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- Timonius*, DC. (1830).
Tinantia, Scheidw. (1839).
Toddalia, Juss. (2 sem. 1789).
Tolmiea, Torr. et Gray (1840).
Tourrettia, Fougroux (1787).
Tragus, [Hall] Scop. (1777).
Trichilia, [P. Br.] L. (1759).
Trichodesme, R. Br. (1810).
Tricyrtis, Wall. (1826).
Trigoniastrium, Miq. (1860).
Trinia, Hoffm. (1814).
Trophis, [P. Br.] L. (1759).

Uncaria, Schreb. (1789).
Urceolina, Reichb. (1828).
Ursinia, Gaertn. (1791).

Ventenata, Koel. (1802).
Vernonia, Schreb. (1791).
Verticordia, DC. (1826).
Villarsia, Vent. (1803).
Vismia, Vand. (1788).
Vochysia, Juss. (1789).
Vriesea, Lindl. (1843).

Wahlenbergia Shrad. (1814).
Wallenia, Sw. (1788).
Watsonia, Mill. (1759).
Weihea, Spreng. (1825).
Weinmannia, L. (1759).
Welwitschia, Hook. f. (1862).
Wikstroemia, Endl. (1833).
Wistaria, Nutt. (1818).
Withania, Pauquy (1824).

Xanthophyllum, Roxb. (1814).
*Xylopi*a, L. (1759).
Xylosma, Forst. f. (1786).

Zamia, L. (1763).
Zantedeschia, Spreng. (1826).
Zelkova, Spach (1841).
Zeugites, [P. Br.] Schreb. (1791).
Zinnia, L. (1759).
Zoisia, Willd. (1801).

XLII.—THE PHYTOPATHOLOGICAL SERVICE IN THE NETHERLANDS AND ITS COLONIES.

J. C. TH. UPHOF.

During the last decade the Phytopathological Service of the Netherlands has developed extensively throughout the country, and its activities are very numerous. Though it belongs to a small nation, it is the outcome of much painstaking work, and will not be found in such a high degree of development in any other country.

Dutch scientists have long been engaged in investigations on plant diseases or pests, for instance Dr. Snellen van Vollenhoven (1843), and Dr. J. Wttwaal (1860); later came the very active and eminent plant pathologist, Prof. Dr. J. Ritzema Bos, who from 1869 to 1920 has been the chief leader in Holland from the standpoint of original research, plant disease control, lecturing and popularising the knowledge of plant pathology among the masses of agricultural and horticultural people.

In 1895 the Phytopathological Laboratory "Willie Commelin Scholten" in Amsterdam was established out of private funds, Ritzema Bos being appointed Director, as well as Professor of Plant Pathology at the University of Amsterdam. In his inaugural speech at the University, he pointed out that phytopathology should not be considered as a part of botany, but as an independent science.

The main object of the institution was to study plant diseases and give advice and demonstrations to growers. The results of

the investigations were published in the *Tijdschrift over Plantenziekten* (Journal for Plant Diseases), and other periodicals, and as *Memoirs*. The general interest taken in it is shown from the correspondence. In 1895, the first year, 376, in 1905, 1272, in 1911, about 4900, and in 1912, 6804 letters were sent out.

In 1891 Prof. Dr. Hugo de Vries, Prof. Dr. Ritzema Bos, Dr. H. W. Heinsius and Dr. H. T. Calkoen organised the Netherlands Phytopathological Society, and the above-mentioned *Tijdschrift voor Plantenziekten* became its leading paper.

In 1899 the actual Phytopathological Service was established, more particularly in consequence of some restrictions made by the United States of America as to San José Scale, peach yellows and rosette. These diseases were unknown in the Netherlands, but certificates were required from nurserymen that their exported stock was free from these diseases or pests and "any other dangerous insects or plant diseases that might be transferred on nursery stock to other nurseries or to the orchard." At that time only nurseries were inspected, and not the actual exported plants.

From 1899 until 1906 the Phytopathological Service was situated in Amsterdam. From 1906 until the present time the seat has been at Wageningen. Prof. J. Ritzema Bos remained Director, whereas Dr. Johanna Westerdijk, who is also Professor of Plant Pathology at the University of Utrecht, took charge of the institution "Willie Commelin Scholten" in Amsterdam as well. Quite recently the institution "Willie Commelin Scholten" was removed to Baarn.

An important advance was made in 1909, when the Phytopathological Service was divided into a general and a special branch. The former took charge of questions of control of plant diseases and pests, and stands in close connection with the Government Institution for Plant Pathology of the Agricultural College at Wageningen. The latter service took charge of nursery inspection and kindred activities.

At the present time the entire Phytopathological Service is independent of the Institution for Plant Pathology.

The present Phytopathological Service is extensive and employs a large staff of scientifically and technically trained men, as well as several persons employed in offices, museums, laboratories and experimental fields.

The Director of the Service is assisted by three phytopathologists, one ornithologist, two agricultural and horticultural experts, besides twenty-two technical officials and controllers; the latter residing in various parts of the Netherlands, especially in agricultural and horticultural centres such as Boskoop, Aalsmeer, Naarden, Oudembosch, Naaldwijk, Lisse, Hoorn, Venlo, Elst and other places. A technical curator is employed in the museum.

In the administrative section seven persons are employed, while six take charge of laboratories and experimental fields.

Further, there are about 200 correspondents and collaborators distributed over the entire country; these men are usually educated in agricultural and horticultural schools or colleges, and have therefore a fundamental knowledge of plant diseases, pests, and their control.

The Phytopathological Service is divided into six chief sections, which are able to work more or less independently of each other.

i. *Section for examination of diseases and infected plants.*

Information is given to agriculturists, horticulturists, foresters and amateurs who require advice as to the life-history of disease-causing fungi or animals and as to the methods for combating them. If necessary, inspections are made free of cost. The laboratories of this section are well equipped with modern apparatus for making pure cultures of fungi and raising various pests. Experimental fields and greenhouses have also been erected in order to carry out inoculation experiments. The investigations are carried on in a general manner; they are not conducted extensively nor purely scientifically, though enough is being done to provide for correct diagnoses of diseases and to recommend suitable remedies.

This division also sends, when necessary, contributions on diseases to various periodicals and newspapers. It issues warnings at various times when certain diseases may become prevalent. It distributes pamphlets, which treat in a popular way of diseases and pests of special interest and kindred subjects.

ii. The second section takes charge of methods of combating diseases and pests of horticultural crops, and forms a very important branch of the Phytopathological Service. Such a branch is especially necessary in a country like Holland, where horticulture is mainly developed in centres; where sometimes several hundred growers are near each other, such as Boskoop, Aalsmeer, Naaldwijk, and other places, where the growers have one common interest in their work. In such localities it is necessary to use every efficient method to combat disease. Further, inquiries are made as to the distribution and virulence of certain diseases. Lectures and field demonstrations are given whenever necessary, and short notices are sent to local newspapers. Personal visits are paid to nurserymen and other growers, where special advice is given as to problems of plant pathology or methods of combating diseases are demonstrated. The staff receives much co-operation from its many collaborators in this line of work. Publications of a somewhat technical nature for the horticulturist are abstracted and utilised as propaganda.

iii. The third section is interested in combating diseases and pests from an agricultural standpoint, and works upon the same principles as the former. It covers a much larger area, because at the present time agriculture is not as intensively centralised as horticulture. In this respect also collaborators are of great help, and are well acquainted with most diseases and pests of

farm crops. Lectures and demonstrations are usually given in winter, while in summer field demonstrations and excursions are held whenever they are wanted. Collaborators who render services do not receive any salary, though travelling and hotel expenses are refunded by the Government. Fields are carefully inspected and the question of selling seeds or using them as planting material decided. Great care is exercised in the inspection of potatoes. Much advantage is taken of technical publications dealing with agricultural crops.

iv. Another branch of work of much importance is the supervision of the laws relating to disease, which includes also the control of plants for export. In the former case measures have been prescribed against the wart disease of potatoes and American gooseberry mildew. The areas of land are carefully inspected and, in fields where wart disease is found, all plants are destroyed by boiling. The growing of potatoes in infested fields is prohibited, the growers receiving indemnification for any loss caused by this enforcement of the law.

As regards American gooseberry mildew the tops of the twigs of the current year are cut off and burnt, while the soil round the shrub is dug up for a few inches. The transport of gooseberries from infested orchards is also controlled.

The Phytopathological Service of the Netherlands was the first in any country to insist on the inspection of plants, or parts of plants, destined for export, in order to guarantee the absence of diseases or pests. Before packing, all plants are inspected by controllers, and a certificate is given for export in cases of freedom from disease. No permission is accorded to export infected goods, which is of considerable importance in preserving the reputation of Dutch growers abroad. This control on export existed in the Netherlands long before freedom from disease was required by any country as a necessary condition of import. Later on, rigid restrictions on the import of live plants, bulbs and potatoes were enforced by various Governments, *e.g.*, the United States of America, New Zealand, South Africa, and Czecho-Slovakia. The propaganda which had long been actively carried on in Holland had already greatly contributed to the improvement in the health of plants, so that the task of the Governments in the enforcement of legislation was much facilitated.

v. The ornithological section, which is also of importance, studies the bird species which are useful or harmful to crops, their habits and time of breeding being observed all over the country.

vi. A very important section is that which takes charge of the sections of horticultural and agricultural shows relating to diseases and pests. In every part of Holland where such exhibitions take place, there are very neat-looking stands from the Phytopathological Service showing various stages in the development of diseases, preserved either in alcohol, formalin, as mounted

herbarium species, and the like. Further, there are statistical tables, descriptions of the life-history of fungi and insects and microscopical slides. Not only in the Netherlands, but also abroad this division is very active. For example, the author noticed at the Lille Exhibition, in the department of Dutch exhibitors, a large stand on plant diseases which was sent by the Phytopathological Service of Wageningen.

Much work is done in organising Phytopathological Research in the Dutch possessions, especially the Dutch East Indies, though a Phytopathological Service such as exists in Holland has not yet been established.

The Department of Agriculture has in Java a Laboratory for Plant Diseases where a staff of botanists and zoologists are already engaged upon various lines of research, while several private companies have also engaged botanists or trained phytopathologists to study various pests and diseases and to find means of eradicating them; such stations have been established in Malang and Deli, and the Java Sugar industry possesses one.

No doubt in the near future the Dutch East and West Indies will also have a very extensive Phytopathological Service, as well organised as other institutes for tropical agriculture already formed.

XLIII.—THE YELLOW PINES OF NORTH AMERICA.

W. DALLIMORE.

In Canada and the United States there are several groups of species of *Pinus* that bear similar common names, one of the most important being designated "yellow pine." The yellow pines include species that are very different in general appearance and in working qualities, whilst they are as widely separated geographically as it is possible for them to be. From these facts it is desirable that persons handling the timber should have an intimate knowledge of the several species, and of their distribution.

The yellow pines include the following species :—

<i>P. cubensis</i> , Grisebach.	<i>P. ponderosa</i> , Douglas.
<i>P. mitis</i> , Michaux.	<i>P. Strobus</i> , Linnaeus.
<i>P. monticola</i> , Douglas.	<i>P. Taeda</i> , Linnaeus.
<i>P. palustris</i> , Miller.	<i>P. virginiana</i> , Miller.

As all are known by several common names in addition to that of yellow pine, the various synonyms are given with each species.

***P. cubensis*, Grisebach.**—Bastard Pine, Cuban Pine, Meadow Pine, Pitch Pine, She Pine, She Pitch Pine, Slash Pine, Spruce Pine, Swamp Pine, Yellow Pine.

This is the most tropical of the Eastern N. American species. Its northern limit is reached in S. Carolina, and it is found in Georgia, Southern Alabama, Louisiana and Florida, extending