

Keeping Out Bad Immigrants of Plant World

Federal Horticultural Board Exercises Strict Quarantine Over Insect Pests in Plants, Diseased Potatoes, Trees and Shrubs—Danger in Cotton—Nursery Stock—Flowers—Personnel of the Board.

Special Correspondence WASHINGTON, D. C.

ALTHOUGH it may seem ridiculous to spend thousands of dollars annually to prevent one little moth egg that could pass through the eye of a cambric needle from entering the country, the machinery of the Departments of Agriculture, State, Treasury and Post Office are co-operating to keep out that little pest, the pink cotton boll-worm.

The same agencies are united to exclude by quarantine diseased potatoes, trees, shrubs and plants, and in so doing are accomplishing far more than one would think toward holding down the cost of living.

The "general staff" which conducts the defense against plant disease is known as the federal horticultural board and is composed of five high officials of appropriate bureaus of the Department of Agriculture.

All along the fertile valley of the Nile, where the luxuriant Egyptian cotton grows, planters are more worried over the ruinous work of the pink boll-worm in their cotton fields than they are over the greater devastation of the European war.

In the consternation caused by the loss of a fifth of their crop they have thrown up the barriers and are excluding all foreign cotton—an unnecessary measure against the pest, with its life cycle of destruction so firmly in possession of their fields; but directed against any further insect invaders.

The pink boll-worm was taken to Egypt from India, where its wretched family billions are still leaving their baleful impress.

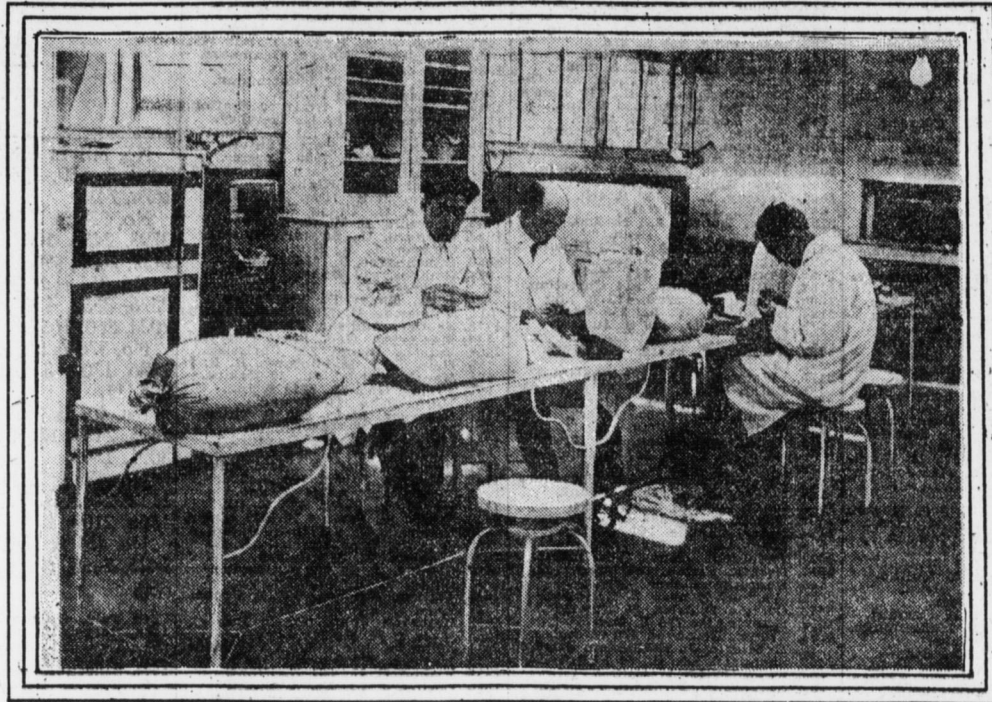
The tiny egg is deposited by the mother moth upon the growing plant leaf, which becomes the food of the larva emerging in six days from the egg. Thence it eats its way into the heart of the cotton boll, where in this secretive stage it spends about twenty days, until full grown, when it is nearly half an inch long.

It has been bred upon the cotton seeds, and when about to transform into the pupa and become a moth again it occupies the hull, from which it has devoured the kernel, and its place of living has given it the name "pink boll-worm."

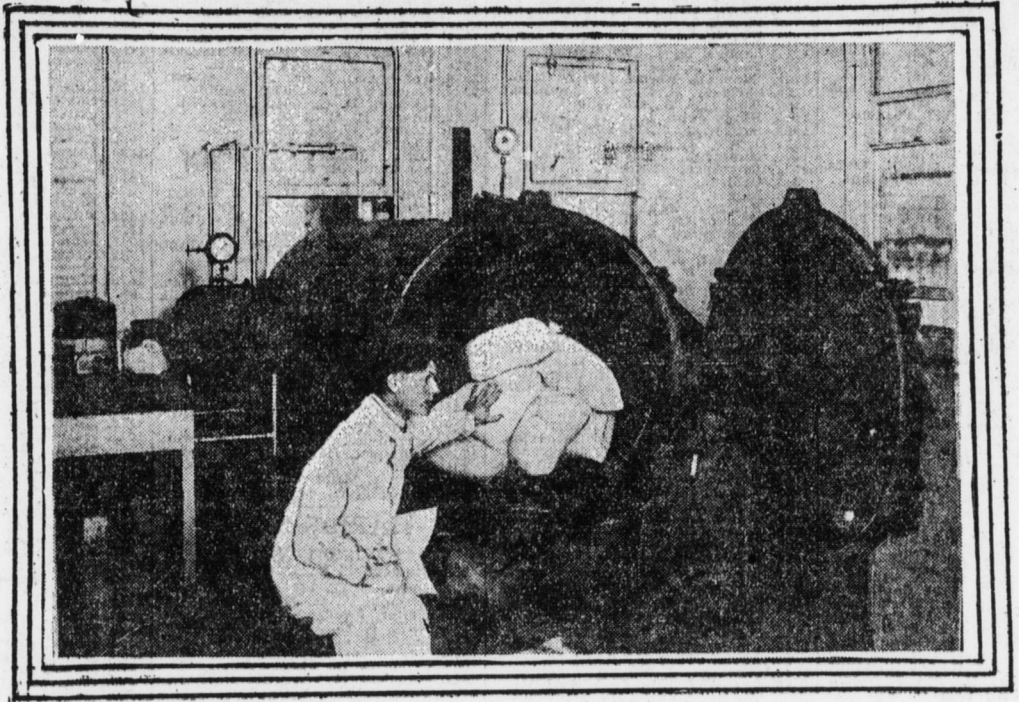
In about two weeks more the moth emerges, a fragile insect about three-quarters of an inch in expanse, now a grayish brown color with darker blotches. In three or four days it deposits its eggs and lives ten days or more, doing harm all its life and leaving behind it a multiplied evil succession.

While the annual yield of American Sea Island cotton, the best in the world, is by no means enough to make all the spool cotton, automobile tires and other articles requiring a grade better than that of ordinary upland cotton, it is somewhat surprising to learn that 200,000 bales of Egyptian cotton contaminated by the pink boll-worm are imported with impunity to the United States.

It was made possible by a system of fumigation originated by the board and worked out on a commercial scale by its expert, that every bale is disinfected before distribution. The cotton—a couple of hundred horizontal cylinders of heavy structural steel, hermetically sealed and then the air is pumped out until there is almost a vacuum within. Hydrocyanic acid gas is then admitted, and although the bales are compressed before shipment until they are almost as hard as blocks



INSPECTING SUSPECTED PLANTS FOR PESTS OR SIGNS OF DISEASE.



MINIATURE VACUUM DISINFESTING TANK IN THE EXPERIMENTAL LABORATORY; COMMERCIAL TANKS ARE BUILT AFTER THIS MODEL.

of wood, it penetrates the cotton so that all animal life, including boll-worms in every stage, becomes extinct in less than an hour and the cotton can be used without possibility of spreading infection to any mill for manufacture.

There are only four of these fumigating tanks in the country, one at each of the four ports of entry for cotton—New York, Newark, N. J.; Boston and San Francisco. They are under private ownership and are run as a business proposition, a charge being made for each bale of cotton sterilized. The plant at Newark was built for its owner's accommodation by one of the great manufacturers located there, as he uses vast quantities of the Egyptian product in making spool cotton.

Although privately operated, these tanks are under the closest government inspection. The bales must be left in the receiving chambers a certain time; the poisonous gas must be of a positive strength; the appliances and chemicals tested and every precaution must be taken to evacuate the gas without risk of life to the men operating the plant.

One shipment of the infested cotton seed—and it is believed to be the only one—is known to have entered this country, and that was before the quarantine was established. This lot was taken to Arizona, where a state quarantine was in force; the infestation canker having broken out in Great Britain, Germany and Austro-Hungary, the department issued its proclamation forbidding absolutely the importation of potatoes from other countries.

Another thing which the board is fighting is the importation of any nursery stock which carries the white pine blister rust, a tree disease destructive of both ornamental and forest pines.

This blight may be carried by all five-leaved pines from Europe, Asia, Canada and Newfoundland and all gooseberries and currants from Canada. Their importation is absolutely prohibited.

Cotton seed, except from some parts of Mexico; the seed of nutmeg pears from Mexico and Central America, live-



THE FEDERAL HORTICULTURAL BOARD. LEFT TO RIGHT—CHARLES L. MARLATT, CHAIRMAN; WALTER D. HUNTER, GEORGE B. SUDWORTH, WILLIAM A. ORTON, REUBEN C. ALTHOUSE, SECRETARY. KARL F. KELLERMAN, ALSO A MEMBER, NOT PRESENT WHEN PHOTOGRAPH WAS TAKEN.

ing canes of sugar, all citrus nursery stock (oranges, lemons, etc.), all Indian corn or maize from oriental countries and some less important plant products may not be imported at all, because each is likely to carry some disease which thus far has not broken out in our native plants.

It is just as reasonable as it is to prevent the landing of passengers from some port known to be full of such infectious disease as the bubonic plague.

These plant quarantines cover the

stock found in certain localities or certain diseased plants, but the oversight of the board is extended to regulate the entry of all woody and certain other plants and seeds imported.

Nearly all European and some other foreign countries maintain a rigid inspection service of their nursery stock, and importations from those places are allowed on permits issued to the importer by the department of agriculture. This involves a certificate by the foreign inspection service that the plants are free from disease and insect pests, whereupon they are admitted through the customhouses, and may be sent to any state in the Union.

The plants, however, are not free for delivery, for nearly every state maintains an inspection service which calls for the examination of a quarantine of seeds and plants. The results of the inspection are reported by the state examiners to the board, together with the action, which in case of serious pest or disease is the destruction of the plants.

This state inspection is generally very thorough, and may be enforced by the board, if not kept up to the standards by the states, together with the action, which in case of serious pest or disease is the destruction of the plants.

No importations of seeds or plants are permitted from countries which do not maintain an inspection service, except in very small quantities for experimental purposes, and that case they will grant a special permit upon which, after satisfactory federal inspection, they may be entered.

Formerly many seeds and plants, samples of cotton and the like, were sent in through the mails—a very convenient way for all concerned. The board, however, has, with regret, abolished the packages in the mail; and no matter how careful the senders were, the contents were liable to carry infections.

If the senders were careless, the danger was very great. Egyptian cotton seeds sent through the mails were found to be contaminated as high as 20 per cent with heads of many other plants.

Even for a total abstainer, a physician may order an exception for the patient's good, and there is no objection to this mailing order. Seeds and plants may be sent to the Department of Agriculture, for in that case they are examined by experts, and if diseased are at once cremated.

The board maintains on the grounds

of the department, near the east wing, a small laboratory, where diseased plants of all kinds are taken. It contains a miniature disinfesting tank, and is a most valuable adjunct.

The act creating the board provided that it should consist of five members, to be designated by the Secretary of Agriculture, and that they should serve without additional pay.

The Secretary appointed as his chairman, Mr. Charles L. Marlatt of the bureau of entomology; William A. Orton, vice chairman, of the bureau of plant industry; George B. Sudworth of the forest service; Walter D. Hunter, named as secretary of the board, and upon his shoulders and his assistants fall the details of the office and the execution of the directions of the board.

The effectiveness of the various quarantines, the satisfactory disinfesting of cotton, the agreements with foreign countries on special subjects, the closing of the foreign markets against plants, seeds and samples have not been attained without mature thought and action by the board, nor without co-operation on the part of the federal departments—the Treasury, through its customhouses; the Post Office, the Interior, through the bureau of standards, and the State, through its consular offices; nor has the plant inspection service of the states been lacking.

At first the restrictions were very embarrassing to the importers, but the board has recognized the situation, and they, in turn, appreciating the reasonableness of the demands, have accepted the situation, and are now exceptions are very willing to render all possible assistance in excluding anything which will injure the country's interest.

That this is not a small thing these figures from nursery stock importations tell. For the year ending June 30, 1914 (before the war), there were imported 7,800,000 fruit trees (6,800,000 from France), 1,830,000 fruit tree stock, nearly 2,000,000 rosebushes, 1,600,000 ornamental trees, 842,000 coniferous trees. Besides these many other plants not mentioned here.

One diseased lot means an injury to the United States, and the pink boll-worm, may destroy a staple crop, and the thin line of defense against these pests is reduced.

But I have studied the subject and there are ample quantities of nitrogen available from soft coal, lignites, and even peat to make all the explosives that could possibly be needed.

"Practically all the nitrates used in the United States are explosives for purpose of peace and for war are imported from Chile; and until the price of domestic ammonia is reduced a more abundant supply their importation may be expected. But in event of war of such character that Chilean shipments be stopped, there are ample quantities of nitrogen available from soft coal, lignites, and even peat to make all the explosives that could possibly be needed.

"If there should not, particularly at the outset, be enough nitrates for munitions and for fertilizer too, it must be borne in mind that little fertilizer is used by the American farmer in raising the staple articles—wheat, corn, rye, oats, hay and cotton.

"The gas that may be made from coking coal in the by-product oven is a large and cheap source of power when used with gas engines. It can be generated wherever wanted and applied to industrial use. In emergency this power can be converted into electrical power for the fixation of nitrogen from the atmosphere, as the Germans, in their peculiar situation, have found necessary, or for running munition factories.

"I have not attempted in this informal talk to detail the various processes or to discuss elaborately the costs and quantities of coal, coke, ammonium, steel, rate of ammunition consumption, or the many other items which are involved in supplying the country with nitrates in times of peace and of war.

"But I have given facts enough to show that the coal-coking by-product oven will produce all the nitrates which may be needed in time of peace for agricultural purposes, and that if war should befall and foreign supplies should be cut off, they could be made in emergency to increase their output to any desired extent, even through a war protracted many years."

United States Must Preserve Nitrates or Be at an Enemy's Mercy

Nitrates Necessary in Making of Smokeless Powder and High Explosives—In Case of War United States Might Be Denied Shipments From Chile—The Remedy a Plant to Fix the Nitrogen of the Atmosphere—Congressional Appropriation of Twenty Millions for a Fixation Plant—A Talk With a National Authority on Production of Nitrates.

Special Correspondence WASHINGTON, D. C.

SHOULD the war come to the United States, and the powder and explosives now on hand—and they will not last long against a powerful enemy—are exhausted, the army, if there be any, would have to fall back upon the black powder of the civil war.

The country would be utterly at the mercy of the invader, because there would be no nitrates with which to make smokeless powder and high explosives. The first care of an enemy strong enough to make a landing would be to stop the shipping of nitrates (saltpeter) from Chile.

The military experts and the scientific bodies organized for preparedness have seen this danger, and the last Congress, in alarm, appropriated \$20,000,000 to erect, if the President so decides, a plant to fix the nitrogen of the atmosphere, that from the very element which sustains life may be taken the substance which is death's instrument in Europe.

More power for a fixation plant which

will turn out in the form of ammonia enough nitrate for use in war is required than that furnished by the consolidated waters of the great lakes tumbling over Niagara. The cost of operating such a plant is enormous; nevertheless it must be met, unless some better way of securing the indispensable nitrates can be found.

At the instance of the War Department, Director Van H. Manning of the bureau of mines has considered it well worth while to dispatch the bureau's



DR. J. W. TURRENTINE, Chemical Engineer, Department of Agriculture. (Photo by Harris & Ewing.)

chief chemist, Charles L. Parsons, to Europe to investigate how the warring nations secure nitrates for their explosives.

In spite of the quantities of explosives used on the thousand miles of battle-front, less saltpeter from Chile is passing through the Panama canal to the allies than did during the first year of the war, and the scientists have found out the reason.

Dr. Parsons is now in London, and he expects to visit France, Italy, Norway and Sweden. He is not going to see what the allies are doing, but how

they are doing it, for he knows that the gas from the nitrates is used in fighting by means of by-product ovens, which save thousands of tons of nitrates otherwise wasted in making many millions of tons of coke from soft coal.

The Germans, however, cut off from foreign nitrates, have augmented their supply by erecting a fixation plant said to turn out ammonia at the rate of 140,000 tons a year.

It is generally supposed that Germany, before the war, obtained most of the ammonia used for explosives from Chile, and that nearly all the nitrates which came as a by-product from coal were used to make fertilizer. Owing to the relatively small farming area of that country, high cultivation is necessary to make the ground yield crops that will feed the population while the blockade continues.

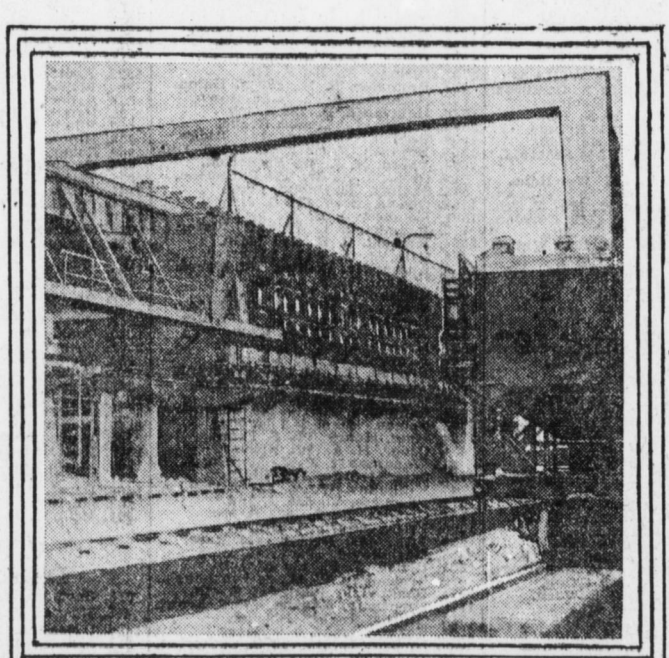
But all the nitrates had to be used to manufacture cannon food, and there was none left for the crops of 1913; that is why they fell off. The fixation plant filled the deficit; that is why the crops of 1914 have been plentiful.

To obtain an accurate statement of the nitrate situation recourse has been had to one of the experts of the Department of Agriculture, Dr. J. W. Turrentine, one of the national authorities on the production of nitrates, although he is more interested in seeing it used for agriculture than for war.

His training and his study of methods and apparatus have made a chemical engineer, rather than a laboratory chemist, out of him. He has studied all known sources of nitrates, and has told how to obtain from domestic sources an ample supply for all purposes, namely, by the oxidation of ammonia produced as a by-product in the process of coking bituminous coal, as one starts a fire of soft coal in an open grate," said he, "at first coal gases are given out; the coal turns a dull black and settles into a mass. That mass is coke—soft coal without the gases and volatile matter.

The gases, which here are the important thing, contain ammonia, benzol, toluol, coal tar and other valuable things, which may be recovered as by-products from the coking process.

"Coking soft coal frees it from these gases, gives it many of the desirable qualities of anthracite and is a pre-requisite for its use in the blast furnace in the reduction of iron ore. The mistake must not be made, however, of supposing that coke is only valuable for making iron and steel, for as a matter of fact the potential energy of soft coal



A NEST OF BY-PRODUCT COKING OVENS. BY THEIR USE THE GAS FROM THE COAL MAY BE CONVERTED INTO NITRATES.

is increased by approximately 20 per cent by utilizing the gas and the coke separately.

"In this country during the past year about 75,000,000 tons of soft coal were converted into 55,000,000 tons of coke at a loss of the greater part of the difference between these quantities.

"One of the craziest processes of national waste has been that of letting the gases in coke-making go up in smoke from the old-fashioned beehive oven; for thereby during the past twenty years by-products of the value of hundreds of millions of dollars have been wasted.

"The primitive method of making coke was to dump into an oven, from its shape called a 'beehive,' a charge of three tons or so of coal and burn it with restricted air until the gases were

driven out of the oven top and wholly lost. The first step taken toward economy was to conduct enough of this escaping gas in the adjacent beehive to warm up its charge of coal.

"Although Germany, England and France have been using them a long time, it was not until a few years ago that American engineers introduced here by-product ovens by which all the gas given off in the coking operation is conveyed to tanks or holders, such as may be seen at any municipal gas plant and thence utilized.

"The by-products from these gases consist of coal tar, from which the Germans make the valuable aniline dyes and which is largely used for road building.

"From this gas American manufacturers also get a supply of illuminat-

ing and fuel gas sufficient to supply large communities, and they are actually doing so in several parts of the country. They extract benzol (56,000,000 gallons in 1913), a substitute for gasoline, only the more powerful, an antiseptic, and a most powerful antiseptic, in connection with nitric acid, is used to form the much-dreaded nitroglycerine, the explosive charge used in projectiles.

"But the by-product of the most interest to us is ammonia, which when oxidized under the proper conditions gives the indispensable nitric acid for explosives, and, after treatment with sulphuric acid, produces the sulphate ammonia of the fertilizer. Thus from the coke oven we get nitric acid and benzol, the two essentials of the most diabolical explosives known.

"While statistics are uninteresting, they are the shortest way and, therefore, the best of telling some facts, so I am using these figures to show the growth of the coking industry and the relative growth of the by-product recovery of ammonia, only the more powerful, an antiseptic, and a most powerful antiseptic, in connection with nitric acid, is used to form the much-dreaded nitroglycerine, the explosive charge used in projectiles.

"In 1900 the annual ammonia production of the United States by the coking process, expressed in tons of sulphate of ammonia, was 13,800 tons (3,400 tons of nitrogen). In 1915 it was 220,000 and the estimates for 1916 and 1917, based upon by-product ovens erected and ordered are, respectively, 224,000 and 376,000 tons. But this represents the ammonia product of less than one-third of the soft coal coked annually for the manufacture of iron. Applying this, as in an emergency, the government could do, to all coal coked would result in more than 1,000,000 tons a year.

"The coal which is coked, however, represents but a small portion of the soft coal used annually; and if there is such a demand for ammonia as to create a market, 'good business' will insist upon the coking of as much of this coal as may be required, for the coke has nearly all the fuel capacity which the coal had and is freed from the gas which makes it use undesirable in many places on account of dirt and smoke under combustion and gases which make it unsuitable for household and other uses.

"In war emergency the government could take over this entire production; it would prohibit the use of raw soft coal, or take other measures to compel the coking of all soft coal before final consumption. In taking this course it

would be procuring quantities of benzol or to discuss elaborately the costs and quantities of coal, coke, ammonium, steel, rate of ammunition consumption, or the many other items which are involved in supplying the country with nitrates in times of peace and of war.

"But I have given facts enough to show that the coal-coking by-product oven will produce all the nitrates which may be needed in time of peace for agricultural purposes, and that if war should befall and foreign supplies should be cut off, they could be made in emergency to increase their output to any desired extent, even through a war protracted many years."

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