

An improved method of testing seeds for the presence of dry-rot has been evolved, and has proved most useful against lines carrying only minute percentages of the disease. By this method, which is a modification of the cloche seed germinator, from eight thousand to ten thousand seeds may be tested at one time.

Certain British seedsmen have forwarded from time to time lines of swede and turnip seed which they claimed to have grown under conditions precluding dry-rot infection. Unfortunately, when tested under field conditions in New Zealand most of these lines have developed the disease.

(2) POTATO DISEASES.

(a) *Corticium Disease* (*Corticium solani*).—It has been found that this fungus spreads in the soil from one plant to another; that it remains in the soil for at least twelve months, and that crop rotation does not appear to affect this period of persistence. A series of investigations, extending over a period of four years, has demonstrated that it is economically unsound to treat potato-tubers for the control of this disease, since the fungus does not appear materially to reduce yields under New Zealand conditions.

(b) *Virus Diseases*.—During the year it was demonstrated that a condition known locally as “curly-top of Dakotas” was a graft-transmitted virus disease. Trials demonstrated that net necrosis decreased yields by upwards of 50 per cent. A masked virus, isolated from apparently healthy potatoes, has produced mosaic when inoculations were conducted with seedlings of tobacco and *Datura*.

A quantity of apparently virus-free tubers has been raised from eight varieties in several localities. Part is being used in the glasshouse for further studies of virus diseases, the remainder being reserved for bulking up preparatory to making them available for commercial purposes.

(c) *Wilt Diseases*.—Approximately 2,500 cultures have been secured from potato stems and tubers. From these numerous fungi have been secured, and tests are being made of their pathogenicity as the limited glasshouse accommodation permits. It would appear that many of the fungi isolated are unrecorded as pathogens of potatoes, and several would appear to be unnamed.

(d) *Internal Brown Fleck*.—Since all attempts to isolate a pathogen from tubers affected with fleck have failed, it is probable this condition is not due to any fungus or bacterium. It has not been possible to transmit the disease from tuber to tuber by inoculation, which further supports the belief that the disease is non-pathogenic.

(e) *Dry-rot*.—A long series of inoculation experiments extending over the past two years has shown dry-rot in New Zealand is due to three species of *Fusarium*, the most prevalent isolant being identical with overseas cultures of *F. coeruleum*.

(3) LEGUME DISEASES.

(a) *Collar-rot of Peas* (*Ascochyta spp.*).—Experiments conducted during the past three years have demonstrated convincingly that it is not possible by known methods of treatment to free commercial lines of pea seed from this disease. Consequently, work has been concentrated upon the production of disease-free nucleus lines of several varieties. From certain of these a fair quantity of clean seed has been raised at Tangimoana, portion of which is being tested under glass preparatory to using the major portion for bulking prior to commercial distribution.

(b) *Bean Wilt* (*Bacterium medicaginis, forma phaseolicola*).—Since this disease was introduced with seed imported from Australia last year, it has become widespread throughout the Dominion. As it is seed-carried, and as it is not possible to sterilize seed by known artificial means, we have concentrated upon the production of clean nucleus lines. A quantity of seed has been grown in this manner which is apparently free from wilt, and this will be bulked under isolated conditions in the spring.

(c) *Virus Diseases*.—Needle inoculations have shown that a mottling and dwarfing of garden peas is due to a virus. A second disease, known locally as streak, and suspected of being due to a virus, is under investigation. Attempts are being made to raise nucleus lines of garden peas free from both troubles. Cross inoculations from clovers have resulted in the appearance in garden peas of symptoms of both diseases, showing that the former hosts are carriers, and illustrating the difficulties facing the attempts at production of clean lines of seed.

(d) *Sore-shin* (cause unknown).—From this troublesome disease of lupins two fungi have been isolated. Experiments are now in hand to determine which is responsible for this disease, and field trials have been laid down in which various soil treatments are being tested with a view to working out practical control.

(e) *Legume nodule organism* (*Bacillus radiciperda*).—During the past twelve months 653 farmers have been supplied with cultures of the lucerne nodule organism, quantities being sent out sufficient to inoculate 46,185 lb. of seed.

(4) CEREAL DISEASES.

(a) *Barley Smuts* (*Ustilago jenseni* and *U. tritici*).—Several proprietary seed-disinfectants were tested against the hot-water treatment. Results convincingly demonstrated that hot water alone gave satisfactory control of either smut, showing that these proprietary compounds are of little value under New Zealand conditions.

(b) *Crown-rust of Oats* (*Puccinia coronata*).—Eight differential varieties of oats were grown and harvested from seed secured from abroad. These lines proved to be impure, so cannot be used for biotype work until pure lines have been produced from them.

(5) TOBACCO DISEASES.

(a) *Leaf-spot (cause unknown)*.—Experiments with treated versus untreated seed failed to combat this disease. As we have failed to secure any specific pathogen in numerous cultures prepared from these lesions, it is highly probable the trouble is of physiological origin.

(b) *Tobacco Virus Diseases*.—Needle inoculations have shown that a diseased condition of plants prevalent in Nelson and Auckland is due to tobacco mosaic.

A crinkle-leaf condition which developed in a line of tobacco raised at the experimental area at Auckland, from seed imported from Turkestan is now under investigation, infected plants being seeded with a view to ascertaining whether the disease is carried with the seed.

(6) STRAWBERRY DISEASES.

Detailed surveys were made during the year of the strawberry areas at Auckland with a view to investigating those factors responsible for losses suffered by growers in that region. Seedling plants have been raised in quantity, and these are being used in attempts being made to determine the nature of these diseases. Attempts are being made to produce virus-free plants on a small scale, preparatory to bulking for commercial distribution.