

applied; unless a systematic, painstaking effort is made to solve a problem from its initial stages upwards, we do not need to expect results. Research work in rust necessitates generous expenditure both in the provision of physical equipment as well as in able and well trained scientific man power. The problem is most urgent, and will not yield to half-hearted efforts. It might just as well be left alone, for if the efforts are half-hearted, results cannot be accomplished. Feeble efforts are worse than useless, for no results will be forthcoming, and that gives rise to criticisms that may be well founded but not deserved by the small band of earnest research workers who find themselves subjected to restrictions, rules and regulations, under which spontaneous research is successfully suppressed.

The solution of the rust problem is obviously of vital importance to Canada and the world as a whole. In addressing you to-day I am taking the liberty of speaking quite frankly, and I would sincerely solicit your support, assisting us from time to time in the provision of the absolutely necessary means, without which we cannot hope to accomplish much. I am well aware of the present days' financial stress and the loud clamour for decreased expenditure. Nevertheless, I am equally aware of the promise that can be truly held out of valuable results that are bound to follow really earnest and continued effort.

From experience I find that every year a new battle must be fought in justification of expenditures for scientific research. Once such important work is begun it should be pursued to the end. Objection is often raised to increased expenditures devoted to research, but the very fact that progress is being made every year and results are obtained which require to be followed up, explains the necessity of asking for further support.

We find ourselves to-day in possession of valuable data relating to rust-immunity of certain varieties of wheat. These must be tested one by one, almost grain by grain, not only by the plant pathologist, but also by the cerealist, for resistance to rust alone means little if not accompanied by heavy yields and other essential qualities. At the present time we are not doing justice to the investigation of the wheat rust problem. The first requisite is a personnel of proved ability, wide and successful experience—men of this type are in demand everywhere and they preferably associate themselves with institutions that comprehend and support scientific research fully and liberally. The salaries which the Civil Service of Canada has so far offered for such services are not attractive enough to men of experience, and in consequence our work suffers in quality. Were it not for the personal interest our men are taking, even though they are woefully underpaid, no advance would be possible.

Under the present organization of plant pathological research it may be mentioned that as far the Dominion service is concerned, cereal rust investigation work constitutes only a part of the general cereal disease work of the Division of Botany under the Experimental Farms. Cereal disease work is inclusive of all grain diseases, rust investigations receiving the largest share of attention, smut investigations coming secondly, and root diseases and other economically less important troubles making up the rest. No single phase of this work should be left unattended to, lest diseases of apparently minor importance at present, might gain a foothold and assume proportions beyond easy control. An example of this type of disease is afforded by the recent discovery of a disease known as "White heads" or "Take-all." The "Take-all", a root rot of wheat, attacks also barley, rye, and many of the common wild grasses. Oats are not susceptible. The disease has been troublesome in Australia, New Zealand, and Europe, for some years. In 1920 it was first reported in North America from New York State (though it was doubtless present for some time previously). Since then it has been found in Oregon, Arkansas, and Indiana, in all cases in winter wheat.