

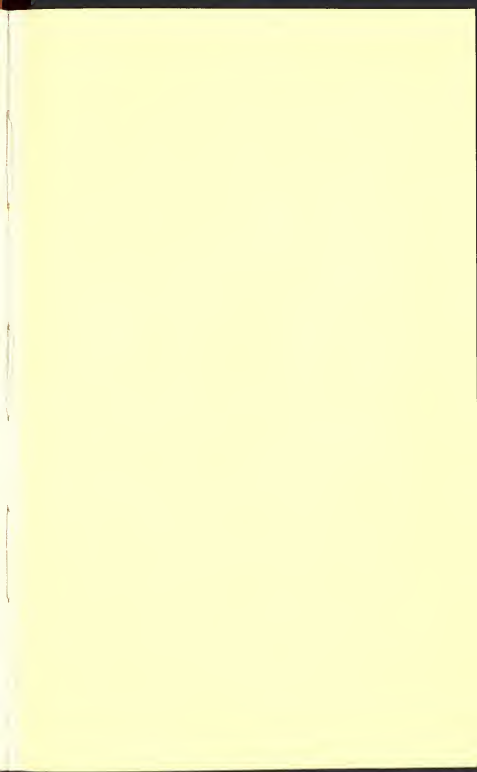


PERKINS
AGRICULTURAL LIBRARY

UNIVERSITY COLLEGE
SOUTHAMPTON

SOUTHAMPTON
UNIVERSITY LIBRARY

BOOK NUMBER	59-589941
CLASS MARK	SB 253
	Perkins





FLAX :

ITS

GROWTH AND MANAGEMENT.

AN ESSAY,

WHICH OBTAINED THE GOLD MEDAL OF THE ROYAL DUBLIN SOCIETY.

BY

JOHN SPROULE,

AUTHOR OF A "TREATISE ON AGRICULTURE," AND EDITOR OF THE IRISH
FARMER'S JOURNAL, ETC. ETC.

"A valuable Essay, and highly creditable to the Author."

C. G. M. SKINNER, Esq., Sec. to Belfast Flax Society.

DUBLIN :

JAMES M^cGLASHAN, 21, D'OLIER-STREET.

LONDON : WILLIAM S. ORR AND CO.

MDCCCXLVI.

Price One Shilling.





ON THE
GROWTH AND MANAGEMENT OF FLAX
IN IRELAND.

FLAX is of the genus *Linum*, of which there are several species, all distinguished by the tenacity of their fibres, when separated from the woody stem which they surround. The only important one, however, and that which forms the subject of cultivation, is the *Linum Usitatissimum*, or Common Flax. This is an annual plant, growing with a slender upright stem, branched near the top, and producing the oleaginous seeds from which the linseed oil, so well known in the arts, is expressed. The varieties of the Flax plant are also few, and are produced merely by a difference of soil and climate, being thence distinguished by the names of the countries in which they are produced.*

The importance of Flax, as affording the material from which one of our most valuable articles of clothing is manufactured, was known at a very early period, not only through-

* A perennial variety of the genus *Linum* is also indigenous to certain parts of the United Kingdom, which, though often tried and recommended as an object of culture, has hitherto attracted but little attention. The stems of this variety proceeding from a single root are numerous, branching and spreading towards their extremities. The root, as its name imports, is perennial. The plant yields a strong and rather coarse fibre, which it is extremely difficult to separate from the woody part of the stem. As it does not reach maturity the season in which it is sown, a second year is required before a crop is obtained; but from the hardy nature of the plant it will last, producing a crop annually, for a length of time.

out a great part of Europe, but also in Asia, and the North of Africa. The ancient Scandinavians, and other barbarous nations, were clothed in linen, and the mummies of Egypt were enveloped in its folds. Its culture and management were well understood in the Low Countries, and other parts of the Continent, previous to the commencement of the seventeenth century, and these continue models in this department of rural economy, for the imitation of the inhabitants of other countries, until the present day.

The cultivation of Flax has long been regarded as a most important branch of native industry in Ireland, especially in the northern parts of the island, where it was introduced by the Huguenots, after the revocation of the Edict of Nantz. Many of these refugees, who had carried on the Linen manufacture in their own country, were attracted to these kingdoms by their attachment to the Prince of Orange, and encouraged to settle in Ireland by the measures then in progress for the promotion of the growth and manufacture of Flax throughout the country. Among the most celebrated of them was Mr. Lewis Cromelin, who settled in the neighbourhood of Lurgan, and it is believed that, owing to the exertions of that individual, and the encouragement which he received, much of the superiority in the manufacture of Flax for which that district has long been characterized, is to be attributed. Cromelin, at that period, obtained a patent for carrying on and improving the Linen Manufacture, accompanied by a grant of £800 per annum, as interest for the sum of £10,000 to be advanced by him, or by his procurement, as a stock for carrying on the same; £200 per annum was granted to him for his superintendance of this undertaking, with a further sum of £120 per annum for three assistants, and an annual allowance of £60 for the support of a French minister for his little colony. These advantages he enjoyed for many years, and afterwards a public Board was constituted for the further improvement of the Linen Manufacture, with an an-

nual grant of £20,000, voted to it by Parliament, which was continued to the Linen Board for upwards of a century.*

The stimulus thus given to the extension of the Linen manufacture in this country, together with the circumstance of Flax being at that period a highly remunerative crop, caused it to spread rapidly throughout the country. The Linen Board appointed inspectors, or superintendants, to each of which was allotted a certain district, and the duties of these officers consisted in affording instruction to such as were desirous of receiving it, and carrying the plans of the Board into effect. Flax-seed was distributed among those who could produce satisfactory testimonials of having a quantity of land prepared for its reception, and premiums were awarded for the extension of the crop, the value of the premium depending on the extent devoted to it. But it is unnecessary, in a sketch like the present, to enter into the different measures adopted by the Linen Board, in pursuance of the objects for which it was incorporated. At the commencement of the present century, the cultivation of Flax was almost universally practised in the North of Ireland, and for many years since, until the manufacture of the article went into other hands. At this period, the manufacture of Flax was even more an object with the farmer than its cultivation, as it occupied the female members of his family throughout the entire season, in the different processes, until they sold it in yarn. The manufacture of this into cloth afforded employment to another numerous class, the Linen-weavers, who were also small farmers. Every three weeks, or so, a web, or parcel of Linen, containing a specified number of yards, usually about fifty-two, was brought to market, besides allowing the manufacturer a few days to devote to his little farm. The growth and manufacture of Flax, through its different stages, thus afforded remunerative employment for almost every class of the population,

* See Proceedings of the Linen Board, *passim*.

and may be regarded as, in some degree, contributing to the industrious habits, and general intelligence, so characteristic of the inhabitants of that portion of the island.*

But when the growth and manufacture of Flax, as they existed some twenty or thirty years ago, are compared with those of the present day, what a contrast presents itself! Then it was a crop in which every one was interested, and afforded remunerating prices in every department of its management. In common with every other article of agricultural produce, however, it decreased rapidly in value, especially on the withdrawal of the stimulus which had formerly operated so much towards its extension; and the introduction of spinning by machinery took that department completely out of its former hands, and gave the last decisive blow to the prospects of the Flax grower; as, however unremunerative he might have found it as a crop, yet the profitable employment of the female members of his family, in spinning it into yarn, made ample amends.

From the preceding sketch of the progress of Flax culture in this country, it might be inferred that a close approximation to perfection in that department of rural economy, had been attained by the Irish small farmer; but although it attracted so much attention, and for a length of time afforded a source from which large profits were derived, yet, in common with most Irish affairs, the management of the Flax crop, even in the most favoured districts, when compared with

* From a perusal of the Reports of the late Linen Board, it would appear that the exertions of that body were directed more to the *manufacture* of flax than to the introduction of an *improved system of cultivating it*, and in this department their exertions were not made in vain. In the palmy days of the linen manufacture in the North of Ireland, yarn was spun so fine, that twenty and sometimes thirty hanks only weighed one pound. A young woman in Comber, County Down, a descendant of the ancient family of M'Quillans of the County Antrim, frequently produced sixty-four hanks from a pound of flax; each thread round the reel being two and a-half yards long; 120 threads in each cut; and twelve cuts in each hank.—See *Stephenson's History of the Flax and Hemp Manufacture of Ulster*, p. 21.

that of Belg'um and other countries, was seen to be wretchedly defective. During the prosperous times of the Linen manufacture, those engaged in it were satisfied with the large profits which were then obtained, without any inquiry as to whether they could be still further increased by pursuing a different course of management; and accordingly, when subjected to competition with the produce of the foreign market, the Irish Flax grower found that he could not maintain his ground. The consequence has been, that for a considerable time past, the growth of Flax has been materially on the decrease in Ireland; and had not the most active measures been employed for the renovation of this once important branch of industry, it would in a short time have been banished from the land.

When the present consumption of the numerous spinning establishments of the country is taken into account, the importance of producing the necessary supply at home will be apparent, if the cultivation can be rendered more profitable than it has been, of which there is now not any doubt entertained. In the year 1841, it has been ascertained that no less a quantity of Flax has been imported from foreign countries, for the supply of our manufactories, than 80,000 tons, causing an annual drain of gold from this already impoverished country of from £5,000,000 to £6,000,000, for Flax alone; but if the sum paid for seed and oil-cake be also taken into account, the annual outlay will amount to £10,000,000 or £12,000,000.* When the demand for the article is so great, it is surely deserving of the most serious consideration whether or not the supply can be produced at home, to enrich the inhabitants of our own country, instead of the foreigner.

Before closing these preliminary remarks, a circumstance connected with the cultivation of Flax is worthy of remark, namely, that the cultivation of that crop has generally de-

* See Reports of the Flax Society.

creased as improvements in agriculture have advanced. This is, in part, to be attributed to the alterations which have been introduced in reference to the order in which the several crops of the farm succeed each other; and, in part, to the circumstance of the Flax interfering so much with the other operations of the farm, that the manufacture could not be properly attended to. Under any circumstances Flax is a troublesome crop, and is suited rather to the small farmer than to the extensive one, inasmuch as the former can better devote the necessary attention to the subject. In Belgium, where Flax of the best quality is produced, the land is for the most part in the occupation of small farmers; but their entire system of cultivation, when compared with ours, is more like that of the garden than of the field. The land is kept in the highest state of fertility by the application of manures, not, as is the case with us, applied every fifth or sixth year, but repeated every season, and in Belgian husbandry a weed is scarcely seen. In Belgium, however, in many cases, the grower is not the manufacturer. The crop is disposed of when growing, to a class of persons called *Factors*, who prepare it for the spinner. The division of labour here, as in every other department of industry, is evidently productive of the most beneficial results. The farmer obtains a remunerating price for his Flax, while growing, without any further trouble; and the factor, from the circumstance of being constantly employed in the manufacture of the article, may reasonably be supposed to understand it better, and produce a superior sample to what the farmer could do. The Flax crop is one requiring the most minute attention in the different stages of its growth and management, which in some degree renders it unsuitable for the extensive farmer, or at all events better suited to the small farmer. The Irish small farmer, however, has yet to learn the importance of that minute attention to details, which is so essential in Flax culture, and without which it is better that it should not be attempted.

Another important circumstance connected with this subject should not be lost sight of by the Flax grower. The depression so severely felt for several years past, has chiefly affected the *inferior qualities* of Flax; and when a superior article was brought into the market, it *invariably brought remunerating prices*. A large proportion of the article brought into the markets has, for many years, not realized more than from 37*s.* to 40*s.* per cwt., which, even in the case of the heaviest crops, could not by any means remunerate the farmer; but it is to be observed, that, at the same time, samples of good quality brought 80*s.* and upwards. Indeed, so great is the difference in price between superior and inferior samples of Flax, that, even at the present time, the former will fetch £7 per cwt., while the average price does not nearly approach half that sum. Here, then, is a splendid field for exertion. If the returns from the growth of Flax can be doubled without devoting another acre to its cultivation, what an increase would thereby be made to the resources of the country? That an approximation to this is capable of being effected, no reasonable doubts can now be entertained. The seed itself is a most important consideration with the foreign grower, though almost entirely neglected in this country; so important, in fact, that more is returned by the seed alone, under proper management, than the Irish farmer often obtains for his entire crop.

That the soil and climate of Ireland are well adapted for Flax culture is abundantly testified by the superiority of the samples occasionally produced, in cases where a proper course of management had been adopted. To this circumstance it is that we are indebted for the establishment of the Flax Improvement Society, in one of the resolutions of which we find it expressly declared, "that ignorance of a proper system in the management of the Flax crop in this country is *alone* the cause of its inferiority to the produce of the Continent; that this is now established beyond a doubt;

and that by the introduction of those *right principles* that are wanting, our farmers may share the benefits at present possessed exclusively by the more skilful cultivators of France, Belgium, and Holland.”*

In presenting the reader with practical directions on the cultivation and management of the Flax crop, it might appear sufficient to notice merely those points in which the present system is defective; but as these are so numerous, it is considered better to present a full detail before the reader, of the management to be adopted, dwelling particularly on those points in which our old system is peculiarly defective, and relying chiefly on the instructions circulated by the Belfast Flax Society as those which the Irish farmer should implicitly follow.

On a comparison of the climate of Ireland with that of the Flax-growing countries on the Continent, it is declared to be, in many respects, much better adapted for the cultivation of that crop than any of them. In Belgium, especially, continued dry weather during the Flaxseed-time renders the preparation of the land extremely difficult, as retarding the due pulverization of the soil, which is essential to the success of the crop. It is well known that Flax seed sown on well prepared land will spring in six or seven days, while on rough and cloddy surfaces it will not spring at all without rain; and when moisture is present it will come up unevenly, and, from this cause, produce an inferior sample. During the growth of the crop, it also frequently suffers much from drought on the Continent; and it is stated by M. Demann, the Belgian agriculturist, brought to this country by the Flax Society, that he has on several occasions seen the Flax crop not to exceed eight inches in length, from that cause, while in other cases it proved a total failure.† These are drawbacks on the cultivation of the Flax crop with which the Irish farmer has rarely to contend; and when ordinary attention is paid to the

* First Report of the Flax Society, p. 35.

† Ibid. p. 54.

preparation of the land, and the seed sown at a proper season, a good braird may, almost with certainty, be calculated on. The humidity of our climate, though favourable to the Flax crop in the early stages of its growth, is, however, a serious drawback as it approaches maturity, often laying down the heaviest and most promising crops, which should then be pulled, however green the Flax may be, as it spoils rapidly by lying on the ground; and in the autumn, when the succeeding operations are being performed to prepare it for market. In the grassing, especially, much injury is frequently sustained by wind and wet weather, during which the crop cannot be taken up; and, under our present course of management, contributes to the production of the very inferior quality which the Irish farmer generally brings to market. But this drawback, fortunately, is not without remedy, by the adoption of the Courtrai system, so called from the name of the district in the north of France in which it is practised; and if the Flax Society did nothing else than bring the merits of this system so prominently before the public as they have done, they would on that account alone be entitled to the gratitude of their countrymen. When we come to treat of the after management of the Flax crop, this system shall be fully explained.

In the cultivation of Flax, the first consideration presenting itself is the selection of the *soil*. Like most of our agricultural plants, it will grow upon most soils, not absolutely barren, the most favourable being those having a large proportion of vegetable matter in their composition. That to which the cultivators of Flax in Flanders and in the northern parts of France give the preference is strong loamy land, well adapted to the growth of wheat, and this is also the sort of soil on which the most valuable crops are produced in this country. Strong clays do not answer well, nor soils of a gravelly or dry sandy nature. The quality of the soil with regard to fertility, is also deserving of consideration, as well as its texture and composition. If too much enriched by the ap-

plication of manures, the Flax will grow too luxuriantly, and produce a coarse fibre, besides being liable to injury from not being able to maintain its erect position while growing: and if, on the other hand, the land be deficient in fertility, the produce will be scanty and unremunerative. Manure should not be applied directly to the Flax crop, unless in very small quantity. Liquid manure is frequently applied by the Belgians, in proportion to the wants of the soil, and it is not found to injure the quality of the fibre. In cases where manure may be required to render the soil sufficiently fertile, it may be applied the preceding autumn, before giving the first ploughing to the land; but this cannot be regarded as an economical method of supplying manure to the soil, and the better plan is to enrich the land sufficiently, by applications to the preceding crop. When manures are applied to the land immediately before winter, much of their fertilizing qualities will be carried off by the rains, and this will especially be the case where they have not been thoroughly incorporated with the soil.

The place for Flax in the rotation is after lea or a corn crop, and as soon as possible after the land has been broken up from grass; it will, therefore, succeed with propriety oats or wheat after lea, and this may be regarded as the proper place for Flax in the rotation. It should not by any means come after potatoes, or other green crop, in which case the fibre would be invariably coarse, and the stalks uneven, from the manure not being perfectly incorporated with the soil, although this course of cropping is not uncommon in the Flax-growing districts of Ireland. Another important consideration in the culture of this crop, and one too frequently overlooked in this country, is, that it is inexpedient and unprofitable to have Flax sown upon the same land oftener than once in seven years, while in many cases it will not succeed if repeated oftener than once in eight, ten, or twelve years, according to the quality of the soil. It must not also be cultivated on land which has been

recently limed, certainly not sooner than the third or fourth year. On many of the rich, heavy soils throughout the country, where Flax had previously been cultivated with the greatest success, nothing is more common now than to hear the occupiers of such soils complain that they cannot produce good crops; but their failures have, in most cases, proceeded from the use of lime in large quantities, and making the Flax-crop too soon follow the application.

In the preparation of the land for Flax, the objects to be attained are the reduction of the soil to a fine tilth, and the thorough eradication of weeds. The preparation of the land for this crop is even of more importance than the quality of the soil itself, and in this primary operation the practice of the Irish farmer is wretchedly defective. A single ploughing, and that a very imperfect one, is all the preparation usually given, and after a few turns of the harrow to smooth the surface, the seeds are sown, and covered by earth being shovelled from the furrows. The plough, in this case, has not gone deeper than three or four inches at most, and the soil is not by any means pulverized to that depth, as the limited action of the harrow has only partially reduced the furrow slices made in ploughing, and the roots of the Flax plants therefore penetrate the soil with difficulty. When the land has been properly prepared, an extremely light covering only is necessary, and the system of covering from the furrows is particularly objectionable. Furrows should not be formed at all in land appropriated to Flax cultivation, on account of the variety in quality which the uneven surface thereby formed invariably produces, and consequent inferiority of sample when prepared for market. Furrows, indeed, in any case, are indicative of slovenly farming, as the only reason which can be assigned in their favour is their serving to carry off superfluous moisture, which would otherwise saturate the soil, and render it unproductive. Now that draining is so well understood, however, a wet soil is one of the strongest indications of bad farming.



This is not a proper place to enter at length upon the important operation of draining, but it may be remarked that there is no other crop less suited to a wet soil than Flax.

The land intended for Flax should receive a deep ploughing in the autumn, so soon as the previous crop is removed off the land, as this early ploughing facilitates the after pulverization of the soil in the spring. In this state it remains during the winter, and as early in the spring as the state of the soil will admit of the action of the implements of tillage, its further preparation is to be resumed. This will usually commence with a good harrowing, to reduce partially the furrow slices which have stood the winter. After this, another ploughing is to be given, in a direction crossing the preceding one, after which the harrowing is to be repeated, and continued as long as it is found to have a beneficial influence in pulverizing the soil. Such weeds as have been brought to the surface by the action of the harrow, are then to be collected over the surface, and removed from the field, as well as the small stones which in most soils are also disengaged by the action of the harrows. In favourable cases, and on rich and easily pulverized soils, this preparation may be sufficient; but in most cases another ploughing and harrowing will be requisite. The action of the roller will also be a necessary auxiliary to that of the harrow, especially on adhesive soils, the lumps of which, in dry weather, will resist the action of the harrow alone.

The course of preparation now described will be found to effect the object in view, a thorough pulverization of the soil, so far as the implements of tillage can penetrate. Deep pulverization is much more important, as a preparation for Flax, than is usually imagined, it having been repeatedly ascertained, contrary to the general opinion, that, under favourable circumstances, the roots of Flax will strike into the ground fully one-third the length of the stalk. As we have already remarked, this part of the culture of Flax is much neglected by the Irish farmer, the seeds being generally sown

after a single furrow, and the land generally foul and cloddy; hence a primary cause of the inferiority of our Flax crops.

The mode of sowing Flax is similar to that of the corn crops, so well understood, but great care is necessary to have the seeds equally distributed over the surface. They are covered in by a slight harrowing, after which the roller is to pass over the ground, to ensure quick and even germination. A rolling, and slight harrowing afterwards, before sowing, is also recommended to level the surface, and prepare it for the reception of the seed. The proper seed time is during the month of April, and as early as possible in that month, the precise period being regulated by the weather, and consequent state of the land.

The quantity of seed to be sown will in some measure depend on the chief object in view in the cultivation of the crop. When the quality of the fibre is regarded as the chief consideration, thick sowing is necessary; but should the saving of the seed be a principal object, it will be better secured by using a smaller quantity of seeds. When Flax is sown thin, it branches much towards the top, and thus produces an increased quantity of seed, but then this object is effected at the expense of the fibre, which is thereby rendered coarse, as well as deficient in quantity. As the production of the largest quantity of seed is incompatible with the greatest return from the fibre, and the latter being the most valuable, the production of seed is to be regarded as a secondary consideration. The Flax crop is usually much too thin in Ireland, and hence another cause of the inferiority of our produce, which is the more unaccountable as the saving of seed is seldom attended to. It is worthy of observation that the plants from which the finest fibre is produced, have rarely more than one seed-pod, in fact not more than one in twenty having more than a single capsule. The stalks of flax are thus like trees in a young plantation, those standing closely, from which alone fine Flax can be produced, being tall and slightly branched, while others,

standing at greater distances, will be short, and covered with branches over a great part of the stem. It is also generally known that Flax greatly branched loses much in the manufacture, and thence, in addition to being coarser, is unproductive. About three bushels or nine-pecks of seed to the statute acre will be the proper quantity, and if fibre of an extraordinary degree of fineness is required, another gallon or two may be added. It is of the utmost importance that the seed should be of good quality, and free from the seeds of weeds, a circumstance too often neglected, our farmers being often tempted to purchase an inferior article under the lure of cheapness, which is a false economy, a worthless crop being the invariable result of using inferior seed. Flax-seed that is fresh and proper for sowing should be smooth, bright, plump, and so heavy as to sink in water. It should taste sweet, and, on being broken, it should appear of a bright yellowish green colour, and oily. Inferior samples of foreign seed also usually contain a large quantity of the seeds of weeds, which it is especially important the farmer should guard against sowing.

Although the direct application of manures has been said to be injurious to the Flax crop, this observation has reference chiefly to the use of farm-yard manure, which, as yet, is almost the only substance used in this country. We have yet much to learn in other departments of Agriculture, as well as in Flax cultivation, from the industrious Flemings, whose economical management of manures is deserving of general imitation. Among other objections to the use of farm-yard manure on the Continent is its liability to introduce to the soil the seeds of weeds, which the Continental Flax-growers are so anxious to guard against. Liquid manure is, however, almost invariably applied by them to the Flax crop, being usually applied just before sowing the seed. A thousand gallons of urine, including drainings from the house, stable, byre, and dung-heap, and to which the contents of the privy have been added, with often from 600 to 1000lbs. of rape

cake mixed through it, are frequently applied to the acre. It is carried out in tubs on handbarrows, and evenly distributed over the land, after which a few days are allowed to intervene before sowing the seed.*

The clovers and grasses are occasionally sown with the Flax crop, both in this country and on the Continent, the previous preparation of the land for that crop being also well adapted for the cultivated forage and herbage plants. In this case the seeds of the latter are either sown with the Flax seeds or just before the first weeding is given to the crop, the treading of the weeders and pulling of the weeds in the latter case affording sufficient covering for them. Flax, however, is too close a growing crop to admit of the clovers and grasses being grown among it without interfering with their growth, nor does the admixture take place without injury to the Flax crop itself; but what is thus lost on the one hand is thought to be gained on the other. The Flax crop is but a short time on the land, being pulled at a time when vegetation is still active, and the pulling of the crop moulds the young plants and causes them afterwards to make rapid progress. Partial failures of clover, when sown among grain crops, are not uncommon, but when sown with Flax such an occurrence is extremely rare. On the whole, however, it is better that the sowing of the clover and grasses should be deferred until after the pulling of the Flax crop, when sufficient time still remains for that purpose.

The next process, and the only one required until the crop is ready to be taken up, is weeding. This commences when the plants are a few inches in height, and can be readily distinguished from the weeds, or about the third week. It is performed by women and children, who, with coarse cloths around their knees, creep along on all fours, which injures the young plants less than walking on them. They work

* Rham's Flemish Husbandry, and Reports of Flax Society, *passim*.

also facing the wind, so that the plants laid flat by their pressure upon them, may be blown up again, or at least be assisted to regain their upright position. This circumstance, among numerous others, shows what minute attention is paid to every thing affecting the Flax crop by the Continental farmers, and affords an instructive lesson to our farmers at home. The tender plants being all pressed down in the same direction very soon recover, but twisted and flattened in different directions, they do so with difficulty. Notwithstanding all these precautions, however, the weeding should not be too long delayed, lest the young plants be so much injured, that they cannot afterwards regain their erect position.

The period of pulling the crop depends, in some degree, on the intention of the grower. When it is wished to procure fine fibre, the Continental practice is, to pull rather green; but when the quality of the seed is an important object, somewhat longer time should be given before pulling. When any of the crop is lying, it should be at once pulled and kept by itself, as should also the long, middling, and short Flax, and tied up separately. This is particularly attended to on the Continent, and is a great means of enhancing the value to the spinner, and consequently to the grower, who will be amply repaid for his trouble. When great varieties exist in the quality of the Flax, before being taken up, it is, however, an indication of defective husbandry; as, unless in the case of a diversity of soil, the Flax should be uniform in quality. To judge of the time of pulling, the best criterion is, when about two-thirds of the stalk is observed to turn yellow, and to lose its leaves; and also, when by cutting the seed-pod across with a knife, the seeds have changed from their fluid state. The quality of the Flax as well as that of the soil on which it has grown must be taken into account, in determining the precise period at which the crop should be taken up, and on all these points experience only can properly determine. Taking up the crop in a wet state should be avoided, if possible.

The usual practice in this country in taking up the Flax-crop, is to pull it and form it at once into sheaves or bunches, similar to the sheaves of grain in the harvest-field; and these being formed into stooks, are allowed to stand a few days, or until it is convenient to have the Flax removed to the steep. In the majority of cases, the seed is disregarded, and the Flax at once put into the water without being subjected to the operation of rippling. In fact until the advantage of saving the seed was prominently brought before the Irish Flax-growers by the Belfast Flax Society, the practice was scarcely known, an erroneous idea being entertained, that the quality of the fibre would be injured by the removal of the seed. Through the exertions of the Society, however, the practice has been gaining ground. Irrespective of the value of the seed, it is of importance, that it should be taken off the Flax to facilitate the after operations to which it is to be subjected. The interval between pulling and rippling should not be great, otherwise the heads of the Flax are liable to be broken off by the force necessary to draw them through the rippling machine, and from the injury thus caused by unnecessary delay, prejudice has arisen against the system.

The universal practice in Ireland has been, to water Flax in the Autumn instead of in the ensuing Summer, as practised in the most celebrated Flax-growing districts of the Continent. But the Flax is also frequently steeped in the Autumn on the Continent, in which case, instead of being at once formed into bunches as in Ireland, it is laid on the ground in handfuls heaped in small parcels, each handful crossing the preceding one a little, and left in this state to dry, for a greater or less length of time, according to the state of the weather, and that of the crop. The handfuls should be of such a size, that they can be grasped readily afterwards in rippling, and by careful handling, they will be quite detached from each other when the Flax comes to be spread, which not only saves trouble to the spreaders, but prevents injury to the Flax itself. The seed

is in, all cases, saved on the Continent, and it is a great waste not to do so in every case. The succeeding operations are performed with much greater facility after rippling. The Flax can be spread with greater expedition and economy, the capsules then not interfering with the separation of the stalks from each other, which is known to be extremely difficult when the rippling process has not been performed. As soon as the capsules containing the seed are dried, and break readily on being pressed between the finger and thumb, the Flax is ready for being rippled. This work is usually done in the field, in which case a large winnow-cloth is spread, and the ripple placed in the centre of it. The rippling-machine is an instrument like a comb, with iron teeth. These teeth should be round, smooth, and tapering, standing about twelve inches



out of the wood, and placed so close together that the pods cannot pass through. There may be two persons employed in rippling, each alternately drawing their handful of Flax through the teeth of the machine, which is to be placed on a long stool for the work-people. This rippling should go on simultaneously with the pulling, the number of hands employed in each department being properly apportioned for that purpose. The rippling should always be performed the day on which the Flax is pulled, and the second day it should be taken to the steep. Where large quantities of Flax are to be treated, it will therefore be obvious, that the size of the ponds should be such as to contain one day's pulling and rippling, in order that the crop may be evenly and uniformly watered.

A great disadvantage in treating Flax in the Autumn, is the difficulty, in many cases, of preserving the Flax-seed after rippling. In moist weather, and where the quantity of seed on hand is large, it is indeed, extremely difficult to save the seed properly, even under the most careful management. If the capsules or seed-pods be placed together in quantities, after being taken off, rapid fermentation will immediately ensue, to the total destruction of the seed for any purpose afterwards; so that, to guard against this casualty, they must be thinly spread over a boarded floor, or other dry place, and repeatedly turned. In humid weather, a slight kiln-drying may be given to the seed, if intended for crushing or feeding, without injury; but if designed for sowing, this process would interfere with its vitality, and render it unfit for the intended purpose.*

* On this subject no apology is necessary for placing the following extracts before the reader, taken from a letter addressed by Mr. John Mac Adam, of Belfast, to Mr. Skinner, the efficient and active Secretary of the Belfast Flax Improvement Society:

"I have, during the last three months, purchased upwards of 950 bushels of seed, and expect to get some 300 or 400 more, before Spring. The quality has been much the same as last year's crop, but in many cases superior, principally owing to the greater care and skill now executed by our farmers in preparing the seed for market.

"Besides this quantity of seed, I have bought upwards of 6,000 bushels of the flax bolls, containing the seed. I was induced to offer the farmers a market for the bolls, as I found that many objected to saving the seed, not from any doubt of its value, but from not having lofts to spare for drying the bolls, and but very inefficient apparatus for preparing the seed. In the early part of the season I purchased the bolls, just as rippled from the flax; but finding, from the large quantities offered, that I could not have all dried before spoiling, I made it a proviso that they should be well dried either in the sun or on a kiln. Every eight bushels of bolls produced, on an average, one bushel of clean linseed.

"The chaff, or bran, is a very excellent food for cattle, as it contains a large proportion of mucilage, and all the weak seeds that are blown off in the cleansing. I sent samples to some correspondents of mine, farmers in Ayrshire, and they were so well satisfied of its nutritive qualities, that they ordered 1,000 bushels; and I have since had orders from Wigton and Dumfries, from others of my friends, to whom I had also sent samples. I have, besides, sold some hundred bushels in this

We now come to speak of the Courtrai system of managing Flax, and to recommend it earnestly to the Irish flax growers, especially to those of capital, who are not obliged in an early stage to dispose of their produce. In the district from which this system derives its name, the Flax, after being pulled, is placed on end, in the manner of sheaves in a stook; and so skilfully is it arranged in this position, that it is difficult to blow down by winds, nor has rain much effect on it. In eight or ten days, according to the state of the weather, it will be dried, after which it may be bound up into bunches, and made up into small wind stooks, as they are termed, in the field, after remaining some time in which the Flax may be carried at once to the barn, or stacked in some convenient situation, until the further operations of the manufacture are to be commenced. The seed may be taken off it during the winter, at a period when the other operations of the farm are at a stand; the operation in this case not being performed by the ripple, but by repeated strokes of a stick, the foot being at the same time kept on the root end of the Flax, to prevent it from being turned about, which would impede the after process in its manufacture. The steeping then takes place in the following May or June, at a time when the weather is favourable for the process, and when the farmer also has leisure to attend to it. An erroneous opinion prevails in this country, that such treatment would



town and neighbourhood, principally to cow-keepers; and, in every case, it has given great satisfaction. The low price of linseed cake and linseed meal has caused an increased demand for these articles in this country; and their value, as food for all kinds of stock, is beginning to be appreciated.

"The price I gave this year, for linseed, was from 3s. to 4s. 6d. per bushel, and 6d. per bushel for the bolls: and even at these comparatively low prices, the farmers expressed themselves well satisfied of the advantage and profit to be derived from saving the seed. They had all kept a considerable part of the produce as food for cattle, and were fully convinced of its utility."

injure the quality of the fibre; but the superiority of the samples treated in this manner, clearly shows that such is not the case; in fact Flax is occasionally kept for two or three years before being watered, and is found to improve by keeping.

The subsequent management of Flax belongs more properly to the manufacturer than to the farmer; but there not being a class of persons in this country devoting themselves to this purpose, the manufacture of it devolves on the farmer, to enable him to bring it to market. In the Low Countries, however, a class of persons follow this as a profession, and to this circumstance, no doubt, much of the celebrity to which they have so justly attained in this department of rural economy is to be attributed. Through the instrumentality of the Flax Society, Belgian Flax factors have already established themselves in the North of Ireland, with their proper establishments of Belgian artizans, and we feel assured, that this step will contribute much to the extension of Flax culture in that part of the island, and to the increase of the farmer's profits from it. The Flax Society are most anxious to introduce the Courtrai system of management, but until the factorship of Flax is established in the country, that object will scarcely be effected. The Irish farmers, generally, cannot afford to wait the return from their Flax crop until the ensuing season, and are, therefore, compelled to treat it immediately after being pulled, to have it ready as soon as possible for market; but were Flax factors general throughout the country, the farmer would obtain the price of his Flax before leaving the field, and probably also obtain a larger return from it than he would do after manufacturing it for market, owing to the inferior system of management to which it would be subjected. Although the Flemish farmers understand the different processes of the manufacture so well, yet they frequently dispose of their crops in this manner, and always obtain remunerating prices. No matter what exertions are made to introduce a better system of manufacture, much Flax will ever be negligently treated or lost so long as the farmer is also the manufacturer.

The establishment of manufactories in the Flax-growing districts, for this purpose, is peculiarly deserving of the most serious consideration from the landed proprietors of the country. Capitalists would readily come over from the Continent, were sufficient encouragement afforded ; and if once established no doubts can be entertained as to their success, as the prices they would be enabled to give the farmers for their crops while growing, would ensure a larger quantity being offered for disposal in this manner than could for a length of time be purchased from them.

The seed having been taken off the Flax, the next operation is the watering, which is the same no matter what the previous management may have been, except that when the flax is dried a longer period will be required in the steep. The object of causing the Flax to undergo this process is to facilitate the separation of the fibre from the stem, during which the mucilaginous matters, causing the fibres to adhere to it, partially undergo the putrefactive fermentation. The water for the purpose should be soft, to ensure which it is well that it should be collected in the pond for some time previous to the Flax being steeped. It is also of importance that the water should not be changed during the time the Flax is in it, the quantity required from leakage being, however, cautiously supplied. Above all, it is necessary to guard against the use of water impregnated with any mineral substance, which would prove destructive to the Flax. In order to guard against this, therefore, it may be necessary to form a cut all round the Flax pond, which may be filled up with stones, by which arrangement the ingress of injurious matters will probably be prevented. The selection of proper situations for these ponds is too little attended to in this country, although the treatment in watering exercises a powerful influence on the quality of the Flax. The ponds should at least be of sufficient depth to admit of the Flax being placed almost upright in them, and the length and breadth may be determined by the locality, or the quantity of Flax to be steeped. The Flax is put in to

the pond with the root end undermost, and a covering of straw or other matters, to shade off the light, is found to be advantageous. When covered over in this manner stones are afterwards to be placed along the surface, to prevent any portion of the Flax from rising above the water. Although any considerable current through the pond is not desirable, yet such a flow as will carry away the impurities caused by the fermentation, is essentially necessary to produce Flax of a good colour. When fermentation takes place in the pond, without any influx of fresh water, the colour of the Flax will invariably be found to have been destroyed.

The time required in the water is variable, according to the weather, and sort of water employed, as well as the degree of ripeness or dryness to which the Flax had previously attained. When the Flax is properly watered, it will be observed to sink in the pond, and the fibres will separate freely from the stalks, on its being broken and rubbed. To avoid mistakes, however, on this important point, a few stalks of average fineness should be drawn from the centre of several of the bunches, in different parts of the pond, and carefully examined. In warm weather, eight or ten days will sometimes suffice, and in other cases ten or twelve, the precise time not being subject to rule; repeated examinations, therefore, can only be depended on. It is generally believed that too little watering is given in this country, trusting to the grassing afterwards to make up the deficiency; but it is especially important that the watering be not carried too far, which would cause the entire destruction of the fibre.

When the Flax is sufficiently watered, it is taken out of the pond, and placed on the banks to drain, for a few hours. The usual course is to place the bunches flat, but the better plan is to place them on end, resting on the roots, and supporting each other. In this position, the water drains off more readily than when the bunches are laid flat, but in any case, the time between taking the Flax out of the pond and spread-

ing it should be short, never extending beyond the second day, otherwise it will be materially injured.

Short and close pasture land is the proper place on which to spread the Flax, and in this operation it is important to distribute it evenly over the surface, and to make the rows perfectly straight, to prevent confusion in turning. The intention of this process is to remedy any defects in the watering, and to wash and bleach the Flax by exposure to the sun and rains. It is worthy of observation, that the Belgians spread their Flax much thicker than it is usually done in Ireland. This has the effect of preventing the weather from hardening it too much, before it is properly bleached, and also of rendering it much less easily tossed about by winds. After remaining in this manner for some time, it is turned over by long poles, or wattles, run under the rows, beginning with the first row, and proceeding, so that the second falls upon the ground occupied by the first. Those accustomed to the work can perform the operation with so much facility, that the Flax, after three or four turnings, is as regularly and evenly in the rows, as when first spread. These turnings are given with a view of washing and bleaching both sides of the Flax equally. The turnings, as far as possible, are performed immediately before rain, the effect of which is obvious, as the rain serves to beat down the Flax, and give it, as it were, a better hold of the ground, the Flax, after being turned, being of course more easily disturbed by wind, than after being first spread. This process is never neglected on the Continent, though rarely attended to in this country, and this omission satisfactorily accounts for the want of uniformity of colour, which is a general characteristic of Irish Flax. From recent trials, it has been satisfactorily shown that at least two shillings per stone are lost by neglecting this particular alone.

The length of time during which Flax should remain on the grass, as in the case of steeping, is variable, depending on the weather and state of the Flax. If not fully watered, a

greater length of time will be required on the grass; the same also holds good in dry weather, a longer time being required than in wet, the reason of which is obvious. As in the case of watering, too little time is frequently allowed on the grass; but in either of these cases, accurate observation and experience only can be relied on, the precise time not being subject to rule. It is important to ascertain that it is thoroughly dried, before being taken up, after which it is again bound into bunches. Should it not be intended to proceed immediately with the manufacture, the Flax is found to be improved by being put up in small stacks, loosely built.

The next process in the manufacture of the Flax is breaking the woody parts of the stem; but previous to this being performed, it is the usual practice to give the Flax an additional drying, by artificial heat, or, as managed in most cases, it may more appropriately be termed *roasting*. Defective as is our management of Flax in many respects, the ordeal it passes through at this period exceeds every thing else in absurdity, and is, in itself, a fruitful source of the inferiority of our Flax, and in a great degree accounts for the brittleness and huskiness by which it is usually characterized. When the Flax is taken off the grass in the autumn, it is indeed often difficult to get it thoroughly dried; but this may usually be effected by adopting the Belgian practice of *gaiting*, or setting each bundle after being taken off the grass on end, the band in this case being placed near the top, and the lower end spread out, as is frequently done with grain in the harvest-field. A few hours of dry weather, in this position, will generally prepare it for being formed into the stack, which, in the first instance, should rarely be more than the length of a bunch of Flax in width, to admit of its being still further dried, to prepare it for being at once manufactured, or formed into large stacks. When properly dried before being stacked, the Flax improves by keeping, a circumstance which should not be lost sight of. This prepares it to undergo the different processes in the manufacture with less

injury, as the loss occasioned by subjecting Flax in a hard, brittle state to these operations, may be easily conceived.

For breaking the fibre, and preparing the Flax for the



scutcher, a simple instrument is sometimes employed. It consists of two wooden frames, attached to each other by a hinge, the cross-bars of which are so placed that two of them shall not be opposite to each other, the upper frame having usually a bar less than

the lower one. In the one here figured, the upper part is raised by a spring, the parts acting on the Flax being formed of iron. By means of a simple contrivance, shown in the figure, motion is communicated to the frame by the left foot of the workman. This is a great improvement on the break in common use, both as regards efficiency and economy of manual labour. The Flax is also sometimes bruised by a large stone passing over it, which is put in motion by horse-power, but it performs the work very imperfectly. A still more simple, but rude instrument, is also in use in several parts of the North of Ireland, consisting of a sort of large wooden mallet, the effective part of which is the side. In this case the Flax is spread on a hard and even surface, and by repeated blows of this mallet, or hand-break, as it is called, the stem is reduced and broken, to prepare it for the scutcher.

This operation is, however, much better performed by rollers placed close together, and revolving in contrary directions, similar to those through which the unthreshed corn passes in the threshing-machine. The action of these can be regulated according to the quality of the Flax which is subjected to their operation.

The subsequent operation of scutching is also performed

by machinery or manual labour. Hand-scutching is almost universal on the Continent; but it is performed there, as in the case of every thing pertaining to the culture and manufacture of the Flax crop, with the utmost care, and much superior to what it is usually done in Ireland. The Belfast Flax Society has used every exertion to introduce hand-scutching more extensively, as a substitute for machinery, the work being not only better performed in the former case, but it being also better suited to the condition of the small farmers. This operation is so well known in Flax-growing districts that it need not be described. When Flax is extensively cultivated, however, hand-scutching is evidently inapplicable, from the difficulty in procuring the necessary hands for the work, and in this case machinery must necessarily be employed. This operation does not, also, require a detailed description, not being performed by the farmer himself. The common construction of the Flax-mill is exceedingly simple. Motion is communicated by a water-wheel, or otherwise, to a horizontal axle, on which the scutchers or wipers are placed, and the ends of them, which thus resemble the spokes of a cart-wheel, and revolve in a similar manner, act on the handfuls of Flax, which are presented to them resting on a board placed for the purpose. The operation of these mills has been much objected to, on the ground that they mutilate and destroy the fibre in a great degree, before the woody part is separated from it; and with a view of effecting an improvement in this department of the manufacture, a premium of one hundred guineas has been offered by the Flax Society for the machinery best adapted for the purpose; to be decided at the approaching annual meeting of the Society; when it is to be hoped that something worthy of such a munificent prize may be brought forward.*

* Since writing the above, the annual meeting of the Flax Improvement Society has taken place; and although in the opinion of the Committee of the Society, no improvement has been brought before them, justifying the granting of the premium referred to, yet the result of it has been highly gratifying in inducing several able

These, then, are the details which it has been considered necessary to place before the reader on the subject of Flax culture, as recommended by the valuable Society to which allusion has so often been made in these pages, and which the experience of the Continental Flax-growers has shown to be that best calculated to fulfil the object in view. In the progress of our remarks we have seen that the management of the Irish farmer is greatly defective. The Flax crop is usually sown in this country with too little regard to the selection of the soil, or the order in which it should succeed the other cultivated crops of the farm; nor has the selection of the seed itself, or the preparation of the land for its reception, come in for a greater share of attention; although all those matters are objects of especial regard with the industrious Flemings, and other Flax-growers of the Continent. In the manufacture of the crop the same neglect of any thing like a rational system of procedure has been seen to be equally apparent; the seed, in itself a considerable source of profit, being generally disregarded, and the entire management being slovenly in the extreme. On the opening of our ports to the foreign Flax-grower, the superiority of their Flax was soon apparent, and had well nigh driven the home growth entirely out of the market, or had caused it to bring such unremunerating prices, that its cultivation was in a great degree abandoned. It was apparent that Flax of the finest quality was occasionally produced, the returns from which were amply remunerative; that, in fact, while the usual prices of Flax in the market ranged from £1 to £3 per cwt., samples were occasionally brought forward for which double these prices were readily offered. This circumstance did not escape the

competitors to come forward for the prize, the improvements suggested by whom are calculated in no small degree to promote an improved system of manufacturing Flax. Among those whose mills have called forth the approbation of the Committee, may be mentioned Mr. Hutchinson of Killycairn, who has taken out a patent for his invention; Mr. Henry, Glenburne Mills; Mr. Key, of Courtraill Mill Keady; Mr. Byers, near Market-hill; and several others.

attention of the enterprising and public-spirited merchants of Belfast, who soon perceived that our inferior samples were mainly owing to our defective management; and hence the formation of the invaluable Society which has already effected so much for the improvement of this important branch of our native industry.

The produce of Flax, even under the best system of management, will, of course, vary according to the soil, season, and many other particulars. In those parts of the Continent where its culture is so well understood, it is esteemed their *golden crop*, and regarded as superior to any other on the farm. The ordinary produce there is from £20 to £30 an acre, independent of the seed, which is worth £5 or £6 more. The seed alone, which has hitherto been entirely neglected in this country, may, at a low calculation, be assumed to repay the cost of the seed sown, with all other charges attending the cultivation and manufacture of the crop, leaving the fibre altogether as nett proceeds. Here, then, is a splendid field for exertion; and our farmers may take shame to themselves if they rest satisfied with their former unprofitable returns. There need not be the slightest fears of the supply exceeding the demand; for, however great exertions may be made for the extension of the culture of Flax, it will be many years before our spinners can obtain a sufficient supply in the home market.

A few words as to the application of the seed may not here be out of place. When properly saved, it may with propriety be used for sowing, and will not be inferior for this purpose to any imported seed. The propriety of sowing seed saved at home, even in preference to that imported, would appear from the practice of the Dutch, whose management in Flax culture is so well worthy of imitation. They are, however, aware of the importance of an occasional change of seed; and although they raise and export much, they also bring much of what they sow from Riga. Riga seed, when sown in Holland, is generally found to grow coarse, and yield a bulky crop the

first year. The seed produced from this is always sown a second year, and the seed it then yields is that most prized by the Dutch for sowing again, as they always find it to produce the best and finest Flax; and the seed of the third crop, which they consider unfit for use, they export, which is that so much prized by us. In order to serve themselves with seed of the best quality, many of the growers of Flax in Holland sow a small quantity of Riga seed every year, to secure seed of the second year's growth for their own use. It would, therefore, appear that our growers of Flax might easily raise at home a considerable portion of the seed they require, and that, perhaps, of superior quality, instead of using so much from foreign countries, some of which is the refuse of their markets. In many cases the finest samples of Flax brought to market are the produce of home-saved seed; and for the first year at least, it is extremely probable, that seed of home growth, the produce of imported seed from Riga, would be the most valuable which the farmer could employ. This department, the saving and selection of home-grown seed, is deserving of more attention than has hitherto been paid to it.

But under the best course of management which can be devised, much of the seed saved will be unfit for sowing; nor is it necessary that it should be so, as the demand for this purpose is small when compared with the supply. Large quantities of foreign seed are annually imported for crushing, and our manufacturers would, of course, from choice, buy home-grown seed, if offered to them. Flax-seed is also much prized as an article of food for the domestic animals of the farm; and so important is it considered for that purpose, that a late writer on the subject, himself a Flax-grower, considers that Flax is deserving of cultivation for its seeds alone, as an article of food for cattle, even were the fibre of no value.* The value of oil-cake, which is the portion of the Flax-seed remaining after the oil is

* Suggestions on fattening Cattle on native instead of foreign Produce. By John Warnes, Jun., Esq. London, 1842.

expressed, is well known for its fattening properties, from which the value of the refuse seed, before expression, may be easily inferred. Nor is the saving of the seed a difficult operation. It is one requiring attention, rather than a great amount of labour, the chief object being to prevent any degree of fermentation taking place until it is thoroughly dried, after which the capsules may be stored together in any quantity required. Repeated turnings, after being taken off the Flax, are absolutely necessary, and exposure to the sun, if the weather be fine. As mentioned in another part of this Essay, a slight kiln-drying will not injure the seed, either as food for the domestic animals or for the oil manufacture. After being thus thoroughly dried, it will be necessary to pass the capsules through a winnowing machine to separate the sand, dust, and other matters from them, which become mingled with them in the rippling process, and afterwards when spread out on floors to dry. The refuse thus separated would otherwise be incorporated with the chaff after the separation of the seed, and render it worthless as an article of food;—indeed a case came under the observation of the writer, in which the use of the refuse of Flax-seed, for a length of time, proved fatal to horses and cattle using it, simply from its containing a quantity of sand and other matters, which were found in quantity in the bowels of the animals after death.

When properly dried, the seed is separated with facility from the chaff by passing the capsules through a corn-mill, the stones being placed as for shelling the grain, after which the separation is completed by the winnowing machine. When the seed as well as the refuse is intended for feeding, it is unimportant whether they be separated by winnowing, as the whole may, with propriety, be boiled up together, with turnips, cut straw or hay, and other matters. This mixture is highly relished by horses and cattle, and is not inferior to any other food which can be given them for bringing them into condition. Experience will soon enable the farmer to ascertain the precise quantity which should be given; but it may

here be remarked, that where no part of the seed has been separated from the chaff, the allowance, even for the largest sized animals, should be very small, perhaps not more than from two to three quarts for each feed.

Before concluding this subject, special allusion must be made to the adaptation of Flax-seed jelly as food for calves, and as one of the best substitutes for milk, to a certain extent, which has hitherto been discovered. The pure seed only is employed in this case, which is boiled for several hours over a slow fire, the quantity of water employed being such as will make the jelly of the consistence at which it can be taken by the calves. Sudden changes of food are well known to be extremely prejudicial to these animals, and in using Flax-seed jelly with milk, the quantity of the former must be gradually increased in proportion as it is found to agree with the young animals. It would, of course, be an exaggeration to contend for the superiority of jelly over milk, their natural food; but when it is found desirable to economize the supply of milk, it may be safely said that no better substitute than Flax-seed jelly has hitherto been employed, whether as regards economy or its adaptation for the required purpose.

In enumerating the advantages to be derived from Flax cultivation, another, though perhaps one of the least important, remains to be noticed, the value of the water in which the Flax has been steeped as a manure, and especially valuable when allowed to run over grass lands. After a trial of the fertilizing qualities contained in this substance, few farmers will be inclined to allow it to flow without interruption to the adjoining streams, in which it generally proves fatal to whatever fish they may contain.

APPENDIX.

THE attention of scientific men has not hitherto been devoted to the development of the phenomena constantly presenting themselves to the cultivator of the soil in the degree which the importance of such investigations demands. This has perhaps resulted from the lukewarmness with which such investigations have been received, and the indisposition so generally manifested to profit by them. Science has, however, already effected much in this department of industry, and is still calculated to do more, if the researches of scientific men be made available. Being strongly impressed with a conviction of the importance of this subject, and that it cannot be too frequently brought before the farming classes, we have much pleasure in reprinting the following abstract of the very important Paper on the Chemical Constitution of Flax and Hemp, by Dr. Kane, which we do by the kind permission of the author. Dr. Kane is already well known to the public by his indefatigable exertions for the diffusion of scientific knowledge, and could he be induced to turn his attention to agricultural chemistry, both he and the valuable Society to which he is so efficient a Professor, would be conferring lasting obligations on their countrymen. The importance of the subjoined Paper will be apparent to every reader, not only as containing important results, but as laying the foundation for further researches.

“ In those plants which are cultivated for the purpose of being ultimately employed as food, it is found that certain constituents are withdrawn from the soil, partly of an organic and partly of an inorganic character, which give to the plant, or to certain portions of it, the constitution that adapts it for sustaining the animal orga-

nism. Thus nitrogen, alkalies, and lastly, phosphates, &c., are found as components of plants, and the value of the crop yielded by a certain surface of ground is proportional, generally speaking, to the materials which the crop has taken up. If, therefore, wheat, or oats, or potatoes exhaust a soil, the agriculturist does not suffer thereby, for he is paid for the materials of which they have exhausted it, and when he replaces that loss of material by fresh manure he but invests a certain capital, to be delivered at a profit in the next season.

“ Many plants not employed as food, but ancillary to our civilization as luxuries, or as utilized in the arts, are similarly circumstanced. Thus when indigo or tobacco is grown, the object is to obtain the greatest possible development of the colouring or of the narcotic principle. For this purpose, elements are necessary of which the soil is thereby deprived, but the impoverishing of the soil is paid for, by its materials being sold as the valuable portion of the plant. In such cases, therefore, to sustain the fertility of the soil, a continued supply, from external sources, of the materials which the plants take up is required. The farmer must supply in the manure the elements which he sends to market in the grown plants.

“ Dr. Kane then proceeded to point out that this principle was limited as to certain classes of plants, by the fact, now clearly established by the concurrent investigations of vegetable physiologists and of chemists, that certain vegetable substances, and those of high importance to mankind, were not formed of materials abstracted from the soil, but were produced by the vital action of the plant upon the constituents of the atmosphere. This class of bodies he characterized as being constituted, generally, of carbon, united with hydrogen and oxygen in the proportions which form water. The carbonic acid of the atmosphere, with the watery vapour constantly existing in it, supplies the elements of sugar, gum, starch, and ligneous fibre, and the oxygen of the carbonic acid, evolved by the vital action of the plants, tends, as it is well known, to ameliorate the air we breathe. When, therefore, we take the sugar, or the woody fibre of a plant, we have a material, formed, as to its elements, independent of the soil. For its formation is required a

plant in healthy vegetation, and for the plant to be in healthy vegetation, it may require to abstract from the soil various materials, so that the crop may actually be of a highly exhausting nature. Still those materials do not go to the sugar or to the fibre; they exist in other portions of the plant; and if the sugar or fibre be the valuable portion of the crop, as in reality usually occurs, the elements which render its production costly are rejected, and let to waste; they do not subserve any future useful purpose, although nothing should be easier than to apply them thereto.

“Such is actually, according to Dr. Kane’s idea, the condition of the growth of one plant of the highest importance to agricultural industry in Ireland—that of flax, and also of another, which, although not now grown here, has been grown with success, and, as he conceives, might still be cultivated with considerable advantage, the hemp. In flax and hemp the valuable portion of the plant is ligneous fibre; the purer this fibre is, the more its value increases; yet the pure fibre contains no element derived from the soil. It is well known to be produced solely by the atmospherical constituents. Hence the intense exhausting nature of the flax and hemp crops, which makes them be dreaded by agriculturists, notwithstanding the high money value of the crops, arises, according to Dr. Kane, from causes of which the effects may be obviated by attention to the true conditions of the growth and composition of the plants, so that those fibre-crops, such as flax and hemp, from being the most exhausting and expensivé, may be rendered the least injurious to the land, and perhaps amongst the cheapest that can be grown.

“As the chemical composition of these plants had never been examined, Dr. Kane devoted himself to the determination, as well of their organic as of their inorganic constituents, and from an extensive series of analyses, of which the details are given in the memoir, arrived at the following results :

“Composition of the stem of hemp, dried at 212° F.

Carbon	39.94
Hydrogen	5.06
Oxygen	48.72
Nitrogen	1.74
Ashes	4.54
	<hr/>
	100.00

“ Composition of the leaves of hemp, dried at 212°.

Carbon	40.50
Hydrogen	5.98
Nitrogen	1.82
Oxygen	29.70
Ashes	22.00
	<hr/>
	100.00

“ The ashes of the hemp plant were found to consist of

Potash	7.48
Soda72
Lime	42.05
Magnesia	4.88
Alumina37
Silica	6.75
Phosphoric acid	3.22
Sulphuric acid	1.10
Chlorine	1.53
Carbonic acid	31.90
	<hr/>
	100.00

“ Dressed hemp fibre was found to give but 1.4 per cent. of ashes, when dried at 212°. Its organic composition need not be given, as it is identical with that of ordinary woody fibre, which is well known. It therefore contains no nitrogen.

“ The characteristic constituents of the hemp plant are seen to be nitrogen and lime. In these it is peculiarly rich, and with these it is the duty of the agriculturist abundantly to supply it.

“ When hemp is steeped in order to separate the fibrous bark from the internal stem, it is known that the water dissolves certain substances out of the plants, and thereby acquires narcotic properties. Dr. Kane evaporated a quantity of the hemp liquor to dryness, and analyzed the extract so obtained, in order to trace what action the steeping had exerted on the plant. He found the composition of the hemp extract, dried at 212°, to be,

Carbon	28.28
Hydrogen	4.16
Nitrogen	3.28
Oxygen	15.08
Ashes	49.20
	<hr/>
	100.00

“ If we exclude the ashes, the organic part consisted of

Carbon	55.66
Hydrogen	8.21
Nitrogen	6.45
Oxygen	29.68
	<hr/>
	100.00

“ This composition approaches to that of the azotized animal substances, and surpasses the animal manures usually sold. The water in which hemp has been steeped contains thus most of the nitrogen of the plant, and if poured over the soil should serve efficiently to restore its fertile powers.

“ The ashes of the hemp extract require also to be noticed, for the plant, in steeping, gives up to the water especially its soluble constituents. The ashes of the leaves of hemp contain in 22 parts only 1.77 soluble in water, or 8.05 per cent., whilst the ashes of the hemp extract contain in 49.2 parts, 29.70 parts soluble in water, or 60.4 per cent. Thus almost all the alkaline constituents of the ashes are dissolved out by the water, whilst the earthy materials remain associated with the residual portions of the stem.

“ Dr. Kane next examined the stem, as it remains after treatment for the fibre, by steeping and peeling. Dried at 212° this *hemp residue* consisted of

Carbon	56.80
Hydrogen	6.48
Nitrogen43
Oxygen	34.52
Ashes	1.77
	<hr/>
	100.00

“ The ashes contained but a trace of alkali, and it is seen that the nitrogen has almost disappeared.

“ From these researches it is plain that, by the quantity of nitrogen, of phosphoric acid, of potash, of magnesia, and of lime, which the hemp takes from the soil, it must be, as experience proves it, a highly exhausting crop; but as the materials so abstracted are not found in the valuable fibre, but in the residual stem, the chaff, and the steeping liquor, all these are available for the purpose of restoring to the soil what had been taken up, and in fact, if it were

possible to carry on the processes of the preparation of the fibre without loss, the same nitrogen and inorganic constituents might, as it would appear from these chemical inquiries and from physiological researches, serve for any number of successive crops of hemp; the fibre alone, generated at the expense of the atmosphere, being sent out and sold, and thus the crop be absolutely deprived of all exhausting quality to the soil.

“ Dr. Kane’s inquiries regarding the flax plant were of a precisely similar character to those described already in the case of hemp, and have led him to similar conclusions affecting the practical culture of this important plant. The general results of his analyses are as follows :

Stem of flax dried at 212°: the plant had its usual amount of leaves, but the seed vessels had not ripened.

Carbon	38.72
Hydrogen	7.33
Nitrogen56
Oxygen	48.39
Ashes	5.00
	<hr/>
	100.00

“ There is a great difference here shown between the composition of the plants of hemp and flax, though they resemble each other so much in their uses. The hemp contains a large amount of nitrogen, the flax very little. The hemp contains more oxygen than would form water with the hydrogen. Flax, on the contrary, contains an excess of hydrogen. The difference is also remarkable in the composition of the ashes.

“ The ashes of the flax plant consist of

Potash	9.78
Soda	9.82
Lime	12.33
Magnesia	7.79
Alumina	6.08
Silica	21.35
Phosphoric acid	10.84
Sulphuric acid	2.65
Chlorine	2.41
Carbonic acid	16.95
	<hr/>
	100.00

The great quantity of lime which characterized the hemp here disappears, and the peculiar quality of the ash is the presence of soda and potash in equal quantities, much magnesia, and especially the large proportion of phosphoric acid. Dr. Kane has not met with any analysis of the ash of a plant yielding the same amount of phosphoric acid, and hence the exceedingly exhausting power of the flax crop is easily understood.

“ Dr. Kane notices in this ash of flax, that the potash, soda, sulphuric acid, and chlorine are in a very simple relation to each other, the numbers given above coinciding closely with those of two atoms each of sulphuric acid and chlorine, six of potash, and nine of soda. So that if (in the ash) all the soda be taken as carbonate, the potash will be divided equally among sulphuric, muriatic, and carbonic acids. Dr. Kane thinks that this simplicity is probably accidental, but suggests it for attention in subsequent analyses of flax ashes from other localities.

“ The steeping of flax to loosen the coat of fibrous bark is accompanied by the solution of certain constituents of the plant, as in the case of hemp. The extract of the steeping water was analyzed; it yielded, dried at 212°,

Carbon	30.69
Hydrogen	4.24
Nitrogen	2.24
Oxygen	20.82
Ashes	42.01
	<hr/>
	100.00

“ The organic part of this extract consisted therefore of

Carbon	52.93
Hydrogen	7.31
Nitrogen	3.86
Oxygen	35.90
	<hr/>
	100.00

“ Here, as in the case of hemp, the nitrogen of the plant is concentrated, but the total quantity of nitrogen is not half so great. In the ash of the extract, as in the case of hemp, the soluble alkaline matters also preponderate. The ashes of the plant yielded 33.90 per cent. of matters soluble in water; whilst the ashes of the flax-steep extract yielded 60 per cent. of matters soluble in water. The flax-steep is therefore rich in all the materials necessary to produce

a new generation of plants; and Dr. Kane stated, as a satisfactory confirmation of the views put forward in his memoir, that in many instances where agriculturists have sprinkled land with the water in which flax has been steeped, they have found it a most active manure.

“ After the flax fibre has been removed from the rotted stem, the residue, or chaff, was found to be composed as follows :

Carbon	50.34
Hydrogen	7.33
Nitrogen24
Oxygen	40.52
Ashes	1.57
	<hr/>
	100.00

This is almost identical in composition with the residual hemp stem, and may therefore be applied to the same uses. Restored to the soil with the steep water, it should give back all that the crop of flax had taken from the grounds, and thus the valuable fibre being generated by the atmosphere, the great source of expense in the cultivation of the plant might be removed.

“ Dr. Kane finally placed before the Academy certain tables, in which, taking the average quantity of produce from a statute acre of fibre crops and of food crops, and comparing, from the data supplied by the analyses of Sprengel, Boussingault, and his own, the weights of materials of which the soil is exhausted by each crop, it appeared that the fibre crops were actually more exhausting than the food crops; whilst the agriculturist profits by the materials that the food crops take out of the ground, and the substances taken up by the fibre crops from the soil are at present actually rejected as waste and valueless. Hence it is, as Dr. Kane considers, of much interest to the agricultural industry of Ireland that the views of economizing the residues of the preparation of flax and hemp, put forward in his memoir, be tested by practical men, as, if they be found correct, and that those residues may be applied with success to prepare and fit the soil for another crop, those fibrous plants will be practically deprived of their exhausting qualities, and the greatest disadvantage, under which their extensive cultivation in this country labours, may be removed.”

THE END.

CULTURE OF FLAX—IMPORTANT DISCUSSION.

One of the most practical features connected with the annual meeting was a discussion "On the growth of flax, and the best method of preparing the seed as food for cattle." This discussion took place on Tuesday morning, in the Town-hall, St. Nicholas-street. Several of the leading agriculturists of the county were present.

The Earl of HANZWOON, President of the Society, occupied the chair.

Professor JOHNSTON introduced the subject of the discussion, in a long and able discourse. He said before they commenced the treatment of the subject which the Council had selected for discussion, he might be allowed to state what were his views in regard to the object and purpose for which they were assembled. Probably some of them had been to the meeting at Northampton, and attended to the lectures delivered there. He himself had no share in those public meetings, and therefore was more ready to listen to what other persons had to observe in regard to the matters discussed. It appeared to him that the object of such meetings and discussions was not to find out one or two things to which they might object in the speech of the person who addressed them, and draw from them a sweeping condemnation of the principles advanced, but rather that they should come to hear something that they had not heard before—to pick up some grains of information useful to them all. He did not state this with any view to procure indulgence for his own observations, because they were always received in these assemblages with the greatest indulgence; but there were others not so accustomed as he was to public speaking, and therefore entitled to some consideration. He hoped that whatever might transpire at these proceedings, they would go away forgetting any thing that was objectionable, and remembering any thing that was useful. The importance of the cultivation of flax to the manufacturing industry of Great Britain and Ireland was becoming daily more and more apparent. The value of flax, too, as our agricultural crop, yielding a good return, made it of much importance; and, in affording employment to the people, flax exceeded all other crops, for proof of which he referred them to the books published by Mr. Warner, Mr. Dixon, and the Irish Flax Society. It was important in a national point of view, as supplying the raw material of one branch of our manufactures. That animosity which formerly existed between the agricultural interests was becoming day by day less and less, and nothing was more calculated to encourage this good understanding than the effect of our being able to raise sufficient flax for our own use. The saving to this country would exceed six millions annually, which was the amount now paid to foreigners for flax, seed, and oil; and if this six millions were devoted to the encouragement of the manufacturer, the prosperity of the farmer, and the comfort of the labourer, it was obvious the cultivation of flax would be very beneficial to this country. He should now address himself to one or two objections which were made to the cultivation of flax. The first was, that flax cultivation would abstract too much land from the growth of corn. Now if one was bound to produce all that the country required, we should be badly clothed and fed; and if, again, they considered that the farmer held land by which he had to live, they would probably concede that he would make the best use of that land which his knowledge and means enabled him to do. A child required leading strings and swaddling clothes; but the young man who was about to start in the world must have his hands at liberty and his energies unfettered. So it was with the farmer. He must be free. He ought to be able to till his ground so as to produce the greatest amount of remuneration. He would, however, make one reserve, and here he would repeat to them a passage in a book he had published some time since. It was, "The object of a practical farmer is to raise from a given extent of land the largest quantity of the most valuable produce at the least cost, in the shortest period of time, and with the least permanent injury to the land." In this passage he thought the interest of the farmer was clearly pointed out, while the interest of the land owner was marked with equal distinctness; and its having been frequently quoted and adopted by writers and speakers, was a proof of its correctness. That being the case, that the land should be cultivated with the greatest profit to the farmer and the least injury to the land, there arose two questions,—If a given crop was so cultivated by the farmer as to injure the land, the landowner had a right to take it from him; but a landlord should rather instruct the farmer in the growth of a crop than prohibit its growth. Many years ago there was not one lease without a clause in it prohibiting the growth of

JAMES

DUBLIN.

The

By THE
Model

A May

By THE

Dogs :

Their Or
to their
12 Illust

Domest

Their Na
Author of

The L

How can
&c. 12m

The P

And its P

"What

A few His
Earl of Cl
Galway.

Irish G

In a Series
various Ro
THOMAS

A Trea

By EDMU
sewed; 1s.

The Ir

Containing
Gardening
and Gard

flax. A better spirit had, however, risen up, and the landowners acted more wisely in adopting the course this Society was pursuing—diffusing more knowledge, knowledge which showed that the farmer whose land was best cultivated had not only done the best for the landowner but for his own interests; and the time would come when all such prohibitory clauses as he had referred to would be done away with, and when science and practical farming would teach both landowner and farmer that the best system for one was the best for both. (Applause.) The second objection, that flax cultivation would not only abstract land from the growth of corn but would diminish the quantity of manure, he would next advert to. This was true; and the reason of it was, that in the growth of flax the seed, stem, root, and everything, were pulled up and taken away. With corn it was different, as the straw, which formed a considerable bulk of the produce, was returned to the ground in the shape of manure. Flax, therefore, was an exhausting crop. Common sense and experience had taught this. Some crops might be better after such crops—there might be a fine crop of wheat after flax, but still, in the long run, the exhausting effects of flax would manifest themselves. Now with regard to the rapidity and degree of exhaustion, this depended on a variety of circumstances—first, there was the condition of the soil; secondly, the rotation adopted would materially affect the rapidity of exhaustion; and, thirdly, there was the amount of waste in connexion with this crop. As to the soil, it was a question which had engaged the attention of the Flax Improvement Society, in Ireland, which kind of soil was best adapted for flax; and in order to obtain data, they had sent over persons to Belgium, and one of those persons was here to-day to tell them what were the facts he had collected. That society had obtained samples of soil from Belgium, from Ireland, and from the neighbouring county of Lincoln, and the Isle of Axholme, where flax was grown, for the purpose of analysing them and selecting the best for the growth of the crop. In his opinion, it did not matter much what soil they took, provided the mechanical conditions were such as were suited to the growth of this crop. He had seen flax growing upon so many soils that he thought they must arrive at the conclusion that there was no soil which could not be brought into the condition requisite for its growth. He had seen it in Ireland and Lincolnshire, and he had seen it growing upon peaty soils, and in Scotland and other parts it was found to grow well upon such soils. It was also found to grow well upon sandy soils, and in Belgium sandy soils were the best fitted for its cultivation. Professor Johnston here referred to an analysis of different soils, and pointed out that those of Belgium and Holland were best adapted to the growth of flax, and that they were light sandy soils; and if, therefore, they selected soils similar they would find them the best. He believed that the experience of the flax growers in this country and in Ireland did not agree with that. They knew that the skill of the Flemish husbandmen consisted not in the application of improved implements and mechanical industry, but depended on the mode in which they managed their manure, in proper seasons, in proper times, and in proper quantities. That was almost the whole of the skill which they possessed. We had stiff soils to contend with, we had climate to contend with, and twenty other contingencies which the Flemish farmer had not to contend with. He did not lay great stress, therefore, upon the analysis which had been laid down, but he thought much dependence was to be put upon the experience of the Flax Society of Ireland; that experience was, that the best qualities of flax grew upon stiff loamy soils resting upon clay soils. It was a matter for them to know that the quality and condition of the soil had very much to do with the rapidity with which it was exhausted. It was true of all our crops that upon whatever soil they were grown their effect upon the land depended very much upon the nature of the soil. The waste of the different parts of the plants that were allowed to take place was a point that very materially affected the rapidity of exhaustion, and it was here that the main gist of this question arose. In the case of flax the stem was carried off and the root was entirely pulled up and also carried away. This was not the case in the ordinary crops produced in this country, as for instance, corn crops, of which the roots and a portion of the straw were always left on the land. After noticing some experiments by Sir Robert Kane, with a view to ascertain how the exhaustion produced by growing flax might be diminished by irrigation with water in which the flax had been steeped and other means, Professor Johnston observed that the practical difficulties were such

TERS.

lent of the National

to Instructions as
atic Fowl," with

J. RICHARDSON,
Illustrations, 1s.

Small Farmers,"

Estates of the
Mercuria, County

scription of the
Climate. By
sewed.

secs. 12mo, 1s.

Land—Cottage
RYAN, Steward



SOUTHAMPTON UNIVERSITY LIBRARY

Date of Issue

--	--	--	--





MEMORANDUM

FOR THE RECORD

MEMORANDUM

FOR THE RECORD

MEMORANDUM

FOR THE RECORD

MEMORANDUM

FOR THE RECORD

MEMORANDUM

FOR THE RECORD

MEMORANDUM

FOR THE RECORD

MEMORANDUM

FOR THE RECORD