

CHAPTER XXX

A FEW FACTS IN BRIEF

The Twelve Primary Constituents Found in Plants—Loss of Nitrogen, Phosphoric Acid and Potash by Mowing—Clover in Relation to Nitrogen and Phosphates—When Artificials should not be Used—Action of Artificials—Organic Manures—Artificial Fertilisers—Solubility of Fertilisers—Value of Artificials—Humus—Farmyard Manure—Value of Farmyard Manure—Root Absorption—Insoluble Fertilisers—Composts—Lime—Snow—Fertilisers which May and May Not be Mixed Together—Why Greens and Lawns Deteriorate—Sea Sand—Charcoal—Breeze, Cinders and Crushed Clinker—The Mechanical Condition of Soil—The Chemical Condition of Soil.

The twelve primary constituents found in plants :—

Nitrogen	Iron oxide
Potash	Magnesia
Phosphoric acid	Sulphuric acid
Lime	Silica
Water (hydrogen and oxygen)	Soda
Carbon	Chlorine

Nitrogen, phosphoric acid, lime and potash are the chief constituents to fail, because they are used up at a greater rate than any of the others.

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One ton of grass is reputed to remove 34 lb. of nitrogen, 36 lb. of potash, and 16 lb. of phosphoric acid from the soil.

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Soil without nitrogen is barren.

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Nitrogenous fertilisers tend to encourage grasses.

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Clovers extract nitrogen from the air and store it in nodules attached to their roots.

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Dwarf-growing clovers and trefoil are valuable "through the green" on hot, dry soils; they bind the sand, make a

good bottom, and, because they store nitrogen, help the grass.

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Phosphatic fertilisers tend to encourage clovers.

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Clovers are undesirable on sports grounds of any sort, so take care that you do not use fertilisers containing phosphates in excess.

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Turf apparently without clover will often produce a large crop when fertilisers are used containing phosphates in excess.

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Many lawns and greens are spoilt by being dressed with unsuitable fertilisers.

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Highly soluble fertilisers should be used in conjunction with compost on sandy soil, because if used alone they will dissolve with the first rain and be washed out of reach of the roots of the grass and so wasted.

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No artificial fertilisers should be used during very wet weather for the same reason.

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No artificial fertilisers should be used during hot, dry weather, because they lie about on the surface and waste, unless watered in.

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Artificial fertilisers do not act equally upon all soils.

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Artificial fertilisers usually give better results on heavy soils than on light soils.

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Artificial fertilisers should not be relied upon alone, especially on light soils.

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Artificial fertilisers should be mixed with sand, soil or compost, and the whole mass sifted before use.

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Manures may be divided roughly into two classes :—

Organic or natural manures.

Artificial or manufactured fertilisers.

Organic Manures :—Blood Manures, Brewers' Grains, Bran, Composts, Farmyard Manure, Fish Refuse, Hides, Horn, Hair, Human Excrements, Oil Cake, Poudrette or Native Guano, Sewage, Seaweeds, Sheep Fold Manure, Urine or Liquid Manure, Woollen Refuse or Shoddy, etc.

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Artificial Fertilisers :—Ammonium Sulphate and Ammoniacal Liquor, Bones of all sorts, Basic Slag, Coprolites, Dissolved Wool, Dissolved Peruvian Guano, Guanos, Gypsum, Kainit, Lime, Mineral Phosphates, Nitrate of Soda, Nitrate and Muriate of Potash, Norwegian Fish Guano, Retrograde and Precipitate Phosphate, Rodunda Phosphate, Spent Iron Oxide, Salt, Sodium Salts, Sulphate of Iron, Sulphate of Magnesia, Silica, Vegetable Ashes, etc.

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Some of these will be dealt with exhaustively and others ignored, either because they are of little value or difficult to obtain.

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Soluble fertilisers are those that dissolve quickly.

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Insoluble fertilisers are those that take a long time to dissolve, decompose, or become disintegrated.

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Most artificial fertilisers vary as regards their solubility.

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A soluble fertiliser is quick in action.

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A partially soluble fertiliser is not so quick in action.

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Insoluble fertilisers are slow in action.

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The value of an artificial fertiliser is determined by the standard of its purity and by the balance or relative proportion of its component parts.

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An artificial fertiliser with a low standard of purity is dear at any price.

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An ill-balanced artificial fertiliser is one that contains an excess of the primary constituents of plant life that

are required only in minute quantities by the plant, and a deficiency of the three primary constituents that are required in large quantities, viz., potash, nitrogen, and phosphoric acid.

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Sandy soils are generally deficient in humus.

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Artificial fertilisers add no humus to the soil.

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Organic or farmyard manures add humus to the soil.

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Humus is decayed vegetable or animal matter.

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Humus retains moisture, and gives body to a sandy soil.

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Humus warms a cold clay soil, and makes it work easier.

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Humus is a necessity in all soils, being the natural refuge of the soil bacteria.

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Potent artificial fertilisers are apt to destroy humus in light soil.

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Farmyard manure made in a pit is half as valuable again as that made in the open.

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Farmyard manure stored in the open should be covered with two or three inches of soil.

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Soil fixes and retains ammonia.

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The value of farmyard manure depends largely upon the quantity of nitrogen it contains.

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Farmyard manure, if placed in uncovered heaps, loses a large percentage of ammonia by volatilisation.

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Farmyard manure produced by stock fed on oil cake is richer than all other sorts.

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Peat moss manure is more valuable than straw manures,

for light sandy soils. It is richer in nitrogen, and conserves the moisture.

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Farmyard manure, if relied upon alone, is reputed to exhaust the soil.

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Farmyard manure warms and adds humus to the soil.

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Farmyard manure retains moisture and ammonia in light soils.

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Farmyard manure renders stiff soils more friable.

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Root absorption only takes place when the plant foods are in liquid or gaseous form.

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No plant can absorb solid matter.

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Insoluble fertilisers should be used in the Autumn, so that they become weathered and partly or wholly soluble by the following Spring, when the plants can absorb them.

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Soluble fertilisers should be applied when the plant is growing and able to absorb them.

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Soluble fertilisers applied when the plant is dormant will be lost and do no good.

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All fertilisers and composts should be used in a very finely sifted state, and worked into the turf by means of a stiff broom or bush harrow, so as not to interfere with play.

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All artificial fertilisers and composts should be used during dull, damp weather.

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Several light dressings of fertiliser or compost do more good than one heavy dressing, and the play is not interfered with.

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Clods of raw manure or unsifted compost thrown over turf are a sure sign of bad management :—

Because in the case of Golf the green is put out of play for several weeks.

Because half the value of the dressing is lost, as so much of it has to be removed before the ground can be got into play again.

Because there is sure to be a quantity of small stones in the soil, which will do the machines a lot of damage before they are rolled in.

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Never use clay soils for top-dressing, unless it be in the form of "Nottingham Marl," which is frequently used for top-dressing cricket pitches.

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Use good light loamy soils for top-dressing.

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Lime sweetens sour lands.

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Lime decomposes organic matter, and hastens the process of nitrification.

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Nitrification is the change brought about by fermentation or bacteria.

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■ Lime liberates soluble potash from insoluble compounds present in the soil.

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Lime improves the mechanical and chemical condition of the soil.

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Lime renders clay lands more friable, and converts insoluble compounds into soluble ones.

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Lime makes sandy soils less porous, and helps to retain moisture.

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Lime is one of the twelve primary constituents of plant life.

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Lime is necessary for the growth of grasses.

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Gas lime contains sulphate and sulphide of lime, which latter is poisonous to plant life unless it is exposed to the weather for a long period.

Gas lime is of less value than either carbonate of lime or quicklime.

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Gas lime is chiefly used for cleaning verminous land.

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Lime is present in most soils in sufficient quantity to sustain plant life.

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Gravelly, granite, and peaty soils are generally deficient in lime.

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Carbonate of lime or pulverised chalk is the best and safest to use on sports grounds.

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Snow cannot be classed as a manure, but it has a very beneficial effect upon turf, as it protects it from the extreme cold and keeps it comparatively warm.

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By removing snow the turf is not only actually damaged by being swept when in a frozen or semi-frozen condition, but the frost is suddenly let into the ground, and the turf is subjected to a sudden and severe change of temperature and condition, with the result that it stands a very great chance of being killed, or at least severely damaged.

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It is impossible to putt with any degree of accuracy upon frozen greens, so why risk spoiling them for twelve months for the sake of possibly one afternoon's golf, if it can be called golf?

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Never sweep snow from turf, and never play upon frozen turf, if it can be avoided.

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NEVER MIX—

Dung with lime.

Guano with lime.

Guano with slag.

Nitrate with superphosphate.

Sulphate with slag.

Superphosphate with slag.

Lime with sulphate of ammonia.

THE FOLLOWING MAY BE MIXED—

Superphosphate with sulphate of ammonia.

Bones with nitrate of soda.

Bones with sulphate of ammonia.

Bones with slag.

Slag with nitrate of soda.

Fish guano with any mineral fertilisers.

Phosphatic guanos with nitrate of soda.

Phosphatic guanos with sulphate of ammonia.

Organic manures with any mineral fertilisers.

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Flower gardens, vegetable gardens, and farm lands are generally manured regularly and systematically.

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Golf courses, garden lawns, and other athletic grounds are rarely manured, either regularly or systematically.

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What the manure and tillage do for flowers, vegetables, and farm crops, a rest during the winter, when the grass is dormant, is supposed to have the same effect upon the turf—the absurdity of it!

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No wonder greens and lawns deteriorate, become weedy, and eventually have to be renovated or re-made.

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Sea sand, if pure, is almost wholly composed of minute fragments of rock.

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Sea sand may contain lime in the form of crushed sea shells.

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Sea sand is a valuable dressing for golf and bowling greens.

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Sea sand has a very beneficial effect on the mechanical condition of the soil.

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Sea sand improves the surface drainage of heavy soils, warms it and makes the surface firmer and cleaner.

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Pit or river sand, if clean and sharp, can be used as a substitute for sea sand.

Pit or river sand containing clay should not be used on fine turf.

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Charcoal is a very valuable dressing for turf ; particularly for golf greens standing on heavy soft soils, and mossy bowling greens.

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Charcoal purifies and aerates the soil.

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Charcoal improves the mechanical condition of the soil.

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Charcoal improves the surface drainage of heavy soil, warms it and makes the surface firmer and cleaner.

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Charcoal should be graded to suit the soil, using the large grades on soft wet soils, and the smaller grades on medium to light soils.

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Breeze, clean cinders and crushed clinkers can be used as substitutes for charcoal.

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Breeze, etc., should be graded to suit the soil by passing them through a series of sieves of the following meshes, $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ inch.

This will give four separations :—

Fragments not exceeding $\frac{1}{8}$ inch.

Fragments exceeding $\frac{1}{8}$ inch and less than $\frac{1}{4}$ inch.

Fragments exceeding $\frac{1}{4}$ inch and less than $\frac{1}{2}$ inch.

Fragments exceeding $\frac{1}{2}$ inch.

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The mechanical condition of soil depends upon its texture.

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Soil in a good mechanical condition obtains an adequate supply of air and water for bacterial life, which is more important in producing a fertile soil than the actual quantity of nutrient material it may contain.

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Soil in a bad mechanical condition is more or less infertile, owing to the absence of the beneficent soil bacteria, in spite of the fact that it may contain an adequate supply of nutrient material.

The chemical condition of soil depends upon the quantity of matter it may contain that will, by decaying, yield sufficient available grass foods, such as organic compounds of nitrogen which nitrify readily, and compounds of phosphoric acid and potash, which become readily available for the grass.