

cultivated this by itself for seed in tolerably good land, and after some time I found it matted so much by its creeping roots as to become quite unproductive both of herbage and seed. Care should therefore be taken that only a proper portion of this be introduced. The seeds of this and *Poa trivialis* are the same in bulk, and probably the same proportion should be adopted. The seeds of both species hang together by a substance like to cobwebs, when thrashed, and require to be rubbed either in ashes or dry sand to separate them before sowing.

SECT. II.—ARTIFICIAL GRASSES*.

UNDER this term are included such plants as are sown for fodder, either with a view to form permanent pastures when mixed with the grasses, or as intermediate crops on arable land. In those cases they are usually sown with a spring crop of Oats or Barley, and the artificial grasses are protected after the harvest by the stubble left on the ground, affording the succeeding season a valuable crop, either for pasturage or hay.

40. *ACHILLEA Millefolium*. YARROW.—This has been much recommended for sheep feed; but I observe it is frequently left untouched by them if other green herbage is found on the land. It will thrive in almost any soil, but succeeds best in a good loam. The seed used is about twelve pounds per acre.

41. *ANTHYLLIS vulneraria*. KIDNEY VETCH.—This plant is not in cultivation, but it has been noticed that where it grows naturally the cows produce better milk and in greater quantity. It grows best in calcareous soils: the seeds are large, and easily collected. This plant well deserves attention.

42. *CICHORIUM Intybus*. CICHORY, or BLUE SUCCORY.—Much has been said of the good properties of this plant; and if it has them to the full extent mentioned by different authors, I wonder there is not little else than Cichory grown in this country. It is very prolific, and will grow extremely quick after the scythe during the summer months: but I fear, from the observations I have made, that it does not possess the fattening quality it is said to have. The plant is so extremely bitter, that although cattle may be inclined to feed on it early

* This technical term is generally known to farmers. It is applied to Clovers, and such plants as usually grow in pastures, and not strictly Gramina.

in the spring, yet as the season advances and other herbage more palatable is to be met with, it is left with its beautiful blue flowers and broad foliage to rob the soil and adorn our fields, to the regret of the farmer. It grows wild in great abundance in Battersea Fields, where my late friend Mr. Curtis used ludicrously to say that *bad husbandry* was exhibited to perfection. This plant is there continually seen in the greatest abundance, where the ground has not been lately disturbed, even under the noses of all the half-starved cattle of that neighbourhood that are turned in during the autumn.

The root dried and ground to a powder will improve Coffee, and is frequently drunk therewith, especially in Germany, where it is prepared in cakes and sold for that purpose.

43. *HEDYSARUM Onobrychis*. SAINT-FOIN.—This is certainly one of the most useful plants of this tribe, and in the south of England is the life and support of the upland farmer: in such places it is the principal fodder, both green and in hay, for all his stock. I have not observed it to be cultivated in Worcestershire or Herefordshire, where there appears to be much land that would grow it, and which is under much inferior crops. The seed sown is about four bushels per acre. A mistake is often made in mentioning this plant. The newspapers, in quoting prices from Mark Lane, call it *Cinquefoil*, a very different plant, (*Potentilla*) of rather a noxious quality. See *Gleanings on Works of Agriculture and Gardening*, p. 88, where a curious blunder occurs of this kind.

44. *LATHYRUS pratensis*. MEADOW VETCHLING.—Abounds much in our natural meadows, particularly in the best loamy soils, where it is very productive and nutritious. It is not in cultivation, for the seeds do not readily vegetate; a circumstance much to be regretted, but unfortunately the case with several of our other Tares, which would otherwise be a great acquisition to our graziers.

45. *LOTUS corniculatus*. BIRD'S-FOOT-LOTUS.—There are several varieties of this plant; one growing on very dry chalky soils, and which in such places helps to make a good turf, and is much relished by cattle. The other varieties grow in marshy land, and make much larger plants than the other. Here it is also much eaten; and I have also noticed it in hay, where it appears to be a good ingredient. As it thus appears to grow in any situation, there is no doubt, if the seeds were collected, that it might be cultivated with ease, and turn to good account in such land as is too light for Clover. In wet and boggy situations it becomes very hairy, and in this state its appearance is very different from that which it has when growing in chalk, where it is perfectly smooth.

This plant should not be overlooked by the experimental farmer.

It is very highly spoken of in Dr. Anderson's *Essays on Agriculture*, under the mistaken name of *Astragalus glycyphyllos*, p. 489; but a

truly practical account is given of it by Ellis in his *Husbandry*, p. 89, by the old name *Lady-Finger-Grass*.

46. *MEDICAGO falcata*. YELLOW MEDIC.—Is nearly allied to Lucerne, and is equally good for fodder; it will grow on land that is very dry, and hence is likely to become a most useful plant; its culture has, however, been tried but partially. Some experiments were made with this plant by Thomas Le Blanc, Esq., in Suffolk, which are recorded by Professor Martyn. *Martyn's Miller's Dict. art. Medicago*.

47. *MEDICAGO polymorpha*. VARIABLE MEDIC.—This is also a plant much relished by cattle, but is not in cultivation: it is an annual, and perhaps inferior in many respects to the Nonsuch, which it in some measure resembles. There are many varieties of this plant cultivated in flower gardens on account of the curious shapes of the seed-pods, some having a distant resemblance to snails' horns, caterpillars, &c. under which names they are sold in the seed-shops. It grows in sandy hilly soils; the wild kind has flat pods.

48. *MEDICAGO sativa*. LUCERNE.—Too much cannot be said in praise of this most useful perennial plant: it is every thing the farmer can wish for, excepting that it will not grow without proper culture. It should be drilled at eighteen inches distance, and kept constantly hoed all summer, have a large coat of manure in winter, and be dug into the ground between the drills. Six or seven pounds of seed will sow an acre in this mode.

I have known Lucerne sown with Grass and Clover for forming meadow land; but as it does not thrive well when encumbered with other plants, I see no good derived from the practice. No plant requires, or in fact deserves, better cultivation than this, and few plants yield less if badly managed.

49. *MEDICAGO lupulina*. TREFOIL, or NONSUCH.—A biennial plant, very usefully cultivated with Rye-grass and Clover for forming artificial meadows. Trefoil when left on the ground will seed, and these will readily grow and renew the plant successively; which has caused some persons to suppose it to be perennial. About eight or ten pounds of seed are usually sown with six or eight pecks of Rye-grass for an acre, under a crop of Barley or Oats.

50. *PLANTAGO lanceolata*. RIB-GRASS.—This is a perennial plant, and very usefully grown, either mixed with grasses or sometimes alone: it will thrive in any soil, and particularly in rocky situations. It is much grown on the hills in Wales, where by its roots spreading from stone to stone it is often found to prevent the soil from being washed off, and has been known to keep a large district fertile which would otherwise be only a bare rock. Sheep are particularly fond of it. About four

pounds sown with other seeds for pasture, will render a benefit in any situation that wants it. Twenty-four pounds is usually sown on an acre when intended for the sole crop, and sown under corn.

51. *POTERIUM Sanguisorba*. BURNET.—This plant grows in calcareous soils, and is in some places much esteemed. On the thin chalky soils near Alresford in Hampshire, I have observed it to thrive better than almost any other plant that is cultivated. Sheep are particularly fond of it; and I have heard it said that the flavour of the celebrated Lansdown mutton arises from the quantity of Burnet growing there. It is also the favourite food of deer. This will grow well in any soil, and there are few pastures without it but would be benefited by its introduction. Twenty-five pounds per acre are sown alone: eight pounds mixed with other seeds would be sufficient to give a good plant on the ground.

52. *SANGUISORBA officinalis*. GREAT CANADA BURNET.—Cattle will eat this when young; and it has been supposed to be a useful plant, but I do not think it equal to Burnet.

It is perennial, and is often found wild, but has not yet been cultivated.

53. *TRIFOLIUM pratense*. RED CLOVER.—This is a very old plant in cultivation, and perhaps, with little exception, one of the most useful. It is very productive and nutritive, but soon exhausts the soil; and unless it is in particular places it presently is found to go off, which with the grazier is become a general complaint of all our cultivated Clovers. It is also well known, that if the crop is mown the plant is the sooner exhausted.

Seeds of Clover have the property of remaining long in the ground after it has become thus in a manner exhausted; and it frequently occurs that ashes being laid on will stimulate the land afresh, and cause the seeds to vegetate; which has given rise to the erroneous opinion with many persons, that ashes, and particularly soap ashes, will, when sown on land, produce Clover.

Red Clover is usually cultivated in stiff clays or loamy soils; and when sown alone, about sixteen or eighteen pounds of seed are used for the acre.

54. *TRIFOLIUM medium*. ZIGZAG, or MOUNTAIN-CLOVER.—Is in some degree like the preceding; it produces a purple flower, and the foliage is much the same in appearance; but this is a much stronger perennial, and calculated from its creeping roots to last much longer in the land. It is equally useful as a food for cattle, and does not possess that dangerous quality of causing cattle to be *hove*, or *blown*, by eating it when fresh and green. This plant is, however, only to be met with in upland pastures, and there in its wild state; for it does not seed very abundantly, and is not in cultivation.

In the London seed-markets we often hear of a species of red Clover termed Cow-grass, and it generally sells for more money, and is said to differ in having the characters ascribed to it of this plant, namely, a hollow stem; the leaves more sharply pointed; the plant being a stronger perennial, and having the property of not causing the above-mentioned disorder to cows that eat of it. It is said to be cultivated in Hampshire, from whence I have often received the seeds which have been purchased purposely for the experiment; but on growing them, I never could discover these differences to exist. It is a circumstance worthy notice, that the very exact character of the *Trifolium medium* should thus be said to belong to the supposed variety of red Clover. I have endeavored for the last twenty years to find out the true Cow-grass, and am of opinion that it has been from some cause mistaken for this plant.

The *Trifolium medium* is, at all events, a plant well worth attention, and I think it might be easily brought into cultivation; for although it does not seed so abundantly as the *T. pratense*, I have observed it in places where a considerable quantity has been perfected, and where it might have been easily collected by gathering the capsules.

55. *TRIFOLIUM repens*. DUTCH CLOVER.—This is not so robust a plant as either of the former kinds, but it creeps on the ground and forms a fine bottom in all lands wherever it occurs, either cultivated or wild. This has not the property of *blowing* the cattle in so great a degree as the other sorts have. This disease is said to be accelerated by clover being eaten whilst the dew is on it: and when green clover is intended to be used as fodder, it is always best to mow it in the heat of the day, and let it lie till it is withered, when it may be given to cows with safety.

Clover seeds of all kinds are necessary ingredients in laying down land to pasture; and the usual quantity is about twelve pounds per acre mixt in proportion at the option of the grower.

This kind remains longer in light soils than the red does; but although both are perennial plants, they are apt to go off, for the reason pointed out under the head of *T. pratense*. This plant, as well as the *T. medium* and other perennial kinds, is sometimes found in old pastures on loamy soils; and whenever this is the case, it is a certain indication of the goodness of the soil, and such as a judicious gardener would make choice of for potting his exotic plants in, as he may rest assured that the soil which will maintain clover for a succession of seasons will be fit loam for such purposes.

56. *TRIFOLIUM procumbens*. YELLOW SUCKLING.—An annual very like the Nonsuch; it is a very useful plant, seeding very freely in pastures and growing readily, by which means it is every year renewed, and affords a fine bite for sheep and cattle. I have now and then seen the seeds of this in the shops, but it is not common. There is a gentleman who cultivates this plant very successfully near Horsham, and

who, I am informed, states it to be the best kind of Clover for that land. It grows very commonly amongst the herbage on Horsham Common, so that it is probably its native habitat. The seeds are the smallest of all the cultivated Clovers, and of course less in weight will be necessary for the land.

57. *TRIFOLIUM ochroleucum*. YELLOW CLOVER.—This is not a common plant, but it deserves the attention of the grazier. I believe it is not in cultivation. In the garden it stands well, and is a large plant. The herbage appears to be as good as that of any other kind of Clover, and it might, if introduced, be cultivated by similar means.

58. *TRIFOLIUM agrarium*. HOP TREFOIL.—This is also a good plant, but not in cultivation; it is eaten by cattle in its wild state, is a perennial, and certainly deserves a trial with such persons who may be inclined to make experiments with these plants.

Buffalo Clover is a kind similar to *Trifolium agrarium* and *Trifolium repens*, and appears to me to be a *hybrid plant*. This has been sometimes sent to this country from America, and is a larger plant than either. It has, however, as far as I have grown it, the same property of exhausting the soil as all the other species possess, and is soon found to go off: it is not in cultivation to any large extent.

59. *VICIA Cracca*. TUFTED VETCH.—Persons who have most noticed this plant have imagined it might be introduced into cultivation. It is hardy, durable, nutritious, and productive; but, like the Yellow Vetchling, the seeds do not readily vegetate; the only way to cultivate it, therefore, would be by planting out the roots; which might be done, as they are easily parted and are to be procured in great plenty in the places where it grows wild.

60. *VICIA sativa*. VETCHES, FETCH, or TARE.—A very useful and common plant, of which we have two varieties known to the farmer by the name of Spring and Winter Tares: they are both annuals. The spring variety is a more upright growing plant, and much tenderer than the other: it is usually sown in March and April, and affords in general fine summer fodder.

The Winter Tares are usually sown at the wheat seed-time, remain all winter, and are usually cut in the spring, generally six weeks before the spring crop comes in. The Winter Tares are now considered a crop worth attention by the farmers near London, who sow them, and sell the crop in small bundles in the spring at a very good price. Tares are usually sown broadcast, about three bushels and a half to the acre. Persons should be careful in procuring the true variety for the winter sowing; for I have frequently known a crop fail altogether by sowing the Spring Tares, which is a more tender variety, at that season. It should be noticed that the seeds of both varieties are so much alike that the kinds are not to be distinguished; but the plants are easily

known as soon as they begin to grow and form stems; the Spring kind having a very upright habit, and the Winter Tares trail on the ground. It is usual for persons wanting seeds of such to procure a sample; and by growing them in a hothouse, or forcing frame, they may soon be able to ascertain the kinds. Ellis in his Husbandry says, that if ewes are fed on Tares, the lambs they produce will invariably have red flesh.

61. *VICIA sylvatica*. WOOD VETCH.—A perennial plant growing in the shade; it seems to have all the good properties in general with the other sorts of Tares; but is not in cultivation.

62. *VICIA sepium*. BUSH VETCH.—Is also a species much eaten by cattle in its wild state, but has not yet been cultivated: it nevertheless would be an acquisition if it could be got to grow in quantity.

So much having been said of the different kinds of Tares, perhaps some persons may be inclined to think that it would be superfluous to have more in cultivation than one or two sorts. To this I would beg leave to reply, that they do not all grow exactly in the same situations wild; and if they were cultivated, some one of them might be found to suit in certain lands better than others; and perhaps we never shall see our agriculture at the height of improvement, till by some public-spirited measure all those things shall be grown for the purposes of fair comparative experiment—an institution much wanted in this country.

HINTS AS TO THE LAYING DOWN LAND TO PERMANENT PASTURE.

HAVING endeavoured to explain as nearly as possible the nature and uses of the plants which are likely to improve our meadows and pastures; I shall proceed to describe the best approved mode of sowing the land, on which depends, in a great measure, the future success of the husbandman's labour.

Under the head *Lolium perenne* I observed the practice of sowing clovers and that grass with a crop of barley or oats, which is intended as an intermediate crop for a season or two, and then the land to be again broken up and used for arable crops. And this is a common and useful practice; for although neither the Clover or Rye-grass will last long, yet both will be found to produce a good crop whilst the land will bear it, or until it is overpowered by the natural weeds of the ground*, which renders it necessary to the farmer to break it up.

I am aware of the difficulty of persuading persons (farmers in par-

* It is not an uncommon opinion amongst farmers, that Rye-grass produces Couch; and this is not extraordinary; for, if the land is at all

ticular) to adopt any new systems; and I have often, when speaking of this subject amongst men of enlightened understandings, been told it would be next to madness, to sacrifice the benefit of a crop of oats or barley when the land is in fine tilth, and whilst we can grow grass seeds underneath it.

"To this I reply, that there is no land whatever, when left for a few months in a state of rest, but will produce naturally some kind of herbage, good and bad; and thus we find the industry of man excited, and the application of the hoe and the weeder continually among all our crops, this being essential to their welfare. I cannot help, therefore, observing how extremely absurd it is to endeavour to form clean and good pasturage under a crop that gives as much protection to every noxious weed as to the young grass itself. Weeds are of two descriptions, and each requires a very different mode of extermination: thus, if annual, as the Charlock and Poppy, they will flower among the corn, and the seeds will ripen and drop before harvest, and be ready to vegetate as soon as the corn is removed; and if perennial, as Thistles, Docks, Couch-grass, and a long tribe of others in this way, well known to the farmer, they will be found to take such firm possession of the ground that they will not be got rid of without great trouble and expense.

"Although the crop of corn thus obtained is valuable, yet when a good and permanent meadow is wanted, and when all the strength of the land is required to nurture the young grass thus robbed and injured, the proprietor is often at considerable expense the second year for manure, which, taking into consideration the trouble and disadvantage attending it, more than counterbalances the profit of the corn crop.

"To accomplish fully the formation of permanent meadows, three things are necessary: namely, to clean the land, to procure good and perfect seeds adapted to the nature of the soil, and to keep the crop clean by eradicating all the weeds, till the grasses have grown sufficiently to prevent the introduction of other plants. The first of these matters is known to every good farmer,—the second may be obtained,—and the third may be accomplished by practising the modes in which I have succeeded at a small comparative expense and trouble, and which is instanced in a meadow immediately fronting Brompton Crescent, the property of Angus Macdonald, Esq. which land was very greatly encumbered with noxious weeds of all kinds: but, by the following plan, the grasses were encouraged to grow up to the exclusion of all other plants; and though it has been laid down more than ten years, the pasturage is now at least equal to any in the county.

"Grass seeds may be sown with equal advantage both in spring and autumn. The land above mentioned was sown in the latter end of August, and the seed made use of was one bushel of Meadow-fescue, and one of Meadow fox-tail-grass, with a mixture of fifteen pounds of white

furnished with this weed, it receives great encouragement under this mode of culture.

Clover and Trefoil per acre; the land was previously cleaned as far as possible with the plough and harrows, and the seeds sown and covered in the usual way. In the month of October following, a most prodigious crop of annual weeds of many kinds having grown up, were in bloom, and covered the ground and the sown grasses; the whole was then mowed and carried off the land, and by this management all the annual weeds were at once destroyed, as they do not spring again if cut down when in bloom. Thus, whilst the stalks and roots of the annual weeds were decaying, the sown grasses were getting strength during the fine weather, and what few perennial weeds were amongst them were pulled up by hand in their young state. The whole land was repeatedly rolled, to prevent the worms and frost from throwing the plants out of the ground; and in the following spring it was grazed till the latter end of March, when it was left for hay, and has ever since continued a good field of grass.

"Several meadows at Rochampton, belonging to the late B. Goldsmid, Esq., were laid down with two bushels of Meadow fescue-grass and fifteen pounds of mixed Clover, and sown in the spring along with one peck and a half of Barley, intended as a shade to the young grasses. The crop was thus suffered to grow till the latter end of June, and then the corn, with the weeds, was mowed and carried off the land; the ground was then rolled, and at the end of July the grasses were so much grown as to admit good grazing for sheep, which were kept thereon for several weeks. It should be observed, that the corn is to be mowed whilst in bloom, and when there is an appearance of, or immediately after rain; which will be an advantage to the grasses, and occasion them to thrive greatly.

"I sowed some fields for the same gentleman in autumn in the same way, and found them to succeed equally well."

The above remarks are part of a communication I gave six years since to the Society of Arts, for which I was honoured with their prize medal; and I have great pleasure in transcribing it*, as I frequently visit the meadows mentioned above, and have the satisfaction of hearing them pronounced the best in their respective neighbourhoods. Thus are my opinions on this head borne out by twelve years experience. Let the sceptic compare this improvement with his pretended advantage of a crop of Barley.

It should be observed that our agricultural efforts are intended only to assist the operations of nature, and that in all our experiments we should consult the soil as to its spontaneous produce, from whence alone we can be enabled to adapt, with propriety, plants to proper situations. The kinds of selected grass-seeds that are at this time to be purchased are few, and consist of *Lolium perenne*; *Festuca pratensis*; *Alopecurus pratensis*; *Dactylis glomeratus*; *Cynosurus cristatus*; with the various kinds of Clovers: and it is not easy to lay down any rule as to the mixture or proportion of each different kind that would best

* See Transactions of the Society of Arts, vol. xxvii. p. 70.

suit particular lands. Attention however should, in all cases, be paid to the plants growing wild in the neighbouring pastures, or in similar soils, and the greater portion used of those which are observed to thrive best.

In certain instances I have mentioned particular quantities of seeds to be mixed with others; but in general I have stated how much it would require to sow an acre with each kind separately; from which a person may form a criterion, when several sorts are used, as to what quantity of each sort should be adopted. Taking into view, therefore, that nothing but a mixture of proper kinds of Grasses, &c. will make good pasturage, and that our knowledge is very imperfect on this head at the present season, we must advise that particular attention be paid to the subject, or little good can be hoped for from all our endeavours.

SECT. III.—FODDER FROM LEAVES AND ROOTS.

THE student in agriculture will find in this department a wide field for speculation, which, although it has been greatly improved during the last century, still affords much room for experiments.

During the last thirty-five years I have had opportunity of observing the great difference in the quantity of cattle brought to one of our largest beast-markets in the south of England; and it is well known that this has increased in a ratio of more than double; and I am informed by a worthy and truly honourable prelate, who has observed the same for twenty-five years previously, that it has nearly quadrupled. I have also made it my business, as a subject of curiosity, to inquire if the increase at other markets has been the same, and from all accounts I am convinced of the affirmative. Now as we have ample proofs from the statistical accounts of our husbandry, that less corn has not been grown in the same period, we shall naturally be inclined to give the merit of this increase to the introduction of the Turnip husbandry, which, although it is now become so general, is, comparatively speaking, but in its infancy; and it is from that branch of our agriculture that has sprung the culture of the great variety of fodder of the description which I am now about to explain.

And here it may not prove amiss to observe to the botanical student, should he hereafter be destined to travel, that by making himself thus acquainted with the nature of such vegetables, he may have it in his power to render great benefit to society by the introduction of others of still superior virtues, for the use both of man and the brute creation. When Sir Walter Raleigh undertook his expedition to South America, the object of which failed, he had the good fortune from his taste for botany to render to his country, and to the world at large, a more essential service, by the introduction of one single vegetable, than