

A SYSTEMATIC STUDY OF VEGETABLE VARIETIES,
STRAINS AND STOCKS USED IN THE CANNING
AND FREEZING INDUSTRIES

by

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A THESIS

submitted to the

OREGON STATE COLLEGE

in partial fulfillment of
the requirements for the
degree of

MASTER OF SCIENCE

June 1940

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ACKNOWLEDGEMENTS

The author wishes to express his appreciation to Professor C. B. Sayre of the New York State Experiment Station for permission to use these data for this thesis, and to Professor A. G. B. Bouquet and Dr. W. S. Brown for the many helpful suggestions in the preparation of the manuscript.

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INTRODUCTION

The study of vegetable varieties has been, and will continue to be, an essential function of olericulturists. Differences between varieties were noted by many of the early modern horticultural writers, for much of the literature relating to vegetable crops as well as pomology was devoted to the discussion of new sorts.

The garden pea is recognized as one of the most ancient (18) of food plants. Some of the earliest writers, however, apparently were not interested in varietal names, for in 1693 John Evelyn in his garden publication "The Compleat Gardener" (11) dismisses the subject of pea varieties by writing, "Peas or Pease, are multiplied by seed; there are great Ones, little Ones, white Ones or yellow Ones, and green Ones. All the world knows they grow in cods (pods) and are almost round, and sometimes half flat." Despite his naive discussion of the subject, peas were to a limited extent associated with names 16 years prior to that time, and there is some evidence that the name "Round-cival" as a group term was applied to several closely related peas as early as 1597 when Gerarde (12) in his herbal mentions the name to identify a certain kind of garden pea.

HISTORY

The first noteworthy pea breeder was Thomas Andrew Knight, (13) whose experiments with peas were conducted during the last decade of the eighteenth century and the first quarter of the nineteenth. From the progeny of a cross between a degenerate (rogue) pea and an unnamed gray pea evolved in due course Knight's Tall Green Marrow and Knight's Dwarf Green Marrow, two sorts from which are said to have come all wrinkled pea varieties. Knight's success in developing new varieties stimulated other hybridizers to produce new sorts. As a result the number of pea varieties became so great that it was deemed expedient to conduct variety trials in an attempt to classify them and standardize the nomenclature.

One of the first comprehensive trials was conducted in the gardens of the London Horticultural Society, later known as the Royal Horticultural Society, the results of which were published (13) in 1835. It represented the first attempt to classify, describe and compare pea varieties on the basis of trial ground observations as we do today. Subsequent reports were made in 1845, 1860 and 1872, all of which aided in a substantial manner to bring about a systematic understanding of the material. This work has been perpetuated in the Wisley trials (1) in which most modern English pea varieties have been and continue to be entered after their release from the commercial seedsmen and

private gardeners.

Peas were introduced into America very early, as many references by Sturdevant (17) will certify. Although lists of variety names were published by McMahon in 1806 (28) and Thorburn in 1830 (41), Fearing Burr in 1863 (7) was the first American garden writer to describe and compare vegetable varieties as grown in this country. When the land grant colleges were established Federal funds were made available for agricultural research. During the years prior to 1900 the maintenance and study of vegetable trials was one of the most popular projects, and as a result practically every experiment station published in bulletins and in their annual reports tabular, descriptive and comparative data concerning vegetable varieties.

Soon after the turn of the century, in cyclical fashion interest lessened in variety trials and less attention was given to varietal problems. This attitude continued until the early twenties when a concerted effort was initiated to modernize vegetable varietal information in order that plant breeders might better orient themselves concerning the available data.

In 1925 the State of New York authorized the preparation and publication of a comprehensive monograph series to be known as the "Vegetables of New York". The objects of such a study were manifold, the chief of which were the systematic organization of varietal synonymy and the

detailed description of all vegetable varieties grown in America described and compared in accordance with definite standards so that the plant breeder might become intimately acquainted with the various character manifestations, a knowledge of which is so necessary for the orderly development of improved varieties. Publications of this material on six vegetable crops have been issued (18) and "The Sweet Corn of New York" (39) will be referred to in this study.

Additional evidence of the need of accurate varietal information was indicated in 1930 when the Federal Government authorized the study, preparation and publication of the vegetable variety type books. These were meant to ascertain and describe the commercially important vegetable varieties with the view of making comparisons of new sorts. The data for four crops have been published, two (24, 35) of which are of primary interest in this treatise.

Although corn is of American origin, sweet corn was grown by the Indians to a limited extent only. Two varieties, Sweet or puckered and Black Sweet or black puckered were known by the Iroquois, and three other sorts were grown by the Mandans, Poncas, and the Pawnees. The last fifty years of the past century brought forth the gradual development of varietal nomenclature, as the total number of named varieties during the fore part of

the century possibly did not exceed ten.

Other than an occasional listing of sweet corn in the seed catalog, Burr (7) was the first worker to describe in some detail how one variety differed from another. More extensive trials were conducted by Sturtevant (38) in 1884 and his report serves as the first systematic varietal study of this vegetable up to that time. As mentioned in connection with the early varietal trials of peas, experiment station workers were also very active in determining the comparative value of the new sweet corn sorts. The most comprehensive study was conducted by New York (Geneva) Experiment Station (39), the results of which were published in 1934 as the monograph "The Sweet Corn of New York". Since the advent of hybrid sweet corn varieties, a sequel (10) to the latter serves as the most recent source of historical, descriptive and comparative information.

DISCUSSION OF TERMS

The terms variety, strain and stock may be confusing. In order to alleviate possible misunderstanding regarding the use of them some explanation may not be amiss. Work (42) gives the following definitions of these terms:

Variety: "A variety includes those plants of a given kind which are practically alike in their important characteristics of plant and product. Each variety

should be distinct in one or more prominent and significant features. Names varieties that are not distinct should be classed as strains of a recognized variety, or as mere synonyms."

Strain: "A strain includes those plants of a given variety which possess its general characteristics, but which differ from others of the variety in one important, or two or three minor respects--differences not great enough to justify a new variety name. Thus Alaska is a standard variety of pea. Superalaska is a more vigorous, larger seeded strain of Alaska...The distinction between variety and strain is based simply on degrees of difference."

Stock: "A stock represents all plants of the same parentage or pedigree. Differences between various stocks of a variety or strain could be very slight. A seed grower may maintain more than one stock of a strain or variety, each representing a single pedigree line. These may be so nearly alike as to be indistinguishable, but as long as they are separately maintained they are called distinct stocks. Frequently one has been found to be better adapted to one section than another, and by reference to stock numbers these individualities can be maintained."

It would seem rather inexpedient to refer specifically to the hundreds of variety trials which have been conducted in this country and abroad. These data have been summarized in publications already cited and therefore would have little significance in this treatise. Associated with these variety trials have been in several instances comparisons of commercial vegetable variety stocks. These usually have not been of significant value and have been criticized on the very just basis that, for example, the performance of a commercial Alaska stock A, in 1940, may have little or no relation to its performance one year hence.

The comparison of variety strains with their prototypes, however, has been recognized to be somewhat more reliable, since the expected differences are greater than are the expected differences between a variety and the several stocks of that variety. Hall (14) related in his comparison of Alaska with Alcross, (a strain of Alaska) that the yield of Alcross was equal only to the poorest producing Alaska. Similarly he found that Late Alaska was distinctly different from Alaska in season, in color of foliage, and in height and vigor of vine. Mahoney et al (25) have shown in their comparison of the Alaska strains Superalaska, Alaska Strain 5 and Maryland Alaska 126 that because strain yields fluctuate from year to year testing over a period of years was necessary to obtain a true value of any one strain with respect to yield and quality. Similar methods are advisable in conducting varietal trials for it is equally important to know how a new variety will perform with unfavorable growing conditions as it is when the growth factors are favorable.

THE PROBLEM

These characteristics of an impartial variety and strain trial are recognized, yet it has been apparent that a check one step closer to the seed source than those mentioned would be highly beneficial to the large

commercial processors. It was ascertained that in some instances thousands of dollars had been lost to the farmer and the processor because the crop produced from seed proved to be inferior in trueness to type and yield. From this experience it was reasoned that had the processor known of the lack of genetic stability of the stock a year in advance he could have cancelled his seed contract on the basis of unsatisfactory performance.

The usual method (8, 26) observed by seedsmen in growing seed is to start from single plant selections. The progenies from these selections are gradually increased until such a time that sufficient seed is available to plant in small increase blocks. These lots are meticulously rogued and every effort is made to see that every plant allowed to produce seed is like the original single plant selection. In seven or eight generations a sizeable amount of selected seed is accumulated. This is known in the seed trade as stock seed and is used by the seedsmen to perpetuate the strain or variety and also to produce seed for the commercial deliveries. Since peas have a way of gradually degenerating, progressive seedsmen continuously have new stocks in varying stages of development. When one stock becomes so badly off type that it cannot be efficiently rogued, it is discarded in favor of one of the new ones less distantly removed from single plant selections.

This situation presents an opportunity for the large processor to determine a year in advance the probable utility of his contract seed deliveries. It might be reasoned that if an exact sample was obtained of the stock seed from which the seedsman proposed to produce next year's commercial seed, it could be grown this year in the region where the commercial crop was to be grown next year and by its performance its suitability could be ascertained.

Four vegetable crops commonly grown for canning and freezing are considered in this study. Of these it is believed that peas are particularly well suited to demonstrate the feasibility of such a plan, although beets and spinach also react in a similar manner. The open-pollinated varieties of sweet corn are well suited for such a plan, although the new hybrid-inbreds and top-cross varieties are not as well suited. The latter sorts are grown almost to the exclusion of the others, thus the only recourse available is to compare one seedsman's strain with that of another. Since the first generation hybrid seed originates from the combination of two or more distinct lines, obviously the comparisons of stock seed would be impractical. Significant differences between varieties, strains and stocks of some of these vegetable crops will be indicated in the subsequent individual discussions.

THE NATURE OF ROGUES AND ROGUING

From the practical point of view, Renard (53) relates that the term "rogue" refers to any plant which does not conform to the characteristics of the variety in which it is found. Hume (20) considers as a rogue any plant in a field (of peas) which is off type or which belongs to another variety, but the term is frequently used to designate in a more technical sense a particularly degenerate type. The term "roguing" refers to the removal of these individuals at any stage of development in an attempt to keep the seed lot as true to type as possible.

There are many types and forms of rogues. In peas a rogue in a certain variety may differ from the typical plant in such characteristics as height and vigor of vine; foliage size, shape, color, texture and abundance; manner of podding; length of peduncle; pod shape and size; size, shape, color and surface character of peas; time of blossom production; nodal position of first bloom and color of flower. (26, 33, 34) Bateson and Pellew (3) refer to the well known "rabbit-eared" rogue which frequently occurs in some of the broader-leaved freezing type of peas. The plants are almost vetch-like in general appearance and have taken their name from the narrow upright stipules which gives one the impression of rabbit ears.

Brotherton (5) determined its mode of inheritance and

found it to be very unstable in the heterozygous condition and in combination with certain other genes. The type was called a mass-somatic mutation. Unfortunately most of these are heritable and continually harass the seedsmen in their efforts to furnish uniform stocks of seed. A few are vigorous growing sterile types which obviously eliminate themselves upon their demise. Most rogues, however, are frequently more prolific than typical plants and necessitate constant vigilance by the seedsman if the off type plants are to be prevented from becoming the main components of his stock.

Some rogues (4, 6, 33, 34) are more troublesome than others. Plants that produce blooms earlier than the typical plants obviously result in a certain percentage of over-mature hard seeds among the raw product. Peas which discolor the liquor are objectionable. Significant amounts of late-blossoming, rank-growing rogues contribute to the lack of uniformity and loss in yield and, at times, lead to difficulties with the grower in determining the proper stage at which the peas should be harvested. The presence of light colored peas among normally dark colored ones is particularly disconcerting to the freezing industry, for it is frequently impossible to separate the two colored lots satisfactorily.

Rogue plants are found in sweet corn stocks also, but in ordinary seedsmen's parlance are referred to as

off-types. These are usually infrequent and with present methods of seed corn production where the inbreds are observed critically there is little opportunity for them to be perpetuated. Such characteristics as uniformity of maturity, regularity of row number and arrangement, variation in kernel color, quality of the product and yield are the essential factors considered in judging the suitability of varieties, strains or stocks.

Beet strains and stocks are pretty much confined to one or two varieties in the canning industry. Rarely is a wild rogue plant found and in judging the value of various strains and stocks emphasis is placed on interior color, uniformity of root shape and size and character of the tops.

Spinach strains and stocks are rarely off type and emphasis is placed in determining the ability with which it can delay seed stalk formation. Uniformity of foliage color and size and color of stems may be significant in some instances.

ARRANGEMENT OF DISCUSSION

In order to preserve unity it seems advisable to treat each of the four crops--peas, sweet corn, beets and spinach--as separate trials. Although the trials had a common objective, obviously in many instances the methods of seed treatment, plat arrangement, note taking,

harvesting, etc., were varied to suit the crop requirements.

These data were obtained during the 1939 growing season. They were secured as the result of a cooperative investigatorship with the New York State Experiment Station at Geneva and one of the commercial canning and freezing organizations of that State. All stock seed lots discussed were submitted by commercial seedsmen upon the mutual understanding that the results were not to be published in such a form as to be advantageous to competitors. For this reason the various stocks and strains of Alaska peas, for instance, will be identified only by symbols.

PEA TRIALS

Methods and Materials

Stock seed of 48 varieties, strains and stocks of peas were submitted for the trial. Since Horsfall (19) had indicated that Alaska, Thomas Laxton, Telephone and Perfection were at times adversely affected by the red copper oxide treatment, all lots of seed were dusted with semesan at the rate of $2\frac{1}{2}$ ounces per bushel to afford equal protection against damping-off fungi. Simultaneously each lot was treated with 1 ounce of powdered graphite per bushel to assure a uniform flow of seed through the grain drill. It had been shown (2) that seed dust protectants increased the friction between seed and

drill parts which caused seed injury as well as unequal seed distribution in drilling.

Plat Size and Arrangement

The experimental plats were located on a very uniform valley soil series known as Genesee silty clay loam. It was known to be well drained and from previous crop response to have a uniformly high fertility level. The plats were 100 feet long and 19 feet 3 inches wide (3 standard drill widths) and were arranged consecutively in numerical order. The necessity of using large plats was based on the assumption that a sizeable sample was needed to be efficiently shelled by the viner. Although the significance of ample replications on most soils was recognized it was believed that two replications were adequate under the conditions of the trial. More would have been impossible to handle with the facilities available. All strains and stocks of one variety in each replication were located in adjacent plats to facilitate note taking and comparisons. The plats were arranged in 5 tiers of 20 plats in each tier. A 20-foot roadway was left between each tier of plats and around the periphery of the entire trial field. To further expedite the critical observation of each lot, allowance was made for a 4-foot path between each plat.

Soil Treatment

The area was fall-plowed. In the spring it was fitted with a dic as soon as the land could be worked. Several days before planting the entire area was fertilized with a broadcast application of 350 pounds of 4-16-4 commercial fertilizer.

Seed Drilling

The plats were planted April 29, 1939 with a standard 11-tube McCormick-Deering grain drill equipped with a rate-of-seed-drop regulator. The rate of seeding varied with the size of seed for it is generally recognized (25) that to obtain a comparable stand, more seed must be sown of the large-seeded varieties like Telephone, World's Record, Thomas Laxton, et. than of the small seeded varieties like Alaska and Surprise. All lots were divided into 4 size-classes, the smallest seeded ones being sown at the rate of 4 bushels per acre and the largest ones at 5 bushels per acre.

Mahoney et al (25) have shown that there is no correlation between yield and stand when it varied from 17.5 to 22.2 plants per yard for sweet varieties or from 23.6 to 30.2 plants per yard for Alaskas. Although the final stand in this trial was not so thick, comparable variations did not exceed these. When the plants were 2 to 3 inches high 6 five-foot counts in each lot were made to determine the average number of plants per foot of drill row. These

data are recorded in Tables VI and VII in comparison to the laboratory germination percentage. In all cases the field stand was considered to be normal for that growing section. Occasionally one or more of the drill tubes failed to function properly and this resulted in a few drill-row skips. The number and length of these was determined and adjustments made in calculating the yields of each replication. Since there were thirty-three 100-foot drill rows in each replication, 3% of the actual yield was added to the total for each 100-foot drill-skip.

Environmental Conditions of the Growing Crop

The pea crop grew under moderately favorable climatic conditions. Although the May rainfall was somewhat deficient, the June precipitation was nearly normal. High temperatures preceding the harvest of the late varieties were particularly deleterious to Perfection and the dwarf freezing varieties.

Two types of mosaics contributed to the plant injury. One known as alfalfa virus #2 (30, 31, 37) was apparently transmitted by aphids from alfalfa plants. It is particularly virile in Perfection peas and affects the plants when 3 to 4 inches high. It produces a dwarfing effect, crinkled leaves and usually results in the death of the terminal growth. The plant revives in about

a week and resumes growth from lateral buds. Obviously this retards the natural rate of development and apparently brings about delayed blooming and maturity of the peas. It may, therefore, be a contributing factor to unevenness of maturity at harvest time. The second type, known as pea mosaic No. 1, (31, 37) was transferred from clover plants. This was especially prevalent on the Telephone peas. It did not manifest itself until after most of the pods had been formed. The affected plants became deformed and somewhat mottled in appearance, and the pods became misshapened, twisted and failed to mature peas. Certain varieties and strains were affected by one or both of these types in varying degrees of severity, the relative amounts of which are considered in the individual varietal accounts.

The lack of adequate moisture during the month of May brought about favorable conditions for the manifestation of the pea disease commonly known as root rot. Several organisms are known (15) to cause root rots, the ones most frequently associated with the malady being *Aphanomyces euteiches*, *Corticium vagum*, *Pythium ultimum*, *Ascochyta pinodella*, *Mycosphaesella pinodes*, and *Fusarium martii*. Any one or all may contribute to the general effect recognized by growers as pea root rot. These organisms bring about a rotting of the roots which in severe cases extends to the second and third nodes, killing

the epidermal and cortical tissues. Since in the pea vascular system (16) the root-stem transition is not completed in the short hypocotyl but extends through the first three internodes, fibre vascular bundles are liable to injury. In seasons of plentiful rainfall, the diseased plants usually are not seriously affected, but during a prolonged dry spell following normal precipitation, the injured root systems are not able to extract adequate moisture and the plants gradually turn yellow, dry up and die.

Apparently some varieties and stocks are more susceptible to injury than others. Several stocks of Thomas Laxton were affected in varying degrees, as will be brought out in the individual discussions. The fact that identical response was observed in both replicates indicated that a weakness did exist and that the appearance in one part of the field was not coincidental. The normal growth of *Fusarium* wilt-resistant varieties, stocks and strains as well as those not resistant was considered evidence that the malady was not *Fusarium* wilt.

Systematic Data

Periodic observations were made from the time the plants were three inches high until harvest. During this time notes were taken to determine the blooming date, the number of early and late blooming plants, the type and

number of other rogue plants, the general uniformity of the stocks and the trueness to type of population as a whole. A critical observation was made of 20 plants selected at random from each plat as an additional method to determine trueness to type. All interpretations of these data were based on descriptions of standard varieties written by the Federal Government (35) and by the State Experiment Station of New York (18). New varieties were compared with descriptions secured from the originators. These data tabulated in Tables VIII and IX, included height of vine, number of nodes, length of internodes, first bloom node, length of peduncle, number of peas per pod and the number of pods per plant.

Harvesting and Vining Technique

As the various lots approached edible maturity they were inspected daily by an experienced field man who advised when the plats had reached their maximum development for most efficient utilization. In the morning of the prescribed date, the pea plants were pulled and placed in two wind-rows. It was believed that this method of harvesting eliminated the variable which might have been brought about by cutting with a mowing machine. Each lot was trucked to the vining shed where the peas were vined. The same viner was used for all lots and every effort was made to feed the machine at a uniform rate. The only

change in the operation of the viner was incident to the type of pea being vined. The commercial practice was to increase the speed of the beating cylinder when small, tight-podded canning varieties were being vined. It was necessary, however, to use a reduced speed in vining large puffy-podded sorts in order to prevent undue cracking and bruising of the peas. After the last of each lot had been fed into the viner the machine was allowed to run 10 to 15 minutes in order to clean it. The weight of the shelled peas was then recorded and later calculated as pounds of shelled peas on the acre basis for each lot. These data are recorded in Tables XII and XIII.

Determination of Sieve Sizes

An essential feature in judging peas is the relative proportion of the various pea sieve sizes produced. To determine this the entire lot was thoroughly mixed and a gallon sample secured. This was washed to remove viner juice and a weighed portion divided into its component parts by the use of the various standard sieve size screens. The weight of each size was secured and the percentage of the whole calculated. These data are recorded in Tables X and XI.

Tenderometer Readings

The principles of the pea tenderometer have been explained by McKMartin (27) and Smith(36). In brief it

is a method of determining the relative toughness or tenderness of a standard quantity of shelled peas. It measures the toughness of the peas in accordance with amount of pressure necessary to shear a definite volume of peas. Since the application of pressure is automatic and entirely mechanical the human variable factor does not become an influence. There has been shown to be a definite correlation between the readings and the quality of the product, a fact of considerable practical significance to the canning and freezing industries. It has enabled the field men to check their judgement with an unbiased reading, and as a consequence has increased the uniformity and the quality of the season's pack.

Although other methods of determining quality of both the raw and the canned samples have been available (22) they have not been found adapted for practical work under factory conditions because of the time necessary to make the determinations. The tenderometer does not have this disadvantage and therefore is particularly valuable for measuring quality differences among varieties, fertilizer treatments, time of harvest, etc.

Samples in triplicate were taken from each lot in this trial at the same time and in the same manner described previously. The average reading of the 3 samples was used as an index of maturity at the time each lot was harvested. These data are also included in Tables X

and XI. Quality standards as measured by the tenderometer are cited in Table XIV. Several instances are recorded which appear to have resulted from faulty judgment in determining the proper harvest period. As will be brought out in the varietal discussions, inclement weather and disease were contributing factors beyond control.

Quality Determinations

Some varieties were processed separately either by freezing or canning. Only those varieties which were relatively new were treated in this manner, since the quality of the standard varieties was well known. Ten lots were frozen by the Birdseye commercial quick freezing process and stored in the zero-degree-F. room. At the end of the packing season these were brought out, cooked and their suitability for commercial use determined on the quality basis. This grading was done by qualified experts on frozen peas.

Two lots of peas were canned separately and later graded by official graders of the cooperating organization. The results are mentioned in the varietal comparisons to follow.

Color Determinations

Direct comparisons were made of foliage, pod and pea color of all varieties with the aid of Maers and

Paul's "Dictionary of Color" (23). No attempt was made to distinguish between stocks of a given variety for no significant difference was noticeable to the human eye. Its chief value was intended as a method of comparing the color of new varieties with the standards. All observations were made in the day under clear north sky light without sun glare. These data are presented in the form of color plate numbers applicable to the pods, peas, and leaflets and are recorded in Table XV.

Basis for Rating

In concluding the discussion of each lot, a comparative rating from excellent to poor was assigned in accordance with the value of the stock in respect to trueness to type and freedom from impurities. Each was also graded as to its commercial value, from A to indicate superiority to D to indicate unsuitability. In several instances lots were given a stock purity rating of excellent, but because of poor quality, poor adaptation or susceptibility to disease, were not considered suitable for commercial production.

Table I

Varieties, Strains and Stocks of Freezing Peas

Flat No.	Variety	Stock	Lot. No.
16.	Glacier	A	H38596
17.	Thomas Laxton	R	1462
18.	Thomas Laxton	C	M-13026
19.	Thomas Laxton	W	60-0125
20.	Thomas Laxton	A	38601
21.	Thomas Laxton	G	6355
22.	Thomas Laxton	M	1811
23.	Thomas Laxton	F	97191
24.	Thomas Laxton	S	87841
25.	Thomas Laxton	N	411-76
26.	Thomas Laxton	L	252
39.	S-54	W1	X071
27.	Gradus	Ri	963-2235
28.	Improved Gradus	R	1258
38.	No. 57	W	1797
53.	Miracle	S	13739
30.	President Wilson	A	55139
31.	Morse's Market	F	10040
45.	Gilbo	R	1604
46.	Stratford	C	M-05511
47.	Albion	A	73014
48.	Alderman	C	M-04525
49.	Telephone	R	1183
50.	Telephone	W	6-071
51.	Telephone	G	7219

DISCUSSION OF VARIETIES, STRAINS AND STOCKS

FREEZING PEAS

Thomas Laxton Group

16. Glacier Stock A--Lot No. H--38596

Glacier is a Fusarium-resistant strain of Thomas Laxton, which also is apparently highly resistant to pea root-rot. On the basis of the sieve size grades and the tenderometer readings of the ungraded samples, it attained the fancy stage of maturity about 1 day earlier than Thomas Laxton. It conformed to type remarkably well as neither off-type plants, other than an occasional late blooming rogue, nor off-type pods were observed. It equaled the high yield of Thomas Laxton, stock S having produced at the rate of 4356 pounds of shelled peas per acre. Since the tenderometer reading was 92 in comparison to that of 85 for Thomas Laxton S, it is highly probable that when harvested at a comparable stage it would yield somewhat less. Forty-one per cent of the peas were number 6's with a tenderometer reading of 103. Since the 4's and 5's gave an average test of 84 it lowered the test of the composite sample just within the fancy grade. Although the strain is very similar in most respects to a good stock of Thomas Laxton, the frozen product was judged to be slightly inferior to that variety in quality.

particularly in respect to flavor and sweetness.

Stock: excellent Quality: moderately good

Commercial rating: B; provisionally recommended;
especially on Fusarium wilt and root-rot
infected areas.

17. Thomas Laxton--Stock R--Lot 1462

This was one of several Thomas Laxton stocks that indicated a decided susceptibility to injury by the various root-rot producing organisms. Although no evidence of injury was observed for 2 weeks after emergence, the effects became more and more noticeable as the season progressed. At harvest time, pre-mature because of drying vines, fully 50 per cent of the plants were dead. Observations in relation to varietal type and purity obviously were not comparable to that made of stocks which escaped injury. Of those plants that did survive, considerably less than 1 per cent were late blooming, vigorous rogues. Neither was it possible to make just comparisons with root-rot tolerant stocks of the same variety in earliness of maturity, yield, or the relative pea sieve size percentages. The stock was considered sufficiently free of off-type plants to be commercially acceptable.

Stock: good. Quality: excellent.

Commercial ratings: B; provisionally recommended,
suitable on areas in which root rot is not a
factor.

18. Thomas Laxton--Stock C--Lot M-13026

The stock was one of three most severely injured by root-rot. It was necessary to harvest the plants several days earlier than their normal maturity for fully 75 per cent of the plants were dead or dying, the pods of which were at varying stages of shriveling. It was not possible to determine the purity of the stock, although the same stock submitted the previous year proved to be an excellent one. No equitable comparison in season, yield, or pea sieve size could be made. The trial did, however, indicate rather emphatically that the stock was not suited to areas even mildly infested with root-rot.

Stock: questionable; basis 1938 test, excellent.

Quality: excellent.

Commercial rating: A to D; not recommended on root-rot infected areas--otherwise satisfactory.

19. Thomas Laxton--Stock W--Lot 6-0125

Distinct foliage color differences were observed between the plants in this population. It was estimated that about 30 per cent of the plants were nearly as light green as those of Gradus, similar to the original Thomas Laxton foliage color, and the remainder were typical. Subsequent examination indicated that the lighter colored plants bloomed and matured a day or two earlier than the typical Laxton plants. No difference in pod shape or color were

observable. The stock was seriously affected by root-rot and at harvest time, necessarily premature, about 60 per cent of the plants were dead or dying. Of those that withstood the malady about 1 per cent were very vigorous, late Telephone-like rogues. Although the yield data, pea sieve size percentages and tenderometer readings were recorded they were not considered comparable to those of stocks which escaped root-rot injury.

Stock: poor. Quality: excellent.

Commercial rating: C to D; not recommended.

20. Thomas Laxton--Stock A--Lot 38601

The stock gave every indication of being an excellent one from the standpoint of purity. As the season progressed, however, more and more plants became affected by root-rot and at harvest time, somewhat premature, about half of the plants were dead or dying. Those that did not succumb proved to be true to type, uniform in rate of blooming and without evidence of genetic instability. Comparable data for yield, pea sieve sizes and tenderometer readings were not obtained.

Stock: excellent. Quality: excellent.

Commercial rating: A to D; not recommended for root-rot infested areas--otherwise satisfactory.

21. Thomas Laxton--Stock G--Lot 6355

Some indication of genetic instability was shown by the presence of about 1 per cent late very vigorous Telephone-like rogues and an occasional plant which produced off-type, distinctly curved, narrow pods with somewhat smaller peas. Since these plants were similar in foliage type and blossoming habit and only slightly taller than typical Thomas Laxton plants, it represented a rogue type which would be particularly difficult to remove in the seed increase blocks. The stock was moderately susceptible to root-rot injury and at harvest time about 25 per cent of the plants were dead or dying. This reacted in the yield, and although it was somewhat greater than obtained from the very susceptible stocks, it was considerably less than obtained from root-rot tolerant stocks of Thomas Laxton.

Stock: fair. Quality: excellent

Commercial rating: B- to C; provisionally recommended except for root-rot infested areas.

22. Thomas Laxton--Stock M--Lot 1811

For a sample of stock seed this lot contained too many late blooming vigorous rogues for satisfactory commercial performance. Fully 3 to 4 per cent of the population were of this type and without critical roguing in the seed increase field, the commercial seed

deliveries would, in all probability, produce a still more reguish population. Although these late maturing sorts in a commercial field would not seriously affect the quality of the product, their presence would render serious competition to normal plants in respect to soil moisture and soil nutrients. This factor is doubly significant in view of the fact that the normal plants were the least vigorous of any Laxton stock submitted as indicated by the plant height in Table VIII. The stock was moderately susceptible to root-rot injury for at harvest time about 25 per cent of the plants were dead or dying. This obviously reacted in the yield, pea sieve sizes and tenderometer readings.

Stock: rather poor. Quality: excellent.

Commercial rating: C-; not recommended.

23. Thomas Laxton--Stock F--Lot 97191

Two types of rogue plants were observed in this stock. About 1 to 2 per cent of the plants were late blooming, vigorous growing, Telephone-like rogues, and an occasional "rabbit-eared" plant was found. The stock was slow to show the characteristic root-rot symptoms but as the season progressed the injury became more and more evident. Premature harvest was necessary, at which time about 25 per cent of the plants were dead or dying. Because of this handicap, the data for yield, pea sieve

sizes and tenderometer readings were not considered comparable.

Stock: fair. Quality: excellent.

Commercial ratings: B-; provisionally recommended,
but not for root-rot infested areas.

24. Thomas Laxton--Stock S--Lot 87841

The foliage color of this stock was rather variable and in general resembled that of Laxton stock W. Two distinct shades of green were evident, about half of the plants of which were typical medium green (23L6) (see Table XV) of Thomas Laxton and the remainder similar to the lighter green (22L6) of Gradus. Although there appeared to be a slight unevenness of maturity, it could not be associated with either one of the color types as was the case with Laxton stock W. No difference in pod types, pea size or pea color was discernible. Less than 1 per cent of the plants were late blooming rogues. The stock was apparently resistant to root-rot injury, and was one of the three Laxton stocks to emerge at the end of the test with little or no evidence of being adversely affected by the malady. It was the most productive of any Thomas Laxton stock in the trial having produced at the rate of 4356 pounds of shelled peas per acre. The composite sample of these had an average tenderometer reading of 88, 84% of which were sieve sizes 5 and 6.

This is highly indicative of uniform maturity and good quality.

Stock: moderately good. Quality: excellent.

Commercial rating: B ; recommended, especially for
root-rot infested areas.

25. Thomas Laxton--Stock N--Lot 411-76

The stock was an exceedingly vigorous one and was apparently resistant to root-rot injury. Laxton stock L was the only other one to equal it in plant vigor, both of which produced plants averaging 34 inches high. Two types of rogues were observed. The most numerous were the tall, late Telephone-like rogues to the extent of 2 to 3 per cent of the population. The other was an occasional roguish "rabbit-eared" type which matured in season with the typical Laxton plants, the peas of which were much smaller and distinctly paler green in color. This type of rogue is considered particularly troublesome in packing peas for freezing. The variation in color is extremely objectionable, since the presence of a small percentage of light peas would be rather conspicuous. Among the various Thomas Laxton stocks in the test this one ranked third in yield having produced at the rate of 3609 pounds of shelled peas per acre. Seventy-two per cent of these classified as 5 and 6 sieve sizes, the composite of all sizes having a tenderometer reading of

78. This indicated that the plats might have remained in the field a day or two longer, in which case a larger yield would have materialized which might still have been included in the fancy grade.

Stock: rather poor. Quality: fair.

Commercial rating: C; not recommended, except in areas subject to root-rot injury.

26. Thomas Laxton--Stock L--Lot 252

With the exception of a few late blooming Telephone-like rogue plants, considerably less than 1 per cent of the population, this stock was a very good one. It possessed excellent vigor, had the highest average number of usable pods per plant of any Laxton stock in trial and was apparently highly resistant to root-rot injury. It ranked second in yield having produced at the rate of 4211 pounds of shelled peas per acre. These graded 85 per cent 5 and 6 sieve sizes and the composite sample of all sizes gave a tenderometer reading of 85.

Stock: good. Quality: excellent.

Commercial rating: A; recommended, especially for root-rot infested areas.

39. S-54--Stock W1--X071

This was an experimental hybrid included in the trial to determine its suitability for freezing. Nothing was known about its parentage but subsequent observation

indicated that it was more like Thomas Laxton than any other variety in trial and for that reason is included in the Laxton group for ease of comparison. It proved to be much less uniform in plant height, maturity and pod type than any stock of Thomas Laxton. It seemed to have two rather distinct blooming cycles and on the whole lacked the proper concentration of pod production necessary for uniform maturity. The stock was exceedingly "ragged" in appearance due to the presence of 5 to 6 per cent of very late, Telephone-like rogues. The pods were slightly longer and somewhat more bluntly rounded at the tips than were those of Thomas Laxton. It was, however, apparently resistant to root-rot and produced at the rate of 3381 pounds of shelled peas per acre. In order to avoid the development of hard peas, the plants were harvested when the first set of pods had attained optimum development; thus there were a substantial percentage of immature peas in the composite sample. This graded 79 per cent 5's and 6's and gave a tenderometer reading of 85.

Stock: poor. Quality: rather poor.

Commercial rating: D; not recommended.

Gradus Group

27. Gradus--Stock R1--Lot 963-2235

The population of this lot could hardly be called

a stock of Gradus, for it consisted of a gross varietal mixture. At least 35 per cent of plants were typical Thomas Laxton in plant and pod characteristics which matured slightly earlier than the Gradus plants. Otherwise the lot was free of rogues and showed little or no indication of root-rot injury. Because of the high percentage of Laxton plants the plants were not harvested as late as they would have been had the stock been pure Gradus. In spite of this precaution, a tenderometer reading of 93 was obtained.

Stock: poor.

Quality: not determined because of varietal mixture.

Commercial rating: C-; not recommended.

28. Improved Gradus--Stock R--Lot 1258

This strain of Gradus proved to be an exceptionally uniform and productive one. It was 4 days later than Thomas Laxton. It had the highest percentage of double-podded plants of any freezing variety, strain or stock in trial, the majority of which were born as doubles on the basal 3 blooming nodes. Although all blossoms were produced as doubles, the upper pods that set were limited in most cases to one per node. Many of the plants were indeterminate in growth habit and continued to produce blossoms until harvest time. This variety was apparently highly resistant to root-rot

although it was somewhat susceptible to aphid injury. It was the most productive lot in trial having yielded at the rate of 5870 pounds of shelled peas per acre. Although these were larger than those of Thomas Laxton (72 per cent 6's) the composite tenderometer reading was only 87. Competent judges considered the cooked frozen peas slightly lighter and brighter color than those of Miracle, but uniform and of excellent flavor.

Stock: excellent. Quality: very good.

Commercial rating: A; recommended.

38. Number "57"--Stock W--Lot 1797.

In the fore part of the growing season this unknown lot gave every indication of being equally as desirable as Improved Gradus. As the season progressed the stock became more and more ragged and at harvest time about 10 per cent of the plants continued their growth and blooming in an indeterminate manner. It definitely lacked the proper concentration of bloom necessary for a one-harvest variety. A more critical examination indicated that the basal second and third bearing nodes produced slab pods, or at best, pods which contained 1 to 3 peas each. This reacted in reduced yield as evidenced by the datum in Table XIII, the stock having produced but 2116 pounds per acre. Sixty-nine of these were 5's and 6's and the composite sample of all sizes registered a tenderometer

reading of 92. The stock was not affected by root-rot.

Stock: poor. Quality: poor.

Commercial rating: D-; not recommended.

53. Miracle--Stock S--Lot 13739.

On the basis of foliage color and general plant type, Miracle probably can be included in this group for the purpose of this discussion, although it is later in season and has distinctly darker green pods and peas (Table XV). The plants were as tall as those of Improved Gradus and 5 inches taller than the most vigorous stocks of Thomas Laxton. The pods were nearly as long as those of Alderman, were distinctly darker green in color, not as plump and had peas which were slightly more oblong in shape, slightly smaller and distinctly brighter, more attractive green in color. The stock was uniform in plant and pod characters and was apparently free from rogues. It produced 3230 pounds of shelled peas per acre with a tenderometer reading of 86. Of the composite sample, 72 per cent of the shelled peas were 5's and 6's. Judges considered it to be excellent in flavor, color, and texture and were of the opinion that it was one of the most promising new peas introduced since Thomas Laxton.

Stock: excellent. Quality: excellent.

Commercial rating: questionable; recommended for

further trial to determine its commercial possibilities.

Dwarf Group

30. President Wilson--Stock A--Lot 55139

For several years this variety has received consistently high quality ratings as a frozen product. It has been criticized, however, for its unevenness of maturity, inconsistency in yield from year to year and its dwarf habit of growth. This stock proved to be a very good one and has given every indication of being a significant improvement over previously offered stocks. Other than the occurrence of an occasional late blooming plant the stock was free of regues. No indication of root-rot susceptibility was observed, although in the seedling stage about 10 per cent of the plants were affected by a mosaic caused in all probability by alfalfa virus number 2 (37) which severely stunted the growth, and killed the growing point. These plants resumed growth a few days later from the uppermost lateral buds. It attained prime maturity in 62 days, 4 days later than Thomas Laxton, a fact of significant importance in view of the need for a good quality, intermediate-maturing variety between Thomas Laxton and Telephone. Among the dwarf-growing varieties it ranked third in yield having produced 3713 pounds of shelled peas per acre with a

tenderometer reading of 87. The peas were large, 82 per cent of which were 5's and 6's. Its dwarf-vining habit will limit its production to those areas with high fertility levels and adequate rainfall.

Stock: very good. Quality: excellent.

Commercial rating: A; provisionally recommended--
should not be grown on soils with average
fertility levels.

31 Morse's Market--Stock F--Lot 10040.

This dwarf growing variety attained commercial maturity in 65 days, a week later than Thomas Laxton and 5 to 6 days earlier than Telephone. About 2 per cent of the plants were injured by alfalfa virus number 2 which delayed the bloom on the affected plants. Other than an occasional tall, late blooming rogue the stock was free of off-types. No indication of root-rot injury was observed. Since the pods were somewhat flattened, similar to Laxtonians, the peas were rather oblong in shape and in this respect were objectionable to commercial processors. It produced 4501 pounds of shelled peas per acre having a tenderometer reading of 95. This slightly exceeded the highest yielding Thomas Laxton stock. Seventy-two per cent of them were 5's and 6's. It was considered fair in quality but of doubtful value for commercial freezing.

Stock: very good. Quality: fair.
Commercial rating: C ; not recommended.

45. Gilbo--Stock R--Lot 1604

Apparently a change has been made in the pod type of this variety for in previous trials it had been classified with the varietal group of Stride peas. On the basis of this trial it conformed more closely to the Strategem-Dwarf Alderman varietal group both in pod conformation and the oblong shape of the shelled peas. The variety was rather susceptible to the crinkly leaf mosaic caused by alfalfa virus number 2, 15 to 20 per cent of the plants being affected. No evidence of root-rot injury was observed and only an occasional off-type plant was found. It was the most vigorous of the dwarf-growing varieties having attained an average vine growth of 28 inches. It was the lowest yielder among the 4 dwarf varieties and produced 3381 pounds of shelled peas per acre. The tenderometer reading of 97 indicated that the variety was harvested at the last possible moment in order to be classed as fancy peas. Eighty-two per cent of the peas were included in sieve sizes 5 and 6.

Stock: very good. Quality: moderately good.
Commercial rating: B-; provisionally recommended
for further trial--not for commercial adoption.

46. Stridelong--Stock C--Lot M-05511

This lot did not conform in pod or pea characteristics to the varietal Stride group as in former trials, although the plants were typical. It was a very good stock for only an occasional late blooming Telephone-like rogue was observed. About 10 per cent of the plants were injured by the alfalfa virus number 2 but no indication of root-rot damage was indicated. The change in pod type from the expected puffy type typical of Stride caused a delay in harvesting. This was indicated by the high tenderometer reading of 105 which automatically eliminated it from the fancy grade to the M grade or second fancy. The high yield of 4626 pounds of shelled peas per acre, therefore cannot be considered comparable to those varieties and stocks whose product did conform to the quality standards. This unquestionably altered the quality rating for it was judged unsatisfactory for commercial freezing.

Stock: very good. Quality: questionable.

Commercial rating: C; recommended for further trial--not for commercial adoption.

Telephone Group

47. Alderman--Stock A--Lot 73014.

It is exceedingly difficult to detect off-type

rogues in this group because of the vigorous vine growth produced. This stock was quite uniform in all respects, and only an occasional late blooming rogue was observed. About 2 or 3 per cent of the plants in the seedling stage were injured by alfalfa virus number 2, and as with all members of this group, the stock was susceptible to pea mosaic virus number 1, the enation type. It was the largest producer of the group having yielded 3340 pounds of shelled peas per acre with a tenderometer rating of 80. The composite shelled pea sample included 79 per cent sieve sizes 5 and 6.

The quality of Alderman and Telephone peas is not equal to that of Thomas Laxton and the only excuse for using them is that the late season in which they mature has enabled the packer to obtain the necessary spread of the raw product.

Stock: excellent. Quality: fair.

Commercial rating: A; recommended.

48. Alderman--Stock C--Lot M-04525

Four types of rogues and off-type plants were found in this stock. One type produced Laxton-like pods; one produced small, narrow, slender pods containing small peas; somewhat less than 1 per cent of the plants were early bloomers and an occasional very late and vigorous rogue was observed. Although the total percentage of

all mixtures was probably not very high, their presence was indicative of a genetic instability which might be more serious in the commercial seed produced from this stock. About 4 per cent of the seedling plants were injured by the alfalfa virus number 2 and as the plants approached maturity some indication of the stock's susceptibility to pea mosaic number 1 was observed. It was one of the least vigorous stocks and the only one in the group which did not produce at least some of its pods in doubles, a fact which may have contributed to its low yield. The stock produced 2842 pounds of shelled peas per acre with a tenderometer value of 88, 82 per cent of which were included in sieve sizes 5 and 6.

Stock: poor. Quality: fair.

Commercial rating: C; not recommended.

49. Telephone--Stock R--Lot 1185.

The stock contained about 1 per cent late vigorous off-type plants but otherwise was free of impurities. About 5 per cent of the seedling plants were injured by the alfalfa virus number 2, and about a week before harvest time 25 to 30 per cent of the plants were observed to be very susceptible to pea mosaic number 1. The stock was also very susceptible to heat injury and at harvest time fully 10 per cent of the plants had "fired" or

turned brown from scorching. Its bearing habit was such that it produced very few double pods to the node. These factors were, in all probability, contributory to the low comparative yield of 2800 pounds of shelled peas per acre. These gave a tenderometer reading of 95 the composite of which included 82 per cent sieve sizes 5 and 6.

Stock: moderately good. Quality: fair.

Commercial rating: B-; provisionally recommended, although of questionable adaptation due to susceptibility to heat injury.

50. Telephone--Stock W--Lot 6-071

This stock was very susceptible to the seedling stage of crinkle leaf mosaic caused by alfalfa virus number 2, fully 25 to 30 per cent of the plants being thus affected. This severe injury probably accounted for the irregularity in blooming rate of otherwise typical plants. In addition to the explainable variation in rate of blooming, 3 to 4 per cent of the plants were overly vegetative, rogue-like in appearance many of which were barren. These, of course, would eliminate themselves in the course of commercial seed production but their presence is not only indicative of genetic instability but also offers serious competition for the normal plants in the stock. The stock was very susceptible to pea mosaic number 1. It ranked third in yield having produced 2966

pounds of shelled peas per acre with a tenderometer reading of 88. The fact that 40 per cent of the normal plants produced their pods as doubles and singles is probably indicative of the potential yielding possibilities of the stock when purified.

Stock: rather poor. Quality: fair.

Commercial rating: C ; not recommended.

51. Telephone--Stock G--Lot 7218.

Although 35 to 40 per cent of the plants were stunted and the growing points killed by alfalfa virus number 2, the stock was only slightly susceptible to pea mosaic number 1. Only an occasional late blooming overly-vegetative plant was found and no further evidence of impurity was indicated. It produced the shortest vine growth of any stock in the group, but 43 per cent of them produced their pods as doubles or as doubles and singles. It was the second most productive stock having yielded at the rate of 3070 pounds of shelled peas per acre. These gave a tenderometer reading of 90, 82 per cent of which were included in sieve sizes 5 and 6.

Stock: very good. Quality: fair.

Commercial rating: B ; recommended.

TABLE II

Varieties, Strains and Stocks of Canning Peas

Plot No.	Variety	Stock	Lot No.
2.	Alaska	A	H 38532
3.	Alaska	G	5565
4.	Alaska	W	5-920
5.	Alaska	M	1823
6.	Alaska	C	H-90136
8.	Superalaska	C	H-00251
9.	Superalaska	N	28-57
10.	Surprise	A	H-377686
11.	Surprise	G	5920
12.	Surprise	R	1533
13.	Surprise	W	2245
14.	Wisconsin Early Sweet	R	7576
15.	Wisconsin Early Sweet	C	193
32.	Wisconsin Penin	W	6-0105
33.	Improved Wisconsin Penin	C	H-08026
34.	Pride	A	73117
35.	Chief	R	1180
36.	Climax	R	7433
39.	Perfection	A	73047
37.	Perfection	C	H-6410
40.	Perfection	G	3556
41.	Perfection	M	A7-21
42.	Wisconsin Merit	D	707

CANNING PEAS

Alaska Group

2. Alaska--Stock A--Lot H-58332

For the greater part of the season very little difference could be detected between the various stocks of this variety. As they approached canning maturity, however, the presence of overly-vegetative rogues could be readily observed. This stock was a very good one and contained only an occasional late off-type plant. It was the most productive stock among the Alaskas, having yielded 3257 pounds of shelled peas per acre with a tenderometer reading of 114. The quality standards in respect to firmness of canning peas are somewhat lower than for freezing peas. Reference to Table XIV indicates therefore that a reading of 114 for Alaska peas classifies this stock sample as extra standard grade, i.e., intermediate in quality. Had it been harvested a day earlier it, in all probability, would have been graded as fancy. Sixty-eight per cent of the composite shelled pea sample were included in sieve sizes 3 and 4.

Stock: very good.

Commercial rating: A; recommended.

3. Alaska--Stock G--Lot 5565

The stock lacked the proper blooming concentration of a well bred line. About 2 to 3 per cent of the plants were late blooming rogues and an occasional "rabbit-eared" plant was found. It produced at the rate of 2996 pounds of shelled peas per acre having a tenderometer reading of 103. Sixty per cent of the composite sample were 3's and 4's.

Stock: fair.

Commercial rating: B-; provisionally recommended.

4. Alaska--Stock W--Lot 5-920

Other than the occurrence of about 1 per cent late blooming rogues, the stock appeared to be satisfactorily pure for commercial production. It produced at the rate of 3008 pounds of shelled peas per acre having a tenderometer reading of 105. Sixty-one per cent of the composite sample were 3's and 4's.

Stock: Moderately good.

Commercial rating: B; recommended.

5. Alaska--Stock M--Lot 1823

More late blooming rogue plants were present in this stock of Alaska than any other. At least 3 to 4 per cent were of this type, the presence of which rendered the lot exceedingly ragged in appearance. The stock produced 2987 pound of shelled peas per acre having a tenderometer

value of 110, thereby indicating that the plot probably should have been harvested a day earlier. This, together with the fact that 58 per cent of the plants produced their pods as doubles or as doubles and singles probably accounts for the good yield in spite of the high rogue count.

Stock: rather poor.

Commercial rating: C; not recommended unless other seed supply limited.

6. Alaska--Stock C--Lot M-90136

This stock was an excellent one in every respect. Not more than 2 or 3 late blooming rogues were observed in the 20th acre plat, and no evidence of off-type pods was indicated. It yielded 3008 pounds of shelled peas per acre having a tenderometer reading of 115. This indicated that the plats were harvested a day late for the fancy grade. This was further substantiated by the slight increase in the size of peas, 69 per cent of which were included as 3's and 4's.

Stock: excellent.

Commercial rating: A; recommended.

6. Superalaska--Stock C--Lot M-00251

Superalaska is a tall vigorous strain of Alaska which was developed from a rogue plant selected in a field of

commercial Alaskas. It averaged 2 to 3 inches taller than most Alaska stocks although the Alaska stock M equalled that height. The pods are somewhat more puffy than true Alaska and unless watched carefully might be declared ready for harvest too early for maximum yield. This stock was rather ragged in appearance and had about 2 per cent late blooming overly-vegetative plants as well as an occasional off-type and unrelated rogue. It produced a lower yield than any regular stock of Alaska. This amounted to 2655 pounds of shelled peas per acre with a tenderometer reading of 103. The composite sample included 72 per cent 3's and 4's and 6 per cent number 5's. Since the tenderometer reading and sieve size grading indicated that the variety was harvested at the correct time, it is believed that the lower yield than Alaska is significant.

Stock: fair.

Commercial rating: C; not recommended.

9. Superalaska--Stock E--Lot 28-57

This lot proved to be a stock of regular Alaska rather than one of Superalaska as the name would indicate. It was one of the shortest vined Alaska stocks in trial but was exceptionally uniform in blooming habit and general appearance. Only an occasional overly-vegetative rogue was evident. On the whole it seemed to lack the

vigor of the other Alaska stocks although it was well podded. It produced 2865 pounds of shelled peas per acre having a tenderometer reading of 101. The composite sample included 65 per cent of the peas in sieve sizes 3 and 4.

Stock: very good.

Commercial ratings: B; recommended on assumption that it will be renamed correctly.

Surprise Group

10. Surprise--Stock A--Lot H-37X686.

The most characteristic feature of this stock was its lack of proper blooming concentration. Three to four per cent of the plants produced the majority of their blossoms several days after the peak blooming period of the majority had passed. These plants were somewhat more vigorous growers than typical Surprise plants but not as extremely vegetative as the late blooming rogues observed in Thomas Laxton. Apparently the Surprise stocks were all harvested a day or two early, for tenderometer readings were well below the maximum allowance. This stock produced a yield of 3983 pounds of shelled peas per acre with a tenderometer reading of 92. Although the plants were harvested a day later than the other 3 stocks, it had the lowest percentage of sieve

size number 6 peas and the largest percentage of number 1's. These data are interpreted to mean that irregularity in maturity as well as premature harvesting were both contributing factors to low yield.

Stock: fair.

Commercial rating: B-; provisionally recommended.

11. Surprise--Stock G--Lot 5920.

The stock contained about 2 per cent late vigorous off-type plants, many of which were not the usual rogues commonly found in Surprise peas but were distinct Telephone-like plants. Sixty per cent of the plants in this stock produced their pods as doubles or as doubles and singles which is an indication of its potential yielding possibilities when the undesirable rogues have been eliminated from the line. It produced at the rate of 4294 pounds of shelled peas per acre with a tenderometer value of 97. The composite sample included 55 per cent of the peas in sieve sizes 5 and 6.

Stock: fair.

Commercial rating: C ; not recommended, but should be submitted for further trial.

12. Surprise--Stock R--Lot 1585.

There was very little evidence of unevenness of maturity and only an occasional off-type plant could be found. It gave every indication of being a well bred

stock. It produced at the rate of 4169 pounds of shelled peas per acre with a tenderometer reading of 98. The composite sample included 56 per cent sieve sizes 5 and 6. Had this been allowed to stand a day longer it would have more closely approached the high yield of Surprise Stock W.

Stock: very good.

Commercial ratings: A-; recommended.

13. Surprise--Stock W--Lot 2245

This was very similar to stock R with the exception of being somewhat less uniform in rate of blooming. About 1 per cent of the plants were late off-types but there was no indication of the distinct irregularity in pod type characteristics of the Surprise submitted by the same seedsman a year ago. It was the highest producing stock in the group having yielded at the rate of 4646 pounds per acre. The composite sample gave a tenderometer reading of 102 and graded 56 per cent sieve sizes 5 and 6.

Stock: good.

Commercial ratings: B; recommended.

14. Wisconsin Early Sweet--Stock R--Lot 7576.

This variety resulted from a rogue plant selection out of Surprise. It has the characteristic indeterminate growth habit which renders it more vigorous than Surprise

and also more ragged in appearance. For this reason it is particularly difficult to determine the most expedient time to harvest it. Observation of the sieve size and tenderometer data indicate conclusively that both stocks of Wisconsin Early Sweet were harvested too early. The yield data are therefor not considered comparable to those of the Surprise stocks.

Stock: good.

Commercial rating: A; recommended.

15. Wisconsin Early Sweet--Stock C--Lot 103.

Other than the fact that this stock averaged 2 inches shorter in vine growth than Wisconsin Early Sweet, Stock R, no marked difference in rate of blooming, rogue count or yield could be observed.

Stock: good.

Commercial rating: A; recommended.

Pride Group

34. Pride--Stock A--Lot 73117.

This variety is representative of the dwarf-growing canning peas intermediate in season between Surprise and Perfection and analagous to the dwarf group discussed in the freezing pea section. About 5 or 6 per cent of the plants were injured by the alfalfa virus number 2 which killed the growing points of the young seedlings. This

delay in growth probably accounts for the slight variation in bloom emergence observed on otherwise typical Pride plants. Only an occasional off-type plant was present. The stock yielded 4812 pounds of shelled peas per acre with a tenderometer reading of 95. Since members of this group are subject to the same tenderometric grade limitations as Perfection, the peas were harvested at the fancy stage. The composite sample included 60 per cent sieve sizes 5 and 6. The fact that 66 per cent of the plants produced their pods as doubles is further indicative of its high yielding potentialities. Authorities differ in respect to the quality of the canned product.

Stock: very good.

Commercial rating: A to C; provisionally recommended.

32. Wisconsin Penin--Stock W--Lot 6-0105.

No off-type plants or late blooming rogues were observed and there was only an occasional plant with slightly hooked, off-type pods. The stock was slightly susceptible to the seedling stage crinkly leaf mosaic caused by alfalfa virus number 2. The plants averaged 4 inches taller than Wisconsin Penin stock C and 70 per cent of them produced their pods as doubles or as doubles and singles, in which respect it was also superior to stock C. It produced at the rate of 4501 pounds of

shelled peas per acre with a tenderometer reading of 95. The composite sample included 66 per cent sieve sizes 5 and 6. The quality of the canned product is generally considered to be superior to that of Pride.

Stock: excellent.

Commercial ratings: A; recommended.

33. Wisconsin Penin--Stock C--Lot M-02026.

Insofar as its purity and trueness to type was concerned it was equally as good a stock as the latter. The fact that its plants averaged 4 inches shorter is considered of vital importance for such a dwarf-growing group, since this in itself would limit its commercial adoption to only the most favorable situations. The stock produced a considerably less proportion of its pods as doubles than did stock W which is indicative of somewhat lesser yield possibilities. Since the tenderometer reading of the composite sample was 89 its yield of 4128 pounds of shelled peas is probably low. The sieve size data, in which 69 per cent of the peas were classed as 5's and 6's, indicated that the peas of the two stocks had attained the same size although those of stock C had remained more tender.

Stock: excellent.

Commercial rating: A-; recommended with the reservation that it be grown only on the best soils.

Tall Late Group

35. Chief--Stock R--Lot 1180.

This was an exceedingly uniform and vigorous stock. No indication of impurity nor susceptibility to mosaic or root-rot was evident. It is of doubtful value on soils with a high fertility level, especially in respect to nitrates, for the vine growth was so excessive that upon approaching maturity the weight of the peas caused the vines to collapse. This resulted in a thick mat of vegetation within which favorable conditions for the development of mildew were created and from which many of the plants were killed before the pods had attained optimum maturity. The stock produced 2489 pounds of shelled peas per acre with a tenderometer value of 81. These included 53 per cent sieve sizes 4 and 5. These data clearly indicated immaturity of the raw product, a situation which was unavoidable under the conditions of the experiment.

Stock: excellent.

Commercial rating: A to D; recommended only for soils with an average fertility level.

36. Glimax--Stock R--Lot 7433.

Only an occasional late blooming rogue was observed and the stock was uniform in appearance and true to type. Although the variety is somewhat less vigorous

than Chief it has some of the disadvantages of that variety in respect to its production on soils with high fertility levels. It is exceedingly difficult to determine the best time to harvest the variety, and unless harvested correctly, objectionable color variation will exist among the peas. For this reason the variety is frequently called in by the field man a day or two before the majority of the peas attain optimum development. The tenderometer data and percentage sieve sizes clearly indicate such a condition. Because it is an excellent quality late pea it is used to a limited extent in areas where the Perfection doesn't make a satisfactory growth. The fact that practically all of its plants bear their pods as doubles is indicative of its potential productive power when grown under the right conditions.

Stock: excellent.

Commercial rating: A to C; recommended on the same basis as Chief.

Perfection Group

29. Perfection--Stock A--Lot 73047.

No indication of off-type plants or pods was evident and the stock was exceedingly uniform in all respects. It was, however, very susceptible to injury by alfalfa virus number 2, fully 60 per cent of the young plants

being affected. The stock appeared to be more heat tolerant than the others and consequently a larger percentage of the pods filled and less plants "fired" or died because of excess heat. It produced at the rate of 3920 pounds of shelled peas per acre with a tenderometer reading of 85, 63 per cent of the composite sample of which were included in sieve sizes 4 and 5. Unseasonable hot weather made it necessary to harvest prematurely this, as well as the other Perfection stocks, as the above data clearly indicates.

Stock: excellent.

Commercial rating: A; recommended.

37. Perfection--Stock C--Lot M-6410.

The stock was somewhat less susceptible to injury by the alfalfa virus number 2 than stock A as only 15 to 20 per cent of the plants were affected. About 1 per cent of the plants began to bloom 3 to 4 days earlier than the rest, a situation which contributed to the presence of hard peas at harvest time as indicated by the high tenderometer reading of 119. About 1 per cent of the late-blooming rogues were also present and contributed to the irregularity of the stock. The plants of this stock were particularly difficult to call because of the unevenness in pod and pea development. Among pods of equal age many developed pronounced

constrictions or failed to produce peas at all. Whether this condition was brought about by unfavorable weather conditions or by a genetic weakness in the strain is not known. Since stock G reacted in a similar manner it is believed due to the unfavorable growing conditions and the inability of the stock to cope with the situation. Similar stocks submitted for trial the year previous and grown under ideal environment did not develop the weakness. The stock produced 3008 pounds of shelled peas per acre, 69 per cent of which were included in sieve sizes 5 and 6.

Stock: rather poor.

Commercial rating: C; not recommended.

40. Perfection--Stock G--Lot 3566

Only an occasional early and late blooming rogue plant was observed, the stock as a whole being uniform. It was very susceptible to injury by alfalfa virus number 2, 35 to 40 per cent of the plants being thus affected. The stock gave every indication of being a productive one until about a week before harvest when many of the pods failed to develop as fast as the peas within them. This resulted in an abnormal constriction and tightening which made it practically impossible for the viner to efficiently shell the peas. Other pods remained nearly slab-like and failed to fill properly.

This was attributed to the unseasonable growing conditions and the inability of the stock to withstand the hot weather. The stock produced at the rate of 2422 pounds of shelled peas per acre with a tenderometer reading of 101. The composite sample of shelled peas included 63 per cent sieve sizes 4 and 5.

Stock: apparently good.

Commercial rating: B; recommended.

41. Perfection--Stock M--Lot A&-21.

Although this was an exceedingly uniform and productive stock, it did not conform to the varietal characteristics of Perfection. Its foliage was lighter green, due to more gray blotches on the stipules, it matured 2 days earlier and the average plant height was 3 inches shorter. In general it resembled the dwarf variety Pride in blossoming habit, foliage type and stiffness of peduncles, yet it was several days later in maturity and was a more vigorous grower. It was only slightly affected by the alfalfa virus number 2, and there was little or no evidence of injury resulting from hot weather. It was not surprising, therefore, to find that it was the heaviest producer among the Perfection stocks. It yielded 4792 pounds of shelled peas per acre having a tenderometer value of 95. The composite sample included 63 per cent sieve sizes 5 and 6. Although it

did not strictly conform to normal Perfection standards, its ability to produce a normal crop of tender peas in rather unfavorable growing conditions warrants its continuance in further trials.

Stock: excellent (but not true Perfection).

Commercial ratings: questionable; recommended for further trial.

42. Merit--Stock D--Lot 707

This is a recently introduced variety similar in season and type to Perfection but bears no relationship to it. It was an excellent stock in every respect. There was no indication of mixture, rogue plants, mosaic injury or root rot. It definitely was more tolerant of heat than any Perfection with the possible exception of stock M. The plants averaged 5 inches shorter than those of Perfection, the foliage was slightly darker green and the stipules were larger. The pods averaged longer than those of Perfection, were slightly darker green in color but were not as frequently born in doubles. The shelled peas were larger than those of Perfection, 76 per cent of which were included in sieve sizes 5 and 6. It produced at the rate of 3526 pounds of shelled peas per acre with a tenderometer of 97. Critical judges were somewhat apprehensive of the pea color as it tended to be rather light and variable.

Stock: excellent.

Commercial rating: Questionable; not recommended
for commercial adoption, at the present time,
but worthy of further trial.

TABLE III

Varieties, Strains and Stocks of Sweet Corn

Plat No.	Variety	Stock	Lot No.
1.	Seneca Golden	Ro	669
2.	Tendergold	M	X4B
3.	Tendergold	A	78446
4.	Tendergold	W	12962
5.	Early Aristogold	N	X962
6.	Burbank Northern Cross	R	X2710
7.	Kingscrest J-9	N	X644
11.	Hybrid 92-28	Ro	1679
12.	Golden Cross	Ro	2519
13.	Golden Cross	SS	X3121
14.	Golden Cross	R	X3888
15.	Golden Cross	W	12969
16.	Golden Cross	A	56117
17.	Aristogold	M	X784
19.	Ioana	W	X12465

SWEET CORN TRIALS

Since the adoption of first generation hybrids as the chief source of sweet corn for commercial processing, it has been possible to determine the genetic stability of the material with much greater accuracy than when commercial seed was produced by uncontrolled pollination. Inasmuch as commercial hybrid sweet corn seed is produced by the combination of two or more distinct inbred lines, it is not possible to apply the same interpretation between strains of hybrid sweet corn as between strains and stocks of peas the seeds of which are produced from one pure line. The performance of a Golden Cross Bantam stock during the current season is, then, only an indication of what the stock might do another year provided the same inbreds were used to produce next year's first generation seed.

Methods and Materials

Fifteen varieties and strains of yellow hybrid sweet corn were included in the trial. These were treated with semesan dust to protect them against seed rot-producing organisms. Each lot was planted in 3-row plats 45 feet long with the rows 32 inches apart and the plats replicated 3 times. Guard rows were planted on all sides of the trial plat. The land was the same

soil type as that on which the pea trial was conducted and was fertilized 3 days before planting with a broadcast application of 300 pounds of 4-16-4 commercial fertilizer. The seed was planted in drill rows on May 24, 1939, at the rate of 8 pounds per acre. Ten days after emergence each plat was thinned to a uniform stand of 1 plant every 14 to 16 inches. All subsequent care of the crop was in accordance with the commercial practices of the section. The season was excessively hot and dry for optimum corn growth, and as the result abnormally low yields were obtained from all lots.

Field Comparative Data

The center row of the second replication of each lot was used to secure descriptive data. As the season progressed each plant was critically observed and the date of silk emergence, color of silk and color of tassel recorded. The silk emergence date was useful in determining the approximate time the ears would be ready to harvest. It had been the experience of canners in the section that yellow corn would attain optimum maturity for the whole kernel pack about 24 days after silk emergence. The commercial practice was to start the 24 day interval after 50 per cent of the plants had produced their silks. The color of silk and tassel were recorded as indices of uniformity. When the ears had

had attained prime maturity for canning whole kernel corn, the height of each plant was measured and the husked ear length, number of kernel rows and regularity of arrangement were recorded as additional indices of uniformity. From these data, recorded in Tables XVI and XVII, as well as general observation, the purity and trueness to type was determined.

Yield Comparative Data

As each variety and strain approached prime maturity in accordance with the 24-day period after the 50 per cent silk stage, a professional field man inspected the corn and advised as to when the lots were to be harvested. The adverse weather conditions rendered it extremely difficult to make this decision, and as a result two lots were later shown to have been harvested prematurely for prime whole kernel corn. Each plat was stripped of its ears in accordance with the commercial practice of making one harvest, and the ears were weighed. These data are recorded in Table XVIII as unhusked weights per double row plat, the average for the three plats and the calculated yield at the acre plat.

A hundred pound arbitrary sample was then husked with a commercial husking machine and re-weighed to determine the percentage loss by husking. As a practical

method of determining the uniformity of maturity, the entire sample of each lot was graded into 5 classifications based on the maturity of the kernels. The classifications were immature, whole ear stage, whole kernel stage, cream style stage and over mature. These are recognized degrees of maturity. The contents of each class were re-checked by the factory raw products superintendent. Each class was re-weighed and the percentage of the whole calculated and recorded in Table XIX.

In order to determine the percentage of cut corn possible to obtain from a given sample, all ears except the immature ones were run through a Chisholm-Ryder corn cutter and the cut corn was washed, run over a picking table and weighed once more. Since these methods were in all respects identical to the commercial practices of the factory, it is believed that the data secured afford a fair comparison of the comparative uniformity and productive potentialities of the strains in question.

DISCUSSION OF VARIETIES, STRAINS AND STOCKS

1. Seneca Golden--Stock Ro--Lot 669

It was the earliest variety in trial, having attained prime maturity in 84 days, 3 days earlier than Tendergold and 10 days earlier than a good stock of Golden Cross. There was a definite indication of mixture for 4 per cent of the plants were distinctly taller and later in maturity than the others. It conformed fairly well to type in respect to tassel and silk color, 88 per cent of them being red. It was more variable in the number of kernel rows per ear than typical (10) of Seneca Golden. A considerable proportion of the kernels were variable in the shade of orange color, a characteristic which showed to disadvantage as the corn was prepared for freezing. Since an inbred of Extra Early Bantam was used as one parent to produce this hybrid, the variation in this respect was not altogether unexpected, although the weakness was particularly noticeable in these tests. Although 48.5 per cent of the field run sample was usable as ear-pack or whole-kernel corn, the late maturing off-type plants apparently accounted for a substantial portion of the 7 per cent immature corn. The variety yielded at the rate of 4 tons per acre which cut 29 per cent whole kernel corn. This was less than Tendergold produced although the

percentage cut was the same.

Stock: fair.

Commercial rating: C; not recommended in its present impure state.

2. Tendergold--Stock M--Lot X4B

Mature ears of this stock attained prime maturity in 87 days, 3 days later than Seneca Golden and 7 days earlier than Golden Cross. The plants were more uniform in tassel color than those of Tendergold stock A, but somewhat more variable in plant height. The ears were less regular in row arrangement and more variable in number of kernel rows than Tendergold stock W, both factors which detracted considerably from the appearance of the ear pack. There was a 4 to 5 per cent greater loss in weight by husking than with stocks A and W although little difference in the uniformity of maturity was evident as determined by the total percentage of over mature and immature ears at harvest time. Considerable variation in the orange-yellow kernel color was also observed. The variety yielded at the rate of 8855 pounds per acre which cut 28 per cent whole kernel corn.

Stock: fair.

Commercial rating: B- to C; not recommended.

3. Tendergold--Stock A--Lot 78446.

The stock matured in 87 days, in season with Tendergold stock M and 7 days earlier than Golden Cross, stock Ro. Although the silks and tassels were more variable in color than the other stocks of Tendergold, the plant height and ears were distinctly more uniform in size and appearance than Tendergold, stock M. The husked ears averaged slightly longer than those of Stock W, and had about the same number of kernel rows which were slightly more regular in arrangement. About the same amount of kernel color variation was evident in the other two Tendergold stocks. It was slightly more uniform in maturity than Tendergold stocks M and W, 48.5 per cent of the husked corn being usable as corn-on-the-cob or as whole-kernel corn. Although it was the heaviest producer of the three Tendergold stocks with a yield of 9612 pounds per acre, it cut only 26 per cent usable corn, so no actual yield difference existed. The greater uniformity of the stock, however, is believed to be indicative of superior breeding, which in a more favorable year would respond accordingly.

Stock: good.

Commercial rating: A-; recommended.

4. Tendergold--Stock W--Lot 12962

According to the silking dates this stock was at least 2 days later than the other Tendergold stocks. It was harvested in 89 days, 5 days later than Seneca Golden and 5 days earlier than Golden Cross stock Ro. The stock was uniformly red-tasseled but rather variable in silk color, 20 per cent of them being green. The plants were slightly more variable in height than those of stock A, and the husked ears were distinctly shorter but were somewhat more uniform in the number of kernel rows. It produced 6937 pounds per acre which cut 29 per cent whole kernel corn. A considerable variation in rate of maturity was evident by the fact that 9.5 per cent of the corn was either immature or over mature and only 40 per cent was suitable for the fancy whole-ear and whole-kernel packs. The variation in kernel color was especially noticeable on the husked ears of this stock.

Stock: fair.

Commercial rating: B-; provisionally recommended
if adequate seed of stock A is not available.

5. Early Aristogold--Stock M--Lot X962.

Although the name inferred that the variety was an early one it was 95 days before the stock was believed ready to harvest. This was 1 day later than a good stock of Golden Cross and only 4 days earlier than

Aristogold. The plants were predominantly green-tasseled and green silked but not as uniform in this respect as Aristogold. Most of the ears were 7 to 8 inches long, 72 per cent of which were 12-rowed and 24 per cent 8- and 10-rowed. The kernel arrangement was the most irregular and unattractive of any lot in trial. It produced 8671 pounds per acre which cut 19 per cent whole-kernel corn. This low percentage cut was significantly influenced by the large proportion of immature ears. Despite the fact that 43 per cent of the harvest weight was in prime fancy condition, 2 per cent was over mature. These data indicate the extreme variation in maturity of the stock, and the chief reason why the variety has no place in commercial production.

Stock: poor.

Commercial rating: D; not recommended.

6. Burbank Northern Cross--Stock R--Lot X2710.

Prime maturity was attained in 93 days, 6 days later than Tendergold stock A, and 1 day earlier than Golden Cross stock Ro. The plants were uniformly red-tasseled and were 96 per cent red-silked. Although they averaged shorter than those of Golden Cross stock Ro, they were distinctly more variable in height. The husked ears were distinctly plumper than those of Golden Cross stock Ro, due to the presence of more kernel rows

and larger cobs. Although the ears were too thick and strongly tapered for the whole-ear pack, the kernel size and color were very similar to that of Golden Cross and should be satisfactory for the whole-kernel and cream-style packs. The variety produced 8344 pounds per acre which cut 28 per cent whole kernel corn. It was quite uniform in maturity, only 3.5 per cent of the harvest weight being immature. It is of questionable utility in comparison with Golden Cross since the variation in maturity is sufficiently great between strains of Golden Cross now available to give the necessary seasonal spread for the main crop.

Stock: good.

Commercial rating: B; provisionally recommended.

7. Kingscrest J-9--Stock N--Lot X644

This variety was especially developed for the whole-ear pack trade. It attained prime maturity in 91 days, 3 days later than Tendergold stock A. The plants were uniform in tassel color and silk color but rather more variable in height than is typical for the variety (10). The ears were uniform in length and diameter, 88 per cent of them having 10 or 12 rows of moderately well-arranged kernels. The presence of 12 per cent 8-rowed ears rendered the whole-kernel cut product rather variable in shape. The kernels were

considerably deeper orange yellow than Golden Cross and was therefor considered distinctly inferior to it. It was the poorest yielder in the trial having produced 7015 pounds per acre which cut 19 per cent whole-kernel corn. This was not due to premature harvest, since 49.5 per cent of the harvest was at the fancy stage of development, but in all probability, to its characteristic shallow kernels (10).

Stock: good.

Commercial rating: D; not recommended.

11. Hybrid 92-28--Stock Ro--Lot 1679.

This unnamed hybrid resulted from the combination of sub-strains Purdue 39 and Purdue 51, the originals of which were the parents of Golden Cross. It was developed for the whole-ear pack and has several significant advantages over Kingscrest J-9 for this purpose. It attained prime maturity in 94 days, in season with Golden Cross stock Ro and A, and 7 days later than Tender-gold stock A. It was not significantly different from Golden Cross stock Ro in plant characters, although the husked ears were distinctly more slender and more uniform in diameter and number of kernel rows. The rows were particularly well arranged and well filled at the tips and the kernels were uniform in size and equal in color and quality to the best Golden Cross. It produced

10,696 pounds of ears per acre which cut 28 per cent whole-kernel corn. Critical judges estimated that 60 to 75 per cent of the ears could be used for the whole-ear pack, an amount which is 25 to 40 per cent greater than the best regular stock of Golden Cross could contribute.

Stock: excellent.

Commercial rating: A; strongly recommended.

12. Golden Cross--Stock Re--Lot 2519.

Optimum maturity was attained in 94 days, 3 days earlier than Golden Cross stocks M, R, and W. The plants were the most uniform of any Golden Cross stock in the trial. They were 100 per cent green-tasseled and green-silked and 92 per cent 5 to 6 feet tall. The ears were 80 per cent 7 to 8 inches long and 72 per cent were 12-rowed. They were uniform and attractive in appearance as attested by the fact that 88 per cent of the ears had regular kernel row arrangement and 100 per cent well filled tips. No variation in kernel color was observed. The stock produced 10,737 pounds of ears per acre which cut 26 per cent whole-kernel corn. Its uniformity was indicated by the fact that at harvest time 58 per cent of the corn was included in the fancy whole-ear and whole-kernel stages, and only 4 per cent was immature or over mature.

Stock: Excellent.

Commercial rating: A; strongly recommended.

13. Golden Cross--Stock K--Lot X3121.

This stock was harvested in 97 days, 3 days later than Golden Cross stocks Ro and A. The plants were variable in silk and tassel color and slightly variable in height. The husked ears were very unattractive, variable in length, and decidedly off type in row number, 20 per cent of them being 8-rowed. Many of the 8- and 10-rowed ears were irregular in kernel arrangement. The stock produced 9448 pounds per acre, the least of any Golden Cross stock in trial, and cut 28 per cent whole-kernel corn. It was more variable in maturity than Golden Cross stock Ro and A as indicated by the presence of 30.5 per cent of corn too old for the ear-pack or whole-kernel stage with the proportion of immature corn remaining about the same.

Stock: poor.

Commercial rating: D; not recommended.

14. Golden Cross--Stock R--Lot X3888.

Optimum maturity was attained in 97 days, in season with Golden Cross stocks W and M and 3 days later than stocks A and Ro. The plants were variable in tassel color, 80 per cent being red, and extremely variable in plant height, ranging from 3½ feet to 7 feet. The husked ears were moderately uniform in length but were variable in shape and off-type in kernel row number,

44 per cent of them having 8 and 10 rows. A few ears contained about 2 per cent white kernels and 52 per cent of the ears showed more or less variation in the orange yellow color. The stock produced 10,389 pounds per acre, 6 per cent of which was immature and over mature and 39 per cent too old for the fancy whole-kernel or whole-ear pack. The comparatively large proportion of cream-style corn undoubtedly contributed to the 33 per cent whole-kernel cut.

Stocks: very poor.

Commercial ratings: D-; not recommended.

15. Golden Cross--Stock W--Lot 12969.

This stock matured in 97 days, 3 days later than Golden Cross stocks A and Ro, and 1 day earlier than Ioana. The plants were uniformly green-tasseled and were very uniform in height and general appearance. The ears were similar to those of Golden Cross stock Ro but differed from it in having 4 per cent 8-rowed ears. Only an occasional ear showed any indication of orange yellow kernel color variation. It produced 10,225 pounds per acre which cut 30 per cent whole-kernel corn. There was some indication of maturity variation since 5 per cent of the corn was immature and over mature and 23 per cent was too old for the fancy whole-ear and whole-kernel packs.

Stock: good.

Commercial rating: B ; recommended.

16. Golden Cross--Stock A--Lot 56117.

This is a distinct strain of Golden Cross and differs from the recognized type in having 100 per cent red tassels and green or amber-green silks. Although 3 days earlier than most green-tasseled stocks, it matured in season with Golden Cross stock Ro. The ears were slightly more slender than the original stock of this strain and is thus a distinct improvement. They averaged slightly longer than those of any other stock, and 88 per cent of them were 12-rowed. In this respect it was more uniform than any other Golden Cross stock although an occasional 16-rowed ear was also observed. It was the heaviest yielder in the trial, having produced 11,105 pounds per acre. This cut 27 per cent whole-kernel corn and was the most uniform in maturity of any lot in trial, 59.5 per cent of the corn having been classed in the fancy whole-kernel and ear-pack stages when it was harvested.

Stock: excellent.

Commercial rating: A; recommended.

17. Aristogold--Stock M--Lot X784.

This variety attained maturity in 99 days, 5 days later than Golden Cross stock Ro and 1 day later than

Ioana. The plants were distinctly taller than those of Golden Cross and only slightly more variable than the best stocks of that variety. The tassels were large, bushy and 100 per cent green in color. The ears averaged larger than any stock of Golden Cross, were very uniform in row number and symmetrical and regular in row arrangement. The kernels at prime ear-pack stage were bright creamy yellow in color and very similar to those of Golden Cross. In the whole-kernel and cream-style stages, however, the indication of a distinct orange pigment was more evident. The tendency to darken in color as it attained the whole-kernel stages was considered undesirable. It produced 10,900 pounds of corn per acre which cut 29 per cent whole-kernel style. The fact that 19 per cent of the corn was over mature clearly indicated that the variety was harvested a day or two too late for satisfactory quality. Selected ear-pack stage ears were cooked and graded for quality. Competent judges considered it distinctly inferior to Golden Cross.

Stock: excellent.

Commercial rating: D; not recommended.

19. Ioana--Stock U--Lot X12465.

Maturity was attained in 98 days, 4 days later than Golden Cross stock Ro, and 1 day earlier than Aristogold. The plants were uniformly red-tasseled and red-silked,

slightly shorter than Aristogold and slightly less variable in height. The husked ears were uniform in length but somewhat more variable in number of rows than Aristogold although 76 per cent of them had 12-14, most of which were straight and attractively arranged. It produced 10,369 pounds of corn per acre, which cut 29 per cent whole-kernel corn. Twelve per cent of the harvest was over mature for fancy cream style, thus indicating that the variety was harvested a day too late. Contrary to the previous year's trial, the kernels were observed to be somewhat variable in the orange-yellow color at the prime whole-kernel stage. Although rather an attractive variety for ear-pack, it was noticeably lacking in flavor and possessed a tougher pericarp than that of Golden Cross.

Stock: good.

Commercial ratings: C; not recommended except for further trial.

TABLE IV

Varieties, Strains and Stocks of Beets

Plat. No.	Variety	Stock	Lot No.
1.	Detroit Dark Red	W	9789
2.	Detroit Dark Red	A	M3711
3.	Detroit Dark Red	H	X2789
4.	Detroit Dark Red	Ro	4339
5.	Detroit Dark Red	F	X303
6.	Perfected d Detroit	N	X1104
7.	Perfected Detroit	Lu	X6414
8.	Ohio Canner	Lu	X2122

BET TRIALS

The beet is a biennial plant and unless it is subjected to a sustained period of cool weather when young, (40) does not produce seed stalks until the second year after seeding. This provides the seed producer with an opportunity to examine the mother beets for type and interior color and to select for seed production only those of the desired type. The exercise of explicit care in making these selections has had its reward in that the average stocks of Detroit Dark Red beet delivered to canners at the present time is generally conceded to be much superior to the average stock of the same variety delivered 10 years ago. This situation has resulted in no small measure from the concerted efforts of the plant breeders, the canners and certain State experiment stations whose regulatory work (29) has included the testing of vegetable seeds to determine the commercial utility of their progeny.

Methods and Materials

Eight varieties, strains and stocks of garden beets were included in this trial. Most of them were strains or stocks of the Detroit Dark Red variety since that is the one most widely grown for the canning industry. Each lot was planted in 2-row plats 35 feet

long with the rows 2 feet apart and the plots replicated 3 times. Guard rows were planted on the sides of the trial. The land was the same soil type as that on which the peas and sweet corn were planted and was fertilized with 350 pounds of 4-16-4 at the same time the fertilizer for the peas was applied. The seed was drilled May 2, 1939, with a single row Planet Jr. seeder at the rate of 8 pounds per acre. All subsequent care was the same accorded the commercial crop in the vicinity.

Field Comparative Data

The roots were harvested July 29, 1939, approximately 12 weeks after planting. The roots from a portion of one row in replication 2 were used to determine root type, interior color and the relative size of tops produced. A hundred roots of each lot were pulled at random and used for detailed examination. After the number of off-type beet roots was determined each root was cut in transverse to observe the interior color. A color classification of very dark, dark, medium, light and very light was established and as each beet was cut its color was designated as applicable to one of these groups. These data are recorded in Table XX.

Since most of the beets grown in that section are pulled and topped by a mechanical harvester, it is essential that the beets have a well developed long top

and a strong crown. All lots were examined for this character and the designation of "short top" or "long top" mentioned in the individual stock discussions refer to this characteristic.

Yield Comparative Data

The yield data were secured by harvesting the roots from a 20 foot portion of each replication, the average of the three replications was used to calculate the acre production. In one instance, lot 4, Detroit Dark Red stock Ro, the seed was apparently sown too thickly. This resulted in the production of a large number of beets, but the lack of adequate room within which to grow greatly reduced their size and weight. It is believed, therefor, that the recorded yield in Table XXI is not representative of the stock. Other lots developed normal sized roots.

DISCUSSION OF VARIETIES, STRAINS AND STOCKS

1. Detroit Dark Red--Stock W--Lot 9789.

The stock proved to be a short-topped one and of questionable value for the section unless grown as a spring crop. Since growing conditions are more favorable at that time adequate top growth would be developed to enable the mechanical harvester to operate efficiently. It possessed very good root type insofar as shape was concerned and developed fairly good color. Although it had the highest percentage of medium red and light red interiors only the light ones were considered objectionable. It was the most productive stock in the trial.

Stock: moderately good.

Commercial rating: B-; recommended for Spring production only.

2. Detroit Dark Red--Stock A--Lot M3711.

The tops of this stock were exceedingly tall and vigorous, the crowns were firm and the petioles large and prominently veined. It should be well suited to the prevailing harvesting methods. The roots were rather variable in size although less than 1 per cent were oblong and off-type in shape. The presence of one small yellow-fleshed root was detected, the significance of which was difficult to understand, for obviously the root would never be selected for seed purposes. The

interior color although not the best, was satisfactory for commercial production, for only 2 per cent of the roots were light red. The stock produced at the rate of 20 tons per acre. In view of the presence of the wild yellow root type it would probably be expedient to be suspicious of the stock.

Stock: questionable.

Commercial ratings: B to D; recommended for further test.

3. Detroit Dark Red--Stock N--Lot X2786.

This was a vigorous long-top stock with medium sized crowns. An occasional sprawling, broad-leaved, small crowned off-type plant was observed but these were not sufficiently numerous to be of any practical significance. About 2 per cent of the roots were oblong and off-type in shape. The interior color was very good, 85 per cent of them being very dark or dark red in color. It produced a yield of slightly less than 20 tons per acre.

Stock: moderately good.

Commercial ratings: B; recommended.

4. Detroit Dark Red--Stock Ro--Lot 4339.

The plants were long-topped, exceedingly vigorous and uniform in type. The roots were very uniform in size, shape and color and this was by far the best stock

of Detroit Dark Red in the trial, for 71 per cent were very dark red and 26 per cent were dark red in interior color. As explained previously, this lot was seeded thicker than the others, a situation which reacted in the production of many but small and light weight beets.

Stock: excellent.

Commercial rating: A; highly recommended.

5. Detroit Dark Red--Stock F--Lot X303.

The plants of this variety were somewhat more sprawling than the others and intermediate in height between the tall as represented by stock Ro and the short as represented by stock W. The petioles were slender, dark red and moderately small. It is questionable if the stock would produce a sufficiently strong top to be efficiently harvested by mechanical means unless grown as a spring crop. About 2 per cent of the roots were oblong and not typical Detroit Dark Red. The interior color was excellent, 98 per cent of the beets being either very dark red or dark red. The stock produced nearly 17½ tons per acre.

Stock: very good.

Commercial rating: A-; recommended for spring planting.

6. Perfected Detroit--Stock N--Lot X1104.

This is a strain of Detroit Dark Red. It produced

tall vigorous tops very similar to those of stock Ro, although the leaves appeared to be somewhat broader. About 1 per cent of the beets were distinctly flat in shape, similar to Crosby Egyptian, and 5 per cent were distinctly turbinate. This significant amount of off-type roots might be objectionable in packing small whole beets for which purpose the canner insists upon a globular shaped root. The interior color was very good with only 1 per cent being light. The stock produced 15 tons per acre.

Stock: fair.

Commercial rating: B- to C; provisionally recommended.

7. Perfected Detroit--Stock Lu--Lot X6414.

The plants produced were tall and vigorous and had medium large firm crown. About 3 per cent of the roots were off-type, some being oblong and others flattened. The interior color was excellent with 43 per cent being very dark red and 48 per cent dark red. The stock produced 17½ tons per acre.

Stock: moderately good.

Commercial rating: B; recommended.

8. Ohio Canner--Stock Lu--Lot X2122.

The stock produced medium sized plants and crowns with rather slender deep red petioles. It is questionable

if the tops produced for fall harvest would be strong enough to be efficiently pulled by the mechanical harvester. In all probability in seasons of normal rainfall little difficulty would be experienced. Although the roots produced were remarkably uniform in shape and size, all of them lacked the depth characteristic of Ohio Canner. On the basis of this trial this appeared to be an improvement, for the average root in this stock closely approached the globular. The interior color, although commercially satisfactory was not as intensely dark red as when the variety was first introduced. The white rings were apparent in most of the dark red beets but were so narrow and indistinct as to be of little concern to the commercial canner. Only 1 per cent of the roots were classed as light in color. The stock produced 16 tons per acre.

Stock: very good.

Commercial rating: B ; recommended.

TABLE V

Varieties, Strains and Stocks of Spinach

Flat No.	Variety	Stock	Lot No.
1.	Viking	H	X214
2.	Viking	A	38386
3.	Heavy Pack	W	X1405
4.	Darkie	A	78396
5.	King of Denmark	F	X279
6.	King of Denmark	W	X4771
7.	Nobel	N	X2001
8.	Queen of Holland	W	14063
9.	Matador C	W	14064
10.	Supra	N	X1774
11.	Dark Green Smooth Leaf	W	X2121

SPINACH TRIALS

It seems pertinent to recognize something of the floral characteristics and methods of breeding and seed production of the spinach plant in order to understand the possible origin of rogue and off-type plants. The spinach plant is a cross-pollinated one, the pollen of which is extremely fine and light. Since it is produced in abundance (9, 21) over a long period and is carried by air currents it is necessary that different varieties being grown for seed be isolated by a distance of a mile or more to prevent crossing. Inadequate isolation, therefor, is apt to result in the occurrence of off-type plants in the commercial crop.

This situation is complicated by the fact that several types of sexual plants are characteristic of the crop. In most instances male and female flowers occur on separate plants in the typical dioecious condition. Sometimes, however, monoecious plants are found.

Drewes (9) has segregated spinach plants into 4 groups:

1. Extreme staminate: These bear only male flowers. The leaves are small, thin and sharply pointed. The plants are small, start to bolt early and are short-lived. Since this type produces no seed yet transmits the undesirable characters to the seed producing plants, the class is very undesirable.

They constitute a serious problem to the breeder because of their lack of long standing character, and to the grower because of their inferior foliage quality and early seed stalk formation.

2. Vegetative staminates: These bear only male flowers but produce normal foliage and bloom about the same time as pistillate and monoecious plants.

3. Monoecious plants: These bear both male and female flowers in the same cluster, produce seed and normal foliage.

4. Pistillate plants: These bear only female flowers, produce seed and normal foliage.

Modern spinach breeders have discovered that by the use of single plant selections from a monoecious variety it is possible to eliminate the extreme vegetative staminate plants. Although it has been possible to establish monoecious pure line for a generation or two, Rosa (21) and Drewes (9) concluded that sooner or later the purest monoecious line would produce some staminate and some pistillate plants.

Methods and Materials

Eleven varieties, strains and stocks were included in the trial. These were treated with red copper oxide (32) as protection against decay-producing organisms. Each lot was planted in 5 row plats 25 feet long with

the rows 12 inches apart and the plats replicated 3 times. The center 3 rows were used for yield records and the remaining ones as guard rows. The trial was conducted on muck, the soil type used most extensively for spinach production in New York State. The area had been fall-plowed and was fertilized at the rate of 600 pounds of 5-8-10- commercial fertilizer 3 days before the crop was sown. When the plants were established a top dressing of nitrate of soda was applied at the rate of 150 pounds per acre. All subsequent care was identical to the commercial practices in the vicinity.

Field Comparative Data

As a method to check the comparative stand the number of plants was counted at harvest time. This was accomplished by making a 1 yard count of the crowns in each replication after the spinach had been removed. The average number of plants per foot of row was determined and is included in Table XXII. As the season progressed the plats were observed critically to determine the amount of mixture. The varietal characteristics were compared with standard descriptions. (24)

The comparative rate of seed stalk production was determined for this is one of the most important characteristics of a crop that must be removed in one harvest. Since spinach to be used for canning and

freezing is sold on a graded basis the percentage of seed stalks must be kept at the minimum. The comparative color was determined about a week before harvest at noon time with a lightly overcast sky.

Yield Comparative Data

Optimum maturity is frequently influenced by the rate of seed stalk formation. Since weather conditions were not too favorable for good spinach growth the lots which were poorly adapted to warm weather were the first to produce seed stalks. The number of days to harvest, therefor, are for the most part directly correlated with the varieties' ability for long-standing. The spinach was harvested from a 20-foot strip 3 rows wide in each plat of 3 replications. These data together with the average yield per plat and the calculated yield per acre are included in Table XXII. The order of bolting (seed stalk production) referred to in the individual discussion was based on the relative time it required 50 per cent of the plants to produce visible seed stalks. This information was secured from the 2 unharvested guard rows.

DISCUSSION OF VARIETIES

1. Viking--Stock H--Lot X214.

The variety was very similar if not identical to Heavy Pack in general appearance, color and shape and size of leaves. The most significant difference observed was its tendency for seed stalk formation earlier than Heavy Pack, a strain distinction rather than a varietal one. No off-type plants were observed. It produced about 12 tons per acre which was about a ton and a half less than Heavy Pack. Optimum maturity was attained in 43 days. Foliage color was medium green, intermediate between Nobel and King of Denmark. Order of bolting, third.

Stock: good.

Commercial rating: B; provisionally recommended.

2. Viking--Stock A--Lot 38386.

This stock was slightly more vigorous and more upright in growth habit than Viking stock H. The leaves were somewhat more variable in color and the plants tended to produce seed stalks earlier than the latter. Although it exceeded the yield of Viking stock H, the quality of the raw product was inferior to it in respect to variation in color, prominence of petioles and the presence of more young seed stalks. Optimum maturity was attained in 42 days. Foliage color was

somewhat variable but in general intermediate between Nobel and King of Denmark. Order of bolting, second.

Stock: fair.

Commercial rating: C; not recommended.

3. Heavy Pack--Stock W--Lot X1405.

The superiority of one strain over another was well demonstrated by this lot. It proved to be an excellent strain of Viking for it differed from that variety only in its ability to stand without bolting under adverse spinach growing conditions. It was criticized on the basis of having rather prominent petioles in the 1939 trials although in previous tests under more favorable growing conditions the proportion of petiole to leaf blade was sufficiently small to render the stem inconspicuous. It produced about 13 tons per acre, a ton more than the best quality Viking stock. Optimum maturity was attained in 44 days, a day earlier than King of Denmark and 2 days earlier than Darkie. The foliage color was identical to that of Viking and was intermediate between that of Nobel and King of Denmark. Order of bolting, seventh.

Stock: excellent.

Commercial rating: A; recommended.

4. Darkie--Stock A--Lot 78396.

In many respects Darkie has the most potential possibilities of any variety introduced within recent years. It is superior in color, texture and flavor to any variety, yet because of its low comparative yield and the presence of 4 or 5 per cent early seed-stalk producers, it cannot be considered for commercial production as a spring crop at prevailing prices paid for spinach. It is a smooth-leaved, intensely dark green spinach with slender, inconspicuous, moderately dark green petioles. This has been particularly noticeable in seasons of normal rainfall when other varieties have produced rather large light green stems so objectionable for the frozen pack. It was also noted that it showed less "red-root" in the raw product after it had been harvested, or at least the anthocyanin pigments did not develop as high up on the plant as it did on King of Denmark and Heavy Pack. An occasional semi-savoy-leaved plant was observed but otherwise the stock was pure. It produced about 10½ tons per acre, the same as that of King of Denmark stock W but 2½ tons less per acre than Heavy Pack. Optimum maturity was attained in 50 days for 95 per cent of the plants, although the remainder produced seed stalks several days earlier. The foliage color was the darkest green of any spinach ever observed. It

was the last to produce seed stalks with the exception of the 5 per cent early bolters. The data obtained are difficult to compare with that of the other lots.

Stock: poor.

Commercial rating: D; not recommended except for further trial.

5. King of Denmark--Stock F--Lot X279.

No indication of mixture or off-type plants was observed in this stock. Its most evident weakness was the lack of vigor in comparison to the King of Denmark stock W. It was the poorest yielding lot in the test having produced slightly less than 10 tons per acre. Optimum maturity was attained in 46 days, one day later than Heavy Pack and Nobel. The foliage color was dark green, intermediate in this respect to that of Darkie and Viking or Heavy Pack. Order of bolting, sixth.

Stock: good.

Commercial rating: B-; provisionally recommended.

6. King of Denmark--Stock W--Lot X4771.

The stock was equally as uniform and true to type as that of King of Denmark stock F and was superior to it in vigor. An occasional plant formed seed stalks earlier than in stock F which necessitated its harvesting a day earlier than the latter stock. It produced nearly 11 tons per acre, the same as Darkie and Supra. Optimum

maturity was attained in 45 days. The foliage color was dark green, intermediate between that of Darkie and Viking or Heavy Pack. Order of bolting, fifth.

Stock: good.

Commercial rating: A+; recommended.

7. Nobel--Stock N--Lot X2001.

This variety, representative of the Giant Thick-leaved type, is not used to any extent for canning in New York and not at all for freezing. It was included in the trials for comparison with the new varieties. It proved to be a good stock and free from off-type plants. It produced only an occasional seed stalk before it attained optimum maturity, a matter of 44 days. It produced about $11\frac{1}{2}$ tons per acre which was $2\frac{1}{2}$ tons less than that of Matador C. The foliage was light green and the lightest of all varieties in trial. Order of bolting, fourth.

Stock: good.

Commercial rating: B to C; not recommended for freezing.

8. Queen of Holland--Stock W--Lot 14063.

This was a new variety which proved to be similar to Viking and Heavy Pack in foliage color, although the leaves were smaller and somewhat more savoyed. In this respect the stock was more variable than is characteristic

of a well fixed line. It proved to be poorly adapted under the conditions where grown and was one of two varieties which developed premature seed stalks in greater abundance than the others. It yielded $10\frac{1}{2}$ tons per acre, $2\frac{1}{2}$ tons less per acre than did Heavy Pack. Optimum maturity was attained in 41 days, its earliness being directly attributable to its inability to withstand warm temperatures as well as Heavy Pack. The foliage color was medium green, intermediate between that of Nobel and King of Denmark. Order of bolting, first.

Stock: fair.

Commercial rating: D; not recommended.

9. Matador C--Stock W--Lot 14064.

The variety proved to be most like Nobel in type of growth, color and smoothness of leaf surface. It was a decidedly more vigorous grower than that variety, had broader leaves with somewhat shorter and less conspicuous petioles and appeared to be slightly darker green. The difference, however, may not have been significant in this respect. It also was a more rapid grower, yet was one of the slowest to produce seed stalks. No variation in plant type was observed and the stock had every appearance of being well fixed. It was the most productive lot in the trial having yielded at the rate of 13.79 tons per acre, about 700 pounds

more than Heavy Pack. Optimum maturity was attained in 44 days, in season with Heavy Pack and a day or two earlier than King of Denmark. The foliage color was moderately light green, very closely approaching that of Nobel. Order of bolting, seventh.

Stock: excellent.

Commercial rating: A; recommended for commercial canning test.

10. Supra--Stock N--Lot X1774.

This proved to be very much like Matador C in general appearance, but lacked the vigor, size of leaf and long-standing character of that variety. Optimum maturity was attained in 42 days, 2 days earlier than Matador C. It produced somewhat over 10½ tons per acre, and had it been able to withstand the warm weather without bolting as well as did Matador C, the yield would have more closely approached that of the latter. The foliage color was indistinguishable from that of Matador C.

Order of bolting, fourth.

Stock: good.

Commercial rating: B- to C; recommended for further trial.

11. Dark Green Smooth Leaf--Stock N--Lot X2121.

Contrary to the implication suggested by the name the variety proved to be as light green as Matador C and

Supra. The leaves were somewhat more strongly tapered than those of Matador C and an occasional plant was found to be distinctly savoyed. It developed premature seed stalks as early as Queen of Holland and was, therefore, poorly adapted under the prevailing growing conditions. Because seedstalks were formed so early its optimum maturity was attained in 41 days. This unquestionably influenced the yield which amounted to 10½ tons per acre. The foliage color was moderately light green, nearly as light as Nobel. Order of bolting, first. (Same time as Queen of Holland.)

Stock: fair.

Commercial rating: D; not recommended.

TABLE VI

Germination and Seed Data for Freezing Tests

Plot no.	Variety	Stock	Lab. Germ.	Plants per yard						Ave.	Drill Skips	
				Replications							A	B
				A		B						
16.	Glacier	A	91	23	21	24	20	31	22	22	-	-
17.	Thomas Laxton	R	87	23	27	23	27	21	26	24	-	-
18.	Thomas Laxton	C	95	33	32	32	33	31	32	32	-	-
19.	Thomas Laxton	W	97	28	27	28	26	30	28	28	-	-
20.	Thomas Laxton	A	90	18	19	19	22	20	23	20	-	.5
21.	Thomas Laxton	G	98	23	27	25	23	23	26	25	-	-
22.	Thomas Laxton	H	94	24	26	26	26	27	24	25	-	1.0
23.	Thomas Laxton	F	95	25	25	25	26	26	28	26	-	.5
24.	Thomas Laxton	S	98	23	27	25	24	27	26	26	-	-
25.	Thomas Laxton	N	92	27	25	26	28	28	27	27	-	-
26.	Thomas Laxton	L	97	27	26	25	22	24	23	25	2.0	.5
39.	S-54	W1	95	21	22	22	20	24	26	23	-	-
27.	Gradus	R1	84	21	19	21	20	20	21	20	1.0	.5
28.	Improved Gradus	R	91	26	23	25	23	27	21	24	-	-
38.	No. 57	W	97	24	25	24	25	24	24	24	-	-
53.	Miracle	S	98	29	26	27	31	27	26	28	-	-
30.	President Wilson	A	93	24	21	23	24	21	21	22	-	1.0
31.	Horse's Market	F	99	24	26	24	26	27	25	25	-	.5
45.	Gilbo	R	93	23	25	25	26	23	24	24	-	.5
46.	Stridelong	C	74	27	27	25	27	27	30	27	-	1.0
47.	Alderman	A	98	24	26	28	24	25	28	25	1.0	1.0
48.	Alderman	C	89	27	26	25	30	27	29	27	-	1.0
49.	Telephone	R	93	22	23	27	26	23	20	24	-	-
50.	Telephone	W	95	27	26	28	28	23	30	28	1.5	2.5
51.	Telephone	G	94	26	25	26	26	23	27	26	-	-

TABLE VII

Germination and Stand Data for Canning Peas

Plat No.	Variety	Stock	Lab. Germ.	Plants Per Yard Replications			Ave.	Drill Spacing	
				A	B			A	B
2.	Alaska	A	98	16 22 22	21 24 25		22	-	-
3.	Alaska	G	96	28 26 26	27 27 27		27	.5	-
4.	Alaska	W	96	26 26 25	29 22 26		26	1.0	-
5.	Alaska	M	92	24 30 22	28 23 27		26	1.0	1.0
6.	Alaska	C	96	25 26 29	29 23 28		27	-	1.0
8.	Superalaska	C	96	26 27 27	27 25 25		26	-	-
9.	Superalaska	N	98	25 26 25	26 29 27		26	-	-
10.	Surprise	A	99	28 27 30	28 26 26		28	-	-
11.	Surprise	G	91	31 30 30	30 30 28		30	1.0	-
12.	Surprise	R	98	30 30 30	30 28 32		30	1.5	-
13.	Surprise	W	95	29 28 28	30 28 30		29	-	1.0
14.	Wis. Ea. Sweet	R	95	30 29 34	34 35 32		32	-	1.0
15.	Wis. Ea. Sweet	C	97	24 30 30	30 25 28		28	-	-
32.	Wis. Penin	W	87	27 25 26	24 23 21		25	1.0	2.0
33.	Imp. Wis. Penin	C	74	25 26 24	25 27 24		25	1.0	-
34.	Pride	A	93	28 24 21	24 29 25		25	-	-
35.	Chief	R	93	27 30 28	30 29 31		29	2.0	1.5
36.	Climax	R	92	35 35 35	35 36 36		35	-	-
29.	Perfection	A	94	30 30 29	28 29 31		30	-	-
37.	Perfection	C	89	26 25 28	26 32 29		28	.5	-
40.	Perfection	G	97	26 29 27	30 28 30		28	-	-
41.	Perfection	M	95	31 31 32	31 29 27		30	-	-
42.	Merit	D	99	25 26 24	28 23 25		25	-	-

TABLE VIII
Systematic Data for Freezing Peas

Plot No.	Variety	Stock	Pl. Ht.	Bloom Node	% DEL's	Both	Pod Length (in)	Peduncle Length (in)	No. of Pods	Peas per pod
16.	Glacier	A	31	10	0	13	2.87	2.90	2.5	5.2
17.	Thomas Laxton	R	32	10-11	0	13	3.02	2.96	2.5	5.3
18.	Thomas Laxton	C	30	9-10	0	14	2.90	2.77	2.4	5.5
19.	Thomas Laxton	U	31	9-10	0	0	2.97	3.11	3.1	5.3
20.	Thomas Laxton	A	33	9-10	0	7	3.05	3.39	3.2	5.3
21.	Thomas Laxton	G	23	9-10	0	7	3.02	2.93	3.1	6.0
22.	Thomas Laxton	M	29	10-11	0	33	3.02	2.63	2.9	5.3
23.	Thomas Laxton	F	31	9-10	0	0	3.03	2.97	3.1	5.4
24.	Thomas Laxton	S	31	9-10	0	0	2.93	3.22	3.1	5.6
25.	Thomas Laxton	N	34	9-10	0	8	3.08	3.43	2.9	5.9
26.	Thomas Laxton	L	34	10	0	0	3.10	3.29	3.1	5.6
39.	S-54	W1	33	9-10	0	8	3.17	3.34	3.1	5.5
27.	Gradus	R1	31	9	0	0	2.97	3.07	2.7	5.6
28.	Imp. Gradus	R	39	10-11	26	53	3.25	3.28	5.6	4.7
38.	No. 57	W	50	11-12	0	40	3.30	3.79	4.0	4.2
53.	Miracle	S	39	13-14	0	0	2.8	2.90	4.0	6.3
30.	President Wilson	A	23	10-11	0	0	3.94	2.75	2.7	5.9
31.	Morse's Market	F	24	12	0	73	3.70	2.22	4.7	4.3
45.	Gilbo	R	28	11-12	0	45	4.11	3.28	4.4	5.7
46.	Stridelong	C	22	10-11	13	40	3.43	2.13	4.5	4.8
47.	Alderman	A	65	17-18	7	13	4.22	3.87	3.8	7.9
48.	Alderman	C	69	16-17	0	0	4.10	3.38	3.1	7.3
49.	Telephone	R	61	17-18	0	7	3.90	3.64	3.4	6.5
50.	Telephone	W	60	18-19	0	40	3.95	2.90	3.4	7.3
51.	Telephone	G	57	17	7	40	4.05	3.45	3.5	7.0

TABLE IX
Systematic Data for Canning Peas

Plot No.	Variety	Stock	Pl. Ht.	Bloom Note	% B.L. ¹	% Both	Pod Length (in)	Petiole Length (in)	Pods per Plant	Peas per pod
2.	Alaska	A	27	9-10	5	40	2.38	1.83	3.6	5.3
3.	Alaska	G	28	10	10	40	2.40	2.13	2.9	5.6
4.	Alaska	W	26	9-10	5	30	2.30	1.91	2.4	5.5
5.	Alaska	H	30	9-10	10	45	2.35	2.34	4.2	5.3
6.	Alaska	C	28	9-10	0	20	2.40	1.73	2.7	5.6
8.	Superalaska	C	30	10-11	5	30	2.55	1.74	3.5	5.9
9.	Superalaska	W	27	9-10	0	20	2.40	1.73	2.7	5.6
10.	Surprise	A	30	10-11	0	30	2.52	2.07	3.5	6.0
11.	Surprise	G	30	9-10	7	53	2.38	1.96	4.3	4.9
12.	Surprise	R	30	9-10	0	40	2.32	1.90	3.3	5.2
13.	Surprise	E	28	9-10	0	33	2.35	1.63	3.5	4.9
14.	Wis. Ea. Sweet	R	31	10-11	0	7	2.60	2.01	2.7	5.9
15.	Wis. Ea. Sweet	C	29	10	7	13	2.40	1.65	3.5	5.8
32.	Wis. Penin	W	24	12	7	63	2.97	1.49	5.3	5.0
33.	Imp. Wis. Penin	C	20	12-13	80	14	2.95	.96	3.9	4.8
34.	Pride	A	26	13	66	14	2.86	1.73	4.8	6.2
35.	Chief	R	43	15-16	93	7	2.62	1.15	4.8	5.3
36.	Climax	R	46	13	98	1	2.51	2.91	6.0	5.4
29.	Perfection	A	31	14-16	93	1	2.77	2.15	5.5	5.5
37.	Perfection	C	35	14-16	86	14	2.87	2.64	6.2	4.9
40.	Perfection	G	35	14-16	86	7	2.78	2.34	5.1	5.2
41.	Perfection	M	32	13-14	71	28	2.94	2.92	6.1	6.2
42.	Merit	D	30	17-18	40	33	3.16	1.81	5.4	6.1

TABLE X

Sieve Sizes and Tenderometer Values of Freezing Peas

Flat No.	Variety	Stock	Sieve Size Percentage						Majority % 5's and 6's	Composite Tenderometer Value
			#1	#2	#3	#4	#5	#6		
16.	Glacier	A	6	3	3	16	37	41	78	92
17.	Thomas Laxton	R	3	3	9	22	31	32	63	75
18.	Thomas Laxton	C	3	6	13	25	34	19	53	70
19.	Thomas Laxton	W	3	6	9	19	28	35	63	74
20.	Thomas Laxton	A	3	6	6	16	31	38	69	82
21.	Thomas Laxton	G	3	3	9	19	31	35	66	75
22.	Thomas Laxton	M	3	6	12	19	28	32	60	78
23.	Thomas Laxton	F	0	3	12	19	31	35	66	83
24.	Thomas Laxton	S	0	3	3	10	28	56	84	88
25.	Thomas Laxton	N	3	3	6	16	31	41	72	78
26.	Thomas Laxton	L	0	3	3	9	26	59	85	85
39.	S-54	Wi	3	3	6	9	19	60	79	85
27.	Gradus	Ri	0	3	6	6	19	66	85	93
28.	Imp. Gradus	Ri	0	3	3	6	16	72	88	87
38.	No. 57	W	0	3	9	19	25	44	69	92
53.	Miracle	S	0	3	9	16	31	41	72	86
30.	President Wilton	A	0	3	6	9	19	63	82	87
31.	Morro's Market	F	0	3	9	16	31	41	72	95
45.	Gilbo	R	0	3	6	9	22	60	82	97
46.	Stridelong	C	0	3	3	9	28	57	85	103
47.	Alderman	A	0	3	6	12	22	57	79	80
48.	Alderman	C	0	3	6	9	22	60	82	88
49.	Telephone	R	0	3	6	9	22	60	82	95
50.	Telephone	W	0	3	6	16	28	47	75	88
51.	Telephone	G	0	3	6	9	22	60	82	90

TABLE XI

Sieve Sizes and Tenderometer Values of Canning Peas

Plat No.	Variety	Stock	Sieve Size Percentage						Size Majority in per cent		Composite Tenderometer Value
			#1	#2	#3	#4	#5	#6			
2.	Alaska	A	6	23	34	34	3	0	68	3 and 4's	114
3.	Alaska	G	9	28	35	25	3	0	60	"	103
4.	Alaska	W	6	25	35	31	3	0	66	"	105
5.	Alaska	N	6	22	31	36	3	0	69	"	110
6.	Alaska	G	6	19	28	41	6	0	69	"	115
8.	Superalaska	C	3	19	34	38	6	0	72	"	103
9.	Superalaska	N	6	25	31	35	3	0	66	"	101
10.	Surprise	A	6	9	19	22	28	16	50	4 and 5's	92
11.	Surprise	G	#	6	13	22	25	31	56	5 and 6's	97
12.	Surprise	R	3	6	13	22	34	22	56	"	98
13.	Surprise	W	3	6	16	19	34	22	56	"	102
14.	Wis. Ea. Sweet	R	3	13	19	25	34	6	59	4 and 5's	83
15.	Wis. Ea. Sweet	C	6	9	16	26	34	9	60	"	84
32.	Wis. Penin	W	3	6	9	16	22	44	66	5 and 6's	95
33.	Imp. Wis. Penin	C	3	3	9	16	28	41	69	"	89
34.	Pride	A	0	3	12	23	38	24	62	"	95
35.	Chief	R	6	16	22	25	28	6	53	4 and 5's	81
36.	Climax	R	9	19	25	28	19	0	53	3 and 4's	78
29.	Perfection	A	3	9	16	28	35	9	63	4 and 5's	80
37.	Perfection	C	0	3	6	22	38	31	69	5 and 6's	119
40.	Perfection	G	3	6	12	25	38	16	63	4 and 5's	101
41.	Perfection	M	3	3	12	19	38	25	63	5 and 6's	95
42.	Merit	D	0	3	9	12	35	41	76	5 and 6's	97

TABLE XII

Comparison of Yields and Days to Maturity of Freezing P as

Plot No.	Variety	Stock	Days to Maturity	Yield in Pounds per Replication		Ave	Yield per Acre in Pounds
				A	B		
16.	Glacier	A	58	196	208	202	4356
17.	Thomas Laxton	B	56	70	82	77	1660
18.	Thomas Laxton	C	54	81	93	87	1867
19.	Thomas Laxton	W	54	73	85	79	1701
20.	Thomas Laxton	A	56	71	85	78	1680
21.	Thomas Laxton	G	56	120	128	124	2676
22.	Thomas Laxton	M	57	116	114	115	2489
23.	Thomas Laxton	F	57	130	120	125	2697
24.	Thomas Laxton	S	58	207	197	202	4356
25.	Thomas Laxton	N	58	165	169	167	3609
26.	Thomas Laxton	L	58	199	191	195	4211
29.	S-54	W1	58	160	154	157	3381
27.	Gradus	R1	58	142	156	149	3215
28.	Imp. Gradus	B	62	281	263	272	5870
32.	No. 57	W	65	90	106	98	2116
53.	Miracle	S	65	143	157	150	3230
30.	President Wilson	A	62	166	178	172	3712
31.	Morse's Market	F	65	217	201	209	4501
45.	Gilbo	B	68	153	161	157	3381
46.	Stridelong	C	68	207	223	215	4626
47.	Alderman	A	70	159	151	155	3340
48.	Alderman	C	70	136	128	132	2842
49.	Telephone	R	71	123	137	130	2800
50.	Telephone	W	71	141	135	138	2966
51.	Telephone	G	71	153	131	142	3070

TABLE XIII

Comparisons of Yields and Days to Maturity of Canning Peas

Plot No.	Variety	Stock	Days to Maturity	Yield in Pounds per Replication		Ave	Yield per Acre in Pounds
				A	B		
2.	Alaska	A	55	140	162	151	3257
3.	Alaska	G	55	126	150	138	2996
4.	Alaska	W	55	134	146	140	3008
5.	Alaska	M	55	126	152	139	2987
6.	Alaska	C	55	125	155	140	3008
8.	Superalaska	C	56	120	126	123	2655
9.	Superalaska	N	55	120	118	124	2683
10.	Surprise	A	58	189	181	185	3983
11.	Surprise	G	57	207	191	199	4294
12.	Surprise	R	57	190	196	193	4169
13.	Surprise	W	57	221	211	216	4646
14.	Wis. Ea. Sweet	R	58	168	178	172	3734
15.	Wis. Ea. Sweet	C	58	175	159	168	3630
32.	Wis. Penin	W	63	218	200	209	4501
33.	Imp. Wis. Penin	C	63	199	185	192	4128
34.	Pride	A	65	231	215	223	4612
35.	Chief	R	63	112	118	115	2489
36.	Climax	R	65	132	148	140	3008
29.	Perfection	A	69	188	176	182	3920
37.	Perfection	C	71	134	146	140	3008
40.	Perfection	G	69	119	107	113	2427
41.	Perfection	M	68	212	232	222	4792
42.	Merit	D	70	170	158	164	3526

TABLE XIV

Tenderometer Quality Standards for Peas

Peas for Freezing (all varieties)

Tenderometer Reading	Grade
99 or less	Fancy
100-105	2nd Fancy (M grade)
105-115	Extra Standard
115 or more	Standard (rejects)

Peas for Canning

Alaska

109 or less	Fancy
110-125	Extra Standard
125 or more	Standard

Surprise Type

119 or less	Fancy
120-135	Extra Standard
135 or more	Standard

Climax and Perfection Type

114 or less	Fancy
115-130	Extra Standard
130 or more	Standard

TABLE XV
Color References for Leaflets, Pods and Peas
(Maers and Paul)

Variety	Leaflets	Pods	Peas
Alaska	22L6	20L2	19J2
Surprise	23L6	20L4	19K3
Wisconsin Early Sweet	23L8	20L3	19K3
Penin	23L6	20L2	18H3
Pride	23E9	20K4	18H3
Chief	23J8	19K3	18J2
Climax	23J9	20K3	18J3
Perfection	23J9	20K4	19J3
Merit	23K9	20K4	19J2
Glacier	23L7	21L5	20K5
Thomas Laxton	23L6	21K6	20K6
S-54	23L6	21K6	20K6
Gradus	22L6	21L4	20L6
Improved Gradus	22K7	21K5	19L6
No. 57	22E6	21K5	19L6
Miracle	22L6	22L6	20L6
Morse's Market	23L9	21K6	19L6
President Wilson	23L9	21L7	20L6
Gilbo	23J9	21K6	19L6
Stridelong	23J9	21K6	19L6
Telephone	23L9	21K9	20L5
Alderman	23L9	21K6	20L5

TABLE XVI

Variations in Plant Characteristics of Sweet Corn

Plat no.	Variety	Stock	Tassel Color (per cent)		Silk Color (per cent)		Plant Height (per cent)							
			Red	Green	Red	Green	42-48 in.	49-54 in.	55-60 in.	61-66 in.	67-72 in.	73-78 in.	79-84 in.	85-90 in.
1.	Seneca Golden	Ro	88	12	88	12	8	24	44	20		4		
2.	Tendergold	M	100	0	84	16	8	8	52	20	12			
3.	Tendergold	A	70	30	80	20		8	48	40	4			
4.	Tendergold	W	100	0	80	20		8	36	40	16			
5.	Pa. Aristogold	M	20	80	20	80	4	32	48	12	4			
6.	Burbank, H.C.	R	100	0	96	4		16	24	52	4	4		
7.	Kingscrest J-9	W	96	4	96	4	4	4	12	36	36	8		
11.	Hybrid 92-28	Ro	0	100	0	100			16	56	28			
12.	Golden Cross	Ro	0	100	0	100			8	52	40			
13.	Golden Cross	M	20	80	20	80		8	16	60	16			
14.	Golden Cross	R	80	20	80	20	8	16	12	36	24		4	
15.	Golden Cross	W	0	100	0	100			24	48	28			
16.	Golden Cross	A	100	0	0	100			32	28	36	4		
17.	Aristogold	M	0	100	0	100				4	28	40	24	4
19.	Ioana	W	100	0	100	0				20	28	44	8	

TABLE XVII

Variation in Ear Characteristics of Sweet Corn

Plat No.	Variety	Stock	Ear Length (per cent)					Number of Rows (per cent)					Row Regularity (per cent)		
			4-5 in.	5-6 in.	6-7 in.	7-8 in.	8-9 in.	8 rows	10 rows	12 rows	14 rows	16 rows	Regular	Slightly Irregular	Distinctly Irregular
1.	Seneca Golden	Ro		8	36	40	16	8	16	52	20	4	64	28	8
2.	Tendergold	M		4	20	64	12	4	4	56	20	16	28	44	28
3.	Tendergold	A		4	28	60	8			52	36	12	52	32	16
4.	Tendergold	W		12	40	40	8			60	32	8	48	32	20
5.	Ea. Aristogold	M		8	24	52	16	4	20	72	4		32	28	40
6.	Burbank, N.C.	R		8	28	48	16		4	8	56	32	60	28	12
7.	Kingscrest J-9	N		4	44	48	4	12	40	48			56	16	28
11.	Hybrid 98-28	Ro			4	72	24		32	68			56	28	16
12.	Golden Cross	Ro			4	20	16		12	72	16		88	4	8
13.	Golden Cross	M	4		20	56	20	20	24	44	12		64	8	28
14.	Golden Cross	R		4	36	48	12	12	32	36	20		80	8	12
15.	Golden Cross	W			4	84	12	4	12	80	4		76	12	12
16.	Golden Cross	A			16	52	32		4	88	4	4	76	24	
17.	Aristogold	M			4	52	44		8	68	24		96	4	
19.	Ioana	W			8	56	36	4	16	64	12	4	88	8	4

TABLE XVIII

Sweet Corn Yield Data

Plot No.	Variety	Stock	Days	Yield in Pounds per Replication			Ave	Yield per Acre
				A	B	C		
1.	Seneca Golden	Ro	84	45	38.5	39	40.8	8344
2.	Tendergold	M	87	49	46.5	34.5	43.3	8355
3.	Tendergold	A	87	49.5	43.5	48	47	9612
4.	Tendergold	W	89	47	43	41	43.7	8937
5.	Pa. Aristogold	M	95	43.5	43.5	40	42.4	8671
6.	Burbank N.C.	R	93	41.5	45.5	43	43.3	8344
7.	Kingscrest J-9	N	91	35.5	33	34.5	34.5	7015
11.	Hybrid 98-28	Ro	94	54.5	54.5	48	52.3	10696
12.	Golden Cross	Ro	94	54	57.5	46	52.5	10737
13.	Golden Cross	M	97	48	44.5	46	46.2	9448
14.	Golden Cross	R	97	46.5	55.5	50.5	50.8	10389
15.	Golden Cross	W	98	48.5	50.5	51	50	10225
16.	Golden Cross	A	94	45.5	56	61.5	54.3	11105
17.	Aristogold	M	99	52	50	58	53.3	10900
19.	Loana	W	98	47	54	51	50.7	10369

TABLE XIX

Grade and Maturity Classification of Sweet Corn
(Based on per cent of a 100-pound field sample)

Plot No.	Variety	Stock	Husked Ears	Immature	Whole Ear	Whole Kernel	Grain Style	Over Mature	Usable Cut Corn
1.	Seneca Golden	Ro	67	7	21	27.5	10	1.5	29
2.	Tendergold	M	63	4.5	20.5	26.5	8	3.5	28
3.	Tendergold	A	67	3.5	21	27.5	10.5	4.5	26
4.	Tendergold	U	68	4.5	16.5	23.5	13.5	5	29
5.	Pa. Aristogold	M	67	16	31	12	6	2	19
6.	Burbank N.C.	R	68	3.5	17.5	30	17		28
7.	Kingscroft J-9	N	60	5.5	53	16.5	5		19
11.	Hybrid 92-28	Ro	70	2	26	32.5	7.	2.5	28
12.	Golden Cross	Ro	70	3	32.5	25.5	8	1	26
13.	Golden Cross	M	68		13.	22.5	30.5		28
14.	Golden Cross	R	70	2.5	9	16	39	3.5	33
15.	Golden Cross	W	66	2.5	11.5	26.5	23	2.5	30
16.	Golden Cross	A	65	2.5	28.5	31	3		27
17.	Aristogold	M	69	1.5	13.5	16.5	16.5	19	29
19.	Ioana	W	68	.5	8.5	18.5	22.5	12	29

TABLE XX

Comparative Color of Beets

Plot No.	Variety	Stock	<u>Interior Color—Per cent</u>				Very Light
			Very Dark	Dark	Medium	Light	
1.	Detroit Dark Red	W	24	44	30	2	0
2.	Detroit Dark Red	A	39	47	12	2	*0
3.	Detroit Dark Red	H	27	58	14	1	0
4.	Detroit Dark Red	Ro	71	26	3	0	0
5.	Detroit Dark Red	F	53	45	2	0	0
6.	Perfected Detroit	N	34	58	7	1	0
7.	Perfected Detroit	Lu	45	48	7	0	0
8.	Ohio Canner	Lu	37	56	6	1	0

* 1 Small, wild, yellow fleshed beet-like plant found in sample.

TABLE XXI
Comparative Yields of Beets

Plat No.	Variety	Stock	Germination	Yield in Pounds per Replication			Average	Yield per Acre
				A	B	C		
1.	Detroit Dark Red	W	74	37	41	40	39	43,124
2.	Detroit Dark Red	A	90	33	38	40	37	40,402
3.	Detroit Dark Red	H	88	36	38	34	36	39,204
4.	Detroit Dark Red	Ro	89	24	25	27	25	27,334
5.	Detroit Dark Red	F	68	34	32	31	32	34,957
6.	Perfected Detroit	N	88	30	24	30	28	30,274
7.	Perfected Detroit	Lu	82	36	28	33	32	35,175
8.	Ohio Canner	Lu	87	36	24	29	30	32,485

TABLE XXII

Comparative Yields of Spinach

Plat No.	Variety	Stock	Germination	Plants per row foot	Days to Harvest	Yield in Pounds per Replication			Average	Yields per Acre
						A	B	C		
1.	Viking	H	93	14	43	37	32	34	34	24,624
2.	Viking	A	78	14	42	43	34	36	38	27,588
3.	Heavy Pack	W	93	13	44	43	35	32	37	26,862
4.	Darkie	A	93	12	49	32	30	28	30	21,780
5.	King of Denmark	F	88	12	46	28	25	28	27	19,602
6.	King of Denmark	W	88	14	45	32	30	28	30	21,780
7.	Nobel	N	90	11	44	30	30	32	31	22,506
8.	Queen of Holland	W	90	13	41	31	28	28	29	21,054
9.	Matador C	W	93	13	44	40	38	36	38	27,588
10.	Supra	H	90	12	42	38	24	29	30	21,780
11.	Dark Green	N	90	11	41	32	30	26	29	21,054
	Smooth Leaf									

CONCLUSIONS AND RECOMMENDATIONS

From the general observations and data secured in conducting this varietal, strain and stock seed trial the following conclusions and recommendations have been made:

PEAS FOR FREEZING

- L. The Thomas Laxton stock L and S were very satisfactory in trueness to type, were apparently resistant to root-rot injury and are therefore unqualifiedly recommended for commercial production. Stock N, apparently resistant to root-rot, was not as pure as the latter two and should be used only if necessary. Thomas Laxton stocks R, C, A, and F were acceptable in respect to trueness to type but were very susceptible to root-rot injury and are not recommended for areas in which this is a problem. Thomas Laxton stock U proved to be a fairly pure stock and in case of seed shortage could be used provided that it was not grown on root-rot infested soil. Stocks W and M were rather poor ones and are not recommended for commercial production.

Although Glacier was an excellent stock and apparently highly resistant to root-rot, the quality of the frozen product was considered inferior to that of Thomas Laxton. Variety S-54 stock W1 was not suitable for commercial production.

2. Improved Gradus stock R was an excellent one in respect to purity, productiveness, resistance to root-rot and quality, and is highly recommended for commercial production. Gradus stock Ri is not recommended for the reason that it was a gross varietal mixture. Miracle stock S was an exceedingly promising new variety and is recommended for further trial. Number 57 stock W was inferior and poorly adapted for commercial production in New York.
3. The dwarf-growing varieties as a group are not adapted for commercial production except on moisture-retentive soils with naturally high fertility levels. President Wilson was an excellent stock and if grown on the right soils should prove acceptable.

Although Horse's Market was a pure stock, it was considered inferior in quality and therefore is not recommended. Gilbo and Stridelong were the most vigorous of the dwarf varieties, were both good stocks and are recommended for further trial but not for commercial production.

4. The Telephone and Alderman varieties are used because of necessity rather than choice. They are, admittedly, only fair in quality and produce excessive vine growth in proportion to the amount of shelled peas, yet their season of maturity enables the processor to spread the packing season more advantageously. Alderman stock A and Telephone stock G were the best adapted and are recommended without reservation. Although Alderman stock R proved to be satisfactory in type, it was very susceptible to heat injury, and should be used only if necessary. Alderman stock C and Telephone stock W are not recommended for commercial production.

PEAS FOR CANNING

1. Alaska stocks A, W, and C proved to be entirely acceptable for commercial production. Stock N, although misnamed Superalaska, was a good stock of Alaska and when sold as such should be equally as desirable as the above mentioned stocks. Alaska stocks G and M were only fair stocks and should be used only if previously mentioned ones are not available in sufficient quantities. Superalaska stock C was considered inferior to others in the group and is not recommended.

2. The Surprise stocks R and W were satisfactory in performance and type and are recommended for commercial production. Stocks A and G were not as desirable, largely on the basis of inadequate bloom concentration, but are recommended for further trial. Wisconsin Early Sweet stocks R and C were both harvested too early to tell much about their productivity, but they showed every indication of being good stocks, and are recommended for commercial production.
3. The dwarf group of canning peas included one stock of Pride and two stocks of Penin. All three proved to be uniform and true to type. There is some divergence of opinion regarding the quality of Pride, and Penin is not acceptable as a canned product to all brokers. Recommendations for commercial production necessarily are dependent upon their acceptance by the canning industry.
4. Perfection stocks A, G and M were remarkably uniform, although the latter was not typical Perfection in varietal characteristics. The first two are recommended without reservation, and the latter is recommended for further trial. Stock C was poorly adapted to the section, not uniform in plant characteristics and therefore not recommended for commercial production. Merit, although possessing

many desirable characteristics, was considered to lack the necessary uniformity in pea color. It is recommended that it be given further trial.

SWEET CORN

1. Seneca Golden stock Ro is not recommended for commercial production on the basis of inadequate uniformity and poor yield.
2. Of the three Tendergold stocks in trial, stock A was the best and should be highly satisfactory. Tendergold stock W was fairly uniform and is provisionally recommended, whereas stock M lacked the necessary uniformity for a well bred canning corn.
3. Early Aristogold was not an early variety, was distinctly uneven in maturity and ear characteristics and is not recommended.
4. Burbank Northern Cross was uniform and true to type but was not superior to Golden Cross in general adaptation, and consequently has nothing to recommend it over that variety.
5. Kingscrest J-9, although fairly true to type, possessed the deep orange yellow kernels considered to be highly objectionable for ear-pack corn in New York.
6. Hybrid 92 X 28 was an exceptionally uniform and productive variety and is highly recommended for

commercial ear-pack production.

7. Golden Cross stocks Ro and W and strain A were the outstanding ones in trial of this hybrid variety, all of which are unqualifiedly recommended for commercial production. Golden Cross stocks M and R were quite the opposite in respect to uniformity and trueness to types, and have little or no place in commercial production for canning or freezing.
8. Aristogold, although an excellent stock in respect to purity and trueness to type, developed deep orange yellow kernels at the prime whole-kernel stage and is therefore not usable in New York.
9. Ioana was a good stock but its quality was not considered good enough for extensive commercial production, and is therefore not recommended.

BEETS

1. Practically all stocks of beets observed in the trial were commercially acceptable. Detroit Dark Red stocks Ro and H are recommended for July planting on the basis of color and top growth, the latter an essential characteristic for efficient pulling by the mechanical harvester. Stocks W and F produced smaller tops and were recommended for spring planting only. Stock A contained one yellow-fleshed beet and probably should be regarded with

- suspicion until subjected to further trial.
2. Perfected Detroit stock Lu possessed good color and top growth and is recommended for July planting. Stock N contained a small percentage of off-type roots and should be used only if necessary.
 3. Ohio Canner, although somewhat inferior in color to what it formerly was, proved to be commercially acceptable, particularly in respect to the uniformity of root conformation and top growth.

SPINACH

1. Of the two Viking stocks in trial stock A was the better, but since Heavy Pack proved to be a much superior strain of Viking, it is recommended for commercial production in preference to either of the Viking stocks.
2. Darkie possessed several valuable characteristics not hertofore observed in spinach, but the presence of 5 per cent off-type pre-mature seed stalk producers must limit its use to breeding and continued trial.
3. King of Denmark stock W was superior to stock F and is recommended where this type is grown.
4. Although Nobel proved to be satisfactorily pure, the variety is not adapted to freezing as well as Heavy Pack and King of Denmark, and is therefore

not recommended.

5. Queen of Holland and Dark Green Smooth Leaf did not possess satisfactorily long-standing characteristics and are not adapted for commercial production.
6. Matador C appeared to have considerable promise, was very productive, uniform and long-standing. It is recommended for commercial trial.
7. Supra, although a fairly uniform stock, had nothing to recommend it over standard varieties, but it is suggested that it be given further trial.

SUMMARY

In 1939 a critical study was made of some vegetable varieties, strains and stocks of peas, sweet corn, beets and spinach grown in western New York. In contrast to the usual variety study, for the most part each lot of seed used in the experiment was a sample of the identical stock seed used by the seedmen to perpetuate the line from which expected commercial deliveries were to be made the following year. By growing the seed and recording the results it was believed feasible to determine a year in advance, the advantages and disadvantages of any line. It would then be possible to cancel the seed contracts of those stocks not found satisfactory for commercial production.

A detailed study was made of 48 pea lots (25 adapted for freezing and 23 for canning), 15 sweet corn lots, 8 lots of beets and 11 lots of spinach. These were planted in replicated plots and carefully observed throughout their growth period in an attempt to determine of each lot the trueness to type, degree of vigor, tolerance to disease, insect injury and heat, relative productivity, quality and general adaptation to the region in question.

PEAS

Among the freezing peas types 2 stocks of Thomas Laxton were recommended without reservation, 5 stocks were provisionally recommended because of their susceptibility to root-rot and 3 were not recommended because of impurities and root-rot susceptibility. Two other varieties, Glacier and S-54 were not recommended because of poor quality and mixture respectively. In the Gradus group Improved Gradus R was recommended for commercial production, Miracle for continued trial and Gradus R1 and Number 57 not recommended because of gross varietal mixture and poor adaptation. The dwarf varieties President Wilson, Morse's Market, Gilbo and Stridelong were all true to type, but only President Wilson was recommended for commercial production, with the added provision that it be limited to the best soils only. Two Telephone-type stocks were recommended; one was susceptible to heat and 2 others were mixed.

Among the canning types 4 Alaska stocks were recommended, 2 were considered fair and 1 was found poorly adapted. Two stocks of Surprise were satisfactory and 2 were only fair. Both stocks of Wisconsin Early Sweet were acceptable. The dwarf varieties of Pride and Penin were pure stocks but were not recommended because of a divergence of opinion in the trade regarding their

quality and utility. Two stocks of Perfection were recommended without reservation, 1 was recommended for further trial and 1 was not adapted to the section. The new variety Merit was observed to have promise, but was not considered ready for commercial production.

SWEET CORN

The sweet corn varieties Tendergold stock A, Hybrid 92 X 28 and Golden Cross stocks Ro and W and strain A were recommended as superior to the others in the trial. Early Aristogold, Kingscrest J-9, Golden Cross stocks M and R, Aristogold and Ioana were considered inferior on the basis of uniformity of maturity and ear characteristics or on the quality of the processed product.

BEETS

All but one of the beets were recommended as suitable for commercial production. Detroit Dark Red stocks Ro, H, W and F were satisfactory, but stock A was regarded with suspicion because of the presence of a yellow-fleshed beet in the population. Perfected Detroit stocks Lu and N possessed good color although the latter contained a small percentage of off-type roots. Ohio Canner was also recommended.

SPINACH

The spinach varieties Heavy Pack, King of Denmark stock W and Matador C were superior for commercial purposes. Darkie, although very promising due to its unexcelled color, texture and flavor, was not recommended for commercial use because 5 per cent of the plants produced pre-mature seed stalks.

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