

Creating an Agricultural World Order: Regional Plant Protection Problems and International Phytopathology, 1878–1939

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Beginning in 1878 with the International Phylloxera Convention of Berne, international conventions have sought to relieve national agricultural industries from two specific burdens. First, by defining phytosanitary practices to be enforced by national plant protection services, these conventions attempted to prevent the introduction of plant diseases and pests into national territories from which they were previously absent. Second, by standardizing these practices—especially through the design of a unique certificate of inspection—the conventions attempted to eliminate barriers such as quarantines affecting international agricultural trade. The succession of phytopathological conventions seemed to epitomize the coalescence of an international community against agricultural pests. What actually coalesced was bio-geopolitics wherein plant pathologists and economic entomologists from North America and the British Empire questioned the so-called internationality of the environmental and economic specificities of continental European agriculture, embodied in “international” conventions. Although an international phenomenon, the dissemination of agricultural pests provided opportunities for cooperation on a strictly regional albeit transnational basis that pitted bio-geopolitical spaces against each other. This article retraces the formation of these spaces by analyzing the deliberations of committees and congresses that gathered to define an international agricultural order based on the means to prevent the spread of plant disease and pests.

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IN THE LATE NINETEENTH AND early twentieth centuries, national governments multiplied the number of quarantine laws and inspection regulations governing imported agricultural commodities. Because commodities acted as a vector for the spread of agricultural pests, they were easy targets for politicians, who forbade the entry of certain plants to protect the growth of national industry, while invoking phytosanitary purposes. Not only did these restrictions hinder the circulation of plants on the world agricultural market, their multiplication and heterogeneity increased the workload of exporters willing to meet the desiderata of importing nations. Furthermore, countries with plant protection services had to diversify their certification and inspection practices to ensure the sanitary state of consignments sent abroad, at the risk of having their crops refused. As the director of the Horticultural Branch of the Board of Agriculture (England) observed in 1914: “It is not only the fear of new diseases, but the fear of fresh legislative restrictions which has given the movement in favour of international action so great an impetus.”¹

Between 1878 and 1939, in an effort to counter this regulatory confusion, numerous countries negotiated and ratified a series of international conventions to prevent the worldwide spread of plant diseases and noxious pests detrimental to agricultural crops. These conventions sought to relieve national agricultural industries from two burdens: first, by defining the phytosanitary practices to be enforced by national plant protection services, they attempted to prevent the introduction of agricultural pests into national territories from which they were previously absent; second, by standardizing these practices—especially through the design of a unique certificate of inspection—the conventions attempted to facilitate the circulation of plants and agricultural commodities and eliminate barriers affecting international trade.

The creation of these conventions can be seen as the culmination and integration of three interrelated internationalization processes. First, transportation improvements expanded international trade and facilitated the exchange of agricultural and industrial commodities between countries from the second half of the nineteenth century onward. This was particularly true of the grain and meat trades, as New World countries possessed large operations that produced sizeable excesses for export to European countries. Although this “European grain invasion”

incited a wave of protectionist tariffs in the 1890s, certain countries preferred to rely on the free trade of agricultural commodities to promote their own agricultural production or to supply their growing urban populations with cheap food. This was especially true of Great Britain, which resisted implementing tariffs or imperial preferences on its dominions for fear of a price increase of foodstuffs.²

Second, this increase in international trade accelerated biotic exchange: the deliberate introduction and acclimatization of exotic plant and animal species, as well as the accidental distribution of microbes, insects, and other pests. The exchange of agricultural pests had been going on for centuries, but the intensification of agricultural production made its detrimental effects more visible and less tolerable; pests could destroy a single crop cultivated over a large territory, such as when European countries experienced the potato blight during the mid-1840s. The ecological and economic vulnerability of monocultures and a wave of accidental introduction of pests in the last quarter of the nineteenth century prompted national and local governments to enact regulations and quarantines related to foreign plants.³

Third, 1880 to 1914 was a key period in the internationalization of science. International scientific congresses found a stable basis and established bureaus such as the International Associations Union and the International Organization of Intellectual Cooperation to supervise and coordinate their organizations. In the case of crop protection, scientists from different disciplines and countries agreed to meet on a regular basis to define and recommend measures for the development of research and its application. From 1891 onward, phytopathologists—scientists studying plant diseases and noxious bugs in agriculture—participated in international congresses of agriculture, forestry, entomology, and botany to further international cooperation in their fight against agricultural pests. In these forums, they discussed the international dimensions of plant protection problems. Realizing the limited effectiveness of control measures applied in the field after the introduction of a foreign pest, they saw the need to implement preventive measures at an international level to stop the initial dissemination. Furthermore, they feared that the illegitimate use of quarantine regulations (i.e., for economic protectionism) might undermine the authority they enjoyed through their nascent expertise in the agricultural sciences. They therefore pressed for the enactment

of international plant protection conventions to deal with a problem of international dimensions.⁴

Although these three phenomena were far from new, their intensification and interactions at this time suggest that the conventions epitomized the coalescence of an international economic, biotic, and scientific community. In fact, what actually coalesced was a bio-geopolitical order within which scientists from North America and the British Empire questioned the so-called internationalism of the environmental and economic particularities of continental European agriculture that were embodied in the conventions. Ultimately, these bio-geopolitical entities opposed the constitution of an international phytopathological regime promoted by the International Institute of Agriculture (hereafter IIA), the organization responsible for the adoption of international conventions on plant protection between 1914 and 1929.

Created in 1905 under the patronage of American, David Lubin, the IIA was a clearing house for technical information and statistics concerning agricultural practice, economics, and legislation. The institute's goal was to protect farmers, who possessed little means to confront the interests of the tradesmen and industrialists who dominated the agricultural economy. Among other things, Lubin considered that the possession of technical and statistical knowledge offered farmers an understanding of the world food supply and empowered them to better control their participation in the market. However, the institute quickly became an "organ of state" under diplomatic control. The number of delegates with agricultural training and experience decreased steadily. Nevertheless, the institute did collect and distribute information and deliberate on technical issues at an international level, unlike its counterpart, the International Congress of Agriculture, which deliberately adopted a European approach to agricultural problems.⁵

One of the concerns of the institute was that previous international conferences had been unsuccessful in making national governments act upon the resolutions they promoted. For Lubin, it was needful for governments to enforce, through effective endorsement, the measures and recommendations resulting from these congresses, and only a parliament of nations would possess the moral authority to ensure compliance in the different countries. In June 1905 delegates from some fifty countries met in Rome to create the IIA. By acknowledging the transformation of a

national market of agricultural commodities into an international one, as well as the necessary harmonization of commercial, legal, and technical practices for production and distribution, the delegates formed a coherent community of action. That expression of solidarity faded away when participating countries refused to relinquish their sovereignty over agricultural matters in the institute's final constitution. Thus, the document declared that national control over agriculture prevailed over international agreement. This political and diplomatic independence would resonate in ecological terms during the discussions on crop protection.⁶

From its inception, the institute addressed problems related to plant disease and destructive pests because these agricultural scourges penetrated the world market through the plants that carried them. Unfortunately, national phytopathological regulations promulgated to prevent their introduction—especially quarantine laws—hindered the world trade of plants and agricultural commodities. In that respect, Article 9 of the convention of the institute specified the responsibilities and tasks of the organization and its members in the event of an outbreak: the institute must inform nations of new disease infestations, indicate the infested territories, the extent of the outbreak, and, if possible, the control means.⁷

Construing crop protection as an international problem was a recent phenomenon. Traditionally, damages caused by pest outbreaks had been localized, except in rare instances that had led to multilateral agreements to attack phytopathological problems. One such instance was phylloxera, an insect accidentally introduced from the United States that destroyed the vineyards of France and threatened the wine-growing industry of other European countries in the 1860s. While many politicians and agricultural leaders presented the outbreak as a solely national problem, governments convened in Berne to agree on a course of action. In 1878 the International Phylloxera Convention (or the Berne Convention, as it was also called) established conditions under which plants would enter the international market. However, countries with little or no viticulture had minimal interest in the convention, which only reached out to certain European wine-growing countries: Austria, France, Germany, Hungary, Italy, and Switzerland. Hence, the Berne Convention addressed regional, entomological, and agricultural specifics; it only concerned a limited number of countries (others like Spain eventually adhered to the Berne Convention), a specific insect, and a few plant products from the vine.⁸

The convention devised a certificate that ascertained the sanitary condition of exported plants. However, this amounted solely to the absence of phylloxera, and plants infested by other pests or diseases could receive a certificate. Furthermore, despite the willingness of participating countries to implement a standard sanitary policy, the absence of uniform cross-border measures plagued agricultural exchange between trading partners. At their 1913 annual meeting in Gand, the International Professional Horticultural Union, for example, alleged that some nurserymen who had respected their own country's inspection and certification regulations had their merchandise rejected at customs when the importing country had recently enacted a quarantine law against another pest potentially inhabiting their merchandise.⁹

Criticisms of the phytopathological and organizational deficiencies of the Berne Convention limned future discussions on international plant protection. Ideally, the inspection and delivery of certificates should encompass any pest considered dangerous to the agricultural industry, regardless of the country to which the plants were to be exported. However, this ideal phytosanitary portrait had its own difficulties. The establishment of a uniform inspection and certification process needed to rest on a common definition of a phytopathological problem. Unfortunately, few countries shared the same agricultural enemies, and some that were destructive in one country could be harmless in another climate or in the absence of their regular plant host.¹⁰

Another problem centered on organization. Exporting countries could establish national plant protection services to inspect and certify the phytosanitary state of merchandise to be exported. But the efficiency of inspection activities depended on the enforcement of similar measures in neighboring countries. In these countries agricultural pests could be contaminating plants to be exported, without necessarily provoking visible outbreaks in the field. Since few countries possessed the resources necessary to organize the inspection and certification procedures for agricultural products, plant protection could be a financial burden or not attempted at all.¹¹

The Berne Convention's inability to address the big picture of controlling agricultural pests globally attracted the criticisms of scientists. From 1889 onward, many agricultural researchers had promoted international cooperation in the fight against agricultural pests. In their home countries,

many of them had founded plant protection services both for inspection of products and experimental research. At various international congresses, they articulated the need to expand these activities and advance knowledge through international collaboration. One of most vocal proponents was the Swedish phytopathologist, Jakob Eriksson (1848–1931). Eriksson regretted that research conducted in different national research institutes rested on specific experimental and ecological settings not amenable to a comparative framework and proposed the establishment of an international center of scientific research. The Dutch phytopathologist, Jan Ritzema-Bos (1850–1928), however, thought that the pursuit of plant protection research in a single institute would only worsen the situation by singling out one environment. Instead, Ritzema-Bos recommended the creation of an international network of scientific stations located in every country where experiments could be conducted according to a common research program.¹²

At congress after congress, scientists reiterated the need for international collaboration on scientific and legal matters. Their opinions diverged when they discussed the extent to which research should be centralized, the need to take into account local conditions, and the relationships between research and control measures. Nevertheless, their propositions had one common denominator: they were all critical of the absence of a uniform response to the threat posed by foreign pests and of the inspection and certification measures initiated by the Berne Convention. Phytopathologists were fully aware that diseased seed and plant products exported from infested areas extended an outbreak and that measures to prevent the importation of such products were necessary. Yet the lack of a common definition of the phytosanitary problem hindered the possibility of an international phytopathology; a situation that confronted the horticulturists, scientists, and politicians working to bring about a pest-free agricultural environment.¹³

These propositions gained momentum in the wake of the founding of the IIA, mandated to target plant diseases. Louis Dop, the French delegate to the IIA and its vice president, submitted a plan for international cooperation to the International Congress of Comparative Pathology in October 1912. With the support of the French government, Dop organized a conference in Rome—where the IIA was based. The institute gathered thirty-two countries to discuss the scientific and commercial

dimensions of crop protection, possible means of cooperation for scientific exchange, and the standardization of inspection practices. Among the unrepresented “sovereign states” were New World countries such as the United States, South Africa, Australia, and New Zealand.¹⁴

The absence of the United States partly resulted from the internal politics of the USDA. At this time, the Bureau of Entomology was engaged in a turf war with the Bureau of Plant Industry, home of American plant pathologists. In Europe, damage to crops amounted to “plant disease,” whether caused by pests or micro-organisms. European countries called their plant protection services “phytopathological organizations,” and international meetings dealing with pests and plant diseases, “phytopathological” conferences. In contrast, the USDA allocated jurisdiction based on causative agent. The chief of the Bureau of Entomology, L. O. Howard, complained about the tendency to merge economic entomology with plant pathology under one heading that benefited only the latter. Plant pathologists contemplated participating in the 1914 International Phytopathological Convention in Rome, but under Howard’s influence, the United States sent no delegates and pressed “that future congresses of the same nature should be termed congresses of economic entomology and phytopathology.” In the aftermath of World War I, Howard again drove home his point at international conferences and convinced the IIA to change the name of its Commission of Experts on Plant Disease, a term he found “too narrow with regard to the importance of its missions,” to the Commission of Experts on Plant Protection.¹⁵

As for the other New World countries, the recent establishment of the Imperial Institute of Entomology in 1912 had convinced phytopathologists from some of the British dominions that their views on such technical matters would be adequately represented by the delegates of Great Britain. Their immediate interests laid more in the efficient workings of the Imperial Institute, upon which they relied for the training of technical experts and the dispatching of information related to beneficial and noxious pests. Yet Canada and India sent their own delegates to the conference, as they had done at the General Assembly of the institute, while South Africa, fearing that the convention resulting from the conference would undermine the stringencies of its regulation, refrained from participating.¹⁶

Negotiations at the 1914 convention revolved around several issues, but the most debated topic was inspection and certification processes. Discussion to create a uniform phytosanitary certificate proved to be especially contentious since it had to rest on a common definition of phytopathological problems that would, in turn, delineate the basic activities of national plant protection services. Considered the stepping stone of an international phytopathological agreement, the phytosanitary certificate needed to be more encompassing than the one issued under the Berne Convention. However, increasing the number of pests considered would hinder trade and defeat the institute's purpose of improving the production and distribution of agricultural commodities. In addition, if the conference was to elaborate a list of diseases for which inspection was to take place in every country, the convention was bound to failure because such a list contained too much fodder for dispute.¹⁷

Delegates came up with a rubric to create a uniform certificate, flexible enough to accommodate both the commercial and safety requirements of all countries. Each country had to provide a list of the diseases and pests that it wished to avoid; foreign inspectors granted certificates to plants exported there after having looked specifically for these pests. The list had to exclude cosmopolitan pests, because they were present in all or many countries, and those that could not thrive in the environment of the importing country. In that respect, the design of the phytosanitary certificate at the international level paralleled a regulatory dynamic at the national level. Initially, whenever a new pest threatened local agricultural production, governments adopted laws that targeted a specific species and usually bore its name, such as the Colorado Potato Beetle Act or the San Jose Act. More recently, however, they had moved to enacting general framework laws—titled, for example, the Destructive and Insect Pest Act in the United Kingdom and in Canada—that dealt with the problems of agricultural pests in general. The model phytosanitary certificate possessed similar flexibility, as it did not target specific diseases or species, but the general health of agricultural products. Based on a standard certificate that would remain uniform worldwide while addressing specific plant protection problems, international phytopathology could therefore accommodate the bioregional specificities of crop protection without burdening the world trade of agricultural commodities.¹⁸

The Rome Convention of 1914 provided a framework for the requirements of pest-free agricultural world trade. All adhering countries were to set up a phytopathological service. The objective of these entities was to implement measures to prevent the diffusion of agricultural pests, at home and abroad. They would achieve this through research and the enforcement of legislative and administrative measures, notably the inspection work needed for the phytosanitary certificates and also the local suppression of pests that could infiltrate the international trade of agricultural commodities. The service was to survey the health of horticultural products grown in nurseries, gardens, and greenhouses and exported on the international market and deliver phytosanitary certificates. Therefore, the convention specifically excluded field crops and vines—the latter being covered by the Berne Convention. Adhering states also recognized the authority of the IIA on all issues related to plant protection against agricultural pests.¹⁹

Thus, by construing phytopathology as a world science and plant disease as an international agricultural phenomenon, scientists and diplomats of different countries designed uniform inspection practices to guarantee the absence of plant pests and inspire trust: two conditions necessary for the elimination of plant quarantines from agricultural trade. More specifically, any international agreement needed to compromise between opening commercial boundaries and providing a barrier against pests and plant diseases, although the first of these requirements was more important in defining phytopathological problems in 1914. The Rome Convention required countries to relinquish part of their sovereignty and to adopt an international certification system whereby plants certified to be disease-free were granted a kind of passport to circulate freely and enter any country.²⁰

While the convention, in the words of one British delegate, established “the principle of international action . . . and of international unity,” plant protection problems needed to be first addressed at the national level. However, tensions between these levels of phytosanitary interventions weakened the possibility of dealing effectively with a phenomenon that transcended political boundaries. That became evident during the conference, when delegates from the Netherlands and Germany successfully contested a clause requiring a national service to declare every outbreak in its territory. They argued that the more organized a phytopathological

service, the higher its possibilities of discovering such outbreaks and setting off an alarm in the agricultural community. This clause amounted to a disincentive for the thorough inspection work necessary to foster trust among trading partners.²¹

Another issue of sovereignty that shook the foundations of international phytopathology was the ratification and enforcement of plant protection conventions at a regional level. A prime example was the Berne Convention. During the 1914 conference, German delegates insisted on maintaining the certification system born out of the Berne Convention, despite the fact that it concerned only a few European countries and that the new international certificate rendered it obsolete. Other regional agreements brought together neighboring countries that shared the pragmatic outlook of commercial partners. In May 1913—one year prior to the International Phytopathological Conference in Rome—Uruguay, Brazil, Chile, and Argentina had co-founded *Defensa Agrícola*, an organization concerned with the protection of the common interests of these countries against agricultural pests. Each country agreed to set up a phytosanitary police for the inspection and the issuance of certificates for the exportation and transit of plants among the trading partners. Sweden, Denmark, and Norway set up an Inter-Scandinavian Conference to deal with their common plant protection problems. These regional agreements closely resembled the International Phytopathological Convention of 1914, and all affirmed that their provisions could not be superseded by an international agreement. As a result, some countries questioned the relevance of acceding to an international agreement that would increase the administrative burden, especially given the preeminence of local trade circuits in the agricultural commercial balance. Thus, regional agreements fostered the multiplication of certification systems, and as such, added another layer to the initial problem that an international convention aimed to overcome: local legislative restrictions.²²

Scientists also raised their voices to undermine the establishment of a plant protection system at the international scale. Initially, European and North American scientists condemned the sole reliance on inspection and control measures to prevent the spread of diseases, claiming that strengthening and developing research, notably in the field of plant breeding, remained the safest means to limit the extent of outbreaks. Thus, they initially applauded the Rome Convention's association of

scientific research with administrative action. While economic entomology and plant pathology enjoyed a status never before seen on the international scene, phytopathologists soon realized that inspection services absorbed existing experimental stations and siphoned off resources otherwise directed at research.²³

More importantly, scientists condemned the knowledge base of the Rome Convention of 1914, targeting specifically its European bias. Immediately after the signing of the convention, the International Congress of Tropical Agriculture identified that bias, but it took three more years before E. J. Butler, an Imperial mycologist posted in India, provided a scientific and ecological basis for the criticism. The objections levied by Butler had various grounds, but his principal concern was the lack of consideration for the phytopathological problems of non-European nations.²⁴

Butler also stressed the limited effectiveness of the list of diseases that the convention required each country to draw up and diffuse to foreign inspection services. He invoked the variable virulence of diseases to emphasize the difficulty, for each country, of creating a coherent list, since plant pathogens produced different effects in different climates and agricultural environments. This problem of ecological variation of virulence took on a special distinctiveness when applied to the biogeography of trading partners of agricultural commodities. For countries whose flora and fauna were similar, it was easy to foresee the extent of potential crop damages in the event of the accidental introduction of a pathogen and to predict the behavior of a plant disease or a destructive pest previously absent from a national territory. Such a situation would facilitate the phytosanitary relationships between continental European countries, such as has been the case against the phylloxera, but would be less beneficial for other countries in Europe and the United States. Thus, by stressing the local specificities of phytopathological problems, Butler challenged the very possibility of an international and uniform phytosanitary policy.²⁵

This argument set the stage for Butler's second criticism. By drawing a distinction between the continuous and discontinuous spread of disease, he questioned the international relevance of the convention. In the British dominions and colonies, according to Butler, only imported nursery products that traveled across natural barriers such as oceans introduced exotic plant diseases and pests. For European countries, the

situation was completely different: the continuous spread of fungus spores by birds or winds proved a more difficult and exacting situation to control. Hence, these European countries generally accepted a possibility of minimal introduction, which the phytosanitary certificate informally guaranteed by only listing major agricultural threats.

Plant pathologists and economic entomologists in other British dominions and colonies used Butler's arguments to oppose the negotiation and ratification of international plant protection conventions on the grounds that they were only relevant for countries with contiguous territories. They also underlined the differences between the phytopathological conditions of temperate and tropical countries, claiming that the 1914 convention solely addressed the former. Yet, their concerns were also shaped by their national agricultural interests. Among other things, they lamented that the 1914 convention excluded field crops and other plant products grown on a large scale—industrial crops, among others—especially since horticulture, the main concern of the convention, represented a rather marginal part of their agricultural industry.²⁶

In North America, phytopathologists also used Butler's arguments to counter European scientists endeavoring to formulate a plant protection convention that would be agreeable to all. They rhetorically referred to "the biological basis of international phytopathology" to thwart any diplomatic efforts against the quarantines and restrictions on plant imports in force in their countries. The white-pine blister rust outbreaks and brown-tail moth invasions in the early twentieth century had revealed the ease with which foreign parasitic organisms could invade North America and had shown that the protection of North American agriculture required more than mutual trust and phytosanitary certification. Consequently, both nations instituted quarantines; Canada with the Destructive Insects and Pest Act in 1910 and the United States with the Plant Quarantine Act in 1912. The two countries contemplated prohibiting all plant imports, a goal they more or less achieved during the Great War.²⁷

In the United States, the institutionalization of plant quarantine at the federal level had followed a tortuous path, and its implementation still failed to prevent the introduction of foreign insects such as the European corn borer and the Japanese beetle. The Plant Quarantine Act of 1912 resulted from an administrative and legal battle that lasted for more than a decade, as economic entomologists and plant pathologists

first convinced congressmen of the need for interstate and international quarantines and then overcame other opposition to the bill's passage. Resistance was especially strong among nursery stock importers and horticulturists "who feared that a quarantine act would hinder their foreign import business," as well as state officials who opposed any hindrance of the "movement of home-grown stock between states." Having finally achieved a quarantine, scientists and administrators of the Federal Horticultural Board, in charge of the implementation and enforcement of quarantine measures, were unwilling to jeopardize it by allowing international organizations to cause breaches in their national quarantine system.²⁸

Opposition by US scientists did not mean the demise of international collaboration in plant protection. In 1912 the American Phytopathological Society passed a resolution that recommended the "importance of establishing closer international relations" and the exchange of investigators between Europe and the United States. In the expectation of an international agreement, US plant pathologists expressed their hopes "for improved and more uniform legislation for phytopathological inspection and control," although the chief of the Bureau of Entomology stressed in his official correspondence that: "For the present we do not care to bind ourselves with other countries in this matter of plant inspection and quarantine although we may do so at a later date." During the Great War, Americans welcomed European phytopathologists, who diffused their international message in the United States for lack of a proper forum in a continent under siege and in the hope of spurring a new dynamic in international phytopathology.²⁹

After the war, however, Butler's arguments fuelled North American opposition to international phytopathological conventions. At a joint meeting of the American Phytopathological Society and the American Association of Economic Entomologists in 1922, the chief of the US federal Horticultural Board, W. A. Orton, exposed the "biological basis of foreign plant quarantines" by separating "the problems of restricting parasites from foreign lands" from "the problems of preventing or delaying dispersal of pests already locally established." He further added that this important point was not acknowledged by the report of the last International Phytopathological Convention held in Rome in 1914, which made no distinction between contiguous and non-contiguous countries.

Orton further criticized the convention for excluding cosmopolitan agricultural pests whose diffusion in almost all countries had already happened, since the escape of only one organism could be detrimental and potentially financially devastating even if it was found to be inoffensive in its country of origin.³⁰

Yet, despite the insistence of US phytopathologists of the need to base plant protection policies on biology, Europeans faulted the US government for mingling economic and phytopathological motives in its quarantine legislation. Europeans were quick to notice that, in its most recent amendments of 1919, the Plant Quarantine Act (called Plant Quarantine Number 37) had as a general principle “to make this country independent of foreign supplies with the object of ultimately reaching a condition in which the entry of foreign plants will be limited to new plants and to such plants as are not capable of production in the USA.” For one Dutch nurseryman, American “growers who ask economic protection could not express better this purpose.”³¹

North American scientists further undermined the possibility of establishing an international plant protection convention at the first International Conference of Phytopathology and Economic Entomology in Wageningen in 1923. The Dominion Botanist of Canada Hans Theodor Gussöw echoed the position expressed by Orton and caused a great stir among the scientists, nurserymen, and public administrators of exporting countries. Gussöw, who had attended the 1914 conference, began his address by insisting on the need for “international co-operation and community of action against the spread of insect pests and plant diseases,” but he presented the whole issue in rather harsh terms:

Uniformity of laws governing the importation of plants and plant products seems to be the aim of many conferences nowadays: yet any law is promulgated in the interest of the country enacting it, and there should be no difficulty in making uniform world laws, providing that the world's requirements are uniform. There would be no difficulty in establishing fairly uniform laws in phytopathology, providing the conditions requiring laws are similar. But this is the point upon which opinions differ seriously.³²

Gussöw based his opinions on several points. Discussing the list of plant enemies necessitated by the Rome Convention, he claimed that

“such provisions may suit the case of contiguous countries having similar floral conditions. It does not meet the requirements of the countries of other continents.” He added: “Though our conditions may seem to be similar to your own, they are in reality essentially different. Ours are those of importing whilst yours are those of exporting countries, and the two interests necessarily clash.” Yet, cooperative action against plant diseases and pest legislation remained possible as long as it concerned countries with contiguous boundaries such as Canada and the United States, which had “developed the lines of defense which now protect the Continent of North America in its entirety.”³³

In their urge to expound the basis of their regulatory activities, North American scientists equated international phytoprotection with plant quarantine, an equivalence that the Europeans explicitly sought to avoid. Under no condition would they surrender their continental biota to foreign diplomats and plant inspectors. To North American importers of European nursery products who criticized the technical experts responsible for the severity of regulations, Gussöw replied in the words of Butler that: “Serious consideration has been given in America . . . to the certification systems offered us by Europe. Such systems may have their merits as far as contiguous countries are concerned, but as far as trade between continents is concerned, we fear that certification cannot possibly be a real and permanent protection.” Six months previous to the Wagenigen conference, Orton had invoked Butler’s category to naturalize distinctions between North American and European continental trade: “Plant quarantine policies and methods must be founded on nature’s laws governing the dispersal of parasites. The problems of discontinuous spread between countries separated by ocean or other natural barriers are therefore different from those of continuous spread in adjacent countries.” For North American scientists, international phytopathology simply entailed the exchange of scientists sharing ideas and visiting other countries to investigate *in situ* the conditions underlying disease outbreaks.³⁴

The 1914 International Phytopathological Conference was held just a few months before the outbreak of the Great War, and only a limited number of states—Spain and, after the war, Italy, France, Algeria, and Morocco—were able to effectively ratify the convention. After the war, a few other nations contemplated signing the convention (Japan, Brazil, Bulgaria, and Uruguay—the last three having not attended the

conference), but ten signified their intention not to ratify: Belgium, Egypt, the United States, French Western Africa, England, Scotland, British India, Mauritius, the Union of South Africa, Cyrenaica, and Italian Somalia. Others (Germany, Colombia, Denmark, Norway, the Netherlands, Romania, Sweden, and Switzerland) did not take any definite position on the question, while a few of them had not yet set up any phytopathological service.³⁵

In the wake of these diplomatic shortcomings and the scientific criticisms that the International Phytopathological Convention had spurred since 1914, the IIA reconsidered the issue of plant protection in 1921. By that time, however, world agricultural conditions had changed. A crisis of overproduction followed the years of prosperity experienced immediately after the end of the war. The ensuing economic difficulties in the rural world forced most national governments into stricter protectionist policies. In some countries, agricultural pests seemed an easy and affordable excuse to prevent foreign plants competing with local products. For phytopathologists such quarantine measures shook the scientific basis of international phytosanitary regulations. It was in this context that entomologists and plant pathologists held international scientific meetings, such as at Wageningen in 1923, and discussed collaborative projects on a regional or international scale. Considering the state of the world economy and the use of quarantine regulations to protect national agricultural industry against foreign importations, they also attempted to frame international regulatory discussions in such a way as to separate scientific and political issues and to maintain the independence of their expertise.

The fate of the 1914 convention and the animosity that it generated also convinced politicians, economists, and diplomats to convene interested parties in redefining the modalities of an international phytopathological agreement. In 1924 the IIA decided to organize a conference to revise the International Phytopathological Convention of 1914. The following year, delegates at the International Congress of Agriculture in Warsaw also recommended holding another phytopathological conference with a similar goal. In 1926 the institute set up the International Advisory Commission on Plant Protection to submit a new text to a new convention. However, phytopathologists from the British Empire and the United States remained skeptical toward the enactment of an international convention on plant protection.³⁶

While British delegates had welcomed the 1914 convention in the hope that “the hindrances to trade, which had in recent years grown up in so many countries, would be removed, and that a wide field for the development of English commerce in plants would be opened,” opposition at home from nurserymen and horticulturists and abroad from the phytopathologists of the dominions and colonies curbed their enthusiasm. Furthermore, on the basis of its experience trying to make regulations on plant imports uniform within the British Empire, Great Britain considered that “given the technical difficulties resulting from the diversity of flora and fauna and crops in different countries, any attempts to modify the 1914 convention were doomed to fail.” Therefore, it would contemplate a convention limited to European countries to regulate the continental trade of plants, while enacting uniform regulations for the European importation of plants from overseas outside the convention. The British Indian Empire reiterated its unwillingness to sign the 1914 convention for the lack of advantages that it might derive from it. Now posted to Kew Gardens, Butler stated that British Empire mycologists would not, as a body, endorse any proposal to relinquish their powers to impose severe restrictions on the free circulation of plants. The government of the South African Union decided not to participate in the conference because it considered that a convention regulating the traffic of plants could not meet the interests and needs of all countries. Underlining its distance from Europe and its exemption from diseases occurring in other parts of the world, Australia opposed a convention that prevented countries from protecting themselves against the introduction of agricultural pests by imposing measures not contemplated in the convention. Finally, Canada doubted the possibility of and the opportunity for a uniform international agreement that could encompass and include the individual exigencies of adhering states, especially for countries with non-contiguous boundaries.³⁷

As for the United States, Secretary of Agriculture Henry C. Wallace reported that the government appreciated the advantage derived from an interchange of scientific knowledge, but that the American delegates could not be authorized to modify any of the control measures enforced under the Plant Quarantine Act. “The purpose of this statute is by medium of quarantines to prevent the introduction and spread of insects and plant diseases which may become a serious menace to this country.

To accomplish this end there should be no restriction in the adoption immediately and without hesitation of that protective measure which is dictated by the biological facts involved, in so far as such facts can be determined." The "biological facts" were those expounded by Butler a decade earlier, which formed the "sound basis" of international plant protection. The secretary reiterated that the proper way to negotiate control measures entailed limiting the participants of similar continents: "Such a conference, if entered into by Canada and the United States, would doubtless serve a useful purpose, as should a conference participated in by the various countries of Europe, where they are separated by imaginary lines, rather than such geographical boundaries as exist between the two continents."³⁸

Despite these drawbacks, the institute gathered forty-six states, dominions, protectorates, and colonial governments at a conference in April 1929. Unlike at the 1914 conference, however, most (thirty) delegates were plenipotentiaries and were authorized to sign *ad referendum* the convention coming out of the deliberations. Thus, at the end of the conference, twenty-six countries signed the International Convention for the Protection of Plants; nine countries had ratified the convention by 1935, and four more had done so by 1939.³⁹

Many delegates regretted the absence of representatives from Germany, Great Britain, and the United States, and they deemed it necessary to obtain these countries' agreement. Consequently, they attempted to eliminate any restrictions on plant inspection and enlarge the convention's scope. For example, the 1929 convention extended phytosanitary measures to all plants and eliminated an article (Number 4) of the International Phytopathological Convention of 1914 that limited inspection and certification measures to nursery plants, thereby excluding cereals, seeds, potato tubers, and field crops. In another attempt to woo more signatories, delegates gave states the right to inspect imported plants, whether these bore a certificate or not. This breach of trust irritated delegates of the Netherlands and Hungary, who considered their phytopathological service flawless. According to them, it questioned the value of the phytosanitary certificates.⁴⁰

Certain delegates wished to broaden the scope of certification, suggesting that surveillance encompass all crops and not just those grown for exportation. Delegates from Egypt and the Dutch Indies complained

that they lacked the proper means for accomplishing this, while those from Chile, Norway, and Switzerland, which all possessed well-organized services, considered it practically impossible to control all nurseries and agricultural fields, especially those that supplied the local market. But for those who wished to eliminate exceptions, the inclusion of all cultivated products in the inspection system was the only way to limit the possibility of exporting infested plants. To attain this goal, some claimed, countries needed to exercise a greater control of local outbreaks that could spread to export crops. Thus, inspectors would be in a position to claim that all plants were pest-free and that they had been grown in a pest-free environment. But not all delegations agreed on this, since many lacked the appropriate means for inspecting export crops, let alone crops for internal use only.⁴¹

At the heart of these debates was many scientists' belief in the value of the phytosanitary inspection certificate. To keep the certificate at the center of an international system of plant protection, the 1929 International Convention for the Protection of Plants granted more autonomy to the importing country, while exercising more constraints on the exporting country. In other words, it made the inspection and certification processes more stringent and encompassing for the exporting country, but the importing country could ignore these efforts by inspecting every plant regardless of whether it bore a certificate. The basis of the consensus of 1929 differed markedly from 1914. To have a large number of countries accept a series of specific compulsory actions—not the least being the suspension of inspection of certified plants at the port of entry—the International Phytopathological Convention of 1914 limited its field of application to horticultural products. Under the International Convention for the Protection of Plants, all plants were inspected and certified. Additionally, the institute resolved that when states required certificates targeting specific diseases or pests, they would inform the IIA so that all countries could be notified. Finally, the institute acknowledged the role that regional agreements could have in international plant protection when it encouraged countries to target specific pests by local conventions, thereby underlining the fact that the terms of its own convention could be too broad. Thus, the 1929 International Convention for the Protection of Plants including many elements that the International Phytopathological Convention of 1914 specifically excluded, such as the

prohibition of specific plants, idiosyncratic certificates, quarantine, and inspection at the port of entry.⁴²

As a tool to connect diverse bioregions and normalize national policies on plant protection within the international sphere, the standard phytosanitary certificate did not succeed in garnering the support of the vast majority of countries participating in phytopathological conferences or in the international trade of agricultural products. Nevertheless, the forums that initiated the conception of the certificates led to the formation of a community that sought to limit the multiplication of plant quarantines, another preventive measure commonly used for crop protection. In the end, the certificate and the regulation of plant quarantines became complementary preventive measures for plant protection, even though their respective proponents always insisted on their incompatibility.

The International Convention for the Protection of Plants respected each nation's sovereignty and biota by allowing it to maintain a right to inspect and quarantine plant products or to prohibit their importation, temporarily or exceptionally, even if the shipments were granted a phytosanitary certificate. Although the potential inspection of certified plants at the ports of entry hindered the free circulation of agricultural commodities, the IIA claimed that adherence to international rules prevented the arbitrary refusal of imports. For an early proponent of international phytopathological regulations like Louis Dop, the immediate results were two-fold. First, every country adhering to the convention adopted measures that enabled a rational organization against the introduction and extension of plant diseases and pests. Second, the convention facilitated agricultural trade, thanks to guarantees offered by the surveillance of crops and their inspection in exporting countries. Such measures provided all countries with assurance concerning the sanitary state of imported plants and prevented importing countries from applying excessive requirements that might be interpreted as being prescribed for reasons other than the sanitary defense of crops.⁴³

By requiring that participating nations create a national inspection service and by outlining its basic duties, the promoters of phytopathological cooperation established a baseline for international plant protection. They also stimulated the nationalization of phytopathology, making the respect of national authority the fundamental principle of any convention. Ironically, this rendered the ratification of an international

convention more difficult. Countries were now in a position to define the specificities of their plant protection problems and voice their differences in an international forum, thereby contesting the political and ecological bias that had informed the 1914 convention.

From another perspective, it is possible to view these efforts as establishing an international phytopathology of a different type than the one foreseen by the promoters of the 1914 and 1929 conferences. Each country created an autonomous institution that was in charge of implementing phytosanitary measures such as inspection, certification, control, and extension. The conventions also provided the IIA with information on disease and pest outbreaks and their control, as well as on the importation and inspection of plants. It facilitated the accumulation of data from every country and the organization of an international observatory and intelligence service on plant diseases and pests. Therefore, while at a global level, international legal actions turned out to be of limited effectiveness in preventing the spread of agricultural parasites, the establishment of phytopathological services enabled practical action as well as the survey and the control plant diseases and pests at a local level.

While difficulties in arriving at an international agreement resulted from exclusive bio-geopolitical spaces based on networks of plant pathologists and entomologists as well as on the trade routes of agricultural commodities, the way these entities were formed went beyond the ecological basis of agricultural production and its scientific interpretation. Although it was repeatedly enunciated that “plant parasites and diseases have no respect for political boundaries,” it was clear that ecological divides were not enough to circumscribe the movement of these agricultural pests. As one Belgium entomologist observed in 1929: “While one admits that there exists little difference between the noxious fauna and flora of a similar continent, one also recognizes that the differences between parasites attacking the American crops and the European crops tend to dissipate as the two continents exchanged constantly and with great ease crop products.” Yet plant pests and diseases did respect geopolitical boundaries by way of commercial exchanges and the application of quarantine regulations, since their host plants were welcomed—or forbidden—in foreign countries. Thus, bureaucrats, scientists, and biota combined to form transnational communities that were defined according

to governmental plant protection practices, history of species introductions, and local conditions of agricultural production.⁴⁴

NOTES

1. This article is based on a paper presented at the Annual Meeting of the Agricultural History Society, Cambridge, Mass., June 15, 2006. I thank Nathalie Jas and Javier Lezaun for their comments on earlier versions and Amanda Dreyer for her research assistance.

A. G. L. Rogers, "The Phytopathological Convention of Rome and its Relation to Tropical Agriculture," *Transactions of the Third International Congress of Tropical Agriculture*, 2 vols. (London: John Bale, Sons and Danielsson, 1916), 1:125.

2. Kevin H. O'Rourke and Jeffrey G. Williamson, *Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy* (Cambridge: MIT Press, 1999); Paul Bairoch, *Commerce Extérieur et Développement Économique de l'Europe au XIXe siècle* (Paris: Mouton, 1976); Michaël Tracy, *L'État et l'Agriculture en Europe Occidentale: Crises et Réponses au cours d'un Siècle* (Paris: Economica, 1986); Kevin H. O'Rourke, "The European Grain Invasion, 1870–1913," *Journal of Economic History* 57 (Dec. 1997): 775–801; A. J. Marrison, "The Tariff Commission, Agricultural Protection, and Food Taxes, 1903–13," *Agricultural History Review* 34:2 (1986): 171–87; Andrew Fenton Cooper, *British Agricultural Policy* (Manchester: Manchester University, 1989); Emmet Sullivan, "Revealing a Preference: Imperial Preference and the Australian Tariff, 1901–1914," *Journal of Imperial and Commonwealth History* 29 (Jan. 2001): 35–64.

3. Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge University Press, 1986); Lucille Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (New York: Academic Press, 1979); Michael A. Osborne, *Nature, the Exotic, and the Science of French Colonialism* (Bloomington: Indiana University Press, 1994); John R. McNeill, "Europe's Place in the Global History of Biological Exchange," *Landscape Research* 28 (Feb. 2003): 33–39. On the potato blight, see, E. C. Large, *The Advance of the Fungi* (London: Jonathan Cape, 1940), 13–43; Henry Hobhouse, *Seeds of Change: Five Plants that Transformed Mankind* (London: Harper & Row, 1985); Steven Turner, "After the Famine: Plant Pathology, *Phytophthora infestans*, and the Late Blight of Potatoes, 1845–1960," *Historical Studies in the Biological and Physical Sciences* 35 (Mar. 2005): 341–70.

4. Anne Rasmussen, "L'Internationale Scientifique 1890–1914" (PhD diss., École des Hautes Études en Sciences Sociales, Paris, 1995); Elisabeth Crawford, "The Universe of International Science, 1880–1939," in *Solomon's House Revisited: The Organization and Institutionalization of Science*, ed. Tore Frängsmyr (Canton, Mass.: Science History Publication, 1990), 251–69; J. Taieb and C. Tapia, "Conférences et Congrès Internationaux de 1815 à 1913," *Relations Internationales* 5 (May 1976): 11–35; Helen Rozwadowski, "Internationalism, Environmental Necessity, and National Interest: Marine Science and Other Sciences," *Minerva* 42 (June 2004): 127–49. This definition of phytopathologists corresponds to the use of the word in Europe at the turn of the twentieth century. North American scientists had a more restricted use of the word that only applied to plant pathologists who studied plant diseases and not to applied entomologists who studied pests. See, Ralph H. Estey, *Essays on the Early History of Plant Pathology and Mycology in Canada* (Montreal-Kingston: McGill–Queen's University Press, 1994), 3–5.

5. For brief histories written by contemporaries, see, Asher Hobson, *The International Institute of Agriculture: An Historical and Critical Analysis of its Organization, Activities, and Policies of Administration* (Berkeley: University of California Press, 1931); F. Houillier, *L'Organisation Internationale de l'Agriculture, les Institutions Agricoles Internationales et l'Action Internationale en Agriculture* (Paris: Librairie technique et économique, 1935), 9–13; Gilbert Noël, “Les Projets Agricoles Européens (1920–1930),” in *Milieux Économiques et Intégration Européenne en Europe occidentale au XXe siècle*, 2 vols. (Paris: Comité pour l'histoire économique et financière de la France, 2002), 2:182–206.

6. On the IIA constitution, see, Louis Dop, “Le Présent et l'Avenir de l'Institut International d'Agriculture,” *Annales de la Science Agronomique Française et Étrangère* 4th Series, 2 (Feb. 1912): 1–39; Dop, “Rapport sur la Coopération Internationale dans la Lutte contre les Maladies des Plantes,” *Premier Congrès International de Pathologie Comparée Tenu à la Faculté de Médecine de Paris du 17 au 23 Octobre 1912* (Paris: Secrétariat général et bureaux du congrès, 1912), 243–44.

7. Dop, “Le Présent et l'Avenir de l'Institut International d'Agriculture,” 24–25; G. Cuboni, “Mémoire sur l'organisation du service des maladies des plantes présenté à la 2e Commission permanente” *Institut International d'Agriculture. Comité Permanent. Procès-Verbaux* (Rome: Institut International d'Agriculture, 1909).

8. *Actes du Congrès Phylloxérique International* (Lausanne: Imprimerie Lucien Vincent, 1877); Giuseppe Cuboni, “Base d'un Accord International pour la Lutte contre les Maladies des Plantes,” *Bulletin Mensuel du Bureau de Renseignements Agricoles et des Maladies des Plantes* 3 (Nov. 1912): 2423–27; R. Pouget, *Histoire de la Lutte contre le Phylloxera de la Vigne en France* (Paris: INRA, 1990).

9. Dop, “Rapport sur la Coopération Internationale dans la Lutte contre les Maladies des Plantes,” 235–50; Giuseppe Cuboni, “Accord International pour la Lutte contre les Maladies des Plantes,” *Revue de l'Horticulture Belge et Étrangère* 38 (Dec. 1912): 372; Étienne Foëx, “Institut International d'Agriculture. IIIe Commission. Renseignements Agricoles et Maladies des Plantes,” *Revue de Phytopathologie Appliquée* 1 (July 5, 1913): 44 recalls the resolutions adopted by the International Professional Horticultural Union at their Congress at Gand, Apr. 28, 1913.

10. Cuboni, “Base d'un Accord International pour la Lutte contre les Maladies des Plantes,” 2422–26; Louis Mangin, “La Défense Mondiale contre les Ennemis des Végétaux,” *Journal d'Agriculture Pratique* 78:1 (1914): 537–39, 567–69; Anon., “International Institute of Agriculture,” *Journal of the Board of Agriculture* 21 (Sept. 1914): 550–53.

11. “Note Relative à la Question Posée par l'Institut International d'Agriculture de Rome,” Paul Marchal to the Directeur des Services Sanitaires et Scientifiques et de la Répression des Fraudes, July 9, 1912, vol. 2203, F10, Archives of the Ministry of Agriculture, Archives Nationales France, Paris, France (hereafter AMA).

12. Jakob Eriksson, “La Phytopathologie au Service de la Culture des Plantes,” *Compte Rendu des Travaux du VIe Congrès International d'Agriculture, Tenu à Paris du 1 au 8 juillet 1900, lors de l'Exposition Universelle de 1900*, 2 vols. (Paris: Masson, 1900), 2:744; I. Ritzemabos, “Protection des Animaux Utiles, Destruction des Animaux et Cryptogames Nuisibles. Mesures de Législation Internationale à Prendre pour Atteindre ces Buts,” *Congrès International d'Agriculture, Tenu à La Haye du 7 au 13 Septembre 1891. Compte-Rendu*, 2 vols. (La Haye: Belinfante Frères, 1892), 2:225.

13. Louis Grandeau, "Compte rendu du 8e Congrès International d'Agriculture de Vienne 21–25 mai 1907," *Annales de la Science Agronomique Française et Étrangère* 3, 3rd series (Mar. 1908): 346–71.

14. Institut International d'Agriculture, ed., *Acte Final de la Conférence Internationale de Phytopathologie 24 Février–4 Mars 1914* (Rome: Imprimerie de l'Institut International d'Agriculture, 1914); A. G. L. Rogers, "The International Phytopathological Conference, 1914," *Annals of Applied Biology* 1 (1914–1915): 113; Dop, "Rapport sur la Coopération Internationale dans la Lutte contre les Maladies des Plantes," 235–50; "Lettre du Ministre des Affaires Étrangères aux Agents Diplomatiques de la République Française à l'Étranger," Feb. 7, 1913, vol. 2203, F10, AMA.

15. Philip Pauly, "The Beauty and Menace of the Japanese Cherry Trees: Conflicting Visions of American Ecological Independence," *Isis* 87 (Mar. 1996): 51–73; Estey, *Essays on the Early History of Plant Pathology*; L. O. Howard to P. Marchal, Mar. 26, 1914, File "Marchal," Box 245, General Correspondence 1908–1924, General Records E34, Records of the Bureau of Entomology and Plant Quarantine, RG 7, National Archives and Records Administration II, College Park, Md. (hereafter NARA II); L. O. Howard, "Notes on the Progress of Economic Entomology," *Journal of Economic Entomology* 8 (Feb. 1915): 113–19. See the explanation provided by David Lubin in a letter to the president of the International Institute, nd, reproduced in Institut International d'Agriculture, ed., *Acte Final de la Conférence*, 62.

16. Deputy Minister of Agriculture to the Under-Secretary of State for External Affairs, Apr. 11, 1913, File 313, vol. 1132, RG 25, Library and Archives of Canada, Ottawa; C. Gordon Hewitt, "A Review of Applied Entomology in the British Empire," *Annals of the Entomological Society of America* 9 (Mar. 1916): 1–34; Stéphane Castonguay, *Protection des Cultures, Construction de la Nature. L'Entomologie Économique au Canada, 1854–1959* (Sillery: Septentrion, 2004), 115–17.

17. Institut International d'Agriculture, ed., *Acte Final de la Conférence*, 192–218, 230–31.

18. *Ibid.*, 192–200; J. F. M. Clark, "'The Eyes of Our Potatoes are Weeping': The Rise of the Colorado Beetle as an Insect Pest," *Archives of Natural History* 34 (Apr. 2007): 109–28; Stéphane Castonguay, "Naturalizing Federalism: Insect Outbreaks and the Centralization of Entomological Research in Canada, 1885–1914," *Canadian Historical Review* 75 (Mar. 2004): 1–34; Dop, "Rapport sur la Coopération Internationale dans la Lutte Contre les Maladies des Plantes"; Pierre Berthault, "Premier Congrès de Pathologie Comparée. Projet d'Ententes Internationales contre les Maladies des Plantes," *Journal d'Agriculture Pratique* 76:2 (1912): 559–61.

19. Mangin, "La Défense Mondiale contre les Ennemis des Végétaux," 537–39, 567–69; "Acte final de la Conférence internationale de phytopathologie fait à Rome le 4 mars 1914," *Bulletin mensuel de renseignement agricole et des maladies des plantes* 5 (Apr. 1914): 621.

20. Institut International d'Agriculture, ed., *Acte Final de la Conférence*, 48.

21. Rogers, "The International Phytopathological Conference, 1914," 117; Institut International d'Agriculture, ed., *Acte Final de la Conférence*, 238.

22. Baron De Bildt, "Rapport sur la Partie Administrative de la Question de la Protection des Plantes Présenté au Comité Permanent de l'Institut International d'Agriculture le 12 juin 1920," *Actes de la Cinquième Assemblée Générale. 3–11 Novembre 1920* (Rome: Imprimerie de l'Institut International d'Agriculture, 1921): 266–67; "La Première Conférence Internationale de la 'Defensa Agrícola' à Montevideo, Uruguay," *Bulletin Mensuel*

du Bureau de Renseignements Agricoles et de Maladies des Plantes 4 (Oct. 1913): 1726–27; Gaston Lavergne, “La Défense Agricole en Amérique du Sud,” *La Revue de Phytopathologie Appliquée* 1 (Aug.–Sept. 1913): 98–99; Enrique José Rovira, “Les Services Phytopathologiques dans l’Uruguay en Relation avec la Convention Internationale de Rome,” *Actes de la Cinquième Assemblée Générale, Annexe A*. On the reaction of the German delegates concerning the Berne convention, see, Institut International d’Agriculture, ed., *Acte Final de la Conférence*, 230–31.

23. Jakob Eriksson, “International Phytopathologic Collaboration,” *Phytopathology* 5 (June 1915): 133–38; George Massee, “Some Observations on the Study of Plant Pathology,” *Journal of Economic Biology* 10:1 (1915): 29–48; Anon., “International Phytopathological Conference, 1914,” *Journal of the Board of Agriculture* 21 (Apr. 1914): 74.

24. “The International Phytopathological Convention of Rome and its relation to Tropical Agriculture. Discussion,” *Transactions of the Third International Congress of Tropical Agriculture*, 2:109–17; E. J. Butler, “The Dissemination of Parasitic Fungi and International Legislation,” *Memoirs of the Department of Agriculture in India. Botanical Series* 9 (Feb. 1917): 1–73.

25. Butler, “The Dissemination of Parasitic Fungi and International Legislation,” 37–38.

26. *Ibid.*; Rogers, “The Phytopathological Convention of Rome and its Relation to Tropical Agriculture,” 1:125.

27. On phytosanitary regulations in Canada and the United States, see, respectively Castonguay, “Naturalizing Federalism,” 1–34; Pauly, “The Beauty and Menace of the Japanese Cherry Trees,” 51–73. On the brown-tail moth, see, Castonguay, *Protection des cultures, construction de la nature*, 30–31, 45–48; on the white-pine blister rust, see, C. Lee Campbell et al., *The Formative Years of Plant Pathology in the United States* (St. Paul: APS Press, 1999), 276–79.

28. L. O. Howard, “Danger of Importing Insect Pests,” *US Department of Agriculture Yearbook* (Washington, DC: GPO, 1897), 529–52; Hae-Gyung Geong, “Exerting Control: Biology and Bureaucracy in the Development of American Entomology, 1870–1930” (PhD diss., University of Wisconsin–Madison, 1999), chpt. 5, 209–46; C. L. Marlatt, “Need of National Control of Imported Nursery Stock,” *Journal of Economic Entomology* 4 (Feb. 1911): 107–24.

29. W. A. Orton, “Plant Quarantine Problems,” *Journal of Economic Entomology* 7 (Feb. 1914); Orton, “The Biological Basis of International Phytopathology,” *Phytopathology* 3 (Dec. 1914): 325–33. See, for example, L. R. Jones, “A Plea for Closer Interrelations in our Work,” *Science* 38 (July 4, 1913): 1–6; Eriksson, “International Phytopathologic Collaboration,” 133–38; Otto Appel, “International Phytopathology,” *Phytopathology* 6 (Mar. 1916): 55–63; C. L. Shear, “International Phytopathology,” in *Report of the International Conference of Phytopathology and Economic Entomology*, ed. T. A. C. Schoevers (Wagenigen: Vennman & Sons, 1923), 56.

30. Orton and R. Kent Beattie, “The Biological Basis of Foreign Plant Quarantines,” *Phytopathology* 13 (July 1923): 295–306.

31. W. A. F. Wery, “International Trade and the Task of the Phytopathologist,” in *Report of the International Conference*, 218. On Plant Quarantine Number 37, see, Peter Coates, *American Perceptions of Immigrant and Invasive Species: Strangers on the Land* (Berkeley: University of California Press, 2006), 102.

32. Hans Theodore Güssow, “International Plant Disease Legislation as Viewed by a Scientific Officer of an Importing Country,” in *Report of the International Conference*, 97.

33. *Ibid.*, 104, 105, 99.

34. *Ibid.*, 103; Orton and Bettie, "The Biological Basis of Foreign Plant Quarantines," 306. Papers read before the American Phytopathological Society in Cleveland in a Symposium on International Aspects of Phytopathological Problems had discussed the exchange of phytopathologists before the Great War. C. L. Shear "Some observations on Phytopathological Problems in Europe and America," *Phytopathology* 3 (Apr. 1913): 77n1. See, also, W. A. Orton, "International phytopathology and quarantine legislation," *Phytopathology* 3 (Aug. 1913): 143–51 and L. R. Jones, "A plea for Closer Interrelations in our Work," *Science* 38 (July 4, 1913): 1–6.

35. A. Brizi, "Questions Concernant la Phytopathologie," *Actes de la Sixième Assemblée Générale. Institut International d'Agriculture. 8–16 mai 1922* (Rome: Imprimerie de l'Institut International d'Agriculture, 1922), 679–91.

36. Dop, "Convocation de la Conférence Internationale pour la Protection des Plantes. 30 mai 1924," in *Procès-verbal. 1924*, ed. Institut International d'Agriculture, Comité Permanent (Rome: Imprimerie de l'Institut International d'Agriculture, 1925), 345–46; T. A. C. Schoevers, "Rapport de la Commission des Experts pour la Protection des Végétaux," *Procès-verbal. 1926*, ed. Institut International d'Agriculture, Comité Permanent (Rome: Imprimerie de l'Institut International d'Agriculture, 1927), 868–69.

37. Rogers, "The International Phytopathological Conference, 1914," 114; An. Kennard, "Lettre de Secrétaire d'État de Sa Majesté pour les Affaires Étrangères au Vice-président de l'Institut International d'Agriculture. 21 août 1924," in *Procès-verbal. 1924*, 348–49; J. C. F. Fryer, "Legislation in England against Diseases and Pests of Plants," *Proceedings of the Association of Economic Biologists* 15 (May 1928): 322; E. J. Butler, "International Plant Disease Legislation as it Affects the British Empire," in *Proceedings of the International Congress of Plant Sciences, Ithaca, New York, August 16–23, 1926*, 2 vols., ed. B. M. Duggar (Menasha, Wis.: George Banta, 1929), 2:1349. "Documentation pour la réunion de la Commission consultative internationale visant la protection des plantes," *Procès-verbal. 1925*, ed. Institut International d'Agriculture, Comité Permanent (Rome: Imprimerie de l'Institut International d'Agriculture, 1926), 840, 864–67.

38. Henry Wallace to the American Delegate at the International Institute of Agriculture, Sept. 13, 1924; memo. from W. A. Taylor, July 30, 1925; R. N. Dunlop to the Honorable Secretary of State, Aug. 19, 1925, File 10735, Box 635, Bureau's Chief Correspondence 1908–1939, RG 54, NARA II.

39. F. Houillier, *L'Organisation Internationale de l'Agriculture*; "Rapport du Secrétaire Général sur les Services et l'Administration de l'Institut," *XIVème Assemblée Générale. 23 Mai 1938* (Rome: Imprimerie de l'Institut International d'Agriculture, 1938), 105; International Institute of Agriculture, *Some Aspects of the Work of the International Institute of Agriculture (1905–1940)* (Rome: Villa Umberto, 1942), 19. However, Chock states that twelve countries had ratified the convention of 1929. A. K. Chock, "The International Plant Protection Convention," in *Plant Health: The Scientific Basis for Administrative Control of Plant Diseases and Pests*, ed. D. L. Ebbels and J. E. King (Oxford: Blackwell Scientific Publications, 1979), 1–11.

40. *Actes de la Conférence Internationale pour la Protection des Plantes (Rome, 10–16 Avril 1929)* (Rome: Imprimerie de l'Institut International d'Agriculture, 1929), 71–72, 81–85.

41. *Ibid.*, 130–32, 121.

42. Thus, a French delegate said: "le certificat est la conclusion même de la convention," (the certification is the ultimate conclusion of the convention) Jules Michel Saulnier,

“Procès-Verbaux des Séances: Discussion sur le Certificat,” *Actes de la Conférence Internationale*, 133; Houillier, *L’Organisation Internationale de l’Agriculture*, 72.

43. Louis Dop, “La Convention Internationale du 16 Avril 1929 pour la Protection des Végétaux,” *Comptes Rendus de l’Académie d’Agriculture de France*, vol. 15 (Paris: Académie d’agriculture de France, 1929), 588–92.

44. C. L. Shear, “Some Observations on Phytopathological Problems in Europe and America,” *Phytopathology* 3 (Apr. 1913): 77–87; Orton and Beattie, “The Biological Basis of Foreign Plant Quarantines”; Émile Blanchard, “La Lutte Obligatoire contre les Ennemis de la Culture,” *Problèmes Agricoles Traités par les Ingénieurs Agronomes* (Paris: Association amicale des anciens élèves de l’INA, 1929), 220.