

FLAX, in *Agriculture*, is the name of a plant cultivated equally for the bark, or covering of its stalk, and its seed; the former being used in making linen cloth, and the latter for oil which is drawn from it by pressure, and for the refuse or cake. The stem of the plant, which is round and hollow, grows to the height of about two feet, and then divides into several branches; these are terminated by blue flowers, consisting of five petals, and are succeeded by capsules divided within, into ten cells, in each of which is enclosed a bright, slippery, elongated seed. The leaves are long, narrow, sharp-pointed, and placed alternately along the stem and branches of the plant.

Soil. The most proper sort of soil for flax is a deep, free loam, such as is not liable to become too much charged with moisture, or too dry; but which has been rendered fine by tilth, such as those situated in a valley bordering upon water, or as is thrown up by rivers. If there be water at a small depth below the surface of the ground, it is thought, by some still better, as is the case in Zealand, which is remarkable for the fineness of its flax; and where the soil is deep and rather stiff, with water almost every where, at the depth of a foot and a half, or two feet, underneath it. It is said to be owing to the want of this advantage, that the other provinces of Holland do not succeed equally well in the culture of this useful plant; not but that fine flax is also raised on high lands, if they have been well tilled and manured, provided the seasons are not very dry and unfriendly to its growth in that way.

It has been remarked, in the papers of the Dublin Agricultural Society, that moist stiff soils yield much greater quantities of flax, and far better seed, than can be obtained from light lands; and that the seed secured from the former may, with proper care, be rendered full as good as any that is imported from Riga or Zealand. M. du Hamel, however, thinks that strong land can hardly yield such fine flax

as that which grows on lighter grounds. With due pulverization and preparation, there can be no doubt but that strong lands will afford excellent crops of good flax. It is seldom that either light sandy or gravelly soils answer well for crops of this kind. Land for flax should neither be in too great a state of fertility, or be too much exhausted, as in the former case the flax is liable to become too luxuriant, and the produce in consequence of it, of a *coarse* quality; while under the latter circumstance the quantity of produce is very small.

It has been stated by Mr. Donaldson, that flax is sown after all sorts of crops, but is found to succeed best on lands lately broken up from grass. And that in Scotland, the most skilful cultivators of flax generally prefer lands from which only one crop of grain has been taken, after having been several years in pasture. When such lands have been lined or marled, immediately before being laid down to grass, the crop of flax seldom or never misgives, unless the season prove remarkably adverse to it. It succeeds in general better after green crops, than those of the grain kind.

Preparation. The land, in order to render it fit for the growth of this sort of crop, requires to be rendered perfectly fine and mellow, by being repeatedly ploughed over, and broken down by severe harrowings. Where grass land is to be broken up for this crop, it should be done in the autumn, and left exposed to the influence of the atmosphere, until the early part of the following year, when it should be well pulverized and broken down by heavy harrowing, then in the course of a week or two ploughed again, in which state it may remain till the period of putting in the seed, when another light harrowing should be given, and the ploughing performed afterwards by a very light furrow. But in cases where the crop is sown after grain, or other crops that have the property of keeping the land clean from weeds, the first ploughing need not be given till January, when it may remain in that situation until it becomes pretty dry in the early spring, being then well reduced by good harrowing and rolling; and after continuing in that state about a fortnight, the seed may either be immediately put in, or another light ploughing and harrowing be first given.

Seed.—With regard to the choice of seed, the same writer states that, that which is of a bright brownish colour, oily to the feel, and at the same time weighty, is considered the best. Linseed, imported from various countries, is employed. That brought from Holland is however in the highest estimation, as it not only ripens sooner than any other that is imported, but also produces greater crops, and flax of that quality which best suits the chief manufactures of this country. American seed produces in common fine flax; but neither the quantity of flax, nor of the pods, provincially the “bolls” which contain the seeds, is so large as the produce from Dutch linseed. The Riga seed yields a very coarse sort of flax, but a greater quantity of seeds than any other. It is common in some parts of Scotland to sow seeds saved from the crop the preceding year, especially when the crop was raised from seed imported from Holland. The success of this practice is found to depend greatly on changing the seed from one sort of soil to another of an opposite nature; but the saving in the expence of purchasing that sort of seed, in place of what is newly imported from Holland, is so inconsiderable, and the risk of the crop misgiving, so much greater in the one case than in the other, that it is supposed those only who are ignorant of the consequences, or who are compelled from necessity, are chargeable with this act of ill-judged parsimony in the business.

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The cultivators of flax in Ireland prefer the American seed for the lighter and more elevated exposed lands; but the Baltic or Dutch for those which are of a heavier quality. The seed of home produce is often sown for white flax in Yorkshire; but the Baltic sort is mostly preferred where seed is the object; which for the ensuing year, and one or two afterwards, is found to answer as well as white-flax. But it is highly probable that if that which has been collected from the perfectly ripened seed of our own growth be made use of, it will be equally productive in both the flaxy substance and the quantity of seed, and the former be equally valuable for all the purposes of the manufacturer.

Proportion of Seed.—In respect to the quantity of seed used, it varies in different places according to the circumstances of the soil, the methods of sowing, and the uses to which the crop is to be applied; but from two bushels, to two bushels and a half, the English statute acre, is the ordinary allowance. In determining the proper quantity necessary for the acre, it is requisite to pay great attention to the condition of the land. When the land is rich and fertile, and the season so favourable that it can be got thoroughly pulverized, if too much seed is sown the crop is in great danger of lodging; and when that happens, particularly before the pods are formed, the flax proves inconsiderable in quantity, and very inferior in quality. When cultivated in the drill mode at narrow distances, a much less quantity will be sufficient than in other cases; and where the intervals are large, scarcely one-half the quantity is required. When the crops are intended for feed, in whatever manner the sowing is performed, much less will be necessary, than where flax is the main object of the grower.

Time of Sowing.—It may be observed, that this must depend much upon the soil and situation, but that the ordinary season of sowing flax-seed is from the middle of March to the middle or end of April; but the last week of March, and the first ten days of April, are esteemed the best times; and, accordingly within these periods the greatest quantity of flax-seed is sown in this country. In the county of York, where this sort of crop is grown on land broken up from grass, the seed is commonly sown before the second week in April, where it can possibly be done; while on such lands as have been in a previous state of tillage, the sowing is frequently deferred a week or ten days longer. Wherever it can be safely practised, early sowing has the advantage of getting the flax plants to cover the surface of the land well, before they can run much risk of injury from the rising of weeds, or the parching effects of heat.

In some of the southern counties of Europe, however, the husbandmen who raise flax sow part of their seed in September and October; so that the plants which spring from thence remain of course in the ground all the winter; and this may be a judicious practice in those places, because plants which have not covered the earth well before the summer heats come on, are apt to be parched by the heat and drought which usually prevail in that season. They sow linseed again also in the spring; but the latter does not yield so large a crop; the flax, however, which it produces is more esteemed, because it is finer than that sown in autumn. M. du Hamel seems indeed to think, that the autumnal sowing yields the best seed; but, however that may be, in places where the winter is apt to be severe, and where the flax, which is but a tender plant, would in course be in danger of being destroyed during that season, almost all the flax is sown about the end of March, or in the beginning of April, as already stated.

It may be laid down as a general rule, that the land which is intended for flax crops should be brought to an exceeding fine tilth, in the way directed above, before the seed is put in; and that it should be enriched by some sort of manure suited to the quality of the soil. Thus, when pasture lands are broken up, in order to their being sown with flax, they must be well wrought during several months, before they will be fit for producing such crops, in the manner just described. To defray the expence of this culture, some other crops may be got off the land in the mean time, especially of such plants as do not occupy it long, and particularly of those which are remarkably benefited by frequent stirring of the earth whilst they grow; such as beans, pease, turnips, &c. because these repeated stirrings render the mould fine and loose, and help to kill the weeds, which would otherwise do great damage to the flax. It is asserted that the Livonians, when they clear wood-lands, burn the wood upon them, then plough them, and in this state prefer them to any other kind of soil for flax crops. If the land which is intended for flax be stiff, great care should be taken not to work it when it is wet, for fear of kneading it; but it is often an excellent plan to work it deeply before winter, when dry, laying it up in very high ridges, in order that the winter frosts may the more effectually moulder and loosen its parts. In the month of February, where the land is not too wet, some very rotten dung should be laid on, and immediately covered over with the mould. The seed should afterwards, at the proper season, be sown, and harrowed in with a light or bush-harrow, so as not to bury it too deep. As this, when young, is a very tender plant, and is more easily injured and checked in its progress by weeds than any other that is usually cultivated in the field, it is indispensably necessary that the danger of injury in this way should be well guarded against, in order to save future trouble and expence.

Methods of Sowing.—Where the principal object of the grower is flax, the most general method of putting in the crops is that of sowing them broadcast over the surface of the land. In performing the business, much care is necessary that the seed be dispersed as evenly as possible over the ground, to prevent the plants rising in an unequal or tufty manner. It should be afterwards covered in by regular harrowing, once or twice in a place, with a light common or bush-harrow, as just noticed, not covering it in too deep.

But where the seed constitutes the chief intention of the cultivator, it is contended by some that the drill mode is preferable, as requiring much less seed in sowing, and affording a much better and more abundant produce. Besides, the smoothness and weight of the seed render it extremely proper for being drilled; and the crops can be kept clean with greater facility.

In this method, the distances of the rows or drills should vary according to the circumstances of the soil, and the manner in which the crops are to be kept clean. Where the hand-hoe is to be chiefly depended upon, narrow distances may be proper, as ten or twelve inches; but where the work is to be principally executed by the horse-hoe or cultivator, larger intervals may be more suitable, as those of eighteen or twenty inches. Slight harrowing and rolling are sometimes afterwards necessary, especially the latter in dry seasons.

It has been observed that thick sown flax runs up in height, and produces fine soft flax; but that when sown thin it does not rise to such a height, but spreads out more, sending off a greater number of side branches, which produce a great abundance of feed, which is much better filled,

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more plump and heavy than that which is produced from thick sown flax crops. Flax crops cultivated in this way are not so liable to be beaten down in bad weather, the stems being stronger and better fortified by the more free admision of sun and air among them; and they are not so much exposed to danger in weeding or cleaning the rows.

After-Culture of the Crop.—Where flax crops are sown in the broad-cast method, they are seldom much attended to afterwards; it is, however, highly useful and necessary that they should have one good hand-hoeing, or weeding, as soon as ever the crop is sufficiently up; care being taken not to injure the plants by too much treading amongst them.

In the drill manner of sowing, the after-culture of the crops must be regulated by the distance of the rows; but they may in general be cleaned from weeds, and kept in vigorous growth, by proper implements and horse labour. The ground between the rows is mostly wrought by a proper horse-hoe, cultivator, or small hoe-plough, taking care that none of the mould is thrown against the rows; to prevent which, the intervals may be hoed with a triangular harrow, having a proper number of iron tines in it, and guided by two handles fixed behind. By these handles the tines are made to go deeper or shallower at pleasure; and if the intervals are cultivated with this instrument, beginning before the earth is become stale, and while the weeds are small, the land may be kept very clean, and in fine tilth, at much less expence than by hand-hoeing: for one horse is sufficient for this work. A great deal may be done in a day; and by a frequent repetition of the hoeings, especially when the earth is dry, the weeds may be so effectually kept down, as never to rise to any height. But the rows must be weeded by hand.

With some it has been a custom to sow, with their linseed, either annual or perennial grass-seeds, when they intend to lay the land down for pasture after the crop is taken off. But as grass plants grow but weakly under the flax, it is a practice by no means to be recommended. No other sort of crop should, however, be ever grown with this, as much injury may be done by it.

Flax is sometimes damaged by insects, when it is about three or four inches high. These, it is said, may be destroyed by a slight strewing of foot, ashes, &c. over the crop. At all events, this dressing will give vigour to the flax, though it may not kill the insects.

If any weeds appear afterwards among the flax, as is almost always the case, they must be thoroughly rooted out: and that the flax may be as little damaged as possible in the doing of this, the weeders should work as carefully as possible.

The finest flax is most liable to be laid, particularly in countries subject to storms. To guard against this accident, some people run across their flax-fields slender poles fixed to stakes: but a better method is to run small ropes across the field, both lengthwise and breadthwise, where necessary; for these being fastened where they intersect one another, and supported by stakes at due distances, form a kind of net-work, which is proof against almost every accident that can happen from tempestuous weather. These practices are, however, both troublesome and expensive, and are seldom or ever necessary where the crops have not been sown too thick on the ground.

Pulling the Flax.—Opinions are divided in regard to the degree of ripeness at which it is best to pull flax crops. Some think it should be pulled whilst it is green, in order that its fibres may be the softer and finer. Others, with the same view, pull it up before its seeds are quite formed.

And others, again, think that it should not be pulled till some of the capsules which contain the seeds have begun to open; being of opinion that the fibres of green flax are too tender, and that they fall into tow. On the other hand, it is certain that the fibres of flax which has stood till it is very ripe are always stiff and harsh, that they are not easily separated from the reed, and that they do not bleach well. Here, therefore, as in most other cases, both extremes should be avoided; and it consequently seems most reasonable to think, that the properest time for pulling flax is when its stalks begin to turn from a green to a yellow, when its leaves begin to fall, and when its seeds begin to be of a brownish colour.

Mr. Donaldson observes, that a crop of flax frequently grows short, and runs out a great number of seed-bearing branches. When that is the case, the seeds, not the flax, ought to be the farmer's chief object; and the crop should be allowed to stand till the seeds are in a great measure perfected. But that when the crop thrives, and is likely to become more valuable for the flax than the seeds, it should be pulled soon after the bloom drops off, and before the pods turn hard and sharp in the points. Whenever the seed is the main object, the crops should be perfectly ripened, which is clearly shewn by the points of the seed-pods turning hard and sharp, and the capsules beginning to crack. It usually takes place towards the end of July, or beginning of the following month.

Where the object is the flax, the crop is pulled up by the roots, and placed in small parcels, usually termed *beats*, upon the surface of the land, so as that it may be as fully as possible exposed to the benefit of the sun. It is afterwards tied up, in order to be conveyed to the place where it is to undergo the process of watering.

In the work of pulling the flax, it is usual, when it is intended to save the seeds, to lay it in handfuls, partly across each other: the reason for which is, that the business of *rippling* is thereby facilitated; as the rippers, in place of having to separate each handful from the bundle, find it, by this simple precaution, already done to their hand.

It may be further observed, that although it is of much importance, yet it very seldom happens, that much attention is bestowed to separate the different sorts of flax from each other, in pulling the crops. In most fields there are varieties of soils; of course, some parts of a field will produce fine flax, others coarse; some long, and some short; in a word, crops of different lengths and qualities. It cannot be supposed that all these sorts of flax will undergo an equal degree of watering, grafting, breaking, and heckling, without sustaining great injury. Therefore, when flax of various qualities is promiscuously mixed together in pulling, it is impossible to prevent some part of it from being lost in the after-management; a loss which might be avoided with a small share of attention, and some additional trouble when the crop is pulled. Those who rent flax-mills are often blamed for embezzlement; but, there is reason to believe, very unjustly. Because the crop of a particular part of a field yields such a quantity of flax from one mill, it does not follow that the manager of another mill should return an equal quantity from the same space, probably, of very inferior land. It is certain, in very many cases, that the inattention of flax-farmers to the above very necessary precaution is the cause why crops of flax often turn out of so little value, and is the principal reason why the proportion of tow or inferior flax so often exceeds, in ordinary seasons, that of superior quality; the millers and hecklers being obliged, in the course of their operations, owing to the mixed state in which they receive the crop from the grower,

grower, to reduce the quality of the whole to a lower standard than there would be any occasion for, were the different qualities sorted, and put into their hands in that state.

As the flax is pulled, when for seed, it is, as has been observed above, laid together by handfuls, with the seed-ends turned to the south. These handfuls should neither be quite in a line with each other, nor directly across, but a little slanting upwards, so that the air may easily pass through them. Some, instead of this method, tie the handfuls of flax loosely at the top, then spread out their roots, and thus set several of them together upright upon their roots. In either of these ways the flax is generally left twelve or fourteen days in the field to dry it. This drying is certainly not necessary for the rippling, because the ripple will separate the capsules from the flax as effectually before it has been dried as it will afterwards; and if it be done with a view to ripen the seed, it should be considered, that the flax will be more hurt by the longer time of steeping, which will become necessary in consequence of this drying, than the seed can be benefited; because the more the substance or membrane which connects the fibres to the seed is dried, the greater must be the degree of putrefaction necessary to loosen and destroy the cohesion of this connecting medium or membrane: the finer parts of the flax itself must necessarily be destroyed by this degree of putrefaction; and if the putrefaction does not arise to such a degree as to destroy the cohesion of this substance or membrane, the fibres of the flax will adhere so strongly to the seed, that the force necessary in scutching will prove equally detrimental to the flax. The practice adopted in some parts of Brittany seems therefore much more rational, which is, to ripple the flax after it has lain in the air two or three days; but even one day will be sufficient if the weather is dry. In fact, it is the best method to do it as soon as possible after the flax has been pulled.

Rippling the Seed.—In order to ripple, or force off the seed-capsules of the flax, which is the next operation, a large cloth should be spread on a convenient spot of ground, with the ripple placed in the middle of it. This is a sort of comb, consisting of six, eight, or ten long triangular teeth, set upright, so as to have the angles approaching pretty near each other, by which the parts containing the seed are removed from the flax. In performing the business, the pods containing the seeds are forced from the stalks by means of this iron-comb, which is called a *ripple*, and which is firmly fixed on a beam of wood, on the ends of which two persons sit, who, by pulling the seed-ends of the flax repeatedly through between the teeth of this comb, execute the operation in a very complete manner, and with great dispatch.

After the flax has been rippled, the seeds and pods thereby obtained should be spread out thinly upon a cloth in the sun to dry and harden. Those seeds which separate from the pods of their own accord are the fullest and ripest, and should therefore be set apart for sowing, in case the precaution of raising some flax purposely for seed has not been attended to. The pods or capsules are then broken, either by lightly treading, or by threshing, in order to get out the remaining seeds, the whole of which, as well as the former, should be carefully sifted, winnowed, and cleaned from dirt and chaffy matter. When the seed is laid up, which should be immediately done, it must be frequently stirred and ventilated, to prevent its heating.

This second sort of seed affords a considerable profit by the oil which it yields, and also by being used when broken for fattening of cattle. The cakes of linseed, after the

oil has been pressed out of them, are likewise found to be useful for this last purpose, though they are thought by some to render the fat of cattle yellow; for which reason it is advised not to give it them till within a few weeks before the calves are to be killed. They are likewise of great utility as a manure, but from the expence can seldom be employed in that way with advantage. See OIL-CAKE.

It has been remarked by the author of the "Present State of Husbandry in Great Britain," that those who bestow most attention on the cultivation of flax in Scotland, generally ripple off the seed, even when there is no intention of saving it; as it is found, when flax is put into water without taking off the pods, the water soon becomes putrid, in consequence of which the flax is greatly injured. This imperfectly ripened seed is improper for being sown, but may be expressed for the oil. But when it is proposed to save the seeds of flax, the pods are carried home from the field as soon as they are separated from the flax; and either laid on cloths, and exposed to be dried by the influence of the sun; or they are spread on barn-floors, and turned two or three times a day, till they are so dry that the seeds can be easily threshed out in the ordinary way. This is the general mode adopted in Scotland. But in Dorsetshire they allow the flax to be on the field after it has been pulled, till the pods become so dry, that the seeds can be threshed out with a stick; which is done on a board, or log of wood, placed in the field for the purpose. It is likewise the practice with some expert flax growers, where the chief object is the seed, to set it up, after being tied up into sheaves, in the manner of corn, and when thus rendered perfectly dry, to stack it until the spring following; at which time, by placing the tops of the sheaves so as to incline towards each other, and making use of a roller, the seed is readily forced out. It is supposed that in this mode more time is allowed in the after-management of the produce.

It may be stated, that the quantity of seed produced on the statute acre is generally from six to eight, but sometimes as high as ten or twelve bushels; and that the price depends in a great measure on that of foreign seed imported; as, when sold to oil-makers, it is generally about one-half of that of Dutch seed, sold for the purpose of sowing. The price of home-cultivated linseed is considerably advanced of late in some of the southern and western counties of the kingdom, in proportion to what it is in those of the northern, owing to the circumstance of its being much used as food for fattening cattle. The average price of the linseed cultivated in the kingdom at large cannot, it is supposed, be rated higher than from three to four shillings the bushel. It has, however, lately been considerably higher.

Watering.—This is the next operation that becomes necessary with this sort of produce. The intention of this process, is that of inducing the separation of the flaxy material, by exciting a slight degree of fermentation of the substance which attaches it to the stem of the plant. It is accomplished in two ways, namely, by steeping the flax in water; and exposing it to the action and influence of the atmosphere. The former is the most common and safe method; the latter being less certain and exact in producing the necessary changes. The first mode is termed *water-retting*, and the last *dew-retting*.

In *water-retting*, when the flax has been cleared from the seed, it is loosely tied up into small bundles, and put into pools or ponds of soft stagnant water, where it is suffered to continue several days, according to the natural warmth of the water. As soft clear stagnant water has

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been found by long experience to be superior for this purpose to any other, where that cannot be obtained without art, a pit or canal may be formed adjoining a river or stream, whence water can be readily brought. This pit or canal is filled with water for some time (a week or two) before it be proposed to pull the flax: by this means the water acquires a greater degree of warmth than river-water possesses, and which contributes greatly to facilitate the object farmers have in view in immersing green flax in water, namely, to make the harl or flaky substance part easily and completely from the boon or reed.

With respect to the period that flax ought to remain in the water, it depends on various circumstances; as the state of ripeness in which it was pulled, the quality and temperature of the water, &c. The most certain rule by which to judge when flax is sufficiently watered is, when the boon becomes brittle, and the harl separates easily from it. The method of depositing the flax in the water is in general that, after having it tied in small bundles, often at both ends, of placing it in a sort of square bed, the bundles being laid lengthways and crossways of each other, so as to bind firmly together; the whole is kept down by having a weight laid upon it. Some, however, instead of this mode, have the small bundles set in an erect position, the tops of every layer, except the lowest, being upwards; and in place of keeping them down by the application of heavy weights, they use sods or earth, treading the whole down occasionally, once or twice at first in the course of the day, so as to keep the whole below the surface of the water, as, where the contrary happens, the flax is greatly injured by being rendered black. The first is, most probably, the best mode of management.

When the flax has remained the proper length of time in these pits, it is taken out by means of a tool called a drag, and deposited in a straight manner on the sides or banks of them, in order to its becoming in some measure dry, and in a state for being spread out on the grafs.

With regard to *dew-retting*, although it is in general the practice, where flax is cultivated in this country, to immerse it in water for some time after it is pulled, yet in Dorsetshire, and the neighbourhood, it is seldom done. There the flax is allowed to arrive at that state in which the harl parts most easily from the boon or reed, by a more gradual process, that of ripening or producing the necessary putrefaction, by the action and influence of the dew, which is nothing more than exposing the flax to the influence of the weather thinly spread out upon a grafs field for a longer period than is necessary, when the operation of watering has been previously performed. When the flax has been so long exposed as to be judged sufficient for effecting the separation of the harl, nothing more is requisite than putting it up in parcels, or bundles, in order to its being broken and scutched.

Grafsing.—After steeping the flax, where the watering method is pursued, the only other operation which properly falls under the farmer's attention is grafsing it. For this purpose it is commonly spread very thin on the ground, and in regular rows; the one being made to overlap the other a few inches, with a view of preventing, as much as possible, its being torn up and scattered by gales of wind. Old grafs-ground, where the herbage does not grow to any great height, is the best for the purpose; as, when the grafs or weeds spring up so as to cover the flax, it is frequently rotted, or at least greatly injured thereby.

Flax is allowed to remain on the ground, being occasionally turned, till, by repeated trials, it is found that the

boon has become very brittle; so that on being broken, and rubbed between the hands, it easily and freely parts from the harl. It is then taken up, a dry day being chosen for the purpose: and, being bound in sheaves, is either sent directly to the mill, which is the usual practice in the northern districts, or broken and scutched, in the manner they do hemp, by a machine or tool contrived for that use.

But before these operations are capable of being performed, it is necessary that the flax should be exposed to the heat of the sun, by placing it against a wall or paling, in a sloping direction, or to the gentle heat of a fire, by putting it over hurdles, or by introducing it into an oven, heated by the refuse flax. The heat in any way should be very moderate, and regulated in an equal manner. And in either case the flax should only be suffered to remain just long enough to dispel any dampness that it may have acquired. The sun is, however, always to be preferred where it can be had.

With respect to the produce, there is scarcely any crop that is more variable than that of flax in the quantity and quality. From twenty to seventy stones of fourteen pounds each have been produced from an acre of land; but from forty to fifty stones may be considered a medium crop. The expence of the cultivation, and management of this crop afterwards, cannot be estimated on the average at less than from nine to twelve or fifteen pounds the acre, where flax is the object.

It has been calculated in these ways in a northern and southern district of the kingdom, before the late great advance in the price of labour.

Expence per Acre.

	£. s. d.
Working land - - -	0 16 0
Seed and sowing - - -	1 1 0
Cleaning and weeding - - -	0 5 0
Pulling - - -	0 10 0
Loading and watering, &c. - - -	0 10 0
Taking and grafsing - - -	0 12 0
Turning and taking up - - -	0 5 0
Rent of Land, as let - - -	5 5 0
Dressing 50 stone of flax, at 1s. 6d. per stone	3 15 0
Profit - - -	7 11 0
	20 10 0

Produce.

50 stones of flax, at 8s. per stone -	20 10 0
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The neat profit stands higher in the following:

Expences per Acre.

Preparation of land for sowing -	6 0 0
Rent, tythes, and taxes, &c. -	2 13 4
	8 13 4

Produce.

Forty stones of flax, at 9s. per stone -	18 0 0
Bounty, at 4d. per stone -	0 13 4
	18 13 4
Profit - - -	10 0 0

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In Scotland, where the flax is often fold before it is pulled, the usual price was formerly from six to ten pounds the statute acre.

The produce and value of the seed has been shewn above.

It seems, on the whole, not improbable but that flax crops may be grown in many situations with advantage.

It is usual for farmers in different parts of Scotland, who rent lands in the vicinity of large towns or villages, to let fields to the inhabitants, for the purpose of raising flax; which is supposed by some the most advantageous mode of any that can be adopted in cultivating the crop. The rents in these cases are mostly fixed at from 3*l.* 10*s.* to 4*l.* the statute acre, according to the quality of the land, the farmer constantly undertaking to cultivate the land in a proper manner. The same practice, with a little variation, is also established in some parts of England; the farmer rents or lets the land to a person who is denominated a middleman, or flax-jobber, and whose business it is to perform all the various operations after the seed is sown; which, as in the former case, is always furnished by the renter, the farmer having nothing more to do than to plough and harrow the ground.

When not grown upon newly broken upland, flax may succeed turnips and potatoes with great propriety. The seed is usually called *linseed*, which see. See also *Oil*.

Flax-Dressing, denotes the various operations which are necessary for bringing flax into a state of preparation proper for being formed into cloth or other articles. These are very different, and require different sorts of implements and machinery, in order to their being properly performed. Flax, for the purpose of being formed into cambric, fine lawn, thread and lace, is dressed in a rather different manner to that which is commonly employed. It is not scutched so thoroughly as common flax, which from the scutch proceeds to the heckle, and from that to the spinner: whereas this fine flax, after a rough-scutching, is scraped and cleansed with a blunt knife upon the workman's knee, covered with his leather apron; from the knife it proceeds to the spinner, who, with a brush made for the purpose, straightens and dresses each parcel, just before she begins to spin it.

And in the Swedish Transactions for the year 1747, a method is given of preparing flax in such a manner, as to resemble cotton in whiteness and softness, as well as in coherence. For this purpose, a little sea-water is directed to be put into an iron pot, or an untinned copper kettle, and a mixture of equal parts of birch-ashes and quick-lime strewed upon it; a small bundle of flax is to be then opened and spread upon the surface, and covered with more of the mixture, and the stratification continued till the vessel is sufficiently filled. The whole is then to be boiled with sea-water for ten hours, fresh quantities of water being occasionally supplied in proportion to the evaporatiou, that the flaxy matter may never become dry. The boiled flax is to be immediately washed in the sea, by a little at a time, in a basket, with a smooth stick at first, while hot; and, when grown cold enough to be borne by the hands, it must be well rubbed, washed with soap, laid to bleach, and turned and watered every day for some time. Repetitions of the washing with soap expedite the bleaching; after which the flax is to be beat, and again well washed; when dry, it is to be worked and carded in the same manner as common cotton, and pressed between two boards for forty-eight hours. It is now fully prepared and fit for use. It loses in this process nearly one-half its weight, which, however, is abundantly compensated by the improvement

made in its quality, and its fitness for the finest purposes.

Flax-Brake, a hand-instrument, or machine, which was originally, and for many ages, chiefly employed in breaking and separating the boon or core from the flax, which is the cuticle or bark of the plant. In performing this business, the flax being held in the left hand, across the three under teeth, or swords of the brake, shewn at A, *Plate (Flax) Agriculture, fig. 1*, and *a, fig. 2*: the upper teeth or swords B, *fig. 1*, and *b, fig. 2*, are then, with the right-hand, quickly and often forced down upon the flax, which is artfully shifted and turned with the left hand, in order that it may be fully and completely broken in its whole length,

Flax Foot-Brake, an implement or machine of the brake kind, invented in Scotland, by which flax is broken and scutched with much greater expedition than by the hand-instrument just described; and in a more gentle and safe manner than by the flax-mill. By this contrivance, the boon or stem is well broken, and the sloping stroke given as with the scutcher, while the machine is moved by the foot. The treadle is of considerable length, on which account it is put in motion with great facility, and assisted in it by means of a fly. The scutchers are fixed upon the rim of a fly-wheel. But though these machines may be highly useful where mills turned by water cannot be established, they are probably much inferior in point of expedition, and the economy of labour. A brake of this kind is represented, in different views, at *figs. 3* and *4*, in which is shewn, by A, the three under-brake teeth, or swords, seventeen inches long, three inches deep, one and a quarter inch thick at the back, and a quarter of an inch at the fore-part or edge.

B, the edges, two and three quarters of an inch asunder at the end next the guide B, and two inches asunder at the other end.

C displays the two upper teeth, about an inch shorter than the under teeth; and

D represents the brake-mallet, about thirty-three pounds English weight.

E is a compound foot-treadle, which is eight feet four inches between the fulcra F, raised at F eight inches above the ground, (or rather five inches higher than the stance of the workman); E is two feet four inches between the fulcra G, and is raised at G eighteen inches above the ground; that is, fifteen inches higher than the stance of the workman.

H, the sword, or upright timber-rod, which turns the wheel by the treadle-crank.

I, the treadle-crank, of seven and a half inches radius.

K, the fly-wheel, four and a half feet diameter, above sixty pounds English weight. As here represented, it is beat or cast-iron, but it may also be made of timber.

L, brass cods or bushes.

m M, the lifting crank; M is fixed firm upon the axle of the fly, while the crank m, about eight inches radius, plays freely round the axle. In position first, M begins to take round the crank (which by the lever R pulls up the mallet); when it comes to position second, the mallet is again at liberty, and by its weight pulls up the crank (faster than the fixed pieces move) into position third.

It may be observed that the treadle-crank is advanced about one-eighth part of the circle before the lifting crank.

n, a small pulley which turns easily round on the end of the crank, and to which a rope is fixed.

F L A X.

O, a piece of timber which prevents the rope from falling in upon the axle, but which should not rub against the rope as it comes down.

P shews where the rope passes between two friction-rollers, which are so placed, that it comes down three or four inches, or half the radius of the lifting crank, on the side of the plummet line, crossing the centre of the wheel; that is, to the side on which the crank turns when it pulls down the rope.

Q, a pillar, which serves only to support the guard for the rope **O**, and the friction rollers at **P**.

R, the lever.

S, the lever-pillar.

T, part of the mallet-frame.

U, two pillars which guide the brake-mallet.

V, an iron spring which receives the leap of the mallet, and throws it the quicker down.

W, the pillars which support the fly.

X, U, the pillars which bear the brake-teeth and mallet.

Y, Y, the spur and cross that support the pillars.

Z, Z, the bottom frame-piece.

a, the broad stool upon which the workman stands, three inches above the ground.

The lifting crank and pulley are shewn separately, in different views, at *M m n*, and *m n*.

The brake teeth are made of good beech or plane-tree; the brake mallet of plane-tree, ash, elm, birch, or oak; and the sword, or upright timber-rod, between the treadle and the treadle-crank, of beech, ash, or oak. The fly-wheel, if timber, should be made of oak, ash, beech, elm, or plane-tree. All the other parts of timber worth mentioning may be made of fir-wood.

At *fig. 5.* is shewn the ground plant of the whole.

This brake may at any time be converted to a beater of flax and hemp, by removing the brake teeth, and putting in their place flat boards. In the upper of these boards may be driven 32 nails, the heads about three-quarters of an inch long, and the points of the heads about a quarter of an inch in diameter; the points of the nail-heads may be placed one inch clear asunder, and at equal distances, as in this way any of the nails may most easily be drawn out in repairing the mallet. An iron hoop put about the mallet will prevent its bursting with the driving in of the nails. In the time of beating, the narrow end of the mallet is placed towards the workman, and where there is much work in that way, the mallet and fly may be made heavier, and then two or more workmen can work together upon the foot-treadles, which may also be made equally long.

FLAX-Heckle, an instrument or tool constructed for the purpose of heckling or straightening the fibres of the flax, which is seen at *figs. 6 and 7.* It has many teeth, fixed in a square flat piece of wood, as seen at **A** and **B**. When used, it is firmly fixed to a bench before the workman, who strikes the flax upon the teeth of the heckle, and draws it quickly through the teeth. To persons unacquainted with this kind of work, this may seem a very simple operation; but in fact it requires as much practice to acquire the method of heckling well, and without wasting the flax, as any other operation in the whole manufacture of linen. The workmen use coarser and wider-teethed heckles, or finer, according to the quality of the flax; generally putting the flax through two heckles, a coarser one first, and then a finer one in finishing it.

FLAX Mill, a mill contrived for the purpose of breaking and scutching flax in a more expeditious manner than by the hand or foot methods. It was invented in Scotland many

years ago, but has been lately much improved, and by being driven by water, makes great dispatch, and in skilful and careful hands generally gives satisfaction. It has been generally constructed so as to break the boon by three indented rollers, placed one above the other; the middle one of which, being forced quickly round, takes the other two along with it; and one end of the handfuls of the flax being by the workmen directed in between the upper and middle rollers, a curved board or plate of tin behind the rollers directs the flax to return again between the middle and undermost rollers; and thus the operation is repeated until the boon be sufficiently broken. Great weights of timber or stone placed at the ends of levers are also employed to press the upper and under rollers towards the middle one.

The business of scutching is carried on by the mill in the following manner: four arms, something like the hand-scutchers before described, project from a perpendicular axle; a box placed around the axle incloses these projecting scutchers, and this box is divided among the workmen, each having sufficient room to stand and handle his flax, which, through slits in the upper part and sides of the box, they hold into the stroke of the scutchers, which, moving round horizontally, strike the flax across or at right angles, and so thrash out or clear it of the boon.

The breaking of the flax by rollers is scarcely subject to any objection, except that it is dangerous to workmen not sufficiently on their guard, who sometimes allow the rollers to take hold of their fingers, and thereby endanger their whole arm being instantly drawn in; in this way many have lost their arms. To avoid this danger, a brake, upon the general principles of the hand-brake before described, has been lately adapted to water machinery, and used in place of rollers. The horizontal stroke of the scutchers was long thought too severe, and wasteful of the flax; but very careful experiments have discovered, that the waste complained of must be charged to the unskilfulness or negligence of the workmen, as, in good hands, the mill carries away nothing but what, if not so scutched off, must be taken off in the heckling with more loss, both of time and flax; but to obviate this objection of the violence of the horizontal scutchers, an imitation of hand-scutching has been applied to water. The scutchers there project from an horizontal axle, and move like the arms of a check-reel, striking the flax neither across nor perpendicularly down, but sloping in upon the parcel exactly as the flax is struck by the hand-scutcher. This sloping stroke is got by raising the scutching-stock some inches higher than the centre of the axle; and by raising or lowering the stock over which the flax is held, or by screwing it nearer to, or farther from, the scutchers, the workman can temper or humour the stroke almost as he pleases.

A flax or lint mill, with horizontal scutchers upon a perpendicular axle, requires a house of two stories; the rollers or break being placed in the ground story, and the scutchers in the loft above; but a mill with vertical scutchers on an horizontal axle requires but one ground story for all the machinery which is required.

FLAX Rippling-comb, an instrument or tool which is formed by setting six, seven, or more long square-teeth nearly upright, in a long narrow piece of plank, so as that their different angles shall come nearly to touch each other. By drawing the flax through between these teeth, the bolls or pods in which the seed is contained are forced off. It is seen at **A** and **B**, *fig. 8.* If the flax is to be regarded more than the seed, it should, after polling, be allowed to lie some hours upon the ground to dry a little, and so gain some firmness, to prevent the skin or harl, which is the flax, from

The filamentous parts of different vegetables have been employed in different countries for the same mechanic uses as hemp and flax among us. Putrefaction, and in some degree alkaline lixivium, destroy the pulpy or fleshy matter, and leave the tough filaments entire. By curiously putrefying the leaf of a plant in water, we obtain the fine flexible fibres which constituted the basis of the ribs and minute veins, and which form, as it were, a skeleton of the leaf. In Madagascar different kinds of cloth are prepared from the filaments of the bark of certain trees boiled in strong ley; and some of these cloths are very fine, and approach to the softness of silk, but in durability come short of cotton; others are coarser and stronger, and last thrice as long as cotton: and of these filaments they make sails and cordage to their vessels. The stalks of nettles are sometimes used for like purposes even in France; and sir Hans Sloane relates, in one of his letters to Mr. Ray, that he has been informed by several, that muslin and calico, and most of the Indian linens, are made of nettles. A strong kind of cloth is said to be prepared in some of the provinces of Sweden of hop-stalks; and in the Transactions of the Swedish Academy for 1750, we have an account of an experiment relating to this subject: a quantity of the stalks was gathered in autumn, which was equal in bulk to a quantity of flax, sufficient to yield a pound after preparation. The stalks were put into water, and kept covered with it during the winter. In March they were taken out, dried in a stove, and dressed as flax. The prepared filaments weighed nearly a pound, and proved fine, soft, and white; they were spun and wove into six ells of fine strong cloth. Unless the stalks are fully rotted, which will take much longer time than flax, the woody part will not separate, and the cloth will prove neither white nor fine. See Dr. Lewis's notes to Newmann's Chemistry, p. 428, 429.