

THE BUSINESS OF SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

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INTRODUCTION.

In 1839 Congress appropriated \$1,000 to be used by the Commissioner of Patents in collecting agricultural statistics and for the purchase of seeds of new and rare varieties of plants. This was the first appropriation providing for a work which during the fiscal year 1906 requires an appropriation of \$290,000. But before such specific help as that referred to was granted to this work the distribution of seeds had been considered of great importance. In a letter dated January 22, 1839, the Commissioner of Patents referred to the introduction of Baden corn as having increased the Mississippi corn crop by 50 per cent, and also stated that varieties of wheat were distributed and tested in 1838. During the early days of the settlement of this country there was of course much miscellaneous private introduction, but in 1770 Benjamin Franklin, as the agent of Pennsylvania, sent home for distribution seeds and mulberry cuttings, and during the administration of John Quincy Adams consuls of the United States were instructed to forward rare plants and seeds to the Department of State for distribution. The amounts annually appropriated since 1839 have varied widely; and, so far as can be learned, in but few instances has the whole appropriation been expended.

Between the years 1839 and 1880 a number of important new crops were introduced—sorghum, Kafir corn, wheats, and sugar canes; but meanwhile the distribution of vegetable and flower seeds became a more prominent feature, and by 1890 nearly all the seeds distributed were of this class.

With the increase in the number of packages annually assigned to Senators, Representatives, and Delegates in Congress, it became increasingly difficult to obtain seeds of new varieties in sufficient quantities, and to a greater and greater extent those of standard varieties were substituted. The introduction of new and improved varieties as an important feature of the distribution work was never wholly lost sight of, however, and in 1898 received distinct recognition in that

Congress set aside the sum of \$20,000 to be used for securing from abroad varieties that might be adapted to our conditions. This action brought the work back to the original purpose, namely, the introduction and testing of new things to be afterwards more widely distributed if found valuable.

For a few years the two branches of this service worked under separate administrations, but in 1902, the Bureau of Plant Industry having been formed, the writer was placed in charge of both branches and he has since carried on the work under the direction of the Chief of the Bureau.

SEED AND PLANT INTRODUCTION.

The work of seed and plant introduction, begun before there was a Department of Agriculture and carried on now for sixty-five years, has to its credit the introduction of some of our most important crops, the annual value of which it would be difficult to estimate.

OBJECTS OF THE WORK.

The question we are often asked and which we shall try to answer here is, "What is the object of this business?"

The object of this branch of the Department is to find new crops and to introduce them to the notice of the American farmer, business man, and consumer. There is always room for something better, and in many sections there is a crying need for anything that will grow and out of which the cultivator can make money. There are plenty of good things known in one section of the country that ought to be known in others, and even in the older sections of our country changed conditions call for new crops—crops that will fit into the rotation and keep the ground occupied, crops that will come on at a time when there is no other work, or crops that will make heavy expenditures for nitrogenous fertilizers unnecessary. The object of this business, therefore, is to help the agriculture and horticulture of the country wherever a need is felt for new crops or for new varieties of old crops. Moreover, an important feature of the work is to learn which crops already standard in this country may be extended to parts of the United States where their value is not at present appreciated. Such work is being done in the extension of alfalfa culture in the eastern United States. Explorers are also sent to every part of the habitable globe to bring home the best seeds and plants.

In all parts of the country there is need of something. On the Atlantic seaboard the abandoned rice fields are waiting to have their fertility utilized by some crop that will pay; in the fruit-growing sections north, south, east, and west, the growers want the ideal cover crop; tobacco growers everywhere need a soil improver that can follow tobacco the same season and will cover the ground during the winter; the home makers in the Northeast and in the Northwest want

better trees, especially evergreens for wind-breaks and ornament; the florist desires a healthy Easter lily; the southern farmer is in need of better cottons, disease-resistant cottons, and better corn; Florida wants new fancy fruits that will bring high prices to pay for the high cost of production, besides crops that can be grown cheaply and will pay for the trouble; the Northwest needs, among other things, hardy alfalfa and grains to resist drought and rust; the Southwest wants crops that will resist drought and alkali; everywhere, indeed, there is need of some crop adapted to special conditions of soil, of climate, or of market.

The object of this business is to fill these various needs by introducing new and improved crops to the American cultivator.

DOES IT PAY?

The old records of seed distribution are not as complete as might be desired, but a study of some of the important crops introduced since the first appropriation in 1839 and a conservative estimate of the present annual value of some of them have given the following interesting results. The estimates are little more than guesses, and probably much below the actual annual value of the crops.

SORGHUM.—Introduced from China and France, 1864(?). Cost of introduction, about \$2,000. At present grown throughout the United States. The annual value of the crop is at least \$40,000,000.

KAFIR CORN.—Introduced at a cost of probably not more than \$5,000. The annual value of this crop, which is largely grown in the semiarid Southwest, exceeds \$15,000,000.

DURUM WHEAT.—Cost of introduction, not more than \$10,000. At present durum wheat is the chief dependence for a crop on more than 500,000 acres of land too dry to grow other wheats. The cultivation of this wheat is extending every year. The present value of the crop is about \$10,000,000 annually.

JAPANESE KIUSHU RICE.—Cost of introduction, about \$18,000. The introduction of this variety has resulted in a large increase in the rice crop and has been an important factor in the phenomenal growth of the rice industry in Texas and Louisiana. Since the introduction of Japanese rice the area devoted to this crop has increased from 210,396 acres in 1899 to a total of 610,700 acres in 1904, raising the value of the land in the coast sections of Louisiana and Texas from between \$1 and \$2.50 per acre to from \$35 to \$50 per acre, and the output of cleaned rice has been increased from 179,919,293 pounds in 1899 to 548,880,600 pounds in 1904. If one-half of this increase has been due to the above introduction the annual value of this is nearly \$3,000,000.

SWEDISH SELECT OATS.—Cost of introduction, about \$5,000. The annual value of the increased crops produced by this variety in Wisconsin alone has been estimated at \$1,000,000.

EXCELSIOR WHITE SCHONEN OATS.—Introduced in 1868. The cost of this introduction is not ascertainable, but it was probably not in excess of \$1,000 for the variety. Hon. William G. Le Duc, then Commissioner of Agriculture, writing in 1879, says:

The increased production per acre by the Excelsior White Schonen oats some years since was 2.5 bushels per acre, and a like increase is reported from a distribution of the Board-of-Trade oats in the northern and the Rustproof in the southern part of the country during the past two years. But the average increased yield fairly attributable in like period to improved varieties of seed would amount to 40,000,000 bushels, now worth \$15,000,000.

CHEVALIER BARLEY.—Distributed by the Department about 1871. Cost of introduction not ascertainable, but probably about \$1,000. At present this is one of the standard varieties in the United States, the crop being worth many millions of dollars. This barley has also been extremely useful as one of the parents of some hybrids at present more valuable than the parent variety.

FULTZ WHEAT.—Introduced by the Department in 1871. Cost of introduction not ascertainable, but probably small. This is still one of the standard varieties in the East, and the value of the crop, at a low estimate, amounts to millions of dollars annually.

WASHINGTON NAVAL ORANGE.—The original cost of this introduction was probably insignificant, but the value of the California crop alone for the past year was \$8,000,000, f. o. b. cars in California.

The cost of all seed and plant introduction and distribution work from 1852 to 1905, inclusive, has been \$4,477,402. The estimated *annual* value to-day of a few of the varieties introduced by the Department is certainly far in excess of \$100,000,000.

But the justification for this work may be found not alone in what has been done, but in the prospective value of crops and varieties, if we can find and introduce the kinds that are clearly needed. The crop of flaxseed in North Dakota alone is worth nearly \$17,000,000 annually, and the presence of wilt disease is a serious menace to this crop. If seed of a wilt-resistant variety can be secured and distributed, flax may again be grown on thousands of acres now said to be "flax sick." This will mean that the tow mills which have been recently established in North Dakota for handling fiber from the general seed crop, but which have been forced to close because the haul became too long to make their business profitable, may again open.

The loss of cotton in a few counties in the South from wilt disease alone amounts to half a million dollars annually, all of which may be prevented by the introduction of a wilt-resistant variety.

The tobacco growers of Connecticut expend large sums for nitrogenous fertilizers. If they can use a vetch that will leave nitrogen in the soil, it will easily save them \$10 per acre on 30,000 acres, or a total of \$300,000 annually.

This country imports dates to the value of \$600,000 annually. Why should we not establish the industry in our own hot deserts and keep the money at home? Japanese straw matting can be woven by power looms, but the raw material is not at present produced here. The annual value of this crop to the farmer will be, if established, at least \$2,000,000. In every portion of the United States there is need of some profitable crop to add to those already grown. It is the business of the Office of Seed and Plant Introduction and Distribution to fill these needs, and the filling of them seems well worth while.

WHAT IS BEING DONE, AND HOW.

The Office of Seed and Plant Introduction and Distribution is endeavoring to assist in the upbuilding of new plant industries wherever opportunities offer. Many of the best of these opportunities are opened up by discoveries made by experts employed by the Department of Agriculture, and one important line of the work consists in cooperating with the other offices of the Department.

This Office stands distinctly for cooperation, because it is believed the work can best be done in that way. There are more than fifty men in the Bureau of Plant Industry alone who are almost constantly in the field and in touch with the needs and opportunities existing. These men can and do look out for any good new things or for a chance to take up a profitable line of work. Many of them are studying farm practice, and in the course of their work note where a new crop would fit in well. In such cases arrangements are made through these men for a test of that crop to determine whether it will succeed. If it does succeed, enough seed is distributed to give those interested a start with the crop. Such cooperation is helpful all around. The student of farm practice has furnished the idea, and this Office has tested it, or, rather, has helped the farmer to test it.

COTTON AND TOBACCO.—All the work done on these standard crops is in cooperation with the Department experts. A few years ago one of them demonstrated that some cotton plants were resistant to the wilt disease. The control of the disease therefore evidently lay along the line of using resistant varieties. Every year since that time this Office has distributed 200 bushels of wilt-resistant seed and has contracted for a small acreage planted to new varieties which are also resistant, and these new sorts will be introduced as soon as ready. The expert who understands cotton and cotton diseases supervises the work, and this Office grows the seed and distributes it, in like

manner cooperating in the introduction of other new varieties of cotton. As new varieties of merit are found seed is bought and distributed, and contracts are made for an acreage of such new varieties as are still in process of selection.

In the course of selection work on tobacco it was shown that improved types may readily be secured by selecting individual plants for seed bearers. When this was once shown, arrangements were made to have our tobacco seed secured in this way, and in the summer of 1905 the tobacco experts visited the chief tobacco centers and personally selected the seed parents for this work.

GRAINS.—The most important cooperative enterprise now being carried on is the introduction of cereals. This work is all done through the Cerealist of the Bureau and covers the introduction of durum wheat, hardy winter wheats, oats, barleys, and the Russian or proso millets. While the work affects more or less the entire United States, by far the most attention has been given to grains for the arid and semiarid regions extending from North Dakota to Texas and for the high altitudes of the Rocky Mountains.

NEW CITRUS FRUITS.—After years of effort Dr. H. J. Webber produced three new citrus varieties, which appear to be worthy of wide distribution. If they succeed, they will add materially to the citrus varieties in cultivation, and it has been the duty of this Office to distribute them. During the past two years, therefore, contracts have been made for thousands of these trees, which have been sent wherever it was thought they would be of value.

MISCELLANEOUS INTRODUCTION WORK.—In numerous other ways this Office cooperates to test or to establish new crops. In 1904 more than 10,000 bushels of seed of early varieties of cotton were sent to Texas to aid in fighting the boll weevil. Tubers of 98 varieties of potatoes were purchased, with the object of selecting a disease-resistant sort. Ten acres of watermelons of a strain being bred to wilt resistance were contracted for. One of the Bureau experts is being aided to inaugurate an extensive series of tests to find out what kind of alfalfa seed should be used in various parts of the United States. This Office has cooperated with the Bureau of Chemistry to find out whether cassava can be made a more profitable crop in Florida. It is helping the Drug Plant Laboratory to demonstrate that two valuable plant products—camphor and morphine—can be successfully produced in this country, and when the demonstration has been made it will take up the wide distribution of the seeds and plants. This Office is also assisting the Subtropical Laboratory to introduce the culture of the vanilla bean and the mango and other tropical fruits. These are some of the minor ways in which cooperation is being carried on in work having for its object the establishment of new plant industries or the introduction of better varieties. There are many more of these little

projects that might be mentioned. New ones come up all the time, and a careful hearing is always given to plans that promise to pay. In these ways the Office of Seed and Plant Introduction and Distribution can put before the people the results of some of the best work of the Department, much of which would otherwise not be so widely known.

FOREIGN EXPLORATIONS.

This line of work was actively inaugurated in 1897, when the Secretary of Agriculture sent Prof. N. E. Hansen to Turkestan to obtain seed of the hardy alfalfa growing there. For several years this work was conducted by the Section of Foreign Seed and Plant Introduction, and is now an important line of activity in the business of introducing new seeds and plants. Many of our best crops have come from foreign parts, and there are, without any doubt, many other choice varieties waiting to be recognized and introduced. As the title indicates, it is the business of this branch of the work to explore foreign countries and to find out what can be brought to America and made to pay here. Specific expeditions are undertaken in order to secure one or more important crops the existence of which is known and the introduction of which is thought to be desirable and possible. Of course the explorer would be a poor one, indeed, who did not keep his eyes open for any other good things the country visited might afford. Such expeditions usually have their origin in the studies of Department experts, who show that climatic conditions in some part of the United States are similar to those in certain countries abroad, where profitable crops not now produced in the United States are grown. It may be found that such products are now imported, either raw or manufactured, to the value of millions of dollars annually, and it is then evident that it would pay to introduce these cultures, especially if they can be grown on land not now profitably occupied. A careful study of the conditions is made and a competent man is sent abroad with instructions to bring back seeds or plants of the desired sorts in quantity, and also to report on the methods of handling the crop.

Prof. N. E. Hansen in 1897 went to Turkestan in search of hardy alfalfa, and he brought back, besides this, seeds and plants of many other kinds. Dr. S. A. Knapp went twice to the Orient in search of better varieties of rice and brought back the Kiushu rice, which has given such an impetus to rice culture in the South. Mr. E. A. Bessey went to Turkestan and Russia to secure a new supply of Turkestan alfalfa, and he also secured valuable grains and other seeds. Mr. W. T. Swingle sent from Smyrna the insect required for fertilizing the fig, and also secured in Africa a large consignment of valuable varieties of date palms. Mr. M. A. Carleton on two expeditions secured the varieties of durum and other wheats which are proving such important factors in the semiarid regions of the West. Mr. D. G. Fairchild, at present

in charge of this branch of the work, has traveled extensively both for the Department and with Mr. Barbour Lathrop, who has sent many of our recent introductions. Messrs. T. H. Kearney and T. H. Means made most valuable observations on plants grown under irrigation in the Nile Valley, and Mr. Kearney later secured the largest single shipment of date palms yet brought over. Others have searched for plants in Mexico, Central America, China, and Africa, and a special explorer is now working in north China and Manchuria, in which regions it is hoped to secure hardy fruits and field crops.

As seeds and plants are brought in by the various explorers they are numbered and full records are made of their source, character, and expected possibilities. They are then distributed for testing or are placed in the Department gardens or greenhouses for propagation. When these seeds and plants are received they go into the hands of the men in charge of the various crop lines, and the responsibility of those in charge of the foreign explorations then ceases.

TESTING GARDENS AND PROPAGATING HOUSES.

The testing gardens and propagating houses are two indispensable accessories to the successful prosecution of this work. (See Pl. XXIV, fig. 2.) Many of the introductions that finally proved to be among the best things discovered came in small quantities—a handful of seeds, a few buds or scions, for which stocks must be on hand, or a Wardian case of potted plants. (Pl. XXIV, fig. 1.) Unfortunately, our greenhouse space is limited, and most of our work has to be done in the outdoor gardens.

There are two principal gardens, besides many smaller stations, where tests of grains or forage crops are being made for local conditions, and three date-palm gardens.

The home testing garden is at the Arlington Farm, where extensive annual tests are made and where plants that are believed to be hardy in the climate of Washington, D. C., are placed for testing and observation. The most important of all the introduction gardens, however, is at Chico, Cal., where a plant-introduction garden has been established to nurse, test, propagate, and produce new and choice varieties adapted to mild, temperate conditions. The climate of this place, while not suitable for tender subtropicals, is adapted to the orange or any plant equally hardy. There seeds are planted in quantities, and thousands of seedlings are raised of those cultures for the introduction of which special efforts are being made. The garden covers 80 acres, mostly choice land, and, though only one year has passed since the work was begun, already many thousands of plants are ready for stocks or for distribution. Here have been established collections of useful plants, so that in time there may be opportunities to breed new varieties of value to the whole country.

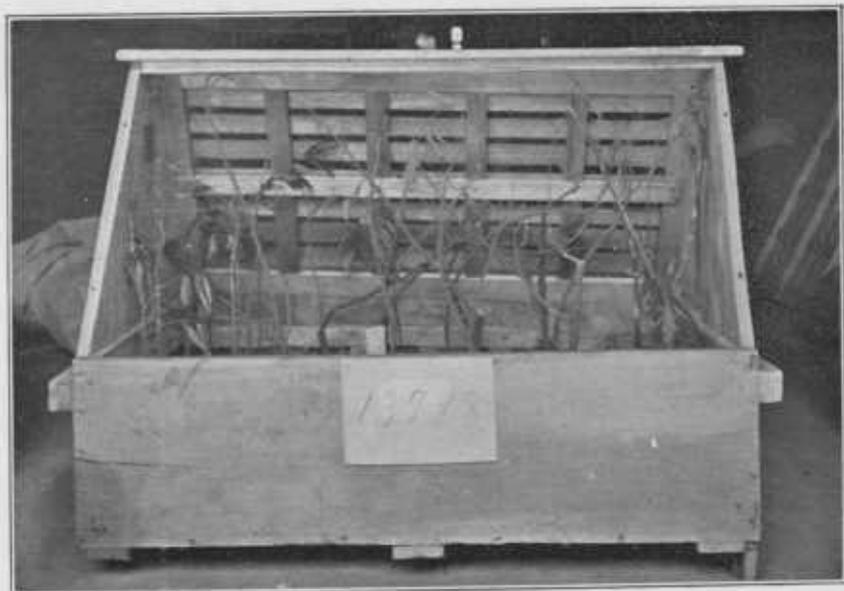


FIG. 1.—WARDIAN CASE OF POTTED PLANTS AS RECEIVED FROM ABROAD BY THE OFFICE OF SEED AND PLANT INTRODUCTION AND DISTRIBUTION.



FIG. 2.—MANGO HOUSE OF THE OFFICE OF SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

DATE-PALM GARDENS.

The introduction of date-palm culture is, because of the nature of the tree, a task of unusual difficulty, being at the same time one of unusual importance for those regions adapted to this fruit. It was necessary, therefore, to bring together a collection of varieties in special gardens where they could be cared for, studied, and propagated. The first garden was established at Tempe, Ariz., in cooperation with the Arizona experiment station, and in it are now 930 trees of more than 125 varieties. Later a tract of 15 acres was secured at Mecca, Cal., in cooperation with the California experiment station, and on this there are 724 trees of more than 100 varieties. During the past season a third garden has been planted at Yuma, Ariz., and here the work is carried on in cooperation with the Arizona experiment station. These gardens are equipped with fumigation houses, because it is important that no insect pests should be introduced with the palms from foreign countries. Here and there, where special conditions existed, young trees were sent to private growers, but the right to control the offshoots was reserved. Later the introduction gardens and the earlier distributions will serve as sources of supply from which young plants may be sent to those who wish to go into the business of raising date palms.

SMALLER TESTING STATIONS.

Besides the work carried on at the main testing stations, introductions are tested at special stations in Pullman, Wash.; San Antonio, Tex., and Chillicothe, Tex., and grains at stations throughout the western grain belt. At all of these stations careful records are kept, and, as soon as a new thing is known to be promising, seed is saved and more seed is purchased or grown under contract. These stations are necessary for testing the relative value of new varieties. If the seeds were distributed to various cooperators no one would have more than a few kinds and a comparison of value would be out of the question. These stations are needed, therefore, to find out what the introductions are worth and also to raise seed of varieties of which there was but little seed at first.

TESTING THE VALUE OF NEW VARIETIES AND PLACING THE BEST BEFORE THE PUBLIC.

In the history of every introduction there are three steps—securing the variety, testing it, and finally introducing it or attracting to it the favorable notice of the public. Varieties are secured by keeping in touch with what the Department experts and field men do and learn, through foreign explorers, and through extensive correspondence. When received the varieties must be tested, and while this is done largely

in the Department's gardens, such tests can not cover the whole field and are at best merely preliminary. All varieties must be tested through a series of years before a final decision can be reached as to their value. Much of this work is done by an extensive corps of cooperators living in every part of the United States and interested in the various crops. Whenever a special introduction of a new variety or crop which has already been studied is made, the seeds or plants are at once sent out according to a prearranged plan, so that such seeds are not usually kept on hand for a long time. Miscellaneous seeds are placed on the Department's grounds or are sent to special cooperators interested in that particular kind of plant.

The time during which varieties must be tested before they can be confidently distributed varies widely with the varieties and also with the character of the seasons during which they are tested. The introduction work with grains, which has been carried on more extensively than any other one line, may serve as an illustration. During the first year small plats are grown at the testing stations or at the various cooperating State experiment stations. No seed is sent anywhere save to these places. The behavior of the plants is carefully noted as to quality and quantity of the crop, as to resistance or lack of resistance to disease and drought, and any other points that would affect the profitableness of the variety. The seed from these plats is carefully saved and planted the second year on a larger scale; and, besides this, if the variety has given marked indications of value, seed is sent to a few carefully selected cooperating farmers. The observations of the first year are repeated, and, if the variety makes good the promises of the first season, a larger quantity is sent out the third year to a number of cooperators, and, besides, the seed is planted on an acreage basis on our own testing grounds. At the close of the third year the reports of those who have received seed are compiled, and if the results are favorable the variety is declared ready for distribution and a quantity of seed is secured.

At the conclusion of the testing work, note is made of the area over which the variety has proved valuable, and, as applications come in through Senators, Representatives, and Delegates in Congress or direct to the Department, the seed of this variety is sent out to farmers living in that area. In the case of a new fruit a much longer time must necessarily elapse before results can be secured. The scions or buds are sent to reliable cooperators for fruiting tests in comparison with standard varieties of the same kind. This requires from three to six or more years, after which, if a given variety proves valuable, further time is required for the propagation of sufficient material for distribution. In all such cases the valuable kinds are put into the hands of reliable nurserymen as soon as possible, because it is thought that,

after the variety is in trade, this Office can better devote its time and energies to new work than to continue the propagation and distribution of varieties that may be obtained in the trade.

In some cases, of course, special measures are necessary to establish an industry. This is the case, among many others that might be cited, with the date palm, the Japanese matting rush, and also with new vegetable and salad plants which are wholly unknown to American consumers. The date is a slow-growing, long-lived plant that can not be top-worked or budded like an apple or orange tree. If a worthless variety has been used to plant a grove the planter will wait five or more years and expend probably not less than a total of \$10 per tree only to find that his grove is worthless. On the other hand, this culture is so peculiarly adapted to our southwestern arid region, and the annual importation of dates is so considerable, as to justify a heavy expenditure on the part of the Government to assist in establishing this industry. Consequently, a special garden is maintained at Mecca, Cal., and a large number of suckers have been imported for the two cooperative gardens in Arizona. As the varieties fruit, it will be possible to determine which give good results in the United States, and the natural increase from these trees, though slow, will assist in building up the industry. This will require many years and much money, but it is the only way to carry on this part of the work.

We need not be troubled about a market for dates. If we can produce the fruit the market will be found ready. In some cases, however, this is not so. To some extent a market had to be made for macaroni wheat, especially as a bread wheat, and such new vegetables as the udo and chayote will not sell at present, even if truckers should grow them. In such cases this Office arranges to have a quantity grown at Government expense or by a cooperator, who is willing to take the risk and who can induce the stewards of prominent hotels to put the new vegetable on the menu. If the new dish meets with the approval of the guests it is necessary to provide a continuous supply, so that the favor once gained may not be lost. In this way, if the new thing has real merit, the demand will gradually increase, and if the supply keeps pace with the demand a new culture may be permanently established.

A special garden has also been established for the matting grass. This being a new industry, it will be necessary to study out for the United States the methods of propagation, fertilization, etc., required for this plant. If it succeeds, the abandoned rice fields of the Atlantic coast will once more be profitable. The methods employed must be adapted to the requirements of each case.

FORAGE-CROP WORK.

While the important line of cereal introductions is still conducted on the cooperative plan, the equally important work of introducing and distributing grasses, clovers, and other forage crops is carried on wholly by this Office and forms one of the important divisions of the business. Some of the best work ever done in seed introduction has been in the line of forage crops. With the revival, in 1897, of interest in the introduction of crops from abroad this was one of the first matters to receive the attention of the Secretary of Agriculture, and he then sent Professor Hansen to Asia to get seed of the hardy Turkestan alfalfa. The relatively slow progress of this variety, though it was of undoubted value under certain conditions, illustrated one difficulty always to be looked for in the work with new varieties—especially of field crops—that is, the difficulty of getting good seed. Largely because of the uncertain and unsatisfactory supply of seed from abroad and the total absence of a home supply, the spread of this variety lagged, and it was found necessary to distribute the second consignment of seed in such a way as to do something toward establishing a home supply. The method adopted in this case had, therefore, to be somewhat different from that usually followed, and enough seed was sent to each individual to plant from 2 to 25 acres, and contracts were made by which this Office controlled the seed produced. In the case of most forage crops, the course pursued with all introductions is followed, and often unlooked-for success follows what is thought to be merely a routine distribution.

GENERAL DISTRIBUTION.

In its warehouse the Office keeps a supply of seed of such of the standard forage plants and grains as are considered worthy of wide distribution, and to this list is added from time to time some new variety which has been tested and found valuable for a given section. The seeds of all leguminous crops are inoculated with nitrifying organisms in accordance with the methods discovered in the Laboratory of Plant Physiology of the Bureau of Plant Industry, and for this branch of the business drying machinery and cleaning mills of various sorts are required, so that the seeds may be sent out in the best possible condition. The constantly increasing number of requests for seeds of forage plants and grains received from farmers all over the country, many of them coming through members of Congress, necessitated the adoption of some definite position in regard to this work. The object being to accomplish the greatest good from such distribution, it is important to distinguish between idle curiosity, a mere desire to get seeds for nothing, and a genuine wish to try a new crop. So far as practicable, seeds are sent only to persons who will make a

report, even if the report be one of failure. For this work the United States is districted, and the Department's experts select the new or valuable forage and grain crops that should be distributed in each district. Of the varieties so selected, preparations are made to send one or more to any responsible applicant, according as his correspondence may indicate that he can profitably use one or several kinds. As the final tests of new varieties are completed, those sorts that prove valuable will be added to the distribution list. The system which has been organized will eventually, it is hoped, result in the establishment of a corps of good cooperators throughout the United States, and these men will make the final tests of new sorts and assist materially in the introduction of the crop.

SEED GROWING.

Not only is the whole subject of seed growing closely related to this work in a general way, but the establishment of a new seed-growing business will add to the plant industries of the country and is therefore directly in line with the work of this Office.

One of the branches of seed production which it is most important to establish in this country is that of sugar-beet seed. The United States is rapidly becoming a great beet-sugar producer, and yet up to within a few years it was said that we could not grow sugar-beet seed. The best interests of the beet industry, however, demand that we be independent of Europe for our seed and that seed shall be grown for our special conditions. Besides this, the industry itself is worth about half a million dollars a year.

This Office has undertaken, therefore, to do its part in establishing this industry and has been at work for three years developing select strains of pedigreed seed which might serve as a foundation for the production of choice commercial seed. Such seed as has been produced by growers has been purchased and distributed in order at the same time to determine its value and to introduce the American seed to factories. There is no doubt that this industry will be established in due time.

Attention is also being given to the matter of growing flower and field seeds, the latter especially in cases where a new crop is introduced, for which home-grown seed will be wanted.

BULB GROWING AND TRIAL GROUNDS.

This Office is concerned not only with field crops and vegetables but also with cultures that interest the florist and ornamental gardener. So far as it has facilities, it will aid in the introduction of cultures of this class and in the development of new varieties.

There has long been a more or less desultory interest in the culture of Dutch bulbs—tulips, narcissi, and hyacinths—in the United States. Good bulbs of these kinds have been grown at various times but never in commercial quantities. This Office has undertaken to help along this industry by furnishing good stock in some cases and testing such American-grown bulbs as could be obtained. During the spring of 1905, blooms of Emperor narcissus from American-grown bulbs, forced in the Department of Agriculture greenhouses, graced the table of the President of the United States. An expert propagator has been twice sent to the bulb growers to assist them with advice as to methods and to see what was being done. Besides this help given to those interested in bulb culture, a trial ground for bulbs has been maintained on the Potomac Flats, near Washington, so that the chief varieties could be compared and the questions of fertilizers, harvesting, and handling under conditions prevailing on the Atlantic coast could be studied. Here many thousands of bulbs are planted, the stocks of the leading Dutch dealers being compared as to quality. (See Pl. XXV, fig. 2.)

EASTER-LILY BULBS.

Special attention has also been given to the production of the Easter lily in the United States. The bulbs of this lily, so important to the florist, are now imported, and a large percentage is usually diseased. If a place can be found in the United States where healthy stock can be grown and put on the market as early as the bulbs are now received from Bermuda, we shall solve a problem that will be worth much to the commercial florist. Substantial progress has already been made, full reports of which will be made public in due time. This is only mentioned here as one of the lines of work in which this Office is engaged.

VEGETABLE TRIAL GROUNDS.

In order to have first-hand information about the quality of the seed used for Congressional distribution, to keep up with the times in the matter of new varieties, and to do something toward systematizing the knowledge of varieties of American vegetables, trial grounds are maintained at the Arlington Farm and on the Potomac Flats, near Washington, and annual trials are conducted at various places in the United States. (See Pl. XXV, fig. 1.) All of this work is under the direction of Mr. W. W. Tracy, sr., whose long experience at the head of a large commercial trial ground and whose intimate knowledge of vegetable varieties especially qualify him for this work. At the Arlington Farm tests are made of samples of all lots of vegetable seeds distributed through Congressional orders. Here also the principal new varieties offered by seedsmen each year are tested. Besides the tests at Arlington, the trial-ground work looking to the preparation of



FIG. 1.—VEGETABLE TRIAL GROUNDS OF THE OFFICE OF SEED AND PLANT INTRODUCTION AND DISTRIBUTION ON THE POTOMAC FLATS.



FIG. 2.—BULB TRIAL GROUNDS OF THE OFFICE OF SEED AND PLANT INTRODUCTION AND DISTRIBUTION, SHOWING TULIPS AND HYACINTHS.



PACKETING SEEDS FOR CONGRESSIONAL DISTRIBUTION.

standard descriptions of all the recognized vegetable varieties is carried on at a number of places in the United States. Several hundred samples are planted on each of these tracts, so that the effect of different soil and climate may be noted for each variety. Careful notes are kept on these tests, and from the field descriptions that are made it is proposed to issue standard descriptions of all the recognized varieties as soon as possible. It is hoped that these bulletins may become useful handbooks for the seedsmen, especially for such as can not well conduct extensive trial grounds, and that in course of time the catalogue descriptions may be more unified than is the case at present.

CONGRESSIONAL DISTRIBUTION OF VEGETABLE AND FLOWER SEEDS.

The distribution of vegetable and flower seeds on Congressional orders is the largest single business this Office has to handle. The total number of packets put up and mailed during the fiscal year 1905 was 35,773,400. These were assembled into packages of five packets each, making 7,110,680 packages. The seed purchased to fill all these packets was enough to fill 28 cars of 30,000 pounds per car. The work of packeting begins about November 1 of each year and is completed before the end of the April following, the greater part of the work being done in a little more than four and a half months of this period. If we consider the work to extend over six months 500 packets are put up every minute of every working day of eight hours during that time. During much of the time as many as 1,000 packets per minute are put up.

The Secretary of Agriculture has pointed out that, while it is his duty to carry on the distribution in accordance with the wishes of Congress, the money expended for vegetable and flower seeds could probably be more profitably used for the introduction of new and rare seeds, such as grains, forage crops, cotton, tobacco, and the like. The large quantities of seed needed make it impossible to use the rare varieties even if there were a sufficient number of new and valuable varieties of vegetable seeds each year to fill the requirements. The number of really new and desirable varieties of vegetables that appear each year is extremely small, and the seedsmen of to-day are so thoroughly awake to the importance of introducing novelties that any new variety quickly finds its way into the trade.

It is only the standard varieties of vegetable and flower seeds, therefore, that can be used in the general free distribution. These are in more or less regular supply in the trade, and while the stocks vary in quality it is not difficult for those who understand the business and who know the sources of supply to secure each year first-class seeds at reasonable prices. This Office aims to get seeds of the best value. This, of course, does not mean the cheapest seed, as everyone knows

that the value of vegetable seed is not measured solely by the price. Vitality and trueness to type, or purity of stock, are of the utmost importance, and of these the latter can be determined only by a field inspection. Experts must therefore be employed who know the general character of each grower's stock, and part of whose business it is to visit the principal growers at least once each year to keep posted on their work and on the quality of their stock. The objects kept in view are (1) to obtain good seeds—as good as those sold by the best mail-trade houses (though they are no better, since the seeds are bought mostly from the growers who supply the seed trade); and (2) to get these seeds at the best prices.

The first step in arranging for a new annual distribution is to prepare suitable combinations to send into the different sections of the United States. For convenience the country is divided into four sections; and in order to send as wide a range of desirable sorts as possible into each section a number of combinations are made up, each of five kinds of vegetable seed, and each is so planned that it shall contain a good assortment.

These combinations are made up with much care and are the foundation of our work. The number of Senators, Representatives, and Delegates in Congress in each section being known, this number is multiplied by 12,000, the number of packages constituting a "quota," and the result shows the aggregate number of packages of all combinations needed for that section. The various combinations in a section are made equal in number, or nearly so, and when all the combinations are made the number of packets of each kind needed can be readily determined. This information is necessary before buying can begin, so that all the seeds bought may be purchased with a definite purpose.

The seed needed is secured in one of two ways: (1) It is bought outright, the seeds being on hand at the time of purchase, or (2) it is contracted for, the Department agreeing to pay a fixed sum for all seed of satisfactory quality delivered up to a given amount. All seeds offered are considered by a special committee which consults with the seed experts of the Bureau of Plant Industry and recommends purchases in accordance with the following considerations:

- (1) The known quality of the stocks offered.
- (2) The reputation of the firm making the offer.
- (3) The price, calculated upon delivery at Washington, D. C.

The price, though important, is never the first consideration; good seeds must be secured at a fair price, and "the best value" is the watchword in the work. The packeting of the seed is done by contract. A view of the room in which the work is done is given in Plate XXVI.