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FARM AND ORCHARD

Notes and Instructions from Agricultural Colleges and Experiment Stations of Oregon and Washington, Specially Suitable to Pacific Coast Conditions

SOIL CHEMISTRY.

By Professor H. V. TARTAR, Oregon Agricultural College.

Chemical investigations have shown that all substances are made up of certain simple forms of matter, such as iron, aluminum and carbon, which are called elements. In most substances these elements are combined in a more or less complex form. Although some eighty of these elementary forms of matter have been discovered, only about a dozen of these are found in any quantity in plants. Carbon, hydrogen, oxygen and nitrogen make up about ninety-five per cent of the total weight of all plants, i. e., their organic portion, and are derived either directly or indirectly from air and water, the nitrogen being assimilated by the plant after fixation in the soil. The remaining five per cent of the plant consists of mineral matter or ash, the portion left when the plant is burned, and is composed mainly of the elements of iron, aluminum, calcium, magnesium, phosphorus, potassium, sodium, silicon, chlorine and sulfur. These are all taken up by the plant directly from the soil. Much investigation and experience has proven that only four of these elements are likely to be deficient in a soil, namely, nitrogen, potassium (generally expressed as "potash") phosphorus, (usually expressed as "phosphoric acid") and calcium, (or "lime," as it is generally expressed.) These are often termed the "critical" soil elements, and are the actual basis of all direct fertilizers.

It is singular to note that only very small quantities of these plant foods which are so essential to plant growth are soluble even in strong acids. Rich soils contain approximately 0.20 per cent of total nitrogen. Analysis of the acid soluble mineral substance will show about 0.10 to 0.15 per cent of phosphorus (phosphoric acid), 0.30 per cent of potassium, (potash), and 0.50 per cent of calcium (lime). The figures show plainly that proper and scientific methods of farming must be practiced for the maintenance of the fertility of even our richest soils.

The most important of these critical soil elements is nitrogen. It is combined with other elements in the soil humus (decaying animal and vegetable matter). In the free state nitrogen is a gas and in this form constitutes three-fourths of the air. The total nitrogen supply in the air over each acre of the earth's surface, if available to plants, would meet the needs of a hundred-bushel crop of corn every year for half a million years. Nevertheless nitrogen in available form is worth 18 to 20 cents a pound in the fertilizer markets. The organic matter in the soil is the nitrogen storehouse from which plants derive their supply. Constant removal by crops, oxidation of organic matter in clean cultivation as well as waste through leaching, all assist in depriving the soil of this essential element. Experience has shown that under exhaustive systems of farming the soil nitrogen supply is easiest impaired. To add available nitrogen to the soil in the form of commercial fertilizers costs from 18 to 20 cents a pound, which make it too expensive for use on a general farming scale. Experiments have shown, however, that leguminous crops, such as clover, vetch, and alfalfa, have power to obtain free nitrogen from the air through the intervention of certain microscopic organisms which live in tubercles upon the roots of these plants. Such crops add nitrogen to the soil, and hence rotation with a leguminous crop is an inexpensive and efficient means of supplying this element to the soil and one that is applicable to general farming.

The mineral plant foods, potassium, phosphorus and lime, exist in the soil in various forms: potassium often in combination with quartz in the mineral feldspar; phosphorus in combination with iron, aluminum and lime as phosphates; and lime often in the form of silicate and carbonate (limestone). These compounds are by chemical processes, which are encouraged by tillage, converted into soluble or available forms which can be assimilated by plants. The plant can only obtain these mineral elements from the soil and when the supply becomes deficient they must be furnished through the addition of appropriate fertilizers.

The fact that ordinary wood ashes are so rich in potash as to be valuable as fertilizer indicates that certain plants withdraw large amounts of this element from the soil. Six tons of well cured alfalfa hay contain 150 pounds of potash, which would cost about \$7.50 if bought in the form of a fertilizer in the open market. Potash is usually stored in the seeds of plants in relative abundance. During

Germany's Flower City. Erfurt, known as the Flower City, is the seat of the horticultural industry in Germany, thousands of visitors coming here each year to see the magnificent displays of plants and flowers cultivated in the local nurseries and hothouses.

Value of the Phrase-Maker. A talent for phrase-making can instill more life into a lost cause than logical argument.—London Truth.

plant growth this element seems to aid materially in the building up of the starches and sugars of the plant. Potassium may be applied to the soil by applications of muriate of potash, sulfate of potash, or kainite.

Phosphorus is a chief component of the seed and fruit of the plant. A ton of wheat bran contains about 24 pounds of phosphorus. The nucleus of every living cell of plants is rich in phosphorus. This element is taken up from the soil in the form of salts called phosphates, but within the plant it enters into the composition of complex organic compounds. It may be supplied to the soil in the form of bone meal or phosphate rock. Dissolved bone and acid phosphate are readily soluble forms of phosphorus obtained by treating bones or rock phosphate with sulfuric acid and are used when quick acting phosphate is desired.

Lime is absolutely essential to the normal growth and development of all agricultural plants, but for grain crops the amounts positively necessary are not large. Legume plants are heavy lime feeders. In the form of carbonate, lime plays an important part in keeping the soil neutral by combining with the acids which develop in the decay of vegetable matter. It is also a prerequisite for the proper bacterial activity of the soil. Heavy clay soils are made more friable by lime applications, and on the other hand, through its cementing action, sandy soils are rendered more compact and less leachy. Lime in the form of carbonate seems to aid materially in making other plant foods in the soil more available. Land plaster (sulfate of lime) has the property of rendering the potash in the soil more available, hence the benefit generally noted on applying this substance to leguminous crops.

Concerning Oregon soils it may be said that analyses of several hundred samples from various parts of the state prove them to be rich generally from the chemical standpoint. A table showing the average total nitrogen and acid soluble plant food content of our soils is herewith submitted classifying the results of analyses made at this station up to 1910 under three divisions.

	Total Nitrogen		Phosphoric Acid		Lime	
	Pr. Ct.	Pr. Ct.	Pr. Ct.	Pr. Ct.	Pr. Ct.	Pr. Ct.
Western Oregon	0.15	0.25	0.30	0.60		
Eastern Oregon	0.08	0.17	0.26	1.20		
Southern Oregon	0.12	0.31	0.15	1.05		

The soils of Western and Southern Oregon are generally rich in nitrogen because of their high content of organic matter which, is due to climatic conditions favorable to humus formation. These soils are almost universally rich in phosphorus. The lime content of Southern Oregon soils is usually high while some of the Willamette valley soils are apparently deficient in this element. These soils are in the main quite well supplied with potash. The semi-arid soils of Eastern Oregon, on the other hand, do not have the good supply of humus and nitrogen of the soils of the Western part of the state. This fact is due undoubtedly to the difference in climatic conditions. The Eastern soils are rich in their content of mineral plant foods.

FASHION HINTS



This attractive child's dress is made of blue gingham, with a collar of white embroidered linen. The skirt is very plain; no pleats to worry the laundress.

The Five Great Races. "What are the five great races of mankind?" a Chinese student replied, said Bishop Montgomery at the anniversary of the Society for the Propagation of the Gospel, reports the London Mail, "the hundred yards, the hurdles, the quarter mile, the mile and the three miles." In another paper a Chinese student said that "Out of sight, out of mind," could be explained in two words, "Invisible, insane."



FASHION

RIFLES in fashion count for a good deal these days. It is at the season of the year when all manner of clever things are invented to catch the eye of those who congratulate themselves that their shopping is finished. This is a ruse of the merchants to empty the purse of the buyer.

Business must proceed, even though the weather is hot and vacation time is at hand. Also the dressmakers swing the fashions around, here and there, to interest their patrons and to get away from routine. In the first of the season, when the new clothes are brought over from Paris, the models are copied by the huddled to an alarming extent. Now it is time to introduce innovations, and so we see quaint and attractive things in every gathering of women. It might be said with truth and emphasis that the public is responsible for this variety of fashions more than the dressmakers.

It is hard to get one of the latter to depart from the French models or the crinoline patterns which she has in the workshop. If she is thrown on her own resources she can do remarkably good designing, but for some reason that she does not explain she never gives herself a chance for individual experiment. No matter how many patrons she has, she follows for each a model that she brought from abroad, if she is a big importer, or she copies a sketch in a fashion book if she is a little dressmaker.

Blue Serge Gowns. It is rather wonderful to observe the popularity of the one-piece suit of thin blue serge. It has been amazingly developed in the last four weeks, and has all manner of individual touches that make it worth while. It is a good kind of gown for every woman to include in her wardrobe. It may not stand for any one occasion, but may serve for half a hundred. It is just this kind of gown that is available for all changes of climate and unexpected trips.

It can be worn with or without a coat, and in many ways pays for itself over and over.

The favorite model is an Empire skirt, more or less wide at the hem, according to our new measurements, which run from a yard and a half to two yards and a quarter. The panel down the back is rarely eliminated and the fastening is in front. There may be folds of the serge or surah or taffeta, either in blue or black, to cut off the length, and if one is averse to a narrow skirt, fashion allows an inserted box plait at each side from hips down.

The skirt, rising moderately on the bodice, is stitched to it with three rows of machine stitching. It is hung on a four-inch band of silk belting, which is fastened with hooks and eyes in front. The bodice is also attached to this belting, which preserves a neat look around the waist, although the skirt does not curve in to fit. The cut of the bodice is much fuller than it has been. The short-kimono sleeves are used and the under-arm seam is long, but there are tucks or plaits that run over the shoulder, or begin at the waist and make for fullness over the bust and under arms. The arrangement of the neck is a matter of individual preference, and there is always an undersleeve, or the simulation of one at the elbow.

One of the most attractive of these suits worn by a girl who knows how to dress has a plain skirt with panel down front and back, and a five-inch hem of the material finished with rows of black silk stitching. It is about three inches higher than the normal waist line and curved very slightly at the sides. The bodice is folded in to it, stitched down, and has a long wedge of white mulline net in the shape of a vest that runs into a high-boned stock.

Cotton-Figured Net. One of the materials that have come into being at the beginning of the hot weather is the figured cotton net that we had with us several seasons ago. It is usually in blue and white, although one can find it in two or three other color combinations. Blouses are made of it to wear over low silk slips or fine muslin corset covers run through with colored ribbon.

These net blouses, you know, are quite the fashion and are immensely popular for warm days, with suits that have a dressy atmosphere. Some women wear them in the morning with plain linen suits, but they look more fit in the afternoon or for luncheon.

The coarse-figured ones are made in kimono style or with the revived armhole and shoulder seam. They have a double-plaited frill down the front, finished with a hem of blue net or cluny lace, and are fastened with white crochet buttons down the front. The high collar is made in folds with a turnover band at the top of heavy lace. The sleeves are finished with a tight folded cuff fastened with white buttons at the back.

The net is also used for over drapery. It takes the place in some gowns of chiffon cloth or marquisette. One good-looking gown is of very thin blue messaline made with a plain empire slip with the net draped into a long tunic which opens in front, has the right side crossed well over the left, and is bordered with a half-inch plaiting of blue satin ribbon, which matches the figure in the net.

The short-waisted bodice is unusually full for these days, has a deep, round guimpe of thin French lace which only extends to the collar bone. The empire girde is made from three bands of box-plaited ribbon finished with a twisted circle of blue ribbon in front and two long ends. There are undersleeves of lace which hang free of the elbow and are shaped to a rounded point at the back, and the upper sleeves of the figured net are edged with the plaited blue ribbon.

As an economical suggestion it would be well to think of this net as a covering for an evening gown that needs repairing and that has seen its best days. Stripped of its gowns and reduced to a simple slip, it could



be covered with figured net at small expense. One small point would be wise for every woman to remember, that the drapery of today does not come to the foot line of the lower skirt. It stops about six inches above. It is usually looped up in some fashion at the side and is often finished with a three-inch band of colored or figured flannel satin or a ruffling.

White Wash Frocks. It has been repeated so often that all white wash frocks are not in first fashion, that one is apt to become tiresome by referring to it. However, it seems worth while to say that a compromise has been effected between fashion and tradition by the invention of charming gowns of white voile and marquisette which have all the earmarks of the best lingerie frocks and are trimmed with dashing lines of color to give them a novel effect.

There seems no end to the fashion for eyelet embroidery, and it is used more on voile and marquisette than on muslin, possibly because one sees more of the former fabrics than of the latter. Plain white wash material is not even used for everyday frocks. It has given way to striped muslins in violet and white, brown and ecru, black and white, blue and white. There are many other combinations, both in stripes, in pin dots and in circles, and one sees a dozen of these gowns to one of the old-fashioned plain white lawn.

A dainty style is shown in the illustration, made in cambric; groups of fine tucks with strips of insertion in between form trimming at top of bodice; lace is used for edging, and ribbon is threaded through insertion and finished off with bows.

A piece of insertion is taken round at about the knees, ribbon is threaded through and arranged in loopy bows at the right side of front; pieces of insertion pointed at the ends are set in at intervals; a frill of soft lace finishes the foot.

Materials required: Four yards 35 inches wide, about five yards insertion, six yards ribbon, 2 1/4 yards wide and 2 1/4 yards narrow lace.