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First steps in Farming.—Young Man's Department.—Manure Constituents in food.

I am quite prepared to see you hold up your hands in incredulous astonishment, my friends, when you read this present article. In fact, nothing but ocular evidence could have persuaded me, I who am speaking to you, that, in certain cases 95 0/0 of the most valuable constituents of the food must be sought for, not in the flesh, fat, bones, etc., of the feeding animal, but in its manure.

We saw (v. Journal for April 1883, p. 179) that, for the same weight of dry food, the sheep produces nearly twice as much manure as the pig, while the ox produces even more manure than the sheep. You will observe that the food given to the pig, consisting as it usually does, in practice as well as in Lawes' experiments, of meal of different sorts, is much more digestible than the food given to oxen and sheep, a large part of which is made up of hay; and you will also observe that the quantity of dry manure (litter excluded) produced a week per hundred pounds of live weight, was nearly the same whether the animal eating the provender was ox, sheep, or pig: the greater consumption of food by the pig accounts for this.

We have also seen, when speaking of the valuable constituents of manure, that the nitrogenous matters and the ash are the only parts worth preserving—the bulky parts, the straw etc., are useful as mechanical distributers, as attractors and retainers of heat from the sun-rays. If the live weight of an animal remains unchanged, and there is no production of weight, all the ash and the nitrogen contained in the food will be voided in the dung; and, of course, the reverse is equally true: if the bodily weight is increasing, or milk is being produced, the amount of ash constituents and nitrogen in the manure will be less than that contained in the food in direct proportion to the quantity of those substances which has been converted into animal produce.

Some of the albumenoids (nitrogenous) and ash constituents are left undigested during the passage of the food through the alimentary canal; these are voided in the solid dung. The digested part of these constituents passing of course into the blood, becomes animal increase if the animal is giving milk or increasing in weight; and what remains is separated from the blood by the kidneys, and is discharged in the urine.

We saw, when considering what became of the food eaten by the three varieties of animals concerned in the Rothamsted experiments, that of every hundred of albumenoids (in barley meal consumed by a pig) twenty-one will be voided in the solid dung, and seventy-nine pass into the blood. Now, if a pig consume five hundred pounds of barley-meal, containing about fifty-three pounds of albumenoids, it will increase in weight about 100 lbs. which animal increase will be found to contain about 7.8 pounds of albumenoids. Whence it follows that for every hundred pounds of albumenoids consumed, 14.7 are stored up as carcase, 21 appear in the solid dung, and 64.3 as urea, etc., in the urine. In the same way, deducting the ash constituents stored up in the animal from those originally present in the food, we get at the quantity present in the manure. And to make this the clearer by a concrete statement—for these abstract calculations are always troublesome to my mind, which is not half as well trained as it ought to be—you may study the following table:

NITROGEN STORED UP AND VOIDED FOR 100 CONSUMED.

	Stored up as increase.	Voided as solid dung	Voided in urine.	In total manure.
Oxen	3 9	22 6	73 5	96 1
Sheep	4 3	16 7	79 0	95 7
Pigs	14 7	21 0	64 3	85 3

ASH CONSTITUENTS STORED UP AND VOIDED FOR 100 CONSUMED.

	Stored up as increase.	In total manure.
Oxen	2 3	96 7
Sheep	3 8	96 2
Pigs	4 5	85 5

How very small is the amount of nitrogen and ash stored up in the fattening animal! It seems, at first sight almost incredible. More than 95 0/0 of the ash, in each of the three cases, finds its way into the dung, and with oxen and sheep, more than 95 0/0 of the nitrogen too! The pig converts a larger amount into carcase, but no great things after all.

Again, look at the urine. From three to four times as much nitrogen in it as in the solid dung! This proportion depends entirely on the food, however. in the case of an animal fed on hay, the nitrogen will be found to be a little in excess in the solid dung; on straw, the excess will be still greater; but if cake, corn, and roots be given, the urine will contain a large excess of nitrogen over the solid excreta. From this, as cake, in fact feeding stuffs of a high class in general, contain large quantities of nitrogen, we may conclude that if the

food be nitrogenous and easily digested, the nitrogen in the urine will greatly preponderate; if, on the other hand, the food be poor in nitrogen and hard to digest, the nitrogen in the solid, may exceed that in the liquid, dejections.

Lime, magnesia, and phosphoric acid are chiefly found in the ash constituents of the solid dung—in the urine nearly all the potash. Where, as in Lawes' experiments, sheep were fed on hay, 95 0/0 of the lime, 70 0/0 of the magnesia, and 83 0/0 of the phosphoric acid, contained in the food, were found in the solid dung, but only 3 0/0 of the potash.

The next table gives a good idea of the general composition of the solid and liquid dejections. The sheep were eating meadow-hay; the oxen, clover-hay and oat straw, with about eight pounds of beans (horse-beans, not haricot-beans) per day.

PERCENTAGE COMPOSITION OF SOLID AND LIQUID EXCREMENT. SHEEP FED ON HAY.

	Solid excrement		Urine.	
	Fresh.	Dry	Fresh.	Dry.
Water	66 2	...	85 7	...
Organic matter	30 3	89 6	8 7	61 0
Ash	3 5	10 4	5 6	39 0
Nitrogen	0 7	2 0	1 4	9 6

OXEN WITH NITROGENOUS DIET.

	Solid excrement.		Urine.	
	Fresh.	Dry.	Fresh	Dry.
Water	86 3	..	94 1	..
Organic matter	12 3	89 7	3 7	63 0
Ash	1 4	10 3	2 2	37 0
Nitrogen	0 3	1 9	1 2	20 6

See how much less water the solid and liquid excreta of the sheep contain than those of the ox. they are of course more concentrated, and hence, pound for pound more valuable—that is why, in the South of England, we value a folding of sheep at $18 an acre!

How rich, too, the urine is, both in nitrogen and ash. We find that in the more highly fed oxen the dry matter of the urine contains more than 20 0/0 of nitrogen

The next table, and the last, I suppose, that I shall trouble you with, is given to show the average amount of nitrogen, and of phosphoric acid and potash, the only two ash-constituents worth bothering ourselves about, contained is ordinary cattle-foods. In reading it, you will please to bear in mind what I have repeated more than once: nitrogen is the most costly of all plant-foods as well as of all cattle-foods, phosphoric acid and potash being present in manure, our cultivated plants can, on an ordinary farm, find their other ash-constituents in the soil, and even potash may be neglected, as far as purchased manure goes, if cattle are decently well fed. It comes to this: what is wanted on a fairly well managed farm is *nitrogen* and *phosphoric acid*.

Oilcakes, you see, yield the best manure; they are rich in nitrogen and phosphoric acid, and contain no small amount of potash. (1)

(1) A feeding bullock, in England, often has 14 lbs. of linseed-cake a day, for five and six months at a stretch; the beasts are not expected to pay—the manure makes the profit on the grain crop.

MANURIAL CONSTITUENTS IN 1000 PARTS OF ORDINARY FOODS.

	Dry matter	Nitrogen	Potash	Phosphoric acid
Cotton cake (decorticated)	900	66 0	15 0 ?	31 2
Rape cake	900	48 0	13 2	24 6
Linseed cake	380	45 0	14 7	19 6
Cotton cake (undecorticated)	885	39 0	20 1	22 9
Linseed	905	36 0	12 3	15 4
Palm-kernel meal (English)	930	25 0	5 5	12 2
Beans	855	41 0	12 0	11 6
Peas	857	36 0	9 8	8 8
Malt dust	905	38 0	19 5	17 2
Bran	865	22 0	14 8	32 3
Oats	870	20 6	4 5	6 2
Wheat	856	18 8	5 4	8 0
Barley	860	17 0	4 9	7 3
Maize	886	16 6	3 6	6 1
Clover hay	840	19 7	19 5	5 6
Meadow hay	857	15 5	16 8	3 8
Bean straw	840	10 0	25 9	4 1
Wheat straw	857	4 8	5 8	2 6
Barley straw	850	5 0	9 7	2 0
Oat Straw	830	5 0	10 4	2 5
Potatoes	250	3 4	5 6	1 8
Mangels	115	1 9	3 9	0 7
Swedes	107	2 4	2 0	0 6
Carrots	142	1 6	3 2	1 0
Turnips	83	1 8	2 9	0 6

Beans and pease, malt-dust and bran, come next: malt-dust is terribly neglected here—I could hardly give it away at my brewery at Chambly.

A queer thing, and one that will surprise many: clover-hay yields a richer manure than barley, oats, or wheat, but meadow-hay stands below the cereals in this function.

Dung from animals eating potatoes is poorer than dung from root-fed animals.

Straw is, as we all know, the worst manure-yielding food, but it is worth while to notice how far superior in all points bean haulm is to the straw of the cereals, as is pease-haulm in a minor degree.

You must not imagine that the whole of the nitrogen of the animal manure is of the same value as the nitrogen in sulphate of ammonia or in nitrate of soda. It is not so: because plants probably take up all their nitrogen from the soil in the form of nitrates, and the formation of these from the nitrogen of the solid dung is a work occupying a considerable time. The nitrogen of the urine, however, is quite as valuable as that contained in the above named auxiliary manures: its conversion into nitrates is very rapid.

Do not imagine that a great bulk of litter mixed with the dung is of much use. If you have paid attention to what I have said, you will see at a glance that the more directly animal manure is applied to the land, the more immediate its effects will be; besides, it is probable that fermentation of dung with a lot of straw results in the formation of nitrogenous humus compounds, which are insoluble, and decompose very slowly in the soil.

ARTHUR RICE JENNER FUST.

Winter Feeding of Fowls.

EDS. COUNTRY GENTLEMAN— The health of fowls, especially in cold weather, depends greatly on the regularity and frequency of feeding. As corn is the staple grain, it should

be kept within reach of the fowls so that they may help themselves at pleasure and thus they will regulate the quantity taken at one time as suits their convenience and comfort. Filling the crop is injurious at all times, and particularly so in severe weather. A large fowl, when stinted, and seeing corn but twice, and often but once in a day, will fill the crop to repletion, taking in a half pint or more at a feed This chills the fowl, and if inclined to be tender, brings on indigestion, which is difficult to manage at that season. If fed in this manner, where there are many fowls and the quantity insufficient, the master fowls take the whole at the expense of the others.

I have found that the better way to feed fowls, in cold weather, more especially laying hens, is to keep corn by them the whole time. I put it in troughs at the side of the building. In this manner they will have an equal chance, and will fill up the crops at night. If it is not all digested by morning the fowl is not strong or in perfect health. My rule for feeding laying hens in cold weather is sometimes varied, but I generally endeavor to give a soft warm feed in the morning. I sometimes mix chopped onions with it, but as a rule give them separately. This vegetable is an excellent antidote for disease, and the fowls become extravagantly fond of it. They will eat onions at any time of year, and at large or in confinement. In making the mush I use unbolted corn meal scalded with boiling water, with sufficient grease or drippings to make the whole palatable. The greasy matter softens the meal and causes it to become digestible. The feed should not be so soft as to be mushy or sloppy, neither should it be so stiff as to choke the fowls when swallowing it, but just thick enough to stand up and keep in shape.

I am particular as to the manner and matter of the feed of my fowls at all times, and especially so in cold weather when they yield the larger profit in eggs. My aim in keeping fowls is eggs alone, therefore it becomes necessary to be careful concerning the feeding. The health depends upon it, also the profit. Regularity is important with fowls as well as all farm stock. Habits once formed are permanent, and fowls may be trained to suit the needs and ends of the keeper, if persevered with. But the keeper must be always regular, for the fowls become impatient of delay and know their regular periods. It is as easy to raise eggs in cold weather as in warm, and far more profitable, if the keeper is not afraid of trouble and constant care.

The fowls must be attended to, and it is no small matter where the flocks are large to keep a steady supply of water when the weather is so severe that it freezes in a few hours, They must also have warm shelter, comfortable roosts, and a ground floor for scratching. Laying hens are active and their activity must be promoted. As soon as the old fowls are through the annual moult, which should occur before going into winter quarters, they should be supplied with egg-producing food. The vegetables should be fed separately. I often give some at the time of giving other food, and the fowls mix as suits their appetites. Whole corn is the main reliance, and is always at hand. The other feeds are interspersed and varied from time to time, always observing the regular period with some kind of food that is palatable.

C. B. *Duchess Country, N. Y,*

Marketing as Early as Possible.

The Bucks County (Pa) Intelligencer, published in a district where raising and fattening poultry is largely carried on, gives the following advice :

We do not know whether the poultry crop of Bucks county is up to the average this year or not. But whether it is or not, it is time to begin fattening and marketing the cockerels and most of the pullets that will not lay before next spring. Many poultry-keepers make the mistake of keeping the crop too late. The birds should be about grown by this time, and as soon as the frame has attained its growth the best thing to do, where profit is considered, is to fatten and send to market. There are two or three advantages in early marketing : There is a good demand for roasters as soon as the cool weather sets in and they bringa fair price ; there is no glut until settled cold weather when poultry can be safely shipped from the interior : there is as much or more profit in marketing before Thanks giving as after, beside the saving of the feed and risks from disease, thieves, dogs, &c ; if the surplus crop is worked off early there will be more room and a better chance for those that are to be kept over ; with nothing to bother or worry the pullets they should all be laying by or before the first of December, when eggs are valuable. The feed saved by early marketing of the surplus can be profitably applied in producing eggs, which at that time of year of year will be worth about double per pound what the poultry will fetch. Turkeys and geese cannot of course be advantageously marketed before Thanksgiving, but all the turkeys that are large enough should be disposed of then : to this end they should be liberally fed and thus prepared for early marketing. No poultry-keeper will make a mistake who sends his surplus stock to market early.

Poultry as Gleaners

Now is the time for the farmer, says a French journal, to make use of portable houses to take his poultry to the fields, as also his geese and turkeys. Fowls like the change, they enjoy roaming about ; in fact, it is their holiday, and at harvest time fowls disport themselves as if they were aware that it was time to be sent into the field. A poultry yard, dry and restricted to space, with always the same food, is replaced by the open country, tender herbage, and where they feed on *friandises*, they have a thousand varieties of insects, and grain, which is often in a state of fermentation, thereby giving it an agreable alcoholic taste, and which is seldom met with unless in the droppings of horses. Now is the time to send out into fields the fowls and turkeys. Poultry at this time of the year are in excellent condition ; they can bear the fatigue of wandering about the fields to satisfy their appetites —a very useful proceeding for the farmer, not being required to go to his granary, but who finds a great saving by having the lost grain gleaned by his poultry. A little, active boy, vigorous and vigilant, is sufficient to take charge of a flock of turkeys, which he does with the help of a long stick, with which he threatens them in case they wander too far, but never strikes them with it. The boy must be very patient and gentle with them, and not hurry them on, so that they may not lose a single grain or insect. They ought to be allowed to eat as much as they like, always within an easy distance from home. On their leaving, as on their returning, the poultry woman ought to count them, and see they are not ailing, and to induce them to be regular in their return to the farm, a good feed of maize, barley, or buckwheat ought to be given to them.

THE POULTRY-YARD.

Careless Managment.

EDS. COUNTRY GENTLEMAN—The careless poultry keeper is often surprised by finding, early on some cold, frosty, October morning, a brood of chicks fresh from the shell. The surprise can hardly gladden the sight of the owner, for there can be no hope of raising them in the inclement weather. If a

few survive, they are of small value, always dwarfed and imperfect. This is the result of direct negligence. If the fowls had been kept in confinement, or every hen made to give an account of herself at the morning feed, this trouble might have been avoided. These are the persons who say that fowls do not pay their keep, and they are only kept around to please the women folk.

Fowls should not be allowed to steal their nests. They are never so profitable as when kept in confinement— in summer in ample yards, and in winter in roomy, comfortable buildings. The eggs can always be found where they are laid, and there are no late broods coming off at the beginning of winter. I have frequently heard the indifferent poultry keeper remark that it is better for a hen to steal her nest and come off in late summer. Her brood is then no trouble, and the chicks are all pretty sure to live and grow up. I know better. Experience has taught me that one early-hatched chick well fed and raised, is worth two of these late, neglected ones. I do not leave it to the fowls what kind or sort of chicks I shall raise. I like to control this matter myself. I have a choice, and I know which my best fowls are. From them only do I make my increase of stock. Of course fowls kept in confinement are more trouble, but there is no branch of farming that pays better for the outlay than the keeping of fowls. The stock must be right, and than there will be found little difficulty, with a steady application to the business. All the fowls' wants must be supplied. A hen should never be set after the 10th of June, and not then unless it be on eggs of some small and early maturing breed. This gives an opportunity for every feather to get full growth in warm weather, after which the fowl takes on fat rapidly. Lean, poorly-kept hens will not lay, and lean, poor poultry is not fit for market. The rule should be to give good keeping at all times and seasons.

Duchess County, N. Y. C. B.

A Yorkshire Egg Farm.

"Henwife" supplies to the London Live Stock Journal an account of a visit she has recently paid to a farm where the staple return is from hens:

In the middle of Yorkshire, at the picturesque village of —, surrounded by a beautiful scenery of heather, moor, hill and rushing brown stream, lies the farm to which I refer. Mr and Mrs. W— are the only occupants of the cosy little stone farmhouse, and preferring to perform all the work of the dairy and poultry yard themselves, are therefore satisfied that it is well done I should mention that the exceptional size and beauty of the eggs which I saw in a grocer's windows in the market town led me to inquire whether they were a specimen basketful or no, and being much struck with the reply that these were "only part of a consignment received that day," I begged permission to visit the farm which supplied them.

A short journey of half an hour brought me to the village, where I was most kindly received; and Mrs. W. at once gave me full particulars as to her method of feeding and managing the hens. In the morning, about six, they receive a good meal of small round maize. Directly afterwards they go roaming all over the grass fields always returning punctually at noon for their dinner. This second feed consists of the best Indian meal, mixed with a fourth part of very superior Scotch oatmeal, sweet and fresh; a sprinkling of spice is added, and the mixture made with boiling water. This they eat ravenously, and then rush off again to the fields. About five o'clock a duplicate meal is given them, after which they go to roost.

Mr. W. has not more than 200 hens. The breeds are mixed. In some I could see Andalusian blood, in other the nodding tuft and speckled plumage of the Houdan, were apparent, Cochin and Brahma, as well as Dorking characteristics might be observed in others. From these 200 hens Mr. W. has obtained, from May 1st to September 1st, £60 worth of eggs, the highest price obtained being 1s. for seven and the lowest 1s. for seventeen. In April and May he several times collected 1,000 eggs per week. The average yield during May and June was 100 to 130 eggs per day. At this moment he is bringing to market from 350 to 420 eggs weekly, the hens laying daily from 50 to 60 eggs.

Fifty eggs daily in September from 200 hens in deep moult, is a most extraordinary return, of course, a very large proportion are not laying at all at this moment. The eggs are quite over the usual size: six of them when selected turning the scale at a pound; but they average seven to the pound, picked up haphazard from the nest.

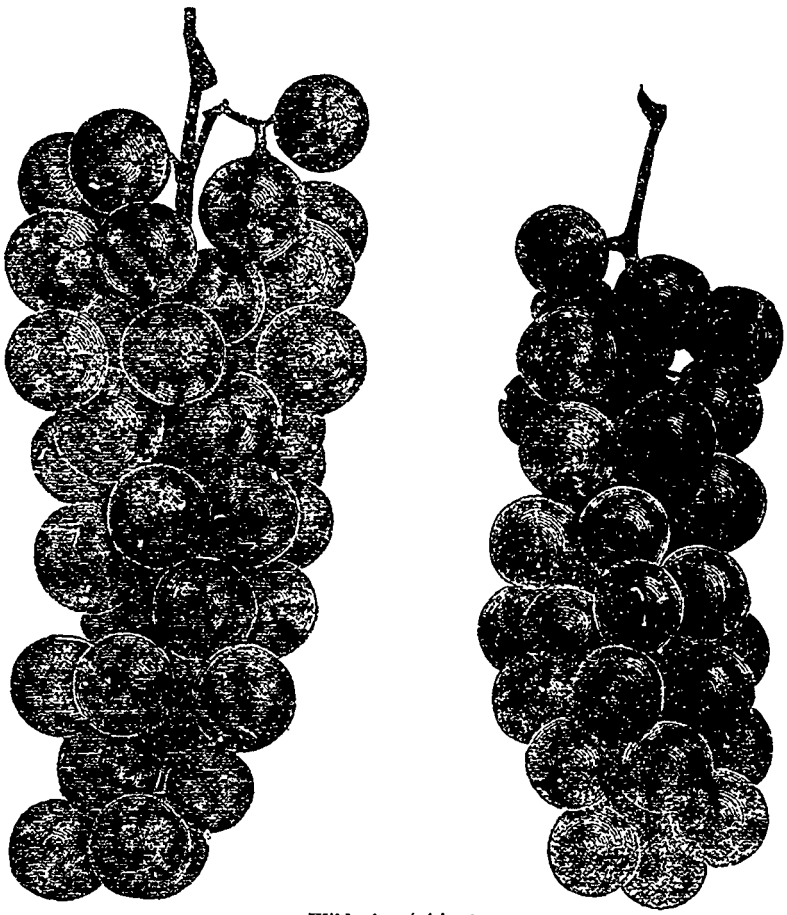
Mrs. W. insists upon the food given to the birds being of the best quality, and distributed most punctually. She occasionally, in the winter, makes a pail-ful of sour barley quite hot, by baking slowly for an hour, and considers it to be a great stimulus to laying. The hens are many of them in their fourth year, at the commencement of which they are killed. Mr. W.'s experience satisfies him that birds bred from laying strains do not reach the height of their powers till the completion of their second year. Green corn he considers the worst of food for laying hens, and has observed that, if allowed access to the ricks at this season, they cease laying. He thinks it (being sweet and new) fattens, but lacks the stimulus contained in sound and thoroughly dried corn.

Referring to the ravages hens are supposed to commit in their ranging, Mr. W. spoke highly of the benefit conferred by poultry on grass lands, by devouring insects and manuring the soil. He informed me that when he began to farm his present tenement, thirteen years ago — consisting of sixteen acres — he could not make enough hay to winter three cows, but that now he keeps ten with ease. It is evident that in this case the "eye of the master fattens the steed," as the old proverb has it; but Mr. W. gives much of the credit to his poultry. Buttermilk forms another article of diet in the chicken yard; this or sweet milk is given in troughs, and especially during the autumn and winter months forms a valuable heat-producer. On inquiring as to what method Mr. W. pursued in breeding his laying birds, he replied "Whenever I see a good layer I buy her, and set a few clutches of her eggs, and always, when setting from my own birds, select the eggs of those which lay the largest ones, and that most frequently." The cocks are of the same mixed breeds as the hens. I think I saw about twenty in all. The soil is dry—a mixture of loam and sand, with here and there a good deal of limestone. The fowls' houses are of the most simple description, and they have a free run over the grass fields. I left Mr. W.'s farm with a feeling of real pleasure. It is delightful to have found even one English farmer who allows that poultry will pay, and who demonstrates so practically. All around his neighbors echo the old cry, "Fowls don't pay," and in many cases have given them up in despair. Great cleanliness, great care and punctuality in feeding, personal attention, and a simple and practical rule in breeding have brought about these excellent results. Why are there not many more such cases? I have often urged upon farmers and cottagers to establish a profitable breed of poultry. Perhaps this instance of a well earned and paying return may encourage them to go and do likewise.

Grazing According to Climate.

EDS. COUNTRY GENTLEMAN— Some years ago your eminently practical contributor G. G. repeatedly insisted on the close grazing of pastures in America, as a practical necessity

in securing or establishing a good sod. A surface soil filled and bound together with roots, is in England called "well sodded." It seems to me that the difference between the climates of England and America, and the more favorable influence of the moist and cool climate of England, should be duly considered in establishing a good sward in pasture land. The moist air almost continually existing in England, keeps the surface soil moist, the subsoil containing still more moisture, so that the constant treading incident to grazing, presses the surface soil and grass roots firmly together. After the treading down there is no re bound or rising of the sod and the grass keeps growing constantly till the moist sod is well matted together with roots. The usually moist air has also much influence in maintaining the sod and verdant freshness of pastured lands.



Wild vine, (vitis riparia).

The conditions of the soil and climate in interior America, including Canada of course, are not only different from those of England, but to me seem much less favorable to constant root-growth in the surface soil. When grass is closely eaten off in England, the green parts left still remain green because not dessicated by too rapid evaporation, and grow because supplied with sufficient moisture in the soil and the air. On the other hand, if only a few short or mangled leaves be left from too close grazing a considerable part of the grass will die out in the dry surface soils of most American pasture lands, the dying out being due to the dry and uncompacted surface soil, and the much more rapid drying of the growth left.

The grass lands of interior America cannot be permanently compacted by the treading of grazing stock as are those of England, for the surface soils are, in average seasons and in a general condition, too dry to cohere and remain consolidated even when trodden down firmly. Hence to prevent the destruction of the grass roots it is necessary to prevent the killing of the lower blades by preventing too close grazing. It is certain that green leaves are as vital and necessary to root growth in grass as they are to keep the roots alive and growing in other plants.

There are certain grasses in limited areas that bear close grazing in the hot and dry climate of the American interior. Red-top, *Agrostis vulgaris*, is preëminent in bearing much treading and close grazing. I have watched its conditions in half a dozen Northwestern States, and have never seen it of a yellow or dead brown hue, but always green and fresh in color. This fact clearly demonstrates that it was in a live, green, growing condition, however close the grazing may have been Some years ago I owned fifty or sixty acres of red-top grass, and even the close grazing of sheep did not kill it, but it continued always green.

The soil on which red top grass flourishes is generally moist intervale-soil on the margins of mashes, or moist meadow lands, and on low, moist lands along roadsides, as in central Wisconsin, and on the roadsides for 200 miles west from Dubuque, Iowa, the soil being moist enough to supply the grass with needed water. The moist condition of the soil has also led to its compaction about the roads by the treading incident to close grazing. Hence the reason for success in growing red-top in America.

Blue grass affords light grazing in the summer season. My experience with it has been on rather dry soil. It flourishes best in autumn, after the highest heat period has passed, and after the usual rains of mid-September, showing that cooler and moister air than mid-summer usually affords is necessary to its most successful growth. This is evident where it succeeds best, in Illinois and Iowa. It affords pasture late in the fall, after frost has killed blue-joint and other prairie grasses.

The grass generally grown on American uplands, or on the higher and drier parts of American farms, is timothy, the foxtaill of England, probably. (1) On the lower end of the stem in this grass there is a small bulbous enlargement, from the fine feeding roots branching off into the soil. It seems logical to infer that this bulb is a natural reservoir to contain a limited but necessary supply of sap, with its necessary solids in solution, as a provision during intervals of drouth, the contents of the bulb being of course stored up when moisture from rain is in excess of the demands of growth. This contains moisture enough to keep timothy alive and growing during dry intervals, and on soils too dry for most other grasses. Whether this explanation be the correct one or not, it seems logical. The laceration or injury of these bulbs by close grazing or otherwise, kills the grass, root and branch. This laceration of the bulbs is frequent, because they are naturally formed above the surface, and die from lack of moisture in very dry ground. It seems, moreover, reasonable that any leaves left above these bulbs must tend to prevent their being injured either by the excessive heat or laceration from close razing.

On the whole, the instances in which close grazing is advisable in our dry inland American climates, are apparently exceptional, and result from conditions approximating those of English pastures; but in our dry climates and summers too close grazing is not to be recommended.

Royal Jersey Agricultural Society
JUBILEE SHOW-1.

It is much to be regretted that our Jubilee Show, which should have been the climax and crowning glory of the year, was nothing more than an echo of the spring shows. We had the April Bull Show and May Cow Show exactly reproduced, *plus* a few churns and chaffcutters, and *minus* two or three of the best animals, carried off in the meantime to America. We had the very same classes, the very same prizes, and these were won (in most instances) by the very same animals! (To make the thing complete, it should have been held in the very same spot, and nobody should have been admitted but the very same people!) When the society had decided in April and May which was the best (second, third, fourth, twelfth best) yearling, two-year-old, etc., what possible good could arise from calling the same animals together, three or four months after, and solemnly saying the same thing over again? Could anything be more utterly useless? It was simply time and labor and money, *and a golden opportunity*, absolutely thrown away.

Had the old familiar prize schedule been anything like prefect, then the committee might have been pardoned for "letting *well* alone," as the proverb advises. But judgment cannot be stayed on such a plea. In the first place, there was not a single class, not one prize *open to the whole Island*. Our Royal Jersey Agricultural Society confined its prizes (in cattle at all events) strictly to its own members and, during the whole 50 years of its existence, I am not aware that it has ever offered a prize to anybody else. Do the American agricultural societies keep their prizes to themselves? Does any other society (agricultural, scientific, political or religious) in Europe, America or any where else? And what better opportunity could our society have desired than this jubilee, to free itself from its trammels and throw its classes open to the whole Island? Why not have gone a step further and offered *special prizes to English breeders*? We have carried off their prizes often enough, and have sold them in the last 20 years about 40,000 head of cattle, for which they have paid paid us something like half a millionsterling, say £10 ($50) per head of our population! Why not have gone further still and offered prizes for *Guernseys*? It would have done our farmers no harm to see the two breeds by side, and they might have learned something by the comparison. Why not have offered a prize for the *best herd* the *best family* or the *best sire*, judging him by three of his daughters? Or, still more practically useful, why not have given a champion prize or challenge cup for the *best seven days' butter record* made during the season— entries open to the whole Island— tests conducted by the R. J. A. S.— cows cared for, fed and milked (under the eyes of the judges) in their own homes and by their own people— the seven days to be consecutive, but date chosen by competitor?

In so small a place as Jersey (something like a square, 7 miles each way) such a competition appears to be perfectly feasbile— indeed, I proposed it at two committee meetings following, but it was dismissed as "impossible," and I could not even find a seconder. Yet I hold, with all respect, that it was not only possible, but that the labor and money spent on such a contest would have done more good than fifty jubilee shows, or a thousand show-ring prizes. The modern madness for shows of all sorts, from Short-Horn bulls to pretty barmaids and babies, was never madder than when it meddled with Jersey cattle, and pretended to judge them by a scale of points in a show ring. If a Jersey cow is worth anything at all, it is as a butter-giver, and how can you judge this in a show ring? Can you pick out next year's Derby winner or a 2.10 trotter, in this way? No— the race horse to the course, the trotter to the track, and the Jersey cow to the churn! Let the scales and weights decide! But our society sticks to her shows, and to her scale of points which gives *only* 14 *points out of* 100 to the udder, teats, and milk veins— the visible butter machinery. To pick out the best cow in a show is difficult enough any way, but by such a scale of points it is impossible. Fortunately for the breed, our judges are wiser than the society they serve, and the "scale of points," though still borne on the reports, is practically as dead as Queen Anne. One thing more— if it is so difficult in a show ring to select the best *cow*, how about a *bull*? In Short-Horns it is easy enough, for the future bullock stands before you, but a Jersey is valuable only for his *butter power*, his ability to transmit to his daughters the butter yield of his dam. His only recommendation *before* you use him is the butter record of his dam, g. dam, g. g. dam, and as many more of his ancestresses as you can get; his best recommendation *after* you have used him is the butter record of his daughters And how can you tell this by looking at him as he stands in a show ring? It is madness *in excelsis!* particularly when you remember its far-reaching results. Bulls, selected in this haphazard way, are run after to such an extent that a first prize bull has been known to serve 500 cows (the pick of the Island) in two years! What a disaster, if he is not a good butter bull! Yet what means are taken to insure his being *the best*? None, absolutely none, but the show ring. If our society had gone on a different tack, if it had encouraged and promoted butter tests throughout the Island, if it had superintended them and published certified results (with or without pri-

(1) By no means, timothy, *phleum pratense*, is known in England by that name. Foxtail is *alopecurus pratensis*.

zes) all these fifty years, where should we be now ? In the first place, Jersey breeders — not only here, but in America and England — would be working in the broad light of day, instead of in a darkness so thick that breeding with brains is almost impossible. Which is the best strain ; the best family ; the best cow ; the best bull ? What shall I buy ? How shall I breed ? Which families " nick " best with each other ? No one can tell ; nobody knows.

With fifty years of butter tests, such questions as these (the very A B C of breeding) would have been settled long ago. The best strains and families and individuals would now be matters of history, and their names familiar in our mouths as household words. In the next place, what would have been the effect of such a long, persistent series of tests upon the breed itself ? The *average yield of butter must have increased* all over the Island. If the best bulls (thesons of the highest record cows) had been constantly bred to— as they most certainly would have been — bad cows would by this time have been bred out altogether. Good cows put to such bulls would have produced daughters, granddaughters, great granddaughters, &c., better and still better than themselves, until the original best record had become a common occurrence. Just as a 2.30 trotter, once a phenomenon, is now (by constant breeding from the fastest animals of the fastest strain) only one in a second-rate crowd. If a similar process had been carried out with Jerseys— constantly breeding for butter— it would not only have produced extraordinary animals giving unheard of records, but the *average* of the whole breed would have been improved at the same time, like the average speed of trotters. If this general average had only improved one pound per head per week, this would give for Jersey alone an increase of £10,000 ($50,000) a year— not to mention the still higher place Jerseys would have taken compared with other breeds, and the increased prices they would thus command.

The length to which these preliminary notes have run, compels me to keep over till next week the discussion of the prize list.

Langley House, Jersey. JONATHAN SMITH.

Smoking Hams

The old method has many objections, which are obviated in that I shall describe. Most farmers have a small building devoted exclusively to smoking purposes, but whether built of wood, bricks or stones, the process of smoking, as usually pursued, invariably results in befouling the meat so badly that that portion has to be cut off and wasted, as wetting or even washing still leaves it unpalatable, if not unfit to eat. Often the slit in the skin of the ham tears out, or the string by which it is suspended breaks, and it falls into the ashes or fire, if one is burning, in which it lies broilling, perhaps for hours before it is discovered. Smoke-houses built of wood are sometimes burned, in which case, if not a total loss, the hams are greatly damaged ; and it is not an uncommon occurrence that hams are stolen from the smoke-house. There are other inconveniences and annoyances, of which every one is aware who has smoked hams in the usual way, that every reader will think of, so I will not speak particularly of them. As a substitute for the smoke-house, let me suggest that you smoke a barrel thoroughly with maple or hickory chips (raise the barrel an inch or wo from the ground to furnish draught), and when smoked sufficiently, sweep out the inside, and give it a slight rinsing with cold water. When you have thus prepared it, pack the hams and shoulders in it, flesh side up, and pour over them the pickle suffieient to cover them, and your work is done. The pickle extracting the desired smoky flavor from the barrel, will carry it through the whole mass of meat, and much more equally, or evenly, than by the usual process of smoking, as the flavor will be as strong in the centre as at the surface of the ham. In addition to this even flavoring of the meat, this process will be found to be much less troublesome and less laborious, avoiding the risk of falling into the fire, of a burning smoke-house, or into the hands of thieving neighbors, beside escaping that filthiness which is inseparable from the common way of smoking, and its consequent waste when preparing it for the table, as the meat is every way as clean when taken from the barrel as when placed in it. By this process all the expense, labor and trouble of bagging the hams after making, to keep them from the flies, is obviated, as they may be kept submerged in the pickle till wanted, or the last piece is desired for the gridiron, pot or pan. Be sure to smoke the barrel very thoroughly if you would have a strong flavor of smoke in your meat.

OUR ENGRAVINGS.

Forest trees, leaves, and seeds.

Illustrations of water-meadows &c.

Wild grapes. The bunches of grapes were gathered at Rougemont this autumn. When I saw them, they had suffered considerably by too much handling during the process of engraving, but they were almost incredibly magnificent in form and size, and brilliant in colour. The vine from which the bunches were taken grows close to an *elm*, and climbs to the height of forty feet up the tree. Rather droll that it should have chosen such a support, as the elm. Romans called the elm *viduus*, i. e. *widowed* : they supposed that it was injurious to the vine to allow it to embrace, parasitically, a tree of that species.

FORESTRY.

BLACK SPRUCE.

Every thing I have said about the white spruce is applicable to the black spruce. The only marked differences between the two kinds are, that the black spruce, in suitable soils, attains a height of hundred feet, and is a little inferior to the other in the quality of its wood for the joiner's use.

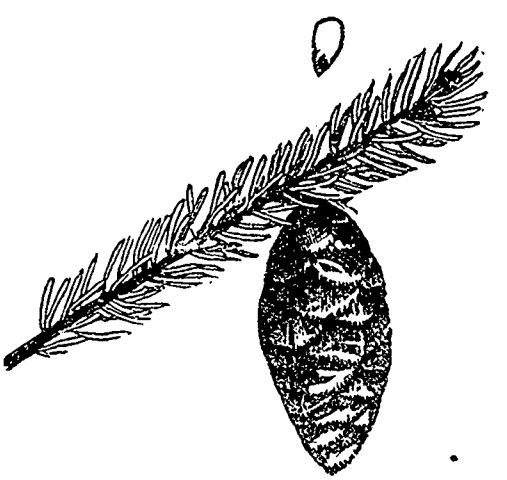


Fig. 1.

With the tender shoots of the black spruce is made the noted *spruce-beer*, the favourite beverage of the Canadian during the summer months. The engraving no. 1, p. represents a bough of the black spruce, with its cone and seed.

American Larch.

The larch delights in low, damp, and even marshy places. The seed ripens in autumn, and is preserved, like the seed of other conifers, in moist sand. About thirty thousand pickles go to the pound. This tree, which grows rapidly, is seventy feet high at maturity, and, twenty years from sowing, furnishes dimension timber from forty to fifty feet in height. Sow in spring, and in two years time, when the plant will be about a foot high, transplant it into the nursery. Its final transplantation should be done very early in the spring. This is absolutely essential, for the tree starts into growth with the first thaw, and is then very difficult to transplant. As the ground will not be shaded for the first four years, the hoe and grubber must be kept going all the time. Larch-wood is strong and heavy; hence, it was employed by the farmer for fence-pegs and harrow-teeth, before iron was used for the one purpose, and wire for the other. The property which larch possesses of resisting the rotting influence of water, causes it to be a favourite timber with ship-builders A great deal of it is used for railroad-sleepers, for which purpose it becomes large enough in twenty four years from sowing. I strongly recommend the cultivation of the larch to all our farmers, and more especially to railroad-companies. The seed of the American larch is shown in eng no. 2.

Fig. 2.

Canada White Pine—Rock-pine—Red Pine.

The pines are the most important of all the trees with which the Canadian lumberer deals. The Canada white pine is the most valuable of the three species which are most frequently met with in the Dominion. Cool, damp soils suit it but it will do well in light, sandy soils with a clay subsoil. Plains of arid sand may be advantageously planted with this tree, the seed of which takes eighteen months to ripen; it is collected in autumn and sown in spring, placing not more than half an inch of earth upon it. Germination takes place, generally, in thirty days, but, occasionally, the plant is invisible for twelve months. A pound of white pine seed contains ten thousand pickles, and a pound of red pine seed, forty thousand. They grow very quickly, and may be set out in the nursery two years from the seed. When the time of final transplantation arrives, they should be planted at a distance of eight feet, every way, from tree to tree, and the vacant spaces should be filled up with two or three willows or poplars, in fact, with any quick-growing trees, which may be cut six or seven years afterwards. In fourteen years, the white pine may be expected to furnish timber thirty five feet high by nine inches in diameter, on an average; and in twenty six years, fifty feet by eighteen or twenty inches, may be looked for. The Canadian white pine attains a height of from one hundred and twenty five to one hundred and forty feet, with an average diameter of seven feet; and at the Centenary Exposition, at Philadelphia, a plank of this wood was exhibited, eight feet four inches wide, by nine inches thick. The red pine does not grow to the same dimensions, hardly ever exceeding seventy five feet, neither is its wood of so fine a quality. Dry sandy land is its favourite. Rock-pine is only mentioned here for the sake of recommending its preservation and use where it grows naturally. It is worth hardly anything, from a commercial point of view, except for firing. Poor, stony soils suit it, and it rarely exceeds forty feet in height. Eng. no. 3 represent a branch of the white-pine, and eng. no. 4 its seed. Eng. no. 5 depicts a a branch of the red pine.

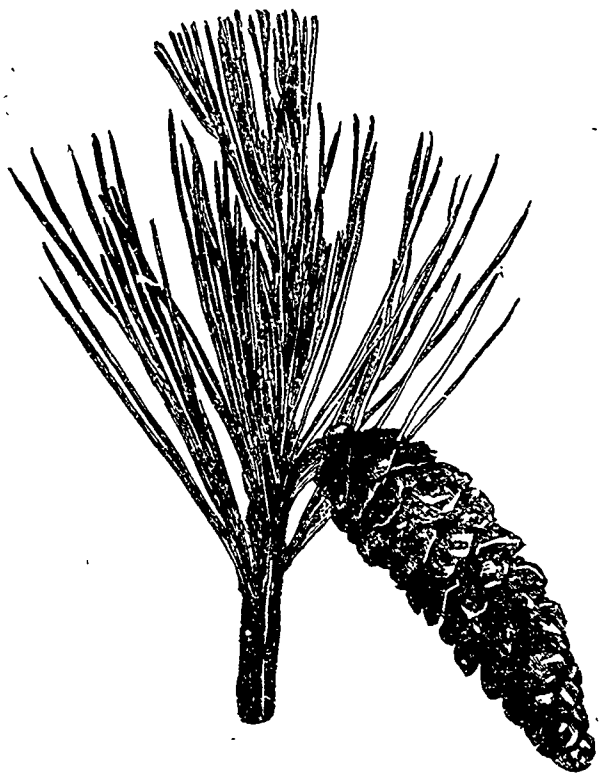


Fig. 3.

Fig. 4.

Balsam-Fir—Double Balsam-Fir.

The fir, a very common tree in this country, prefers a moist soil, and does not disdain a marshy one. The seed, which

matures in the fall, must be sown at once, as it easily loses its germinating power, and even if treated thus, not more than 25 0/0 will grow. Forty thousand pickles are found in a pound of seed : it takes five or six weeks to come up. Fifty feet is the height of the balsam-fir, by one foot in diameter ; but the double balsam-fir grows to sixty feet, and is easily distinguished from the former, since it has not, like it, vesicles filled with resinous gum, and is, in addition, loftier in growth, though the leaves and cones are shorter. The two varieties are often found growing together. The fir grows quickly, and is very useful in young plantations of tender trees as a protection against the wind, especially in damp places, where no other conifer would grow. The wood of the fir is almost valueless ; for firing it is hardly worth more than the poplar. The balsam-fir produces a gum called, in common parlance, *gomme de sapin*, and known in medicine as Canada-balsam. Eng. no. 6, represents the balsam-fir ; eng no. 7, one of its boughs ; and eng. no. 8, the seed.

Fig. 5.

Fig. 6.

Fig. 7.

Norway-Spruce.

Here is an exotic which, in my opinion, deserves a place among the conifers fitted for cultivation in all the provinces of the Dominion. This fine tree seems to be so well inclined to become acclimatised in our country, that I have thought it right to enter it in the list of our indigenous trees. It is hardy, presents a magnificent appearance, and reaches a height of one hundred feet. It is easy of transplantation, and of rapid growth, although it is said to start slowly; a fault which I have proved to be unjustly laid to its charge. It has been known, without special care, to attain a height of thirty four feet, by fifteen inches in diameter at the base, in twenty four years. One quality of this tree is to throw out extremely strong lateral branches, which makes it highly suitable for wind-breaks round orchards, nurseries, or permanent plantations of walnuts, oaks, etc., And this is the principal reason why I recommend its cultivation. There is one peculiarity in its wood : it is fit for use before it reaches a foot in diameter, which is not the case with the other spruces. As regards other matters, including its cultivation, all that I have said about the white spruce applies to the Norway spruce. Eng. no. 9, represents one of the branches of the Norway-spruce ; and no. 10, its cone

CHAP. V

SUMMARY DESCRIPTION OF THE FOREST TREES WHICH INHABIT THE PROVINCE OF ONTARIO.

Besides the species common to all the provinces, Ontario possesses a more considerable number, some of which are peculiar to that division of the Dominion, and others are met with in several of the other provinces, as will be seen in the sequel. We will now proceed to describe these species.

SECTION I.

DECIDUOUS TREES.

The following varieties of deciduous trees are met with in Ontario :

Small-fruit Hickory,	Red oak,
Bitter Hickory,	Copper-tree
Pig-nut Hickory,	White, or silver Maple,
Shell-bark Hickory.	Red Ash,
White heart Hickory,	Beech,
Hornbeam,	Butternut,
Chestnut,	Black Walnut,
White oak,	Slippery, or red Elm
Yellow Chesnut-oak,	Iron-wood,
Quercitron-oak,	Large-toothed Aspen,
Scarlet-oak,	Button-wood,
Post-oak,	American Lime or Basswood,
Swamp-Chestnut-oak,	Tulip-tree.

Small fruit Hickory.—Bitter Hickory.—White-heart Hickory.—Pignut—Shell bark Hickory.

I unite all these hickories under one head, for the purpose of giving a description common to the whole, in which I will point out wherein they differ from one another. The Hickory delights in cool, rich soils. Its seed, a white nut with a thin shell, the kernel of which is extremely bitter in the *carya*

amara, but eatable in the other sorts, ripens in autumn. Some people recommend sowing it at once, but, if kept in damp sand, it will retain its power of germinating until spring. There are from fifty to a hundred nuts in a pound-weight—the number differs according to the size of the various sorts. There are two ways of sowing: in the place where the plantation is intended to be permanent, or in beds, for subsequent setting out in the nursery. Two inches of

Fig. 8.

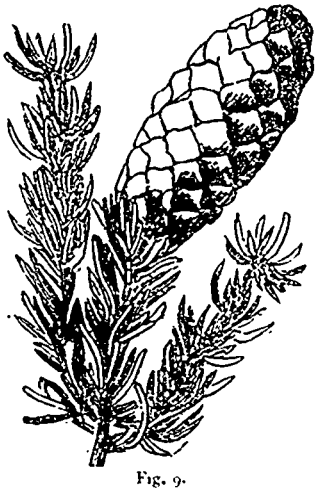


Fig. 9.

earth will sufficiently cover the seed. Sowing in the permanent plantation has been recommended for a long time, because the plant having a long tap-root, if this is broken in transplantation the tree takes a long time to recover from the injury. Still, the foresters in Europe have sown it in beds for many years. At a year old, with a very sharp spade, they cut the tap-root about eight inches below the surface, thrusting in the spade, very obliquely, under the plant in spring or autumn, when the sap is quiescent. Treated thus, the young tree shoots

Fig. 10.

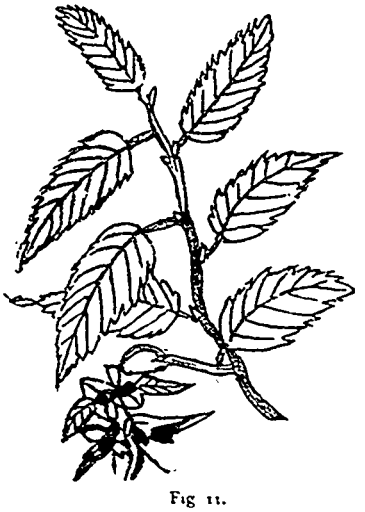


Fig 11.

out numerous lateral rootlets, and, a year after the operation, it is transplanted into its permanent abode, where it is sure to take, and grows as rapidly as the sugar-maple. The hickory not putting out its leaves until the spring is far advanced, demands protection from the smothering effects of weeds. Hence, it would be well to sow at the same time, when the permanent location planting is practised, some of the quicker growing trees, such as the red maple, the poplar, the willow, etc.. The shade derived from the vigorous shoots and leaves of such, will prevent the weeds from taking possession of the land. When they have done their work, the inferior trees can be cut, and the ground left to the hickories alone.

No firewood is to be compared with the hickory; and for

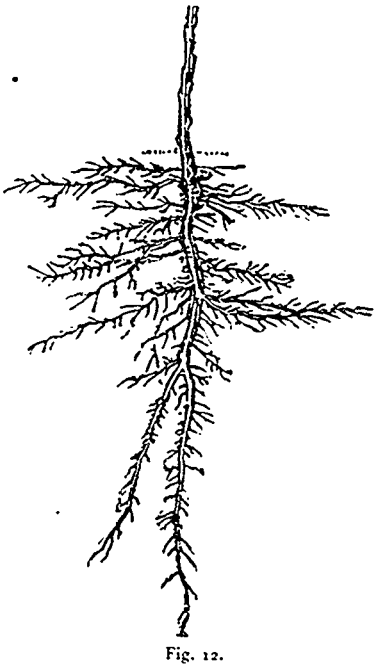


Fig. 12.

all purposes requiring great resisting power it is most excellent. The small-fruit hickory grows to a height of seventy feet by two feet in diameter; the bitter-hickory to fifty feet; and the shell bark to sixty feet. The wood of the last wrongly named *noyer tendre* (soft walnut), is very hard, and is much sought after on that account. Of all woods it is the best for firing. The pig-nut is also of good quality, and attains a height of seventy feet, while the white-heart does not exceed fifty. The latter's kernel is contained in a very hard shell.

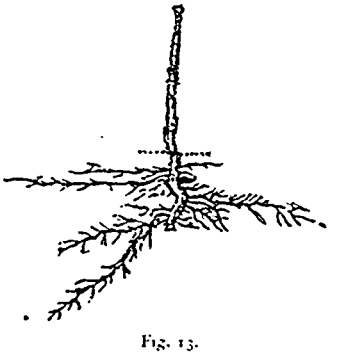


Fig. 13.

Hornbeam.

A tree of slow growth, and one that hardly ever exceeds twenty feet in height; so, I do not recommend its cultivation. Still it is worth mentioning here, as the fine and close grain of the wood makes it useful in certain mechanical constructions, such as the teeth of cogwheels, and for firing, if there is enough of it. For these reasons, it should be preserved with care, and its growth assisted. The hornbeam delights in rich soils; the seed is dry, hard, and winged, and a pound of

it contains about ten thousand pickles, which are slow to germinate. It would be as well to sow in autumn, though the seed can be kept in damp sand till spring. Eng. no. 11, represents the leaves of the hornbeam, and , p. , its seed.

Chesnut.

Rich, silicious soils suit this tree best : it abhors wet clays. Its seed, the edible chesnut, three thousand to the pound, ripens in autumn, and may be preserved in damp sand till spring. It should be sown in its permanent locality, as its transplantation rarely succeeds. Of quick growth, its height at maturity is sixty feet. The wood of the chestnut is hard and durable, but coarse and porous. One of its chief advantages is that after cutting it shoots freely from the stump. Good post for fencing, and fair firewood, though full of sparks, are yielded by the chestnut.

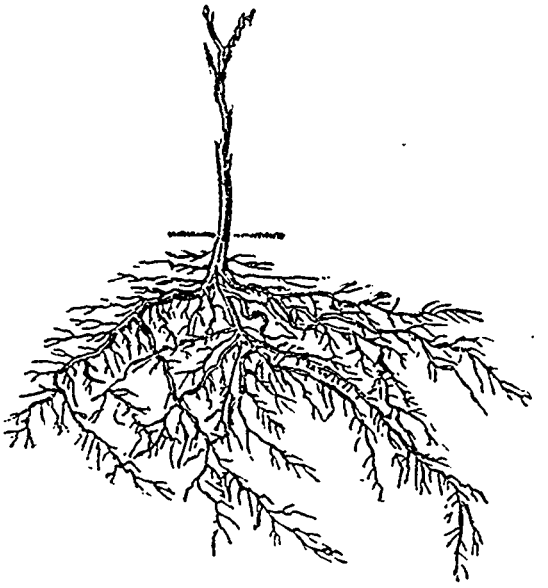


Fig. 14.

White oak—Chestnut oak—Quercitron oak—Scarlet oak—Post oak—Swamp Chestnut oak—Red oak.

The white oak rejoices in deep, heavy land, not too damp. In stony soil, the chestnut-oak does well. The quercitron-oak loves dry land ; the scarlet-oak, rich land ; the post-oak, loves an alluvial soil, and the scarlet has the same tastes as the white oak, only it is less afraid of moisture. The seed, or acorns, of the quercitron, the scarlet, and the red sorts, takes two years to ripen ; but the others mature in the autumn of the first year. The seed, one hundred to the pound, may be sown in the fall, or preserved till spring in damp sand, kept cool. Sow exactly as advised for the hickory, and cut off the tap-root in the same way : the result of this treatment will be identical in both cases. To make this operation the clearer, I offer an engraving no. 12, of a year-old oak with its tap-root, another, no. 13, the same without the tap-root ; and a third, no. 14, depicting it a year after the amputation. It will be seen, by the last cut, that the excision of the tap-root has had the effect of causing it to throw out a great number of hairy rootlets, by means of which the plant has been able to assimilate a greater quantity of nourishment in a given time. In its youth, the oak, like the hickory, should be mixed with other species for shade and shelter. The seedling becomes about a foot high the first year, and may be transplanted a year from the excision of the tap-root. The ultimate height of the different oaks is as follows : the white oak, seventy feet by four ; the chestnut-oak, sixty feet ; the quercitron, eighty feet ; the post oak, fifty feet, the swamp-chestnut-oak, one hundred feet ; and the red oak grows as big as the white, but not so high. Slow grower as is the white oak, it is said to reach, in twenty four years, a height of twenty five feet, with a diameter of two feet at twelve inches from the ground. Thus, in these few years it becomes of great value for building, and is worth sowing, even by those who look to reap a profit in their own life-time. The ship-builder, the plough-maker, the cooper, all value highly the timber of the oak, and it furnishes excellent firewood. The inner back of the quercitron supplies the dyer with a yellow dye—hence its trivial name—*Dyer's oak*. Eng. no. 15, represents the leaves of the white oak. Eng. no. 16 represent the leaf of the chestnut oak. Eng. no. 17, the leaf of the quercitron oak. Eng no. 18, the leaf of the scarlet oak ; Eng. no. 19, the leaf of the swamp-chestnut-oak. Eng. 20, the leaf of the red oak, and no. 21, its acorn.

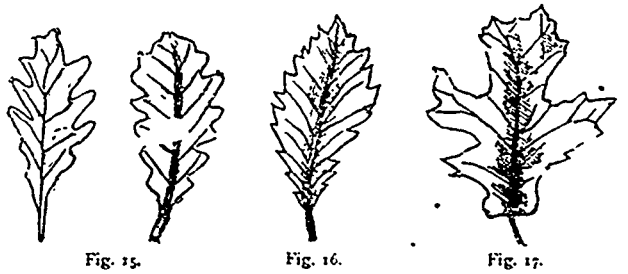


Fig. 15. Fig. 16. Fig. 17.

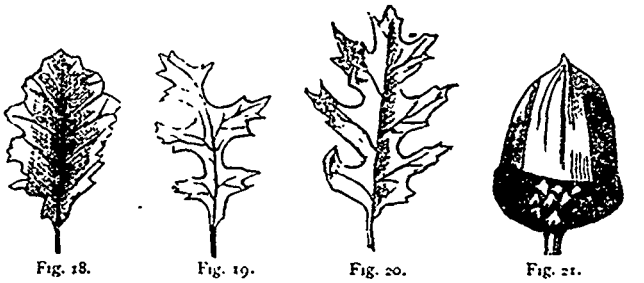


Fig. 18. Fig. 19. Fig. 20. Fig. 21.

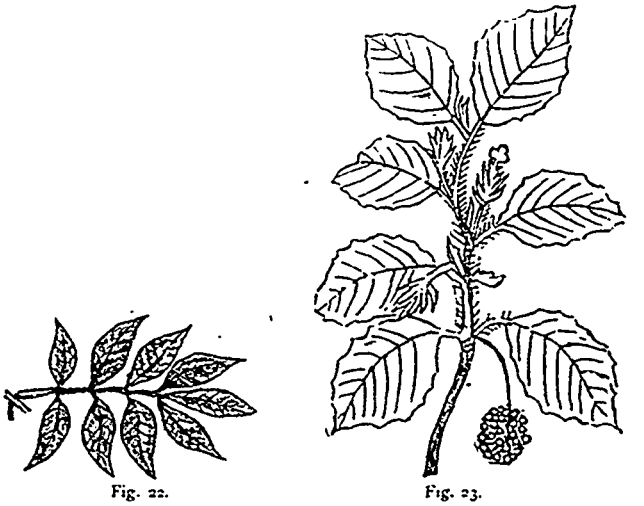


Fig. 22. Fig. 23.

Coffee-tree

This tree, the singular name of which in French, *chicot*, is derived from the appearance of the end of its boughs in winter, grows to fifty feet high by fifteen inches in diameter.

It grows well from the seed, which must be scalded before sowing, as the integument is very hard. The wood of the coffee-tree is of a reddish colour, hard, with a fine grain, and is highly prized by the cabinet-maker. It is worth attention where it grows naturally, but is hardly fit for cultivation.

White, or Silver Maple.

This tree attains a height of fifty feet; its woolly seed pods five thousand of which weigh a pound, are three inches in length, and ripen in June, when they should be sown at once, and, therefore, if the seed must be bought, it should be bought immediately after the crop is ripe. Rapid is the growth of this maple, and, consequently, the wood is brittle, of little value, and the tree soon dies off. Damp soils suit it, and sugar can be made from the sap, though it is not so saccharriferous as the sap of the true sugar-maple.

Red Ash.

This ash, which delights in rich soils, seldom exceeds forty feet in height. The wood is inferior in quality, but is in request for baskets and barrel-hoops. For its cultivation, etc., see the other articles on the ash. Cut no. 22 shows the leaf of the red ash.

Fig. 24.

Fig. 25.

Beech.

Hating sands, this well known tree finds a pleasant abode in hilly, gravelly soils, where there is little depth of earth. The *mast*, which ripens, as all the world knows, in autumn, must be sown at once, as it soon loses its power of germination. It should be slightly covered, and will be found up in the spring. A pound of mast will contain fifteen hundred pickles. As it is by no means easy to raise the beech from seed, perhaps it would be wiser to take the young plants which spring in the underwood, and set them out in a nursery. The beech, like the hickory and butternut, requires the protection of more rapidly growing trees in its youth. It grows slowly, though quicker than the oak, and when full grown is sixty feet high. Though worth preserving, it is not worth taking much trouble about, for its wood is inferior even to the yellow-birch as a combustible, and for other purposes it is not much in demand. The mast, when crushed, furnishes a by no means despicable salad-oil. The eng. no. 23, depicts leaf of the beech; and no. 24, the mast.

Butternut.—Black Walnut.

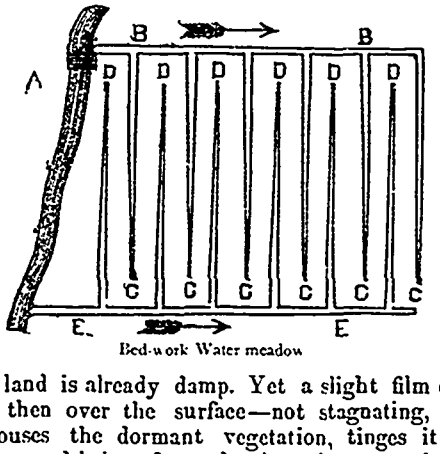
The walnuts rejoice in rich soils. The seed should be set in autumn, immediately after it ripens, as it is very difficult to preserve it during winter. Still, kept in damp sand, in a cool, or rather, in a cold place, it will do well enough. Twenty five nuts weigh about a pound, and they should be sown where they are to remain, as the tap root is very strong, which makes the plants impatient of removal. The observations on the oak and the hickory are applicable to these trees. Two inches is deep enough to bury the seed. The butternut grows rapidly, and at last attains a height of fifty feet. If sown in beds, it must be transplanted very young, as the tap-root would be broken off if the tree were allowed to stand too long without removal. It would be better to cut the tap-root in the bed, and to treat the plant as recommended for the hickory. The black walnut grows to a height of ninety feet, and furnishes the costly wood so highly esteemed by cabinet-makers. The butternut, less valuable than the black walnut on account of the inferiority of its colour, is used for the same purpose. The cultivation of the walnuts is, in general, precisely the same as that recommended for the oak and hickory, to which my readers may refer. Cut no. 25 represents the leaf and nut of the black-walnut.

From the French. J. C. CHAPAIS.

Irrigation.—Water-meadows.

A few weeks ago, a gentleman, the principal of one of our agricultural colleges, was talking to me about a certain stream which flows along one side of the college-farm, and inquiring my opinion as to the feasibility of using it for irrigation. I know the stream well, and have often studied its capacity and fall: it is admirably adapted to the purpose, and, without going to a great expense, several acres of meadow might be flooded when deemed desirable. A certain outlay must be made for gates—we call them *pen-stocks* in England; from *pen*, old British for the *head*, as *pen-coch*, *red head*—and carriers, but if the modern plan pursued in the West of England, particularly in Devonshire, be followed, the expenditure will be a trifle compared with the return. I will throw a few thoughts together on the general subject of irrigation, and try to make the principles and practice of this invaluable aid to stock-farming as clear as possible.

It may surprise some of my readers to hear that, in forming water-meadows, it is not the chief object to moisten them. Irrigation is carried on, mainly, in autumn and spring,



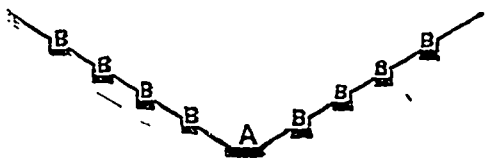
Bed-work Water meadow

when the land is already damp. Yet a slight film of water trickling then over the surface—not stagnating, by any means—rouses the dormant vegetation, tinges it with a vivid green, and brings forward a luxuriant crop, just when it is wanted, while the dry meadows are bare and brown. In England, we let on the water at intervals during the whole winter, but in this climate we must be content to work during the fall and spring, bearing in mind that the water must never be let on or taken off during frost.

No one, who has seen our English water-meadows, can doubt the benefits derived from irrigation, but the mode of the water's action is still a mystery. It can't be the moistening of the roots of the grass—they are moist enough before the

water is let on—it is not the covering, for stagnant water is ruinous to the grass; the fluid must be kept in motion however slow; it is not the deposit of mud, for many of our most pellucid springs, particularly in the chalk country, are most serviceable to the irrigator, though the first runnings after autumn floods are not to be despised, as they, at any rate, tend to deepen the soil about the roots of the plants. And it is curious to see, as I have often seen, how bright and clear the muddy stream becomes after having filtered through the stems of a few acres of grass; you may see the trout two or three feet below the surface of the water when it has returned to the lower level of its bed, whereas, before it has been passed over the meadow, it was as brown and thick as *sewerage*.

Makers of water meadows, *gutterers*, as they call them in Devon, have, as have all *close-corporations*, *secrets*—peculiar ways of judging whether certain streams will be beneficial to the land or not. I never thought much of these secrets, for my part. All streams useful for irrigation have the following characteristics: they feel soft, and so to speak, oily, to the fingers; they don't freeze easily; what fish they contain, especially trout, are of good quality, and the markings or colours of the fish distinct, the spots of the trout bright and numerous, and the trout itself strong and lively on the hook—such a difference between the behaviour as there is, no one but a real fisherman would believe! One unerring sign there is: the growth of water-cress. Though this plant is seldom found in a wild state—the real sort never, I believe—a few might be sown and transplanted early in spring into the side of the stream sought to be utilised for irrigation, and they would soon show whether the water was good for our purpose or not. Brown water, full of tannin from running through peats-bogs, is emphatically *not* good.



Catch-meadow.

Where the system is much studied, as in Devon, they say that the warmth of a spring is a great test of its goodness. There is a plentiful spring by the roadside, between Chambly and St John's, which I have often seen on a frosty morning steaming away like a cauldron, and it is wonderful to see how far down the stream the open water remains unaffected by the frost. This, according to the *gutterers*, should be a first-rate irrigating brook. Anyhow, it is notorious in the West of England that of two springs, one hot and the other cold, the former should be chosen. I only wish we had a Devonshire man here to start the system: it is sad to see so many fine brooks running past so many fine meadows without doing them any good.

And so, though gropingly, we arrive at these conclusions: water acts upon the meadows by warmth; if the stream contains mud or fine soil its action is stronger; if the drainings of towns or yards are present it is stronger still. On the other hand: if the fish in it are coarse; if tannin is present in large quantities; and, I may add, if it is *hard*; the water is, probably, inferior, and experiments on a small scale should be made, before embarking on any extended operations.

There are two systems of irrigation pursued in England: bed-work and catch-work. A few words on the former of these, but very few, as the cost of bed work, even if we had the skilled hands to undertake it, is very great. probably not less than $150 an acre. To make a bed work water-meadow, the turf must be pared off, the whole surface laid up in high regular ridges, from thirty to forty feet wide, along whose top the water runs in little gutters, overflowing the sides to the bottom, where other gutters receive it and carry it back to the stream at a lower level. The engraving will give a good idea of the system. The meadows at Audley End, Lord Braybrooke's place in Essex, Eng., are a specimen of the most perfect work of this kind. Formed in 1841, from old pastures, without disturbing the surface except for the purpose of adjusting the levels and cutting the ditches, they have been immensely productive ever since, having been cut for hay twice each year, with the following results:

FIRST CUTTING	WEIGHT OF GRASS PER ACRE	HAY PER ACRE
1843.....	Tons Cwt	Tons Cwt.....
May 1st to 30th.....	12 5.....	3 8 .....
1844		
April 22nd to May 15th	13 0.....	3 11. .....
1845		
May 23rd to June 3rd...	13 17.....	3 13 .....

And the second cut produced about the same, so we may conclude that the two crops yielded from seven to eight tons of hay per acre. See R. A. Society's Journal, vol 6, part II, p. 522. These meadows happening to have been originally laid up in wide, high beds, did not cost any great sum to form; but the Duke of Portland's water-meadows at Clipstone cost £40,000, or £130 per acre! Still, they pay well, returning upwards of £11 per acre clear profit.

Many of the best flooded-meadows date from the time of the monasteries; notably, those at Leeds-Abbey, Kent, the property of an old friend of mine, "now with God," C. Wykeham Martin, M. P.. Despite all the abuse heaped upon the poor monks, they were the great agricultural improvers of their day. Their day though is not ours, and the necessity for these expensive works has been done away with even in England since the introduction of root and early forage crops, which have provided food for the stock at a time when the whole country used to be brown and barren.

Beds.

Here, we must look for a cheaper plan, if we are to utilise our streams for the purposes of irrigation; and it is to the cheap "catch work" system of Devon and the other western counties we must resort, if we would unite cheapness with efficiency. In these lovely counties, which have the valleys without the Alps of Switzerland, abundant streams roll cheerfully in a rapid descent over stones, or among mossy rocks, and the sheltered sides, shelving rapidly upwards, have long since tempted the farmers to lead the water along their sloping face in tiers of channels, each of which receiving the overflow from above, as it begins to gather irregularly, receives it in a level trough to brim over anew, until it reaches the lowest trough, which delivers it back to the river's bed; hence the term "catch-meadow," because each trench catches the water from its neighbour above it. See engraving.

And it will be seen at a glance, that the catch-meadow is as cheap to form as the bed-work-meadow is expensive. I need

hardly say that, the slope being already there, all the outlay required is for the gutter-cutting. How many thousand acres in the Townships, at present barren, may be made to grow large corps of hay by these simple plans, I do not know ; but if any one will take the trouble to drive along the *upper* road from Richmond through Compton to the province line, he will see hundreds of springs performing only a part of the functions for which nature intended them. Look, again, at St Hilaire mountain, at Rougemont, and other like spots : a vast amount of wealth is passing away out of our reach every day, as long as the copious streams which flow down the sides of these hills are not utilised. The cost of levelling and guttering, in Devonshire, varies from $3 to $8 per acre.

In an experiment, made by Mr Pusey, M. P., a well known practical agriculturalist in Wiltshire, the following almost incredible results were arrived at : one meadow, of two acres only, kept seventy three sheep for five months ! ! ! Now, in Lincolnshire, an acre of good turnips is expected to keep ten sheep for five months—compare the two ! If used in this way, namely for sheep, the best plan of treating a water-meadow would be to hurdle it off, and pass the water over the fed off portion for twenty four hours after the sheep have been shifted. This would wash the manure into the land and prevent waste of ammonia, the smell of which is very evident in every sheep fold. In summer-watering, the land should be only " damped ; " if it continues flooded more than two or three days, at the utmost, a *scum* forms on the surface of the ground and the grass is injured.

Where the brook runs through, or near, the farm-buildings, the liquid manure should be allowed to pass into the stream when it is flooding the meadow. Here, a tank to contain the urine would be most useful, as the whole could be preserved till spring, and all the bother of hauling it out, or pumping it over the dung in the pit, would be done away with.

It is very curious, that though water from a stream which has run through a bog is injurious to land, water supplied by the drainage of a bog makes good grass. Lord Hatherton's meadows, at Teddisley, Staffordshire, are entirely irrigated from this source. A bog of eighty acres, which produced nothing but a few wild-ducks, was drained , the water of drainage turns a twelve horse-power wheel, which does all the work of threshing, grinding, and chaff-cutting, required on the farm, and then is used for flooding eighteen acres of as fine meadows as can be found in England. The bog is cultivated, and immense crops of mangels, rape, and oats grown. The engraving " a catch-work water-meadow " will almost tell its own story : *ab* is the main conductor, the curved line of which is supposed to be caused by various irregularities in the fall . the level of the land *must* be preserved. At *b*, the water should flow along the feeders *b c*, and *b d* ; overflowing here, it finds its way into *e f*, which, when full, sends its water on again to *h g*, and so on to *i* and *k*, until at last, the main drain *m* carries off the whole into the parent stream at a lower level.

If the water flows unequally, *stops*, stones, bits of turf, or anything of the sort, should be placed in the feeders to retard its velocity. Feeders should vary in distance from each other according to the fall. The engraving no. is intended to show the level used in guttering.

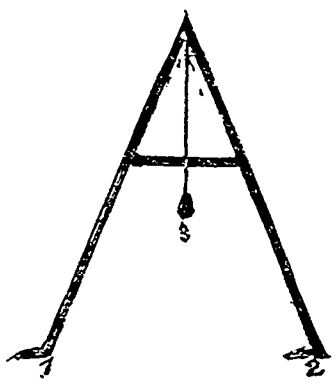
A. R. J. F.

Cider-making.

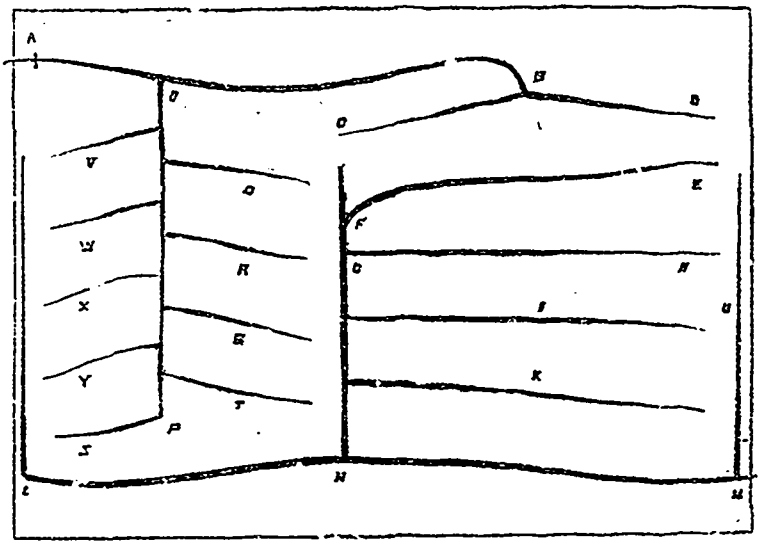
There is a good deal of cider made in Canada and in the New-England States when apples are plentiful. Very little is good for much: it is either mawkishly sweet or as sour as verjuice. I never taste the fine dry cider—more like a wine than anything else—our Gloucestershire tenants make, a couple of pints of which will seriously affect a man's temperament. I was immensely amused on my arrival in Canada, some quarter of a century ago, to find that cider as a drink was permitted to the most rigid *teetotaller* ! Well, the cider, I soon found, was pretty harmless—there had been precious little sugar in the fruit originally, and, therefore, very little alcohol had been formed, and the greater part of what had been formed was converted into vinegar by a bad system (there was no *system* at all) of fermentation. Cider won't make itself any more than wine will, and according to the treatment and care it meets with will be its quality : it is either delicious or horridly bad.

Now our Gloucestershire and Herefordshire men deal with the fruit after this fashion :

Gathering the fruit.—Men beat the trees with long poles, which are sometimes armed with an iron hook to enable the labourers the better to lay hold of and shake the branches of the trees. The apples are gathered into baskets, and placed in heaps to mellow, remaining in the heap from three to five weeks , if the fruit is kept too long, good cider cannot be made from it, as some of the apples will be rotten. If, on the other hand, time is not allowed for mellowing, the conversion



Level for watering



A catch-work water-meadow

of the *lignine* or woody fibre into sugar will be incompleto.(1)

Crushing, pressing, etc. After crushing, the flavour and quality of the cider is much improved by leaving the mass of fruit for twenty-four hours before pressing. Some aroma is evidently formed from the contact of the bruised skins and pips. The juice from the press is put into casks filled to the bung-hole, which is left open, and in a few hours fermentation commences, on the due management of which the subsequent strength and quality of the cider depends. The expressed apple-juice, as it issues from the press, is a turbid, brownish liquid, luscious and sweetish to the taste, but far from inviting in appearance. The coarsest of the impurities speedily become separate from the body of the liquor, being partly discharged in the form of scum, which issues through the bunghole along with the first yeast which is discharged, and partly as a thick sediment which gradually settles to the bottom of the cask as the activity of the fermentation subsides. When the cider becomes clear, it is racked into another cask, and, generally speaking, no further trouble is taken with it. Here, then, is the grand error, falling into which, half, or more than half, of the cider made in this country is spoiled. The fermentation goes on, or rather, a secondary fermentation is set up, and continues as long as any sugar remains to be converted into alcohol.

Racking for sale etc.—Now, for commercial purposes, it is generally considered desirable to retain a considerable amount of sweetness in the liquor. This may be done in two ways: by repeated rackings into fresh casks; or by sulphuring.

Sulphuring, or matching.—Matches are made of woollen or linen cloth, a few inches long by an inch wide, and are thickly coated with sulphur by repeatedly dipping them into that substance when heated to liquidity. Having stopped closely every vent in the cask except the bunghole, light the match, and lower it into the cask, holding the match by the end, which should be free from sulphur, until well-lighted, when the bung should be driven in, the cloth being wedged in between the bung and the stave. The *rationale* of this proceding is clear enough : sulphurous acid is formed, rendering the *soluble* gelatinous matter present *insoluble*, and arresting the fermentation and consequent decay of several of the essential oils to which the flavour and aroma of the cider are due. In fact, it acts in the same way as the *tannin* of hops acts on beer.

As our own people do not care for sweet cider, but prefer a dry liquor, they seldom match their cider; it is racked into fresh-washed casks two or three times, and at three years old, is much more like the pure sherry one gets in Spain than anything else—it is as dry and as nutty-flavoured as Amontillado. A trifling quantity of *caramel*, or burnt sugar, is used for colouring.

The strength of cider is dependent, in the first instance, on the quantity of *grape sugar* (glucose) contained in the expressed juice—nothing but sugar can be converted into alcohol by fermentation. If, owing to a bad season, it is found deficient in sugar, glucose from the corn-works might be added to the juice : just as our experimentalising wine-makers are doing with their must. But this will seldom be found necessary, as a plentiful apple year is generally a sunny year, and it is only when the fruit is abundant that any quantity of cider is made here.

(1) I have no analysis of apples to prove this, but Berard's analysis of pears will serve to show what an immense difference there is between fruit ripe from the tree, and fruit in a proper mellow condition. He examined Beurrée pears in three states—1, ripe and fresh ; 2, kept till mellow ; 3, kept till brown or beginning to rot : (Sugar, 1° 6 45, 2° 11 52, 3° 8 77), showing, clearly, that n° 2, when converted into perry would contain, if properly managed, about 80 0/0 more alcohol than n° 1 ; and the same holds proportionally good with apples, though they do not contain quite so much sugar as pears.

It will be observed that fermentation in this, as in the treatment of all alcoholic liquors, is the main point to be studied. Let us see, then, what this fermentation is, and what its effects are :

The spontaneous fermentation which occurs in the saccharine juices of fruits, such as grapes, apples, pears, etc., is due to the presence of certain azotised compounds—azotised meaning, of course, containing nitrogen. Fermentation can only be excited, in the first instance, in the presence of oxygen—i. e. in atmospheric air which contains oxygen. When once begun, it will continue until the whole of the sugar is decomposed, although further admission of the atmosphere be prevented : alcohol and carbonic acid are formed during the process, and yeast is also produced. Now yeast, once brought into existence, is not only able to convert the remaining sugar into alcohol, but, from its power of absorbing oxygen, will change the alcohol into vinegar. Here, then, we are led to see the wisdom of carrying on all fermentation in close vessels, as recommended in M. Chapais' article on wine-making : a re-curved pipe should be fitted into the bung, with its end in a vessel of water, allowing the escape of the carbonic acid which is evolved during the process, and preventing the entrance of atmospheric air.

In musts, like the grape-juice, skins, etc., a large amount of sugar and a very small quantity of nitrogenous compounds are present, consequently, the decomposition of the latter is completed during fermentation, and their separation in an insoluble form is effected previous to the conversion of the whole of the sugar into alcohol and carbonic acid. Rack the liquor carefully from the lees, and wine thus treated will keep for an indefinite period, in fact, if the atmosphere could be excluded, it would keep for ever, and in any temperature, as M. Pasteur has clearly shown in his great essay on fermentation. In practice, however, the air cannot be excluded ; and besides, as many an owner of " bonded spirits " finds to his loss, alcohol is able to escape through the staves that form the containing vessel.

My readers will now understand why cider, in spite of numerous rackings, undergoes so many fermentations : the juice of the apple contains a proportion of nitrogenous compounds, susceptible of being converted into ferment more than sufficient to change the whole of the sugar present into alcohol, and in cold summers this undue proposition is increased, consequently, sugar should be added to the juice whenever this excess is even suspected. Champagne is often found to be what is technically called " ropy ", or in common parlance, viscid, owing to the mutual action of sugar and the gelatine used for finings. The cure used in France for this disease is, I believe, an infusion of oak bark, or tannic acid in some shape : this throws down the soluble nitrogenous matters in the form of an insoluble flaky precipitate, and, when carefully racked, the wine is fine and safe to keep. This might be tried with cider, and, I think, with success, as it is beyond doubt that acidity is purely owing to the presence of this excess of nitrogen.

I have mentioned before, in talking of wines, the curious fact, that the apple sweetest to the taste does not contain the amount of sugar afforded by some fruit which is almost bitter to the palate. The " Stere " (*austere ?*), which yields the strongest and finest flavoured cider is almost uneatable, and so is the celebrated " Cochlagee—" the spelling of which word is probably incorrect, as I never saw it in print. But if the analysis given above is correct, the probability is, that, in what we call dessert fruit, the chief conversion of the lignine, etc., into sugar, which in the cider-fruit takes place after gathering, is completed, or nearly so, on the tree. As a general rule, two measures and a half of apples will make one of cider.

ARTHUR R. JENNER FUST.

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ILLUSTRATIONS.

CORRESPONDENTS, &c.