

Irrigation.

HOW DIFFERENT SOILS ABSORB AND RETAIN MOISTURE.

By H. R. Hilton, read before the Kansas Irrigation Association at the Wichita meeting.

Soil is rock disintegrated, dissolved or pulverized by the action of the air, water and ice, aided chemically by the various salts and acids present in the soil and fertilized by decayed vegetation, animal excretions and chemical agents.

Recent investigations point to the conclusion that the mechanical arrangement of the soil grains determines its fertility more than the chemical properties it may possess. Experiments show that the greater the number of soil grains in a given space the greater the amount of air space, because the small grains being light, arrange themselves more loosely than the larger or heavier ones.

In a good wheat soil, when dry, there is at least 50 per cent. of air space, *i. e.*, in a cubic foot of soil one-half the space is occupied by the soil and one-half by the air.

Prof. Milton Whitney, of Johns Hopkins' university, has determined that in an ordinary wheat soil there is at least ten thousand million soil grains in a gram (about a pint), and in some of the finest soils this number has reached twenty-four thousand millions.

In coarse or sandy soils the particles, by reason of greater weight, take a closer arrangement, hence there is less air space.

The more soils are divided up and made fine, like dust, the more air space, and for same reason the more surface in a given bulk. To illustrate: A cubic foot of hard granite has only six square feet of surface exposed to air or water. If ground to fineness of a good wheat soil, then a cubic foot will have over two acres of surface, and in the finest limestone soil of Maryland the exposed surface of all the soil grains in a cubic foot exceed three acres in extent.

The amount of surface is important, as the water in the soil adheres to these surfaces, and the roots occupy the spaces between in search of food. The more fine spaces there are the more fine rootlets there will be and the more food the plant can gather from the soil.

When water is applied to the surface of the soil, either naturally or artificially, it will occupy all the air spaces, so that the amount of air space practically determines the amount of water in a soil, when fully saturated. This will usually be 40 to 60 per cent. of the bulk of any good soil.

Water descends into the soil by gravity. When fully saturated it descends by gravity only. When only partially saturated a different law operates. This law we call capillary attraction or surface tension.

In a moist soil each soil grain is surrounded by a thin film of water—sometimes so thin that the air space is scarcely reduced. They are like tiny soap bubbles with a grain of soil inside of each. If water supply is increased the film around each soil grain gradually thickens, until the whole space between the soil grains is filled.

The movement of the water in a fine soil is constantly from that containing most moisture toward that containing least, till the whole mass of equal fineness of soil is equally supplied. Each tiny globule of moisture around the soil grains, or water particles on the surface of each, tends to contract, setting up a strain or pull. This is the motive power which transports the water through the soil.

Surface tension has power to move moisture in any direction—up towards the surface, down into the subsoil, or horizontally. It aids gravity in pulling water down from the surface until full saturation takes place; then gravity alone can act, because the power to contract grows less as the film around the soil grains thicken, and ceases altogether when the spaces are filled with water. This suggests why soils resting on a fine clay subsoil are so valuable for grass and wheat, which require larger percentages of moisture than most of our staple crops—because clay is finely divided and usually retains a

high percentage of water. I have found fine clay in excavation for a sewer in Topeka, taken fifteen feet below the surface, that absorbed 50 per cent. of its own bulk of water in a little over an hour of time, the water being applied at the base. If the soil had been slightly moist the water would have been taken up more rapidly, as surface tension cannot act in a perfectly dry soil, only as it moistens the nearest particles first by contact. There seems to be scarcely no limit to the height such a clay would lift water if the supply of water was constant. The same clay soil filled to saturation gave up very little of its moisture when placed in a position to drain out. Our black loam soils will generally take up 50 per cent. of their bulk of water, and where stable manured, as high as 60 per cent. has been absorbed. Kaw valley soil near Topeka, manured two years ago, exceeded 60 per cent.; same soil unmanured, 10 per cent. less. This agrees with Prof. Whitney's theory, as the result of his investigation, that the value of manures is quite as much in causing a rearrangement of the soil grains, so as to take up and retain an increased quantity of water, as in any new plant food added.

It is the amount of water a soil retains or holds back, after the surplus is drained out, that determines its value, and also determines what kind of vegetation finds its right proportion of moisture for best development. Wheat requires a higher percentage of moisture than almost any other of our staple crops in Kansas, hence the importance of fining the soil and turning it below the surface, where the roots feed. Corn roots deeper, and grows at the season when moisture is wasted most by evaporation, hence needs its supply furnished to it deeper down in the soil. Subsoiling to a depth of twenty inches in the summer or fall is a necessity in most Kansas soils to provide storage for the rain that falls, so that none may be wasted by running off at the surface, carrying with it into our streams the richest food plant.

When subsoiled, the rains or artificial floodings will carry these fine surface soil particles down into the subsoil, and this fine soil serves two good purposes—one, to pump the water from the moist subsoil below, and the other, to encourage the plant roots to go deeper. The roots will follow the fine soil down into the subsoil, where the water supply is more permanent, and the plant is less subject to adverse conditions and variations in supply than when it roots close to the surface.

Twelve feet in depth of fine clay subsoil will hold at one time the annual average rainfall of the State of Kansas.

No one can farm intelligently until he knows something of the texture and mechanical arrangement of the soil grains, and when we really get down to farming our land we will prepare it as nearly as possible to suit the wants of the plant we cultivate so as to furnish it with the moisture it needs for its best development in the early stages of growth, and decrease the supply when we want to promote flowering or ripening.

In my own crude experiments to determine the amount of moisture various soils would take up or retain, I found that when water is applied to the surface of dry soil, and no way is provided for the air to escape below, the air caught and confined in the soil, by the saturated soil above, resists the downward flow. When the air was liberated artificially, then the descent of the water rapidly increased. In many soils this is practically the effect when heavy rains follow a period of drought. This would operate in the application of irrigation water to loam or clay soils, but in sandy soils, or loam with sandy stratum beneath, the air would escape laterally through the sand, being aided by the pressure of the water above. Where muddy river water is applied to sandy soil, the silt retained will increase its capacity to hold water and reduce the rate of flow downward. With gradual increase of silt in sandy soil, from year to year, there should be a reduced demand of such soil on the water supply, because less would be drained out.

Sand in the soil facilitates drainage.

Water descends rapidly through it while short of saturation. After drainage it does not retain as much moisture as fine clay or loam, but this has its advantage in our climate, as it does not retain so much water near the surface, nor pump so much to the surface. Sand mixed with fine soil or clay transports water very rapidly. If the supply below is constant, it has sufficient power to pull all the moisture needed for plant life from a depth of several feet. As the land is cultivated and pulverized the fine particles will be constantly carried into the subsoil by the rains or floodings filling up the spaces between the coarser sand grains, thus increasing storage below.

We have before us to-day the great question of how to get water and soil together. By any of the plans suggested, the water, when applied to the soil, costs money. The economical use is therefore important. It is scarcely possible to apply river water containing silt, except by surface irrigation. Clear water, in my judgment, should be applied by tile drains, two feet below the surface. These should be so laid that the drain pipes, when three-fourths full, will drain off any surplus. When the terminal point indicates a surplus of water then supply should be reduced, or stopped, till that which is in the pipes is taken up by the surrounding soil.

Plant growth and evaporation reduce the supply of moisture at surface, and surface tension is constantly acting to supply the waste from the saturated soil below. Tiles can be filled with water daily or as often as the demands of the plant require.

This system gives the ideal condition for plant life. It encourages deep rooting. Growth is not checked by shutting off air while flooding. It gives the air free access to all the plant roots all the time. It keeps the temperature of the soil more uniform. Waste of water is prevented by frequent shallow cultivation, where not already shaded by the plant growth. It does not interfere with cultivation. Absence of surface ditches favors economy of labor. The water being applied directly at point wanted, without waste, every gallon is utilized and its service is at least two-fold that by surface application. The first cost is great, but in the end cheaper; the result certain, because giving the most perfect condition for continual uniform growth without interruption. The depth to place tile, distance apart, and quantity of water needed must be determined by practical tests in various soils. From these can be formulated directions based on the power of any given soil and subsoil to absorb, retain and transport water.

We need engineers to determine how and where we can profitably secure water for irrigation. The services of soil physicists are equally necessary to analyze and test soils to be irrigated and to point out where economy may be practiced and waste prevented, so that the water, when secured, may be intelligently used. For instance, to get the best results some soils need to be subsoiled; others would be injured by it. Tests of subsoil would reveal to the physicist the presence or absence of conditions favorable to water storage. Some soils need salt applied to bring about a closer arrangement of soil grains, while others tend to arrange themselves too closely, and need gypsum plaster or lime to force them further apart and prevent compacting.

The investigations of Prof. Hilgard, of California, show that the great fertility of the arid regions is largely due to the presence of alkalies that have been retained in the soil. In moist climates these are washed out by rains and carried into the drainage of the country, and must be supplied artificially by fertilizers. These salts in the soil play an important part in the mechanical arrangement of the soil particles and in dissolving the rock in the soil and fitting it for use of the plant.

The temperature of the soil is important. The cooler the soil down to near freezing point, the more moisture it will contain, and the more it will absorb from the air. Increase of temperature lowers the level of water in the soil. A compact soil, exposed to the sun, is heated far beyond a soil kept

loose by cultivation. There is, probably, no one thing so wasteful of water in the soil, near the plant roots, as a hard, compacted surface.

All these phases of this question require the experience and skill of the chemist and expert in soil investigation to aid us in securing the best results, whether water is supplied naturally or artificially. Every farmer is interested in this question, and it raises problems which the State alone can furnish the facilities to solve.

The writer is a strong believer in subsoiling to break up, at once, the compacting of ages, and establish better water channels between the cultivated surface and the moist soil beneath. It is the main hope of the farmer who has no source of water supply for irrigation.

In most of our soils there is a tendency to compact one to two feet below the surface, because our rains have been just sufficient to wash the alkalies in the surface soil down into the subsoil, but not sufficient to leach it out into the water drainage. The accumulated alkali being in excess tends to compact the soil in which it lodges, and form a sort of hard-pan, almost impervious to water. Where this exists it should be broken up, that surface water may readily descend, and be as readily pumped up again when nature calls on the reserves below. The sifting of the fine surface soil into the subsoil is an advantage that cannot be too strongly urged. The first great problem is to get the soil moistened; the second is to keep it moist. An ordinary corn plant, in July weather, needs about three pounds of water per day. This means that the corn plant needs it all. There is none for waste by evaporation. Subsoiling provides storage beyond immediate influence of temperature; encourages deep rooting; admits air to great depth and establishes water-ways between ground water and cultivated soil.

No crop should be planted on subsoiled land the same year in which it is subsoiled, and wheat should not be sown till a crop of corn or other cultivated crop is first raised on it.

The cost has been the greatest barrier heretofore, because plows were of such heavy draft. The Perine plow, invented by a blacksmith in Topeka, gives us the most practical subsoiler yet introduced. Its point is an exact counterpart of the shape of one-half of the moon in its first quarter. With three-horse team it will loosen the soil fourteen inches below the ordinary six-inch furrow. A number of farmers in Shawnee county are now testing the value of subsoiling, and we hope soon to hear of farmers in a neighborhood in many parts of Kansas clubbing together to buy a plow and test, by subsoiling, ten acres or more on each farm. This is the way to find out, and I believe it is the "way out," too, for many of them.

SYSTEMATIC CATARRH.

Many Persons Have It Who Do Not Suspect It—Its Victims are Legion.

Mr. O. S. McQuillin, of Spring Hill, Iowa, writes:

"Four years ago last fall my stomach, without any previous warning, refused to perform its functions, and I soon lost strength. Shortly after this I had my first experience of five sieges of the grip, covering a period of about three years. During this time food was forced through my stomach by using cathartics. Large blind piles bid fair to block all evacuation. My kidneys soon became involved, so that the scant and often painful voidings resembled beef's gall. A curious brown dry scab that had been growing a little below my left eye, that I thought was a fever sore, began to spread, and I have some reason to believe it would in time become a cancer. With flesh wasted away—or, I think, eaten up by multitudes of microbes—strength exhausted so that it took all my energies to even get into a bath tub, hopes all gone, I saw Pe-ru-na advertised in the Iowa State Register. I wrote to you and received, among other pamphlets, Family Physician No. 2, which convinced me that catarrh had possession of my throat, head, stomach and kidneys. I began to take Pe-ru-na and Man-a-lin, following free advice which Dr. Hartman gave me. In a short time I could eat nourishing food, and the piles, kidney trouble, constipation and the peculiar sore on my face, all disappeared; flesh, strength and a splendid appetite returned, and I went to work."

Send to the Pe-ru-na Drug Manufacturing Co., of Columbus, O., for a free copy of Family Physician No. 2.

shrine the name of Judge Caldwell as among the foremost.

The decision which called forth these resolutions may postpone the time when the interest gatherer can again claim the first right to consideration in the business affairs of the Union Pacific, and incidentally in those of the other roads now operated under direction of the courts, and it may lead to some complications in the adjustment of legacies of the past to conditions of the present and near future. It may at some time be looked upon as a small thing to call for formal action by great organizations, and it may not now be creditable to our civilization that it required the decision of a judge to place the representatives of flesh and blood, of brain and mind, of men in their organized capacity, upon the same footing in making a bargain as that from time immemorial occupied by the steel and iron, the dollars and cents, the capital in its organized capacity and with the representatives of which the men have to deal.

PRODUCTION OF GOLD.

The total production of gold in the United States is thus reported by the Director of the Mint: Value of total production, 35,950,000, which is an increase for the year of 73,455 ounces, representing \$1,518,423.

The following table shows the production in fine ounces for the calendar year 1893, with the increase or decrease as compared with the year 1892:

Alaska 48,863, decrease 3,403; Arizona 57,286, increase 321; California 584,370, decrease 23,796; Colorado 364,022, increase 96,072; Georgia 4,072, increase 119; Idaho 79,669, decrease 3,602; Michigan 2,032, decrease 354; Montana 173,791, increase 29,433; Nevada 46,367, decrease 29,654; New Mexico 44,171, decrease 22,229; North Carolina 2,593, decrease 1,207; Oregon: 79,543, increase 7,378, South Carolina 5,598, increase 30; South Dakota 193,761, increase 3,043; Utah 41,293, increase 9,357; Washington 10,744, decrease 7,327; all other States 726.

The value of the gold in any case may be found by multiplying the number of ounces by 20.67. These figures are about \$1,000,000 less than the aggregate values reported by the agents of the bureau, for the reason that it has been unable to retrace the full amount reported to the refineries and mints. The Director states his estimates are certainly not in excess of the actual production.

SUGAR TRUST SALARIES.

A Wall street paper claims to have inside information as to the salaries which the officers of the sugar trust extort from the trust company directly, but finally from all users of sugar. It says: "Mr. H. O. Havemeyer, as President of the company, receives \$75,000 per annum. As a member of the Board of Trustees he receives an additional yearly salary of \$25,000, making his annual income from the American Sugar Refining Company, \$100,000. Mr. Theodore A. Havemeyer receives \$75,000, \$50,000 as Vice President, and \$25,000 as a Trustee. Mr. J. E. Searles enjoys the same substantial annual income, \$50,000 as Secretary and Treasurer of the company, and \$25,000 as a Trustee. The other members of the board, Messrs. T. O. Mathiesen, William Dick and Joseph B. Thomas, all receive \$25,000 a year, making another annual expenditure of \$75,000. There is a vacancy in the Board of Trustees, caused by the death of the late George C. Magoun, which necessitates another expense of \$25,000 per annum. The American Sugar Refining Company, therefore, annually spends \$350,000 in salaries to officers and trustees."

HOW KILL MOLES?

EDITOR KANSAS FARMER:—Will you or some of the readers of the FARMER tell me how to get rid of moles? I have tried "Rough on Rats" and traps without success. My garden is full of them and they take the seed about as fast as I can plant it. G. W. CLARK. Carbondale, Kas.

[Moles are indeed a serious pest, as to the destruction of which we shall like the experience of every one who has had any measure of success.—EDITOR.]

IMPROVEMENT BY SEED SELECTION.

No more direct road to desirable ends is presented than the now demonstrated possibility of speedy and permanent improvement in the qualities of plants by selecting seeds from such as have the desired characteristics. Not only has the possibility of such improvement been fully shown, but the actual work has been entered upon at several experiment stations, and at none with greater wisdom, conscientiousness and success than at Kansas Agricultural college. Without here referring especially to the work in this line done by the agricultural and horticultural departments of the college, attention is called to a work which was necessarily under the direction of the chemical department, because the qualities of the product could be determined only by chemical analysis. The illustration afforded by these experiments is, however, especially valuable because of the accuracy with which, by the methods of the chemist, the relative values of the plants under consideration are ascertained.

The experiments referred to were with sorghum cane, undertaken with a view of improving its sugar-yielding properties. The success of the experiments is such as to warrant the assertion that had the policy of the government with reference to sugar remained the same as it was when the experiments were first undertaken, the profitable production of sugar as a staple Kansas crop would now be a reality.

But whether or not the improvement here wrought shall ever of itself become available as a source of profit in sugar-making, the demonstration of the possibility of so great and rapid improvement in any plant constitutes an object lesson of untold value and is finding application in the treatment of other plants. The limits of possible improvement of the sorghum plant are not known, and it may be that the continuance of the efficient work which has wrought the changes shown in the table will, in the near future, produce a sugar-yielding plant of such excellence as will need no "protection" to enable it to compete with the cheapest sugar in the world.

The following from the bulletin giving account of the experiments will be read with interest:

"The selection of individual stalks of special merit has now been in progress for six years. Its success has been less perfect than would have been the case but for circumstances beyond our control, such as drought, flood and the ravages of insects and English sparrows. Throughout the series of experiments, it is the plan to preserve average seed, as well as selected, for purposes of comparison, but owing to a variety of circumstances it has not been possible to carry out this plan perfectly, so that nearly all of our present stock of seed has shared more or less in the general result of seed selection and of crossing. It has been impossible to so situate so many sorts as to prevent much crossing. But crossing is one mode of improving, and some of the best sorghums we now have are the result of crossing. Table III presents a comparison of analyses of sorghum grown from average seed and from selected seed. It will be noticed that there has been a marked increase in sugar content, the improvement ranging from about 25 to 40 per cent. of the amounts observed in 1888. We are far from maintaining or believing that this improvement is the result of seed selection wholly, for, although the 'average' seed has been largely tinged by the selected seed, it is not believed to have been sufficiently so to account for all of its increase in sugar. Acclimatization and, perhaps, favorable seasons the last three years, should be allowed considerable weight. Making such allowance, however, there still remains a large improvement which can be accounted for only by admitting the efficiency of persistent scientific seed selection.

"In comparing the figures of the table for the six years, one should have in mind the very unfavorable season of 1890. As explained in our report for that year, two circumstances interfered with the normal growth of the crop—first, dry, hot weather in

June and July, followed by cool, wet weather in August and September, which caused a renewed growth; and second, an early frost, which caught much of this new growth while immature."

TABLE III.—SHOWING IMPROVEMENT IN SIX YEARS.

VARIETY	1888		1889		1890		1891		1892		1893	
	Best single stalk.	Average.	Best single stalk.	Average.	Best single stalk.	Average.	Best single stalk.	Average.	Best single stalk.	Average.	Best single stalk.	Average.
UNDEMBULLE	15.79	13.47	15.79	13.47	15.79	13.47	15.79	13.47	15.79	13.47	15.79	13.47
CROSS OF ORANGE AND AMBER (Denton)	14.18	12.70	14.18	12.70	14.18	12.70	14.18	12.70	14.18	12.70	14.18	12.70
LINK'S HYBRID.	14.37	14.01	14.37	14.01	14.37	14.01	14.37	14.01	14.37	14.01	14.37	14.01
EARLY AMBER.	15.50	13.87	15.50	13.87	15.50	13.87	15.50	13.87	15.50	13.87	15.50	13.87
KANSAS ORANGE.	15.51	12.62	15.51	12.62	15.51	12.62	15.51	12.62	15.51	12.62	15.51	12.62

The editor of the KANSAS FARMER may be a "crank" on the subject of improvement by seed selection and by crossing, but he is not half so much of a crank in this respect as every intelligent farmer and horticulturist is likely to be as the work now only begun proceeds. The above quotation from the report of Profs. Failyer and Willard shows that during the six years of the experiments improvements were made amounting to 25 to 40 per cent., and there is no indication that the limits have been reached.

The authors of the bulletin refer in deservedly complimentary terms to the work done by Mr. A. A. Denton, at Sterling, and they very properly propose to confer his name on one of the best varieties originated by him. It is well hereto remember that in the course of his most elaborate and excellent experimental work Mr. Denton found that not only may the sugar content of cane be greatly increased, but that any other characteristic of the plant may be varied in any direction desired. Thus, and as noted by Profs. Failyer and Willard, the percentage of glucose in sorghum has been greatly reduced. Changes have also been wrought as to date of ripening, vigor of growth, ability to withstand drought, height of canes, stockiness, strength to withstand winds, root development, etc.

Why should not other crops be similarly modified? Why may not the experimenters give us apples, pears, peaches, plums and cherries whose blooming time shall be such as to escape the danger of late frosts? Why shall not our staple field crops be developed in the direction of better adaptation to the vicissitudes of climate as well as of better yields and more valuable qualities?

These and many other improvements need not the special skill of the chemist to determine them, and are therefore the more readily made.

THOSE FREE BEET SEEDS.

EDITOR KANSAS FARMER:—Please publish in the KANSAS FARMER the address of the company that had beet seed to give away. It was published in your paper two or three months ago, but I lost track of it and never could find it. C. L. C.

LaCrosse, Kas. [It will probably do "C. L. C." no good to write for these seeds. The company alluded to seems to be a myth. Why its announcement was sent out has not been disclosed, but it is not unlikely that there was an intention to create an interest which might be used with some effect on Congress in favor of specific legislation.—EDITOR.]

STATE FAIR MATTERS.

After a long delay there is a prospect now that the Kansas State Fair Association matters may reach a settlement, in view of the fact that at the request of the creditors, the court of Shawnee county, on Monday last, appointed as receiver, Guilford Dudley, a banker and stockman of Topeka, who is disposed to have the matter speedily adjusted. Soon after the close of the fair last year, Col. Allen Sells, of Topeka, was appointed receiver, but owing to a lingering illness which finally resulted in his death, claims against the association have been tied up. As matters develop toward a settlement of premiums and other claims, our readers who are interested will be kept posted on the exact situation.

The financial reports for last week note a check upon the slowly returning prosperity. This is attributed to the great strikes and lockouts whereby several hundred thousand workers become idle in consequence of disagreements as to wages.

To Make Shingles Durable.

EDITOR KANSAS FARMER:—In answer to the inquiry as to preserving shingles, would say I made a heavy sheet iron tank thirty inches square by forty inches deep in which to cook fence posts in coal tar after charring them till black over a fire. Removing the tar I put in crude petroleum, as it comes from the ground, and set in two bunches of shingles and boiled them from two to four hours. A sheet iron was placed to drain the shingles and turn the oil back into the tank. The roof made of these shingles has been on nearly twenty years and shows no mark of decay. The next shingle roof I lay for myself shall be treated the same way, but instead of crude oil I shall use linseed oil, mixed with red lead. To do this properly the shingles will have to be unbound so as to allow the paint to pass through them. The worst trouble about this process is that we unfortunate creatures cannot stay in one place long enough to reap the benefits of such labors.

Eureka, Kas. J. F. WOODSON.

From Reno County.

EDITOR KANSAS FARMER:—I saw in a St. Louis paper that one Anderson has traveled over the State of Kansas to report as to the prospect of the coming wheat crop. He reports Kansas all right. I want to say that he is a willful liar or he don't know anything about the prospect. More than one-half of the wheat land of Reno county will be planted to other crops. I have seen men from other counties that say their wheat crop will not be a half crop. I have lived in Reno county now twenty-one years. I do not think that I ever saw a poorer prospect for wheat this time of the year. I can assure you that I am no calamity crank. I own a good farm. It is not for sale or trade. I am well satisfied with Reno county, Kas. It is good enough for me. I do not see why men should lie about their prospect for crop just that some one outside can make some money, and he a gambler.

Apples, cherries, plums and pears are all right so far. ZENO THARP.

Drs. Thornton & Minor,

Bunker building, Kansas City, Mo., the well-known specialists in the treatment of all rectal troubles, have established a principle in connection with their ever-increasing clientele that is well calculated to inspire confidence in their integrity and ability to perform to the last degree that which they promise when assuming to cure their patients, and that is, they decline to accept a fee until they have clearly demonstrated that a cure has been accomplished. Thousands testify to the efficiency of their treatment. Another specialty of theirs is diseases of women, and of the skin. Beware of quacks. Ask for their circulars, giving testimonials of leading business men and high officials—they contain special information for the afflicted. Address, DRs. THORNTON & MINOR, Bunker Building, Kansas City, Mo.

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Horticulture.

A WESTERN GROWER'S EXPERIENCE.

By A. L. Brooke, of North Topeka, Kas., read before a recent meeting of the Horticultural Society of Shawnee county.

One of the first lessons in our trade is to learn what to grow. It is a healthy indication when we find instead of "What grows best?" the question, "What does the country demand?" The active, live grower is constantly keeping this question before him, and as men do in other trades, is trying to supply this demand. Downing says of the propagation of the apple from seed: "When reared from seeds they always show a tendency to return to a wilder form, and it seems only chance when a new seedling is equal to or surpasses its parent. Removed from their natural form, these artificially created sorts are also much more liable to disease and decay." This short quotation from this most renowned author of "Fruits of America" tells you much plainer than can I in many words why fruit trees are reared from buds and grafts instead of from seed. It is not because of its convenience and cheapness, but rather from compulsion. To propagate from seed would be too slow and uncertain and must be left to the slow process of the fruit gardener.

The prime object, then, is to get good stock for our young shoots, whether they be buds or grafts. To get these we go as nearly as can be to the natural or wild state, so as to avoid as much as possible the diseases so prevalent in our country. It has been proven as per example that "the yellows" in the peach can be readily inherited from unhealthy seed, just as the germ of disease is conveyed to the offspring in the animal kingdom. The great essential, then, is to keep the stock upon which you wish to propagate healthy. To keep as nearly as possible to this desired state the seed sown generally is the natural. You will understand, of course, that my remarks pertain to fruit trees, and not to small fruits, which latter you well know are propagated in a different manner.

Having secured, then, natural stock, we then proceed to get the particular variety desired, either by budding or grafting. In either case it is the aim to get good, thrifty cions or buds from the parent stock. Here I wish to relate an anecdote that came to my notice a few years ago in one of our farm journals. The editor, who now occupies a high position in another field, gave the nurseryman a good scoring, as he so well knew how to do, for cutting cions and buds from the tree in the nursery row, before the tree had borne fruit and thereby given proof of its correctness, trueness to name. This was truly amusing to that nurseryman, who, as a student of nature, knows his trees as he walks among them and can call them by name from their marks, growth and appearance, as readily as can the shepherd name his sheep as he walks among his flock. I will venture the assertion that there are men growing nursery stock in Shawnee county who can name more varieties of fruit correctly from the appearance of the tree than the honorable gentleman referred to can name from the appearance of the fruit itself.

As has already been stated, the natural tendency of seed is to return to its wild state, and also the improved is more liable to weakness and disease; so are the shoots cut from the branches of an old tree more liable to disease, and the seeds from the fruits of old trees are more prone to go back to their wild or natural state than are the seeds from more vigorous and younger trees. For reasons already advanced I would advocate getting cions from the nursery row, or from trees not long in bearing, of course barring all mistakes in selection of varieties. As eternal vigilance is the price of liberty, so is eternal watchfulness helpful in keeping your line of stock true to name.

Just what will give success in this Western country in securing a good percent of a stand in either buds or grafts, I will not undertake to tell you. It has been the universal experience of nurserymen that when they had gained a complete knowledge by several years

of close study and much labor, the following season would only convince them that they were wrong and were just where they stood before making this circle of experience. There are many things that will in a very short time undo what you have spent much time and patient labor to perfect. Perhaps that which has more to do with success than any other one thing is thorough cultivation. First, deep plowing, not six inches, but a foot, if you can accomplish it. Don't plow under clods to torment you the whole season through. It is a good plan, when dry, to harrow the surface before plowing. Fine dirt is what holds the moisture. Good, thorough, level cultivation is more conducive to good growth of stock than anything else.

An ardent, enthusiastic man, who, I believe, was a lover of fruit and fruit trees, once told me he planted 80,000 apple grafts out in the northern-central part of the State, and secured a good stand, but when they grew to about eight inches or a foot, all died; the next year 40,000; the next 20,000, when he gave up in despair. He thought they were killed by hot winds. Afterward, seeing an example of his cultivation here in the valley of the Kaw, I knew they were killed by neglect. When it gets so dry and hot in this valley that corn begins to wilt and the farmers begin to complain, then we get the most satisfactory results in our nursery work. The drier it gets the more thoroughly and the deeper should we cultivate, and we will give you a tree with more health and vigor than we can when the rain-maker overdoes his job. Too much moisture is not conducive to health and growth in nursery stock. Trees are more liable to disease in wet seasons and insects seem to be more injurious at such times. Those who have lived in the great basin of Utah and Colorado say they have no trouble from this source and are much more successful if left to furnish all their moisture by irrigation.

Very many of the failures in orchard planting can be attributed to bad care after planting. Weeds and trees were not made to grow on the same ground at the same time. A great deal of the trouble, though, can be charged to the bad handling of stock before it leaves the nursery. A careless nurseryman can soon kill what he has spent a long time and much money to mature.

If trees are taken from the nursery in the fall they should be well grouted as soon as they are lifted from the nursery row, then heeled in, care being taken to carefully pack the dirt about the roots. In the spring the soil is generally more favorable, and the conditions being reversed naturally, better success can be obtained even when less care is exercised.

When nursery stock is received in a frozen condition, if in boxes and well packed, don't disturb it. If convenient, place in a dark cellar and allow frost to come out slowly. If dry, add water, or if you can bury in moist earth and allow it to remain until perfectly thawed out, then it can more than likely be planted without injury.

Finally, in closing this paper, I think it can safely be said, that there is no other business or profession which is at times so irksome, and yet so fascinating; so liable to disappointment and yet so promising; so useful and yet at the same time so much blamed for treacherous dealings. The dollar made in the nursery business is a very uncertain one up to the time it is safely in the pocket, and it is seldom crowded for room when once there. Nurserymen as a class are honest, and try very hard to give a dollar's worth for every hundred cents you pay. They generally sell you true to name, though the cases are numerous when the opposite has been done. A great many people have been fooled so often that they buy with no idea of getting anything other than what is given them. It is true a great many men are like children—they want what they should not have. One man asked me for Early Harvest, and when assured that he could not get the tree, looked at me with an amused expression, saying that it would be no disappointment to him not



MRS. ANNIE JENNESS MILLER.

Ladies admire Mrs. Jenness Miller for what she has done in the cause of costuming and dress reform.

They also love her for the good suggestions and valuable advice she has given, all of which have enabled the women of America to become more attractive, enjoy

life better and live longer.

Perhaps the most valuable advice which Mrs. Miller has ever given, and especially valuable because is the only thing of the kind she has ever done, and then only after conviction born of experience, can be found in the following autograph letter:

To H. H. Warner & Co.

It gives me pleasure to express my faith in the virtues of your "Safe Cure," which is the only medicine I ever take or recommend.

Six years ago I received the most pronounced benefit from its use at a time when suffering from mental over-work, and I have subsequently in my travels as a public lecturer recommended it to many people, and personally know of several cases where the "Cure" succeeded when the doctors failed.

Although a perfectly well woman I take several bottles every Spring just as I take additional care in the selection of tonic-giving food at this season, believing in the ounce of preventive rather than the necessity for the pound of cure, and in every instance the "Safe Cure" has the effect to give new energy and vitality to all my powers.

Annie Jenness Miller.

Any woman or man who reads the above and who feels, as so many people do at this time of the year, in need of something to aid and strengthen in the duties of the season, cannot do better than to follow the

same course as described by Mrs. Miller, who is herself the personification of health and womanly development. Certain it is that great benefits will result which cannot be secured in any other way.

to get them, as he had bought and planted twice before and both times got something else instead.

The man who would give me a thorn for a rose; a peach tree for a flowering almond; a winter sort for a summer variety, I would drive from my door as rudely as I would him who would steal the bread intended for my children. He not only gives me what I do not want but robs me of valuable time that can never be regained.

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In the Dairy.

Conducted by A. E. JONES, of Oakland Dairy Farm. Address all communications Topeka, Kas.

Dairy Criticism.

EDITOR KANSAS FARMER:—I saw directions in your issue a few weeks ago, telling a lady how to make butter, but I will venture the assertion that you never churned a pound of butter in your life, or you would know better how to churn it. I was told the same as you tell, when I bought a barrel churn in your town, to stop churning when the grains of butter were the size of a grain of wheat. Now, my experience of fourteen years is, churn until the lumps of butter are as large as your fist. It wastes the butter—according to your ideas—in drawing the buttermilk off, as it runs out with the milk and takes too long to gather it. If any of the readers know of a better way I would like to know it.

Dover, Kan.

H. FLICKINGER.

We are glad to get such a letter as the one from Mr. Flickinger, for it is the province of this paper to enlighten every one laboring under honest ignorance. It is hoped he will bear with us while some needed comments are made on his communication. If all his methods in making butter correspond with the one he mentions in regard to churning until the butter is in "chunks as large as your fist," it is no wonder the market is flooded with poor, white, spongy, soft, rancid, 10-cent butter. Such methods are inexcusable at the present day, when so much dairy information is accessible for almost the asking, and it is by similar operations in this line that some grades of butter are quoted at 6 cents a pound in the Chicago market. As a rule, where such looseness is practiced in any one of the steps in butter making, a disregard to other essential points is apt to run through its operations, and tends to make dairying a failure with those who have never discovered the difference between the ways in vogue twenty or thirty years ago, and those of the present day. The experience of fourteen years in dairy work is a sad commentary on such decayed methods; still more strange when practiced in the midst of the many inventions that go to lighten labor and render the business certain of remuneration. Doubtless there are thousands in this State who are still clinging to the same or other equally inconsistent notions in regard to butter-making, for the price that is obtained for the majority of store butter is proof of the assertion.

Mr. Flickinger seems to take for granted that the editor of this department is a mere figure-head or "dude," that writes just from theory, or to fill space, and never saw a cow or a churning of cream in his life. However, we will try to give him a little additional light on the art of gathering butter that has so agitated his soul. As we have said, stop churning when the butter is in grains the size of wheat, throw in a little cold water and wait five or ten minutes, and if the butter grains have not all risen to the top so they will not run out with the milk, get a sieve at the tin shop (simply a pan punched full of small holes), let the milk run through this (and we all know from experience that not a grain of butter will be lost), give the churn a few more revolutions and then wash until the water comes off clear. By this method, adding a little experience and business sense, you will have a mass that looks like veritable grains of gold, instead of great oily chunks from which the buttermilk can never be eliminated by water. Herein lies half the secret of good butter. If the buttermilk is not removed the article will soon be remarkable for its strength, and, seemingly, venerable for its age. The writer of this actually churns and works butter at his Oakland dairy, near Topeka, and is always glad to welcome visitors.

Granular Butter.

"How many boys and girls on the farm have had an old apron tied around their waists and been told to 'churn until the butter will hold up the dasher?' Such instructions are fatal to good butter," says the Iowa Homestead. "In the first place, the dash churn is ten years behind the times and ought to be thrown out of every farm, even if no more butter is made than to supply the family table. The box or barrel

churn is cheap and it is so much more convenient and so much better butter can be made with it that there should be no hesitation in discarding the old dash churn in its favor. But no matter what kind of a churn is used, never churn until the butter is gathered in chunks large enough to hold up the dasher. There are several reasons why this should not be done. One of them is that the grain is destroyed. Good butter has a fine, distinct grain, and when broken shows a distinct fracture like cast-iron. If this grain is destroyed by over-churning or over-working, the butter becomes a greasy mixture, like lard, and has a greasy taste. Again, it is necessary that the buttermilk be well washed out or the butter will become strong and rancid in a short time. This cannot be done when the butter is churned into lumps, so in the latter case the grain, flavor and keeping quality are all injured. The churn should always be stopped when the butter is in the form of small granules, ranging in size from a red clover seed to a grain of wheat; then the buttermilk can be well washed out and the grain will be uninjured if the working is properly done. There is no reason why the farmer should not make just as fine butter as any one, providing he will take the trouble to do it right."

Whey Butter.

At the Wisconsin State Dairy school, last winter, the whey from the cheese vats was run through the separator and butter made from the fat thus saved. The quality of the product was said to be very good, some packages scoring very high, and puzzling even good judges to distinguish it from refined cream butter. It is doubtful if this is a practice which would pay from a financial standpoint of view, but illustrates chiefly what can be done and the possibilities of the separator system.

The Poultry Yard.

How to Use an Incubator.

From a paper read before the Salem, Ind., Farmers' Club, by Mrs. W. W. Stevens:

"Have all eggs as fresh as possible; test well and have no cracked ones; place in incubator; go exactly by directions furnished with the machine, and make up your mind to stay with it for three weeks. I do not mean that it needs constant care, but every night and morning; and if a patent concern, lots of time during the day and night. Eggs should be turned twice per day and the heat and regulator examined at the same time. On about the fifth day test the eggs and remove unfertile ones. Many do not do this, but I think it an economy of time, as there is no use turning unfertile eggs for more than two weeks, and as the bulb of the thermometer should rest on an egg there is danger of its being an unfertile one, and as they are several degrees colder there is danger of overheating the live eggs. The question of moisture is the thing that bothers me most, and I guess is the one least understood by manufacturers, as well as breeders. I would rather have too little moisture than too much. Where there is too much the chicks grow so large they have just room enough to pip the shell and not enough to break it all around. Neither do they take up the yolk well, consequently are delicate and die early. If too little moisture is given chicks are smaller and come out of the shell clean and quickly, and seem to be much stronger. Of course, a happy medium is to be striven for. One great cause of dissatisfaction among those who use incubators is they expect too much of them, and another is that after hatching there seems to be so few chicks for the number of eggs put in. Our favorite machine holds 250 eggs, and it would take sixteen hens to cover that number. Once in awhile an old "biddie" will hatch every egg, but I consider it a good hatch to get twelve chicks out of fifteen eggs. Three eggs left in the nest does not seem of much importance, but three times seventeen, or fifty in the incubator, looks like a big proportion. Occasionally the incubator gets too hot

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and all are killed, but a hen every once in awhile leaves her nest and chills the eggs and hatches nothing, so it is pretty even in that respect. When it comes to the work everything is on the side of the incubator. It is always where you put it; does not peck at your eyes; does not break an egg every time it gets off, and best of all does not tramp about half the chicks to death after they are hatched. I am decidedly in favor of incubators, even if one wants to raise only one or two hundred chicks."

Has a Thousand Leghorns.

Mr. P. H. Engel, Glen Elder, Kas., writes us the following letter. It will be well to read it. Mr. Engel has 1,000 Leghorns, yet he prefers a change. We give his words, as follows:

"I now wish to ask you for a little information regarding the Wyandottes. I keep 1,000 chickens—all Leghorns; they are good layers but no good for market, as they weigh next to nothing. Now, I am thinking of giving up the Leghorns and getting Wyandottes in their place, but I know nothing about the Wyandottes. I read a good many advertisements where they are highly recommended, but cannot depend on that. I want a fowl that is a good layer, and also good for market—anyhow better than the Leghorns. I wish you would give me your candid and honest opinion, and information to this effect. I sell all my old stock of chickens every year, and replace with young ones, and that gives me about 1,000 for market, with young roosters included, and therefore it would bring me more profit. Of course, I only want to keep one kind. I have houses for 1,000 chickens. I use George H. Stahl's 300-egg incubator, with the newest improvement; it is first-class and not to be beaten, and F. W. Mann's bone cutter by horse-power. My chickens have a limited range."

In the above we find one who has 1,000 chickens, and replaces them every year. He raises them for market, and does not favor the Leghorn for that purpose. It is not everybody who can keep 1,000, and yet Mr. Engel does it, and says he knows nothing about Wyandottes. Our advice is hardly competent in such a case. If Mr. Engel does not regard eggs as of the same importance as meat then he should make the change, and the Wyandotte is an excellent choice for market. It is hardy and a good layer, but we suggest that he get two or three breeds, and first experiment with a dozen of each before making a radical change. Try Light Brahmas, Wyandottes and Plymouth Rocks.—Poultry Breeder.

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Slaughtered in Kansas City.....	956,792	1,427,763	372,385		
Sold to feeders.....	249,017	10,125	71,284		
Sold to shippers.....	360,257	510,489	16,200		
Total sold in Kansas City.....	1,566,046	1,948,357	459,869	22,522	

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I have several fine lots near the Methodist college at University Place, Lincoln, Neb., for sale cheap, or will exchange them for farm lands.

Farms for Sale.

I have several farms in central Nebraska for sale cheap, and some I might exchange for property near Omaha. Write what you want.

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If you are cataloging of buying a farm don't fail to write for my catalogue. I have improved farms with about half now in growing wheat in Rooks county, Kansas, the best grain and stock country to be found anywhere. Am selling very low. If you want one don't lose any time in selecting it, as they will go fast at \$5 to \$10 an acre. I sell some for only one-tenth down and a tenth yearly, but prefer a larger payment down. I give long time and easy terms. Write just what you want and how much you can pay down, in your first letter, so as to save time. The whole country has been thoroughly soaked with moisture and a big crop is assured. There never was a better time. Don't pay rent any longer but own your own farm.

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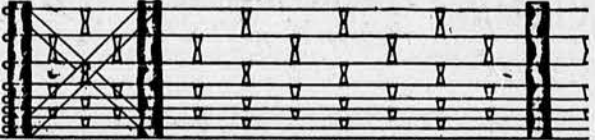
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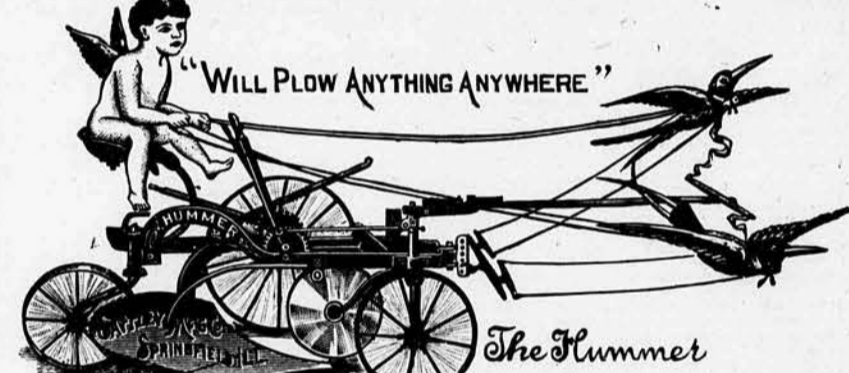
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