

been, we may more reasonably attribute crop returns lower than the average, and a greater accuracy of returns may partially account for them. We know that the agricultural produce of Britain is now far greater than in former times, and we know also that the average yield of wheat there is more than double that of America—nearly thirty bushels to the acre in England, and less than thirteen in the United States.

It is said by old experienced farmers that there are no such good crops raised under the modern system of farming as there were when the summer fallow was part of the regular rotation of the farm—that the bare fallow brought into operation productive powers of the soil that would otherwise have remained dormant. The land, not merely the surface soil, is a vast reservoir of agricultural wealth, of mineral fertilizers, such as are most beneficial to the growing of wheat, clover and many other farm products. If it be "apparent that the fertility of the soil is rapidly decreasing" with our improved agriculture, there is in the land itself the material for its restoration to renovated fertility, if fitting means be used. It is the part of farmers to continue their onward progress in agriculture, taking advantage of every means of improvement, and, if need be, to have recourse at intervals to the old method of fallowing to bring from beneath the surface the hidden stores of additional improvement.

#### Agricultural Experiments by Mr. Lawes, of Rothamsted, Eng.

The experimental farms of Mr. Lawes have of late been the subject of comment by the agricultural press in America, as well as in England, where they are carried out. The great work of making such experiments, and carrying them on continuously since the year 1834, might well be expected to be the work of a society such as the R. A. S., or of a company organized and endowed by the nation, and not of a private individual. Without any extraneous aid, and relying solely on his own resources, he has prosecuted his researches for nearly half a century. Mr. Lawes has associated with him a man eminently qualified to aid in the experimental work carried on—Dr. J. H. Gilbert, F. R. S., &c. So highly have their labors been estimated that a new laboratory was built for them by public subscription among agriculturists in 1855, and since that period the work carried on and the results attained have made the laboratory and experimental grounds of Rothamsted known to scientists and agriculturists in the New as well as the Old World.

The problem Mr. Lawes proposed to solve was to determine the actual relations of the crops grown on the various farms to the soil and the various manures or fertilizers used to promote their growth, and to do this on a scale of such magnitude, both for area and time, as would settle upon a strong and safe basis the fundamental principles of agricultural practice. For a work so extensive in design and so vast in all its details he has been obliged to have a number of assistants, chemists and others.

The investigations are under two heads: First—Field experiments—those on growing plants, &c.; and, Second—Experiments on animals, &c. We will refer to the field experiments.—To grow some of the most important crops, which were usually grown in rotation, each separately, year after year, for many years in succession on the same land, and to do this (1) without manure, (2) with farm yard manure, and (3) with a great variety of chemical manures; the same manure being, as a rule, applied year after year on the same plot of ground and on the same crops. These experiments have been varied by an actual course of

rotation with different manures. For example, wheat has thus been grown for thirty years in succession on thirteen acres of land, divided into thirty-five plots, and has been varied on other plots with various kinds of wheat, and alternated with fallow for twenty-seven years on one acre in two plots. In like manner for barley, oats, beans, clover, turnips, sugar-beets, mangold wozels and potatoes for various areas and times, as high as thirty-two years in succession and also for like times.

The experiments on permanent meadow or park grass land have been continued over twenty years, and have been attended with instructive and useful results. It is found that in case of the continuous treatment by certain mineral manures only, while the annual average crop for twenty years has risen from twenty-one and a quarter hundred weight of produce per acre, weighted as hay, to sixty-two and a half hundred weight per acre, the number of species of plants has diminished from fifty to about twenty, and these the most useful of the grasses, &c. The land continuously fertilized with mineral manures gave 5½ tons of hay per acre, and the adjacent unmanured gave 2½ tons.

In the wheat field called "Broadbalk" it needs no skill to see the immense disparity between the several plots of grain growing side by side and under treatment for over a quarter of a century by different fertilizers. It is notable that this old field upon the English chalk, left unmanured continuously for the whole period of time of these experiments (there are two such plots upon it), yields an average of 14 bushels of wheat per acre. Fourteen tons per acre of farm-yard manure have raised the average yield of this land from fourteen to thirty-five bushels of wheat to the acre. The experiments with the several fertilizers, separately and combined, showed that a combination of mineral manure with superphosphate of lime and ammoniacal salts is essential to the production of the highest condition of fertility.

[From a report by the special correspondent of the *New York World* the above sketch is in great part abridged.]

#### Wheat from South Australia.

The importation of breadstuffs to England from every point of the compass is unlimited, and the surprise is that one country can consume the wheat and corn from every continent on the globe, and that country herself being very fertile, and her agriculture unequalled by any other. Americans have not a monopoly of the British market for breadstuffs. The north of Europe sends vast supplies; India exports largely, and from the Pacific vessels discharge their cargoes in the ports of Great Britain. A new field of her grain importation was opened out on June 11th by the arrival of the barque Calden, from Adelaide, South Australia, with a cargo of 6,210 bags of wheat. This is said to be the first grain cargo which has come direct from South Australia to Sunderland. This season's wheat production in South Australia has been extraordinarily abundant, and this has, it appears, induced British merchants to undertake importation from such a great tance.

Every such incident is a lesson for Canadian farmers. It is, "line upon line," impressing upon us the policy of no longer making wheat our only agricultural staple. England, the great market for agricultural produce, is abundantly supplied by all nations with breadstuffs, and consequently we may cease to expect the high prices there for wheat. In fact, the steam engine has brought all nations nigh each other, and prices are nearly

equalized in the country where grown and the far off land where they are consumed.

There is a brisk demand for beef in the English market, with paying prices. Meat now sells for more than double the price it commanded thirty years ago. Why then not feed more cattle of such quality as will command the highest prices. Feeding cattle will remunerate the feeders—but it is only feeding well-bred animals, and feeding well.

#### The Difference Between Drained and Undrained Land.

Be the season wet or dry, the great advantages of underdraining, wherever necessary, is apparent to any one who observes the state of growing crops. The sickly yellow hue of the crops, cereals or others, where surplus water is stagnant in the soil, shows a marked contrast to the healthy dark green of the crops on the land in which no surplus water has been allowed to stagnate. The application of manure can effect this much, but it can never be a substitute for good labor, of which the first and most profitable operation is carrying off the water, which, if allowed to remain, is deleterious to every plant that grows on the soil. Not only is the crop, whether cereals, grasses or roots, much lighter in yield on wet than on dry land; but it is also much inferior in quality.

The *Agricultural Economist*, in his view of "The Month and the Farm," refers graphically to this subject. He says:—"One thing, however, is sufficiently clear: the present year's wheat crop is doomed to be very variable. On cold, wet soils the plant went off so yellow during the wet weather, and still remains so sickly that the best weather cannot now provide a perfect remedy. Never was the difference between drained and undrained lands so marked. In travelling through every district it strikes on the attention most vividly, and the difference in the value of the respective crops would be more than equal to the entire cost of effecting drainage. On the other hand some very good crops of wheat appear on lands of a hungry, gravelly, avid character, which not unfrequently are found suffering at this time from the want of moisture."

These observations will no doubt lead many to open their eyes, that they may see more clearly the difference between neglected farms and those that are properly cultivated.

#### Notes from my Garden.

EFFECTS OF THE PREVIOUS YEAR.—The injury done to shrubs or trees is not limited to that immediate season, whether the cause of the injury may have been insects or frosts. Last year some currant bushes that were stripped of their leaves by the caterpillar before they were observed have never since been healthy. They were well pruned in the fall and manured, yet in spring they leaved out badly, many of the smaller branches not at all, and they fruited badly, not yielding half a crop. It is a better plan if trees be injured as these were, to grub them and plant others in their stead. If in the same place remove the earth in which the old trees grew and replace it with fresh earth.

COAL ASHES AROUND FRUIT TREES.—I put a deep layer of coal ashes around my plum trees in the fall. The application did not wholly save the fruit from the curculio, though I have a pretty fair crop without having used any other protection. The coal ashes, though it seems not a perfect preventive, I find to be useful, applied as it was, as a mulch, as a fertilizer, and as an aid in fighting the insects.

MILDEW.—This season, for the first time, I