on shovelling the grain over to allow of air being mixed with it, when it will dry far more quickly. Besides, grain which is left lying untouched is liable to become mouldy, and this will destroy its germination. At times, especially on dull days, it is advisable to chill the grain by placing the bags for a minute or two in cold water, moving the bags several times up and down before spreading it out for drying. This has been found of advantage, especially when barley is being treated. In rare cases, grain has begun to sprout while spread out for drying. This causes no harm whatever, providing the grain is sown before it is absolutely dry. In the laboratory we have found that grain that has sprouted and is allowed to get fairly dry will revive completely when sown without much delay and grow just as well as untreated seed.

FURTHER REMARKS.

Danish co-operative method for hot water treatment.—In Denmark, where the hot water treatment is probably most widely practised, arrangements have been made with breweries and creameries in which steam and a permanent water supply are available. The farmers bring their grain to such centres and have it treated, but must remove it in a wet condition and dry it at home.

Special machines used in Germany.—On the continent of Europe, especially in Germany, there are machines in use to a limited extent for the hot water treatment of grain, some of which give great satisfaction. Dr. Appel, for instance, has designed a machine of this kind which appears to have never been surpassed in efficiency and simplicity. Perhaps at some future time such machines may be found necessary in Canada, and anyone who desires more detailed information concerning the Danish co-operative treatment of grain or a description of Dr. Appel's machine, which it is not necessary to give here, may have the same by applying to the writer.

In some instances, instead of the treatment of the soaked grain subsequently with hot water, hot air of equal temperature is recommended. The results obtained are just as satisfactory, and the system may have some advantages in reducing the time required for drying, but on the whole it is more complicated and requires apparatus which would have to be specially manufactured.

We have found the hot water treatment very satisfactory. The treatment itself is not too difficult to carry out with success, although the drying of the grain appears to us always a difficult problem. By mixing the wet grain with a quantity of perfectly dry road-dust or sawdust and sowing the same with it, it is possible to save time to some extent. Where this is done, the drill should be carefully adjusted to insure the sowing of the proper quantity of grain required for a good stand.

SMUT DISEASES OF BARLEY.

(Plate 4.)

Barley is subject to two forms of smut.—For a considerable time it was thought that barley was subject only to one smut disease. This position was taken by the older writers, who referred to barley smut by the name *Ustilago nuda*. When it was found, however, that the treatment applied to barley grain with a view to preventing smut produced rather contradictory results—in some cases eliminating the disease, in others, notwithstanding correct and careful treatment, rather increasing it—the view was at first held that the treatment after all had its limitations and was of restricted value as far as barley was concerned. Later, however, when a closer study became possible owing to the advance of our knowledge concerning flower infection, it was found that barley was subject to two distinct forms of smut, the one being a form of covered smut, *Ustilago Hordei* (Pers.) Kellerm & Swingle, and the other a true loose smut, *Ustilago nuda* (Jens.) Kellerm & Swingle. This discovery at once accounted satisfactorily for the failures experienced in some instances, viz., where loose smut was concerned, which naturally appeared at an increased rate owing to the seed treatment proving of no value.