

HOME COURSE IN SCIENTIFIC AGRICULTURE

FOURTEENTH ARTICLE. COMMERCIAL FER- TILIZERS.

By EDWARD B. VOORHEES, Late Director
of the New Jersey Agricultural
Experiment Station.

THERE is perhaps no question of greater importance to the practical farmer than that of soil fertility. To produce profitable crops and at the same time to maintain and even to increase the productive capacity of the soil may rightly be termed "good farming." Many farmers are able to do this, and the knowledge of how to do it has been largely acquired through years of experience, during which the character of the soil, its adaptability for crops and the methods of its management and manuring have been made subjects of careful study, without, however, any definite and accurate knowledge concerning manures and their functions in relation to soils and crops. Experience is an excellent teacher. Still a definite knowledge of the fundamental principles may be substituted for years of experience in the successful use of manures.

The fertility of the soil would remain practically unchanged if all the ingredients removed in the various farm products were restored to the land. This is to a large extent accomplished by feeding the crops grown on the farm to animals, carefully saving the manure and returning it to the soil, and where it is practicable to pursue a system of stock feeding in which those products of the farm which are comparatively poor in fertilizing constituents are exchanged in the market for feeding stuffs of high fertilizing value the loss of soil fertility may be reduced to a minimum, or there may be an actual gain in fertility.

A careful study of the present condition of farming in the United States indicates, however, that as a rule the manure produced on the farm is not sufficient to maintain its fertility and the need for artificial supplies is real, though the amount required may be considerably reduced by careful management.

In the system of so called "grain farming," which has obtained over large areas of this country for a long time and is still practiced, the live stock is often limited to a number sufficient only to the needs of the farm for labor and food. The grain is sold, and the manure is made up chiefly of the natural wastes or unsalable material, such as straw, stalks, etc. The grain contains proportionately greater amounts of nitrogen and mineral constituents than these wastes. Hence the practice continued for a long time results not only in a deficiency in the soil of organic substances containing nitrogen, but also in an exhaustion of the mineral substances. The original character of the soil and its treatment measure the rate of exhaustion. The less fertile soils of the east and south are rapidly depleted, while the rich prairies and river bottoms maintain their fertility for a longer period.

The continuous cotton and tobacco growing of the south and the wheat growing of the west are even more exhaustive, since here the demands upon the soil are not changed. Year after year the same crop is grown, and the same kind and proportion of constituents are required, while even slighter returns are made in the way of manure than in the system of farming just described. Under such conditions the decomposition of the organic matter in the soil is accompanied by proportionately greater losses of nitrogen. Moreover, the land is left bare for a large part of the year, and its fertility is thereby still further decreased. The crops become less abundant each year, not because the soil is entirely exhausted, but because it is so far exhausted of those constituents essential to the special crop grown that its production is no longer profitable.

Changed conditions of farming, which have an important bearing on this point, are, first, increased cost of labor and lower prices of many of the products of one crop farming, and, second, an increasing demand for market garden products and fruit. For example, in growing wheat, the labor of preparing the soil, of sowing and of harvesting is practically the same, whether the yield is ten bushels per acre or thirty bushels, and the same is true of a number of other crops; hence in case of the larger yield the cost of labor per bushel is materially reduced. Meager crops of a relatively low value cannot be produced profitably with high priced labor. Soils of a high degree of fertility are required in order to produce large yields of these crops. The return to the soil of only the wastes of the farm leads sooner or later to a decreased fertility, however good the management may be; hence the need of supplies of plant food from sources outside the farm in order that maximum crops may be produced.

It has been demonstrated in the case of market garden crops that even very fertile soils contain too little available food to insure a maximum production. This is especially true where rapidity of growth, earliness and high quality

of produce are important factors. The areas now necessarily devoted to these crops are so great that the amount of farm manures available is much too small. Besides, the constituents contained in such manures, being in part but slowly available, are less useful than the more active forms contained in commercial fertilizing materials. Market garden crops are in a sense artificial crops and, as a rule, need artificial supplies of plant food.

Fruit culture, an industry of growing importance, is profitable, particularly on the poorer soils near the eastern markets, largely in proportion to the amounts of the mineral elements applied in excess of those contained in soils otherwise well adapted to the crops. A proper supply of food not only enables the trees to resist unfavorable conditions, but improves the quality of the fruit and prolongs the bearing period of the orchards and vineyards.

It will be thus seen that commercial fertilizers can be used most advantageously either in re-enforcing farm manures in general or in providing a generous supply of quickly available plant food in specialized, intensive farming. It should be the aim in applying such fertilizers to supplement rather than to replace entirely the manual resources of the farm, for the best results from their application may be secured only on soils well stocked with organic matter (humus), a material that can be maintained in the soil only by the systematic application of the bulky barnyard or green manure.

Nitrogen, phosphoric acid and potash are the constituents most likely to be deficient in soils or most quickly exhausted by the production and removal of crops. They are known as "essential" fertilizing constituents, and the value of a commercial fertilizer is determined almost exclusively by the amount and form of the nitrogen, phosphoric acid and potash which it contains. It does not follow, however, that all soils, or crops will respond equally to applications of materials containing these elements, for the needs of soils and the requirements of crops vary.

Soils differ as to their needs for specific fertility elements, owing either to their method of formation or to their management and cropping. A sandy soil is usually deficient in all the essential plant food constituents—nitrogen, phosphoric acid and potash—while a clayey soil usually contains the mineral elements in abundance, particularly potash. On the other hand, a soil very rich in vegetable matter is frequently deficient in mineral matter, while a limestone soil is likely to contain considerable proportions of phosphoric acid.

These are the indications in a general way, and they explain why it is that different kinds of soil that have not been cropped differ as to their need of the different fertilizing constituents.

Methods of management and cropping also exert an influence. For example, soils of equal natural fertility may not respond equally to uniform methods of fertilization, because in the one case a single crop requiring for its growth proportionately more of one of the essential elements than of another is grown year after year, and it may be that the element required is the one that exists in the soil in least quantity.

On the other hand, crops may be grown that demand but minimum amounts of the element in question.

Summarizing the conclusions of science and practical experience in regard to the use of commercial fertilizers, it may be said:

First.—Commercial fertilizers are mainly valuable because they furnish the elements—nitrogen, phosphoric acid and potash—which serve as food, not as stimulants.

Second.—The kind of farming in the past and the demands for special products in the present make their use necessary in profitable farming.

Third.—In order to use them profitably the farmer should know—

(a) That nitrogen, phosphoric acid and potash are the essential manual constituents.

(b) That the agricultural value of these constituents depends largely upon their chemical form.

(c) That these forms are contained in specific products of a well defined character and composition and may be purchased as such from dealers and manufacturers and may be mixed successfully on the farm.

Fourth.—The agricultural value of a fertilizer bears no strict relation to the commercial value. The one is determined by soil, crop and climatic conditions, the other by market and trade conditions only.

Fifth.—The variations in the composition and value of manufactured fertilizers which contain the three essential constituents are due to variations in the character and in the proportion of the materials used.

Sixth.—The ton basis alone is not a safe guide in the purchase of these commercial fertilizers. Low ton prices mean either low content of good forms of plant food or the use of poorer forms. Fertilizers, high grade both in quality and quantity of plant food, cannot be purchased at a low price per ton.

Seventh.—The best fertilizers cannot exert their full effect on soils that are too dry or too wet, too compact or too porous. They can furnish but one of the conditions of fertility.

Eighth.—The kind and amount to use should be determined by the value of the crop grown and its power of acquiring food.

Ninth.—A definite system or plan should be adopted in the use of fertilizers. "Hit or miss" methods are seldom satisfactory and frequently very expensive.

NOT THE SHORTCAKE OF OLD

Writer Laments That Hotel and Restaurant Variety Is Hardly What Mother Used to Make.

Are you among those unfortunates who once knew the taste—no, not mere taste, rather the all-pervading influence—the ecstatic hypnotism of the palate, produced by a real strawberry shortcake, and are now reduced to the restaurant and hotel variety? I saw "strawberry shortcake" on the menu the other day. My mind promptly visualized an old blue plate staggering under a three-decker wedge of yellow foam biscuit, loaded down with a plint of field strawberries and smothered under a cup of rich cream.

The vision perceptibly altered when the waiter placed before me a thin and haggard piece of dough, soaked with milk and garnished with a few sliced bits of half green market berries that spoke eloquently of the high cost of living.

But there was a time—when shall return the glory of its prime?—when all the poetry of youth ripened on the fragrant stalks of the field strawberry.

Shortcake was the main item on the table, two big three-layer affairs, on old-fashioned dinner plates as big as platters. Oh, of course, there was the usual pyramid of baked potatoes, and four or five pounds of beefsteak with butter gravy, and a loaf or so of bread and maybe a soup plate of green peas at each plate, and like enough a pitcher of milk or cider; but it was well understood that the shortcake was the chief thing.—Exchange.

COLORS TO CURE DISEASES

Red Cloth Considered Efficacious by Many Dwellers in English Country Villages.

In many English country villages today there are old women who declare that the surest way of curing a sore throat is to wrap the affected member in red flannel. The belief that bodily welfare depends upon and responds to certain colors is very ancient, and one that is reflected in the customs of many lands. Red particularly is marked as a healing color.

From times immemorial the Chinese have dressed smallpox victims in carmine color, while in Tongkin children who get the measles are painted red. In Spain, too, it has long been customary that anyone suffering from measles shall be attired in a red shirt and fed with red syrup; and the Spanish peasants regard the "red" treatment as being far more important than any medical aid.

The curious belief that ailments can be cured by certain color changes has a fairly sound scientific basis, though scientific color experiments have not been carried very far. Learned authorities agree that red light is excellent in most skin diseases, while blue and violet are infallible germ killers. Green is regarded as a sure bringer of rest and calm, and is generally used in treating all sorts of eye complaints and nervous diseases.

To Make Use of Horse Chestnut.

The soapy nature of the kernel of the horse chestnut has led investigators to search for a way to utilize it in removing dirt and grease from textile goods. According to Les Matieres Grasses, several methods of extracting this soapy substance have been patented, and, moreover, profitable uses have been found for other constituents of the horse chestnut. The shell is rich in tannin, and is used in preparing an extract for tanning leather. The kernel contains about 6.6 per cent. of a pale yellow oil similar to almond oil. After the oil has been extracted the residue, treated with dilute alcohol yields an extract containing about 15 per cent. of eucalic acid, a saponaceous substance that has excellent lathering and cleaning properties. The material left after the oil and soap have been removed can be made into a white starch. When treated with cold water to remove the bitter principle, it is suitable for food.

Got the Idea.

As a stolid young German was steering a trio of other Germans about for a day, it became necessary to use a telephone. Though Fritz had had small dealings with telephones, the idea was so appalling to the three newcomers that it occurred to him as an opportunity to cover himself with glory.

He stepped up to the 'phone in as jaunty and debonaire a manner as he could.

He rang the bell for central with something of a flourish and took down the receiver.

"Hello—is dis—" He paused limply; he was stuck! Only a second, however. Then his self-confidence came back:

"Is dis der middle?" he finished smartly.

Wise Young Wife.

Not all young matrons are so unsophisticated as some persons think. One striking exception resides in Harlem. Entering the butcher shop on the eve of a large house party to be given at her home, she saw displayed a dozen chickens.

"Please pick me out a half-dozen chickens that are tough," she said, "I have a special reason."

The butcher put aside seven.

"Are those all?" she asked.

"Yes, ma'am," was the reply.

"These will do," she said.

"Then send the other five to my house at once," said the young matron.

The butcher is guessing still.

THE CAMPFIRE

THE ONLY NATIONAL HYMN.

Senator Rayner is correct in speaking of "The Star Spangled Banner" as the national anthem, which he did in his effort to get Fort McHenry preserved as an historical monument now that is no longer valuable as a fortification. Senator Heyburn denies that it is the national anthem more than any other patriotic song, and while he does not name an official and authentic anthem he thinks "My Country 'Tis of Thee" is probably the one. The objection to this is that the air is that of "God Save the King." "The Star Spangled Banner" is not very easy to sing, nor are the words even easy to commit to memory, but if Senator Heyburn will consult the military and naval authorities he will learn that it is at "The Star Spangled Banner" that officers and men rise and uncover or otherwise salute.

VETERAN FINDS HIS GUN.

Concealed in a hollow tree where he had placed it fifty years ago, a New Jersey veteran found what was left of his rifle that he had abandoned during the battle. The man noticed that he could not possibly escape capture, this happened very close to Devil's Den, and quickly thrust his gun into the hollow of a tree in the neighborhood. The man had not visited the field of carnage since, but when at Gettysburg during the celebration, he thought of this incident and went to look for the place, which he easily remembered. Sure enough, the barrel of the gun, rusted of course, was still hidden away in the hollow, the stock having completely rotted away. He said he would not take \$100,000 for the relic.

A SORRY LOT.

Well, Br'er Wilson," said the elder of one of the colored churches to a newly appointed pastor, "what do you think ob yer new congregashon?"

"Since yo' asks me, Br'er Johnson," replied the minister, "I have got to say dat I tink dey is er scrubby-lookin' crowd."

"Why, Br'er Wilson, what do yo' mean?" questioned the other in amazement. "Dese folks has mo' campmeetin' and got religion oftener dan mos' eny congregashon in town."

Well, dat's jes' it, Br'er," responded the pastor, "dat's jes' de trouble. Dey has done wore out de seats ob

dey pants backaldin' and dere knees prayin' fer fogibness."

SYKES' DOG AND HOOD'S ARMY.

After the battle of Nashville a friend asked President Lincoln if he expected any more trouble from Hood's army. He replied:

"Well, no Medill; I think Hood's army is about in the same fix as Bill Sykes' dog, down in Sangamon county. Bill had a long yellow dog that was forever getting into the neighbors' meat houses and chicken coops. They had tried to kill it a hundred times, but the dog was always too smart for them. Finally one them got a small bag and filled it up with powder, tying a piece of punk around the neck. When he saw the dog coming he fired this punk, split open a hot biscuit and put the bag in, then buttered it and threw it out. The dog swallowed it at a gulp. Pretty soon there was an explosion, and the pieces of the dog fell all around. Bill Sykes came along, and, seeing the scraps lying around, said; 'I guess that dog, as a dog ain' of much account.' There may be scraps of Hood's army around, but I guess his army, as an army, ain't of much account."

A GRATEFUL CONFEDERATE.

George See, 140th N. Y., Orange, N. J., says that during the war the musicians used to help the doctors with the wounded and carry the wounded from the field. He became quite an expert in caring for the wounded, so much so that a Confederate Lieutenant named M. C. Stowers, 6th Ga., who was a prisoner and had one of his legs amputated, would not allow the doctors to remove the bandage until Comrade See came. At one time, when the doctors were making their rounds early in the morning, the Confederate refused to let them touch his leg until Comrade See was called. Comrade See had to be gotten up out of bed, and when he came in the Confederate said: "Now George, don't be mad at me. You know I depend on you for good treatment, and when this thing is over I want you to come down to Atlanta, and I will see you thru."

WHERE HE DID BATTLE.

Former District Attorney John J. Sullivan was the principal speaker at a reunion of old soldiers a few years ago. He had all the wonderful command of pathos and eloquence in full working order that day, and as he concluded his oration tears glistened in the eyes of many of the veterans. One

of the old boys came up to Mr. Sullivan and said:

"Your description of the scenes on the field of carnage during a fight was beautiful. You must have been in the thick of a battle some time. Where did you have your most thrilling experience?"

"At Warren," replied Colonel Sullivan.

"A Warren?" Why, I never knew there was any fighting there."

"Probably not," replied Colonel Sullivan, "but if you had been behind the bat for Warren the day we beat Youngtown 1 to 0 you would have known you were in a fight and a mighty warm one, too," and the Colonel extended his guarded and twisted fingers to prove his assertion.—Cleveland Leader.

WHEN THE BUGLE WAS A GONG.

When John E. Wilkie, formerly of the secret service, was young, he served with distinction among the border fighters of the West in their raids on bands of insurgent Indians and cattle "rustlers."

On one occasion according to Mr. Wilkie the posse on which he was serving ran out of available horses, and car horses had to be forced into commission. These animals were unaccustomed to any command other than that of the car-bell, and refused to obey the customary bugle calls.

Accordingly the posse found it necessary to procure a large gong, which was struck, once for the troop to stop and twice for it to advance. In this manner they kept fairly good order.

One of the company—a bit of a wag—composed a parody on "Barbara Frietchie," a portion of which ran:

"Who touches a hal: of you gray head
Dies like a dog! Ding-Dong" he said.

SHE BELIEVED IN CLEAN SHIRTS.

Rose Pastor Stokes, the settlement worker, while waiting in a tenement house one day, overheard two women conversing on the stairs.

"One made the remark to the other," relates Mrs. Stokes, "that her husband always wore a clean shirt every Sunday morning."

"The other replied, 'Well, now I never cares about Sundays, but I always do see that 'e 'as a clean shirt ev'ry Saturday afternoon, cos' that's the time he is generally drinking, and when 'e does take his coat off to fight I do like to see him look nice and clean.'"

"AGRICULTURE IS THE FOUNDATION OF COMMERCE."

NORTHERN ILLINOIS FAIR

at
Streator, Illinois, September 6 to 13

An Exposition devoted to the Advancement of the Human Race, of Agriculture, Live Stock, Art and Industry, Mechanics, Horticulture, Domestic Science, Education, Women's Work and Humanity

EXHIBITS AMUSEMENTS CONTESTS OF SPEED

Greatest Fair in Northern Illinois
Largest and Best Live Stock Exhibit
"Better Babies" Contest of Wonderful Interest
A Horse Show of Surpassing merit
Free Attractions Afternoon and Night

Most Liberal Purses and Premiums
Best Machinery Display in the State
An Excellent Educational Exhibit
A Gladway of Spectacular Features
Everything from the Farm and Kitchen

EVERY DEPARTMENT A GUARANTEED SUCCESS

The Managers of the Northern Illinois Fair are making every effort to build up in Streator a fair which will fairly rival the great State Fair at Springfield, and their ultimate success is already assured. The fair this year will be much better and bigger than last year. They have provided:

The largest and best buildings of any Fair in the State, outside of Springfield
The largest Amphitheatre, seating 8,000 people in comfort

A Floral Hall which is a dream of kaleidoscopic beauty and attractiveness; 420 feet long by 70 feet wide, which will be filled to the limit with those things that appeal to one's taste and refinement—Textile Fabrics, Art, Educational, etc., etc.

There will be a Horse Show wherein the champions of the world will compete for honors. The Gladway will have new, interesting and spectacular features—15 great shows and 400 people, with everything up-to-date in the way of amusements.

There will be Free Attractions every afternoon and night. Continuous performances of daring acrobats, gymnasts, and jugglers, drills, and wall scaling—a succession of thrills and laughs—clean and amusing. There'll be

Music and Drills by Ewing's Zouave Band, winners of fame on two Continents
Trotting and Running Races of the quality that Streator always provides

A prominent feature of the week will be the home-coming of those who have ever lived in this part of the country. If you want to meet an old friend you will find him at the fair.

Everybody is invited to come and bring their families

Every comfort has been provided and a few days at the Fair will not only be interesting and amusing but educational as well. COME TO THE FAIR.

A. R. WOLFE, President CHAS. WENNINGER, Secretary