

A hydraulic drawbar dynamometer for testing the draught of implements was designed and constructed and is now in use.

An experimental spraying-boom was constructed for adapting a tractor-drawn orchard spray for spraying field crops.

MICROBIOLOGY

Dr. I. D. BLAIR

Ear Blight and Frost Damage.—*Fusarium graminearum* and *Fusarium avenaceum* have been identified as the predominant fungous cause of ear blight. Natural air-borne infection of spikelets contributes to a much lower degree of ear blight compared with brown foot-rot resulting from stem decay.

Frost damage in the late spring of 1947 caused severe grain losses in North Canterbury when frosts of 12° were recorded in mid-November. Experiments on low-temperature effects on wheat ear development have continued during a second year, primarily for the purpose of defining frost-damage symptoms in contrast with those associated with fungous infection.

Eyespot Disease (*Cercospora herpotrichoides*).—An area with a severe eyespot-disease record over four seasons has been set aside for development as a trial ground. Among results for the 1946–47 season no significant differences in infection in standard varieties were recorded, although there was evidence that some varieties were more susceptible than others to ultimate straw break as a result of tiller infection. Among soil treatments it was found that ploughing-in 1 ton per acre of straw caused a sharp reduction in eyespot infection in both autumn- and Spring-sown crops. Other cellulosic materials, including stable-manure, poultry-run litter, and green manure, reduced infection, while organic nitrogen effected no improvement compared with control. In glasshouse plots no *Cercospora* colonies were isolated from plants grown from seed collected from diseased plants in the previous harvest. Diseased plants were collected in the field at weekly intervals, and throughout the growing season spore production was found to be very slight.

Effect of Erysiphe graminis.—Spore suspension inoculation of glasshouse-grown plants were made at two weeks, two months, and four months after emergence. Observations were made on leaf infection, height of plant, grain per ear, and weight of grain per plant, and it was found that only those plants inoculated in mid-season—viz., after three months' growth—revealed significant detrimental effects of mildew infection.

Efficiency in Commercial Seed-wheat Dusting.—The efficiency of dust coverage is being studied, using an inoculated culture plate technique. Progress results concerning samples submitted by ten commercial firms indicate that the wheat-seed-disinfection practice, costing approximately £13,000 per annum in Canterbury, is being most inefficiently applied. The percentage of efficient dusting in many samples has been recorded as nil, and in few instances was the figure over 75 per cent. efficient dusting. No differences were found in the ability of standard varieties to retain standard dry dusts, and it has been concluded that wherever adequate mixing of dust and seed is provided all standard varieties exhibit an equal dust adhesion. It has been found that wide variations exist in the characteristics of commercial dusting-machines and in the care and supervision of dusting operations, and as a result of this work improvements have been initiated by several seed firms.

Occurrence of Smut Infection.—Sample lines of wheat from all districts have been centrifuged and aqueous suspensions examined microscopically for *Tilletia* spore load. The study indicates that for practical purposes control of *Tilletia* smut has been achieved.

Crop-disease Survey.—Most noteworthy problems during the past season in Canterbury included wheat take-all (*Ophiobolus graminis*) and frost damage to ears, rye-grass blind-seed (*Phialea temulenta*), tomato wilt (*Phytophthora cryptogea* and *Fusaria* spp.), and lettuce mildew (*Bremia lactucae*).