	1996.0	1984.0	8680.0	6676.0	12.0	2004.0
Alaska.....	Jerome Rice.....	1660.0	1340.0	5116.0	4392.0	320.0	724.0
Alaska.....	Rogers Bros.....	2424.0	1960.0	7720.0	5620.0	464.0	2100.0
Horsford Mkt. Garden	Rogers Bros.....	1376.0	1592.0	16416.0	14432.0	*216.0	1984.0
Perfection.....	Jerome Rice.....	1436.0	1580.0	13640.0	10740.0	*144.0	2900.0
Rogers Winner.....	Rogers Bros.....	1880.0	2100.0	6704.0	6136.0	*220.0	568.0
Lge. White Marrowfat	Henry Dreer.....	2344.0	1928.0	16056.0	11064.0	416.0	4992.0
White Marrowfat.....	Northrup King.....	2664.0	2152.0	18056.0	13592.0	512.0	4464.0
Average Net Gain, in Pounds Per Acre for Inoculated.....						105.1	2332.7
Average Per Cent Increase from Inoculated.....						5.96	23.7

*Minus.

The two right-hand columns of Table II show that with a total of eleven comparative trials with inoculated and uninoculated seed six of them give higher yields of green peas in the case of the inoculated plots. The other five give equal or higher yields in case of plots where the seed was uninoculated. However, the average net gain in pounds per acre for the inoculated plots was 105.1 pounds, which is an average increase in yield of 5.96 per cent for the inoculated plots over the uninoculated ones.

In regard to the comparative yields of green vines from inoculated and uninoculated plots, the average increase in pounds per acre of inoculated over uninoculated plots was 2332.7, which is 23.7 per cent.

The cost for inoculation would be little exclusive of labor and the increases in yield of green peas and vines indicate that it is worth while to use inoculation in all cases where there is any question whatever about the abundance of the proper bacteria in the soil.

Soils

One factory mentions sandy loam as the best soil type for growing peas; such a soil is warm and adapted to early cultivation in the spring. Clay loams are ideal, especially those well supplied with humus and lime. Lighter gravelly soils may produce moderate yields if well supplied with humus. The higher and more sloping gravelly soils are less adapted to pea growing. However, lighter soils, whether sandy or gravelly, permit working earlier in the spring which is important and in case such soils are utilized for peas every advantage should be taken of such a fact. The sandy loams are also well suited to the early varieties and are utilized in the case of a succession of plantings which is common, leaving loam soils on the same farm or in the same community for the later varieties. Stiff clay soils are not especially well adapted to the crop.

There is an advantage in using fields with soil that is uniform in slope, drainage, and fertility, in order to secure uniformity in growth in the crop which reflects itself in the finished product. Southern exposures are seldom selected because such sites tend to hasten the maturity of the crop.

Humus

Large amounts of stall manure or green manure which are to be incorporated with soil where peas are to be produced should not be applied directly to the land but rather incorporated with the soil for the previous crop. It is also of special importance that vines of peas which are returned as refuse from the canning factory should not be applied to the land directly preceding the crop. This is on account of the fact that these vines may carry back diseases to which the pea crop is especially susceptible.

Crop Residues Valuable for Feed

After the peas are threshed for canning at the factory, large amounts of the vines remain. These are valuable as feed and are greedily eaten by livestock. In some instances, these vines are taken directly from the factory by farmers, the quota of each being commonly spread on sod land to cure and to be baled into hay after they are thoroughly dried. This material well cured is relished by livestock and has high nutritive value.

Pea vine refuse is sometimes cured at the vining stations by building it into immense stacks which are also compact. Under these conditions only the outer 8 to 12 inches of the stacks decompose and the interior becomes silage which may be hauled away later for feed. In other instances, silos are built at vineries for the accommodation of the refuse vines.

Some Conditions of Canning Factory Operation

In order to answer certain questions about the conditions under which peas can be produced and put into cans on a factory scale, the writer took occasion to secure answers to a questionnaire from a manager of such a cannery which has been in operation in a middle western state for two years past. This information may be of service in applying it to similar conditions elsewhere.

The cost of building the plant in the instance referred to was about \$60,000 and the capital was raised by a stock company. The capacity of the plant is 60,000 1-pound cans for ten hours, which implies about 15 tons of peas. Such an amount of raw product ready for canning makes it evident that the definite acreage of peas must be assured and in this case, according to the manager, about 300 acres of peas must be tributary to the plant.

In regard to a source of seed for growers, it is customary for the company to furnish the seed at a present price of \$3.00 per bushel. This arrangement not only answers the question for growers as to the source of seed for planting but likewise makes it possible for all growers tributary to the cannery to secure the same variety or varieties. This in turn makes greater uniformity of the product that goes into the cans and uniformity of product is a most desirable and necessary feature. The cannery which has been mentioned markets its product throughout the United States and Canada.

In reply to the question whether special methods of planting and cultivation are recommended to growers, the answer was that the peas are seeded with a wheat drill on a well prepared seedbed and that they are not cultivated. It is considered well to drag or harrow immediately after planting in order to leave the land level. The peas are harvested with an ordinary mower with a special attachment, or in some instances with a special pea harvester. The kind of soil that was considered best in the case of this factory was sandy loam which the writer happens to know is the prevailing type in the community. Obviously it is necessary to have a sufficient area of a kind suitable for producing any special crop like peas in order to establish an industry on a large scale dependent on that crop. It was further answered by the manager that peas in the locality do well in a crop rotation following alfalfa or sweet clover. This cannery permits growers who bring in peas to take the vines away for feeding livestock or returning to the soil and they make no extra payment in case the vines are not taken away. They are, of course, hauled away in practically all instances.

Sweet Corn Canned by the Same Factory

A number of the establishments for canning peas in the United States also can sweet corn and such is the case with the establishment mentioned. The dates of harvesting peas make it evident that the season

for canning that product may be rounded up in good time to begin canning sweet corn. Thus the period of time for utilizing the factory may be extended throughout a much longer season than if peas alone are handled. The questionnaire sent out by the writer not only asked whether sweet corn was taken care of in addition to peas but also made inquiry about the conditions of handling the supplementary sweet corn product. It developed that the capacity of the factory was the same per day for sweet corn as for peas, namely 60,000 1-pound cans or about 60 tons. The acreage of sweet corn desired tributary to the cannery is 700. Seed of sweet corn is likewise furnished to the growers and in this instance the present price is 5 cents per pound.

The methods of cultivation for the sweet corn are very similar to those for handling ordinary field corn except that sweet corn is planted a little thicker. In regard to by-products of canning corn, the only ones are cobs and husks which are hauled away by the growers for feeding purposes.

Seed Pea Growing

The growing of seed which is necessary in turn for the production of peas for canning is separate from the business of producing peas directly for canning. A number of producing areas confine themselves to this business of producing and marketing seed peas that do not operate a canning factory. When the amount and nature of the labor necessary to produce thoroughly acceptable seed for the market are considered, the desirability of making a separate project of such business and giving it undivided attention is understood. Recently, a promoter for a factory made the statement that a difficulty in the canning industry is that of securing a sufficient amount of strictly reliable seed. The scarcity of seed goes back to the fact that it has been difficult for the interest of a large number of growers in given communities to be sustained. Even in communities where a considerable acreage of seed has been put out at various times, competition of other crops along with other causes has caused growers to discontinue the growing of seed peas in a number of instances. Consequently, there is usually a demand for the product. westward first from Canada and New York, through Michigan and Wisconsin, into Montana and Idaho, Washington, and California. Seed peas are always grown in regions of northern latitudes or high altitudes. They are grown both under irrigation and without irrigation.

Necessity for Roguing

It is especially necessary that peas for canning be uniform in all characteristics which in turn means that the seed must be pure as to variety, time of ripening, as well as color and minor characteristics. Accordingly, all plants that produce seed in a field should strictly conform to the given variety. Generally speaking, any plants in a field of seed peas which are "off type" or which belong entirely to some other variety are called "rogues". The term rogue has been used in a more technical sense to designate a particular degenerate type.

It is necessary to remove rogues by going through the field where seed is to be produced and pull them out by hand. There is no other process known for successfully removing them. It is especially neces-

sary that all rogues be pulled out of seed plots where peas are to be secured for seeding fields for increase. With the most careful roguing of such seed plots, it may be possible to reduce the amount of roguing necessary in general fields.

Even though roguing is thus reduced to the smallest necessary amount, it constitutes one of the largest items of expense in seed production.

Where large acreages are produced, it is customary to have as many as 15 men in a group go through the field to pull out the rogues. These are usually carried to the border of the field and placed in a pile from whence they are soon removed and used for feed in order that they may not be returned to the land. When as many as 15 men are arranged in a group for the purpose of roguing a field, 12 of them are generally arranged in a row abreast at such distances apart that with outstretched arms fingertips will touch. Then back of each group of six in the front row ranges an experienced hand who follows and collects any rogues that may be overlooked by the half-dozen workers in front. Finally behind the entire group ranges a foreman who should be especially skilled in picking rogues even though they are plants with only slight differences to distinguish them from those of the desired type. Rogues which differ from type only in character of pod are the most difficult to distinguish, and are most likely to be overlooked.

The matter of roguing is mentioned here in some detail because it involves considerable expense but is necessary where the growing of seed peas is undertaken.

Methods of Culture

Methods of seeding, harvesting and threshing of seed peas are similar to those used in growing peas for canning. They should be seeded on a well prepared seed bed, free from weeds, either with a grain drill or a special seeder. They should be seeded seasonably early. They may be cut with an ordinary mower. After curing, it is possible to thresh them with an ordinary grain thresher or pea huller and in any event care is necessary to run the threshing cylinder slowly enough not to crack the peas.

TABLE III.—Green Weight Yields of Commercial Varieties of Canning Peas Tested at Brookings, 1926.

No. of Plot East to West	Name of Variety	Source of Seed	Wt. Harvested from Plot, No. Grams			Yields Comput ed Per A, Lbs	
			Green Vines and Peas	Green Peas for Canning	Green Vines After Threshing	Threshed Vines	Green Peas
UNINOCULATED							
1	Green Admiral	Jerome Rice	1346.0	190.0	1156.0	9248.0	1520.0
2	Green Admiral	Rogers Bros.	1768.0	220.5	1547.5	12380.0	1764.0
3	Advancer	Northrup King	1915.0	183.0	1732.0	13856.0	1464.0
4	Alaska	Northrup King	1082.5	248.0	834.5	6676.0	1984.0
5	Alaska	Jerome Rice	716.5	167.5	549.0	4392.0	1340.0
6	Alaska	Rogers Bros.	947.5	245.0	702.5	5620.0	1960.0
7	Horsford M. Garden	Rogers Bros.	2003.0	199.0	1804.0	14432.0	1592.0
8	Perfection	Jerome Rice	1540.0	197.5	1342.5	10740.0	1580.0
9	Rogers Winner	Rogers Bros.	1029.5	262.5	767.0	6136.0	2100.0
10	Lge. White Marrowfat	Henry Dreer	1624.0	241.0	1383.0	11064.0	1928.0
11	White Marrowfat	Northrup King	1968.0	269.0	1699.0	13592.0	2152.0
INOCULATED							
12	Green Admiral	Jerome Rice	2822.0	333.5	2488.5	19908.0	2668.0
13	Green Admiral	Rogers Bros.	1615.0	114.5	1500.5	12004.0	916.0
14	Advancer	Northrup King	1334.0	147.0	1187.0	9496.0	1176.0
15	Alaska	Northrup King	1334.5	249.5	1085.0	8680.0	1996.0
16	Alaska	Jerome Rice	847.0	207.5	639.5	5116.0	1660.0
17	Alaska	Rogers Bros.	1268.0	303.0	965.0	7720.0	2424.0
18	Horsford Mkt. Garden	Rogers Bros.	2224.0	172.0	2052.0	16416.0	1376.0
19	Perfection	Jerome Rice	1884.5	179.5	1705.0	13640.0	1436.0
20	Rogers Winner	Rogers Bros.	1073.0	235.0	838.0	6704.0	1880.0
21	Lge. White Marrowfat	Henry Dreer	2300.0	293.0	2007.0	16056.0	2344.0
22	White Marrowfat	Northrup King	2590.0	333.0	2257.0	18056.0	2664.0
UNINOCULATED							
23	Canadian Beauty	Ont. Agr. College	1655.0	213.5	1441.5	11532.0	1708.0
24	Potter	Ont. Agr. College	2125.0	90.0	2035.0	20350.0	900.0
25	O. A. C. No. 181	Ont. Agr. College	2948.0	205.5	2292.5	22925.0	2055.0

The size of all variety plots listed in the foregoing table was 95 feet by 6 feet, except plot 23, which was 95 feet by 3 feet; plot 24, which was 95 feet by 2½ feet, and plot 25, which was 95 feet by 2½ feet.

One pound equals 453.6 grams.