

and furnished throughout their length with one or two rows of stomata or minute orifices, which in dry weather are closed, and in wet weather are open, and which serve the purpose of imbibing moisture according to the wants and condition of the plant. The leaves and glumes or chaffy covers of ears of wheat are provided with similar stomata, which also are to be found on the leaves, stems and branches of all plants, and are the means provided by nature through which plants obtain necessary moisture. Now these stomata, while imbibing moisture, also take in with it the sporules or seeds of the *puccinia graminis*. Each of these fungous plants sheds some hundreds of sporules, lighter and more minute than those of the puff ball; and as even a healthy crop of wheat produces myriads of *puccinia*, while a mildewed crop supplies inconceivably numerous myriads, we can imagine what vast invisible clouds of sporules are wafted by every wind during the sporing period, which lasts from May till October, and how they must become intimately mixed with all the dews and moisture which the thirsty plants imbibe. The Rev. Edwin Sidney, in his work entitled "Blights of the Wheat," says: "The rapidity with which mildew sometimes spreads is astonishing. Only let the circumstances be favorable, and millions upon millions of sporules seem ready to enter the stomata, and germinate beneath them. The atmosphere is charged to an inconceivable extent with such invisible organs of reproduction. Fries declares the sporules to be so infinite that they rise like thin smoke into the air by evaporation, and are dispersed in innumerable ways, as for instance, by the attraction of the sun, by insects, by wind, by elasticity, or by adhesion. He asserts that in one individual he calculated, on good grounds, that there were at least ten millions if not more. Thus a stoma can scarcely ever perform the function of inhalation without taking in more or less of these sporules; and it is a happy circumstance that they refuse to grow except in certain places, and under peculiar conditions, for if their vegetation were general the produce of the earth would be almost entirely consumed by them."

When the sporules of *puccinia* have entered the stomata of wheat, and effected a lodgement beneath the epidermis or rind of the plant, they both prey upon the tissues, and intercept a portion of the sap which ascends from the roots for the forming and nourishing of the grain; hence the grain never comes to perfection, but shrivels up, containing comparatively much bran and little flour, so that wheat which has been mildewed, has been found from accurate investigations to lose from 31 to 75 per cent. of flour.

*Remedies of Mildew.* From the above account of the nature of mildew we may easily perceive that it would be impossible wholly to exterminate the fungous plants which are the cause of it. But though it cannot be wholly exterminated, yet the power of controlling it remains in the hands of the observant and skilful agriculturist. The conditions of soil and culture, and the healthy or unhealthy state of the wheat plants, upon which the progress of mildew very much depends, may be powerfully modified by the skill and the arts of enlightened husbandry. All soils are subject to mildew, but some yield more readily to it than others. Clay soils offer the greatest resistance to it, in consequence of their tendency to keep up an equable temperature about the plants, and thus save them from frequent vicissitudes of heat and cold. Calcareous and sandy soils, on the contrary, from their opposite tendency encourage mildew on the crops raised upon them, hence the importance of an abundant mixture of clay among a sandy soil, at once improving its texture and lessening the tendency to mildew.

Moist and "muggy" weather has been found to be most-favourable to the spread of mildew, and although the farmer cannot influence the weather, yet by judicious surface draining of all marshy places, and subsoil draining of all wet fields, much might be done to ameliorate the very climate, and remove the