first-class clover-hay, should provide himself with hay-caps. Clover is so susceptible to injury from rain, that a single wetting depreciates its value very greatly. It is also hurt by exposure to the direct rays of the sun. The use of hay-caps will add to the feeding value of hay one or two dollars per ton each and every year.

"Sir J. B. Lawes has been growing wheat continuously on the same land, without manure or rotation, for forty-seven years, at Rothamsted. His forty-seventh crop, last year, yielded, on one acre, nineteen and three-eighths bushels, and, on another, twenty and three-eighths. He says that there has not been a year in the whole forty-seven when his wheat yield from this land was not greater than the average of the world. When twenty bushels can be grown at the end of forty-seven years of such treatment; by tillage alone, in an old country like England, it is certainly well for us to revise some of our American ideas."

Dr. Hoskins is a man singularly devoid of prejudice. If he, a very outspoken man, sees anything deserving of praise, he never stints his praise. *Mutatis mutandis*, I would say: "it is certainly well for us to revise some of our *Canadian* ideas." Our land is good, our summers are propitious, our implements are not inferior, and our crops are—well, I am almost ashamed to think what they are. And why are they such as they are? Principally owing to our negligent way of putting the seed into the ground. Observe; Dr. Hoskins says: When twenty bushels an acre can be grown after 47 years of such treatment, by *tillage alone!* And the average wheat crop of the province of Quebec, with a rotation of some sort, manure, combined with such tillage as it gets, is less than half of what Lawes grows, after 47 years continuous cropping with the same plant, no manure, but with plenty of tillage. Well may many of our agronomes advise us to devote ourselves entirely to dairying and give up growing grain entirely! But I hope for better things from my friends and readers.

I have just received from the Secretary of Agriculture of the United-States, a copy of "Six lectures on the Investigations at Rothamsted Experiment-station," delivered by Robert Warington, F. R. S., before the Association of American Agricultural Experiment-stations, at Washington, D. C. These lectures are full of information, both practical and theoretical, and I hope to be able to lay before my readers a résumé of them which will give some idea of the wonderful work Sir John Lawes, a private English gentleman, has been doing for the last fifty years without the slightest assistance pecuniary or otherwise, from government, but purely at his own expense.

Rothamsted is about 25 miles from London; the manor has been in the hands of present family for about 270 years.

Sir John Bennet Lawes, Bart., was educated at our great College of Eton, (1) and at the University of Oxford. Thus, he was not only a gentleman of family, but an educated gentleman, both of which facts would, 50 or 60 years ago, have prejudiced people against him as a teacher of agricultural practice as much as the same facts prejudice farmers against educated gentlemen in the province of Quebec to-day. But as men who are really in earnest about never mind what, can live down prejudice in our part of the world, it took but a few years for Lawes to prove to the average English farmer that he had the root of the matter in him.

Sir John enjoys the advantage—I at least have a right to call it so—of being the product of a very great cross of blood.

(1) Eton College is a *school*. There are at present nearly a thousand boys there.

He is descended from the family of Wittewronge, who originated to England from their native Flanders during the religious persecutions, about 1564, and settled in Buckinghamshire. In 1623, the manor of Rothamsted was bought by John Wittewronge, who was created a baronet by Charles II, and heirs male soon failing, the Lawes family succeeded to the estate by marriage with Mary Bennet, great grandaughter of James Wittewronge.

How and why he began to interest himself in experimental agriculture he shall tell himself:

At this time I had the home farm, of about 250 acres, in hand. I entered upon it in 1834. Farmers were suffering *from the abundance of the crops*, and wheat, though rigidly protected, was very low in price. For three or four years I do not remember that any connection between chemistry and agriculture passed through my mind; but the remark of a gentleman (Lord Dacre), who farmed near me, who pointed out that on one farm bone was invaluable for the turnip crop, and on another farm it was useless, attracted my attention a good deal, especially as I had spent a good deal of money on bone without success. Somewhere about this time a drug broker in the city of London asked me whether I could make any use of precipitated gypsum and spent animal charcoal, both of which substances had at the time no market value. Some tons of these were sent down, and as sulphuric acid was largely used by me in making chlorine gas, the combination of the two followed.

To show the extent of the experiments carried on at Rothamsted, extensive both in area of land and of time employed, I append an account of the systematic field experiments at Rothamsted, from 1843-91:

| Crops. | When begun. | Duration | Continued or ceased | Plots. | Area. |
|---|---|---|---|---|---|
| | | *Years.* | | | *Acres.* |
| Wheat | 1844 | 48 | Continued | 37 | 11 |
| Wheat and fallow | 1851 | 40 | do | 2 | 1 |
| Wheat (varieties) | 1868 | 15 | Ceased | 20 | 4-8 |
| Barley | 1852 | 40 | Continued | 29 | 4½ |
| Oats | 1869 | 10 | Ceased | 6 | |
| Beans | 1847 | 32 | do | 10 | 1¼ |
| Beans | 1852 | 27 | do | 5 | 1 |
| Beans and wheat | 1851 | 28 | do | 10 | 1 |
| Clover | 1849 | 29 | do | 18 | 3 |
| Leguminous plants * | 1878 | 14 | Continued | 18 | 3 |
| Turnips † | 1843 | 38 | Ceased | 40 | 8 |
| Sugar beet † | 1871 | 5 | do | 41 | 8 |
| Mangel-wurzel † | 1876 | 16 | Continued | 41 | 8 |
| Potatoes | 1876 | 16 | do | 10 | 2 |
| Rotation | 1848 | 44 | do | 12 | 3 |
| Meadow | 1856 | 36 | do | 22 | 7 |

* Continuous with the clover. † Continuous root experiments.

Trials, in pots, showed the value of manuring turnips with bones dissolved in sulphuric acid, and, after field experiments with the same manure and crop, Lawes finally was induced to take out a patent (1842) for treating mineral phosphates with sulphuric acid, which was the commencement of the present enormous manufacture of artificial manures.

Like M. Ville, the great French agricultural chemist, Mr. Lawes soon felt that each particular kind of plant had a special desire for a particular kind of food, and hence the necessity of studying the apportionment of each constituent of any manure to certain categories of plants. It is doubtless true that a mixture of phosphate of lime, potash, lime, with a certain amount of nitrogenous matter is sufficient for all the wants of plants; but it is no less true that some one or other is more suited to the wants of one kind of crop than to the