Farm Crop Queries

Conducted by Professor Henry G. Bell

The object of this department is to place at the service of our farm readers the advice of an acknowledged authority on all subjects pertaining to soils and crops.

Address all questions to Professor Henry G. Bell, in care of The Wilson Publishing Company, Limited, Toronto, and answers will appear in this column in the order in which they are received. When writing kindly mention this paper. As space is limited it is advisable where immediate reply is necessary that a stamped and addressed envelope be enclosed with the question, when the answer will be mailed direct.

Phosphates, Their History and Comparison.

Confusion of terms often leads to issues of materials with not infrequent unsatisfactory results. When the southern farmer says "phosphates" he usually means fertilizers. To some extent the word phosphate has been used with the same meaning as fertilizer in many other sections of this continent. Phosphates, however, represent a distinct constituent of plantfood and only one constituent. This constituent in its pure form is called phosphorus. Phosphorus is a heavy gum-like material which is never found free in nature but which enters into the composition of all animal and plant matter. The word phosphorus is derived from a Greek word meaning light, because in the darkness a light is given off by this substance.

For lack of fuller information students of plant growth gave the name of phosphoric acid to the carrier of this constituent. This was on the assumption that the plant most likely took up this necessary plantfood in the form of phosphoric acid.

Phosphoric acid in plantfood performs very important functions, one of which is that it hastens ripening by pushing forth the maturity of the crop through the early growing season. Another important thing that phosphoric acid does is to invigorate root growth. If a soil is short of phosphoric acid, the roots of crops growing in it are usually scarce and spindly. The practical farmer will quickly realize the importance then of a supply of phosphoric acid so that his crops through their strong roots, shall be able to stretch out and lay hold of every bit of available plantfood within their reach.

Phosphoric acid is therefore one of the most important plantfoods that the crop grower has to consider. At the present time phosphoric acid for use in agriculture is found in four common forms. About a century ago history records the fact that the rapid increase in European population was not paralleled by an increase in crop production on the continent. The result was that national scientists began to give warning that if increase in population continued without a parallel increase of crop production the day of famine could be predicted with comparative certainty.

Scientists also began to give attention to the study of the food of the plant and the supplies of the necessary materials which were lacking. A prominent European chemist by the name of Leibig observed that the addition of ground bone improved the quality of cereals. He was not satisfied with the length of time which was necessary for results to be forthcoming. On closer study of the composition of bone he found it could be treated with acid and brought to such a form that it would dissolve readily in water. When this treated form was supplied to growing farm crops they almost immediately found benefit from this material since it was soluble in water.

This discovery was a world contribution since it proved to be the discovery which gave birth to the fertilizer industry. A young Englishman of agricultural prominence named John Bennett Lawes became interested, and associated with him an English chemist, Joseph Gilbert, for a further study of the discovery, with the result that Lawes became founder of the Lawes Manure Company in London, taking out the first patent for the making of acid phosphate in 1842. Sir John Bennett Lawes also founded Rothamsted Experimental Station.

The use of bone meal as a fertilizer is probably much older than the use of acid phosphate. The bones of animals contain considerable organic matter in the flesh which adheres to them and the marrow which they contain. This organic matter aids in the decomposition of the bones in as much as it forms a home for the bacteria of decomposition. Bone meal, therefore, carries not only phosphoric acid, but considerable nitrogen. It is not as quickly available nor does it act as quickly as acid phosphate, because bone meal has to wait until the temperature of the soil becomes sufficiently high for bacterial growth to progress.

A third type of phosphoric acid has more recently been developed. It is called Basic slag or Thomas phosphate. This material is a by-product of the steel industry. In the manufacture of steel it was found that the natural iron ores of Europe contained a considerable amount of phosphoric acid. When the raw ore was melted and an attempt to make hard steel was made, it was found that the phosphorus became a serious detriment to the quality of the steel. Ways and means had to be devised to remove the phosphorus from the melted ore. An invention by a man named Bessemer provided the solution of the problem. Bessemer devised a pot or cauldron which he lined with quicklime. Into this he put the crude ore which when it melted gave up its phosphorus, the phosphorus clinging to the inside crust of the pot, forming phosphate of lime. When the melted ore had been let out the lining of the pot was removed and the cakes ground into a fine powder. This powder was found to contain a considerable amount of phosphoric acid, but in a form which was more slowly available than bonemeal and much more slowly available than acid phosphate.

Phosphates have an important place in our agriculture. Modern science shows that to some extent a soil in proper condition has power to fix some of the free nitrogen out of the air. The rain during heavy thunderstorms brings to the soil no inconsiderable amount of nitrogen out of the air in a year. Legumes, moreover, by virtue of their root structure increase the nitrogen in the soil considerably. There is no supply from which we can get phosphoric acid so easily as we get nitrogen. It does not exist in the air, therefore cannot be brought out of the air. Crops growing on the soil can return only what they take out. Moreover, animals feeding on the crops remove considerable phosphoric acid from the feed since they use it to build their bone, consequently livestock manure is relatively weak in the crop ripener. Practical crop growers know that when they attempt to grow grain on heavily manured fields they get a large increase of straw, but frequently a poor setting of grain. This is due to the unbalanced condition of the nitrogen and phosphoric acid added to the soil in the shape of manure. This deficiency can readily be corrected by the addition of 50 lbs. of acid phosphate to the ton of manure, at the time the manure is hauled out.

Regarding the use of fertilizers, the profit of using well balanced plantfood has been demonstrated by various leading experiment stations. When acid phosphate was applied to the soil it was found to increase the yield and improve the quality of grain crops. Pennsylvania Station found that the yield of corn was increased 7 bushels per acre by this means, while Ohio Station found an equal increase in wheat. By adding phosphoric acid, however, only one of the essential plantfoods is being provided as we have already pointed out, consequently when a carrier of acid phosphate was combined with one of nitrogen, long-time experiments at Pennsylvania Station found that the increase of the fertilized over the unfertilized corn amounted almost to 10½ bus. per acre instead of 7 bus. from acid phosphate alone. Ohio found an increase in wheat of over 13 bus. per acre, instead of 7½ as it got from acid phosphate. When complete plantfood was added (that is plantfood containing nitrogen, phosphoric acid and potash), the increase in yield of corn at Pennsylvania was 15.4 bus. per acre, while at Ohio an equally important increase in the yield of wheat was obtained.

Quick growing crops like cereals and root crops benefit most by the addition of soluble plantfood. Where the season is long and the plant is of such a character that its growth continues for a considerable time in summer the use of bone meal becomes highly profitable.

For pastures and orchards where the crop is growing continually, profitable results can be obtained from the use of slag, although there are indications that more profitable results come from the use of an equal amount of phosphoric acid in its available form (acid phosphate), coupled with sufficient lime to approximate that which is added in basic slag. Considerable experimentation is going on with both American and European slags. At the same time no small amount of slag is being used by the farmers of Ontario and elsewhere. This material undoubtedly has its place, but as a recent writer has said, it should be purchased entirely upon its analysis.

Slags are being made of such a low phosphoric acid content that they virtually add nothing to the soil other than the lime which, of course, in the form of ground limestone can be purchased much cheaper than it sells for in slag. Let every Canadian farmer post himself on the actual plantfood that he is buying in slag or acid phosphate. It is one constituent only and unless he is supplying a large amount of barn manure to his cultivated or cereal crops, he is unbalancing the fertility of the soil by adding acid phosphate or basic slag alone, rather than building up the fertility of his farm in a uniform and well-balanced condition by the use of properly proportioned plantfood. Phosphates have their place and it is an ever-increasing place in Canadian agriculture. The more available the phosphate the greater influence it has on hastening the ripening of the crop. This in itself is a fact of immense financial value to the Canadian farmer. If we can ripen wheat and barley ten days or two weeks earlier simply by adding phosphatic fertilizer (which actual farm tests show that we can do), it means that cereal crops can be grown with profit much farther north than is now the practice and it means immensely improved feeding quality in ensilage than is grown in the cooler climates.

Users of phosphates should keep in mind the fact, that the phosphate rock itself, which comes from the southern States for this continent and from Africa and India for Europe, is practically insoluble in water. The next thing in slowness of solubility is basic slag, then comes bone meal, while acid phosphate is almost immediately soluble where the water supply is sufficient. When we say immediately soluble we mean that up to the point that is guaranteed—16 or 17 per cent. soluble—it is immediately soluble. It is the availability that is largely responsible for the high value of this material.

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An event of great financial importance transpired on the 18th inst. in the celebration by the Royal Bank of the fiftieth anniversary of its foundation. The history of the institution is one of the financial romances of Canada, a remarkable growth in a comparatively short period from humble beginnings to a great banking business, covering not only the Dominion, but extending to many foreign countries.

The expansion of its business in recent years has been remarkable. Four other institutions with established clienteles in as many provinces were absorbed, an energetic policy was pursued, and to-day the Royal ranks well up among the big financial concerns of the Continent. Its operations in Cuba and the West Indies, a field early exploited, have given it a leading place in those countries, with the result that it has now 615 branches, and 42 sub-branches, giving it premier place among Canadian banks in this respect. Capital has grown to upwards of $16,000,000, the reserve fund to $16,400,000, deposits to $381,307,000, and assets to $470,870,000.

An accomplishment of this kind is the highest tribute that can be given the vigorous and progressive character of the management and in that tribute the vice-president and managing director, Mr. E. L. Pease, has a large share, for he it was who thirty-two years ago blazed the trail of success. The Royal Bank has in its president, Sir Herbert Holt, and its General Manager, Mr. C. E. Neill, men of energy, capacity, and wide experience in business and banking affairs. The prosperity of the bank is a reflection of the prosperity and growing commerce of Canada, in which the institution has materially aided by encouraging domestic and promoting foreign trade.

Making Things Grow

Trees, Grass, Flowers, Shrubbery: The Home Place Needs Them All.

Which of these will you buy? Two farms lie black and rich before you, level and yet well drained. As like as two peas and equally distant from the market. Two brothers own them and they built house, barn and outbuildings on the same plans and in the same year. They have traded labor in the years gone by and both have followed the same scheme of crops, have had the same amount of stock and worked their land with equal care. Both are scrupulously neat and prosperous looking. Both are for sale.

The flip of a coin might decide but it will not. In fact, there is no comparison between them. On the one farm the buildings stand bare, unprotected and without a setting. No trees to break the cold north wind, no shade from the heat of the blazing summer sun, no shrubbery to round off the corners and lend perspective to the lawn, no flowers to give a cheerful touch of color to the scene.

On the other farm, the buildings nestle against the background of a protecting grove and look peacefully out upon the highway across a shady lawn. Well-placed shrubbery gives the place a comfy, pleasing, homelike look, and a few simple flowers complete the charm.

Which will you buy?

A thousand dollars could not make you see that barren farmstead; your wife could not see it for twice as much. The bareness of those buildings seems to affect the very fields themselves and it is hard to realize that they are of an equal richness with that other farm. The one attracts the lingering gaze of every passerby.

Undoubtedly the proper planting of the home grounds is a good investment from the point of view of increasing the sale value. But how about it if one does not care to sell? If it is worth that much to someone else, is it not worth it to the owner? It is hard to put a money value on a thing like that but if some other fellow who has never seen the property before is willing to pay a thousand or two for it, you have a pretty good indication that the place is not worth any less to you who have planted it, cared for it, and become attached to it.

What is a farm for? To produce a revenue and make a home. Too many men are apt to devote all of their time to the revenue end of it and neglect the home. This is a grave mistake. The revenue is of little use if it does not increase the comfort of the home. The home is where a woman spends by far the greater part of her life. A man's business takes him to the fields and to the town, away from the home, but a woman's interest lies centred in that little farmstead. For the sake of herself, her growing family and, yes, her husband, she should insist that it be made as comfortable and beautiful as possible.

Some wise man—or was it a woman?—has said that the difference between a house and a home is a tree. Sure it is that some of the clearest memories of our childhood hang about some favorite tree in the old home grounds. Robbed indeed has been the child who has not known those sweet associations. Moreover, the trees are the home of the birds. No country woman, and certainly not the young folk, can afford to be without their cheery companionship. The most contented persons in the world are those who can get their pleasure from the things around them. Many a country woman has eaten out her heart for the festivities of the city when she had a better concert in her own front yard than was ever staged in any grand opera house. The joyful music of the birds heralding the return of spring is one of the most fascinating things that the world has to offer in the city or country and it is our own fault if we miss it. It is pathetic to see some poor beauty-starved soul in a city hovel nailing a battered little birdhouse on an old tree in a dirty little backyard in an attempt to catch a strain of that wonderful music that so many farm women with their unequaled opportunities never hear. If you are not familiar with the birds, get acquainted, and you need never know another lonely day from spring to fall.

The farmer has an equal interest here with his wife. He may not be as much in need of the bird music and companionship—though there is no reason why he should not enjoy them and improve himself by it—but they are the best paying tenants that he could possibly have. Those little songsters that live in the trees and shrubbery, eat untold myriads of harmful insects and add very materially to the value of his crops. They are the farmer's best friends and if he fails to cultivate them and provide them with suitable homes, he is neglecting a great opportunity and is not as good a farmer as he thinks he is.

Look at the care and money that are lavished on the planting and decoration of a city home. The beauty of his yard is the city man's pride, and yet how meagre are the possibilities compared with those of the farm! His poor little two-by-four yard is an absolute limit of space; he lacks good soil; he has to buy fertilizer; he is cursed with the overcrowding of his neighbors' dogs and children. And yet he persists and the results are often wonderfully attractive—so attractive that the farmer is sometimes misled into imitating him. That is a mistake.

The city lot, no matter how beautifully it may be planted, loses its beauty when it is transferred to the farm—for it is out of place. The farm plan must be broader. It must not be confined to the immediate vicinity of the house and a little patch of lawn. A fine barn and a well-kept garden are not a disgrace to be blotted out with a screen or left outside of the scheme of things as though they were something neglected and apart. They are an integral part of the farm home and should be included in the plan. Shade is as acceptable to the stock as it is to the people, and trees improve the appearance of a barn as much as they do of the house. A shaded paddock is quite as attractive as a lawn.

The farmstead is the heart of the farm, the home of the farmer, and, to a large extent, the world of the wife and children. Do not be stingy with it. Make it comfortable and beautiful. There is nothing that is more valuable to have or easier to get in the country than beauty. You may not realize how much you care for a beautiful home but the longing is there and the opportunity is there. So why not have one?

Now is the best time to plan the arrangement of garden and lawn for the spring season.

The Sunday School

INTERNATIONAL LESSON NOVEMBER 9TH,

Peter's Great Confession—Matt. 16: 13-24. Golden Text, Matt. 16: 16.

"Caesarea Philippi" was a town built by the tetrarch Philip, and called after his Roman master. It was beautifully situated at the base of Mount Hermon in the north of Palestine, about thirty miles north-east of the Lake of Galilee and near the head waters of the river Jordan. Here Jesus had come to be away from the multitudes which had thronged everywhere about Him in Galilee, and it was here that the wonderful vision of the Transfiguration took place (chap. 17), as if to confirm the faith which on Peter's lips had found such noble expression.

"Who do men say?" They had opportunities of hearing what was said which He had not. In reply to His question they tell Him that some think Him to be John the Baptist risen from the dead, others Elijah, who was expected to come before the Messiah (Mal. 4: 5), and others Jeremiah, about whom there had been a story long current that he would rise from the dead and would appear again to Israel.

"But who say ye that I am?" Some might have hesitated to make the bold confession, but not so Peter. He believed and he would speak. He was ever the strong, impulsive, and courageous leader, quick to speak and quick to act. If he failed at the time of Christ's trial, it was through perplexity and doubt which had again assailed him, not through fear. Peter's confession here no doubt represents the belief of all, or of most, of the disciples. "Thou art the Christ."

In the early history of Israel the people had been called God's son, and the king as representing the people had also been so called. In that sense the term might have been used of the Messiah, the expected King. But Jewish writers of the century preceding the birth of Christ had exalted the Messiah to a place in heaven and had endowed Him with divine attributes. While Peter may not yet have realized all that his words involved, there appears to be in his confession a recognition of our Lord's divinity, as well as the belief that He is the Messiah, and this recognition was confirmed in the marvelous events which attended His resurrection from the dead.

"Blessed art thou." Jesus addresses Peter affectionately by his old home name of Simon. He tells Simon that God has revealed this truth to him, and that it is upon such men as he that the church of the future will be founded as upon a living rock. Playfully He refers to Peter's name (in Aramaic Cephas), which means "stone," or "rock." What He says of Peter He would have said, no doubt, of any or all of the disciples who thus believed and confessed. For it is not simply truth that is the foundation of faith: it is truth lived, truth in the heart, truth believed and confessed. Peter had apprehended and believed a great fact regarding his Master, in the light of God's Spirit which was leading him, and he had confessed it with his lips. Others hearing that confession would be led also to see and to believe. And so the church would grow, being "built upon the foundation of the apostles and prophets, Christ Jesus himself being the chief corner stone" (Eph. 2: 20). See Eph. 2: 19-22.

"The gates of hell." This expression stands for the forces, visible or invisible, which are opposed to the kingdom of God. They shall not prevail. For the strongest thing in all the world is the soul illuminated by the Spirit of God bearing testimony to the truth which it has seen and known. So the psalmist said, "Out of the mouth of babes and sucklings hast thou established strength, because of thine adversaries, that thou mightest still the enemy and the avenger." (Psalm 8: 2). This was abundantly proved in the early church in times of persecution. Men, women, and even little children confessed Christ in face of the most cruel torture and death, and not all the might of imperial Caesar could compel them to deny Him. Their faith flourished and grew in the midst of persecution. It was victorious even in its weakness, mighty to the overthrowing of its persecutors, and it will prevail, we believe, until the world is won for Christ's kingdom.

"The keys." It is faith and confession that open the door of the kingdom of heaven. He who believes not only enters himself but also opens the door of faith to others. The new law that binds and looses is the law of faith.

"Satan." It is very remarkable that the same Peter, so warmly commended, should soon after have been so sternly rebuked. Jesus has been gently revealing to His disciples the fact of His approaching death. Peter, exultant and hopeful of great things, "took Him and began to rebuke Him." His words, literally translated, are "Mercy on Thee, Lord, that can never be."

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Poultry

The birds in the farm flock should have at least four square feet of floor space per bird in their house. This does not mean about four feet. It means that more room might be advantageous, but less would be dangerous. It is very difficult to keep an overcrowded house in sanitary condition. If the poultry house holds one hundred birds and one hundred and twenty-five are in the flock in the late fall, it will pay best to sell twenty-five birds and use the money to feed the remainder, rather than overcrowd them all.

When building roosts in the fall it pays to remember that the birds crowd together on cool nights and do not seem to need so much room. However, if a night becomes warm they will spread out on the roosts and they need the room for health and comfort. Calculate the roosting space in the poultry house on the basis of a hot summer night. Then at all seasons the hens will have plenty of room.

About four hens per nest is a satisfactory number in the poultry house. If the nests are scarce the birds will crowd together or hide their nests in the litter on the floor or on the range. Build nests so that there will be room enough on a nest for one hen, but not room enough for two. Two hens are apt to crowd together on an over-size nest and the quarrelling may result in broken eggs.

Overcrowding causes the birds to become heated and then they catch cold when coming from the roost on a cold morning. When young stock are housed in colony houses or brood coops they will be injured by overcrowding. Brood coops should not be used for chicks that have been weaned. They do much better when roosting in colony houses where they cannot crowd together.

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