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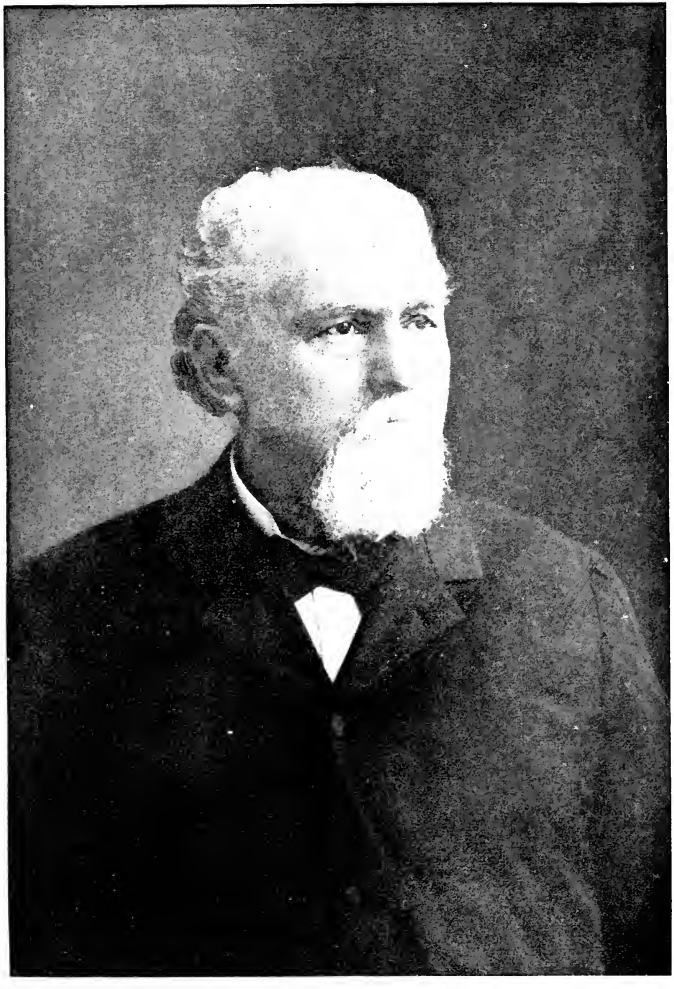

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SOUTHERN GARDENER'S PRACTICAL MANUAL

BY

J. S. NEWMAN

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PREFACE

SINCE White's "Gardening for the South," first published in 1856, there has been no work which furnished a reliable, practical guide to the southern gardener. There are works which treat instructively of the scientific principles involved in the art of gardening. There are others which, emanating from the northern states, are valuable for that section of our country, but, owing to variations of soil and climatic conditions, they possess little value as a guide to the southern gardener. The object of this work is to furnish a reliable, practical guide to those who desire to avail themselves of the wonderful facilities afforded by our sunny Southland for supplying the family table with fresh vegetables from the kitchen-garden every day in the year.

Fifty years of successful experience in gardening and fruit-growing on both a domestic and a commercial scale, inspires some measure of confidence in my ability and right to speak *ex cathedra* on the subject.

During an official life of thirty years, in close touch with the tillers of the soil, and through a voluminous correspondence, covering answers to letters of inquiry from farmers and horticulturists, I have been impressed with the need of a work of the character of the one now attempted. While it is undertaken with many misgivings as to my ability to adequately supply the demand,

the earnest appeals of many friends to leave to the millions of southern toilers the lessons learned during a half century of study, experiment and experience as a devotee to the art of horticulture, encourage me to make an effort to leave some guiding "footprints on the sands of time."

Believing that a more abundant and continuous supply of tender, fresh vegetables and luscious fruits upon the tables in our southern homes, replacing to some extent the deadly frying-pan and the omnipresent canned goods, will contribute to health, refinement and intellectuality, I feel that my declining years can, in no other way, be more appropriately spent than in an earnest, honest effort to render our farm homes more attractive and their occupants more healthy and happy.

The true gardener loves his plants as living companions, and enjoys their successful growth as he does the happiness and prosperity of his children. Plants respond to kind, intelligent treatment, and manifest their gratitude by supplying more abundantly and perfectly their treasure of flowers and fruits. The fragrant rose greets with blushing pride the coming of its kindly benefactor, and seems to delight in his affectionate admiration. There can be no contamination from association with plants, and no danger of deadly disease germs in the consumption of their products.

I have been greatly assisted in the preparation of this book by Prof. C. C. Newman, Professor of Horticulture in Clemson Agricultural College, and Horticulturist of South Carolina Experiment Station.

J. S. NEWMAN.

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PART I.—INTRODUCTION

THE SOIL

THE agriculturist and horticulturist must have a clear conception of the relations which soil, plants and animals bear to each other and to man, who is entrusted with the responsible commission to keep, till, and beautify the earth. He who leaves that part of the earth's surface which has been entrusted to his care in a worse condition than it was when he gained possession of it, is a desecrator of God's footstool and a violator of a most sacred trust.

All life is dependent upon soil and air. This being true, every tiller of soil is interested in the origin of soil and the agencies which contributed to its production. This interest is intensified when he learns that the same agencies which gave birth to the soil are his daily and hourly co-laborers in preserving and increasing its productiveness. Geologists tell us that, at some period in the remote past, the crust of the earth was solid rock, and that through the alternation of heat and cold, expansion and contraction of the immediate surface, fissures were made, into which rain-water entered, and this, by means of its wonderful expansive force when frozen, burst asunder the sides of the fissures and crumbled or disinte-

grated the rock, forming small rock particles, which we call soil. The carbonic acid and oxygen of the air further acted upon these rock particles and still further disintegrated them. Rain-water, flowing over the surfaces of the rock, gradually moved these particles to lower elevations until there accumulated sufficient inorganic material to constitute what we term soil. The organic constituents, however, being absent, economic plants could not be grown.

Another agency participated in remedying this defect. There are primitive plants, known as lichens, which grow upon the surface of rocks. These catch and hold rain in their season of growth. This water freezes and lifts the little plants from their moorings, and, torn asunder from the rocks, they are washed down to form a nucleus of organic matter in the soil below. These primitive plants evidently have the power of collecting nitrogen from the air, thus contributing this most important volatile element to the newly formed soil; and, the nitrogen combining with the mineral constituents derived from the dis integrated rock, the growth of a higher order of plant life is rendered possible. Bacteria are now supposed to have had an active agency in the formation of soil.

THE SAME AGENCIES STILL ACTIVE

Few gardeners realize the extent to which all of these natural agencies,—mechanical, chemical, and bacteriological,—are collaborators with them in their efforts to improve their soils and increase their crops.

By fall plowing, the gardener utilizes the work of

freezing temperature in pulverizing his soil. This facilitates the beneficial influence of the air by allowing it free access to the particles of soil, which are thus acted upon by the constituents oxygen and carbonic acid. This, in turn, makes the soil a comfortable home for the beneficial species of bacteria, the nitrifiers.

How fortunate are we in having the services of these powerful, though silent and unseen, laborers at our bidding, especially when we consider that they require only such intelligent manipulation of the soil as will render their invaluable, freely rendered services practicable.

GENERAL CLASSIFICATION OF SOILS

There is a perpetual movement of soil, together with portions of the decomposing organic matter upon its surface, from higher to lower elevations. Where there is small variation in the surface elevations of the country, the larger part of the disintegrated material remains where it is formed. These are termed by geologists sedentary soils, or *soils in place*. Their mineral constituents are proximately known by the indications of the chemical analysis of the parent rock.

That considerable movement of such soils, and especially of their organic constituents, has taken place, is shown by the greater productiveness of slight depressions compared with that of the more elevated portions of the surface.

TRANSPORTED SOILS are those which have been so far removed from the place of their birth that no reliable indication of their source remains. These are divided into:

(*a*) *Drift*, or coarse material which has been deposited from water in motion. This fact is usually indicated by the presence of water-worn pebbles in great variety and distinctively different in character. This drift-deposit is very clearly marked, in the southern states, along the margin of the old ocean bed forming the dividing line between the tertiary formation and the older land.

(*b*) *Alluvium*, or soil deposited from still water, conspicuously manifest in river-bottoms, containing liberal amounts of humus, light material easily floated so long as the water was in motion. The fertility of such soils as compared with that of uplands, which have been so cultivated as to destroy the humus, emphasizes the necessity of perpetuating the supply of this constituent through the liberal application of coarse manures or a judicious rotation of crops.

AGRICULTURAL CLASSIFICATION

Clayey soils are composed of very minutely divided particles, which retard the free percolation of water. For this reason, they remain wet long after rains. Since much of the surface moisture is carried off by evaporation—a cooling process—gardeners speak of them as "cold" soils. Owing to the fact that they resist the passage of the plow through them, they are spoken of as "heavy" soils as distinguished from sandy or sandy loam, although a cubic foot of sand is heavier than the same volume of clay. Owing to this evaporation from the surface, preventing access of air, the fine soil-particles contract and adhere to each other, thus causing

shrinkage, resulting in the hardening of the surface and the forming of openings or cracks in periods of drought. These cracks admit the heated air, and the contraction which produces them breaks the fibrous roots of plants, thus intensifying the injurious effects of drought. Owing to the slowness with which clayey soils dry, they are often seriously injured by cultivation while wet. This class of soil is not adapted to horticultural use.

Clay loam is clayey soil ameliorated by the presence of sand and humus, but in which clay predominates. If well supplied with humus, to increase its porosity, darken its color, and thus increase its friability and elevate its temperature, clay loam is well adapted to the growth of many vegetables, but is not so desirable for a garden soil as the following.

Sandy loam is one in which sand predominates over the clay. If kept supplied with humus, either by heavy applications of animal manures or by proper rotation, this constitutes the typical garden soil. The fine clayey soil-particles fill the inter-spaces between the grains of sand and, together with the humus, produce a soil of *good texture*, favorable to proper tillage and cultivation, promptly warmed in spring and hence favorable to early gardening, admitting free percolation of rain-water, a free circulation of air, and facilitating the ascent of capillary moisture in periods of drought.

Sandy soils, composed principally of small particles of quartz rock, are objectionable in many respects. The particles of quartz being impervious to water, the rain-water passes too freely through, carrying the soluble

substances available for plant-food out of reach of the feeding roots of our cultivated crops.

If the sandy surface rests upon a good clayey subsoil in reach of the plow, its most serious defects may be remedied by turning to the surface in the fall season a portion of the clay to be pulverized by the frosts of winter and incorporated with the sand. In conjunction with this, such rotation of crops as will abundantly supply humus, converts the sandy soil into a sandy loam, the best type of garden soil.

SOIL IS THE GARDENER'S BANK

The success of the gardener will depend very largely upon his judgment in selecting and his skill in the management of the soil upon which he grows his crops. The plant being absolutely dependent upon the soil for the supply of all of the mineral elements which enter into its composition and for much of the volatile constituents, its importance as the gardener's bank will be at once recognized.

ELEMENTARY COMPOSITION OF PLANTS AND THEIR SOURCES OF SUPPLY

By an element is meant any substance which cannot, with our present knowledge and means, be separated into two different kinds of matter.

So far as known, all substances are compounded of about seventy-four of these elements. Of these, only fourteen are necessary for the production of all forms of vegetation.

The plant derives all of its substance from soil and air. Those derived from the air are known as organic elements, and those derived from the soil as inorganic. These terms are somewhat confusing, since in a certain sense the soil-derived substances are organic when forming a part of an organized body. They are, however, usually classified as organic elements derived from the air and inorganic elements derived from the soil, as follows :

Air-derived, or Organic Elements—	*Soil-derived, or Inorganic Elements—*
Carbon	Phosphorus
Hydrogen	Sulphur
Oxygen	Chlorine
Nitrogen	Silicon
	Calcium
	Iron
	Potassium
	Sodium
	Magnesium
	Manganese

The four so-called organic elements are derived directly (or indirectly through the soil) from the air. These return almost entirely to the air when a plant is burned, while the remaining ten are mainly left in the ash.

The elements derived from the air constitute about ninety-five per cent of all vegetable substances, and yet, with the exception of nitrogen, we are not concerned with their supply. While this is primarily derived from the air, plants secure their supply either from substances containing it in the soil or, as is the case with legumes, from the air imprisoned in the soil.

About four-fifths of the ocean of air which bathes the surface of our globe is uncombined nitrogen. The only known means of collecting this nitrogen from the air is the power possessed by leguminous plants, such as peas, beans, clover, alfalfa, vetches and others, which collect it through the agency of microscopic organisms known as bacteria, that have their homes in excrescent nodules, formed upon the roots of such plants. While these bacteria possess the power of fixing the nitrogen from the air, it is supposed to be changed to the form of nitrates before being appropriated by plants. We understand by nitrate, nitric acid combined with some metal, as sodium, a familiar form of which is known to chemists as sodium nitrate or, in commerce, as nitrate of soda. If it combines with potassium, we have potassium nitrate, nitrate of potash or saltpeter.

Of the fourteen elements found by chemical analysis, to be present in plants, only three,—nitrogen, phosphorus and potassium—are usually considered in the application of fertilizers to the soil. On some soils lime is a needed constituent.

The principal commercial sources of supply of these are:

NITROGEN—(*a*) *Mineral sources:* Sulphate of ammonia, nitrate of soda and (in Europe) nitrate of potash; (*b*) *Animal sources:* Dried blood and tankage, two by-products from slaughter-houses; fish-scrap, etc.; (*c*) *Vegetable sources:* Cottonseed-meal, castor-bean, pomace and tobacco stems. Natural guanos and animal manures are also important sources.

The most cheaply available and inexhaustible source

is the air, through the agency of leguminous plants, the varieties and uses of which will be discussed further on.

SOURCES OF PHOSPHORIC ACID

Previous to the discovery of the beds of phosphate of lime on the coast of South Carolina by Dr. N. A. Pratt, in 1867, the only commercial source of phosphoric acid was animal bone. At present, the principal deposits of phosphate of lime, from which the commercial supply of phosphoric acid is obtained, are found on the coast of South Carolina, in southern Florida and Tennessee. These, pulverized to the condition of an impalpable powder and treated with sulphuric acid, yield the available phosphoric acid so extensively used in the Atlantic and Gulf States.

COMMERCIAL SOURCES OF POTASH

The Stassfurt mines in northern Germany now supply practically all of the potash salts used in compounding commercial fertilizers. Of these:

Muriate of potash contains 48 to 52 per cent of actual potash, and constitutes the principal source of supply in manipulated commercial fertilizers.

Kainit, a natural product of the same mines, is extensively used in the southern states. This contains from 12½ to 13 per cent of actual potash, in combination with 23 to 26 per cent of sulphate of potash, about 35 per cent of common salt (chloride of sodium), some sulphate and chloride of magnesia and a small amount of gypsum.

Sulphate of potash of high grade contains 48 to 51 per cent of actual potash. This form is usually preferred to muriate or kainit for tobacco and some garden crops, such as Irish potatoes and other starch-producers. There are other commercial sources of potash, but these are most commonly used.

RELATION OF SOIL TO PLANTS

While a very small part of the food of plants is furnished directly by the soil, the plant is dependent upon it in many ways. It supports it mechanically in an upright position, and thus exposes its leaves to the influence of the direct rays of the sun. It furnishes a field in which its roots ramify and gather, not only the mineral or ash elements of its food, but the moisture necessary to serve as a vehicle for the transmission of its supplies, both direct and indirect, into its circulation.

The soil is the storehouse of plant-food, the larger part of which is held in reserve in insoluble compounds awaiting intelligent manipulation to induce such conditions as will render its stores available to plants. It is at once a chemical and biological laboratory in which nature's reagents are ever at work producing, by analysis and synthesis, the mysterious metamorphoses of the material which is there stored for the use of the plant. Chemical changes and bacteriological activity await the skilful manipulation of the intelligent gardener to supply the conditions necessary for the maximum usefulness of these auxiliary forces. It receives and stores the warmth of the sun's rays, husbands

the moisture from the seasonable showers, and admits into its porous surface atmospheric air, thus supplying necessary requisites for seed germination and plant-growth.

Soil analysis.—The chemist can tell us, through the analysis of the soil, what elements it contains and how much of each is present, but he cannot tell whether these elements are available as plant-food. He cannot, therefore, learn through the analysis what elements must be supplied to any particular soil to increase plant-production. Soil analysis is especially serviceable in its negative results. If analysis shows the absence of any one of the three essential elements, we know that it must be supplied to render plant-growth possible.

In an excellent bulletin (No. 94, New Series) of the New York State Experiment Station, Dr. L. L. Van Slyke, discussing the amount of plant-food in soil, says:

"The amount of plant-food, even in a fertile soil, is comparatively small. One thousand pounds of a good soil may contain:

Phosphoric acid	1½ pounds
Nitrogen	1½ pounds
Potash	2 pounds

"Some soils may contain larger quantities than these. But when we consider the total amount of plant-food in one acre of soil, the amounts appear large."

While the weight of soil in an acre of different kinds of land varies, we may take the average weight of dry soil in one acre, to the depth of nine inches, as approximating about 3,000,000 to 3,500,000 pounds. One acre

of soil containing the proportions of plant-food given above would, therefore, contain the following aggregate amounts:

Nitrogen	4,500 pounds
Phosphoric acid	4,500 pounds
Potash	6,000 pounds

In addition to these stores of plant-food in the first nine inches, large amounts of insoluble mineral matter are found in the subsoil. The intelligent gardener, recognizing the important part performed by the soil in furnishing directly all of the mineral constituents found in plants, and supplying indirectly nearly all other plant-food, devotes his attention almost exclusively to such treatment of the soil as he thinks most conducive to healthy plant-growth. He feeds his plants, through the medium of the soil, with such combinations of elements as experience and experiment have shown to be necessary to supplement the natural stores of available plant-food in the soil. He manipulates the soil with plow and harrow to facilitate the work of chemical agents and beneficial species of bacteria. In addition to this mechanical manipulation, he applies animal manures, rotates with leguminous crops to furnish humus, adds lime and other amendments where needed, using every means in his power to secure that condition of his soil known as "good texture," which is necessary for the successful germination of the seed and the growth of the plant. The accomplishment of this will be greatly facilitated by the selection of sandy loam or clay-loam as the garden soil.

So important is the soil that success or failure depends upon the gardener's industry and skill in its management.

PLANTS

It is not enough that the gardener should acquaint himself with the needs of the soil which he cultivates, and learn how most effectively and economically to supply them, but he must become thoroughly familiar with the peculiar characteristics and requirements of every species of the plants he cultivates. This can be learned by personal contact and association, accompanied with a close and critical study of the life-history of the plant from the germination of the seed on through its life history, including its feeding and growth, to its completed reproduction.

WHAT IS A PLANT?

An approximately complete answer to this question as regards flowering plants is "An organized vegetable structure having roots, stems and leaves, the destiny of which is to reproduce itself through the agency of flowers and seed." All plant-life proceeds from germs or buds.

The propagation of plants through these agencies involves a most interesting study, which underlies the whole problem of successful agriculture, in which horticulture is the branch which appeals most closely to the unit of civilized life—the home, and in which each member of the family is more or less interested.

GENERAL CLASSIFICATION

All flowering plants are grouped into two general classes, viz.:

Exogens, or outside growers, and *Endogens*, or inside growers. The distinctive characteristics of these classes are so marked that they are easily recognized. *Exogens* have two or more seed-leaves, form new growth on the outside, are hardest on the inside, have a vertical, descending axis or tap-root, the bark readily separates from the wood during active growth. To this class belong all of our forest trees except the palm family.

Endogens embrace all plants of the grass family, including cereals, corn, cane, sorghums, etc. They vegetate with *one* seed-leaf, grow from the inside, are hardest on the outside, have no tap-root, and have no distinct bark.

DURATION OF LIFE

Plants are also classified as:

Annuals, or those which grow during one season, ripen their seed and die. Examples of this class are corn, peas, beans, the melon family, etc. These store in the seed a germ and food for the young plant.

Biennials are those which live through two seasons, and usually store in roots, bulbs or stalks, food from which the seed-stalk is produced the second year. Familiar examples of these are found in the onion, beet, turnip and other root crops.

Perennials are those which have no definite period of life but continue to grow from year to year, produc-

ing seed after attaining the required age, which differs in different species. Very few garden vegetables are perennial.

Perennial-rooted plants succumb to frost above ground, the roots living through the winter. The most conspicuous of these among garden vegetables are asasparagus and horse-radish.

The artichoke and Irish potato reproduce from tubers, while the sweet potato is propagated from tuberous roots or from vine cuttings.

HOW PLANTS FEED—HOW THEY GROW—AND HOW THEY REPRODUCE

There are few subjects more intensely interesting to the lover of Nature than her methods and processes in plant-building and plant-reproduction.

Without entering into the intricate details of the results of scientific research into Nature's secret in these respects, it is important that the gardener who desires both profit and pleasure from his chosen vocation should acquaint himself with the laws of being of his plants and the manner in which the different parts cooperate in collecting, distributing, preparing and appropriating the crude, dead material of soil and air and transforming it into a thing of life and beauty.

The active agents in the feeding and growth of plants are their roots, stems and leaves. These are the organs of vegetation, or growth. It is through these that the dead materials of soil and air are collected, distributed, transformed and vitalized, each working in its

own sphere but in perfect harmony with and dependence upon the others. The microscope reveals the fact that the growth of the plant is an intricate process of cell-building. While the plant possesses no venal or arterial system for the circulation of its vital fluids such as animals have, it possesses a closely analogous intercellular circulation.

Plants take their food either in a liquid solution or as gas—the former through minute root-hairs on the growing parts of the roots, the latter through microscopic openings (stomata) in the leaf surface. This food is not assimilable when taken into the circulation, but must undergo a process in the economy of the plant similar to that of digestion in the animal.

After the seed has been subjected to the requisite influence of warmth, moisture and air to vitalize its germ, the plantlet utilizes the material stored in the seed-capsules in equipping itself with roots, stems and leaves preparatory to performing all of the functions of a complete individual plant.

The following feeding process now takes place: The minute root-hairs absorb, from the soil with which they come in contact, moisture in which appropriate food has been dissolved. This is conveyed by capillary force through the cellular structure of the root and stem to the leaves, where a part of the moisture carrying the solution is exhaled into the air. The solution thus becomes more dense than that entering the leaves, and the process known as diffusion of liquids begins. The changes which have taken place in the leaves have converted the crude sap-fluid taken in by the roots into prepared, digested or

assimilable plant-food. This now diffuses downward through the cells as the crude and more diluted liquid rises, and the parts of the plant from leaf to root appropriate this prepared material to the formation of new cells and through them to plant-growth. While the roots are collecting food, in solution, from the soil, the leaves are taking from the air, carbon and oxygen combined as carbon dioxide (carbonic acid gas), which they dissect, using the carbon as building material during the day, giving the oxygen back to the air and reversing this process at night, appropriating the oxygen and discarding the carbon. It is thus shown that all parts of the plant are mutually dependent upon each other. The roots collect the soil-derived material and send it up to the leaves to be prepared for food. It then diffuses to all parts of the plant, the roots included, contributing to the growth and development into a complete individual. This is the simple story of the feeding and growth of the plant.

SEXUALITY IN PLANTS

Plants reproduce naturally by seed, bulbs, tubers, underground stems, etc., but by far the most common plan is through flowers, resulting in the production of seed.

Flowers of different species of plants differ materially in the arrangement of the essential organs of reproduction. The three principal types are:

Bisexual, or perfect flowers, having all of the essential organs of reproduction in the same flower. Okra, beans, and the cabbage family have perfect flowers. These

contain, besides the petals or the ornamental part, the *stamens*, or male organs, and the *pistil* (or pistils), the female organ.

The *stamens* are composed of two parts, the stem or *filament* on the end of which is a little sack or anther containing a fine powder or *pollen*, which is necessary to fertilize the pistil or vitalize the *ovules* or embryo seed. The pistil is also composed of two parts, the stem, or *style*, and the *stigma*. The latter, which rests upon the upper end of the style, is divided into lobes corresponding in number with the compartments of the *ovary*, the enlarged body upon which the pistil rests and with which it communicates. The pollen-granules fall upon the stigma, which is covered with a retentive gummy substance.

These granules vegetate and communicate, through the filament, with the ovules, and vitalize them. The ovary (egg-bag) contains the ovules (little eggs), or embryo seed. In the okra, the edible pod is the ovary, as is the fruit of the eggplant, the bean pod, etc. Plants bearing *bisexual*, or perfect flowers are capable of producing seed without external aid, as all necessary parts are present in each flower. Such seed, however, cannot always be depended upon to reproduce the variety of plant on which they grow on account of the visitation of insects, which carry the pollen from flower to flower and thus cross-fertilize the pistils.

Monœcious plants.—All plants do not bear perfect flowers, but many have the male organ, or stamen, and the female organs, the pistil, ovary and ovules, in different flowers on the same plant. This is illustrated in the

corn-plant, which bears the stamens on the tassel and the pistil in the silk, each strand of silk being connected with an ovule, and hence the stigma of each strand of silk or pistil must receive a pollen-granule in order that the ovule to which it is attached may produce a grain of corn. All of the melon family belong to this class, the ovary in these cases showing before the flowers open, below the female flower or that containing the pistil. The flowers containing the stamens are readily recognized

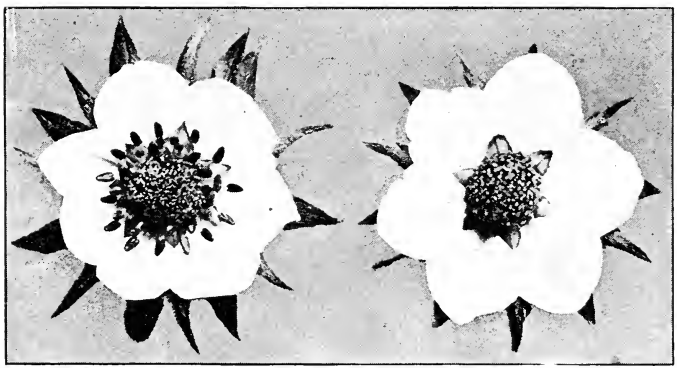

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FIG. 1. Bisexual flower Pistillate flower

by the absence of the ovary. Plants of this class are more liable to cross-pollenizing than are the bisexual, because they are largely dependent upon the priestly office of the bee for marrying them. The melons, squashes and others of that class are so completely dependent upon insects that flowers which open under such weather conditions as prevent the visits of insects fail to produce.

Diœcious plants.—A third class of plants bear male flowers and female flowers, or those containing stamens and pistils on separate plants. Asparagus and spinach are illustrations of this class.

CROSSES AND HYBRIDS

Extreme caution is necessary to prevent varieties of monœcious plants from crossing and their species from hybridizing. This is especially true of the melons, cucumbers, squashes, and gourds and corn. It is impossible to prevent crossing if varieties are grown near each other, while cucumbers and cantaloupes hybridize, as do squashes and gourds. Such crosses and hybrids not only affect the crops grown from the seed, which have been cross-fertilized, but the flavor of the fruit of the current year is affected. If gourds are grown near squashes, cucumbers near cantaloupes, or even watermelons near pumpkins, occasionally the effect upon the flavor is appreciable.

Some very marked cases of the cucumber hybridized with the cantaloupe have occurred in the experience of the writer. The seed of the hybrid produced in each case.

While accidental crossing of varieties is very troublesome to the gardener and fruit-grower, new varieties are thus produced, which greatly enrich our catalogues. Although closely related species hybridize readily, it is almost impossible to establish a type which is sufficiently fixed to reproduce itself accurately.

The desirable qualities of two varieties may be

blended by artificial crossing so guarded as to exclude the pollen of all varieties other than the one desired.

The process is very simple, and with bisexual flowers is conducted as follows: The corolla is opened artificially before the anthers are ready to burst and distribute the pollen. The stamens are carefully removed without injuring the pistil, and a light paper bag is carefully slipped over the flower to prevent access of pollen from other flowers. The flower from which the pollen is to be used is also protected in the same manner. As soon as the pollen in the flowers of the plant is ripe or ready for distribution and the pistil ready for its reception, that from which the pollen is to be used is carried to that from which the stamens have been removed, its pollen gathered on a delicate camel's hair brush and gently deposited on the stigma of the pistil. This flower is again protected from access of other pollen until the day's inflorescence has been completed.

The seed from the ovary of the pistil thus treated, being the combined and exclusive production of these two varieties, will produce a new variety having the qualities of the two parents blended in a new individual.

Selection of seed from ideal plants, blending in the highest degree the good qualities of the parents, will be necessary for several generations of the offspring to perfectly fix the type desired. This practice relates to crossing varieties bearing bisexual flowers. In the case of monœcious and diœcious plants, the pistils and stamens appearing in different flowers, the same process is pursued except that there will be no stamens to be removed.

In the orchard and vineyard, plants are propagated true to variety by division, while in the garden, with the exception of those species which are propagated by bulbs, tubers or tuberous roots, we are dependent upon seed for growing our vegetables.

ROTATION OF CROPS

This should be systematically practiced in every well-conducted garden. The reasons for this practice are based on sound scientific principles.

A proper rotation maintains good physical condition or good texture. This may be accomplished by very heavy annual applications of animal manures.

Different species of plants take from the soil the elements of plant-food in different proportions, hence the continued cultivation of the same crop on a soil may exhaust the available part of the element or elements which it requires in largest proportion, besides causing other injurious effects noticed further on.

The fungous parasites which attack particular species of plants are multiplied from year to year if plants of this species are continuously grown on the same soil, while, if other species which are immune to these parasites are alternated with the host plants of such parasites, the latter fail to be reproduced and disappear. Nearly all insects confine their depredations to particular species of plants, and as these insects hibernate in or near the soil on which their food plants have grown, they become more destructive as they are multiplied by their favorite pasturage. The Colorado potato beetle did not multiply

until fields of their favorite food plant increased their broods.

Some crops supply humus either through the parts left on or in the soil, or through the mulch used to retain moisture, as in the case of potatoes.

Some plants feed through fibrous roots which ramify near the surface, while others extend their roots more deeply, draw their food supply from lower strata and even from the subsoil.

Legumes, such as beans, peas, etc., collect nitrogen from the air, not only thus contributing to their own growth, but leaving the soil supplied with this element for the use of future crops—they are nitrogen-collectors. The majority of our garden vegetables are nitrogen-consumers, and derive this element of their food from the soil. As far as practicable, therefore, nitrogen-collectors should follow nitrogen-consumers, and vice versa. Some garden crops are more favorable to the growth of weeds than others. These should not succeed each other, but should rather be alternated with clean culture crops.

Neither grass nor weeds should ripen seed in a garden if possible to prevent it. Large quantities of grass and weed seeds are introduced into the garden in home manures not properly fermented.

All of these manures should be composted with acid phosphate and allowed to ferment in heap until the germs of all seed which they contain are destroyed.

Plants of the same species should not succeed each other. Plants grown for their seed, or for fruit in which the seed are developed, should follow and be followed by those grown for their leaves.

While rotation cannot be so thoroughly practiced in the garden as in the field, it should never be entirely overlooked in the allotment of the different crops.

No gardener should be content to grow only one crop a year, except those which necessarily occupy the soil throughout the growing season, such as okra, salsify, parsnips, etc. Succession and intercultural crops add to both the pleasure and profit of gardening. The garden is not now divided into squares with walks between as formerly, when labor was cheap and plentiful, but the different vegetables are planted in rows extending across the garden, using as many rows as necessary to supply the family. Under this system, rotation with succession crops is easy.

The writer has grown as many as four crops on the same land in one season, as follows: Irish potatoes planted in January, corn in alternate rows at the last cultivation of the potatoes. Digging the potatoes or, rather, plowing them up, partly cultivated the corn. As soon as roasting-ears were gathered from the corn, the stalks were removed, the land, thoroughly broken, pulverized and manured, was set in cabbage. While cultivating the cabbage, an abundant stand of volunteer potatoes came. Soil was drawn up around these during the cultivation of the cabbage. The soil being very heavily fertilized—105 two-ox cart-loads of cow manure per acre—the cabbage leaves literally covered the surface of the soil by the first of November, thus protecting the little hillocks containing the potatoes, which were gathered as needed during the winter. The potatoes and cabbages were of extraordinary size and quality.

There should be no idle land in a well-managed garden. As soon as one crop has matured or passed its usefulness, the land should be thoroughly prepared, and generally well manured, and a succession crop planted. Winter crops may be grown between asparagus rows and other plants which are practically dormant, such as lettuce, cabbage, radishes, etc.

Plots which are occupied by okra or other annuals until severe frosts, should be manured and plowed several times during the early winter, and planted in peas, beets, salsify, or potatoes from January to March, according to latitude. Frequent winter plowing incorporates the manure with the soil, and the soil is pulverized and improved by the effects of severe freezes and numerous insects are destroyed in the larva or pupa stage, while hibernating. This is especially true of cutworms.

INTENSIVE GARDENING

The southern gardener is much disposed to imitate the southern farmer in half-preparing, half-fertilizing and half-cultivating a large area instead of concentrating his efforts in all of these respects on one-half or even one-fourth the area. It costs less to cultivate one-fourth acre on the most intensive system than it does to treat an acre in the usual slipshod manner. One-fourth of an acre properly handled will supply an average family with enough vegetables for their daily consumption and a sufficient surplus to pay for the labor of cultivation.

The most advanced intensive system means thorough

under-drainage, deep tillage, or trenching, seemingly extravagant manuring, and facilities for irrigation. The ditches for the underdrains should be not less than three feet deep nor more than twenty-five feet apart. If the bottoms of the ditches are firm and rock accessible, the rock culvert drain will answer as well as tile and involve no outlay of cash except for labor.

A row of stones as large as a man's fist placed on each side of the bottom of the ditch, and another row so placed as to bridge across these, will make the culvert. Trash or straw thrown over these will prevent the loose soil from sifting through the interspaces while filling the ditches. The writer constructed rock-culvert underdrains in 1854 which are still effective. Such underdrains prevent the possibility of super-saturation of the soil during rainy seasons, and equally prevent the evil effects of drought by not only increasing the capillary moisture from below but by so deepening the pasturage for the roots of the plants as to make them drought-resisting.

A garden of the size proposed may be reasonably well protected from the injurious effects of drought, if located near the well and house and slightly below them, by conducting all waste water through the underdrains by means of a pipe provided for the purpose. Besides the benefit thus received by the garden, the sanitation of the premises will be conserved by preventing waste water from being thrown around the yard, a practice far too common around private homes. Wherever practicable, water pressure should be provided in storage tanks for general use about the premises, for garden- and

flower-yard irrigation and for fire protection. The cheapest and most satisfactory water-lifter is the hydraulic ram, which can be used wherever a fall can be secured in a near-by creek or branch. If devoted to no other use than watering stock, supplying the family bathtub and the kitchen sink, the expense of the ram, piping and tank proves a judicious investment.

One-fourth acre, properly prepared and cultivated, will furnish more and better vegetables and small fruits than an acre treated in the usual way. The manure necessary for a small garden may be made by composting in some out-of-the-way place, but convenient of access, all refuse material from the yard and garden and the slops from the house, including pickle brine, waste salt from meat and wood ashes. All of this material may be collected from day to day into a slight excavation and occasionally forked over. No animal manures should be used in this, but they should be composted separately with concentrating and protecting substances. Lime and ashes may be used to advantage in the compost of refuse material, but not with animal manures, lest they cause a loss of ammonia. They will hasten the decomposition of the vegetable matter and thus bring it more promptly into condition for use. If there is added to this compost a few loads of leaf-mold from the woods, its value will be materially increased. It will be ready for use on the garden soil when the vegetable matter has been broken down and the whole converted into a dark peaty mass. Stable manure, fresh and unfermented, should not be used in the garden unless applied in the fall and incorporated with the

soil by frequent use of the plow during the fall and winter.

These manures are rendered more promptly available to the plants if composted and allowed to ferment for six weeks.

If cotton seed is available, it may be mixed with the animal manures and moistened as mixed, and then thoroughly commingled with about 700 pounds of acid phosphate to the ton of dry material. During the fermentation, the coarse material of the animal manures is partially decomposed and all grass and weed seed killed by the heat generated by the fermentation. This, used at the rate of a ton to the acre broadcast, and 500 pounds in drill, produces prompt and satisfactory growth of plants.

Success in the garden is largely a question of manures, liberally and judiciously used.

FORWARDING EARLY VEGETABLES

In market-gardening this is a vital question, and the amateur who takes pride and pleasure in his vegetable-garden needs to provide some effective means of forwarding certain species to be transplanted, for the purpose of enabling them to utilize to the best advantage the season to which they are adapted. The cabbage, cauliflower and others delight in the moist and temperate spring season, but the melons, eggplants, tomatoes, peppers, etc., must be protected from the low temperature of spring by the use of hotbeds and cold-frames until after all danger of frost. The hotbeds de-

scribed by northern writers upon the subject are not necessary in the southern states, where the extremes of cold are not experienced. The great mass of manure recommended by them is not needed here. Indeed, a well-prepared coldframe, with protected exposure to the south, will answer except for tomatoes, eggplants and peppers. The following plan for a family garden has proved quite satisfactory in the experience of the writer: A single 3 x 6-foot sash will give ample space not only for starting these three species, but enough for once transplanting them before transferring to the coldframe, where they are to be hardened off for transplanting to the open ground. Excavate to the depth of eight inches an area 3 feet 3 inches wide by 5 feet 8 inches long. Fill this with fermenting stable manure and green cotton seed mixed in equal parts, moisten it and stamp down smoothly, moistening the material as it is mixed, and again when put into the pit if it seems dry.

Construct a close frame of one and one-half inch heart lumber to fit over this pit. Have this two feet high at the north end and one foot at the south end, the sides sloping uniformly. Face the upper edge of the lower end with a dressed strip on which the lower end of the sash should fit closely. Face the edges of the side plank with dressed strips on which the sash may slide smoothly and protect with another strip which shall reach to the upper edge of the sash. These side strips should extend the length of the sash north of the bed, to support it when open. Where side or end planks join, the edges should be protected by a strip of building paper and a two-inch wooden strip nailed over it. The

heat will be retained better and the cold air excluded if soil is banked around the lower part of the plank. When the frame is completed and placed over the manure, fill in to the depth of four inches with sifted, dark sandy loam and put on the sash. In three or four days the seed may be sown in shallow trenches six inches apart and covered about one-half inch deep. Water gently and put on the sash. If warm in the middle of the day, give air by placing a block under the upper end of the sash. Keep the surface moist but not wet, by sprinkling with a watering-pot having a very fine rose. As soon as the plants appear above ground, give air in the middle of bright sunny days unless positively cold. The temperature should not be allowed to fall below 60° nor to rise above 75°. A

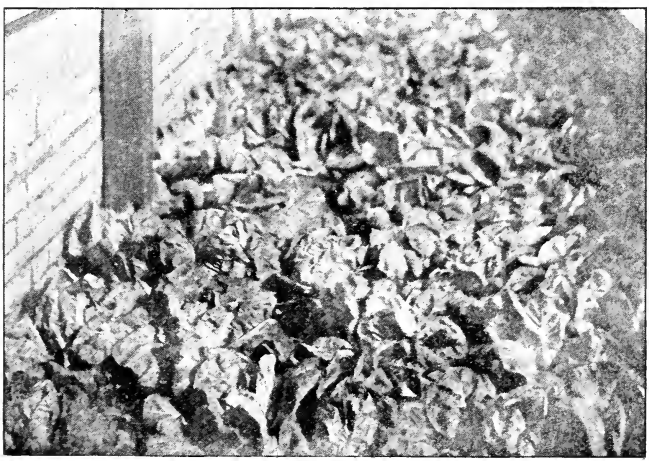

FIG. 2. Lettuce in cold-frame, January 15

half-row each of eggplant and pepper and one row of tomatoes will produce enough plants for the family garden. As soon as the plants form one true leaf or, as commonly expressed, the third leaf, transplant to the unoccupied part of the bed two inches apart each way. In excessively cold spells, cover the sash with mats or old sacks at night. Cabbage, cauliflower and lettuce may be started in the part of the bed not occupied by tomatoes, eggplant and peppers. Since the former will vegetate more promptly than the latter, they may be transplanted to a coldframe before the space is needed by the other more tender plants. These more hardy plants may be started in a coldframe and will be thus less tender than if started in the hotbed.

The coldframe is made in the same way as that for the hotbed, but is placed over finely pulverized, well-fertilized soil without the manure for bottom heat. Abundant coldframe space will be found both convenient and profitable even for the family garden. It is convenient for hardening tender plants before transplanting and for growing lettuce, radishes, cauliflower, parsley, etc., for the table during winter.

Cantaloupes, cucumbers, squashes and watermelons may be started in these frames, planted in two-inch pots, sunk in the soil of the coldframe, and thus escape both the frost and the attack of insects and, transplanted from the pots, yield fruit two to three weeks earlier than from seed planted in the open ground.

Economy is practised by building the walls of the hotbed and coldframe of brick four inches thick and facing the top with 2 x 4 scantling. Pieces of the

same material fitted across where the edges of the sash meet, serve the double purpose of affording slides for the sash and strengthening the sides of the wall. I have used one constructed in this way for seven years. One cross wall inclosing one sash space, or two if desired, may be used as a hotbed and the balance as a coldframe. If glass is considered too costly, cloth, made for this purpose, may be used with reasonably good results.

No garden is complete without a liberal area under coldframes. Many species of plants grown in the flower yard may be started in the frame and thus brought forward for early blooming. Early violets sell for a cent each in cities. They are thus very profitably forwarded in the coldframe.

GARDEN TOOLS AND IMPLEMENTS

First-class work cannot be done without proper equipment in tools and implements. Working with poor tools is poor economy.

If the turnplow is used in breaking squares or parallelograms, commence in the center. Establish the center by sighting diagonally from corner to corner. Where these diagonals meet is the geometrical center of the area. If it is square, begin at the center, preserving the square form until the whole area is broken. By this means neither the team nor the plowman tramps the broken soil, while by the old method, all turning at the corners is done on the broken land and the bed is left lower in the center than at the sides, with a depression leading from the center to each corner if the lot is

square, and a dead furrow in addition in the middle if a parallelogram. After the center of the oblong form is established, measure from this to the long sides and let the first furrow pass through the center and extend on each side of it the distance of the center from the long sides, measured from the short sides. The first furrow will then be the same distance in all its parts from each side of the parallelogram. It will not be necessary, however, to turn the land unless it is covered with manure or other vegetable matter, which it is desirable to incorporate with the soil. If there is nothing on the land to be turned under, a long bull-tongue, properly used, will deeply stir and sufficiently pulverize the soil. If small seeds are to be planted, a smoothing-harrow or drag should follow the plow. An excellent drag is made by connecting half a dozen logs, six inches in diameter and four feet long, by a trace chain passed through an auger hole at each end. This makes a better drag than one made of 2 x 6 boards rigidly fastened together like weather-boarding, since, being flexible, it conforms to the surface of the soil better. If the land breaks up into clods, it should be rolled and then stirred with a disk or cutaway harrow. The roller presses the clods into the soft surface, so that the harrow cuts them instead of merely rolling them around without crushing them.

Before planting seed in the garden, the soil should be repeatedly plowed and harrowed, stirring as deeply as possible and pulverizing until no clods as large as a guinea egg can be seen. If the garden is not trenched or underdrained, it should be subsoiled as deeply as a strong team can pull the plow. Such treatment enables

the soil to absorb surplus water from excessive rainfall and restore it by capillary action to the plants in periods of drought.

Straight rows.—The appearance of the garden is improved by having the plants grow in accurately straight rows. Besides, the plants are more easily cultivated when thus planted.

The drill-marker enables the gardener to lay off all the rows straight and absolutely the same distance apart. This is easily made with the tools that should be found in every gardener's collection, viz.: a hand-saw, a brace with bits ranging in size from one inch down to the gimlet, a square and a drawing knife. It consists of a piece of lumber 2 inches x 2 inches x 6 feet, into which one-inch holes are bored twelve inches apart. Pins made of some hard wood are inserted in these holes, alternate pins extending through so as to form a double marker, one side marking drills one foot apart and the other two feet apart. The first row is marked by a line on the garden reel or simply tied to two common stakes. The outside tooth of the marker is drawn in this guide furrow and, returning, it follows the outside one, and so on to the completion of the area. The marker should have two shafts rigidly fastened to it and properly braced. This prevents wobbling and secures straight rows. The same tool may be used to check across those rows to insure having the plants uniformly distributed along the drills.

The *push-plow* has become an indispensable implement in both the domestic and the commercial garden. The simplest and most useful form consists of handles like

an ordinary horse-plow, but at the opposite end of what would be the beam is a light iron wheel two to three feet in diameter. The foot is of iron, resembling on a smaller scale the foot of the scooter-stock to which the different plows are attached. Accompanying the stock are the following hoes, which can be attached by heel-pin to the foot, according to the work to be done. For cultivating very small plants, a rake-like foot is

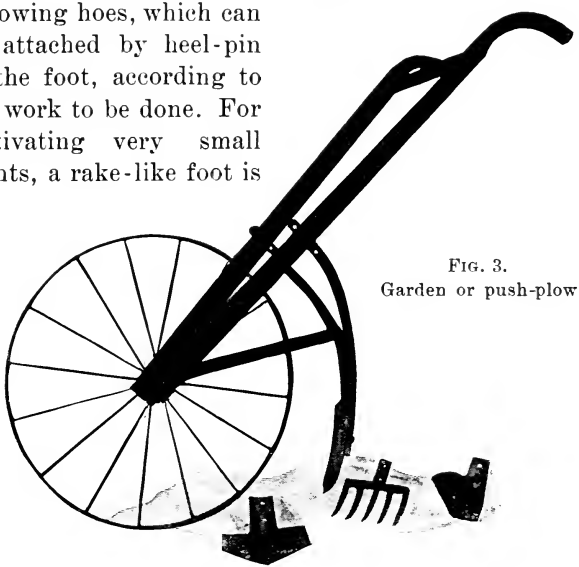

FIG. 3.
Garden or push-plow

used. To follow this, as the plants increase in size, is a small sweep. There should be two of these, differing in width. A reversible scooter, twice as wide at one end as at the other, is useful for deeper cultivation.

A small turn-plow for opening furrows or throwing soil to larger plants is also used. A two-winged shovel for opening furrows for planting at a single trip should be added. After the land has been broken and pulver-

ized, nearly all of the work of preparing for planting and cultivating the crops may be done with this plow. It is cheap, convenient, efficient and durable. I have had one in regular use for ten years.

The *seed-drill*, of which there are several on the market, saves time and seed and secures accurate distribution of the seed the proper distance in the row. The "Mathis" is the most satisfactory that I have used. It contains a vernier containing the names of common vegetables and an indicator which adjusts the valve to the size of the seed, with convenient movable gauge, which is of great service, especially to the inexperienced. It has also a most convenient attachment for opening and closing the seed escape. This is done by means of a thumb-rod extending along the handle of the plow, enabling the plowman to open or shut the valve at will and instantly.

The *Warren*, or V hoe, is the best tool of its class.

The *steel garden-rake* is an indispensable tool, both in preparation of the seed-bed and in cultivation after rains to prevent the formation of crust on the surface and at the same time preventing the germination of grass and weed seed. That with the handle fastened by a steel bow attached to the ends of the rake is the best.

The *potato-hoe*, or hoe-fork, is a very useful tool, since it is adapted to so many different kinds of work. This has four flattened tines, each half an inch wide and six or seven inches long. One can perform nearly all kinds of work required in the garden with this tool, from the preparation of the land to harvesting the crop. If the push-plow and the rake are judiciously used, very little hoeing is required.

The *garden-rake* should have the handle six feet long, and while in use it should be held near the end of the handle in order to give full play to the teeth. It should be alternately pushed and pulled, both in preparing the seed-bed and cultivating the plants. If the surface about the plants is raked as soon after each rain as the soil is in condition to be cultivated, very little other cultivation will be required, and less rain will be needed to produce satisfactory crops. This is true also of field crops, the horse-cultivator or heel-scrape taking the place of the rake in the garden.

Soil Mulch.—We often resort to the expensive process of mulching our plants with straw to retain moisture during the summer. This is practicable only on a small scale, while the whole garden or the whole field may be as effectively mulched with pulverized soil by stirring the surface two inches deep after each rain, preventing the formation of a crust, breaking the capillary tubes through which, if undisturbed, the moisture rises and escapes into the air. This acts on the same principle as the straw mulch, and is more satisfactory. The straw retains the soil moisture by checking its evaporation, The soil mulch acts as a blanket does on the horse when he comes in from a drive wet with sweat. The blanket checks the evaporation from the body of the animal and thus prevents sudden cooling, with its possible injurious effects. The soil mulch acts as a blanket in preventing the evaporation of moisture from the surface of the soil, retaining it beneath the mulch, where it serves to dissolve the plant-food and convey it into the circulation of the plant.

An analysis of the soil to the depth of six inches from two plots under identical conditions except that one was cultivated shallow after a rain while the other was not, one having the *soil mulch* on the surface while a *crust* covered the other, showed that there was twice as much moisture under the mulch as there was under the crust.

The weeder, the smoothing-harrow or the heel-scrape will produce the mulch on a large scale—the garden-rake or the push-plow on a small area. Stir the soil after every rain and hold the moisture.

INSECTS—FRIENDS AND ENEMIES

It is too common for gardeners to regard all insects as enemies. The friendly little lady-bug is too often the victim of such ignorance. There are some families, however, which are all injurious in some form of their existence, and quite a number of beetles that are destructive in both the larval and the perfect stage. All butterflies and moths are destructive in the larval stage, the parent doing no harm except to lay eggs which hatch the destroyers. Every gardener should learn enough about insect life to distinguish friends from foes and the most effective means of combating the latter. It is not my intention to discuss insects in a general way, but I will take up the more common kinds injurious to garden vegetables, as the latter come under consideration later on. A spray calendar will be found on page 204, which gives detailed instructions for combating the various insect pests and fungous diseases that attack our vegetables and fruits.

PART II

SPECIES AND VARIETIES OF VEGETABLES

WE now come to the gardener's manual proper. In this part will be found a brief discussion of the origin, history, characteristics, cultivation, gathering, insect enemies and fungous diseases of the economic vegetables, and suggestions as to the manner of using each. Owing to the great variety of soil and climatic conditions prevailing in our great country, it is not practicable to prepare a manual adapted to all parts of our territory. The contents of this book are derived almost exclusively from my personal experience in four of the southern states, extending over a period of fifty years. For convenience of reference, the vegetables will be discussed in alphabetical order. Technical terms will be avoided as far as possible.

ARTICHOKE

The *Globe*, sometimes called *Bur* artichoke, is cultivated for its flower-heads and blanched leaves. This is a coarse, thistle-like perennial. On account of its showy leaves and flowers, it is more frequently found in the flower-garden in this country than in the garden. The flower-heads under good cultivation are three to five

inches across at the edible stage. In America, it is usually propagated from seed, which may be sown under glass in early spring and the plants transplanted, or it may be sown in the open ground as early as the frost is out of the soil.

To secure large flower-heads or buds, the plants should be left not nearer than two feet apart in the drill, nor should the rows be less than four feet apart. The plants produce few heads the first year but, being hardy in our latitude, continue fruiting for four years, when they begin to fail and should be renewed. Edible heads are secured more promptly from suckers transplanted from the base of the stalk, and the variety is more accurately reproduced in this way than from seed, though the latter produces stronger plants.

The artichoke is a gross feeder and hence requires not only a moist, fertile soil but liberal manuring annually. Wood ashes are considered a special fertilizer for it. From six to twelve suckers are produced at the base of each plant. If large, edible heads are desired, all of the suckers except three should be removed, care being exercised not to injure the main crown in removing them. If all of the heads except that on the center stalk are removed, this will attain unusual size. Since this plant is so easily grown and continues in successful bearing four or five years, it should receive more attention than in the past.

Select a few of the finest early heads, allow them to mature, and save the seed. An ounce of seed will plant as much as will be desired for a family supply.

The half-grown heads are often used for pickles.

The large heads are gathered, just before the florets appear, and boiled. The leaves, or scales, are torn off and the enlarged, fleshy part dipped into melted butter, seasoned with salt and pepper and served. The base or receptacle is also sliced, seasoned and served. The receptacle and the tender blanched leaves are used for salad.

THE JERUSALEM ARTICHOKE

The Jerusalem artichoke abbreviated by the gardener into "chokes," is much more generally grown in the South than the "Globe." It will be observed growing about the fences of old gardens, as a volunteer. It is a perennial, sunflower-like plant which is grown for its potato-like tubers, which remain in the ground through the winter and vegetate in early spring. There is a wild variety found growing in the rich alluvial soil along the Seneca River. This resembles the cultivated variety in its above-ground growth, but is not so prolific as the cultivated variety and the tubers are uniformly small.

We have few crops which produce such enormous yields as this Jerusalem artichoke. The White variety yielded, in the agricultural class grounds of Clemson College, 544 bushels per acre and at the experiment grounds, 540 bushels. The tubers were dug from these areas with potato hoes and an effort made to get them all from the ground, and yet those left came broadcast over the land the next spring.

The variety bearing red tubers, known as Brazilian artichokes, is even more prolific than the White. The

tubers may be planted whole or cut, as is practiced with Irish potatoes. A rich, sandy loam, deeply prepared and free from stone or pebble, is best suited to this crop. They should be planted in rows in a low bed, as with potatoes, covering the tubers three inches. The plants should stand eighteen inches apart in the row, and the rows four feet apart. Cultivate shallow, as for cotton, but retaining the beds. A peculiarity of this plant is the fact that the tubers continue to grow after the plant above ground has died. In the vicinity of Clemson College, S. C., the tubers are not fully grown and matured until the last of November. While this plant will produce paying crops under neglectful treatment, it responds most liberally to high feeding and thorough cultivation.

It may be boiled and used as potatoes, as a cold salad, and is highly esteemed for pickle. The tubers keep better in the ground than stored. Besides being desirable as a garden esculent, there is no other crop which will produce so cheaply or so abundantly a hog food which need not be harvested. They are utilized by giving the hogs the run of the field through the winter.

ASPARAGUS

Supposed to be a native of southern Europe, and was cultivated by the Romans 150 years before Christ. Conover's Colossal, Palmetto, Barr's Mammoth and Columbian Mammoth are offered in the seedsmen's catalogues. These are, no doubt, of the same origin, but varied climatic and cultural conditions are responsible for their

divergent forms. Columbian White seems to have legitimate claim to be classed as a distinct variety on account of the uniform white color of its young shoots.

Asparagus is propagated by seed. The seed may be planted on thoroughly prepared land in shallow furrows twelve to twenty-four inches apart. Sow thinly and cover from one-half to one inch in early spring. As

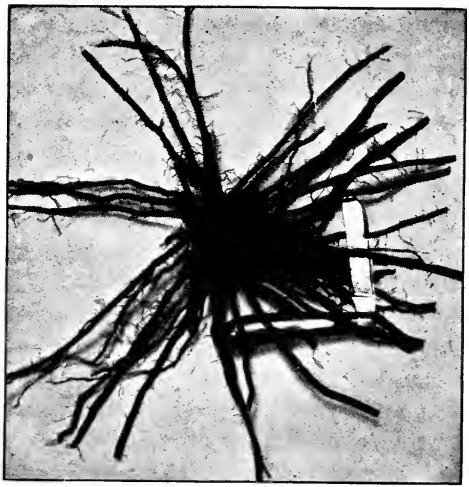

FIG. 4. One-year-old asparagus root.

soon as the plants are well established, thin to three to six inches in the drill and cultivate thoroughly throughout the growing season. The plants will be ready to be transplanted to permanent rows in the fall or at any time during the winter until the following March.

To transplant, trench out deep furrows with two-

horse plow, fill these half full of well-rotted manure or compost. Apply with this, acid phosphate at the rate of 500 pounds per acre, kainit at the same rate, and dried blood, or No. 1 tankage, at the rate of 400 pounds per acre. Mix these by running several times in the row a long, narrow bull-tongue plow, leaving the center slightly higher than the sides of the furrow. Set the crowns of roots of the young plants on this elevation two feet apart, spreading the roots in their natural form. Cover the crowns with four to six inches of mellow loam. Gradually fill the furrow to the surface level. Well-grown plants of one season's growth are preferred to those of greater age.

A better plan is to prepare the trenches as directed, and, instead of transplanting the young crowns, sow the seed very thinly in the furrow and thin to two feet in the drill. As the young plants grow, draw soil to them until the trench is filled. Fully one year will be gained in this way over growing the plants in the nursery row and transplanting the crowns.

The old method of planting in beds is no longer practiced, since superior shoots may be more conveniently and cheaply grown in rows.

If grown for market, there are several advantages in cutting six or eight inches under ground. First, the crowns are earlier relieved of the tax of supporting the shoots; second, since the shoots diminish in size rapidly above ground, the grower harvests a much larger yield per acre; third, the white stalks make a more attractive package, and, being covered with hard woody tissue, the white shoots bear transportation better. Some

markets, however, prefer the green shoots cut above ground, and the grower must accommodate his practice to the demands of the market. For family use, the green shoots are preferred.

For cutting the white shoots, a knife is made for the purpose, but it may be done with any knife having a strong, long blade. Care must be exercised not to destroy young shoots just starting, nor to injure the crowns. If green shoots are desired, the crowns need not be covered so deeply. If covered only a few inches, cuttings may be had much earlier than from deeply covered crowns. The beds should have a south or southeast exposure.

No cuttings should be made from the first year's growth, but all plants left to assist in a full root development. As soon as the plants above ground are killed by frost, the stalks should be cut close to the ground and removed, to prevent seed from falling. These, if left to fall on the ground, become troublesome weeds the next year.

The asparagus plant is a gross feeder, and there is no danger of excessive manuring. The whole surface may now be covered with manure, to be worked into the soil over and between the rows early in February. The proper cultivation will be encouraged if some quick-growing crops are planted between the rows the first and second years. Early cabbage transplanted early in February, beets, bunch beans, lettuce or radishes are suitable crops for this purpose. A few strong shoots may be cut the second year if all small shoots are left to grow to sustain the roots. Cutting, however, must be

done very sparingly and for only a short season. After the intercultural crops are gathered, surface cultivation must be continued until fall, the stalks again cut and removed and a covering of manure two inches deep sown over the whole bed. A dressing of 200 pounds of nitrate of soda per acre, applied in February when the manure is worked into the soil, will increase the size and vigor of the shoots. The third spring, the plants now having sufficient strength to bear it, all shoots may be cut until green peas are ready for use, when all growth should be allowed to remain but cultivation continued until the plants fully occupy the land. A bed properly cared for should last twenty years. No garden is complete without this delicious and wholesome vegetable. Asparagus is one of the most profitable market crops grown. It ships well and is always in demand in its season in our large cities. Male plants produce larger shoots than the female and are more desirable in garden or fields.

Asparagus is a diœcious plant, having flowers containing the female organs of reproduction on one plant and those bearing the stamens or male organs on another. To save seed, cut carefully the best plants bearing the red berries; mash and wash the pulp from these. This may be poured off with the water, the seed settling to the bottom. After drying thoroughly, store them and they will be good for four years.

The only serious fungous disease is the asparagus rust. In localities subject to this disease, the old stalks, together with all spontaneous growths, are burned on the fields. At one time, the crops of some sections were

seriously threatened by the attack of the asparagus beetle. The twelve-spotted asparagus beetle is also an enemy, but does no serious damage.

The tender shoots which put forth with the first advent of spring are the parts used. These are boiled and served with butter on toast, or boiled and seasoned with butter and served as other vegetables are. It is also very popular served in soups. It has valuable medicinal properties and is often prescribed by physicians on account of its diuretic properties. Common salt is supposed to be especially beneficial to asparagus, since its native habitat is along the seacoast. This is indicated also by analysis, which shows a large percentage of sodium and chlorine. Nitrogen is especially important, since its most important office in the plant economy is to increase the growth of the stalk and leaves, thus forcing forward the part for which this vegetable is cultivated. A supply of humus is necessary to keep the soil over the crowns porous.

BEANS

These are annual legumes that have been grown for their edible pods or shelled beans, both green and dry, by English-speaking people for four hundred years. Those which are grown for their edible pods are known as snap or string beans.

Some varieties of these are pole or running beans, while others have a dwarf or bunch habit of growth. Varieties are numerous. One seedsman catalogues thirty-two varieties of snap beans alone. The *Valentine*, of

which there are many popular strains, is the most popular variety for the garden and the truck farm. Some of the wax varieties are very popular, such as *Black Wax*, *Kidney Wax*, *Refugee*, *Butter Wax*, *Golden Wax*, *Valentine Wax* and *Lima Wax*, but these are more subject to fungous diseases than the green-pod varieties. This vegetable has been bred up to such perfection that all varieties are satisfactory. Of the pole varieties, the old *Creaseback*, sometimes termed "*Fat-horse*," though it has been in cultivation more than a century, is still a popular variety. *Lazy Wife* is another deservedly popular sort, being exceedingly prolific of large, long pods and retaining its snap-short quality until the beans are grown. *Southern Prolific* is another very popular variety which is grown extensively in corn-fields, the stalks of corn serving in the place of poles.

The bunch or dwarf varieties may be planted as early in spring as the frost is out of the ground. For the first planting, the danger of the seed rotting in the ground will be avoided by raising the seed-bed a few inches above the general level. The bed will afford drainage, the effect of which, besides drying the soil, will be to admit the air, which is warmer in spring than the soil. Sow thickly in drills, covering two inches deep, and cultivate shallow, drawing a little soil to the plants in the early cultivation. Some books advise thinning to six or eight inches in the drill, but my experience and observation teach that thick planting in the drill gives better results. The drills need not be more than two feet apart. A pint of beans will plant one hundred feet of row, and this will be enough for one planting for an

average family. Repeated plantings at intervals of three weeks may be made until the first of September. Many prefer the pole beans for the fall crop. The Creaseback variety planted in the early spring, if regularly picked, to relieve the drain upon the vines, will continue in bearing until frost. Let a part of the crop ripen on the vines, and harvest for use as dry shelled beans during the winter. Neither beans nor any other vine-growing plant should be cultivated while the leaves are wet. If the fine soil adheres to the leaves, they will rust.

LIMA BEANS

Lima beans, like the snap-shorts, are grown in two styles—bush and pole. Bailey, in his admirable work, "Cyclopedia of American Horticulture," makes three classes, viz.: *Large Lima*, *Dreer's Lima* and *Small Lima* or *Sieva*. Each of these has the bunch and running type. The oldest of the three strains is the Small Carolina, or Sieva, which is smaller than the others but more hardy, and continues in bearing throughout the growing season. It was long cultivated in the southern states as a climber before Henderson produced the bush type. There is no appreciable difference between the size or quality of the beans from the bush and the vine type. The advantages in favor of the bunch strain are that they are earlier and more prolific and do not need the poles. If the beans are not allowed to ripen, either strain will continue in bearing until frost. The beans are small, clear white in color and of good quality. As dry-shelled beans, they make a pleasant and very nutritious winter vegetable. The two

larger types are decided improvements in the matter of size and quality over the smaller type, which is known under the names of Carolina, Small Lima, Butter and Sieva in the southern states. Of the pole varieties of the large lima, the most popular are *Seibert's Early*, *Wood's Improved*, *Ford's Mammoth Podded*, *Large White*, *Salem Improved*, *Panmure Extra-Early* and *Dreer's Improved.* Of the bush types of the large varieties, *Wood's Prolific*, *Burpee's Bush* and *Thorburn's* are standard, but none of them are so early, prolific or reliable as *Henderson's Small Bush Lima.* The lima should be used more as a shelled bean in winter than is practiced in the South. The legume known as the cow-pea of the South is really a bean, and some of the varieties should be cultivated in the garden as table beans. Of these, the *Large Black Eye*, the *Small Black Eye*, the *Mush* and the running variety of the *Lady* are excellent gathered when the beans are just fully grown and boiled with meat.

Lima beans require a higher temperature for germination than the Kidney beans, and hence must not be planted until the soil has been warmed in late spring. Even then it is best to plant upon beds raised above the surrounding soil. They require a fertile soil and good cultivation. Bush Lima beans are planted and cultivated in the same manner commonly practiced with the bush snap beans. A substantial trellis or strongly set poles must be provided to support the pole varieties. They will produce better on poles than on a trellis, on account of better exposure to the sun. The beds should be prepared and the poles set firmly into the soil three feet apart and the seed planted around them. When the

plants are well established, thin to three in the hill. In planting the seed, no attention need be given to placing the eye down. Careful experiment has demonstrated the uselessness of such practice. The poles should be cut eight feet long and put deep enough into the ground to insure them against being blown over. Drive a post-hole punch down to the depth the poles are to go, insert the poles and press the soil firmly to them. If no post-hole punch is at hand, use a stout piece of hard wood a little larger than the large end of the poles. Drive this where the pole is to be and turn it around as it is withdrawn, to prevent lifting the soil around the sides of the hole. If poles are used, the beans may be planted in rows four feet apart and three feet in the drill. A simple but permanent trellis may be made as follows: Plant posts of durable material at convenient intervals extending two feet into the ground and seven feet above. Nail to the tops of these posts a stout wire, smooth or barbed, and another one foot from the ground. When the vines begin to run, weave binding twine around both wires to guide the vines in climbing to the top of the trellis or use only the wire at the top of the posts; plant the beans three feet from the trellis on each side and lean light poles or river cane from the bean hills to the wire. The vines will bear more and continue in bearing longer if the pods are not allowed to ripen.

The pods of the Lima beans are gathered when the beans have attained their full size, but before they begin to toughen. The green-shell beans, boiled and served with drawn butter, afford a delicious and nutritious dish. They add to the flavor of gumbo, along with corn, okra

and tomatoes, and boiled with corn make a favorite dish known on southern tables as succotash. The dry beans stored for winter, soaked over night and boiled and then baked with pork as Boston beans, are equal, if not superior, to the latter.

BEETS

This delicious vegetable has been a favorite occupant of the private garden for many centuries, and is also a profitable market crop, both with the local trucker and the shipper. It is found along the seashore in southern Europe and western Asia, and is also said to have been grown for its beautiful red roots before its edible qualities were developed.

There seem to be three species in cultivation, viz.: The common garden beet, the mangels, grown principally for stock and for making sugar, and the Swiss chard, which is grown for its leaves, as the thickened midribs of the leaves are used as a substitute for asparagus. There are numerous excellent garden varieties varying in shape, color and earliness, but all are good.

Early Bassano is one of the oldest, earliest, most tender and sweetest, but, being of comparatively light color which it loses in boiling, it is objected to by some on this account. Downing is credited with having said, "It is the sweetest, most tender and delicate of all beets." It should be planted as first early and some weeks before the general crop. There is quite a list of blood turnip varieties which, while not so sweet or deli-

cate as Bassano, are of good quality, and, having the desired deep red color, are popular both for the private garden and for market. Amongst these are *Wood's Crimson Globe*, an early and attractive kind; *Crosby's Egyptian*, an improved selection from the old Egyptian; *Philadelphia Early Turnip*, *Maule's Blood Turnip* and various other excellent varieties of the blood turnip type. The long blood-red types are later than the round- and turnip-shaped varieties, but are better for winter use on account of their keeping qualities. The sugar varieties have been introduced principally from Germany, where their saccharine properties have been especially developed by most careful scientific selection of the mother beets. They are uniformly of a light yellow color, to which most housewives object, but they make a sweet and tender table beet.

Mangels are cultivated in colder climates for winter stock food, but in the South the seasons are so long that they become woody before the weather becomes sufficiently cool for storing.

Beet seed may be planted in thoroughly prepared and fertilized soil in the first open weather of early spring, or they may be sown under glass and transplanted if a very early crop is desired. If bottom heat is used to force them, the soil must be not less than six inches deep over the manure. If the manure is too near the surface, instead of forming a continuous straight root, a number of small branching roots will be produced where it reaches the manure—what the gardeners call "fingers and toes." In transplanting, a long dibble must be used, and the root extended into the hole in its natural

position. If bent, the root will not develop, and if the lower part of the dibble hole is not closed around the extremity of the root, the plant will fail to grow. The beet is hardy enough not to be injured by an ordinary frost, and hence can be planted as early as the soil is sufficiently warm to supply the necessary conditions for the germination of the seed. The seed should be planted on a bed raised two or three inches above the general surface. Since there are several seeds in each pod, they may be sown quite thinly to avoid the trouble of thinning, except to take out the surplus plants from the bunches. This should be done as early as the plants are large enough to be handled conveniently. Care must be exercised not to loosen or otherwise injure the plants that are to remain. Transplanting the surplus plants drawn out was formerly the common practice, but this does not pay for the extra trouble. Better plant enough for a supply and throw away those taken out. To facilitate cultivation, have the rows one and a half to two feet apart. For the early crop, leave the plants four inches in the drill, and as soon as the roots are the size of a guinea egg commence pulling out alternate ones for the table. If the seed is sown with a seed-drill so that it comes up in a straight line, the early cultivation will be simplified. The hand-plow provided with the rake or sweep on the foot, may then supplant the hoe. All subsequent cultivation can be done with this plow. The germination of the seed may be hastened by soaking for twelve hours in hot water in which soot has been dissolved. The water may be nearly at the boiling point when poured over the seed and allowed to cool

naturally. This softens the hull and hastens germination, but weakens, to a small degree, the vitality of the seed. For a fall crop, sow the seed in June. Instead of sowing on a bed as for the spring crop, prepare the land level and mark the rows with the garden-marker two feet apart. Open a furrow two inches deep, and sow the seed carefully in the bottom of this and run the wheel of a wheelbarrow on them. This firms the soil on the seed to bring them into closer contact with the soil and promotes the ascent of capillary moisture. A small quantity of fine soil falls in behind the wheel, just enough to form a mulch over the seed. Planted in this way, the roots of the young plants at once enter moist soil and are exempt from the usual injurious effects of drought.

If the land is manured for beets with thoroughly rotted compost, it should be deeply incorporated with the soil broadcast. If commercial fertilizers are used and applied in the drill, they should be deposited in the bottom of a furrow six inches deep, to insure a solid root growth downward and to prevent the growth of laterals. Fresh stable manure should not be applied to the beet crop, as its presence encourages the development of the disease known as scab. If this disease is troublesome, plant on land where beets have not been grown for several years. If the beets are desired for use in winter, in June plant the long blood-red; and, when severe killing frosts occur, lift, cut the tops *below the bud* and store either in barrels with sand between them or bank in the field, covering each layer with fine soil as free from organic matter as practicable.

After the bank is completed in this way, cover with a foot of soil and lay some boards over the bank. If the tops are not cut below the bud, growth will take place and injure the quality of the roots.

If desired to save seed, store some of the best roots with the tops cut above the bud. Transplant these in spring and support the seed-stalks to prevent falling over from the weight of the seed. These need not be planted in very fertile soil, since the growth of the seed-stalk only utilizes the substance stored in the mother beet the previous year and does not draw upon the soil for food. The beet is a biennial plant which stores in the root the first year the food necessary for the production of the seed-stalk and the seed the second year.

Swiss Chard, a variety of beet with coarse, small roots but very large leaves and broad, succulent leaf-stalks, is planted and cultivated as the ordinary beet; but, since it is grown for its leaves, it requires a more liberal application of nitrogen than the species grown for its roots. The leaves and their stalks are larger, thicker, broader and more tender than those of other species. The leaves are prized for salad and the stalks used as a substitute for asparagus. The plants may be covered with sufficient straw to protect them from frost and the stalks blanched for winter use. This species is not appreciated as its merit deserves.

The beet is practically free from insect enemies. In some seasons and localities, the lightning-bug attacks the leaves. It is subject to rust-rot and spot-disease of the leaves and scab on the root, but none of these are seriously destructive.

The tender tops of young beets and the leaves of the chard are used for boiled salad, and the leaf-stems of the chard are cooked and eaten as asparagus. The beet is largely cultivated in Europe for the manufacture of sugar, and within recent years this has become an important industry in the northern and western states and on the Pacific coast. It is the most formidable rival of the sugar-cane as a producer of sugar. Tender beets boiled and served with drawn butter make a very delicious and popular dish. Boil in salted hot water and do not break the skin or they will lose color. Boiled, sliced and dropped into sweet pickle vinegar, they make a delicious pickle at very slight cost of either material or trouble. Any surplus after supplying the family table may be profitably utilized as food for the cow. The garden should feed the cow and the cow the garden.

BORECOLE. See Kale

BROCCOLI

This is a biennial plant which resembles cauliflower, but is more hardy and less tender. It is desirable only under circumstances where it is difficult to grow cauliflower. It was introduced into England from Italy.

Early Angiers produces large, solid heads. *Purple Cape* is the most popular and productive variety, producing large solid heads of a purplish brown color.

Culture and Uses.—Same as cauliflower. If attacked by the same insects and fungous diseases as cabbage and cauliflower, the same remedies are applied.

BRUSSELS SPROUTS

This is a very hardy variety of cabbage, bearing small heads in the axils of the leaves on a long stalk and a small cluster of leaves at the top resembling those of the Savoy cabbage. These little heads are the edible part. The large lower leaves are pulled off to encourage the growth of the little heads. This tendency to produce the small heads is often seen in the common cabbage, especially where the natural formation of the head is interfered with, thus manifesting a natural and persistent effort to reproduce.

The cultivation is practically the same as for other cabbage. In this climate two crops may be grown in one season, the first in spring and another in the fall. The plants are quite hardy and both the leaves and the heads are improved in flavor by frost. The top leaves are usually gathered and used for greens a short time before gathering the heads.

The tops should be removed and the seed saved from the flower-stalks grown from the little heads.

The tender top leaves are first cut after they have been frosted and put into hot water, which has been salted, but the parts principally eaten are the heads. They are quite tender and delicate, resembling the tender leaves of the Savoy cabbage.

CABBAGE

This is probably more universally grown in the family garden than any other vegetable. It is a bien-

nial plant, quite hardy, enduring, if properly transplanted, a temperature of 5° Fahr. if hardened by a gradual lowering of temperature. It is found growing wild on the coasts of England and many parts of Europe, but has been vastly improved, under cultivation, from the wild type, which produces no head. It was cultivated by the Romans and probably introduced into England by them. Bailey, in his "Cyclopedia of American Horticulture," says: "From the one original stock has sprung all the forms of cabbages, cauliflower, Brussels sprouts and kales." Cabbages are edible in all stages of growth, from the time they leave the seedbed until they form hard heads. Many prefer the green leaves as a boiled salad to the blanched heads. While the cabbage will endure a low temperature, it is intolerant of very high degree of heat, especially after the heads are formed. For this reason our best crops are grown in the South in late winter and early spring, and in the late fall and early winter. Only the coarse types, such as our southern collards, will survive our summers, and these reach their best condition for use after they have been subjected to severe frosts. The crop is less subject to fungous diseases and insect pests in early spring and late fall. The spring crop should be transplanted in February and matured and removed from the garden by the first of July, and nothing of the cabbage family should be allowed in the garden during July and August. During these months we have better and more delicate vegetables in abundance and the cabbage is not needed. If allowed in the garden during these months, those that have headed are destroyed by fungous growths,

producing a most disgusting odor, while they not only occupy space which should be occupied by more desirable vegetables, but also serve as a nursery for the propagation of both fungous diseases and insect pests.

The cabbage succeeds best upon clay loam, rendered friable by thorough and deep preparation and a most liberal use of animal manure. It is a gross feeder, and, while it will endure much neglect and abuse, best results are obtained only under the most favorable conditions as to soil, available plant-food, climatic conditions, cultivation and supply of moisture. All plants grown for their leaves or stems must be grown under favorable conditions to be tender and wholesome. If grown rapidly, the cells will be large and the cell-walls thin and tender, and when properly cooked the plants make wholesome food. If grown slowly, because of poor cultivation and deficient food and moisture, woody fiber is increased, the plants become tough and form unwholesome food. There is little danger of manuring too heavily, provided the soil is deeply and thoroughly prepared and soil moisture retained by stirring the surface frequently amongst the plants.

A combination of animal manures and commercial fertilizers is best and most economical. When judiciously composted and fermented to break down the coarse material, this combination destroys the seeds of grass and weeds which are present in the manure, and properly adjusts the ratio between the three principal elements of plant-food. Since cabbages are grown for the leaves, the fertilizer used should analyze high in potash and nitrogen, and low in phosphoric acid com-

pared with that for plants grown for seed production. If animal manures are not available, the humus may be supplied by a growth of pea vines or an application of woods mold and the necessary available plant-food supplied by a commercial fertilizer containing about 6 per cent of potash, 7 of nitrogen and 8 of available phosphoric acid. For maximum crops, thirty or forty tons of mixed animal manure, or one to two tons of commercial fertilizer proportioned as above, will not be excessive. The land intended for the spring crop of cabbage should be manured at intervals during the late fall and winter, and plowed after each application of manure to thoroughly incorporate the latter with the soil, to expose the soil to the pulverizing effects of frost, and destroy the cutworm by exposing him to the winter weather.

It is of the first importance to secure good seed which has been grown from well-selected plants in a section especially adapted to the cabbage. Seed saved from plants grown in the middle south has a tendency to run to seed or to produce only leaves, without heading. Good seed may be saved in the Blue Ridge Mountains, where the cabbage grows to perfection. By selecting plants of ideal development from the fall-grown crop, protecting them during the winter and transplanting in early spring not less than three feet each way and protecting them from plant-lice and harlequin bugs, good seed may be saved in our alpine region. The substances needed for the growth of the seed-stalk are stored during the first year's growth in the stalk and leaves of the head. It is well to slit the leaves of the

head in two directions at right angles to facilitate the escape of the seed-stalk. It is claimed by some that the seeds produced on the branches of the stalk are better than those formed at the extremity, but this has not been proved by experiment. The seed may be sown for the spring crop in October and allowed to remain in the open ground until time to transplant, in the warmer parts of the South. By sowing thinly on well-prepared land, stocky, hardy plants are secured, which may be transplanted as early as February 1 with safety, if the transplanting is properly done. Cabbage plants are seldom injured by the freezing of the leaves, but, if the stem freezes, the plant is destroyed. To prevent this and produce a spreading, stocky plant, it should be set so that the bud will be a little below the surface of the soil. This protects the stem from freezing in winter, causes the leaves to spread on the surface around the plant and prevents the freezing of the soil, to the injury of the roots. The leaves being drawn up over the bud, the cutworm will attack the leaf-stalks instead of the stem of the plant. This method of transplanting protects the plant from the injurious effects of drought in summer by shading the soil over the roots and retaining moisture where it is most needed. It has been stated that the plants may be left in the open ground during the winter in the warmer parts of the South. In the colder parts, as we approach the mountains, they may be grown in the open ground and transplanted to cold-frames protected by glass or cloth as winter advances, giving each plant four square inches of space. It is not necessary to cover them except in extremely cold spells.

Slight frosts will not injure them and exposure to the sunlight whenever the minimum temperature is not below 20° Fahr., will be beneficial. Such plants may be transplanted with safety much earlier than those grown in hotbeds, even if the latter are transferred to coldframes to be hardened. A very common mistake made by even experienced gardeners is sowing the seed too thickly and failing to thin the plants before they become spindling and "leggy." One ounce of good fresh seed will sow 300 feet of row or produce 4,000 plants. Three or four ounces will safely produce enough plants to set an acre of the early sorts and two ounces are enough for the later varieties, which require more room in the field. It is better to clip off all long roots before transplanting rather than incur the risk of having them doubled back upon themselves by careless transplanting. Another common mistake is in putting out small or splindling plants. Stunted young plants, like animals stunted in their early growth, rarely entirely recover. It is, generally, true economy to reject all inferior plants. Even when the plant-bed is well watered, the roots should be lifted by the use of a trowel or a flat dibble to prevent the destruction of the fibrous roots, since the plant must depend upon these for prompt recovery from the injury sustained in its removal. Since a part of the roots will necessarily be lost in the removal of the plant, and its power of absorbing moisture and thus supplying food correspondingly diminished, some of the large leaves should be removed to readjust the equilibrium between the absorbing and the exhaling surfaces. For supplying an ordinary family garden, enough

plants may be grown in a box or flat two feet square and three or four inches deep, filled with rich loam and placed on a shelf on the south side of the dwelling at any time during the winter, if the box is protected by cheesecloth during mild weather and moved into the house during very severe spells. As soon as the plants form the third or first true leaf, they should be thinned and the surplus plants transplanted to other boxes or into a coldframe to become stocky.

There is no plant which profits more by early and frequent shallow cultivation. Indeed, the plant will grow off more promptly if the surface is kept stirred before transplanting both in the seed-bed and in the field in which it is to be grown. The garden rake properly used is the only implement needed. Some twenty years ago Mr. Gregory, of Massachusetts, recommended deep cultivation in the early growth of the cabbage, accompanying the recommendation with the statement that the roots were short. Other writers of more recent date have made similar statements. To test the correctness of this statement and recommendation, I washed up the roots of a plant and found the laterals five feet long. The cabbage requires a well-drained soil but a liberal supply of moisture. The importance, therefore, of keeping the surface of the soil between and around the plants continuously covered with the soil mulch, by means of the frequent use of shallow cultivation, is apparent.

There are so many excellent varieties offered by the seedsmen that one can hardly make a mistake in buying from their lists. *Wood's Extra-Early*, *Solid South*, *Wood's*

Prize Head and *Late Flat Dutch* are all good varieties. The *Charleston Wakefield* is the most popular early variety grown in the South. This is a conical-headed variety but less pointed, larger, and produces a more compact head than the *Early Jersey Wakefield*, *Early Etampes*, *Express* or *York*, which are only a few days earlier. It is excellent for both spring and fall planting. Transplanted the first of February, it gives hard heads in very early spring. Transplanted the last of August, it heads well before severe freezing weather, which rarely occurs before the last of November in the Middle South. *Early Summer*, *Surehead* and *Succession* follow the Wakefield in late spring and summer, while the *Danish Ball Head*, *Lupton*, *Flat Dutch*, *Drumhead* and others challenge the attention of the grower in the alpine or mountain regions for late fall crop. These are transplanted in June or July in the mountain valleys, which are especially adapted to this crop, and mammoth heads are produced. For winter supply, the solid-headed cabbages are taken up in November in the northern part of the South, the roots and stalks buried in trenches on well-drained soil, northern exposure preferred, the heads sheltered from rain until cold weather threatens, when additional protection is needed. I have kept them in perfect condition by packing the heads cut from the stalks and inverted in a shallow trench, placing a row of heads on each side and breaking the joint with a third row also inverted. Sufficient soil was then heaped over the triple row of heads to shed the water and prevent freezing. They have been protected also where they grow by opening a furrow with the turn-plow bar side next to

the plants, bending the heads into this furrow and covering with a sufficient thickness of soil to prevent freezing. If plants are transplanted in September, October and November in the middle and lower cotton belt, fresh heads may be gotten from the garden every day throughout the winter. This is true from Atlanta south in Georgia and from Clemson College south in South Carolina. I have tested this personally. While trucking near Atlanta, I marketed the fall-planted daily through the winter until those planted in February were ready. The temperature has been down to 16° this winter and yet I enjoyed a dish of fresh cabbage at dinner today, January 11, from my private garden at Clemson College, located in the north-westernmost county of the state. In this garden there are now ready for use, salsify or vegetable oyster, young fall-sown beets, turnips, onions from home-grown sets planted in September, kale, spinach, cabbage and lettuce, the latter in cold-frame. English or green peas sown in November are several inches high. Tomatoes gathered after the first frost and stored are still in supply, as well as numerous sugar-pumpkins—a winter's supply.

The first insect to appear on the cabbages is the flea-beetle, which attacks the seed-leaves in the plant-bed. Slug-shot, powdered tobacco or Paris green will check them. The cutworm is destructive to the plants when first set in the field or garden. If the plants are deeply set as directed, the presence of the cutworm may be detected by finding the leaf-stalks cut, and, if visited early in the morning, the enemy may be found under the leaf or near the surface of the soil. This insect hiber-

nates in the larval state and may be destroyed by plowing during winter, as already suggested. The Harlequin, Calico, Terrapin, or Lincoln bug, emerges from his winter retreat with the first warm spring weather and sucks the leaves of the plants. Being a *sucker* and not an *eater*, this insect cannot be destroyed by poisoning the plants. If only a few rows of plants are to be protected, the finger and thumb will be the most reliable mode of attack. This insect will collect upon the most pungent plants, such as mustard, cress or radish. Occasional rows of mustard sown amongst or near the cabbage will collect them, and these plants may be sprayed with kerosene, and plants and bugs all killed at once. This is called the "Harlequin bug trap." It is important to destroy them before eggs are deposited. The eggs hatch the perfect insect, which, in great numbers, seek protection amongst the leaves of the plants, and cannot be destroyed without injury to the plants. There are three species of larvæ which eat the leaves of the cabbage. (*a*) The larva of the white cabbage butterfly, which is seen depositing eggs from March to November on the leaves of the cabbage and other cruciferous plants. This larva is the color of the cabbage leaf, and is covered with very fine short hairs. So nearly does this larva resemble in color that of the cabbage leaf that the inexperienced gardener will overlook it. It is very hardy, withstanding a temperature of 10° Fahrenheit. At this temperature it appears torpid in the morning, but resumes its work of destruction when warmed by the noonday sun. (*b*) The checkered white butterfly produces a larva striped in color and longer than the green worm. It crawls as a

measuring-worm. This, too, is exceedingly destructive, though not quite so numerous nor so cold-resisting as the dark-green worm. Both of these species feed upon the large leaves of the plant. (*c*) The third has dark greenish stripes along its sides and is smaller than either of the others. This feeds on the bud leaves and penetrates the head, and thus, while not so numerous as the other two, is very destructive and fouls the plant with its castings. All of these being eating insects, they may be easily destroyed by the use of Paris green, one tablespoonful to three quarts of flour, air-slaked lime or gypsum. I use measures instead of weights, because it is more convenient to the average gardener to measure than to weigh. This insecticide may be applied with a powder-gun on a large scale, or, for use in the family garden, may be thoroughly mixed, put into a flour-sack and tied to the end of a stick three feet long and dusted lightly over the plants. It is important to destroy the early broods to diminish the numbers in later broods. I have used Paris green annually for ten years without any ill effects from consumption of the cabbage. It is washed from the leaves by the first rain or by the cook in preparing the plant for the table. It has been estimated that a person must consume nineteen heads at a meal to be injured by the poison remaining on the plants. The head grows entirely from the inside and consequently no risk can be incurred from consuming the head. The cabbage aphis is a very difficult insect to combat. The only means known to be even partially successful is spraying with whale-oil soap solution or kerosene emulsion. These insects take their food by sucking, and consequently cannot

be destroyed by poisoning the plant. The cabbage-root maggot is sometimes troublesome, but this enemy cannot be reached by any poison, and it is difficult to trap the fly which lays its eggs at the root of the plant. Club-root is the only fungous disease which seriously affects the cabbage. This cannot be combated except by rotating the soil with crops which it does not attack as host plants.

The most common way of cooking the cabbage is boiling with pork or bacon. It is delicate and wholesome prepared by boiling without meat and seasoned as is cauliflower. Prepared in this way it is little inferior to cauliflower. The Savoy variety is more tender and delicate than the smooth-leaf varieties, is as easily grown as others, and is an excellent substitute for cauliflower. Cabbages, as well as all other vegetables, should be put into hot water that has been slightly salted, and boiled until so thoroughly done that they are easily cut with a spoon. Those not eaten warm at dinner are good cold at supper, or they may be fried for breakfast or baked for dinner. They are good as hot slaw, cold slaw, sauer kraut, or may be chopped fine with cucumbers and made into sweet pickle. Any surplus will be relished by the cow, pig and poultry if there is no market for it. A beautiful red variety is grown especially for pickling.

CAULIFLOWER

This is a delicate form of the cabbage family which is grown for the undeveloped flower-buds. These resemble, when ready for use, a mass of fresh curds,

hence gardeners speak of it as "the curd." This plant will not withstand as much of either cold or heat as the cabbage, and hence must be planted so as to head either in early spring or late fall. This plant requires even

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FIG. 5. Thorburn's Gilt-Edge Cauliflower.

more moisture and more fertile soil than the cabbage. For the fall crop, the seed may be sown in the open ground in July, slightly protected from the direct rays of the sun, and transplanted deeply the last of

August or early in September, in soil thoroughly and deeply prepared and heavily fertilized with thoroughly fermented compost of animal manures, acid phosphate and cottonseed-meal in the proportions recommended for cabbage and applied more heavily. If the land is not naturally moist, mulch liberally with well-rotted manure covered with leaves or straw. The plants may then be watered without causing the soil to bake. A small quantity of nitrate of soda, an ounce to five gallons of water, will prove beneficial used around (not on) the plants. For the spring crops, either winter the plants in coldframes or sow in moderately heated hotbeds early in January, transplant to coldframe and set in the garden the last of February. Transplant and cultivate as directed for cabbage. The cauliflower is subject to the attack of the same enemies as the cabbage. When the curd begins to show, fold the large leaves over it and either pin or tie them so as to partially exclude the rays of the sun. This will preserve the whiteness of the curd.

Early Snowball, *Extra-Early Dwarf Erfurt*, *Autumn Giant* and *Extra-Early Paris* are among the best and most reliable varieties. The Early Snowball is the most desirable of the above varieties.

Cut off all green leaves, soak an hour in cold water with a small quantity of salt in it, then boil in milk and water. Serve hot, and season with cream, butter, salt and pepper. This is considered the most delicate and palatable dish made from the cabbage family. It is highly prized for use in mixed pickles. Unless the gardener has determined to supply the special conditions necessary for success, he had better not attempt to grow

cauliflower. Enough for an ordinary family may be grown in a cheap, cloth-covered coldframe or protected bed.

CARROTS

This vegetable is seldom found in southern gardens, though easily grown and a valuable food for man and animals.

The soil should be deeply prepared as for other root crops to secure long, straight roots without laterals. The fertilizer, which should either be well-rotted animal manure or a standard commercial fertilizer, must be, especially for the long varieties, deposited in the bottom of a deep furrow and low beds made over it. The seed may be sown at the time of sowing beets, in February, covered one-half to an inch and pressed upon by roller or otherwise. If the soil is dry at the time of planting, sow the seed in a furrow two inches deep and run a wheelbarrow over them. As soon as the plants are large enough, thin to three or four inches in the drills, which need not be farther than

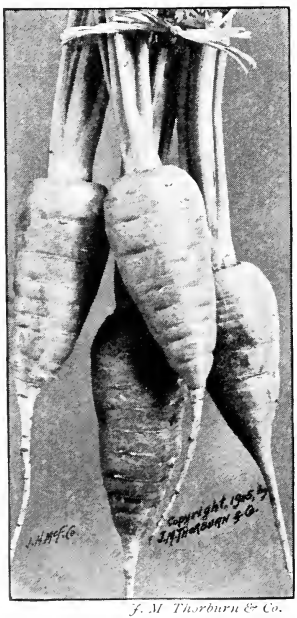

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FIG. 6. Carrots.

eighteen inches apart. Cultivate with garden rake after each rain. The plants may be thinned and the roots used during the summer or allowed to remain where they grow until needed during the winter. If the roots grow above ground, throw two light furrows upon them before severe freezing weather occurs in the fall.

Golden Ball and *Oxheart* are early varieties, but the *Danvers*, *Long Orange* and *Long Lemon* are the heaviest yielders.

Carrots are mainly used in the South in stews and soups, but may be boiled and seasoned with salt and butter. They are sometimes used as a butter color. On deep, rich soil the long varieties yield immense crops at little cost, and are valuable for feeding all kinds of stock. They do not become woody in winter, like beets. Carrots may be kept all winter hilled in the garden or in a cellar. In the lower half of the cotton belt they may remain in the garden all winter without injury from cold.

CELERY

On account of its superior qualities as an accessory to a meal, celery is one of the luxuries of the garden. Though there are no special difficulties involved in its culture, few grow it, and the supply, except in large cities, is usually short. It is a hardy biennial, native of England, where the wild plant grows along the banks of ditches and in marshy places. It is difficult to realize that a vegetable so tender and delicious as the varieties now under cultivation has been developed from so rank a weed.

Celery requires, in its early and late stages of growth, a cool, moist atmosphere, and hence is intolerant of heat and drought. The seed need not be sown under glass in our southern climate, plants much better in every respect being grown in the open ground. A special bed may be prepared for it in April and the seed sown in drills ten or twelve inches apart, or the seed may be sown in drills where the plants are to remain permanently, the surplus being transplanted to flats or beds, where they should be placed in rows six inches apart and three inches in the drill. The soil in which the seed is sown must be a rich loam, which has been made rich by heavy application of manure to crops previously grown upon it or made fertile by liberal applications of thoroughly rotted manure. The seeds, are extremely small, and germinate slowly even under favorable conditions. After the seed-bed has been deeply prepared and very thoroughly pulverized by careful raking, mark off very shallow trenches one foot apart, sow the seed thinly in these trenches, and cover lightly with thoroughly sifted rich loam or woods mold. The seed, being very small, must not be too deeply covered. The germination may be hastened by packing the soil over the seed immediately after sowing by means of a smooth board six inches wide by six feet long. A corn-stalk laid on each side of the drill but not immediately over it, will retain sufficient moisture to insure the germination of the seed. If the weather is very dry before the plants appear, the soil may be watered from the fine rose of the watering-pot, but I prefer retaining the moisture without surface watering. If the seed is sown in the permanent row, treat in the same way, but

make the rows three feet apart if seed of dwarf varieties is sown, or five feet if the large varieties are to be grown. While transplanting is commonly practiced, it is not necessary, as the finest plants are made without this very troublesome operation. A crop of bunch beans, beets or onions may be grown between the three-foot rows and early garden corn in the wide rows.

After the plants appear above ground, frequent stirring of the surface will prove beneficial in retaining moisture and keeping down weeds and grass. This is sometimes necessary before the seed germinates and will facilitate germination by conserving the soil moisture. None but stocky, vigorous plants should be used. Spindling plants seldom develop into profitable growth. Before transplanting, the tap-root should be cut back, since, if left without the most skilful handling, it is liable to be bent back upon itself. If it becomes necessary to transplant when the soil is dry, holes four inches deep should be opened and a pint of water poured in as the plant is inserted, and dry fine soil drawn

Fig. 7. Celery.

around the roots until all moisture is covered. When planted in this way it is not desirable to press the soil to the roots, since the water will accomplish all that is needed in this respect. If water is not used, however, the soil should be pressed firmly upon the roots. If transplanting is practiced, celery may be grown as a second crop after potatoes, beets, peas, beans or onions, and will need no new application of manure if these crops were properly fertilized, except, perhaps, one hundred pounds of nitrate of soda sown by the side of the rows after the plants have taken possession of the soil. Since the leaf-stalks constitute the edible part, it is important that the late summer growth should be grown rapidly to make these stems large and tender. Planting thick to induce self-blanching is sometimes practiced. Under this system, the plants are set one foot each way on very fertile soil and cultivated with the hoe until the plants are large enough to shade out grass and weeds. The outside rows and ends of such beds are protected by wide boards to assist in excluding light. Planted in this way, the leaves are forced to stretch up after sunlight and, while growing taller, the leaf-stalks are not so large nor brittle as when grown and blanched by the more laborious method of earthing up the plants. The self-blanching varieties should be selected for this plan of culture. July and August are the best months for transplanting, since the plants properly set and cultivated will be sufficiently large to commence "handling" by the last of September, which is as early as is safe to begin this work in the southern states. If they are earthed up too early, the warm weather will cause rotting of the leaves. Since

a part of the roots must be destroyed in moving the plants from the nursery rows, it is well to remove some of the outer leaves to, in a measure, reëstablish the equilibrium between the evaporating surfaces — the leaves—and the absorbing surfaces—the roots.

The soil should receive shallow surface cultivation, repeated after each shower, around the plants and between the rows, until the temperature is low enough to begin the process of blanching. This must be done gradually, commencing with what is known as "handling." The soil between the rows is loosened with the plow and moved toward, but not against, the plants. Each plant is then handled as follows: With one hand the leaf-stalks are grasped and all gently pressed together to train them into a compact, upright position, while, with the other hand, the soil is drawn around the plant and pressed against it with sufficient force to hold the leaves in their upright position, being careful not to allow the soil to sift between the leaves upon the bud. After the leaves have made sufficient additional growth, the soil is again thrown to them with the plow or hoe. At the approach of cold weather, the soil is still further heaped around the plants and the process finished with the spade or shovel, leaving only the ends of the leaves showing. Before very severe freezing occurs, the whole plant is covered either with sufficient soil to prevent freezing, or leaves or straw are used instead of the soil. In a short time, varying with different varieties, the whole of the leaf-stalks will be blanched and ready for use.

After a critical examination of fifteen varieties grown under identical conditions, the following are recom-

mended: *Golden Self-blanching*, a beautiful variety of fine flavor but of too much fiber. *Thorburn's Gilt Edge Golden Self-blanching*, an improvement of the latter in size but the leaf-stalks not sufficiently solid and too fibrous. *Giant Pascal.* Plants large; very large leaf-stalks. This has a brittleness and nutty flavor surpassed by none, is a late variety but an excellent keeper. *Perle le Grand* is another late variety of fine quality. *Crawford's Half Dwarf*, misnamed dwarf, for the plants are very large. The leaf-stalks are very numerous, brittle and of superior flavor. *Evans' Triumph*, a crisp, superior variety, of fine flavor. *Perfected Hartwell.* Plants extra large, leaf-stalks very long; a late variety of superior quality. *Winter Queen*, a late variety of rather straggling growth, but stems crisp and of excellent flavor. *Schumacher.* Medium, late, quality good and flavor all that could be desired.

Select vigorous plants in the fall, protect slightly from severe freezing during the winter. In spring, drive up strong stakes to prevent the seed-stalks from being blown over. As the stalks grow, tie to the stakes. Gather the seed from the best heads for planting and from the side limbs for seasoning. Better heads will be formed if the side limbs are removed as soon as they start to grow.

Celery is used principally uncooked. The crisp, blanched leaf-stalks are eaten with salt, and form a salad that is highly appreciated and is considered a luxury. The seed imparts a delicious flavor to soups, pickles and salads. The leaf-stalks are also used for similar purposes. Celery vinegar is made by simply im-

mersing pieces of the stalks in good vinegar. For flavoring meats, salads, soups or pickles this is highly appreciated. The outside stalks can be utilized in this way.

CELERIAC

This is sometimes known as turnip-rooted celery, because, while the leaves resemble celery very closely, it forms an irregular knob or ball at its base somewhat resembling a turnip. It is this enlarged root for which it is cultivated. The plant is more easily cultivated than celery, for which it serves as a substitute for seasoning soups, etc. Plants are grown as directed for celery, but require less space when transplanted (rows two feet and ten inches in the row is the usual distance), since no earthing up is required except to cover the roots with sufficient earth to prevent freezing. The roots may be stored for winter as turnips. This plant is very seldom found in American gardens.

CORN

Corn should be available for table use in every southern garden, according to latitude, from the first or the 15th of May to the first or the middle of November, if proper attention is given to selection of varieties and successive planting through the summer. As early as the temperature and the condition of the soil will permit, plant several varieties which ripen in regular succession on land that has been heavily manured in late fall and winter and plowed several times during

that period, not only to secure thorough pulverization and to mix the manure well with the soil, but to destroy insect enemies which hibernate in the soil. Plant the very early varieties on beds raised several inches above the general level, to secure the necessary warmth in the seed-bed and to effect prompt drainage of the surface. Cover the seed very lightly, since the moisture necessary for the germination of the seed will be abundant near the surface and the necessary warmth will be better secured at the surface than deeper. The soil for these early so-called six-weeks varieties must be excessively fertile and the cultivation regular and thorough, to force the plants to maturity in the short period of their growth. They may be planted in rows three feet apart and three to five grains dropped every two feet in the row. It is better to thin than to replant. At these distances, best results will be obtained by leaving only one stalk in the hill. Slight frost will retard the growth of early planted corn but will not otherwise seriously injure it. At the same time that the early varieties are planted, a few rows of some early double-eared variety should be planted and one of the large field varieties, to keep up the supply. The planting of several varieties of different earliness is more satisfactory than making successive plantings of one variety.

The surface should be lightly stirred with a garden push-plow or with the garden-rake at short intervals, and especially as soon as the surface is dry enough after each rain which falls in sufficient quantity to cause the formation of a crust upon the surface of the soil as it dries. Avoid cultivation deeper than two inches. As

fast as the corn is gathered for the table, cut the stalks and feed to stock, or if not needed, then cure for the winter use.

Early Adams, or Burlington (not Adams Extra-Early), is a superior early variety producing reasonably large ears, but is not a sugar corn. *Stowell's Evergreen Sweet*

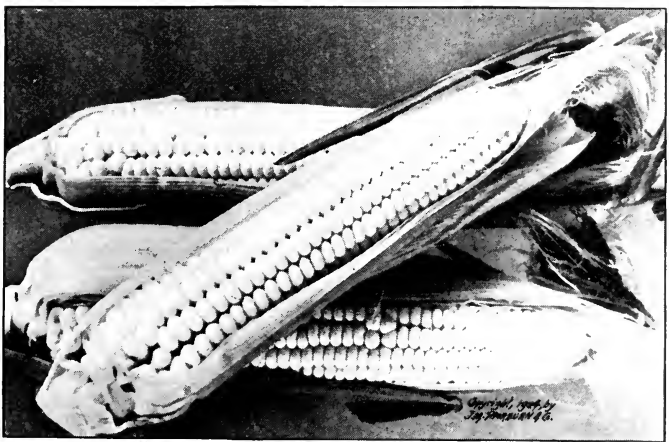

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FIG. 8. Crosby Sweet Corn.

follows this in close succession, produces large ears for sugar corn and remains long in edible condition.

Blount's Prolific, a double-eared variety of dent corn, is an excellent garden variety which follows the Stowell in prompt succession. Following this but planting at the same time, use *Albemarle Prolific* from seed grown in Virginia or in that latitude. *Marlboro Prolific*, an excellent double-eared corn, comes in after the latter with medium-sized ears. Plant deep in summer. Follow the

early crops of green peas, snap beans and cabbage with any of the last three varieties and, at the last cultivation of the Irish potatoes, drop a few grains of corn in alternate middles three feet apart. In all plantings after June first, plant cow-peas with the corn, and as fast as the crops of roasting-ears are used, remove the stalks and cultivate the cow-peas.

The most serious enemy to young corn is the *bud-worm*, which bores into the young plant when quite small and destroys the bud. The only known preventive is to soak the seed until well swollen and then stir it in water containing coal-tar and crude carbolic acid, which covers the grain and repels not only this insect but other enemies. The cutworm, if not destroyed by winter plowing, is troublesome to shallow planted corn, but frequently cuts the plant above the bud and hence does not destroy it. *The corn-worm* (cotton-boll worm) attacks the tender ears before they are ready for the table and often disfigures the ears. No preventive of this pest is known. The *bill-bug* punctures the stalk near the ground and deposits its eggs, and these develop into a grub which subsists upon the interior of the stalk. This insect is often destructive to field corn, but its attack is generally too late to seriously injure garden crops. If corn in the roasting-ear stage is threatened by approaching frost, the whole stalk may be harvested and stored under shelter, where the ears will remain fresh and edible for ten days.

The advent of the cooking-stove has brought into disuse some of the old methods of preparing "roasting-ears," such as roasting before the fire until brown and

covering, with part of the shuck left on, in hot ashes and roasting until done. Sprinkle salt over the grain, split the grains along the rows with a sharp knife, and eat from the cob. The memory of my relish for the "roasting-ear" thus eaten is as appetizing as that of the "ginger cake" eaten in childhood. The names of the dishes now prepared from "mutton" corn is legion, one of the best of which is corn pudding, which is made of grated corn seasoned with milk, butter, eggs and salt, and baked. It is boiled and served on the ear, or boiled and sliced from the ear after splitting the grains with a knife, and made into fritters, etc.

On the old farm in the halcyon days of the old South, "big hominy" was a choice dish made from the whole ripe corn. A mortar was made by burning out the center of a block three feet long sawed from a large tree. In this the clean corn was placed and beaten with an iron pestle to remove the husk. "Lye hominy," still a favorite dish, is made by boiling corn with a gill of concentrated lye in the pot of corn until the husk slips off and the grains are soft. Then wash and pour off the husk. Enough of this is cooked at one boiling to last a family a week. It is beaten to soften the grain, and fried,

The "ash cake" is made by placing the dough, made as usual for bread, on the hearth, swept clean and covered with hot ashes: when done, wash off the ashes quickly while it is hot. It is also wrapped in large cabbage leaves and cooked in the ashes in the same way. Plain corn bread properly cooked and eaten with fresh butter and milk makes an excellent lunch, and is a wholesome and nutritious food.

CORN SALAD

Corn salad, known also as "lamb's lettuce," is a native of Europe, Africa and parts of North America. It is more hardy than lettuce, for which it is used as a substitute. Sow in early fall for winter salad or in early spring. It is ready for use in sixty days. It is sown in drills eighteen inches apart and thinned to four to six inches in the drill. It is commonly used as a cold salad and sometimes mixed with cress, mustard or other pungent salad plants. It is sometimes boiled and used as a substitute for spinach, which see.

COW-PEAS

Cow-peas, also known as field peas or corn-field peas. While custom has given this the name of pea, it is botanically a bean, and while it is mainly cultivated as a field crop, some of its varieties deserve a place in the garden. Apart from its value as a catch-crop, to be grown for the improvement of the soil between the spring and fall plantings of the usual garden vegetables, it being a legume or nitrogen-collector and supplier of humus, it contributes a very palatable variety to the table supply. It may be grown in drills, broadcasted alone or in the corn. There are several varieties which are as much relished by many southern families as is the Boston bean in the North. Gathered when the beans or peas are fully grown, — the pods change color preparatory to ripening,—they make a boiled dish worthy of a place upon the gentleman's table, as well as upon that of

the laborer. They constitute a most nourishing as well as a wholesome food.

The *Black-eyed* variety, of which there are two types, differing only in the size of the bean and in earliness, has become a standard article in the stocks of family grocers. This is a kidney-shaped white pea with a black eye.

The *Mush pea*, so called from the fact that when boiled the individual peas mash into a soft mass, is highly prized for the table, and is also kept in stock by the grocers of our towns and cities. This is a roundish, yellowish white pea of good quality. A small variety known as the *Lady* pea is also grown for table use. This is neither so productive nor so well flavored as the others.

The peas are usually boiled with a small piece of side bacon and eaten warm for dinner. They are also used mashed and fried as a breakfast dish. Roasted in the hulls in hot ashes, they make a delicious dish, fit not only "for a king," but, what is better, for the farmer or gardener, who should live on the best the country affords. Black-eyed peas constitute one of the standard crops in my garden and, besides furnishing a choice dish when gathered just before maturity, are used during the winter.

CRESS

Cress, sometimes called pepper-grass on account of its crisp, pungent taste. There are many types of plants known as cress. One is found growing spontaneously in pastures in Virginia, which is used either as a boiled or

cold salad. On fertile, loamy soil, it produces quite an ornamental spreading plant and is green all winter. Seed sown in the early fall furnishes fresh, crisp salad throughout the fall, winter and early spring, when it seeds abundantly and vegetates in the first cool weather in early fall. It is sometimes called Virginia cress. The garden cress is well worthy of a place in every garden. There are few plants with more ornamental foliage than the curled-leaf varieties, resembling in appearance curled parsley and curled kale. This is excellent as a boiled salad or mixed with lettuce to impart pungency to a salad. As a garnish for cold meats it is unsurpassed. The broad-leaved varieties are fit only for boiling. *Water cress* is the most popular as a market variety. This, once started under favorable conditions, will perpetuate itself. It thrives best on the border of fresh streams or in running water.

CUCUMBER

This is a tender trailing annual. The flowers are yellow, and appear in the axils of the leaves. The essential organs of reproduction are found in different flowers on the same plant. The pistillate flowers are indicated by the small cucumber below the flower, while the staminate flowers have only the flower-stem. The pistils are almost entirely dependent upon insects for pollenation. When grown under glass, it is necessary to hand-pollenize or to confine a colony of bees with the plants to insure production. This was one of the earliest vegetables grown. It was a favorite with the Romans, and was introduced into England during the latter part of

the sixteenth century. Half a dozen plants will supply the table of an average family, but an extra quantity is usually grown and the surplus of the daily gatherings is stored in jars or tubs and covered with salt, to preserve for pickling.

Formerly holes were dug six feet apart each way and partly filled with well-decomposed manure. Hills were slightly raised above the general level, using rich garden loam to form the surface in which the seed were deposited. I long since abandoned this method. Prepare and plant as follows: Open a deep trench with a good turn-plow, turning two full furrows on each side, and leaving six inches in the center of the surface soil to be mixed with a heavy application of compost and commercial fertilizer. After these are thoroughly incorporated with soil and subsoil by running a long, narrow bull-tongue several times back and forth in the trench, return the surface soil, forming a slight bed. Rake this down and pulverize thoroughly with the garden-rake. Now, with a seed-planter, sow the seed thinly in the center of the bed when danger of frost is over. If more than one row is to be planted, let there be five feet of space between them. One row fifty feet long will furnish an abundant supply. Just before the plants show above ground, saturate some sawdust with crude carbolic acid and sprinkle it along the row to keep off the fleas, cutworms and striped cucumber beetles. When the plants have generally formed the first true leaf or, as commonly expressed, the third leaf, thin the plants to two every fifteen to eighteen inches, leaving the most vigorous plants. Cultivate frequently with garden-rake. When the vines begin

to run, pinch off the ends to increase branching. Continue shallow cultivation until the vines cover the ground, but do not move the vines. Gather the green cucumbers as soon as large enough for use, except a few typical specimens to be left for seed. For this purpose, select the finest specimens, and save enough to last several years. Dry, label with the name of the variety and the year in which they were grown, and store where rats and mice will not find them. They are good for eight or ten years. Old seed is preferred to fresh, for the reason that the weaker seed perishes and we have a natural selection of the best. If very early cucumbers are desired, plant a few seeds in the greenhouse or hotbed. As soon as the plants fully develop their seed-leaves, transplant to two-inch pots filled with rich loam and sink the pots in the hotbed or coldframe, well protected from frost. Shade for a few days until they are well established, and keep moist but not wet. After danger of frost has passed, turn them from the pots into open ground after saturating the soil in the pots. The planting of the seed should be so timed that the plants will have begun to run by the time those planted in the open ground vegetate. I have hastened fruiting two weeks by this method.

The best and most popular variety for both family use and market is the *Early White Spine*. More of these are planted than of all other varieties combined. *Early Russian*, *Early Cluster* and *Early Frame* are popular varieties for both table and pickling. *Long Green* is an old variety which is a good table cucumber, but is grown principally for pickling. The fruit is long, of uniform shape and a deep green color.

By dropping the green cucumbers into a close vessel when gathered fresh from the vines, and sprinkling salt thickly over them, they make their own brine and keep indefinitely until needed for pickling. Nothing is more appetizing than a dish of cucumbers and fresh onions sliced together on the dinner table in early summer. By some the large cucumbers are eaten cooked.

The striped cucumber beetle may be kept from the young plants, as already stated, by using by the side of the plants, sawdust saturated with crude carbolic acid. One application is generally sufficient. No remedy has been discovered for the pickle-worm, which attacks the young fruit often before flowering is completed. Plant-lice are occasionally troublesome, but never attack all of the plants. Destroy infested plants by spraying with kerosene emulsion.

EGG PLANT

This plant belongs to the same family as the tomato and Irish potato (Solanum). It is a native of the tropics, and hence requires a comparatively high temperature for germination of the seed. If early fruitage is desired, the seed should be sown in a hotbed to themselves in rows eight inches apart and kept carefully protected from cold until they vegetate. As soon as the third leaf appears, thin and set the surplus plants in two-inch pots filled with rich loam and sink the pots to their tops in a coldframe, or, in the absence of the pots, in the soil of the coldframe in four-inch squares, to develop strong, stocky plants. The young seedlings are often attacked

by a small black flea-beetle which eats the seed-leaves. Tobacco, snuff, or a weak spray of nicotine will make it uncomfortable for them. If there is not a hotbed available, a box twelve inches deep may be filled half full of fermenting manure and this covered with six inches of rich, mellow loam and the seed planted in this. A piece of glass or cheese-cloth soaked in linseed oil may be used over the box, and this placed in a warm southern exposure during the day and removed to cover at night. One dozen plants will produce an ample supply for the family table and some to spare for neighbors. A deep, sandy loam, well drained and liberally manured with thoroughly fermented compost, will give best results. The plants should not be transplanted to the open ground until they are well developed and hardened by exposing them to the sun in pleasant weather. Being a plant of tropical ori-

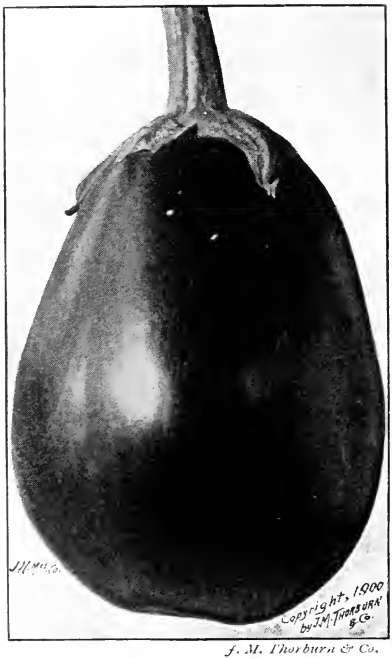

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FIG. 9. New York Improved Purple Eggplant.

gin, it needs warm weather. The plants should not be nearer than three feet when finally transplanted. Give frequent, shallow cultivation. They should commence supplying the table by the middle of June and continue until frost. The fruit is in condition for use from the time it attains the size of a goose-egg until grown.

The name is derived from the White variety, which resembles an egg when small. The *Purple* is, however, the most popular and most generally grown both in the garden and for market. *New York Improved Purple* is a universal favorite, and well deserves its popularity. *Black Beauty*, *Spineless* and *Excelsior Tree* are new favorites, each claiming some special superiority. It will be very difficult to supplant the *New York Improved Purple*. No garden is complete without a few plants of this delicious vegetable. It is especially adapted to the South, and yet it is too often absent from southern gardens.

Notwithstanding the fact that this plant grows more readily and fruits more abundantly in the South than further north, most southern growers purchase seed from northern seedsmen. Every southern gardener should save his own seed. Ripeness is indicated by a change from the glassy purple to a dingy yellow. The best fruits from vigorous, productive plants should be selected. Slice off the surplus flesh, leaving the interior where the seeds are found. Slice this, place in vessels of water and allow sufficient fermentation to soften the pulp. Pass this through a coarse sieve to remove the larger part, and the balance, with the seed, through a finer-meshed sieve to separate the small particles from the

seed. Now wash the seeds, and dry them in the shade. The seed and pulp should not be allowed to ferment more than three or four days, since the heat generated by excessive fermentation may injure the seed. Enough seed may be saved for an ordinary garden by allowing the fruit to approach decomposition, when the seed may be scraped out with a spoon, dried in the shade and stored for next year's planting.

While the Colorado potato-beetle prefers the potato and the nettle, it will attack the eggplant. A dusting of Paris green diluted with flour, gypsum or air-slaked lime, will promptly destroy it. The plants are sometimes destroyed by a species of blight, which attacks the root and turns the wood dark. Under serious attacks of this disease the whole plant wilts and dies. The diseased plants should be dug up and burned.

The fruit may be sliced and fried with egg and bread-crumbs, or boiled until soft and the interior scraped out with a spoon and then fried in batter. A delicious dish is the result of each method. This plant withstands heat and drought, and supplies the table during the fall when other vegetables are scarce.

ENDIVE

Endive is a hardy annual cultivated for its leaves in Europe and to some extent near our large cities, but is seldom found in the private garden. The leaves are blanched by tying together. In our climate, where the cresses, kale, spinach and lettuce are so easily grown for winter and early spring use, it is not needed.

GARLIC

This is the most strongly flavored of the onion family. The bulbs are divided into bulblets, which are separated and used as are the onion sets for propagating the plants. It is used but little by Americans, but is highly prized by some nationalities, who use it much as we do onions. It possesses medicinal properties, but is used less for this purpose than formerly. Sliced and sprinkled with sugar, a syrup is produced which is used as an expectorant. It is also used as a vermifuge. In our large cities it is exposed on the market braided together by its tops. It is well for every garden to have a small patch in some out-of-the-way corner, where it will multiply from year to year by reproduction from the cloves, without cultivation, if undisturbed.

HORSE-RADISH

This is a perennial cruciferous plant grown for its pungent roots. It is propagated from pieces of the root cut to two- or three-inch lengths. When grown for market, roots not less than six inches long should be planted. The soil should be very deeply prepared, and if fertilizers are used they should be placed as deep as possible. In the family garden a rich border deeply trenched is the best place to grow horse-radish, to prevent the multiplication of lateral roots. The piece-roots may be planted at any time when the soil is in proper condition, from October to April. The fall-planted will start earlier in spring and thus have a longer season for

growth. If the soil is sufficiently fertile, the roots will be ready for use in the fall of the second year. Coarse fresh manures are not desirable for this plant.

The harlequin bug is especially fond of sucking the leaves of this plant, and, since it grows throughout the summer, becomes very troublesome. A fungous disease often attacks the main root just below the crown, hollowing out the center and rendering it useless.

The roots are grated and seasoned with vinegar as a condiment to be used with meats, fish and oysters. Pickled with strong vinegar and tightly bottled, it will keep indefinitely.

KALE

Kale is very hardy, and, when sown in the early fall, will furnish tender greens during the winter and early spring. When sown in spring, it produces a quick growth and the leaves are ready for use in six weeks after planting. Sow the seed thinly in rows three feet apart, covering the seed lightly with fine soil. When the plants are two inches high, thin them out, leaving one plant every three inches. Kale should be fertilized and cultivated as turnips when grown for salad.

Curled Emerald Isle is one of the best varieties for either fall or spring planting.

KOHLRABI

Kohlrabi, a species of the cabbage family, is grown for its turnip-like, enlarged stems. The edible part consists of the enlarged base of the leaf-stalk. Its cultiva-

tion is the same as that of the cabbage. *White Vienna* is the favorite variety. The bulb, when cooked young, resembles in quality the rutabaga turnip. It is little grown in this country and is not in demand except for immigrants from European countries.

THE LEEK

The leek is the mildest of the onion family, and for this reason is preferred by some to the onion. Like the garlic, it has flat leaves. The seeds are usually sown in beds and transplanted from these to the open ground. The seed may be sown in fall or early spring. The cultivation is similar to that of the onion, and the vegetable is intended for use green. The soil is gradually drawn to the stem for the purpose of blanching. The most popular varieties are *London Flag*, *Scotch Flag* and *Large Rouen*. It is little cultivated in southern gardens.

Every part of the plant is sometimes used in flavoring soups and stews, but the blanched stem and bulb are the best parts.

LETTUCE

This plant has been cultivated for over twenty centuries, and yet every year apparently increases in popularity with people of cultivated taste There are few plants so easily grown, and yet it may be classed as a luxury on southern tables, as so few domestic gardeners take the trouble to grow it at the season when it is most highly appreciated. The best varieties are intolerant of hot sunshine, while very little protection will

FIG. 10. Hanson Lettuce. Typical mature plants about one-fifth natural size. Bulletin 69, U. S. Department of Agriculture.

secure a continuous supply from November to July. A simple, cheap coldframe, covered either with cloth or glass—the latter to be preferred, though somewhat more costly—will protect it from our severest cold. It will live through the winter in the open ground in this latitude, but makes little growth until early spring. If grown in coldframes, these should be opened during every bright day when the mean temperature in the shade is not below 45° Fahr. Fill the coldframe with soil in which no lettuce has been grown, to the depth of six inches, cover this with three inches of pulverized manure which has been thoroughly fer-

mented, and dig it into the soil and rake smooth. The top of the soil must not be so near the cloth or glass that the leaves of the plants, when large enough for use, will touch them. Sow in drills six inches apart, and, as soon as large enough, thin to three inches in the drill; transplant those taken out to another frame six inches apart each way. As the plants grow large enough for use, draw out alternate plants; the remaining plants will then have room for larger growth. If the soil is kept too moist and the ventilation insufficient, a fungus often attacks the roots, destroying the plants,

There are two distinct types of lettuce—the cabbage or heading varieties and the "cutting" varieties, or those

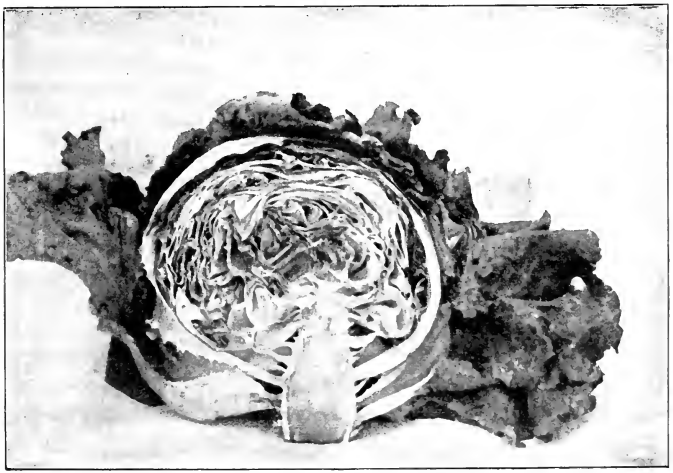


FIG. 11. Hanson Lettuce. Typical mature plants, longitudinal sections, about one-fifth natural size. Bulletin 69, U. S. Department of Agriculture.

which do not form a head. The latter are preferred by many for home use and are much grown for local markets. The heading varieties are grown for shipping.

Early Curled Simpson is a general favorite for the early crop. It does not head but forms a very showy plant, with its curled leaves arranged in a compact mass. It is tender, crisp and quite ornamental. I have grown this variety for many years, and still use it under coldframes. The *Black-seeded Simpson* is similar to the curled but grows much larger. This is an excellent variety for early spring sowing and transplanting to the open ground. *Boston Market* or *White-seeded Tennis Ball* is the most desirable early-heading variety to be grown in the coldframe or for forcing. *California Cream Butter* has been grown with very satisfactory results. It produces compact heads, tender and crisp. There are numerous excellent varieties offered by the seedsmen. The old *Hanson* variety has been improved until it ranks with the best. All of the varieties are good, some better and some best for certain localities.

Select the best plants and save for seed. One plant will produce more seed than needed for the home garden.

MUSKMELONS (CANTALOUPES)

Cantaloupes, as known in the South, and muskmelons in the northern seed catalogues, are the most popular fruit in their season, from June to September. All first-class hotels and restaurants serve them at breakfast. The soil best adapted to them is a deep, fertile, sandy loam heavily manured broadcast and in the drill or hill.

As early ripening of the fruit is very desirable, whether grown for the family table or for market, phosphates should be used liberally. Most authorities advise planting this crop in hills (raised two inches above the general level) six feet apart both ways. After the land has been manured broadcast, plowed, cross-plowed, and harrowed until in good texture, it is marked off in six-foot checks, two shovelfuls of rich compost applied in each check, and this supplemented by a handful of standard fertilizer. These are worked into the soil with a pronged hoe or spade fork until it is thoroughly mixed to a depth of twelve inches over a space of one and one one-half to two feet in diameter. Open two shallow trenches across this bed at right angles to each other, and plant.

The seeds of this melon, if properly stored, are good for ten years. Plant eight or ten seeds in one of the trenches as early as they are likely to germinate, and cover with one inch of fine loam. A week later, plant the other trench in the same way. If the first planting fails, the second will insure an early stand. If the plants are crowded, thin to five. Leave these until danger from the cutworm and striped beetle is over and then thin, leaving two to grow. Commence surface cultivation as soon as the plants appear, and continue it at short intervals until the vines cover the ground. Do not move the vines for the purpose of cultivation. If the weeds and grass appear where they cannot be cut with the hoe without injuring the vines, pluck them out with the hand, as it is very important that no foreign growth be allowed amongst the vines.

When the vines have run a foot or more, pinch the bud from the main vine to encourage the multiplication and growth of the lateral shoots on which the fruit is produced. The main vine produces principally male flowers, while the female flowers are formed on the laterals. There will still be enough male flowers to furnish pollen. Pinching the main vine not only increases the number of fruits, but stimulates early fruiting. Planting in hills, as above described, is perhaps best on thin land or where the melons are manured only in the hill, but, for the last twenty years, I have succeeded better by the following method: Broadcast thirty two-horse-loads of unfermented horse manure to the acre in February, and plow it into the soil. Every week or ten days until planting time, replow, going as deep as the team can pull the plow. After the first plowing, use a long bull-tongue to mix the manure and increase the depth. At planting time, lay off rows five feet apart and open them as deep as can be done with the plow. In these furrows apply, at the rate of a ton per acre, a standard complete fertilizer and mix with the soil and subsoil by running a long, narrow bull-tongue plow several times through the furrow. Turn two furrows into the rows with turn-plow, and finish the beds with long bull-tongues, continuing its use until the furrows meet in the middles. Harrow the beds smooth—for garden culture, rake them—using a seed-drill as directed for cucumbers, strewing the seed continuously in the center of each bed. A mixture of lime, salt and wood ashes spread immediately over the seed row as soon as planted will increase the vigor of the plants and, to some extent, keep off insect enemies. Sow heavy

enough to give a slight white appearance to the surface. When the plants show the third leaf, thin to three every eighteen inches. Later take out two of these. Saturate sawdust or some other absorbent with crude carbolic acid, and sprinkle it around the plants to drive off insects. Cultivate as already directed. By this method, I have gathered from 10,000 to 13,000 merchantable melons per acre. Success in growing cantaloupes depends to an unusual extent upon selection of seed. Seed should be saved only from melons typical of the variety and of best quality, having reference to the form and external netting, the color and texture of the flesh and the size of the cavity. Only the green-fleshed melons possess the peculiar cantaloupe flavor combined with sweetness. Those in which the texture of the meat is coarse and fibrous are usually of higher flavor than those with fine-grained, compact texture. Commencing in 1867, I selected seed from a particular type of melon having deep green flesh and good flavor, keeping only the seed that would sink in water, thus securing the plump, heavy, well-matured seed and those having the strongest vitality. By taking only those which sank in water, the heaviest seeds were saved. By using only such seed, the principle of the "survival of the fittest" gave me only those of the strongest vitality. This was continued for twenty-seven years, when the melons approached perfection. The flavor was uniformly "best," the color of the flesh green and of ideal texture, and the cavity reduced to a minimum, while the weight far exceeded what the size would suggest. From this variety, in 1880, a yield of 13,000 per acre was realized, and those

sold on the local market realized $500 per acre after supplying a large family for forty-five days. In 1894, half the stock of seed planted on a commercial scale in March was killed by a severe freeze on the 20th. The other half was then planted and, after the plants were in bloom, a heavy frost on May 19 destroyed the entire crop. Thus I lost stock of seed that could not have been bought at ten dollars per pound. The red or yellow-fleshed varieties never have the true characteristic cantaloupe flavor, though sweet and palatable. I plant only the green-fleshed varieties. Cantaloupes for home use should be gathered early in the morning and stored in a cool place to mellow—usually for twenty-four hours. They should not remain on the vines until yellow, but should be plucked as soon as the stem will separate readily from the melon under slight pressure to one side. Maturity is usually indicated by a slight exudation of juice around the base of the stem. If gathered too early, they wilt and toughen before mellowing. If allowed to ripen on the vine, they lose in flavor.

Cantaloupes bear the male and female organs of reproduction in different flowers, and cross readily if different varieties are planted near each other and hybridize with other species of the melon family. This is especially true of the cucumber. In 1880, I planted four rows with seed of a supposed new and superior variety bought for distribution by the Georgia State Department of Agriculture. These were planted in a two-acre patch of my selected seed. Some vines produced cucumbers, but a large majority were true hybrids and no more fit to be eaten than green gourds. Of course, no seed could be

saved from melons grown in that patch. They do not hybridize so readily with the watermelon, but I have seen true hybrids—the melons twice the size of the cantaloupe, partially netted and abnormally large, and the flesh tinged with red, sweet, but without the true cantaloupe flavor. They should not be planted nearer than three hundred yards to other species.

Of the green-flesh netted varieties, the *Jenny Lind* is the earliest. While it is small, the flavor is best and the vines prolific. In form, it is round but flattened at both stem and calyx. It should be gathered while the outside is still green, to secure best flavor. Some of these should be planted as first early. *Netted Gem*, now generally known as *Rocky Ford*, is one of the oldest varieties. This is a small oblong melon, thoroughly netted and of good flavor. This ripens next to *Jenny Lind*, but is not so highly flavored. This is the most popular melon with those who plant on a commercial scale for shipping, but is well worthy a place in the garden. For shipping, it is gathered several days before ripe and the stem cut and left attached to the melon. Its uniformity of size facilitates packing in crates for shipping. Its small size makes it convenient for serving in halves on the hotel table. *Champion Market*. This is a nearly round melon, thickly netted, with deep green, highly flavored flesh and very small cavity. It is medium early and desirable. *Acme* or *Baltimore*. This is a beautiful, oblong, netted melon, well adapted to the South. It is earlier than Champion. Its table qualities are very superior. I have grown it for many years. If grown from well-selected seed, its type is very uniform. The flesh is deep green and the cavity

small. *Maule's Superior* seems to be a reproduction of the old variety of twenty years past, known then as the *Netted Green*—a thoroughly netted, round melon without corrugations. The flesh is deep and green, with typical coarse texture and very highly flavored. *Montreal* or *Montreal Market* is the largest really good, green-fleshed cantaloupe. It succeeds well in the South, but is subject to softening at the bud end in moist seasons. *Nixon* is a large, netted, green-fleshed melon which originated near Augusta, Ga. It is next in size to Montreal, and well adapted to the lower South. The slight red tinge of the flesh next to the seed suggests a suspicion that it had its origin in a cross with the watermelon. Its quality is excellent for a melon of its size, and is popular wherever grown. *Maule's New Model* is a comparatively new variety for which Mr. William Henry Maule claims perfection. This is worthy of trial in the South. I have not grown it and hence cannot speak from personal experience as to its merits.

Salmon-fleshed Varieties.—Those who prefer the yellow-fleshed varieties may select from the following list of standard sorts: *Osage Gem*, *Paul Rose*, *Ferry's Defender*, *Maule's Perfection*, *Emerald Gem.*

The cutworm and striped cucumber-beetle are the most formidable enemies to the plants. I have found sawdust saturated with *crude* carbolic acid sprinkled around the plants the most effective preventive of their attacks. The best safeguard from the attack of the pickle-worm is to have the melons early. It is a common error to suppose that these worms enter the melon where it rests upon the ground. On the contrary, they most

frequently enter elsewhere. The worms seem to feed upon the foliage until half grown and then cut their way into the melon. They often avail themselves of the shelter of a leaf resting upon the melon. If cut out of the green melon before the cavity is reached, the melon will mature, but after the cavity is reached and air admitted, the melon rots. I have succeeded in completely protecting my garden crop by the use of six-pound paper bags, such as merchants use in their retail business. When the melons have attained the size of a goose-egg, slip the bags about the stem and pin through the fold as in bagging grapes. I have never known a worm to attack a melon thus protected. Just before the melons should ripen, tear open the bag just enough to see the melon and thus discover when it is ripe. It is common to advise placing a chip under each melon to keep the worms out, but that is useless. Lifting the melon off of the ground prevents it from softening and often from rotting in wet spells.

WATERMELON

As the citric family of fruits is especially adapted to warm climates, this melon is especially grateful to the palate in warm weather. It delights in a sandy soil of moderate fertility. It will not succeed upon clay or any very heavy soil. Second-year new ground or an old broomsedge field where there is no crab-grass seed, makes typical ground for watermelons. They should not be repeated on the same land for a number of years, since the plants are subject to blight if repeated. The

land should be thoroughly broken broadcast, deep furrows opened ten feet apart and checked every eight feet. Open with pronged hoe at the checks a space eight inches deep and two feet in circumference. Apply in these openings a good shovelful of well-fermented compost—about five pounds. The compost made of 600 pounds of cottonseed, 600 of manure, 600 of high grade acid phosphate and 200 pounds of kainit, thoroughly mixed and thrown into a large heap to ferment for six weeks, will be free from live seed and ready to be promptly utilized by the plants. A small handful of cottonseed-meal to the hill may be worked into the soil and subsoil, and a flat hill made over the manure by using surface soil, and the land is ready for the seed. Plant as directed for cantaloupes, half the seed very early and the other half a week later to be sure of a stand. If fresh manure is used, it should be applied in January to ripen before planting time. This should be covered with soil, but the hill finished just before planting. If enough manure cannot be secured, a standard commercial compound mixed in the hill with woods mold or rich loam will answer well, but I prefer some manure in every hill. Very heavy manuring increases the growth of vine, at the expense of the size of the melons. This was tested on a large scale in 1884, using one shovelful of the compost—five pounds—on half a field and two shovelfuls—ten pounds—on the other half. The crop was nearly 100 per cent better where five pounds were used, and the melons much larger. Cover the seed with friable soil one inch in depth, six to ten to the hill. If baking rains, followed by drying wind, occur before the

plants appear, scratch the surface of the hills very lightly to break the crust. Keep the surface around the young plants stirred. As soon as the plants form the first true leaf, thin to two in the hill, selecting vigorous, stocky plants. Continue shallow cultivation, receding from the row with the plow as the plants grow. Plant a row of peas in the middle of the spaces between the rows. This is of especial importance in old land free from the roots of dead plants, since the pea vines will be grasped by the tendrils, and anchor the long vines and thus prevent them from being turned and rolled by severe winds. The fact that the new ground and old broomsedge fields contain many dead roots on the surface to which the vines can cling, constitutes one advantage in favor of such fields. The vines should never be moved in the cultivation, nor should they be cultivated while wet. Some writers advise pinching back the main vine as for cantaloupes. This is a mistake, since the female flowers appear principally on the main vines of the watermelon but on the branches of the cantaloupe.

This plant, having the stamens and pistils in different flowers, naturally crosses very readily. This has multiplied varieties to such an extent that the novice experiences great difficulty in selecting. Some of the best for home use are: *McIver*, a very sweet melon, oblong in form, striped exterior, flesh ideal in texture and quality. Rind too tender for shipping. This melon was originated by Col. E. R. McIver, of Darlington county, South Carolina, and had a local popularity long before it had a place in the seed catalogues. *Kleckley's Sweet* is another melon of superior table

qualities but too tender for shipping. It is a long, oval-shaped melon with dark green rind. Flesh scarlet, firm and delicious in flavor. *Bradford* is a favorite melon for home use and local markets wherever grown. It is very early, medium in size, of oblong form, rind striped, flesh red, tender and crisp. *Gray Monarch* or *Long White Icing*. While experimenting with varieties of melons nearly twenty years ago, this melon was planted as *Jordan's Gray Monarch*. By the side of it was planted what was known as the *Sugar Loaf*, a variety that has been highly prized in several southern states for fifty years. The two varieties were identical in every material respect, even to producing the same sport of a darker greenish gray. *Seminole*, no doubt, had the same origin, since, when planted by the old Sugar Loaf, it produced the identical sport which seems deeply inbred in the original variety and those derived from it. They are all of superior table quality, having deep red flesh, tender and crisp, and very thin rind. Varieties often change in varietal characteristics under different environments. *Georgia Rattlesnake*, grown in the sandy soils in the vicinity of Augusta, Ga., has no superior either for home use or market; but 150 miles north of Augusta it does not maintain its good qualities.

Duke Jones, *Pride of Georgia* and the *Jones*.—These all seem to have been derived from the same stock, and, as the Jones made its appearance earlier, we are inclined to assign to it the parentage. I received seed of the Jones from the originator, Mr. Reuben Jones, of Dougherty county, Georgia, in 1884, and planted it in 1885, and at the same time planted it under another name.

These are all excellent, showy melons, and, while not as good shippers as the famous *Kolb Gem*, which I planted first in 1884, they are superior in table qualities. A peculiarity of the Jones is that a ten-pound melon carries the same good table qualities as the largest in the patch. *Florida Favorite* is an early, oblong, striped melon of superior table qualities. It is too small for shipping even if it had the carrying qualities, but for home use it has few superiors. *Blue Gem* has become very popular as a shipping melon, and is highly prized also for table use. It has become quite a favorite in this section. The rind of this melon is a bluish green, uniform all over. A solid-colored melon is much more liable to sun-scald than one with striped rind. This is true whether the color is solid white, green or black. A large number of superior shipping varieties have been developed in the last twenty years. A round melon bears the pressure of its companions better than an oblong shape, because it presents a double arch to the pressure, while the oblong form is arched only laterally. *Kolb Gem* was a pioneer in this line. This, besides being round, has not a thick, but a hard outside rind and a very firm flesh. All of the Jones are good shippers, and so are *Mammoth Iron Clad*, *Dixie* and others.

The advance in watermelon-growing for market has been phenomenal and interesting. In 1867, sitting in front of the old Planters' Hotel at Augusta, Ga., I saw an Irishman across the street packing large Georgia Rattlesnake melons in crockery crates, lining the crates with straw. I was told that he was making money shipping in that way to the northern cities. In 1876—ten

years later—while collecting agricultural statistics for the Georgia State Department of Agriculture, Augusta reported boastfully that they had shipped that season sixty thousand melons. Now there are more car-loads shipped from the South in a season than melons in 1876.

MUSHROOM

This is but little grown in private gardens in this country, partly because of the absence of suitable conditions required for success, but mainly owing to the liability of mistaking poisonous kinds for the edible. A careful study of the specific characteristics of the edible kinds may readily overcome the latter difficulty, but the fact is that very few do this, and hence this vegetable is not grown. It is so highly appreciated by some that they seek it during warm, moist spells in summer in the fields and old pastures.

MUSTARD

Two varieties of this pungent plant are commonly grown in the vegetable garden, viz.: the *White* and the *Black*. The *White* is preferred for salad and greens, the small bud leaves for cold salad and the larger leaves for boiling. They are both hardy annual plants of the brassica family, highly prized by some, but largely superseded by kale and spinach. The mustard flour of commerce is made principally of the seed of *Black* mustard, though the seed of the White variety is sometimes used for that purpose. The seed of the White variety is used whole as a seasoning for pickles. The most common

use now made of mustard is as a trap for the harlequin cabbage-bug, which seeks the mustard plant on account of its pungent taste. The mustard is sown near the cabbage to attract the bugs, which collect in great numbers on its leaves. Plants and bugs are then killed by spraying with kerosene emulsion early in the morning before the bugs become active. A coarse variety known as Chinese mustard is sometimes grown on account of large, broad leaves. I have seen this in full flower in January in middle Alabama.

NASTURTIUM

Nasturtium, now commonly an occupant of the flower yard, is a very ornamental plant both in leaf and flower. It is seldom grown now in the vegetable-garden, as formerly, but the flower-stalks are used as a pungent, pleasant salad with cold meats, and the stalk and flower together make a beautiful garnish, tastily arranged about cold salads as well as cold meats. The green seed-pods are used for flavoring pickles.

OKRA

This plant belongs to the same natural family as cotton, and, like it, came to us from the tropics. It is as easily grown as cotton, and requires similar cultivation. It should have a place in every southern garden. There are numerous varieties, some of which are so unproductive and bear pods so covered with spines that gloves are required to handle them. If the best variety, the *White Velvet*, is grown, the plants should grow in

rows four feet apart and the plants should be three feet apart in the row. Planted in this way, the plants branch near the ground and commence to bloom within eight or ten inches of the ground. The mistake of gathering the pods too small is very common. The mucilaginous properties are not well developed until the seeds are formed. The pods should be gathered every day as they reach the proper size, to encourage production. Select, as early as the plants develop, two or three of the most promising plants to produce seed. The most prolific, branching plants should be selected for this purpose and no pods allowed to ripen on the other plants. Do not use a knife in gathering, but break the stem of the pods with the hand. This is easily done if the White Velvet variety is grown, since it has no spines on the pods. If a knife is used, there is danger of cutting off the stalk and of stopping its fruiting. While gathering the edible pods, slip the dead flowers from the small pods. If these are left, they contract around the young pod and either destroy or dwarf it. If sufficient room is given the individual plants, the limbs will produce as much as the center stalk. The central stalk should produce a pod for every two inches of the stalk, and the limbs every three inches. Seed should be saved only from stalks that produce in this way. Well-bred and well-fed and cultivated okra will furnish a dish for the family table every day from the first of June until frost. There is no other plant which will do this, unless it be the tomato.

I have tried all varieties worthy of cultivation, and recommend the *White Velvet* as the only variety I would cultivate if I had to gather the pods. I have

gathered a bushel per day of this without making my hands sore.

Okra makes an excellent dish boiled, and seasoned with butter, pepper and salt. That not eaten can be rolled in meal and fried like fish for the next day. Gumbo soups of the southern tables require okra as one of the ingredients. Eaten with stewed tomatoes it makes a good dinner. Any surplus from a day's gathering may be preserved, as are cucumbers, in salt, or the green pods may be sliced and dried in the sun and then heated in the stove to destroy any eggs that may have been deposited, and put away in paper bags for winter soups. The pods preserved in salt may, after soaking out the salt, be fried as are fish after rolling in meal, or may be boiled, mashed and cooked in batter. It is, like the darkey's rabbit, good any way except raw.

THE ONION

This plant is grown from seed, from sets or small bulbs, from bulblets (buttons), as in the case of the top or tree-onion; and from bulblets or small separable parts of a compound bulb, as in the case of multipliers and potato onions. The seeds are produced at the top of the flower-stalk the second year. The ripe bulbs are kept over and planted the next spring, when the substance stored up in the thickened leaves constituting the mature bulb is consumed in producing the flower-stalk and the seed. *Sets* are small bulbs dwarfed by planting the seed very thickly in poor soil. To produce large onions these sets are harvested when the tops indicate ripeness and

stored with the tops left on until desired for planting. The smaller the sets the better, since the large sets are liable to produce flower-stalks.

The *Top* or *Tree Onion* produces both the large bulbs and sets, or bulblets, at the top of the flower-stalk instead

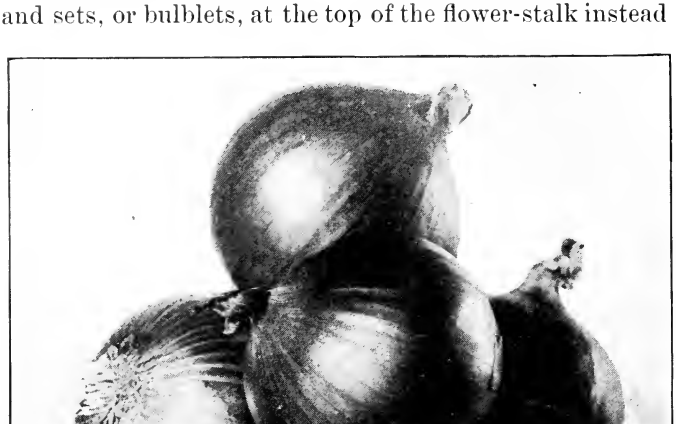


FIG. 12. Red Globe Onions.

of seed. The top sets ("buttons") are also used for reproducing the large onions.

The Multipliers produce neither seed nor buttons, but produce a compound bulb, the separate bulblets of which are planted for the next crop. This is the case also with the variety known as the Potato onion. The true shallot which belongs to the same genus, produces neither seed nor buttons but multiplies in bulbs sometimes an hundred fold. I have counted 105 in one

cluster. These are propagated by division of the cluster, each single bulbel multiplying again. The large Shallot, sometimes called scallions, produces both bulblets and bulbels, and may be propagated from either. The bulblets, or "buttons," are produced as in the case of the top onion, while the single button or bulbel multiplies from separate buds enveloped in the single case.

The soil best adapted to onions is a sandy loam free from pebbles or undecomposed vegetable matter. The soil should be deeply prepared and the manure or fertilizer thoroughly incorporated with the first six inches of soil. Fresh unfermented manure is not desirable, but thoroughly decomposed animal manure—that from the fowl-house and piggery—well rotted and mixed in the soil with strong wood ashes, makes a typical application for this crop. There is little danger of fertilizing land intended for growing onions too heavily if the right kind of fertilizer is used. An exception to this should be be made if sets are to be grown. Forty tons of the mixture just mentioned will be sufficient for an acre, and it will produce more and better onions applied to one acre than if divided between two acres, while only half the seed and half the labor will be required. If the home manures are not obtainable, a ton of complete commercial fertilizer analyzing 6 per cent of potash, 5 per cent of ammonia and 6 per cent of phosphoric acid, will answer. This should be sown broadcast and worked into the soil by repeated use of the harrow or disk cultivator. For early crop, either seed or sets may be planted the last of September. Those from the sets which are intended to be used green may be earthed up four inches on the

stem to increase the length of the edible part. I commence using them in this latitude in January, after a favorable fall, when the largest bulbs are the size of a guinea egg. The sets should be planted in rows fifteen inches apart, and four inches in the drill. The sets are pressed firmly into a shallow trench and enough fine soil to cover their tips drawn over them. I grow my own sets for fall planting. These supply the early crop. Seed sown in the fall follow closely, and seed sown in March follow in July. Onions grown from seed are more delicate in flavor and keep better than those from sets. The keeping qualities, however, depend largely upon the method of cultivation. Those grown with the bulb entirely above ground keep better than those that ripen with the bulb covered with soil. The same rules apply to spring-sown seed and to sets planted in spring as prescribed for fall planting. In each case the soil must be thoroughly pulverized and intensely fertilized.

The seed should be sown very thinly, not more than two seeds to the inch, and covered from half to one inch with very finely pulverized soil. If intended to produce onions, the plants should be thinned to four inches in the drill. Where they grow close together, press the soil with the fingers around the roots of the plant left to grow, so as to prevent injury when thinning out the surplus plants. If there are vacancies in the row, the surplus plants may be used to fill them. Growing onions from the seed means bent knees, a tired back and tedious finger work. If baking rains are followed by drying winds after sowing the seed, cultivation should commence before the plants appear. The onion

is an inside grower, and vegetates with a single very slender seed-leaf. If this encounters a surface crust, it will be doubled back and emerge with weakened vitality if at all. No crust should, therefore, be allowed to form over the seed. Every inch of the surface between the rows and amongst the plants must be stirred frequently to prevent the growth of grass or weed seed. This frequent shallow cultivation will be all that is necessary until the bulbs begin to form, when the soil must be drawn from around them so as to expose the entire bulb above ground. The roots all diverge from the center of the bottom of the bulb, so that the exposure of the latter does not interfere with the former. Why expose the bulb? The bulb is composed of the thickened base of the leaves. The outside leaves of the exposed bulb ripen and dry before the crop is gathered, and hence the onions are in better condition for housing than those on which these leaves are still succulent. If large sets are planted, having stored up the food for supplying the seed-stalk, they will put forth flower-stalks as soon as rapid spring growth commences. These should be promptly removed, or they will prevent the formation of the bulb at the base.

Approaching ripeness will be indicated by the shrinking and weakening of the neck of the stalk just above the bulb. The onions should now be pulled and laid in rows on the ground if the weather is suitably dry, but they must not rest upon each other. If dry weather prevails, allow them to remain five or six days, turning them daily to facilitate drying. If the weather is favorable, they will now be ready to be carted to the storage

room, where, if to be kept through the winter, the dry tops are removed and the bulbs spread upon shelves with slatted bottoms and sides not more than six inches deep. If threatening weather prevents thorough curing in the garden or field, they should be spread thinly on the floor of a well-ventilated room till the curing is completed before storing. If the shelves are not available they may be stored in slatted, shallow boxes similar to those in which fruit and vegetables are shipped. Varieties differ in their keeping qualities, and those of the same variety grown from seed keep better than those from sets. The onion, if properly stored, will endure a temperature approaching zero, but must not be handled while frozen. The so-called new onion culture, which directs planting the seed under glass and transplanting, is not necessary in the South, since, planted in the fall, they endure our winters without injury. The little white multipliers keep better and longer than any other variety. They should be grown in every garden, for this and other reasons to be mentioned later.

By common and concurrent experience the following are considered the most desirable varieties for the upper South reaching down to Florida:

Large Red Wethersfield.—This has been a favorite variety for more than a quarter of a century. The form is somewhat flattened at the base, the color of the skin red, with white meat tinged with red. It is very productive and a good keeper.

Yellow Globe Danvers.—This splendid variety has superseded the Round Danvers, on account of its more attractive form.

Southport Red Globe, *Southport White Globe* and *Southport Yellow Globe* are all popular and desirable varieties, differing very little in size, form, quality or productiveness, but the colored varieties keep better than the white.

Extra-Early Pearl and *Silverskin* are two popular varieties for the home garden on account of earliness, pure white color and delicacy of flavor. Both are small and poor keepers.

Prizetaker.—I have derived more satisfaction from this splendid variety than from any other. It is large, of beautiful form and fine flavor. The outside skin is straw-color; flesh white, mild and tender. Good from either seed or sets.

White and Red Bermuda.—These varieties have been, for many years, shipped in large quantities from Bermuda Islands, holding a monopoly of the early market, but they are now being grown on a considerable scale in Florida.

Top Onion.—This is an old and popular variety, which produces large bulbs and at the same time provides for its propagation by growing buttons, instead of seed, at the top of the seed-stalk. It is very popular in the alpine region of South Carolina, North Carolina and Georgia as a first crop, followed by cabbages transplanted in June between the onion rows just before the onions mature.

White Multipliers.—This variety produces no seed-stalk, but from a single bulb multiplies to the extent of producing a cluster of eight or ten new bulbels, each of which is capable of similar multiplication when planted.

It is an excellent keeper, small, but very mild. It keeps twelve months and is used all through the winter and spring for seasoning soups, salads, stews, etc., and for pickles.

The *Top Shallot* should have a place in every southern garden. This, like the Top Onion, produces buttons at the top of the flower-stalk, but, unlike it, multiplies at the base, growing often a dozen stalks from one. This plant is perennial and ready to supply flavoring to the housewife every day in the year. The bunches are earthed up in early spring eight inches high, causing the stems to blanch. A single row 100 feet long will supply a family for many years without replanting if, in gathering the plants for use, one is left. This, by the next fall, will have developed again into a bunch ready for blanching for spring use. The blanched stems are used cooked or raw, as are "bunched" onions. A furrow should be opened on each side of the row in winter, fertilizers applied and the soil returned. I have a row now seven years old and still productive.

PARSLEY

Only a small rich corner is necessary to produce an abundant supply for an ordinary family. Since the seed germinates slowly, the soil should be very finely pulverized. The young plants are tender and easily choked by weeds. The plants may be started in a coldframe in March by sowing the seed between the rows of other vegetables, such as cabbage or lettuce, which will be removed by the time the parsley seed vegetates. It

requires three or four weeks, and, as soon as large enough, should be transplanted to the open ground. A dozen plants will be sufficient. If tender, fresh leaves are desired for winter use, cut the tops close to the crown in October and transplant to a coldframe or a box in the greenhouse. The plant is hardy in the South, being uninjured by the ordinary cold of our winters. Very cold spells, however, may destroy it, as was the case in the severe freeze of February, 1895, which came after ten days of warm weather. The plants were then in a growing condition, which made them more susceptible to cold. If a continuous supply of fresh leaves is desired, only the well-developed ones should be cut. It is injurious to the plant to remove too many leaves at a time.

The varieties differ but little except in the beauty of the leaf. *Double Curled* and *Moss Curled* are the most desirable varieties. The beautiful green leaves are used to garnish cold meats and fish, and to impart a pleasant flavor to soups and boiled fish.

PARSNIPS

This vegetable should have a place in every family garden, since it may be left in the ground where it is grown and dug as needed during the entire winter and early spring. The soil should be prepared and the fertilizers applied in deep furrows, as directed for other root crops. The seeds are sown in shallow drills two feet apart and covered with half an inch of very fine loam. When large enough, thin the plants to four to six inches in the row. As for all other crops, frequent

shallow cultivation is necessary. Two rows, fifty feet long, will furnish a family supply.

The varieties are few. The best for the family garden are the *Hollow Crown*, or *Sugar Stump-rooted*, and the *Student*. The former produces larger roots of fine flavor, but the latter is more delicate, having less of the characteristic taste and odor of the species.

The simplest way to prepare this root is to wash, scrape and boil whole, putting it into boiling water slightly salted. When perfectly done, serve whole. Slice lengthwise, take out the woody heart and season with butter, salt and pepper while hot. Prepared in this way it is peculiarly rich and marrowy. After boiling, parsnips may be thoroughly mashed and fried in batter. This somewhat disguises the peculiar parsnip taste to which some object.

To save seed, either leave the roots where they have grown, or transplant in spring to some convenient border some of the finest roots. When ripe, cut the stalks and hang in a house to dry before rubbing out the seed. Fresh seed should be used. There are no known enemies to this plant. The roots not needed for the table may be fed to stock. They are more nutritious than the mangelwurzel beet or the turnip.

PEAS

Known as English peas and garden peas. This is an annual legume adapted to every part of the United States. In different localities it is planted at different times from November to May, and for a late crop in

July or August. The Marrowfat varieties are very hardy and are planted in November. They are, however, inferior in quality to the other type. The types usually planted in the gardens for shelled peas for table use are designated as *round*, and are smooth on the surface when dry. The *wrinkled* varieties have the surface irregularly wrinkled when mature. The round varieties are more hardy and earlier than the wrinkled, but inferior to the latter in table qualities. The vines of different varieties vary from one foot to six feet in height. The dwarf varieties are preferred by many gardeners, because they do not require to be stuck or "brushed."

As with nearly all garden vegetables, the pea prefers a deep, rich sandy loam, although it grows successfully in clay loam of good texture. The soil should be fertile but not excessively so, as this increases a tendency to vine growth at the expense of fruitage and involves more expense in supporting the vines, since the sticks, or supports, should be as tall as the vines. The fertilizer should be rich in potash and phosphoric acid and should contain a smaller percentage of nitrogen, since this plant can collect nitrogen from the air. The distance between the rows should vary with the habit of growth of the variety, the dwarf varieties requiring only two feet, while such tall growers as the Champion of England should have four. The seed should be covered four inches deep in a well-pulverized soil, and average one pea to the inch of row. The round varieties may be planted earlier than the wrinkled kinds. The latter will rot in the ground if freezing weather occurs after they

are planted, especially if the soil is wet and cold at the same time. In the middle belt of the southern states, the round kinds may be planted by the middle of January—earlier below and later above this belt. The wrinkled varieties will not bear as thick planting as the round; one seed to two inches is thick enough for them. If the variety does not grow more than two feet high, it will not pay to stick them. I formerly planted in double rows—two rows ten inches apart—but found that few pods formed on the inside of the rows, and for this reason abandoned this practice. As soon as the plants appear, the soil should be stirred with a garden rake. When they reach a height of three inches, a little soil should be thrown to them with a garden push-plow. When six inches high, or as soon as the tendrils form, supports should be supplied the tall-growing varieties. The river cane, if obtainable, makes a convenient and lasting support. The canes should be cut a little longer than the vines will grow and stuck along the row as follows: Stick half the canes on one side of the row so as to lean slightly, all in one direction. Stick the other half on the opposite side of the row and lean them in the opposite direction from the first. If these canes are taken up as soon as the vines ripen, and stored under shelter, they may be used for four or five years. The vines will continue in bearing longer, if the pods are gathered as fast as they reach the proper stage of development for table use than if allowed to tax the plant by ripening. Enough vines to produce seed for the next year's planting should be reserved for that purpose. Gather as soon as ripe, dry and store in

bottles or jars with a wad of cotton saturated with spirits of turpentine. The eggs of the weevil are deposited while the peas are yet green. The young larva develops inside of the pea, and the confined fumes of the turpentine stifles them. Naphtha balls will answer the same purpose. It is a mistake to suppose that northern-grown seeds of this plant are superior to those saved here. The only material difference will be manifested in a gradual increase in the growth of vine. Southern gardeners spend many millions of dollars, in the aggregate, annually for the purchase of seed that should be saved at home.

There are innumerable varieties of peas, but many are duplicates. One of the best early smooth varieties is *Wood's Extra-Early*, a desirable variety improved by selection from *Wood's Lightning Excelsior*, which latter is a close follower of its offspring in earliness, productiveness and quality. *Maule's First of All* is a superior early smooth variety. Any one of these three will answer for the first-early in the family garden.

The wrinkled varieties, being superior in flavor and richness, should be used to keep up the succession following immediately after the smooth sorts. *Wrinkled varieties* have been multiplied until it is difficult to select from them.

American Wonder is a dwarf variety which, while prolific and desirable, does not grow a foot high and hence may be planted closer and requires no stakes.

Nott's Excelsior is an early dwarf wrinkled variety, very prolific and so hardy that it may be planted nearly

as early as the smooth varieties. It does not require sticking. It is considered one of the best of many varieties tested here.

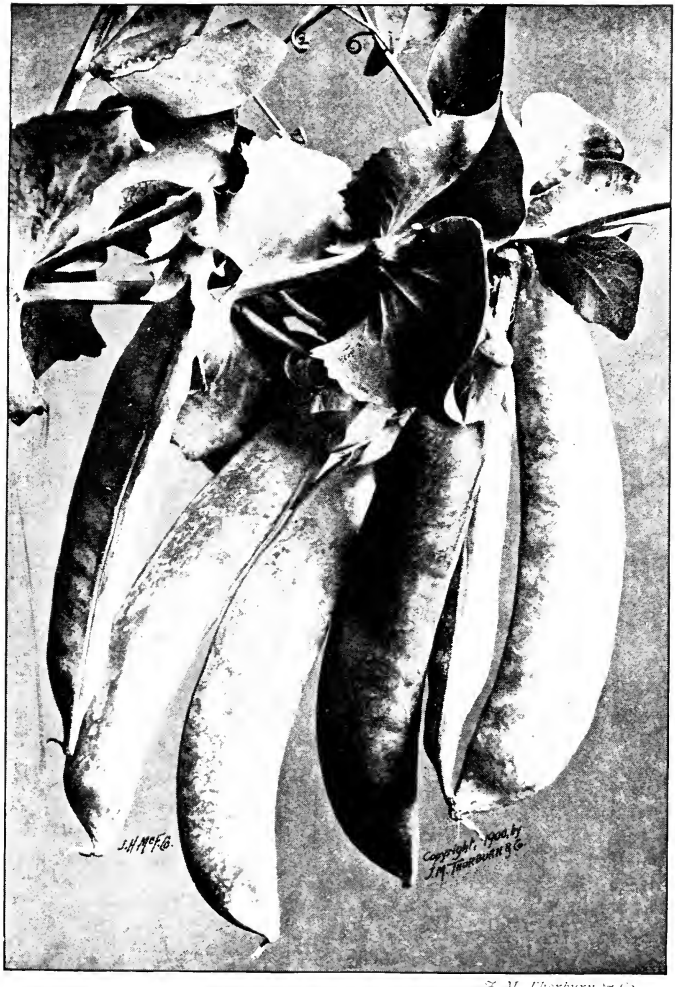
Prosperity is a medium-sized variety which does not require sticking. It is one of the favorites in this section.

Dwarf Champion is similar to the well-known *Champion of England* except in growth of vine, which renders it more easily grown than its parent.

Telephone is a standard wrinkled variety which is a general favorite. I have grown it for a number of years, and will continue its use until a better is found. It grows three to four feet high and requires supports. There are many other excellent varieties of this type offered in catalogues of seedsmen.

It is claimed that a new variety of the Marrowfat type, *Marblehead Early Marrowfat*, possesses qualities far superior to the old varieties such as *Large White Marrowfat* and the *Black Eye*. These have the advantage of being more prolific than the smooth sorts, and so much more hardy that they may be planted in November and come into use just after the extra-earlies. My experience sustains this claim. Planted in November, 1903, they stood the winter perfectly and ripened immediately after *Wood's Extra-Early*. I have them now, planted last November, that have withstood the unusually severe weather of this winter.

Sugar, or *Edible-pod Peas*.—This is a strain in which the pods are cooked and eaten like snap beans. They are very prolific and remain long in bearing. There are three varieties,—*Dwarf Sugar*, which grows only two



J. M. Thorburn & Co.

FIG. 13. Telephone Peas

feet high; *Melting Sugar*, which grows about five feet, and *Mammoth Luscious*, which attains a height of five to six feet and requires strong support. This strain of peas is liked by some, but is not generally popular. The peculiar, rather sickening sweet taste is not relished by many.

PEPPER

A member of the solanum family, a native of the tropics and hence requires a warm season in which to grow. It will thrive on any fertile soil, and requires about the same conditions and cultivation as the egg-plant, already described. If an early crop is desired, the seed may be forwarded in a box a foot deep, in which fermenting manure is placed to generate a bottom heat, or they may be planted in a flat four inches deep filled with rich loam and kept protected from cold. These devices will answer, in the absence of a hotbed or greenhouse. If the seeds are sown under any of these conditions in February and, when the plants are large enough to be handled, transplanted to a coldframe, they will be ready for transplanting to the open ground as early as the soil is warm enough to receive them. Only a few plants will be needed to furnish all a family can use, unless it is desired to cultivate several different types. Some of the varieties are very ornamental when in full fruitage, and are often found in the flower yard or the greenhouse.

A new variety of extra-large size is *Chinese Giant*, prized for salads and mangos. The rind is thick, mild and sweet.

Ruby King is another very large, productive variety. It has, for some years, been the principal market variety, usually sold green. It is a prolific bearer of very showy pods.

Golden Queen.—Those who prefer a yellow pepper will find this a very desirable variety. Similar to Ruby King except in color of pods.

Long Red Cayenne.—The pod of this variety is long, red and pointed; very hot. This is the kind so often seen hanging in the porch of the farmhouse. It is dried, ground and used as a condiment.

Tom Thumb, sometimes called *Bird's Eye.*—This is a dwarf variety usually grown as an ornamental plant in the collection of house plants or in pots in the greenhouse. The berries are the size of a red currant.

Tobasco.—This makes a very handsome plant when loaded with the little crimson pods, which are only an inch in length but very hot; well known on account of its use in tobasco sauce.

Celestial, an ornamental variety, is very productive and showy, and is covered with creamy yellow and deep scarlet pods at the same time.

POTATO (IRISH)

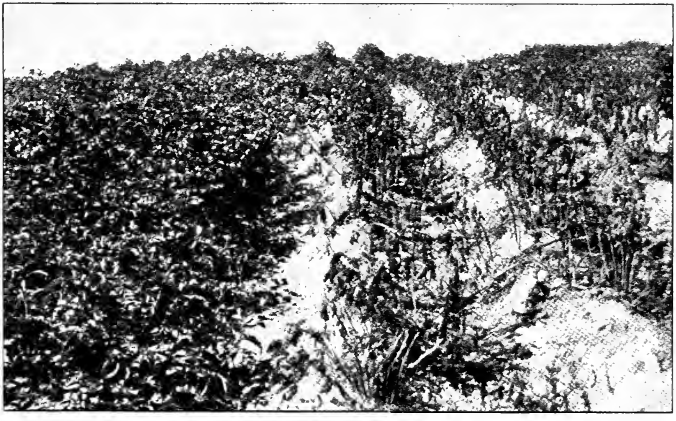
To distinguish this from the sweet potato, it is often spoken of as the "white" potato. It belongs to the same genus as the eggplant and is closely related to the tomato and several narcotic plants, as henbane, tobacco and belladonna. It, too, contains a trace of poison, which is developed when the surface turns green from

exposure to the direct or indirect sunlight, and hence is unwholesome as well as unpalatable when in that condition. The potato delights in a comparatively cool atmosphere and a moist soil and therefore thrives best during the cool months of spring and fall. By mulching heavily with leaves or straw to retain the moisture, a good crop may be produced even during a dry season.

FIG. 14. Spraying Potatoes. Bulletin 264, New York Experiment Station

We secure best results by planting the tubers four to six inches deep and harrowing just as the first plants begin to appear. In the lower cotton belt they should be planted in January; in the middle belt in February, and in the mountain region, last of March or early in April. Only the early varieties can be relied upon in the warmer portions of the South, and these are often injured by a drought in May.

The soil best adapted to this crop is a rich, sandy loam underlaid by a subsoil retentive of moisture. The soil should be deeply stirred and thoroughly pulverized, and well-rotted manure applied broadcast and incorporated with the soil. Fresh unfermented manure is not desirable and should not be used, since it encourages fungous diseases of the vine and scab on the tubers.



Sprayed Potatoes FIG. 15. Potatoes not sprayed

Photographed September 6. Gain due to spraying, 83⅓ bushels per acre. Bulletin 264, New York Experiment Station.

Open deep furrows three feet apart with large shovel-plow or with a one-horse turning plow, and run twice in the row. Into these furrows, strew a complete commercial fertilizer at the rate of 800 pounds per acre, and mix it with the soil and subsoil by two furrows of a long, narrow bull-tongue plow. Cut medium-sized tubers to one or two eyes or buds, making the pieces as large as practi-

cable. Drop these twelve to fifteen inches apart in the drill, and cover with two furrows of a plow, which will place not less than four inches of soil above the tubers.

If, after the plants appear above ground, a frost is threatened, cover them with a thin coating of soil (if the soil is not too wet to be stirred) by running a turn-plow eight or ten inches from the plants on each side of the row. This covering need not be removed after danger is past, as the plants will grow through it. Cultivate level and shallow until the plants are eight or ten inches high, when soil should be worked to the plants. After this is done and the soil has been moistened by rain, apply a mulch between the rows to retain moisture. This done, no further cultivation will be necessary. If the mulch is not applied, stir the surface between the rows after each rain to form a soil mulch to retain moisture. Mulch applied before danger of cold nights is over, increases the risk of injury by frost. The tubers may be bedded like sweet potatoes in early spring, and the sets drawn and transplanted. Mix soil and cow manure with water to the consistency of paste. Dip the roots of the plants into this before transplanting, and, if the soil is dry, use a pint of water to each plant. Open a hole in the prepared soil; pour in the water and, while the water is still there, set in the plant and draw fine earth to it until the moisture is covered. Planted in this way, they produce an early crop of large tubers—finer and smoother than from the usual method, but not so many to the hill. They produce no small potatoes from the sets. I have grown them successfully in this way for the fall crop also. Fifty years ago it was the

common practice to carefully place the cut part of the tuber down. In my boyhood I was required to plant them in this way. Usually when the blossoms appear, there are edible tubers at the roots. The tubers grow upon underground stems, put forth for that purpose, and not on the true roots. When the vines turn yellow, dig the tubers with as little exposure to the sun as possible. Spread in a cool room or on the ground under a house. If exposed too much to light, the tubers will turn green and become unfit for the table. Air-slaked lime sprinkled over them will cause them to keep better. Usually the potatoes are dug in June, in time for a crop of corn to be grown after them. If mulch is used and worked into the soil in digging the potatoes, the land will be in a good condition for celery to be transplanted in July, and, when the celery is taken off, an excellent preparation has been made for strawberries, which require a soil well supplied with humus.

THE SECOND, OR FALL CROP

The second, or fall crop is of greater importance in the family than the spring crop, because they keep better for winter consumption than those harvested in June and are much superior in table quality to the latter. Potatoes of the previous year's crop, preserved until June in cold storage, are sometimes used for planting the fall crop, but they have not proved so satisfactory as seed from the first or spring crop of the current year. Practically the only difficulty in the way of growing the fall crop is in securing a stand. This may

be done in several ways, as follows: (*a*) When the first crop is dug, usually in June, plant the small tubers, without cutting, at once on the same land, covering them six inches deep. Why use the same plot from which the spring crop has been harvested? Because there will be left in the soil many tubers which will "volunteer" in the early fall. These can be transplanted to supplement a defective stand. Plant in rows three feet wide, and plant a row of bunch snap beans in the middle, between the rows of potatoes. The cultivation of the beans will benefit the potatoes by keeping down grass and weeds, by keeping a continual soil mulch on the surface, and the shade of the bean vines will keep the soil cool. My attention was drawn to this method by observing the fact that the tubers left in the ground when the crop was dug invariably came in advance of those removed and planted in August. (*b*) When the crop is harvested in June, prepare the land and plant as just described, except that the rows need not be more than two feet apart, and mulch heavily with straw or leaves. The mulch will retain moisture and insure a stand. Indeed, I have known potatoes grown on the same land for twenty-five years by mulching heavily, a foot deep, the spring crop. Take off the mulch in July, harvest the crop, fertilize the land and replace the mulch for the fall crop. Let the mulch remain during winter, use the potatoes as needed until early spring; then, if the mulch has been sufficiently rotted, plow it into the soil with the small potatoes not used and apply fresh mulch. This was continued by Hon. Samuel Barnett, of Wilkes county, Georgia, for twenty-five years without

change of seed and without deterioration of the crop. I practiced this for five years successfully. (*c*) A third method practiced successfully by Colonel Ryals, the largest truck-farmer in the vicinity of Savannah, Georgia, is: Prepare the land thoroughly the last of August, plant in deep furrows, cover four to six inches, and pass a heavy roller over the row. Being a close observer, Colonel Ryals noticed that near the barrels containing the seed potatoes, where the soil of the rows was tramped and compacted by the feet of the planters, the potatoes came better than where the soil was left loose over them. He therefore determined to pack the soil over the seed on the whole crop. (*d*) The most certain method I have used is as follows: Trench out an area, large enough to bed enough tubers to plant the crop, four inches deep, spread over the bottom of this an inch of rich loam, and place the whole tubers an inch apart on this soil. Cover them with three inches of mellow loam and, overthat,spread chopped straw or shredded corn-stalks two inches deep. This is to prevent the soil from baking when watered. This bed should be located in a cool spot, north of a large tree,

FIG. 16. Second-crop Potatoes
Seed planted same day first crop was harvested

a board fence or a house. Keep it moist, but not wet. Have the land prepared and laid off ready for the reception of the plants. When the plants have three or four leaves, take them from the bed with the mother potato attached. If more than one shoot has come from a single tuber, cut between them and transplant separately. Continue to transplant as the plants get large enough. Do not detach the mother tuber, but plant it with the shoot to supply nourishment until the young plant has developed its root system. If any shoots become disconnected from the mother tuber, transplant with water, as directed for cabbage, when the soil is dry. While this method is somewhat more troublesome than the others, it is compensated for in being absolutely certain. The fall crop will remain in the ground all winter, to be dug as needed without becoming watery or in any way deteriorating in quality, or they may be harvested and stored. They will keep without difficulty, in the ground or out, until time for them to sprout in spring. If left in the row, two furrows made with a good turn-plow should be thrown upon them. This serves the double purpose of affording drainage and protecting them from freezing. The potato produces less vine in fall than in spring and matures in a shorter time. The fall-grown are superior in quality to the spring-grown.

There are over six hundred described varieties of Irish potatoes, but only a small number of these are planted in the South — mainly the early varieties. New varieties are grown from seed. The tubers of the seedlings are small at first, but increase in size under high cultivation. I received from D. Landreth & Sons, in

1886, an old-fashioned wooden match-box full of tubers of a new wild variety discovered in Arizona by Dr. Lemon, accompanied by the request that I plant and develop them. These tubers ranged from the size of an English pea to that of a hazelnut. Mr. Landreth stated in his letter that he had grown these tubers from "some very much smaller." I planted and nursed them for three years, when the largest tubers were the size of a guinea-egg, but, not promising to develop into usefulness, their cultivation was abandoned. Very few varieties produce seed. I have known seed produced only a few times in thirty-eight years' experience in growing potatoes in the South. In 1887, a variety, then known as Empire State, ripened seeds which were planted under a variety of conditions, but none germinated. The seeds are borne at the tops of the vines, in clusters of small balls three-fourths to one inch in diameter. They resemble in appearance a green plum tomato.

Bliss' Red Triumph, a round tuber of good size, has a pinkish red skin but pure white flesh. It is earlier than the Early Rose, which it has almost entirely superseded. This is an excellent variety for both spring and fall crops and a good keeper. Its table qualities are first-class, readily crumbling to a mealy consistency when properly cooked.

Bliss' White Triumph differs little from the former except in color. It, however, has not been so thoroughly tested in the South as the red.

Crown Jewel has proved to be one of the most productive of the early varieties and is deservedly growing in popularity.

Irish Cobbler, though a new variety, is rapidly gaining in popularity in the South. It is a round, white-skinned and white-fleshed potato, an early, heavy bearer and has excellent table qualities.

Extra-Early Sunlight is an oblong white potato, very early and productive. Its form and color make it popular. It is a very promising variety.

Early Ohio is a popular early variety, which has given general satisfaction but is not quite equal to the Bliss and Crown Jewel.

Beauty of Hebron is a desirable variety, ripening a little later than the foregoing varieties, but popular for the home-garden on account of its fine table qualities.

Carman No. 3 is a favorite second-early variety. The tubers are white, with pure white flesh, very uniform in size and shape, and its table qualities are unsurpassed.

Burbank and *Peerless* are two old varieties which have retained their popularity for general crop varieties.

The early-maturing varieties are most popular in the South, because they make before the hot summer weather arrives, but the medium and late varieties succeed well if planted early, and properly guarded against drought by mulching between the rows after a good rain, or by stirring the surface promptly after every rain to conserve moisture by means of the soil mulch. In the mountain region, which is especially adapted to this crop, the general crop and late varieties are desirable.

For some reason, the impression very generally prevails that it is necessary to purchase northern-grown

potatoes to plant every year. Experiments made to compare northern- and home-grown seed have not sustained this view. The failure of many growers either to carry over the spring crop or grow the fall crop is probably responsible for the belief. Those who pursue the business in a systematic, business-like manner grow the fall crop from spring-grown seed and the spring crop from fall-grown seed. If this is regularly practiced, it will materially reduce the cost of growing this crop in the South.

There is no other vegetable which can be prepared in so many different ways and all good. They are ready for use when half-grown. Washed thoroughly, at the same time rubbing off the tender skin, they are ready to be boiled. Half an hour before dinner is to be served, put the potatoes into hot slightly salted water, enough to cover them, and boil gently until done. Pour off the water, and serve hot with drawn butter. If allowed to stand in the water after they are done, they become clammy and unfit to eat. They are often spoiled by being boiled with meat. When potatoes are fully grown, those to be cooked together should be of the same size, or the small ones will be ruined before the large ones are done. As soon as done, pour off the water and wring each one separately in a clean towel, to squeeze out the water, and slip off the skin. Potatoes treated in this way will be dry and mealy and ready for drawn butter, salt and pepper. Serve hot. Potatoes, like rice, can be served on short notice. They may also be prepared in several ways in advance of the meals. They may be sliced and stewed and seasoned with butter,

milk and salt; they may be sliced raw and fried on a quick pan; they may be boiled the day before and sliced and fried for breakfast; they may be mashed and made into cakes and fried, or they may be sliced and made into a salad, or mashed and made into salad. They may be taken hot from the vessel in which they were boiled, mashed thoroughly, seasoned with butter and cream, and stewed until the seasoning is cooked into them as "creamed" potatoes, or they may be mashed, seasoned and baked until the surface is browned, or they may be sliced and boiled in hot lard and made into "Saratoga chips." The ripe potato is excellent baked in "its own jacket" and served hot. It is like the negro's rabbit—"good anyway" it is cooked.

THE SWEET POTATO

Climatic conditions favorable to this plant are just the reverse of those of the Irish potato. This requires a summer temperature of four to five months. Its cultivation is confined almost entirely to the states from New Jersey south. While some are grown in Ohio and Illinois, the production is small compared with the southern states. A rich, sandy loam is the ideal soil for sweet potatoes, but excessive fertility is not desired. A soil over-fertile produces vine at the expense of the enlarged roots, for which especially the crop is grown. The Irish potato is a tuber, while the sweet potato is a tuberous root or the enlargement of a true root, which extends on beyond the potato and performs the functions of a true root. The Irish potato is grown on a stem

which performs no such functions, but is put forth for the sole purpose of making the tuber.

The sweet potato blooms under favorable conditions, but produces no seed. It is propagated from tuberous roots and vine cuttings. The roots are bedded on a warm exposure, as follows: The soil is trenched out four feet wide and as long as necessary to receive the quantity to be bedded. The trenches should be four inches deep and filled with unfermented manure, over which soil should be spread to the depth of two inches. On this place the potatoes, and press each separately into the porous soil, using only perfectly sound potatoes. Do not allow them to touch each other. Spread evenly over them a porous soil four inches deep. Above this spread clean straw just thick enough to prevent the surface from washing or baking when watered or after a heavy rain. Watch closely, and when the first plants begin to appear, rake off the straw and stir lightly the soil enough to destroy all young grass or weeds. If necessary, sprinkle the bed from the rose of a watering-pot, going over twice to give time for the first to be absorbed before the second is applied. Do this late in the afternoon. The potatoes may be bedded the last of March or early in April, according to the advancement of the season or the latitude. Further north it is necessary to forward the plants in hotbeds or coldframes, but this is not necessary in the cotton belt.

Prepare the land thoroughly before the plants are ready. Open deep furrows three to three and one-half feet apart, and apply the fertilizer in these at the rate of 300 pounds of acid phosphate, 300 pounds of kainit and

200 pounds of cottonseed-meal, or their equivalent, per acre. List or turn two turn-plow furrows on this, and, just before the plants are ready, complete the beds and harrow across them with a smoothing-harrow with the teeth set at an angle of forty-five degrees. If the soil is wet when it is desired to transplant, drop the plants so that the roots will lie across the center of the bed, and with a stick concaved at one end, press the roots into the soil, taking care that all roots are pressed in. With a slight motion of the stick, fill the hole made in pressing the plant down. This seems to be a slovenly way of planting, but it has the merit of being rapidly done and involves the least possible stirring of the wet soil and gets the maximum advantage of the moisture in the soil. Besides, the plants put in in this way grow off more promptly than those more carefully set after the soil is dry enough to be stirred. If the soil is in good moist, but not wet condition, open a furrow with a narrow plow in the center of the rows, drop the plants carefully eighteen inches apart, with the roots in the furrow, press the root into the soil, draw enough soil around it to cover well, pack this around the roots, and cover the compacted part with loose soil to prevent baking. If the soil is dry, open holes at the desired intervals deep and large enough to hold a pint of water; place the root in the hole and pour the water on it. Now draw loose soil from the surface until the wet area is covered, but do not press it upon the roots. The water will settle the fine soil around the roots sufficiently.

Do not water the beds too much after the plants are nearly ready for transplanting, as this will induce a

succulent, sappy growth of the plants unfavorable to suitable hardiness for transplanting. Unless, however, the beds have been made wet by rain, water well an hour before drawing the plants. To draw the plants without loss, seize one plant at a time at its base, and press the soil around it with the other hand to prevent lifting the mother potato. Draw only plants which have fully developed green leaves, leaving those younger for the next drawing. If drawing has been delayed till some of the plants are a foot long, make several plants of these. Cut above the first or second leaf, leaving these with the rooted plant. Make vine cuttings of the rest, putting one leaf-joint into the ground and leaving one out. A cutting need not be longer than six inches, and, strange as it may seem, the vine cuttings live better and grow off more promptly than the rooted "sets," "draws," or "slips," as they are indifferently named. Not only so, but they produce smoother, finer potatoes than the slips set at the same time. Repeated experiments designed to compare the productiveness of slips and vine cuttings resulted generally in favor of the cuttings, with the exception of one variety known as *Georgia Yellow Yam* or *Sugar Yam*. The common practice of cutting the tender, immature ends of the vines a foot or more in length and burying the center, leaving both ends out, is putting the vine cuttings to a severe test. The immature ends should not be used. Only the part of the vine having grown leaves is suitable.

The economy of using the vine cuttings may be appreciated when we consider that ten bushels must be bedded to furnish early slips for an acre at one drawing.

Mr. Ben Lockett, of Georgia, who worked a large force of convicts, planted annually thirty acres in sweet potatoes to feed the convicts. He told me that his practice was to plant one acre of rich soil early to grow vines. From this acre, he planted twenty-nine acres with vine cuttings. To grow sets enough to plant thirty acres would require 300 bushels of seed potatoes, if ten are required for one acre, while by his method only ten were necessary. It is claimed by successful, experienced potato-growers that the best seed is grown by planting vine cuttings in June or July. The small, smooth roots from the vines make choice seed. Some of the very successful growers use only large seed potatoes. Results of experiments in which large and small seed were compared have been conflicting. It being necessary to cut the very large potatoes in half, placing the cut side down, the risk of rot is increased. The large ones are more valuable for the table or for market than the small ones, and a larger number of plants will be produced from a bed of small than of large potatoes.

As soon as the plants are set, the soil should be stirred around them with rake or hoe, and shallow cultivation with scrape or cultivator should be continued until the vines cover the ground. At the last plowing, turn the vines into alternate rows while those from which they are moved are being plowed. As this will be the last plowing, use the Terrell heel-scrape, thirty-six inches wide with shovel, both on top of the foot. With this, one furrow to each row will move sufficient soil to the rows of plants. Turn back the vines, and plow the alternate rows in the same way. Take care not to cover

the vines with soil, as this will cause them to take root, to the injury of the crop. Turning the vines will not be necessary with the vineless varieties, but the wing of the scrape should be run under the short vines where they have taken root. Just in proportion as the vines take root, will the crop be reduced. The sap prepared for the nourishment of the plant beyond the points where the vines have taken root, will be expended in the development of "strings,"or very small potatoes, along the vine instead of passing back to the main roots. If after wet spells, therefore, the vines take root in the middles, go over with long-tined rakes and lift them sufficiently to tear the roots loose from the soil. No other attention than preventing the vines from taking root will be needed until harvest.

Since sweet potatoes do not produce seed, the multiplication of varieties presents a perplexing problem. That they do cross in some way is a fact based upon the observation of many planters. I have seen both red and yellow potatoes growing on the same vine, and single specimens partly red and partly yellow. This occurred where varieties of these two colors were grown in adjacent rows, but how the cross was effected is the problem. Bud-variation, suggested by one author, does not explain it. There are several distinct types, distinguished by differently formed leaves, different vine growth and characteristic gumminess of the juice, etc. Each variety has its distinctive form of root and color of skin and flesh, as well as the quality of the latter. The northern taste calls for a dry potato, while the most popular in the South is that with a rich, sugary flavor.

Georgia Yam, or *Sugar Yam*, is almost universally recognized as the standard of excellence. This is a smooth potato with pale yellow skin and flesh, largest in the middle and tapering rather abruptly toward the stem and more gently toward the root. This has a deeply divided leaf, but is not a heavy bearer.

Pumpkin Yam.—This is probably next to the Georgia Yam in popularity. The potatoes are yellow on the outside and the color of the flesh that of a pumpkin on the inside, hence its name. This is an abundant producer of large, well-shaped roots of superior quality from the standpoint of southern taste. A peculiarity of the variety is the production of some of the largest potatoes in the middle of the rows. It is a good keeper, of superior table quality and, together with the Georgia Yam, excellent for evaporating. This is the only variety I have ever known to grow in size after being banked for winter.

Horton Yam is another popular variety in South Carolina and Georgia. This is a medium productive variety, with color between that of the Georgia Yam and the Pumpkin Yam. The quality approaches more nearly that of the Pumpkin Yam.

Extra-Early Caroline is an early, productive variety, roundish in form, with fresh yellow color.

Yellow Nansemond.—A rather small yellow, oblong potato very popular in Virginia, Maryland and New Jersey, not grown much south of Virginia. This is a dry potato, but very sweet.

Red Nose has proved to be a very heavy yielder and of good quality. It is yellow with red tip when first dug, whence the name.

Hanover Yam. — A large, round, white variety, adapted to heavy soils; a heavy yielder, but not first-class in quality.

There are several different types of the *Bunch* or "*Vineless*" *Yam*, the peculiar characteristics of which are that the vines are very short, owing to the fact that the spaces between the leaves are frequently not more than one inch. There are about as many leaves to the vine as on the vine varieties, but clustered closely on the stem. They are more easily cultivated than the long-vine varieties, but the potatoes average smaller than the vine varieties and are not as good keepers. The potatoes are clustered closely in the hill and are hence easily dug.

The *Spanish* varieties, which were very popular forty years ago, are rarely cultivated now. They are usually long, slender and of an ashy color inside. They were planted by breaking or cutting the potatoes into pieces one or two inches long and dropping in the row like Irish potatoes. This is not a desirable method, as the grass and weeds usually appear in advance of the potatoes.

HARVESTING OR DIGGING

There is much difference of opinion among growers as to the proper time to dig. The general practice is to wait until the vines are killed by frost, but there is risk of having the potatoes injured if a freeze accompanies the first frost, as was the case in 1904. The theory on which this practice is based is that the frost stops the growth of the vine and hastens maturity, but it often

happens that a rain just before the frost renews the growth and produces a sappy condition of the potato. There is usually a protracted drought in the fall which checks if it does not stop growth, inducing a dry condition of the roots which promotes their keeping qualities. The best and most reliable indication of ripeness is manifested by the prompt formation of an artificial skin over a cut surface. If the potato is in a growing condition, the cut surface will become dark by exposure, while the matured root will promptly heal the wound by an apparent crystallization of the sap over the wound, forming a white artificial skin for its protection. Potatoes are generally very roughly treated in digging, and carelessly handled afterwards. The skin of fruits and the bark of plants are intended to protect the interior from access of air with its burden of germs. Puncture a growing peach, and the plant at once repairs the injury; puncture it when ripe, and it promptly begins to rot at that point. Its recuperative power no longer exists. The sweet potato is cut or bruised by the plow; it is then picked up and pitched to the pile some six or eight feet away, where it falls upon its mates or perhaps strikes a stone. In either case its natural protecting cover is broken and access to its interior given to the germs of destruction. The potatoes are thrown into a rough split basket, which when filled is handled by holding opposite sides, and these being elastic, the skin is again rubbed from the potatoes. They are dumped into the naked wagon-body and still further bruised, hauled over a rough road and roughly handled in the baskets again. The fermentation which takes

place in the "bank" generates a temperature favorable to the growth of the fungous germs or spores absorbed during their rough exposure. Is it strange that they refuse to keep after such an experience? To withstand the rough handling in general practice, a variety having a tough skin seems a desideratum. Reformation is imperatively demanded in the method of treating this important crop. Potatoes should be dug, if practicable, when the soil is comparatively dry, so that no dirt will adhere to them. They should be spread to dry in the sun where they are dug. This will diminish the injury from handling and improve their keeping qualities.

A full description of the variety of methods adopted for keeping through the winter would fill a volume. The most common practice on the farm is as follows: Dig a shallow circular ditch around an area sufficient for the bank, throwing the dirt toward the center of the circle, thus affording safe drainage. This circle should extend one foot outside of the base of the pile of potatoes, to serve as a base on which to build the cover. Spread dry straw six inches deep over the circle. Build a cone of potatoes in the center; cover them with six inches of dry straw, and place over this large pieces of pine bark, boards or corn-stalks; then build, on the margin left for the purpose, a covering of soil, carrying it nearly to the top of the bank of uniform thickness, leaving a space at the top a foot in diameter for the escape of gas.

Protect with a board shelter, sufficient to keep off rain. Before severe weather, close the opening left at the top with the uniform thickness of soil. Some place a ventilator in the center of the hill. It would be well

to save dry sand during the summer or fall, stored where it will remain dry until needed, and fill all spaces between the potatoes with this, spreading the potatoes in layers and pouring the sand on each layer as the bank is formed to keep the potatoes separated and to keep out mice. In my experience, mice often start the rot by pulping a mass of the meat of the potatoes, which starts fermentation. Potatoes grown in sandy soils usually keep well in this way. Not more than twenty-five bushels should be put into a bank of this kind. Some store in sand in cellars, some build potato-houses and store in sand covered thickly with straw, etc. Uncle Peter, one of my grandfather's old slaves, dug a pit under the floor of his cabin in front of the fireplace, and stored in that. He had seed potatoes for sale every spring. The surest method is described in the following extract from Bulletin 71 of the South Carolina Experiment Station. Following this method, each family may put up enough in the fall for a table supply.

NEW METHOD OF EVAPORATING SWEET POTATOES

Three years ago the solution of the problem of how to introduce the sweet potato to commerce was undertaken. There were two difficulties to be overcome: First, to render the potato less perishable, and second, to reduce its weight and thus render its shipment to distant markets practicable.

The question of varieties, fertilization and cultivation had been exhaustively studied. That large crops can be produced at small cost has been demonstrated. That

they furnish cheap and nutritious food not only for man, but for all classes of domestic animals, is not questioned.

As a market crop they have thus far fallen far short of success. Why is this? First, they are too bulky to bear transportation, even to our own large cities; second, they are too perishable to bear rough handling and exposure to freezing weather. The problem, therefore, which we undertook to solve was to reduce the bulk and weight, by drying off surplus moisture, to so sterilize the product as to exempt them from the fungous diseases to which the green product is subject, and to accomplish these ends without impairing the edible qualities of the desiccated product.

THE FIRST EFFORT ONLY A PARTIAL SUCCESS

In 1899, the roots were peeled and sliced and dried in a movable evaporator. This resulted in removing the excess of moisture, and, consequently, reducing the weight to one-fourth that of the green roots, and rendering the product non-perishable, but this was accompanied by a practical destruction of the flavor. The surplus moisture was removed, but the reabsorption of the moisture was not satisfactory, and, hence, when cooked, they did not resemble in consistency or flavor the fresh potato.

Since these results were obtained the Chemical Department of Clemson College has successfully manufactured a quantity of starch of superior quality from sweet potatoes. These investigations are to be continued, with the expectation of placing this new industry on a commercial basis.

DISCOVERY OF A LADY

In 1900, Mr. J. Sam Pickett, foreman of the Station work, learned that Mrs. E. F. McDowell, of North Carolina, had succeeded in producing a satisfactory article by boiling the potatoes before evaporating them. Acting upon this suggestion, fairly good results were obtained, and a merchantable article produced by boiling in an open kettle, and using again the fruit-evaporator The work, however, was irregularly done, many of the slices being overcooked and hard.

A sufficient percentage of the output was properly prepared to demonstrate that the method was correct and that satisfactory success was attainable with a suitable outfit, skilfully handled. To test the keeping qualities of this output, a part of the product remained in ordinary cloth sacks for seventeen months, having passed through two winters and one summer in a perfect state of preservation.

A COMPLETE SUCCESS

In the fall of 1901, experiments were made with thirteen different varieties to test their comparative adaptation for the purpose.

A room was equipped for steam heating in connection with the cannery in the horticultural division of the experiment station, by means of which the work of boiling, peeling and evaporating could be more expeditiously and economically performed.

By means of a derrick used in the cannery, several

bushels of green potatoes were lowered in an iron basket into a large boiler, in which the water was heated by steam. To secure uniform cooking, the roots should be nearly of the same size. Those weighing from one to two pounds required one hour for thorough cooking. Six to eight hours were required for evaporating them at a temperature of 150° Fahr. An ordinary laborer peeled and sliced one bushel per hour.

The accompanying tabulated statements present the following facts, viz.: First, yield per acre of each variety in bushels; second, yield of evaporated potatoes per 100 pounds, green; third, number of pounds sound green potatoes stored and the pounds of sound roots taken out.

Name of Variety	Yield per acre in bushels	Yield per acre in pounds	Per cent of evaporated product	Yield per acre of the evaporated product
Pumpkin Yam	232	13,920	24	3,340
Hanover Yam	329	19,740	26	5,132
Extra-Early Caroline .	146	8,760	25	2,190
Red Nose	238	14,280	24	3,427
Nansemond	222	13,320	22	2,930
Bunch Yam	165	9,900	18	1,782
Georgia Sugar Yam . .	211	12,660	23	2,911
Vineland Bunch Yam .	136	8,160	22	1,795
Jersey Big Stem . . .	357	21,420	29.5	6,318
Pierson Yam	328	19,680	22	4,329
Jersey Red	261	15,660	29	4,542

Under this system there can be no loss from rotting during storage. On the contrary, the evaporated product is not only not perishable, but, containing only 3.42 per cent of moisture, will keep for an indefinite time and bear transportation to any part of the world at any season.

The following statement shows the loss by rotting of the same varieties used for evaporation:

Name of Variety	No. pounds stored in November	No. pounds sound in March
Pumpkin Yam	199.6	151.6
Hanover Yam	284.0	265.1
Extra-Early Caroline	96.0	86.5
Red Nose	188.6	
Nansemond (from Richmond)	172.3	155.1
Bunch Yam	115.8	
Georgia Sugar Yam	161.6	34.2
Vineland Bunch Yam	86.0	19.5
Jersey Big Stem	307.3	165.0
Pierson Yam	278.3	158.5
Jersey Red	211.7	148.5
Nansemond (New Jersey)	200.6	111.3
Horton Yam	196.0	95.7

The evaporated potatoes show the following percentages according to analysis, kindly made by the Chemical Department of Clemson College:

Air-dry product from the evaporator: Moisture, 3.42 per cent; crude ash, 2.48 per cent; crude protein, 5.06 per cent; crude fat, 0.80 per cent; crude fiber, 2.08 per cent; nitrogen-free extract, 86.16 per cent.

To prevent hardening of the product, it should be packed in close boxes as soon as practicable after removal from the hot room.

PREPARATION FOR USE

Soak the slices in warm water for an hour, and prepare as dressed or candied potatoes. The desiccated

potatoes may also be used, as are the fresh roots, for puddings, custards and pies.

The sweet potato prepared in some form is as commonly found on southern tables as bread, for which it is an excellent substitute. They may be prepared in such a variety of ways that one does not tire of them. Whether we consider it from the standpoint of food for man or for animals, it is by far the most profitable root crop for the South. On the coast of South Carolina it is fed to horses, mules and cows from early fall to late spring. Sandy uplands which will produce only twenty bushels of corn will easily grow two hundred of potatoes, three bushels of which are equivalent to one of corn in feeding value. Pork fattened on potatoes is just as good as that fattened on corn. The vines, fed green or cured, materially increase the flow of milk from cows fed upon them.

PUMPKIN

While this is more commonly grown in the field than in the garden, it is a desirable crop for the garden if one has no field in which to grow it. It will produce well on any class of soil, provided it is fertile. The objection to planting it in the garden is the risk of crossing with other species of the cucurbita family. Enough for a winter's family supply may be grown in vacant spots about the lot. Under ordinary conditions, poultry will not disturb it. While young and tender it may be used as a substitute for the summer squash and is not easily distinguished from the latter, over which it has the advantage of growing better in early fall; and,

being less watery, requires less cooking. It is generally grown in corn-fields, planted at the same time with the corn. Plant in the corn rows, ten feet apart each way, and leave only one plant in a place. It will pay, however, to set apart an area to be devoted entirely to this crop, since there are few crops which will produce more stock food per acre. All varieties keep well in winter if stored in a cool place and protected from severe freezes. I have gathered sixteen from single isolated vines planted in rich spots about the lot.

The best varieties for table use are *Japanese Pie* and *Crookneck Cushaw*, which are used as winter squash and are very highly esteemed as such. The latter is a long, curved variety having a solid neck and a bulb at one end in which the seed is produced. The largest and best variety has dark green stripes running its entire length. The solid neck is often six to eight inches in diameter and fifteen to eighteen inches from the bulb to the stem, measured along the side of the curve.

Virginia Mammoth.—This is a superior oval-shaped variety adapted to the South. The flesh is thick, of a rich golden color and fine flavor. It is a good keeper and grows to an immense size.

Cheese.—This is a large common kind usually grown in corn-fields; flattened and heavily ribbed.

Potiron.—This is one of the largest grown, reaching under high culture 200 pounds in weight. Though large, its fine-grained yellow flesh is rich and sweet and well suited for table use. The main objection is its great size.

Tennessee Sweet Potato.—This is a pear-shaped variety

with dry flesh. When cooked it resembles the sweet potato in color and taste.

RADISH

This is a cruciferous plant, grown for its pungent root. To be tender and crisp, it must be grown on fertile soil with abundant moisture. Rapid growth is necessary to insure good table qualities. A dish of fresh red radishes mingled with crisp, green lettuce, is quite ornamental. While many enjoy an occasional dish of this vegetable in early spring, most persons soon tire of it.

There are three types of radishes, viz., Turnip-shaped, Olive-shaped and Long. Of the latter, there are summer and winter varieties.

Of the turnip-shaped, the most desirable are the *Cardinal Globe*, *Scarlet-Turnip* and the *New Crimson Giant*.

Of the olive-shaped, the *French Breakfast* and *Extra-Early Scarlet* are the most popular.

Of the long type, the best are *Chartier Long Scarlet* and *Early Frame* for summer and *Long White Spanish* for winter.

The seeds are sometimes sown thinly with those of other plants, which germinate slowly to mark the rows. They can also occupy the space between the rows of other vegetables.

RAPE

This is largely grown for pasturage for sheep and hogs in this country and for the oil in the seed. It is

becoming popular as a salad plant, the leaves of which are boiled as kale, turnip leaves or young cabbage. On account of this use now made of it, the name of Georgia Salad is sometimes applied to it. It is sown here in September, either broadcast or in drills twelve to fifteen inches apart, and affords excellent pasturage for sheep and hogs, as well as salad for man.

Dwarf Essex is the variety usually planted. If sown for pasturage, use about two to three pounds of seed broadcast. If for salad, sow in drills twelve to eighteen inches, and thin as used to stand four to six inches in the row. If the tops are cut back, it will branch and continue longer in use. A severe freeze following a warm growing season in winter will kill the plants, but they may be renewed by early spring sowing. While this makes a very good boiled salad, it is neither so handsome a plant nor is it so hardy as kale. There are few more beautiful foliage plants than Scotch Curled or Norfolk kale, which, sown in August, affords excellent salad through the entire winter.

RHUBARB, OR PIE-PLANT

This is a perennial of the Rumex family which is cultivated for its leaf-stalk, and as soon as fully grown is slipped from the stalk, the outer skin removed and then cut across into pieces half to an inch long and made into pies. Since it is ready for use very early in the spring, before there is fruit, it is much enjoyed and should have a place in every garden. It is perennial, prefers a rich sandy loam and should be heavily fertilized

annually. It is propagated by seed and by division of the root, using care to have a bud upon each piece. This method is to be preferred to planting the seed, since the latter is inclined to "sport."

Cultivation should be shallow and frequent, and there should be a heavy dressing of manure in the spring and again at the end of the pulling season. It is a gross feeder and will bear very heavy dressings of manure.

The two varieties most commonly cultivated are *Victoria*, a coarse, large, red-stalked variety grown principally for market, and *Linnæus*, which produces large green leaf-stalks more desirable for the home garden.

SALSIFY, OR VEGETABLE OYSTER

This is one of the most satisfactory winter vegetables grown. It is a biennial plant grown for its long roots, which, when boiled and then seasoned and stewed like oysters, resembles the latter in taste; hence the names, oyster plant and vegetable oyster.

It is perfectly hardy, enduring a temperature down to zero, and may be left in the ground where it grows all winter and be dug as needed. Like the parsnip, it occupies the ground on which it grows for twelve months, but pays good rent by furnishing delicious and wholesome food during the winter, when most gardens are affording no fresh vegetables. While this delicious vegetable should be found in every home garden, it is found in but few. It delights in a deep sandy loam, which should be deeply broken but not manured broadcast; but, like other deeply penetrating

root crops, should have the fertilizer applied in the bottom of a deep furrow. The fertilizer may be finely pulverized animal manure mixed with wood ashes in the furrow, or a commercial compound made by mixing 400 pounds acid phosphate, 200 pounds of cottonseed-meal and 100 pounds of muriate or sulphate of potash or 400 pounds of kainit. Mix these, and apply in the drill at the rate of 500 pounds per acre. If practicable, the fertilizer should be covered six to eight inches below the general level if long roots free from laterals are desired. Bed on the fertilizer, rake the surface smooth, sow the seed *thickly* in a shallow drill, and cover to the depth of one inch. The books usually advise thinning to four or six inches in the drill. This is a serious mistake, which not only reduces the yield of the crop but the size and form of the roots. If the plants are left twelve to the foot of row, each root will be better than if only two to the foot, and there will be six times as many roots. I have observed this many years, and have frequently compared the roots grown thickly with those having four or six inches of space. Cultivate shallow after each rain through the spring and summer. Plant in rows two feet apart to facilitate the use of the plow. This being a hardy plant, the seed may be sown in February or as early as the soil is in condition to be plowed. A half-pound of seed will sow two hundred feet of row.

Mammoth Sandwich Island is a long white variety almost universally planted.

Wisconsin Golden is a new and highly praised variety.

To prepare for use, wash and scrape the roots, slice them into one-fourth to one-half inch pieces, boil

thoroughly until soft. (All vegetables should be put on in hot water.) Drain off the water, return the salsify to the vessel and add milk, butter and salt, and stew as oysters. Add a little vinegar if desired.

For salsify cakes, prepare and boil as before, pass through a colander, mashing thoroughly. Mix with egg and a little flour, forming a batter. Fry into cakes, and serve hot. It is used also for soup.

Salsify is practically exempt from insect enemies, but is subject to a fungus during moist spells in summer which is quite destructive.

SEA KALE

This plant is occasionally cultivated for its tender leaf-stalks, but the expense of cultivation is such that very few will take the trouble necessary for its successful growth for the small returns in a few early dishes, since, in our latitude, we have asparagus almost as early.

SPINACH

This is one of the most desirable salads grown, and yet the majority of southern gardens are without it. It should be sown thinly in drills two feet apart in September to get best results. It is the most hardy of the salad plants that are common in southern gardens, and very much in demand by those having cultivated taste. If sown in September on fertile soil, it furnishes salad throughout the winter and later in spring than other plants. It belongs to the same family as the beet, but

is much more hardy. It will endure a temperature of 6° above zero without injury, as it has in my garden survived one of the severest winters in this latitude. It is grown for its thick green leaves and is the most delicate of the salads. While it is best sown in the early fall, it may be sown in early spring, but does not thrive in warm weather, quickly running to seed. I have not found it profitable to grow the seed in the South, since the warm weather blasts the seed-stalk. It is a dicœcious plant, and, if seed is saved, the male plants may be removed after the seed begins to form.

The large leaves of the plants are gathered where the plants have been properly thinned, but if too thick, the surplus plants are taken out. It is sometimes boiled with meat as are turnip greens, but this is destructive to the best qualities of the salad. The leaves should be put on in hot water and boiled until done; after the water has been thoroughly drained out, the dish should be served with eggs. Prepared in this way, it is the most delicate of all the salads, and, while not very nutritious, is recognized as very wholesome.

SQUASH

This is perhaps the most universally grown of the cucurbita family. Owing to the variety of forms, it can be made a regular occupant of the family table throughout the year. Like the cucumber and cantaloupe, it may be advanced two to three weeks by starting in hotbeds or coldframes, and, as soon as up, potting off into two-inch pots, which may be sunk into the soil of the

coldframe and allowed to remain thus protected until all danger of frost has passed and then transplanted to the open ground. The bunch varieties should be spaced four feet each way, in hills heavily manured, the latter being worked deeply under the hill. The squash, being monœcious in its flower production, should not be planted near cantaloupes or watermelons, for fear of cross-pollenation. The fruit should be gathered regularly as soon as ready for use, to relieve the vines and keep them long in bearing. Squashes are fit for use as long as the finger-nail readily penetrates the surface. This for summer squashes, but the winter varieties are left upon the vines to ripen. The running varieties should have a distance of eight by eight feet for best results.

Select from the early crop specimens typical of the variety, and when thoroughly dried, save the seed. They are good for ten years.

Summer Squashes.— One of the best is *Yellow Summer Crookneck*. This is a bunch variety which has been bred to such a degree of prolificness that it bears more female than male flowers. It possesses a richness not found in the white varieties.

White Patty-pan is a very prolific, delicate variety, preferred by many to the Crookneck and is a favorite market sort. This is a bunch kind also. There are several variations of this type.

Vegetable Marrow is a running variety not much grown, but its quality justifies the name. It bears throughout the summer if not attacked by insects.

Winter Varieties.—*The Hubbard*, *Boston Marrow* and others so popular at the North are not adapted to the South.

The *Cushaw* of several types is especially adapted to the southern states, keeps well and is first-class in quality. See description under the head of Pumpkin.

The summer squash is boiled and then fried, or boiled, passed through a colander and then seasoned and stewed like salsify, making a delicious and delicate dish. It may also be sliced, soaked in water with a little salt and then fried in egg and bread-crumbs like eggplant, from which it is distinguished with difficulty. Young pumpkins are substituted for squash in the fall, and have the advantage of being drier than the latter.

TOMATO

This plant belongs to the same family as the eggplant and Irish potato. The fact that it came to us from the tropics suggests that it requires the warm season in our climate for its growth. It was first grown in the flower yard for its showy fruit, which was suspected of being poisonous. Now it is one of the most highly prized vegetables, and is used in more different ways than any other. It grows and produces well on any class of soil if properly prepared, reasonably well fertilized and thoroughly cultivated. Seed should be sown in the hot-bed in February and, as soon as large enough, thinned. The surplus plants should be potted and the pots sunk into the soil of the coldframe; or, if pots are not available, the plants should be transplanted into the soil of the coldframe, giving each plant four square inches of space. The transplanted plants will develop fibrous roots, become more stocky and will bear the change to

the open ground better than those not transplanted before being set in their permanent places. At least two plantings should be made to keep up a full supply of first-class fruit, since late tomatoes on old vines are rarely up to the standard. The first crop should be transplanted in the open as early as the season will allow. Risk part of the early crop even before all danger of frost is past, but prepare to protect the plants if threatened. Several important advantages will be gained by setting the plants below the general surface of the soil. First, the plants are easily protected in such position from frost. Second, the cutworm does not like to go down below the general surface after his victim. Third, the tomato plant has to bear the brunt of the hottest season; and, if its roots are deep in a well-manured furrow, it will withstand heat and drought. The tomato readily takes root along the stem, and thus is able to utilize the plant-food in the surface soil, no matter how deeply its original roots are placed.

For a later crop, sow the seed in open ground where some of the plants may remain permanently. Draw the surplus plants and set them deeply as just described, in order that they may the better withstand a drought in the fall. If the plant is ten inches high, put six inches into the soil. If the supply of plants for the fall crop is deficient, long cuttings, taken from bearing plants, may be used as follows: Take cuttings fifteen to eighteen inches long, from healthy bearing vines. Having the soil already properly prepared, open holes six inches or more deep, pour a quart of water into each hole and, before it is absorbed, put in the cutting in an inclined position.

Draw loose soil upon it until all wet soil is covered, leaving exposed only a few inches of the growing end of the cutting. Select the cuttings from the most healthy and productive plants of the best varieties. As far as practicable, both plants and cuttings should be set late in the afternoon. If properly transplanted, the loss should not be more than 2 per cent. A piece of stout paper folded around the plant, extending an inch into the soil and three or four inches upon the stem of the plant, will keep off the cutworm.

Cutworms seem to be omnivorous, showing no preference for any particular species of plants. Our attention is not drawn to their attacks upon the wild species; but when we destroy these in the preparation for our cultivated species, there is nothing left green except the latter for them, and we suffer. The cutworm hibernates in the larval state, and hence is ready to attack our early spring plants. If the land intended for early crops is plowed several times during the winter, many of them will be destroyed by the cold and many more by our friends, the birds. If hens are allowed to scratch in the freshly plowed ground, very few of the larvæ will escape. If grain of some kind is plowed in, the hens, while scratching for this, will destroy many enemies. Many of them may be destroyed by placing poisoned food upon the area to be planted before setting out the plants. The following substances may be used: Wheat bran poisoned with Paris green, sods of grass, clover plants, cabbage or collard leaves, bunches of small grain, etc., all poisoned with Paris green. If these fail or are not used, then the gardener must personate the

"early bird" and get out before sun-up and, being guided by the plants that have been victimized, search out the cause of the trouble and destroy it. The cutworm does its work at night and on cloudy mornings, going into the soil for protection during bright days.

As soon as the plants are transplanted, stir lightly around them. If it becomes necessary to water them, either dig a hole by them or drive a stout stake near the roots; remove the stake and pour water into these holes and, after the water has soaked into the soil, cover the wet places with dry soil.

If dwarf varieties are planted, lay off the rows three feet apart and set the plants two feet apart in the row. If large-growing varieties are used, let the rows be four feet apart and the plants three feet in the row. Cultivate shallow and frequently, stirring the surface as soon after every rainfall as the surface is dry enough, to prevent the formation of a crust, and conserve the soil moisture by means of the surface mulch.

If planted on a large scale, no training of the vines can be done, but in the family garden the vines should be kept off the ground by such means as may be most convenient in each case. If the vines are not allowed to trail upon the ground, a larger yield will be secured and rotting reduced to a minimum. If one has time to give regular and systematic attention to them, the best plan is to tie each plant to a stout stake driven securely into the ground and rising four feet above. Pinch out all the small limbs which put forth from the axils of the leaves below the point where the plant branches and forms a cluster of flowers on one of the branches. Pinch off the

bud from the branch bearing the flower-cluster, and allow the other branch to continue growing. Repeat this as often as the plant forks and a flower-cluster is formed. If inferior specimens appear in the cluster of tomatoes, remove them; this will very decidedly increase the size of those left. Treated in this way, the cultivation of the plants may be continued throughout the season, and the fruit will be finer than by any other method I have tried, while there will be practically no rot. Besides, the fruit being fully exposed, the parent of the tomato worm is not so likely to deposit its eggs upon it.

The tomato is subject to two serious diseases; viz., what is commonly known as the "bud-end rot" and the leaf-blight. No satisfactory preventive has been found for the former. Spraying early and frequently with Bordeaux mixture will prevent the latter.

The cutworm and boll-worm—the latter is identical with the cotton-boll worm—and the corn-worm which attacks the green ears of corn, also attack the tomato. The first has already been discussed. The latter cannot be reached after it enters the fruit. It is wise, however, to destroy all infested fruit, to prevent the development of the larva into the mature insect, its parent.

Tomatoes should not be allowed to become thoroughly ripe on the vines, but should be gathered as soon as they begin to change color and stored on shelves in the shade to ripen, the specimens not touching. This is especially important if the vines trail on the ground, since, if the weather is moist, those touching the ground often rot as soon as ripening commences.

Before frost kills the vines, gather all specimens that are grown or nearly so and store for ripening; spread as already directed. By this means the season may be prolonged into January. I had them until February last winter.

There is no vegetable that has been more wonderfully developed in its varietal types than the tomato in the last fifty years. It has not only been perfected in form, but in quality as well.

The *Stone* is probably the favorite with truckers, shippers and gardeners. This is a beautiful, smooth red tomato above medium in size,—indeed, sufficiently large to suit the home-garden or the market.

Crimson Cushion, a more recent introduction, is globular in form and hence involves little waste in slicing.

Matchless was for a number of years the most popular, but is now largely superseded by the Stone. I planted Matchless for ten years, and found it satisfactory for both home use and for market.

Tomatoes vary as much in flavor as peaches. *Acme* and *Golden Queen*, a yellow variety, were classed "best" in a very careful test of a large number of varieties at the Alabama Experiment Station some years ago. *Livingston*, *Paragon*, *Perfection* and *Beauty*, somewhat smaller than the foregoing, are all choice varieties.

Ponderosa produces the largest fruit, but is objectionable on account of the number of irregular and wrinkled specimens.

Pear-shaped Yellow, a small variety, is very prolific, superior in flavor and excellent for preserving and pickling.

New varieties are constantly being advertised in seedsmen's catalogues, but a selection of the above list should satisfy the most fastidious.

The tomato is both vegetable and fruit, and in the latter rôle rivals the cantaloupe as a breakfast relish. It figures in catsups, pickles, preserves, soups, sauces and canned goods, besides being cooked in a variety of ways.

There is no reason why any southern gardener should buy tomato seed. Select the best perfectly formed early specimens from a vigorous-growing and prolific vine. Allow them to remain on the vine until thoroughly ripe. Wash the seed and, when dry, store in envelopes or paper bags; or, spread upon thin cloth without washing. Let them dry on the cloth and remain there until needed to plant.

TURNIPS

This is a hardy biennial of the cabbage family and one of the easiest of the garden vegetables to grow. While the climate of the southern states is not well adapted to the turnip on account of the dry fall weather, if properly planted on fertile soil that has been thoroughly and deeply prepared and well supplied with humus, success is easily attained. A deep, rich sandy loam is best adapted to it.

Open deep furrows two feet apart, and apply acid phosphate in the bottom of these at the rate of 500 pounds per acre. Bed on this with scooter plows, making a flat bed. Harrow or rake these until they are smooth. Do this for the rutabaga in June. If the soil is dry, open a furrow in each bed, sow the seed in the bottom

of this furrow, and run a wheelbarrow upon the seed. This "firms" the soil on the seed and sifts fine soil behind the wheel upon the seed. The seed will find enough moisture at the bottom to supply that necessary for germination and is protected from excessive heat. It is often very difficult to secure a stand if sown in the usual way in dry seasons. I have used the wheelbarrow upon the seed in the furrow for twenty years, and have never failed to secure a stand, no matter how dry the soil was. If the soil is quite moist, the wheelbarrow should not be used. Sow rutabagas in July and August, and the rough-leaved kinds in August and September. A cheap way to grow salad for winter is to sow the seed in August in corn that has been cultivated clean, and simply rake them lightly in with the garden rake. The partial shade afforded by the corn facilitates the germination of the seed. The old *Southern Seventop*, now sold under the name of *Southern Prize*, is best for this purpose. The *Seventop* sold by northern seedsmen is not worth sowing. This *Southern Prize* sown in drills in June and thinned, like rutabagas, to one foot in the drill, produces roots of immense size. A few plants having multiple tops should be transplanted and kept to produce seed. The varieties grown for the roots will usually give more satisfactory results from seed grown further north, but if salad is the principal object, home-grown seed is to be preferred.

The turnip, being a biennial plant, stores up food the first year in the root to produce the seed-stalk the next spring. The roots, therefore, can be saved through the winter and transplanted to some convenient spot for

growing the seed. The substance of the root is consumed in producing the seed, and only the shell of the old turnip is left. The seed-stalks should be supported by stakes, to which they may be tied with a soft cord. I have found the germinating qualities of home-grown seed superior to those of the purchased seed.

Varieties.— *Milan Strap-leaf* is the earliest variety I have planted. It has small top-growth, the turnip is flat, and grows on the surface of the ground. The part showing above is purple, while the lower part is white.

Flat Dutch is another very early, flat and delicate variety of fifty years' standing.

Purple Top Globe.—This is probably the most satisfactory as a medium-early, heavy-producing variety. I have grown of this variety twenty-two two-horse wagon-loads per acre on ordinary land three years in cultivation. It has a beautiful top-shape, with deep purple above and white below the surface.

White Globe is an excellent variety, but not so popular as the latter. This is white within and without. Flavor good.

White Egg is similar to the last, but earlier and not so large and superior in quality.

Yellow Aberdeen.—This is one of the best and most productive varieties of best quality.

To test the quality of varieties, I had six cooked alike and placed on my table together. The members of the family tasted all, but ate the Aberdeen. It is purple on top, with a rich yellow below. The flesh is yellow, tender and sweet. Left in the row all winter, it keeps well and is the last to run to seed in spring. It combines

more good qualities than any other variety I have cultivated. There are other varieties worthy of cultivation and advertised in the catalogues, but those mentioned should satisfy the most fastidious.

Turnips require little nitrogen, but a liberal supply of phosphoric acid and potash. The most serious mistake made by most gardeners is failure to thin the plants early. They should not stand nearer than eight or ten inches in the row.

Cultivation should commence as soon as the plants show well along the row and be continued after each rain, to retain the moisture so much needed and generally deficient during their season of growth.

RUTABAGAS

These are quite distinct from the rough-leaved varieties. The leaves resemble somewhat in appearance the Georgia collard. They produce large and abundant foliage which, when young, makes a rich boiled salad. They resemble the Yellow Aberdeen in external color, but are of a deeper yellow inside. They keep where they grow during our severest winters, but are fresher and more brittle if banked like sweet potatoes at the approach of severe freezing weather. They may remain in the row until the middle of November. Before banking, the tops should be cut below the bud to prevent starting into growth in the bank. They need no straw, but simply a thick covering of soil.

The rutabagas require more room in the row than the rough-leaved varieties. Experiment has demonstrated

that twelve inches in the row gives the heaviest yield of large roots. One pound properly sown in drills will be sufficient for an acre. If broadcast, twice as much seed is required. Sow seed in July and August.

It is of great importance to secure a well-bred seed of the rutabagas. Inferior seed produces a long, woody neck between the bud and root.

Bloomsdale Purple Top has given entire satisfaction for many years. It makes large roots of excellent quality.

Bon Air, advertised by Alexander Seed Company, Augusta, Ga., is the favorite with those who have grown it.

There are few other plants all parts of which are edible. The leaves are highly prized as a boiled salad, while the roots are cooked in a great variety of ways. Some object to the decided turnip taste. The most delicate dish made from turnips is prepared by boiling the roots, after slicing them, until thoroughly done, passing them through a colander and seasoning with a little butter, cream, salt and pepper, and stewing until the cream and butter disappear by absorption in the turnips. The boiled salad is considered very wholesome, especially the fresh, tender growth in early spring.

In England, turnips are planted for sheep, which are corraled on them at night in a portion of the field divided off by a movable fence. The sheep devour both tops and roots, and enrich the land while consuming the crop.

PART III

SMALL FRUITS

GRAPES, strawberries and raspberries should have a place in every southern garden, and the currant and gooseberry in the elevated or mountain regions. The fig should have a place in all gardens in the middle and lower cotton belt.

THE GRAPE

This is one of the most satisfactory, most wholesome, most easily grown and most certain of our southern fruits.

In fifty years of observation in different parts of the South, I have known the destruction of but one crop by frost. A full crop may be gathered the third year after planting, and the vines, under intelligent treatment, will continue in profitable bearing for twenty years.

There are two general types of grapes in cultivation in the South — one derived from the northern fox-grape and the other from the southern fox-grape, or muscadine. These require different treatment in pruning and training. A large majority of our cultivated varieties belong to the *Labrusca* type and its *hybrids*, represented by *Concord*, *Delaware*, *Agawam*, etc. While we cultivate

some excellent varieties of the *Æstivalis* and *Riparia* types, their number is small compared with that of *Labrusca* and *Labrusca* seedlings and hybrids. The *Vinifera*, or European wine-grape, is not adapted to any part of the United States this side of the Rocky mountains.

No home is complete without a few well-cared-for grape-vines. They may be used as a summer shade around the porches, or they may be planted in the garden, or in a lot to themselves, but not in connection with fruit trees, since the proximity of trees encourages the depredations of the birds. Varieties have been sufficiently experimented with to determine those best adapted to the South. No mistake need be made, therefore, in the selection of varieties. The standard varieties will grow successfully on almost any fertile soil which has proper drainage.

Grapes are generally propagated by cuttings if a considerable number of vines are to be grown. If only a few are desired, layering is the simplest and surest method.

The *Rotundifolia* type, and some of the varieties of other types that are not so easily grown from cuttings, may be readily grown from layers. This may be done at any season of the year, but fall and spring are preferred.

Open a trench a few inches deep in the line of the row. In this place put a vigorous cane of the previous season's growth, and confine it with wooden pegs. Shoots will put forth at each joint. When these attain a length of eight or ten inches, fill the trench with good soil and pack it well about the young shoots. During

the growing season, roots will put forth at the base of the young shoots which will be ready to be transplanted the next fall. There will usually be about half as many plants as the layer has joints. The end of the layered cane should be left uncovered. "In order to hasten the formation of roots, a tongue about an inch long and one-sixteenth of an inch thick is cut at every joint, on the opposite side from the bud. This insures the formation of roots at every joint and causes a more uniform growth of the shoots" (Bulletin 58, South Carolina Experiment Station).

Cuttings.— These are taken from vigorous short-jointed canes of the growth of the season next preceding. Cut half an inch below the lower bud and an inch above the upper, making each cutting eight to ten inches in length. In November, with a plow, open a smooth furrow in a rich, loamy soil as deep as the cuttings are long, and place the cuttings carefully against one side of this furrow, four to six inches apart, using care to have the buds point upward. Fill the trench half full of loose soil, and pack this carefully and firmly against the cuttings. Fill the trench so that the top bud of the cuttings will be half an inch below the surface. If properly planted, 90 per cent of the cuttings will produce plants. Allow only one shoot to grow from each cutting. If planted in large numbers the rows of cuttings should be four feet apart, to admit of cultivation with the plow during the growing season. If only a small number is planted any rich border will answer, but clean culture should be practiced throughout the growing season.

PLANTING THE VINEYARD

After the cuttings have made one year's growth, they will be ready to be transplanted into the vineyard. Open deep furrows with the turn-plow ten feet apart, and half-fill them with well-rotted manure. On this apply acid phosphate at the rate of 600 pounds per acre and kainit at the rate of 400 pounds per acre. Mix all of this with the soil, and subsoil with a narrow plow run as deeply as possible, running the last furrows on each side to cover the fertilizer with soil. At intervals of eight feet along these rows open holes eighteen inches deep and two feet in diameter. In the bottom of each of these holes place a half-peck of bones broken into small pieces with an axe, and cover these with the mixed soil and fertilizer, raising the furrow a little higher in the center than around the sides.

Prepare the vines by cutting back the roots to a length of twelve inches and the cane to two joints or eyes. Spread the roots uniformly, cover with three inches of soil and pack firmly with the feet. If sets of roots have put forth from two joints of the cutting, use only those from the upper joint. Set the plant an inch deeper than it stood in the nursery row, covering the soil packed upon the roots with pulverized soil. November is the best month for planting. Drive a stout stake by each vine in the line of the row to mark the plant, and, after the new shoots have grown a foot in the spring, select the strongest and tie to the stake with a soft string, removing all other shoots. Plant two rows of some bunch variety of cow-peas between the rows of

vines, and cultivate the whole space throughout the growing season. Gather the peas in the fall, but leave the vines on the land. In November, set strong posts of some durable timber or wood painted with tar or carbolinium at intervals of sixteen feet, placing the end posts four feet outside of the first vine and the others in alternate spaces between the vines. The posts should be six feet long and set two feet in the ground; stretch tightly two barbed wires along these posts, one two feet from the ground and the other two inches below the top of the posts. I prefer barbed to smooth wire, because the barbs prevent the strings with which the vines are tied from slipping along the wire and thus interfering with the position of the canes when properly trained. The posts and wires being in place, tie the single cane of each vine to the lower wire and cut off the vine even with the wire.

TREATMENT THE SECOND YEAR

In February sow broadcast 600 pounds of acid phosphate and 200 pounds of kainit per acre, and plow them in between the rows of vines. Cultivate shallow to keep down grass and weeds, and in May plant two rows of a bunch variety of peas between the rows.

Allow three shoots to grow from the top of the cane. Train two of these on the lower wire, and tie the third in a vertical position to the top wire. A single bunch of grapes may be allowed to grow upon each of these shoots.

In November, cut back the canes trained to the lower wire to four feet if the vines are of the long-jointed,

vigorous growers, such as Concord and Niagara, or to two feet if a short-jointed variety, like the Delaware, is used. Cut the vertical cane even with the top wire.

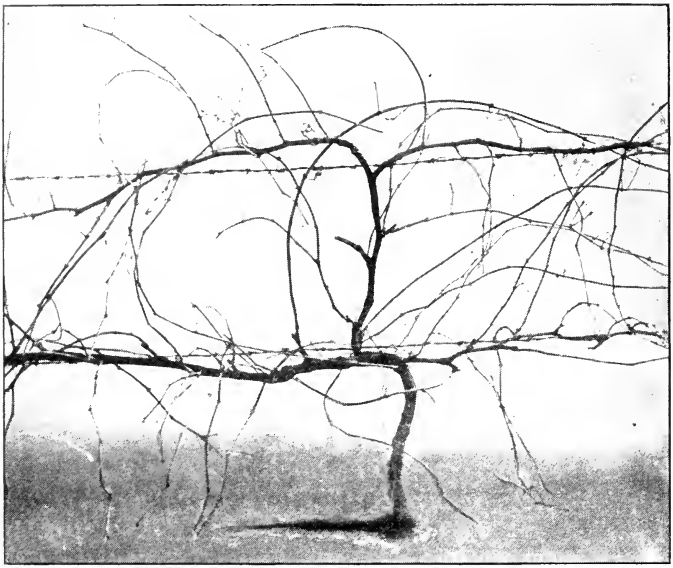


FIG. 17. Four-arm spur system, not pruned.

THE THIRD YEAR

Fertilize and plant peas as directed for the second year. Rub off all shoots from the vertical cane except two at the top, and train these in opposite directions along the wire. Allow a strong shoot to grow from each joint of the canes trained to the lower wire, and when long enough tie to the top wire. While doing

this, rub off all weak shoots and remove small bunches of grapes to concentrate the strength of the vine into the strong shoots and larger bunches. There will usually be

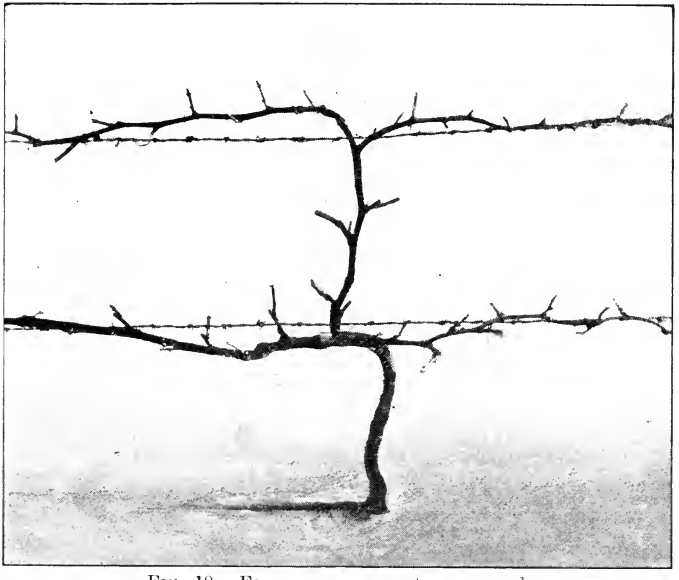


FIG. 18. Four-arm spur system, pruned.

three bunches of grapes upon each strong shoot. In November, cut back or "spur" all of the shoots from the two canes on the lower wire to one or two eyes, and shorten those on the upper wire to the same length as the canes trained on the lower. This treatment may be repeated annually until the spurs on the canes become too long, when one of these may be cut out each year, leaving a strong new cane to take its place. Thus in

FIG. 19. Spiral system, before pruning.

four years all of the old canes will be renewed by fresh ones.

A new method of pruning, known as *the spiral system* (Figs. 19 and 20), is very satisfactory and should be employed when the trellis system cannot be used.

Varieties.—The following standard varieties, which have stood the test of careful experiment for many

years, will furnish grapes of good quality from the last of June to late in September, and the season may be extended late into October by bagging the Ives, Goethe and Norton. While there are many other varieties which have been successfully grown in different parts of the South, the following list of varieties is recommended for the home-garden: Early Ohio, Moore's Early, Lutie,

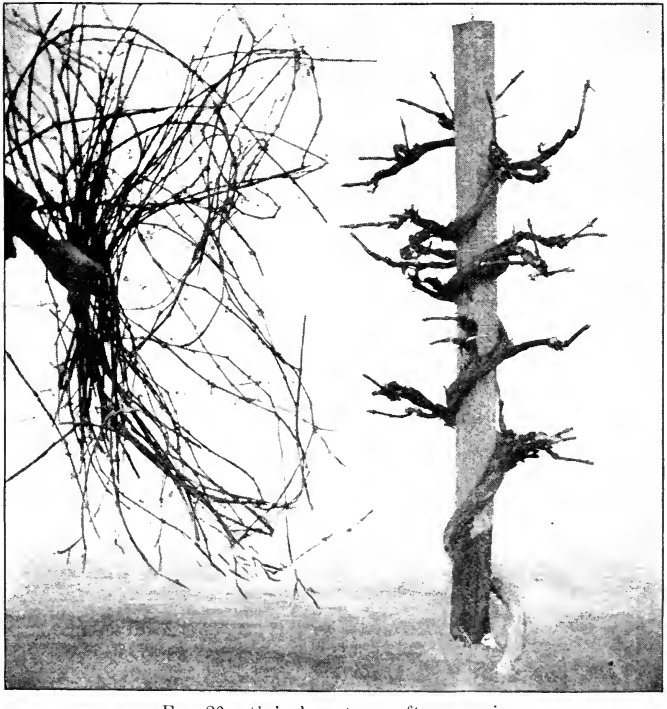


FIG. 20. Spiral system, after pruning.

Delaware, Brighton, Niagara, Concord, Agawam, Ives, Lindley, Catawba, Goethe, Norton's Virginia and Brilliant.

While the *Ives* is one of our most reliable and productive varieties, it turns black some two weeks before it is ripe and is generally gathered green for this reason, while if bagged and kept until thoroughly ripe it is of very fine flavor. The grapes are not salable if gathered as soon as they appear from their color to be ripe, nor are they then edible. I have sold them readily at ten cents per pound out of bags in September. The Goethe, a grape of great merit, ripens irregularly on the bunch if not bagged, while it is one of our most delicious varieties if protected by bags until all of the berries ripen.

The following extract from Bulletin 58, South Carolina Experiment Station, will be of interest to those who may desire to plant a larger number of varieties.

The following varieties are well adapted to this section:

	BLACK	RED	WHITE OR YELLOW
EARLY	Moore's Early	Perkins	
	Early Ohio	Delaware	Diamond
	Champion		
MEDIUM	Concord	Agawam	Niagara
	Ives	Lutie	Elvira
	Wilder	Lindley	Empire State
	Merrimac	Berckmans	
	Carman	Salem	
LATE	Norton's Virginia		Goethe
	Ives (when bagged)		

THE ROTUNDIFOLIA, OR MUSCADINE TYPE

These grapes are classified as the southern fox-grape type, and often named — from one of its most popular

varieties—the Scuppernong. They require entirely different treatment from those of the northern fox-grape type in many respects, such as propagation, training and pruning. Nurserymen have misled growers by stating that they cannot be pruned or grown from cuttings, both of which statements are erroneous. It is true that they do not grow so readily from cuttings as varieties of the other type, but long cuttings taken soon after the leaves are shed, grow quite readily. Within a hundred yards of where I now write there are many vines which I propagated from cuttings. The mistake in regard to growing them from cuttings is based upon ignorance of the proper season for pruning them.

They should be pruned as soon as the leaves fall. If pruned later, they "bleed" very injuriously, while no injury results from pruning at the proper season. It has been customary, ever since the discovery of the Scuppernong variety in North Carolina, to train all varieties of this type on arbors, and yet there are very serious objections to this method. Amongst these are:

(*a*) Difficulty in gathering the grapes.
(*b*) Difficulty in repairing the arbors.
(*c*) The necessity for adding to the arbors annually.
(*d*) The vines become matted toward the center of the arbor and cease bearing except around the edges.
(*e*) No cultivation can be given the vines.

I much prefer training the vines on a trellis, for the following reasons:

(*a*) The facility with which they may be pruned.

(*b*) The facility with which the fruit can be gathered.

(*c*) The increased productiveness and superior quality of the fruit.

(*d*) The exposure of all parts of the vine to air and sunlight.

(*e*) The facility afforded for cultivation.

(*f*) The economy of the trellis compared with the arbor.

(*g*) The comparative ease with which the trellis can be repaired when necessary.

Constructing the Trellis.— The posts for the trellis should be of *black locust*, if available, as these will last for fifty years. If these are not available and more perishable timber must be applied, the wood-preserver, *Carbolinium*, should be used over the entire post. This vastly increases the durability of the timber at small cost. The posts should be six inches square and nine feet long. Set them three feet in the ground, leaving six feet for the trellis. On these fasten securely three wires, —the first two feet from the ground, the second two feet above this and the third two inches below the top of the posts. Set the posts sixteen feet apart, and plant the vines thirty feet apart. Select good, vigorous canes as the vines grow, and train two in opposite directions on each wire. Let these canes continue their growth lengthwise along the wires. As suitable laterals appear on the bottom pair of canes, train one every three feet vertically to the top wire. Spur back all other laterals, as soon after the leaves are shed in the fall as practicable, to six to eight buds each. Treat the

laterals on the vertical canes in the same way. The pruning must be confined to the season mentioned, or the vines will be injured by "bleeding." This process must be repeated annually. The effect of this pruning is similar to that on the bunch grape, increasing size of both bunches and berries.

Varieties. — I have cultivated eight varieties of this type of grapes on trellis, with most satisfactory results. All of these were black except the Scuppernong. So far as known, all seedlings of this are black.

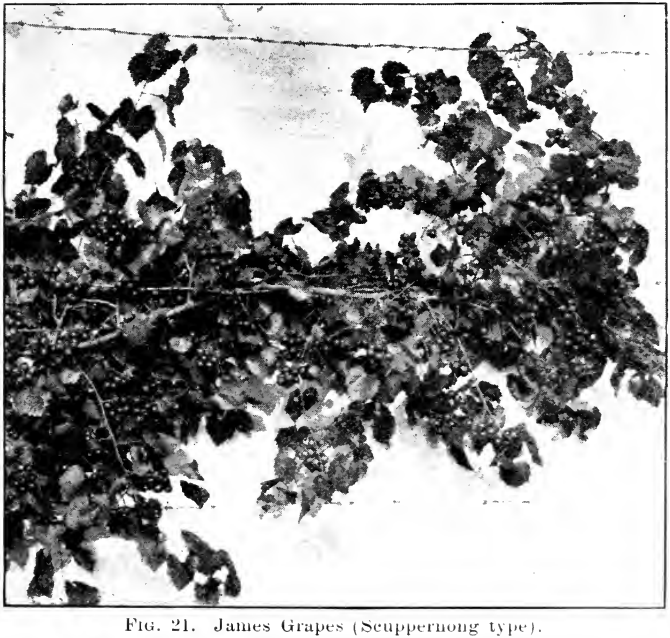


FIG. 21. James Grapes (Scuppernong type).

The varieties are, in the order of ripening: Thomas, Memory, James, Mish, Scuppernong, Scuppernong Seedling, Tenderpulp and Fowers.

Several of these varieties are superior to the Scuppernong in quality, with the additional merit of producing larger clusters, without the objectionable habit of shedding as fast as ripe. This is especially true of the Memory and Mish.

The two lists of varieties recommended for the home garden, together with these, will afford a continuous supply of delicious fruit from the first of July to the first of November.

The Rotundifolia type of grapes, adapted to every part of the South, is not usually damaged by fungous diseases, nor is it seriously attacked by birds.

Protection from Birds and Fungous Diseases.—"*Bagging Grapes.*"—This is done to protect them from the birds, insects and fungous diseases and also to prolong the ripening period.

The Ives will keep perfectly sound in bags until late in October, and the Norton's Virginia will keep in perfect condition from three weeks to a month longer.

We bagged many varieties of grapes this year, and find that some varieties are benefited by bags more than others. Birds are more troublesome to black and red varieties of grapes than they are to the white. This year we bagged about half of our Delawares, and fully 90 per cent of those not bagged were destroyed by birds, while those in the bags were in perfect condition. The Ives, Concord and Norton's Virginia that were not bagged were badly damaged by birds, while the Perkins,

Niagara and Goethe were damaged very little. Grapes planted in an orchard or near trees and hedges are always damaged more by birds than those planted off to themselves. The bags are put over the bunches of grapes as soon as the fruit is set or when the grapes are the size of small shot.

Three-pound bags are used for the large-bunch varieties, such as the Concord and Niagara, and two-pound bags are used for the smaller-bunch varieties, like the Delaware. The bag is slipped over the bunch of grapes and the corners folded close about the stem and pinned. Bagging is very simple and inexpensive, the bags costing from sixty to seventy cents per thousand, and the pins about ten cents per thousand. A man or boy with a little experience can put on from fifteen to eighteen hundred bags in a day, so the total cost of bagging a thousand bunches of grapes would not exceed one dollar and thirty cents. The grapes in bags ripen more uniformly, and always present a much more showy appearance than those not bagged.

Bagging will always prevent the grapes from rotting to some extent, but will not do away with the necessity of spraying when the variety bagged is subject to rot to a very great extent.

Spraying.—"We have conducted experiments in spraying various varieties of grapes to prevent the fruit and leaves being destroyed by fungous diseases. The first spraying was done just before the buds began to swell in the spring and the second application was made a few days before the vines began to bloom. The third application was made as soon as the fruit was set, the grapes

being the size of squirrel shot. The fourth spraying was done three weeks after the third. Some vines were sprayed only once, and others two, three, four and five times.

"The benefit of the spraying increased with the number of applications made up to the fourth, but we could see no advantage in the fifth application except in the late-ripening varieties. The most marked benefit in spraying varieties was with the Delaware. The unsprayed vines lost all their leaves by the middle of June and all the fruit dried upon the vines before ripening.

"Not one bunch of Delaware grapes ripened on an unsprayed vine, while the sprayed vines on the next row retained all their leaves and the fruit ripened beautifully.

"The Bordeaux mixture used in spraying the vines was made by the following formula: Six pounds caustic lime, four pounds bluestone (copper sulphate), fifty gallons water.

"The bluestone is dissolved by putting it into a cloth sack and hanging this in a barrel containing twenty-five gallons of water. Slake the lime in another vessel, and add twenty-five gallons of water to it. The lime and blue-stone solutions are then mixed by pouring them slowly together into another barrel, stirring well as the two solutions are mixed.

How to Spray.—"Thoroughness is the secret of success in spraying.

"In spraying the grapes, one man drives and does the pumping, while two men, one on each side of the wagon, do the spraying. In this way two rows of grapes can be sprayed at the same time.

"The Bordeaux is forced through a nozzle which throws a very fine spray or mist. The nozzle should be kept moving over the vine and under the leaves until every part of the vine has been wet with solution. When the solution begins to drip from the leaves very much, the spray is stopped.

"The barrel spray-pump costs about fourteen dollars, and, when properly cared for, can be used for a number of years. Hand-pumps can be had for less money, but if there is much spraying to be done it will be much cheaper and far more satisfactory to use the barrel-pump." (Bulletin No. 58, S. C. Experiment Station.)

FIGS

While this is one of the most easily grown and delicious of our fruits, and practically exempt from fungous and insect enemies, it is rarely found about our farm homes. The June-bug attacks it in the ripe stage. This bug, owing to its fondness for the fig, is known at Savannah, Georgia, as "fig-eater," pronounced "figater."

The figs, when properly packed, will bear long-distance transportation, and, by shipping in strawberry baskets carefully packed in crates, they will keep about as well as berries. I have sold them in Atlanta at seventy-five cents per peck, and the demand always exceeded the supply.

Propagation.—The fig grows readily from cuttings, and there are generally rooted layers around old trees which can be had for the asking. In November the

cuttings should be made and set in rows three feet apart and ten inches apart in the row. Select wood of last season's growth, and make cuttings about ten inches in length. The following fall the trees will be ready to transplant to a permanent place. Prune both roots and top severely before transplanting. I have grown them for home consumption for the last thirty-eight years, and only once have had the trees killed, but three or four times the first crop of figs has been destroyed by late frost.

Enough for a family supply may be grown on a few trees planted about the lot in protected situations about the houses.

The varieties usually cultivated bear two crops in a season. The first crop grows on the old wood or wood of the previous year's growth ; the second, on the wood of the current season.

No pruning is necessary except the removal of surplus branches, which, if left, render the tree too much crowded.

Varieties.—I have discarded for the hill country all except that commonly known as White Two Seasons, a vigorous grower, reasonably hardy and a producer of large yellow figs of fairly good quality, though somewhat soft when ripe. It invariably sets both first and second crops. It is the earliest and most reliable variety I have grown.

Celestial is a hardy, vigorous grower, and, while the fruit is small, it compensates in quality for its small size. This variety rarely sets a full first crop, but invariably produces a large second crop. The fruit is

small, very sweet, not subject to "fig sour," but dries on the tree, becoming exceedingly sweet. I have trees twenty-four years old that have been killed down only once. These two varieties are the best for the northern part of the cotton belt. *Celestial*, in the list of varieties of figs, bears the relation to other varieties that the Seckel pear does to other varieties of pears — small, but *best*.

Brown Turkey and *Brunswick* are the most popular varieties further south. Both are large, of good quality, but late.

Green Ischia is a small late variety of superior quality.

The fig should not be gathered until *thoroughly ripe*. Ripeness is indicated by the softening of the fruit, the changing of color and the bending of its stem.

THE STRAWBERRY

No garden is complete without a patch of this delicious fruit, and yet, judged by this criterion, there are numerous incomplete gardens in the South.

The strawberry is a perennial plant, which propagates by sending out runners on which new plants are formed. After these have formed their own roots, they are used to make new beds. Since this is a method of propagating by division, the new plants produce the variety of the parent. They may be propagated from seed, but the plants thus grown will not reproduce the variety of the parent on account of cross-pollenation of the flowers. New varieties are originated by planting the seed. Botanically, the strawberry is not a true fruit. The

berry consists of the enlarged receptacle, the naked seed growing on the outside of the edible part instead of inside, as in the raspberry and blackberry. The strawberry corresponds with the part of the compound fruits—raspberry and blackberry—which is left on the bush when we gather the fruit (the receptacle). Some varieties of strawberries produce without stamens, or the pollen-producing (male) organs, while others produce

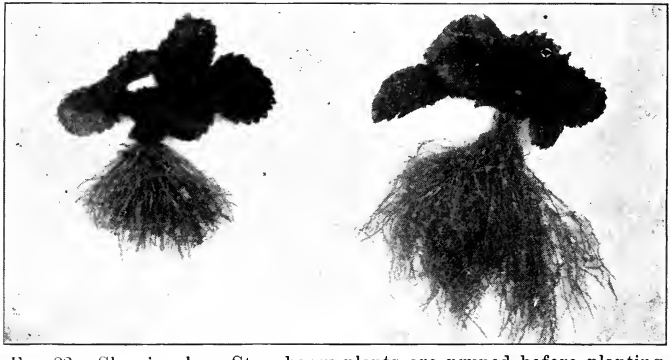


FIG. 22. Showing how Strawberry plants are pruned before planting.

perfect flowers, or those containing all of the essential organs of reproduction. The former are designated as pistillate varieties and the latter as bisexual. The latter are capable of producing fruit without the presence of other varieties, while the pistillate varieties must be alternated with the bisexual or they fail to produce. A tree-peddler offering to sell an old lady a pistillate variety explained this to her and received the reply, "Well, for my part, I don't want strawberries that have to be married before they can make berries." She did

not know that all plants "have to be married" before they can produce fruit or seed.

Soil—Planting—Cultivation.—Strawberries may be successfully grown on any good garden soil, but they succeed best on a fertile, sandy loam containing an abundant supply of humus. This should be deeply prepared and liberally fertilized with *thoroughly rotted* manure, phosphoric acid and potash. If wood ashes are available they afford the best source of potash and in the best form. There is no danger of applying too much phosphoric acid and potash, but an excess of nitrogen causes a luxuriant growth of vine at the expense of fruitage. Fresh stable manure should not be used on this crop in the South.

In the private garden, a very small area will be sufficient to supply the family.

I prefer, if the plants are to be cultivated with the hoe, to plant two feet each way and confine them to single crowns. The runners and the new plants are produced at the expense of the parent plants, and this tax on the energies of the latter diminishes their capacity for producing fruit. The bloom-buds are formed the year before they develop, and hence each crop depends largely upon the treatment which the plants receive the year before. The removal of the runners, therefore, as fast as they form, will increase the yield the next year.

If the plants are to be cultivated with the plow, the rows should be three feet apart and the plants set one foot apart in the rows.

In the South, the plants should be transplanted as soon as practicable after the season's growth ceases—

usually the last of October or early in November. They may be successfully planted at any time while the plants are dormant, but those set early will bear more fruit the first year. The plants which are formed in June have

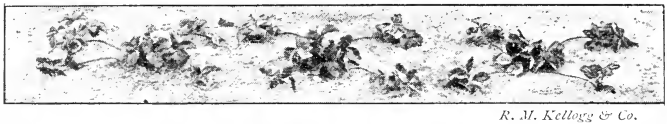


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FIG. 23. The double hedge, or matted row system of growing Strawberries.

more time for producing bloom-buds and hence give a better yield the first year than those formed later.

The common practice of allowing the sets to remain in the line of the rows forming what is termed the "matted row" involves less labor than cultivating to single crowns and produces a larger number of berries, but of smaller size than the single crown method.

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FIG. 24. The single hedge, or narrow row system of growing Strawberries.

Mulching is practiced further north to protect the plants from severe freezing. It is not needed here for that purpose, but, if applied early in the spring, it protects the berries from sand and retains soil moisture and thus lessens the injury from drought. No crop is benefited more by irrigation than the strawberry.

A strawberry bed is not profitable after the third

season, and should be either plowed up soon after the fruit has been gathered or allowed to remain and produce young sets for fall planting. I should advise planting a new bed every second year.

Cultivation and Gathering.— In picking, we should not take hold of the berry at all, but seize the stem just below, and, unless the berry gives unmistakable evidence of ripeness, twist the stem sufficiently to expose to view the lower side before plucking it. If the berry itself is pulled, many will come off without the cap, and if there is grit on them, this will be mashed into the surface.

Clean and shallow cultivation should be practiced throughout the growing season except while the berries are ripening. Fertilizers should be applied broadcast and worked into the soil just before the first spring cultivation begins. Under judicious management, the beds may remain three years before renewing. A light crop is produced the first year and full crops the second and third. The runners may be allowed to remain the third year to be used in forming a new bed. To keep up a full supply, I have found it a good plan to keep three plots — destroy an old bed and plant a new one every year. Under this system two beds are in full bearing all the time.

Varieties.— Since different varieties are adapted to different soils and climatic conditions, it is not practicable to name a list suitable to all sections of the southern states. Selection may be made from the following list suited to almost every section of the South. I have found the following varieties most satisfactory. The *Excelsior* (B), the earliest, is an abundant producer of

very dark red berries, roundish in form and of very good quality. The principal objection I have found to it is the shortness of the stems of the earliest berries. It begins to ripen in this latitude about the 20th of April, and continues in bearing for about four weeks. This should have a place in every collection.

Heflin's Early (B), a new variety following the Excelsior, is forging to the front on account of its enormous size, its superior quality and brilliant color.

Lady Thompson (B) is one of the most popular varieties grown. It is a heavy producer, holds its size well, has long flower-stalks and is therefore easily picked. It comes in before Excelsior gives out and continues long in bearing. It ripens all over at once, but the color, a pale red, is objectionable.

Klondike (B) is a comparatively new variety which is to some extent supplanting Lady Thompson on account of its better color.

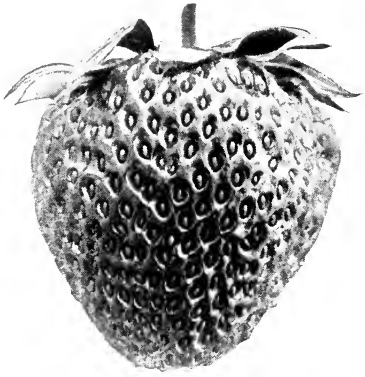

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FIG. 25. Lady Thompson (B) Strawberry.

Hoffman (B) has long been a favorite in the coast region, but is not so satisfactory in the interior. It is now claimed that it has been improved and that the new strain has superior shipping qualities.

Brandywine, (B) *Bismarck* (P), *Howell* (B), *Tennessee*, *Prolific* (B),

(B) Bisexual. (P) Pistillate. See page 19.

Clyde (B) and *Enormous* have proved satisfactory with me as medium ripeners.

Haverland (P) and *Gandy* (B) are probably our best very late varieties. Haverland is a heavy producer of large, long berries, but has the bad habit of ripening above while white below.

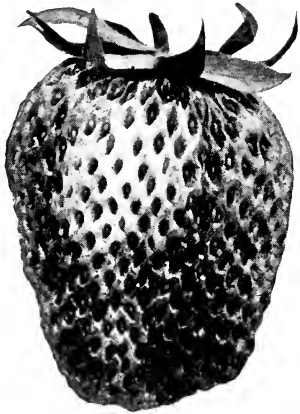


FIG.26. Haverland (P) Strawberry.

RASPBERRIES

While there are really four types of the raspberry, viz., the American Blackcap, the Native Red, European Red and the Hybrids between the black and the red species known as the "Purple Cane" or "Shaffer" types, yet the most important classification to the grower is the method of propagation. If classified according to the manner in which the different species propagate, they are reduced to two types, viz. (*a*) *Blackcap*, or those which perpetuate themselves by layers of the tips of the new growth or stolons; (*b*) *Redcap*, those which propagate from root sprouts.

Our common dewberry propagates as does the blackcap raspberry, while the blackberry propagates like redcap raspberries. The plants for setting new beds of the blackcap type are obtained by layering the ends or tips of the new canes, to induce them to take root. This, however, is not necessary if favorable conditions as to soil, shade and moisture prevail.

The tips often flatten as they reach the ground and frequently divide into four to six prongs, each of which puts forth roots and produces a new plant. These are separated from the parent plant and transplanted at any time from November to the first of March.

The redcap type puts up shoots from the roots, which, after the growth of one season, are suitable for transplanting.

Planting.—As this is done while the plants are dormant, there is little danger of loss if the work is properly done. In no case should the rows be less than four feet apart. The redcaps may be planted two feet apart in the drill, but those of the blackcap type should not be nearer than three feet in the row. As required for all other transplanting, the soil should be firmly pressed upon the roots and loose soil drawn over that thus compacted.

Pruning.—The tops of the young canes should be cut back in May or June to one foot, for the purpose of encouraging the multiplication of branches which will bear fruit the next season. The winter pruning should be done in November and December, when the new canes should be cut back to within three feet of the main stem, to encourage the production of vigorous bearing shoots, on the tips of which the next crop of fruit will be borne. All of the old canes which have borne fruit the previous year should be removed. If properly pruned, no supports will be necessary for the vines. The fruit is borne on the canes which grew the previous season. These die the next winter and should be removed, to give place to the new growth.

Varieties.—Of the *Blackcap* type, I have found the following most satisfactory: *Gregg*, *Palmer*, *Doolittle*, *Ohio*, *Shaffer* and *Caroline*.

Of the *Redcap* type, *Cuthbert*, *Turner*, *Golden Queen*, *Brandywine* and *Hansell*. In the lower half of the cotton belt, all of them succeed best on the north side of the garden fence. In the northern half, such protection is not necessary. Raspberry cordial is an excellent astringent, which should be kept by every family, especially where there are children.

THE CURRANT

This is a very popular fruit in some of our northern states where both soil and climate are favorable to its growth. It is a native of Europe and the northern part of North America. It is well adapted to northern exposures of the mountain regions of the southern states, and succeeds well in the Piedmont region on clay loam soils on northern exposures or protected by buildings or fences in the home garden. I have grown the Red Dutch quite successfully in garden culture at Clemson College, South Carolina.

The plant is hardwood, shrubby growth, requiring little pruning except the removal of old canes to make way for vigorous new ones. Clean, shallow cultivation by means of which a soil mulch is secured, or a mulch of woods-mold, will insure good results.

Propagation is usually done by cuttings made eight or ten inches long and planted in November in an inclined position, preferably on the north side of a fence.

Varieties.— The old *Red Dutch* is still popular. *Cherry* and *Versailles* are the most popular and most generally cultivated varieties. *Victoria* is excellent for general culture and variety of uses.

Wilder, *White Grape* and *White Imperial* are new and desirable varieties.

The early varieties follow in ripening the late strawberries and raspberries, and the later varieties continue the season until grapes are ripe. There are few fruits that are used in a greater variety of ways than the currant.

The principal enemies are the currant-worm and the currant-fly, the former stripping the leaves and the latter depositing its eggs under the skin of the fruit.

BLACKBERRIES

On account of the large quantity of blackberries found growing wild in the South, this important berry has not yet been cultivated to a great extent. Bushels of fine fruits are gathered from the neglected fields and roadsides, and sold in the local markets at from ten to fifteen cents per gallon.

The blackberry does well on almost any kind of soil, but is best suited to a deep, sandy loam. The fruit is greatly improved by cultivation, and enormous crops will be produced if given the proper care and attention.

Propagation and Pruning.— Numerous suckers spring up from the roots of the old plants during the spring and summer. These suckers will be well rooted by fall and ready to be taken up and planted in rows eight feet apart and four feet in the row. The suckers that sprout

up around the old plants in the spring will produce fruit the following summer. These young canes should be pruned when they have attained a height of eighteen inches, so as to make them branch and form fruiting canes for the next year's crop. In the fall, these canes should be pruned again to about one-half their length.

After the fruit has been gathered, the old canes should be cut out to give the new ones more room. Care must be taken that too many suckers are not allowed to grow. The plants should be cultivated frequently during the summer or else covered with a good mulch of leaves or straw.

GOOSEBERRIES

The gooseberry is not cultivated to any great extent in the South, on account of the liability to mildew, though it may be grown successfully in the mountain regions or on northern exposures in the Piedmont belt. It requires clay or clay-loam soil. It is propagated principally by layering, as it cannot be easily grown from cuttings.

The American varieties, which alone are worth cultivating in the South, may be grown from root cuttings.

The fruit is usually gathered green, to be used in pies or for canning. The ripe fruit is very pleasant food. The plants live many years if properly managed.

Pruning has for its principal objects opening the head to prevent mildew and removing old canes to encourage the growth of new ones.

Varieties.— *Downing* and *Houghton* are the best varieties for the South.

PART IV

SPRAY CALENDAR FOR FRUITS

Apple—
Scab
Leaf spot
Bitter Rot
Rust
Codling-moth
Canker-worm
Tent-caterpillar

Spray just before buds begin to swell with Formula I.
Second application should be made soon after the petals have dropped from the flowers. Use Formula X.
Third application should be made two weeks later. Use Formula X.
Fourth application should be made three weeks after second. Use Formula X.
If the weather is wet and the scab on the increase, spray with Formula II every three weeks. Destroy all fallen fruit.

Aphis (Lice).—Spray with Formula VIII, using 1 gallon of stock solution to 8 gallons of water.

Woolly Aphis.—Remove soil from roots of trees and apply 1 to 2 pounds of tobacco dust.

Cherry—
Black-knot
Rust
Shot-hole Fungus

Cut out all diseased parts in winter and burn. Spray with Formula I, just before buds begin to swell. Spray with Formula III as soon as fruit has set, and repeat ten days later. Repeat Formula III after fruit is gathered.

Currants and Gooseberries—
Mildew
Leaf-spot

Spray with Formula II, before buds swell. Repeat after fruit is formed and again after gathering.

Grapes—
Black-rot
Anthracnose
Mildew

Spray with Formula I before the buds begin to swell in the spring.
Second application is made as soon as the first leaves are half grown, using Formula II. Repeat Formula II when the fruit has set, and again two weeks later. Spray again just before fruit begins to color. The bunches may be bagged soon after the third spraying, to protect from birds.

Peaches, Plums and Apricots—
Leaf-curl
Rot

Spray with Formula II before the buds begin to burst in the spring. Spray with Formula III as soon as the flowers drop, and again three weeks later. The fourth application should be made just before the fruit begins to color. Use Formula III.

Curculio.—The curculio may be caught and destroyed by spreading a sheet on the ground and jarring the trees, as soon as the fruit is well set. Add 3 ounces Paris green to Formula III, when second and third application is made.

Pear—Blight.—Cut out and burn. Always cut at least twelve inches below blighted parts. Do not allow trees to grow too rapidly after the third year. If they are growing too rapidly, sow the land in grass or grain.

Codling-moth
Canker-worm

See Apple.

Quince—Curculio.—See Plum.

Raspberry and Blackberry—
Rust
Anthracnose
Leaf-spot

Spray with Formula II when the young canes are 12 to 14 inches high; repeat ten days later. Cut out all the old canes after crop is gathered and spray with Formula II.

Rose—Mildew.—Spray with Formula II before the leaves appear; repeat when the buds are half grown.

Aphis.—Spray with Formula VIII, using 1 gallon of stock solution to 8 gallons of water.

Strawberries—Leaf-blight.—Spray with Formula II just before the blooming season. Spray again after the gathering season, and repeat three weeks later.

San Jose Scale.—Spray with Formula IX when the trees are dormant.

Other Scales.—Spray with Formula VIII when trees are dormant. Use 1 gallon of stock solution to 4 gallons of water.

SPRAY CALENDAR FOR VEGETABLES

Asparagus—Rust.—Cut and burn the patch in the fall, or as soon as the rust has killed the greater part of the stalks; then give the land a light dressing of lime. Spray thoroughly several times during June and July with Formula III.

Beans—Striped Beetle.—See Melons.

Cabbage and Cauliflower—Cabbage-worms.—Dust with Paris green mixed with flour or lime, while the dew is on the plants. Use Formula VI.

Aphis (Lice).—Spray with Formula VIII, using 1 gallon of stock solution to 8 gallons of water.

Harlequin Bug.—Sow an occasional row of radishes or kale as a trap crop. When the bugs collect on them, spray with pure kerosene.

Celery—Leaf-blight.—Spray with Formula II before transplanting. Repeat application every two weeks until cool weather.

Caterpillar.—Dust with Paris green mixed with flour or lime, as soon as insect appears. Use Formula VI.

Eggplant—Potato Beetle.—See Potato.

Melons.—Blight.—Spray with Formula II when vines begin to run. Repeat application every twelve to fifteen days until crop has matured.

Aphis (Lice).—Spray with Formula VIII as soon as lice appear. Use 1 gallon of stock solution to 8 gallons of water. If plants are badly infested, destroy them.

Striped Beetle.—Spray with Formula X as soon as plants are up. Repeat application every seven days until the plants are well established.

Potato—Blight.—Spray with Formula II just before the blooming period. Repeat application two weeks later.

Scab.—Soak seed for one and one-half hours in corrosive sublimate, Formula IV; or in Formalin Solution for two hours, Formula V.

Potato—Potato Beetle.—Spray with Paris green and lime as soon as young beetles appear, using Formula VII; or dust with Paris green and lime, using Formula VI. Repeat when necessary.

Tomato—Potato Beetle.—Treatment same as for potatoes.

Tomato Worm.—Spray with Formula VII as soon as worms appear.

Blight.—Spray with Formula II just before plants begin to bloom, and again after fruit is formed.

Early Vegetables—Cutworms.—Poisoned bran mash scattered over field a few days before setting out the plants, or green rye or barley poisoned by dipping into a solution of Paris green, Formula VII, and scattered over the land late in the afternoon, is very effective. Keep land free from all foreign vegetation.

INSECTICIDES AND FUNGICIDES

FORMULA I.—BORDEAUX MIXTURE

(*Fungicide*)

Copper sulphate (Blue Stone)	6 pounds
Lump lime	4 pounds
Water	50 gallons

Dissolve the copper sulphate in hot or cold water in an earthen or wooden vessel. Slake the lime in a tub or half barrel, adding the water gradually so as to slake thoroughly. When the lime is slaked, dilute both copper and lime to 25 gallons each. The two solutions are now poured into a barrel at the same time and thoroughly mixed. The mixture should be strained while pouring into spray pump.

FORMULA II.— BORDEAUX MIXTURE

(*Fungicide*)

Copper sulphate (Blue Stone)	4 pounds
Lump lime	5 pounds
Water	50 gallons

Prepare in same way as Formula I.

FORMULA III.— DILUTE BORDEAUX MIXTURE

(*Fungicide*)

Copper sulphate (Blue Stone)	2 pounds
Lump lime	4 pounds
Water	50 gallons

Prepare in same way as Formula I.

FORMULA IV.— CORROSIVE SUBLIMATE

(*For Potato Scab*)

Corrosive sublimate	2 ounces
Water	15 gallons

Dissolve the corrosive sublimate in two gallons of hot water, then add balance of water. Allow solution to stand four or five hours, stirring occasionally. Place the seed potatoes in a coarse sack and immerse in solution for one and one-half hours. Corrosive sublimate is very poisonous, and care should be taken in handling it.

FORMULA V.— FORMALIN

(*For Potato Scab*)

Water	15 gallons
Formalin (40 per cent solution)	8 ounces

Allow seed potatoes to stand in this solution for two hours. Spread out and allow to dry before planting.

FORMULA VI.—PARIS GREEN: DRY

(*Poisonous Insecticide*)

Paris green	¼ pound
Flour or lime	20 pounds

Mix thoroughly, and dust lightly on plants when dew is on the leaves.

FORMULA VII.—PARIS GREEN: WET

(*Poisonous Insecticide*)

Paris green	¼ pound
Quicklime	4 pounds
Water	50 gallons

Slake the lime in a small quantity of water, sprinkling in the Paris green gradually, then add the balance of the water. For peaches and plums, use only 3 ounces of Paris green.

FORMULA VIII.—KEROSENE EMULSION

(*Contact Insecticide*)

Hard soap, shaved fine	½ pound
Water	1 gallon
Kerosene oil	2 gallons

Dissolve the soap in boiling water; remove from fire and pour in the kerosene while hot; churn this for ten minutes, during which time it should change to a creamy white mass. Keep this as a stock solution, using one part to eight parts of water for plant-lice. For scale insects, use one part of stock solution to four parts of water. This should be applied when the trees are in a dormant condition.

FORMULA IX.— LIME, SALT AND SULPHUR

New Jersey Bulletin, No. 162

(*Contact Insecticide*)

Stone lime	50 pounds
Flowers of sulphur	50 pounds
Stock salt	50 pounds
Water	150 gallons

Slake the lime with hot water, enough to do it thoroughly; add the sulphur, stir well, and boil for at least an hour, adding water as necessary. Then add the salt, boil at least fifteen minutes more, and dilute to make 150 gallons. In boiling, use no more water than necessary to make a fluid mass. Strain through burlap, and apply hot.

FORMULA X.— A COMBINED INSECTICIDE AND FUNGICIDE

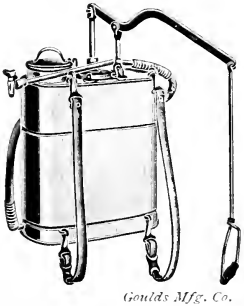
Paris green	¼ pound
Lump lime	5 pounds
Copper sulphate	4 pounds
Water	50 gallons

Prepare as for Formula I; then make a thin paste of the Paris green, and add to the solution and stir well.

SPRAY PUMPS

Spraying has become a necessity in both the garden and the orchard. The question is not, "Can I afford to spray?" but "Can I afford not to spray?" It is not my intention to discuss the various kinds of spraying machinery, but to call attention to the pumps best suited to garden and orchard. There are many kinds of pumps advertised for spraying fruits and vegetables, and it is a

hard matter for the amateur to tell just what kind of spraying outfit to buy.



Goulds Mfg. Co.

FIG. 27. Knapsack pump.

THE "KNAPSACK PUMP"

For garden work on a small scale where one does not care to spray anything taller than six feet, the knapsack pump is more satisfactory than any other small pump I have ever used. This is fastened to the back by means of leather straps (Fig. 28) and is very handy for spraying potatoes, roses, grapes, etc., but will not do for large fruit trees.

The ordinary bucket pump is very unsatisfactory.

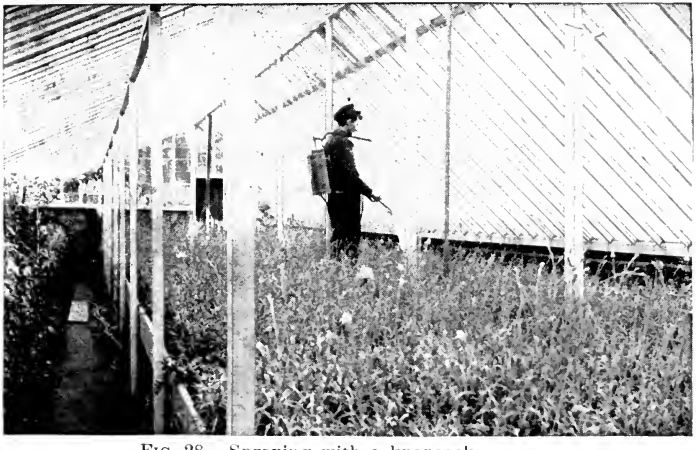


FIG. 28. Spraying with a knapsack sprayer.
Bulletin 126, New York Experiment Station.

THE BARREL PUMP

For spraying fruit trees, it is necessary to have a good barrel pump. This may be mounted on wheels and drawn by hand or placed on a one-horse wagon (Fig. 29);

FIG. 29. Spraying Grapes with barrel pump.

the latter plan is the most satisfactory. By using a long section of hose, the barrel pump will be found even more satisfactory for garden work than the knapsack. The cost of the barrel pump is very little more than that of the knapsack, and when one takes into consideration the fact that ten times more work can be done with the barrel pump in one day than could be done with the knapsack, the purchase price cannot be considered.

The following equipment is necessary for thorough work with a barrel pump:

One barrel pump.
Two 25-foot sections of ½-inch hose.
Two 5-foot extension rods.
One strainer.
One double discharge Vermorel nozzle.
One brass stop-cock.

A SELECT LIST OF VEGETABLES FOR THE HOME GARDEN

Below is given a select list of varieties of vegetables for a home garden and the amount of seed necessary to produce an abundant supply of vegetables for a family of six:

Name of Vegetable	Varieties	Amount of Seed
Asparagus	Columbian White	½ ounce
Beans	Extra-Early Refugee (green pods)	1 pint
Beans	Early Valentine (green pods)	1 quart
Beans (Wax)	Valentine Wax (yellow pods)	1 pint
Beans (Bush Lima)	Wood's Bush Lima	1 pint
Beans (Pole Lima)	Challenger, Pole Lima	1 pint
Beans (Pole)	Southern Creaseback	1 pint
Beets	Bassano (Early)	1 ounce
Beets	Crimson Globe	1 ounce
Broccoli	Purple Cape	1 packet
Brussels Sprouts	Improved Half Dwarf	1 packet
Cauliflower	Extra-Early Snowball	1 packet
Cabbage	Charleston Wakefield (Early)	1 packet
Cabbage	Succession (Mid-season)	1 packet
Carrots	Half-Long Stump-rooted	½ ounce
Celery	Thorburn Fin de Siècle	1 packet
Celery	Giant Pascal	1 packet
Corn (Sugar)	Country Gentleman	1 quart
Corn (Sugar)	Stowell's Evergreen	1 quart
Collards	Georgia	1 packet
Corn Salad	Large-seeded	1 ounce
Cress	Curled Cress	1 ounce
Cucumber	Improved White Spine	¼ ounce

Name of Vegetable	Varieties	Amount of Seed
Endive	Green Curled	¼ ounce
Eggplant	New York Purple	1 packet
Kale	Curled Emerald Isle	1 ounce
Kohlrabi	Early White Vienna	¼ ounce
Leek	Large Flag	1 packet
Lettuce	Big Boston (Early)	1 packet
Lettuce	Giant Crystal Head (Late)	1 packet
Mustard	Giant Southern Curled	¼ ounce
Muskmelon	Netted Gem (Rocky Ford)	½ ounce
Muskmelon	Champion Market	½ ounce
Watermelon	Florida Favorite	¼ ounce
Watermelon	Georgia Rattlesnake	¼ ounce
Okra	Long White Velvet	1 ounce
Onion	Yellow Globe Danvers	1 ounce
Onion	Prizetaker	1 ounce
Onion Sets	Yellow Globe Danvers	1 quart
Peas, Garden	McLean's Advancer (Early)	1 pint
Peas, Garden	Champion of England (Medium)	1 pint
Peas, Garden	Telephone (Late)	1 pint
Pepper	Large Bell	1 packet
Pepper	Long Red Cayenne	1 packet
Parsley	Moss Curled	1 packet
Parsnip	Hollow Crown	½ ounce
Potato, Irish	Irish Cobbler	1 peck
Potato, Irish	Bliss' Triumph	½ bushel
Radish	Early Scarlet White-tipped	½ ounce
Radish	Early Crimson Giant	½ ounce
Radish	Olive-shaped French Breakfast	½ ounce
Rhubarb	Crimson Winter	¼ ounce
Salsify	Mammoth Sandwich Island	¼ pound
Spinach	Long-standing	¼ pound
Squash	Long Island White Bush	½ ounce
Squash	Giant Summer Crookneck	½ ounce
Tomato	Stone	¼ ounce
Turnip	Early Milan Purple Top	½ ounce
Turnip	Yellow Aberdeen	1 ounce

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