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PLANTS USEFUL IN AGRICULTURE.

OBSERVATIONS ON THE CULTURE OF GRASSES, AND ON SAVING SEEDS, &c.

It is now fifty years since the celebrated Stillingfleet observed, "that it was surprising to see how long mankind had neglected to make a proper advantage of plants, of so much importance to agriculture as the Grasses, which are in all countries the principal food of cattle." The farmer, for want of distinguishing and selecting the best kinds, fills his pastures either with weeds or improper plants, when by making a right choice he would not only procure a more abundant crop from his land, but have a produce more nourishing to his flock. One would therefore naturally wonder, after this truth has been so long published, and that in an age when agriculture and the arts have so much improved, that *Select Seeds* of this tribe of plants are scarcely to be procured.

From the experience I have had on this subject, I find their culture is attended with certain difficulties, which arise not so much from the nature of the plants, as from the labour requisite to this purpose, great attention being necessary for saving Grass-seeds at the seasons when the farmer must exert all the strength of his husbandmen to get his other business accomplished.

The only mode by which this can be effected is by selecting a proper soil for the kinds intended to be saved. The seeds should be drilled into the ground at about one foot distance; and care taken that the plants are duly weeded of all other kinds that may intrude themselves, before they get too firm possession of the soil. The hoe should be frequently passed between the drills, in order both to keep the land clean and to give vigour to the young plants. The sowing may be done either in the spring or in the month of September, which will enable the crop to go to seed the following spring. In order to preserve a succession of crops, it is necessary every season to keep the ground clean all the summer months, to dig or otherwise turn up the land between the drills early in

the spring, and to be particular in the other operations until the seeds ripen. Now this business being so inconvenient to the farmer, it is not to be wondered at, that, wherever attempts of this kind have been made, they should fail from want of the necessary care as above stated, without which it is needless to speculate in such an undertaking. There is nevertheless still an opportunity, for any one who would give up his land and time to the pursuit, to reap a rich and important harvest; as nothing would pay him better, or redound more to his credit, than to get our markets regularly supplied with select seeds of the best indigenous Grasses, so that a proper portion of them may be used for forming pasture and meadow-land.

The above hints are not thrown out by a person who wishes to speculate in a theory which is new, but by one who has cultivated those plants himself both for seed and fodder, and who would readily wish to promote their culture by stating a mode which has proved to him a profitable pursuit, and for which he has, already, been honoured with a reward from the Society of Arts.

The following observations are intended to embrace such kinds only as are likely to be cultivated, with those that are distinguished for some particular good properties; as it would be impossible within the limits of this small memorandum to enumerate all the plants that are eaten by cattle. The same mode shall be pursued under all the different heads in this department.

PLANTS USEFUL IN AGRICULTURE.

SECT. I.—GRASSES.

1. *ANTHOXANTHUM odoratum*. SWEET-SCENTED VERNAL-GRASS.—

This is found frequently in all our best meadows, to which it is of great benefit. It is an early, though not the most productive grass, and is much relished by all kinds of cattle. It is highly odoriferous; if bruised it communicates its agreeable scent to the fingers, and when dry perfumes the hay. It will grow in almost any soil or situation. About three pounds of seed should be sown with other grasses for an acre of land.

2. *ALOPECURUS pratensis*. MEADOW FOX-TAIL-GRASS.—

One of our most productive plants of this tribe: it grows best in a moist soil, is very early, being often fit for the scythe by the middle of May. About two bushels of seed will sow an acre, with a proportionate quantity of Clover; which see.

3. *ALOPECURUS geniculatus*. FLOTE FOX-TAIL-GRASS.—

Is very good in water meadows, being nutritive, and cattle in general are fond of it. We do not know if the cultivation of this plant has as yet been attempted.

4. *AGROSTIS capillaris*. FINE BENT-GRASS.—

Dr. Walker, in his History of the Hebrides, speaks very favourably of this grass. I have therefore noticed it here, but I do not think it so good as many others. It grows on the sandy hills near Combe Wood in Surrey, and forms the principal part of the pasturage; but it is neither very productive, nor are cattle observed to thrive on it. The seeds are very small; one peck would sow an acre.

5. *AGROSTIS pyramidalis*. FIORIN *-GRASS.—

No plant has engaged the attention of the farmer more than this grass, none ever produced more disputes, and none is perhaps so little understood. It is perfectly distinct from any species of *Agrostis* indigenous to this country: it is a native of the north-west of Ireland, whence it was some years ago introduced by Dr. Richardson, and to that gentleman's extraordinary account of it we are indebted for numerous mistakes that have been made respecting it. It is an amphibious plant, thriving only in water or wet soils, is very productive, and the stalks after a summer's growth secrete a large quantity of sugar. It has the power, when the stalks are ripe, of resisting putrefaction, and will become blanchd and more

* *Fiorin* is the Irish name of butter.

nutritious by being cut and laid in heaps in the winter season, at which time only it is useful. The cultivator of this plant must not expect to graze his land, but allow all the growth to be husbanded as above; and although it will not be found generally advantageous on this account, it nevertheless may be grown to very great advantage either in wet soils, or where land can be flooded at pleasure.

The seeds are often barren; and the only mode is to plant the shoots or strings in drills at nine inches apart, laying them lengthways along the drills, the ends of one touching the other.

6. *AIRA aquatica*. WATER HAIR-GRASS.—This is an aquatic, and very much relished by cattle, but cannot be propagated for fodder. Water-fowl are very fond of the young sweet shoots, as also of the seeds; it may therefore be introduced into decoys and other places with good effect. Pulling up the plants and throwing them into the water with a weight tied to them, is the best mode of introducing it.

7. *ARUNDO arenaria*. SEA-SIDE REED-GRASS.—This is also of no value as fodder, but it possesses the property of forming by its thick and wiry roots considerable hillocks on the shores where it naturally grows: hence its value on all new embankments. If it be planted in a sandy place, during its growth in the summer the loose soil will be collected in the herbage, and the grass continues to grow and form roots in it; and thus is the hillock increased. Local acts of parliament have been passed, and now exist, for preventing its destruction on the sea-coast in some parts of Great Britain, on this account.

8. *ARUNDO Phragmites*. COMMON REED.—Is useful for thatching, and making slight fences; it grows best in ponds and near streams of water; it does not often seed, but it could easily be introduced to such places by planting its roots in spring: it is a large-growing plant; and where herbage may be wanted either for beauty or shelter for water-fowl, nothing can be more suitable, and the reeds are of great value.

9. *AVENA flavescens*. YELLOW OAT-GRASS.—Is much eaten by cattle, and forms a good bottom. It has the property of throwing up flowerstalks all the summer; hence its produce is considerable, and it appears to be well adapted to pasture. The seeds of this grass are not to be obtained separately; hence it is not in cultivation. It is however worthy of attention, as the seeds are produced very abundantly in its native places of growth. It will grow either in wet or dry soils.

10. *AVENA pubescens*. ROUGH OAT-GRASS.—This appears to have some merits, but the foliage is extremely bitter. It grows in dry soils.

11. *AVENA elatior*. TALL OAT-GRASS.—From the good appearance of this grass some persons have recommended it as likely to be useful for forming meadows; but it is excessively bitter, and is not liked

by cattle generally, though when half starved they are sometimes observed to eat of it. There is a variety of it with knobby roots which is found to be a most troublesome and noxious weed in arable lands, particularly in some parts of the coast of Hampshire where it abounds. This variety was some years ago introduced into the island of St. Kitts, and it has since taken such firm possession of the land as to render a large district quite useless. Persons should be cautious how they speculate with weeds from appearances only.

12. *BRIZA media*. QUAKING-GRASS.—Is common in meadow land, and helps to make a thick bottom; it does not however appear to be worth the trouble of select culture. It is bitter to the taste.

13. *BROMUS mollis*. SOFT BROME-GRASS.—Mr. Curtis has given a very clear account of this grass, which he says predominates much in the meadows near London, but that the seeds are usually ripe and the grass dried up before the hay time: hence it is lost; and he in consequence considered it only in the light of a weed. It has seldom occurred to me to differ in opinion from this gentleman, who certainly has given us, as far as it goes, a most perfect description of our useful grasses: but experience has convinced me that the Soft Brome-Grass, which seeds and springs up so early, makes the chief bulk of most of our meadows in March and April; and although it is ripe and over, or nearly so, by the hay harvest, yet the food it yields at this early season is of the greatest moment, as little else is found fit for the food of cattle before the meadow is shut up for hay, and this plant being eaten down at that season is not any loss to the hay crop. Whoever examines the seeds of this grass will be led to admire how wonderfully it is fitted to make its way into the soil at the season of its ripening, when the land is thus covered with the whole produce of a meadow. I notice this curious piece of mechanism, * not that it is altogether peculiar to this plant, but to show that Nature has provided it means of succeeding in burying itself in the ground, when all the endeavours of man could not sow the land with any other to answer a similar purpose. If the seeds of this grass were collected and introduced in some meadows where it is not common, I am sure the early feeding would be thereby improved.

The seeds are sometimes mixed with those of Rye-grass at market, and it is known by the name of Cocks: it has the effect of reducing such samples in value, but I should not hesitate in preferring such to any other. If any one should be inclined to make the above experiment, two pecks of the seed sown on an acre will be sufficient.—See *Treatise on Brit. Grasses* by Mr. Curtis, edit. 5.

* Many seeds of the grasses are provided with awns which curl up in dry weather and relax with moisture. Thus by change of atmosphere a continued motion is occasioned, which enables the seeds to find their way through the foliage to the soil, where it buries itself in a short time in a very curious manner.

14. *CYNOSURUS cristatus*. CRESTED DOG'S-TAIL-GRASS.—A very fine herbage, and much relished by sheep, &c.; it grows best in fine upland loam, where it is found to be a most excellent plant both for grazing and hay. The seeds are to be purchased sometimes at the seedshops. About twelve pounds will sow an acre.—See *Observations on laying Land to Grass*, in the Appendix to this work.

15. *CYNOSURUS cæruleus*. BLUE DOG'S-TAIL-GRASS.—Dr. Walker states this plant to be remarkably agreeable to cattle, and that it grows nearly three feet high in mountainous situations and very exposed places. As this grass does not grow wild in this part of the country, we have no opportunity of considering its merits. In our Botanic Garden it seldom exceeds the height of ten inches or a foot.

It is the earliest grass of all our British species, being often in bloom in February.

The above intelligent gentleman, who seems to have studied the British Gramina to a considerable extent, says that the following kinds give considerable food to sheep and cattle in such situations; I shall therefore mention their names, as being with us of little esteem and similar to the above.

Phleum alpinum.

Eriophorum polystachion.

Festuca decumbens.

Carex flavescent.

Carex gigantea, probably *Pseudocyperus*.

Carex trigona, probably *vulpina*.

Carex elata, probably *atrata*.

Carex nemorosa, probably *pendula*. And he is of opinion that the seeds may be sown to advantage. Be this as it may, the observation can only apply to situations in the north of Britain, where he has seen them wild; in this part of the island we have a number of kinds much better adapted to soil, climate, and fodder.

16. *DACTYLIS glomeratus*. ROUGH COCK'S-FOOT-GRASS.—Has a remarkably rough coarse foliage, and is of little account as a grass for the hay-stack; but from its early growth and great produce it is now found to be a useful plant, and is the only grass at this time known that will fill up the dearth experienced by graziers from the time turnips are over until the meadows are fit for grazing. Every sheep-farm should be provided with a due portion of this on the land; but no more should be grown than is wanted for early feed, and what can be kept closely eaten down all the season. If it is left to get up it forms large tufts, and renders the fields unsightly, and scarcely any animal will eat it when grown old or when dried in the form of hay. The seed is to be bought; two bushels per acre is sown usually alone.

17. *FESTUCA elatior*. TALL FESCUE-GRASS.—This in its wild state has been considered as a productive and nutritive grass; it grows best

in moist places; but the seeds have been found in general abortive, and the grass consequently only to be propagated by planting the roots, a trouble by far too great to succeed to any extent.—See *Poa aquatica*.

18. *FESTUCA duriuscula*. HARD FESCUE-GRASS.—A very excellent grass both for green fodder and hay, and would be well worth cultivating; but the seeds have not hitherto been saved in any quantity.

I have seen a meadow near Bognor where it formed the principal part of the herbage; and it was represented to me by the owner as the best meadow in the neighbourhood, and the hay excellent*.

The seeds of this grass are small, and about one bushel would sow an acre of ground.

19. *FESTUCA rubra*. RED OR CREEPING FESCUE-GRASS.—A fine grass, very like *duriuscula*; but it is not common in this part of the country; it grows plentifully on the mountains in Wales.

It does not produce fertile seeds with us in the garden.

20. *FESTUCA pratensis*. MEADOW FESCUE-GRASS.—No plant whatever deserves so much the attention of the grazier as this grass. It has been justly esteemed by Mr. Curtis and all other persons practically acquainted with the produce of our meadows. It will grow in almost any soil that is capable of sustaining a vegetable, from the banks of rivulets to the top of the thin-soiled calcareous hills, where it produces herbage equal to any other plant of the kind; and all descriptions of cattle eat it, and are nourished by the food. The plant is of easy culture, as it yields seeds very abundantly, and they grow very readily. I have made some excellent meadows with this seed, which after a trial of ten years are now equal to any in the kingdom. The culture of the seed selected is now nearly lost, which is a misfortune, I had almost ventured to say a disgrace, to our agriculture.

If the farmer could get his land fit for meadow laid down with one bushel of this seed, one bushel of *Alopecurus pratensis*, three pounds of *Anthoxanthum*, and a little *Bromus mollis*, with Clover, I will venture to predict experience will induce him to say, "I will seek no farther."

21. *FESTUCA ovina*.—SHEEP'S FESCUE-GRASS.—This is very highly spoken of in all the dissertations that have hitherto been written on the merits of our grasses; but its value must be confined to alpine situations, for its diminutive size added to its slow growth renders it in my opinion very inferior to the *duriuscula*. In fact, I am of opinion that these are often confounded together, and the merits of the former ap-

* Mr. Curtis observes that this grass grows thin on the ground after a time. I have sometimes observed this to be the case in the Botanic Garden, but it is otherwise in its native state of growth. Nothing stands the dry weather better, or makes a more firm sward.

plied to this, although they are different in many respects. Those who wish to obtain more of its history may consult *Stillingfleet's Observations on Grasses*, p. 384.

22. *FESTUCA vivipara*. VIVIPAROUS FESCUE-GRASS.—This affords a striking instance of the protection that Nature has contrived for keeping up the regular produce of the different species of plants; as when the *Festuca ovina* is found in very high mountainous situations, places not congenial to the ripening seeds of so light a nature, the panicle is found to become viviparous, i. e. producing perfect plants, which being beaten down with heavy rains in the autumn, readily strike root in the ground.

This plant was introduced into our garden many years ago, and still preserves this difference; otherwise it is in all respects the same as the *Festuca ovina*.

23. *FESTUCA pinnata*. SPIKED FESCUE-GRASS.—I have observed this near the Thames side to be the principal grass in some of the most abundant meadows; and as the seeds are very plentiful, I am of opinion it might be very easily propagated: it is, however, not in cultivation at present.

24. *FESTUCA loliacea*. DARNEL FESCUE-GRASS.—This in appearance is very like the *Lolium perenne*, but is a more lasting plant in the ground. Where I have seen it wild, it is certainly very good; but it is liable to the objection of *Festuca elatior*, the seeds grow but sparingly.

25. *HOLCUS lanatus*. YORKSHIRE GRASS, OR MEADOW SOFT-GRASS.—This has been much recommended as fit for meadow land. I am not an advocate for it. It is late in blooming, and consequently not fit for the scythe at the time other grasses are; and I find the lower foliage where it occurs in meadows to be generally yellow and in a state of decay, from its tendency to mat and lie prostrate. I hear it has been cultivated in Yorkshire; hence probably its name. Two bushels of the seed would sow an acre; and it is sometimes met with in our seed-shops. It will grow in any soil, but thrives best in a moist loam.

26. *HOLCUS mollis*. CREEPING SOFT-GRASS.—Mr. Curtis in the third edition of his *Treatise on Grasses* says, he is induced to have a better opinion than formerly of this grass, and that Mr. Dorset also thinks it may be cultivated to advantage in dry sandy soils. I have never seen it exhibit any appearance that has indicated any such thing, and do not recommend it.

27. *HORDEUM pratense*. MEADOW BARLEY-GRASS.—This is productive, and forms a good bottom in Battersea meadows; but although I have heard it highly recommended, I should fear it was much infe-

rior to many others. One species of Barley-grass, which grows very commonly in our sea-marshes, the *Hordeum maritimum*, is apt to render cattle diseased in the mouth, from chewing the seeds, which are armed with a strong bristly awn not dissimilar to the spike of this grass.

28. *LOLIUM perenne*. RAY- or RYE-GRASS.—This has been long in cultivation, and is usually sown with Clover under a crop of spring corn. It forms in the succeeding autumn a good stock of herbage, and the summer following it is commonly mown for hay, or the seed saved for market, after which the land is usually ploughed and fallowed, to clear it of weeds, or as a preparation for Wheat, by sowing a crop of Winter Tares or Turnips. The seed is about six or eight pecks per acre, and ten pounds of Clover mixt as the land best suits. Although this is a very advantageous culture for such purposes, and when the land is not to remain in constant pasture; yet it is by no means a fit grass for permanent meadow, as it exhausts the soil, and presently goes into a state of decay for want of nourishment, when other plants natural to the soil are apt to overpower it. There are several varieties of this grass. Some I have seen with the flowers double, others with branched panicles; some that grow very luxuriantly, and others that are little better than annuals; and there is also a variety in cultivation called PACEY'S Rye-grass, much sought for. But I am of opinion that nothing but a fine rich soil will produce a good crop, and that the principal difference, after all, is owing more to cultivation or change of soil, than to any real difference in the plant itself.

29. *MELICA cœrulea*. BLUE MELIC-GRASS.—This is common on all our heaths; it appears coarse, and not a grass likely to be useful. Yet this kind is spoken of by Dr. Walker under the name of Fly-bent, who says it is one of the most productive and best grasses for sheep-feed in the Highlands of Scotland, where it grows to the height of three feet, a size to which it never attains in this part of the country. It is found in all soils, both in dry sands and boggy places.

30. *PANICUM germanicum*.—GERMAN PANIC, or MOHAR.—I notice this plant here, although it is not a native of this country; neither is it in cultivation. It was introduced some years since by Sir Thomas Tyrwhit from Hungary. It is said there to be the best food of all others for horses; and I think it might be cultivated to advantage on high sandy soils, as a late crop of green fodder. The seeds are similar to Millet*.

31. *PANICUM crus galli*. COCK'S-FOOT-PANIC-GRASS.—This plant has, I believe, never been recommended for cultivation; but it possesses qualities which render it worth attention: it will sometimes grow to the height of four feet, is very fine food for cattle, and will no doubt

* The Hungarian horses are remarked for their sleekness, and it is said that it is in consequence of being fed on Mohar.

make excellent hay. It stands dry weather better than most other grasses I know. The seeds will not vegetate before May, and the crop is not in perfection till late in September. In dry soils I think it could be cultivated to advantage if sown among a crop of Tares or Rye in the autumn; and after they are cut in summer, this would spring up and be a valuable acquisition in a dry autumn, as it would seldom fail producing an abundant crop.

It grows thick, and would tend to clear the land as a smothering crop over weeds: it is annual.

32. *PHALARIS arundinacea*. REED CANARY-GRASS.—This is not in cultivation, but grows plentifully on the muddy banks of the Thames; it will also grow very well in a moderately dry soil; and I have observed that cattle eat it when it is young. As it is early and very productive, as well as extremely hardy, I think it might become valuable as early feed. The seeds of this plant do not readily grow, but it might easily be introduced by planting the roots in the spring. The Striped or Ribbon Grass of the flower garden is only a variety of this. See *Poa aquatica*.

33. *PHLEUM pratense*. TIMOTHY-GRASS, or MEADOW CAT'S-TAIL-GRASS.—Is very coarse and late, and consequently not equal to many of our other grasses either for hay or pasture. It has been highly recommended in America, where it may probably have been found to answer better than it has done with us in cultivation. The seed used to be imported from New York, and met with a ready sale; but I believe it is seldom imported at this time. Dr. Walker says the seeds were taken from South Carolina (where it was first cultivated) to that State, by one Timothy Hanson, from whence it acquired its name.

The same gentleman supposes it may be introduced into the Highlands of Scotland with good effect, but is of my opinion as to its utility in England.—*Rural Economy of the Hebrides*, vol. ii. p. 27.

34. *PHLEUM nodosum*. BULBOUS CAT'S-TAIL-GRASS. (*Phleum pratense* var. γ . *Hudson*).—This affects a drier soil than the Timothy-grass: it grows very frequently in dry thin soils, where it maintains itself against the parching sun by its bulbous roots, which lie dormant for a considerable time, but grow again very readily when the wet weather sets in,—a curious circumstance, which gives us an ample proof of the wise contrivance of the great Author of Nature to fertilize all kinds of soil for the benefit of his creatures here below. There is another instance of this in the *Poa bulbosa*, Bulbous Meadow-grass, which grows on the Steine at Brighton, and which I have kept in papers two years out of ground, and it has vegetated afterwards.

35. *POA annua*. ANNUAL MEADOW-GRASS.—This is the most general plant in nature: it grows in almost every situation where there is any vegetation. It has been spoken of as good in cultivation, and has

had the term Suffolk grass applied to it, from its having been grown in that county. I have never seen it in such states, neither can I say I should anticipate much benefit to arise from a plant which is not only an annual, but very diminutive in size.

36. *POA aquatica*. WATER MEADOW-GRASS.—This is quite an aquatic, but is eaten when young by cattle, and is very useful in fenny countries: it is highly ornamental, and might be introduced into ponds for the same purpose as *Arundo Phragmites*: it might also be planted with *Festuca elatior* and *Phalaris arundinacea*, in wet dug out places, where it would be useful as fodder, and form excellent shelter for game.

37. *POA fluitans*. FLOTE FESCUE-GRASS.—This would be of all others the most nutritive and best plant for feeding cattle; but it thrives only in water. I have noticed it only because it is highly recommended by the editor of Mr. Curtis's *Observations on British Grasses*, 5th edit. The cattle are very fond of it; but it is not to be cultivated, unless it be in ponds, being perfectly aquatic.

Linnaeus speaks of the seeds being collected and sold in Poland and Germany as a dainty for culinary purposes; but I have never seen it used here, neither are the seeds to be collected in great quantities. Stillingfleet, on the authority of a Mr. Dean, speaks highly of its merits in a water-meadow, and also quotes Mr. Ray's account of the famous meadow at Orchiston near Salisbury. There this, as well as *Poa trivialis*, most certainly is in its highest perfection; but the real and general value of grasses or other plants must not be estimated by such very local instances, when our object is to direct the student to a general knowledge of the subject. See Curtis, art. *Poa trivialis*.

38. *POA trivialis*. ROUGH-STALKED MEADOW-GRASS.—Those who have observed this grass in our best watered meadows, and in other low pasture-lands, have naturally been struck with its great produce and fine herbage. In some such places it undoubtedly appears to have every good quality that a plant of this nature can possess; it is a principal grass in the famous Orchiston meadow near Salisbury, and its amazing produce is mentioned in the Bath Agricultural Papers, vol. i. p. 94: but persons should not be altogether caught by such appearances; for I have seen it in some lands, and such as would produce good red Clover, a very diminutive and insignificant plant indeed.

When persons wish to introduce it, they should carefully examine their neighbouring pastures, and see how it thrives in such places. The seeds are small, and six pounds would be sufficient for an acre, with others that affect a similar soil.

39. *POA pratensis*. SMOOTH-STALKED MEADOW-GRASS.—This is also a grass of considerable merit when it suits the soil; it affects a dry situation, and in some such places it is the principal herbage; but I have

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

was ever achieved by all the military exploits performed before or since that period*. It has not only been the means of increasing the wealth and strength of nations, but more than once prevented a famine in this country when suffering from a scarcity of bread-corn, and when most of the ports which could afford us a supply were shut by the ambition of a powerful enemy.

63. *BRASSICA Napus*. TURNIP.—Turnips afford the best feed for sheep in the autumn and winter months. It is usual to sow them as a preparatory crop for Barley, and now very frequently for a crop of Spring Wheat. Turnips are not easily raised but where some kind of manure is used to stimulate the land. In dry seasons the crop is often destroyed by the ravages of a small beetle, which perforates the cotyledons of the plants, and destroys the crop on whole fields in a few hours.

Many remedies against this evil are enumerated in our books on husbandry. The best preventative, however, appears to be the putting manure on the ground in a moist state and sowing the seeds with it, in order to excite the young plant to grow rapidly; for the insect does not hurt it when the rough leaf is once grown. I have this season seen a fine field of Turnips, sown mixt with dung out of a cart and ploughed in ridges. The seeds which were not too deeply buried grew and escaped the fly; when scarcely a field in the same district escaped the ravages of that insect. Turnips are sown either broad-cast or in drills. It takes about four pounds of seed per acre in the first mode, and about half the quantity in the second.

There are several varieties of turnips grown for cattle; the most striking of which are, the White round Norfolk; the Red round ditto; the Green round ditto; the Tankard; the Yellow. These varieties are nearly the same in goodness and produce: the green and red are considered as rather more hardy than the others. The tankard is long-rooted and stands more out of the ground, and is objected to as being more liable to the attack of early frosts. The yellow is much esteemed in Scotland, and supposed to contain more nutriment†. The Stone and Dutch turnips are grown for culinary purposes, and are also sometimes sown after the corn is cleared, as being small and of early growth; these in such cases are called stubble turnips, and often in fine autumns produce a considerable quantity of herbage. For a further account of the culture &c. see Dickson's *Modern Husbandry*, vol. ii. p. 639.

There is nothing in husbandry requiring more care than the saving seeds of most of the plants of this tribe, and in particular of the Genus *Brassica*. If two sorts of turnips or cabbages are suffered to grow and bloom together, the pollen of each kind will be sufficiently mixed to impregnate each alternately, and a hybrid kind will be the produce,

* The Potatoe was introduced by Sir Walter Raleigh, on his return from the River Plate, in the year 1586.

† The usual season for sowing the above varieties is within a fortnight or three weeks after Midsummer.

and in ninety-nine times out of a hundred a worse variety than either. Although this is generally the result of an indiscriminate mixture, yet by properly adapting two different kinds to grow together, new and superior varieties are sometimes produced. One gentleman having profited by this philosophy, has succeeded in producing some fine new varieties of fruits and vegetables, much to the honour of his own talents and his country's benefit*. It is well known to all gardeners that the cabbage tribe are liable to sport thus in their progeny; and to some accidental occurrence of this nature we are indebted for the very useful plant called the

64. ROOTA-BAGA. SWEDISH TURNIP.—Which is a hybrid plant partaking of the turnip and cabbage, and what has within these few years added so much to the benefit of the grazier. This root is much more hardy than any of the turnips; it will stand our winters without suffering injury from frosts, and is particularly ponderous and nutritious.

It is usually cultivated as the common turnip, with this difference, that it requires to be sown as early in some lands as the month of May, it being a plant which requires a longer time to come to maturity.

Every judicious farmer who depends on turnips for foddering his stock in the winter, will do well to guard against the loss sometimes occasioned by the failure of his Turnips from frost and wet. Various ways of doing this are recommended, as stacking &c. But if he has a portion of his best land under Swedish turnip, he will have late in the winter a valuable crop that will be his best substitute. Another advantage is this, that it will last a fortnight longer in the spring, and consequently be valuable on this account. The quantity of seed usually sown is the same as for the common kinds of turnip. There are two varieties of this plant, one white and the other yellow: the latter is the most approved.

65. BRASSICA *Napo Brassica*. KOHLRABBI.—A hardy kind of Turnip cabbage, grown much in Germany for fodder: it is very nutritive, and has the property of resisting frost better than either the turnips or cattle-cabbage. The seed and culture of this are the same as of Drum-head cabbage.

There are two varieties of this plant, the green and the purple; the latter is generally most esteemed.

66. BRUSSELS SPROUTS.—This is a large variety of cabbage, very productive and hardy. The culture the same as for Cattle-cabbage.

67. BRASSICA *oleracea*. DRUM-HEAD CABBAGE.—This is usually sown in March and the plants put out into beds, and then transplanted into the fields; this grows to a most enormous size, and is very profitable. About four pounds of seed is sufficient for an acre.

* See Mr. Knight *On the Apple-tree*.

68. *BRASSICA Rapa*. RAPE.—Is sown about the same time as Swedish turnips, and hoed out for winter feed. The seed of this is valuable for feeding birds, and it is also pressed for oil, which is in demand for various purposes. The quantity of seed the same as turnips.

69. *BRASSICA Napus* var. *CHAUX AU MILLE TETES*.—This is a large variety of the Rape, something similar to the Brussels Sprouts, producing an abundance of green herbage. It was introduced from France some time since; it does not appear to have any merit more than the above plant, which is equally as productive and hardy: another variety called the Chaux de Milan is very similar. It requires the same kind of culture as the Drum-head cabbage.

70. *DAUCUS Carota*. CARROTS.—These are cultivated as a favourite food for horses. The best mode of growing carrots is by drilling them at fifteen inches asunder, by which means they can be kept clean with less trouble than in the broad-cast method; about two pounds will seed an acre; the seed should be well beaten in a bag before it is drilled, which will make it smooth and fit to pass through the hopper. About four pounds will sow an acre broad-cast.

71. *PASTINACA sativa*. PARSNIP.—This is also grown for fodder. The roots yield a good deal in the winter season. There is however a difficulty in taking parsnips out of the ground, which renders it a more inconvenient crop than carrots and many other roots equally good and attended with less labour. About four pounds of seed will sow an acre.

72. *SOLANUM tuberosum*. POTATOES.—Of all the plants ever introduced into this country this has been the most beneficial, but it must be remarked that the same prejudice naturally excited against all new things, existed for many years against this.

But a few years since gardeners in their writings directed "that great care should be taken in clearing the ground of this root, for it was of less account than any other, and if suffered to remain and not dug out clean, was likely to become a most troublesome weed." Thus says Bradley in 1739; and Messrs. London and Wise, who planted Hampton Court Gardens, and who published *The Compleat Gardener* in 1699, do not even mention it.

It is now become very common in all parts of the world, and is very generally known as the best of all substitutes for bread.

Many varieties of the Potatoe are now cultivated. The most approved are, the Ox Noble; the Champion; the Red-nosed Kidney; the Black Potatoe; the Apple Potatoe; all these are grown for feeding cattle. The mode of cultivation is by planting the roots in the spring.

SEC. IV.—GRAINS.

73. *AVENA sativa*. COMMON OATS.—A grain very commonly known, of which we have a number of varieties, from the tin old Black Oats to the fine Poland variety and the celebrated Potatoe-Oats.

These give the farmer at all times the advantage of a change of seeds, a measure allowed on all hands to be essential to good husbandry. The culture is various; thin soils growing the black kind in preference, which is remarkably hardy, where the finer sorts affecting a better soil will not succeed. It is applicable both to the drill and broad-cast. The seed is from six pecks to four bushels per acre, and the crop from seven to fourteen quarters.

74. *CARUM Carui*. CARAWAY SEEDS.—The seeds of this are in demand both by druggists and confectioners. It is cultivated in Kent and Essex; where it, being a biennial plant, is sown with a crop of spring corn, and left with the stubble during the succeeding winter, and after clearing the land in the spring is left to go to seed. It requires a good hot dry soil; but although the crop is often of great value, it so much exhausts the land as to be hazardous culture in many light soils where the dunghill is not handy.

The seed is about ten pounds per acre, and the crop often five or six sacks.

75. *CORIANDRUM sativum*. CORIANDER.—Is grown in the stiff lands in Essex, and is an annual of easy but not of general culture. The seeds are used by druggists and rectifiers of spirits, and form many of the cordial drinks.

The quantity of seed and produce are similar to those of Caraway.

76. *ERVUM Lens*. LENTILS.—Once cultivated here for the seeds, which are used for soups; but it is furnished principally from Spain, and can at all times be purchased for less than it can be grown for.

77. *HORDEUM distichon*. COMMON TWO-ROWED BARLEY.—A grain now in very general cultivation, and supposed to be the best kind grown for malting. The season for sowing barley is in the spring, and the crop varies according to soil and culture; it is sown either broad-cast, drilled, or dibbled. The quantity of seed sown is from three pecks to three bushels per acre, and the produce from three to eleven quarters.

As the process of malting may not be generally understood by that class of readers for which this work is mostly intended, I shall give a short sketch of it.—It is a natural principle of vegetation, that every seed undergoes a change before it is formed into the young plant. The substance of the cotyledons, which when ground forms the nutritious flower of which bread is made, changes into two particular substances,

i. e. sugar and mucilage; and whilst mankind form from it the principal staff of life as an edible commodity, the same parts of the seed in barley are by certain means made into malt, which is only another term for the sugar of that grain. To effect this, the barley is steeped in water, and afterwards laid in heaps, in which state it vegetates in a few days, and the saccharine fermentation is by that means carried on to a certain pitch, when it is put on a kila to which a fire is applied, and it is by that means dried. It is then perfect malt, and fit for the purpose of brewing.

Pearl and Scotch Barley, used for soup and medicinal purposes, are made from the grain by being put into a mill, which merely grinds off the husk. The Pearl barley is mostly prepared in Holland, but the Scotch is made near Edinburgh in considerable quantities. A description of an improved Mill for this purpose is to be seen in the Edinburgh Encyclopædia, p. 283.

78. *HORDEUM vulgare*. BERE, BIG, or WINTER BARLEY.—This is a coarser grain than the Two-rowed Barley, and hence it is not so well adapted to the purpose of malting. It is grown on cold thin soils, being much hardier than the former.

It is now often sown in October, and in the month of May or June following it is mown and taken off the land for green fodder. The plants will notwithstanding this produce in August a very abundant crop of grain. Hence this is a valuable mode of culture for the farmer.

The other varieties of Barley are,

79. *HORDEUM hexastichon*. SIX-ROWED BARLEY.—This is also a coarse grain; and although it was once in cultivation here, it has been altogether superseded by the Bere, which is a better kind.

80. *HORDEUM zeocriton*. BATTLEDORE BARLEY.—This is a fine grain, but very tender, and not now in cultivation in this country.

NAKED BARLEY. The two first species sometimes produce a variety which thrashes out of the husks similar to wheat: these are very heavy and fine grain, but they are not in cultivation: for what reason I know not.

81. *PANICUM miliaceum*. MILLET.—Millet is of two kinds, the brown and yellow. They are sometimes sown in this country for feeding poultry, and also for dressing; *i. e.* it is divested of the husk by being passed through a mill, when it is equal to rice for the use of the pastrycook. The seed used is from one to two bushels per acre. This is more commonly grown in Italy, and on the shores of the Mediterranean sea, from which large quantities are annually exported to the more northern countries.

82. *PAPAVER somniferum*. MAW-SEED.—The large white Opium Poppy is grown for seed for feeding birds, and also for pressing the oil,

which is used by painters. The heads are also used by the apothecaries; which see under the head *Medicinal Plants*. About two pounds of seed to the acre.

83. *PHALARIS canariensis*. CANARY-SEED.—This is grown mostly in the Isle of Thanet, and sent to London &c. for feeding canary and other song-birds, and considered a very profitable crop to the farmer. It is sown in April, and the quantity of seed is about one bushel and a half per acre.

84. *PISUM sativum**. THE PEA.—The Gray Hog-pea used to be the only one considered sufficiently hardy for culture in the fields; but since the improvement in our agriculture we have all the finer varieties cultivated in large quantities. The seed used is about two bushels and a half per acre, and the produce varies from three to ten quarters.

The varieties of Peas are many, but the principal ones used in agriculture are the Early Charlton Pea; the Dwarf Marrow; the Prussian Blue. All these are dwarf kinds; and as the demand for this article in time of war is great for the navy and army, if the farmer's land will suit, and produce such as will boil, they will fetch a considerably greater price in proportion.

The varieties that are found to boil are either used whole, or split, which is done by steeping them in water till the cotyledons swell, after which they are dried on a kiln and passed through a mill; which just breaking the husk, the two cotyledons fall apart.

85. *POLYGONUM Fagopyrum*. BUCK-WHEAT.—This is usually sown in places where pheasants are bred, as the seed is the best food for those birds; it is also useful for poultry and hogs. I have eaten bread and cakes made of the flower, which are also very palatable. Two bushels are usually sown per acre. The season is May; and it is often sown on foul land in the summer, as it grows very thick on the land, and helps to clean it by smothering all the weeds. The crop does not stand on the ground more than ten or twelve weeks.

86. *SECALE cereale*. RYE.—This is often grown for a spring crop of

* At the request of Sir John Sinclair I made an experiment, from directions given by a French emigrant, of mixing Pease with urine in which had been steeped a considerable quantity of pigeon's dung. In the course of twenty-four hours they had swoln very much, when they were put into the ground. An equal quantity were steeped in water; and the same quantity also that had not been steeped, were sown in three adjoining spots of land. There was a difference in the coming up of the crops, of some days in each; but that with the above preparation took the lead, and was by far the best crop on the ground. This is an experiment worth attending to. It is usual to prepare wheat in a similar way, but no other grain that I have ever heard of.

green food, by sowing it early in the autumn, as it is very hardy and is not affected by frost. It grows fast in the spring months, and affords a very luxuriant crop of green fodder. Tares and Rye are frequently sown mixed together for the same purpose, and the Tares find a support in the stalks of the Rye, by which means they produce a larger crop than they make by themselves. The grain is the next in estimation to Wheat, and is frequently used for making bread. The quantity sown per acre is the same as Wheat.

87. *SINAPIS nigra*. BLACK MUSTARD.—This is grown in Essex in great quantities for the seeds, which are sold to the manufacturers of flower of mustard, and is considered better flavoured, stronger, and capable of keeping better, than the white kind for such purpose. It is also in use for various medicinal preparations; which see. About two bushels of seed sown broad-cast are sufficient for an acre.

This plant affords another striking instance of the care of Providence in preserving the species of the vegetable kingdom, it being noticed in the Isle of Ely and other places, that wherever new ditches are thrown out, or the earth dug to any unusual depth, the seeds of Black Mustard immediately throw up a crop. In some places it has been proved to have lain thus embalmed for ages.

Flower of mustard, which is now become so common at our tables, and which is an article of very considerable trade, is but a new manufacture. A respectable seedsman who lived in Pall-Mall was the first who prepared it in this state for sale. The seeds of the white sort had been used to be bruised in a mortar and eaten sometimes as a condiment, but only in small quantities.

When used fresh it is weak, and has an unpleasant taste; but after standing a few hours the essential oil unites with the water which is used, and it then becomes considerably stronger, and the flavour is improved. It is prepared by drying the seeds on a kiln and grinding them to a powder. As this article is become of considerable importance from the demand, it has occasioned persons to speculate in its adulteration, which is now I believe often practised. Real flower of mustard will bear the addition of an equal quantity of salt without its appearing too much in the taste. In an old work, *Hartman's Treasure of Health*, I find it to have been practised by a noble lady of that time to make mustard for keeping, with sherry wine with the addition of a little sugar, and sometimes a little vinegar. Query, Is this, with the substitution of a cheaper wine, the secret of what is called Patent Mustard?

88. *TRITICUM æstivum*. SPRING WHEAT.—Wheat is a grain well known in most countries in Europe. It has been in cultivation for many ages. This species was introduced some years ago from the Barbary coast, and has been found very beneficial for sowing in the spring, when it often produces a large crop. It takes a shorter time to come to maturity than the other sorts; and as it is a more pro-

fitable crop to the farmer on good soils than Barley, it is frequently sown after Turnips are over. This has, perhaps, been one of the best improvements in Grain husbandry that was ever introduced, as it gives the grower great advantages which he could not have under the common culture of Wheat at the usual seed-time. This is little different in appearance from the Common White Wheat. But there was a small variety of it with rounder grains sent to the Board of Agriculture from the Cape of Good Hope about the year 1801, of which I saved a small quantity of seeds which was distributed among the members; and I have lately seen a sample of it in the hands of a gentleman in Devonshire, who speaks very highly of it as producing a large crop in a short time, and that the flower was so much esteemed, that the millers gave him a higher price for it than the finest samples at market of the other kinds would sell for. I believe this variety is very scarce. It is now twelve years since I grew it, from which what I saw, and all other in cultivation, if any there are, have sprung.

89. *TRITICUM compositum*. EGYPTIAN WHEAT.—This is a species with branched ears, and commonly having as many as three and four divisions. It is much cultivated in the eastern countries, but has not been found to answer so well in this country as the common cultivated species.

90. *TRITICUM hybernum*. COMMON WHEAT.—Of this grain we have a number of varieties, which are grown according to the fashion of countries, differing in the colour of the ear and also of the grain. The most esteemed sorts are the Hertfordshire White and the Essex Red Wheat, which are both much cultivated and equally esteemed. The season for growing these kinds is usually September and October. The drill, dibble, and broad-cast modes are all used, as the land and convenience of the farmer happen to suit, and the produce varies accordingly; as does also the quantity of seed sown. From two pecks to two bushels and a half are sown on an acre.

Wheat is liable to the ravages of many terrestrious insects which attack its roots; and also to some very curious diseases. One of these has been very clearly elucidated by our munificent patron of science, Sir Joseph Banks, in the investigation* of a parasitical plant which destroys the blood of the stalk and leaves, renders the grain thin, and in some cases quite destroys the crop, which has done that gentleman's penetration great credit. An equally extraordinary disease is the Smut, which converts the farinaceous parts of the grain to a black powder resembling smut: a circumstance too well known to many farmers. Those who wish to consult the remedies recommended against this, may refer to *The Annals of Agriculture*, and most other books on the subject. It is usual with farmers to mix the Wheat with stale urine or brine, and to dry it by sifting it with slaked lime, which has the effect

* Sir Joseph Banks *On the Blight in Corn.*

of causing it to vegetate quickly, and to prevent the attacks of many insects when the seed is first put into the ground. This is considered as productive of great benefit to the crop; but it is also to be remarked, that it is almost the only grain that is ever prepared with this mixture, although it might be applied with equal propriety to all others. See article *Pisum sativum*.

91. *TRITICUM turgidum*. CONE WHEAT.—This a fine grain, and cultivated much in the strong land in the Vale of Evesham, where it is found to answer better than any other sorts. It is distinguished by the square and thick spike, and having a very long arista or beard.

The following sorts of Wheat are mentioned as being in cultivation. But I have not seen them, neither do I think any of them equal to the sorts enumerated above:

Triticum nigrum. Black-grained Wheat.

Triticum polonicum. Polish Wheat.

Triticum monococcon. One-grained Wheat.

Triticum Spelta. Spelt Wheat.

Besides the use of Wheat for bread and other domestic purposes, large quantities are every season consumed in making starch, which is the pure fecula of the grain obtained by steeping it in water and beating it in coarse hempen bags, by which means the fecula is thus caused to exude and diffuse through the water. This, from being mixed with the saccharine matter of the grain, soon runs into the acetous fermentation, and the weak acid thus formed by digesting on the fecula renders it white. After settling, the precipitate is washed several times, and put by in square cakes and dried on kilns. These in drying part into flakes, which gives the form to the starch of the shops.

Starch is soluble in hot water, and becomes of the nature of gum. It is however insoluble in cold water, and on this account when pulverized it makes most excellent hair-powder.

92. *Vicia Faba*. THE BEAN.—Several kinds of Beans are cultivated by farmers. The principal are the Horse-Bean or Tick-Bean; the Early Mazagan; and the Long-pods. Beans grow best in stiff clayey soils, and in such they are the most convenient crop. The season for planting is either the winter or spring month, as the weather affords opportunity. They are either drilled, broad-cast sown, or put in by the dibble, which is considered not only the most eligible mode but in general affording the best crops. The seed is from one to three bushels per acre.

93. *ZEA Mays*. INDIAN CORN, or MAIZE. In warmer climates, as the South of France, and the East and West Indies, this is one of the most useful plants; the seeds forming good provender for poultry, hogs and cattle, and the green tops excellent fodder for cattle in general. I once saw a small early variety, that produced a very good crop, near Uxbridge; but I believe it is not in cultivation.

SECT. V.—MISCELLANEOUS ARTICLES.

94. *CANNABIS sativa*. HEMP.—This plant is cultivated in some parts of this country. It is usually sown in March, and is fit to harvest in October. It is then pulled up and immersed in water; when the woody parts of the stalks separating from the bark, which sloughs off and undergoes a decomposition by which the fibres are divided, it is then combed (*hackled*), dried, and reduced to different fineness of texture, and spun for various purposes. It requires good land, and the seed is usually two bushels and a half per acre.

The seed, which ripens about the time the hemp is pulled, is useful for feeding birds and poultry, and very nourishing.

95. *DIPSACUS Fullonum*. FULLER'S TEAZLE.—The heads of this plant are used for combing kerseymeres and the finer broad cloths. The heads are generally fit to cut about the latter end of August, and are then separated and made up into bundles, and sold to the clothiers. The large heads are called Kings; the next size Middlings; and the smaller Minikins. The reason they are separated before sending to market is, that the large and small will not fit together on the frame in which they are fixed to the water-wheel, so that it is usual for the proprietor of the fulling-mills to purchase all of either one or the other size. The crop is considered very valuable, but the culture is confined to a small district in Somersetshire. The plant is biennial, and is usually sown in May, and the crop kept hoed during that season. In the following spring the plants bloom, and when the seeds are ripe the heads are fit for cutting; when they are assorted as above for the dealers. Three pounds of seed are used to an acre, and the plants at the last stirring are left from two feet to two feet and a half apart.

96. *HUMULUS Lupulus*. THE HOP.—The Hop is cultivated for brewing, being the most wholesome bitter we have, though the brewers are in the habit of using other vegetable bitters, which are brought from abroad and sold at a much cheaper rate. There is, however, a severe penalty on using any other than Hops for such purpose.

The Hops are distinguished by several varieties grown in Kent, Worcestershire, and at Farnham. The last place produces the best kind. For its culture more at length see *Agriculture of Surry*, by Mr. Stevenson.

97. *ISATIS tinctoria*. WOAD.—Is cultivated in the county of Somersetshire. It is used, after being prepared, for dyeing &c. It is said to be the mordant used for a fine blue on woollen. The foliage, which is like Spinach, is gathered during the summer months, and steeped in vats of water. After some time a green fecula is deposited in the bottom of the water, which is washed, and made into cakes and sold for use.

It is a perennial plant, and found wild in great abundance near Guildford, where great quantities might be gathered for use, and where a great deal of the seed could be collected. Its culture is very similar to that of the Teazle, with this difference, it requires the hoe at work constantly all the summer months.

The two plants Weld and Woad from the similarity of names are frequently confounded with each other, and some of the best agricultural writers have fallen into this error. They are two very different plants, and ought to be well defined, being each of them of very material consequence in this country.

98. *LINUM usitatissimum*. FLAX, or LINT-SEED.—Is grown for the purpose of making cloth, and has been considered a very profitable crop. The culture and management is similar to that of Hemp, and the seeds are in great demand for pressing. Lintseed oil, which it produces, is much used by painters, and is the only vegetable oil that is found fit for such purposes in general. The seeds are of several uses to the farmer; a tea is made of it, and mixed with skimmed milk, for fattening house-lambs and calves. Oxen are often fattened on the seed itself; but the cakes after the oil is expressed are a very common and most excellent article for fattening both black cattle and sheep. These are sold at from 10*l*. to 16*l*. per thousand.

It will require three bushels of Flax-seed for one acre, as it must be sown thick on the land. Lintseed cake has been used also for manure; and I have seen fine crops of Turnips where it has been powdered and sown in the drills with the seed.

99. *RESEDA luteola*. DYER'S-WEED, or WELD.—Is often confounded with Woad, but is altogether a very different plant. Weld is cultivated on the chalky hills of Surry, being sown under a crop of Barley, and the second year cleaned by hoeing, and then left to grow till it blooms, when it is pulled and tied up in small bundles, and after drying is sent to market, where it is purchased for dyeing yellow, and is in great request.

100. *RUBIA tinctoria*. Madder.—This very useful dyeing drug used to be grown in this country in considerable quantities, but it is not cultivated here at the present time. The principal part of what is used now is brought from Holland, and affords a considerable article of trade to the Dutch farmers. Those who wish to be informed of the mode of culture may consult Professor Martyn's edition of *Miller's Dictionary*.

Some years since Sir Henry Englefield, Bart., obtained a premium from the Society of Arts for the discovery of a fine tint drawn from Madder, called the Adrianople red. It was found that it was to be obtained from a variety of the *Rubia* brought from Smyrna; and Mr. Smyth, our consul at that city, was prevailed on by Dr. Charles Taylor to procure seeds from thence, which the Society did me the honour of committing to my care; and I have now a considerable stock of that

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kind, from whence I have myself obtained the same beautiful and superior tint. See *Trans. Soc. Arts.* vol. 27, p. 40.

101. *ULEX europæus*. FURZE, GORSE, or WHIN.—Is used in husbandry for fences, and is also much cultivated for fuel for burning lime, heating ovens, &c. Cattle and sheep relish it much; but it cannot be eaten by them except when young, in consequence of its strong spines; to obviate which an implement has been invented for bruising it. When it grows wild on our waste land, it is common to set it on fire in the summer months, and the roots and stems will throw up from the ground young shoots, which are found very useful food for sheep and other animals. It is readily grown from seeds, six pounds of which will be enough for an acre of land.

PLANTS USEFUL IN THE ARTS.

SECT. VI.—BRITISH TREES AND SHRUBS.

102. *ACER Pseudo-Platanus*. SYCAMORE.—The wood of this tree is soft and of little use, unless it is for the turners' purposes, who make boxes and other small toys of it. It is not of value as timber.

103. *ACER campestre*. THE MAPLE.—Before the introduction of Mahogany and other fine woods the Maple was the principal wood used for all kinds of cabinet work, and was much esteemed: the knobs which grow on those trees in an old state afforded the most beautiful specimens, and according to Evelyn were collected by the curious at great prices. The Maple trees in this country are none of them at the present day old enough to afford that fine-veined variegation in the timber which is alluded to in this account.

104. *ARBUTUS Unedo*. THE STRAWBERRY-TREE.—Is a native of the islands in the celebrated Lake of Killarney in Ireland, where it grows to a large size. We know of no particular use to which it is applied. It is however one of our most ornamental evergreen shrubs, producing beautiful flowers, which vary from transparent white to deep red, in the winter months, at which season also the fruit appears; which taking twelve months to come to maturity affords the singular phenomenon in plants, of having lively green leaves, beautiful flowers, and fruit as brilliant as the richest strawberry, in the very depth of our winter. We have a fine variety of this plant with scarlet blossoms, and also one with double flowers, both of which are singularly ornamental to the shrubbery.