

RUST IN WHEAT.

To the Editor of the Canadian Agriculturist.

SIR,—Permit me, through the columns of your excellent journal, to suggest, for the consideration of your scientific readers, an explanation of the cause of the rust or shrinking of wheat—that most fruitful source of anxiety and often of disappointment to the Canadian farmer. I do not, Sir, baptize these suggestions with the high title of *theory*, nor propose them as a certain solution of the cause of the rust of wheat, but I would offer them for the consideration of naturalists. The only explanation with which I have met of the rust of wheat is that given by Mr. Knight, some 40 or 50 years ago. Mr. K. suggested and scientific agriculturists have adopted his explanations, that immediately after a rain, a greater quantity of sap, than usual, ascending through the pores or capillary vessels, bursts the outer coating of the straw, and by this disorganization the further growth of the straw is prevented. From the absence of facts bearing upon this point, it may be equally impossible to refute or confirm this theory. Upon it I have only one remark to make, namely;—if the vessels of the straw are liable to burst by the increased amount of sap caused by the rain, I would ask, why they do not burst at an earlier period, when the straw is certainly more tender than at this particular time. This, I believe, does not take place, otherwise the growth of the straw might be checked when its head had attained but half its natural size? I am not aware that this ever occurs.

To the botanist I would define this theory (I use the term for convenience for want of a better) in few words. Though the agency of warm rains followed by sultry or hot weather, the *anther* explodes before it comes to maturity, and, therefore, the *pollen* which is indispensably necessary for the perfection of the grain, never reaches the *stigma*, and hence the rust or shrinking of the wheat.

For the information of the general reader and those unacquainted with botany, allow me to subjoin the accompanying explanation. If any, who are familiar with the terms and science of botany, are disposed to censure my illustrations as too prolix for themselves, such will bear in mind that they may not be so to those unacquainted with this subject; and as this point, so far as I am aware, has not been touched upon, I shall take the liberty

of a wider range in the elucidation of my views than, otherwise, I should feel justified in doing.

The cause of the rust or shrinking of wheat must be looked for in the imperfection or derangement of some of those organs which are necessary for the full development of the grain. The principal organs of the growth of plants and trees are two—the stem and the leaves. In the tree the sap ascends through the *alburnum* (the last year's growth) to the leaves; through the agency of the leaves it undergoes certain chemical changes, and then descending again between the bark and *alburnum*, it forms another layer between the bark and last year's growth. If either of these organs should become deranged, as, for example, if the tree were *girdled*, or the leaves picked off, the growth of the tree would be checked or entirely stopped. In the production of the grain there are other organs, the derangement of which, suggests the most natural cause of the rust of wheat. These organs are what botanists call *stamens* and *pistils*.

On examining flowers, we shall find a number of thread-like projections in and around the centre of the blossom. If the reader will take the wild or most of the single garden flowers, he will find these organs very distinctly marked, such as the strawberry, tulip, (stamens and pistils very prominent) pink, apple, cherry, &c. The centre one or ones (for there is sometimes one, sometimes many) we call *pistils*; those surrounding them—the *stamens*. At the base of the pistil is the germ of the future seed; on the top, an opening called the *stigma*. On the top of each stamen is a knob or box, called the *anther*, filled with a dust-like substance called *pollen*. This pollen, by the bursting of the anther, is scattered, some of which falling upon the stigma of the pistil, is itself burst by the moisture of the stigma, and from it a liquid flows through the pistil to the germ. This liquid is necessary for the full development of the seed. Without it the seed never comes to maturity. If then any disorganization of these organs should take place, the growth of the seed would be checked. As moisture causes the anther to swell and burst, if there be too much wet just before the anthers are ripe, or far enough developed, they burst, and the pollen is scattered before it comes to maturity; as a necessary consequence the germ of the future seed is deprived of this indispensable nutriment, the growth of the seed is checked, and the grain shrinks—or as it is called—rust ensues.