blest peasant in the Colony. The process is as simple as it is available to all, and consists of a slit being made in the thick end of the leaf, when it is torn asunder, leaving the inner part exposed, and by then soaking it in salt water, which is never far to reach, in about a week the pulp may be removed by hand and the fibre preserved. No waste whatever is found in this method; and it is understood that a man or woman, or grown boys or girls, may turn out from 50 to 60 pounds of fibre as the result of a day's work. The plan is being adopted throughout the Colony, and what was for some time deemed a missing link is thus effectively supplied.

TROPICAL FODDER GRASSES.

(Reprinted from the Kew Bulletin.)

The selection of suitable grasses for cultivation in tropical countries is a matter of considerable importance. Few countries have completely solved the question. It is evident also that a good deal of time and energy is spent in the effort to introduce foreign grasses, when there are excellent indigenous grasses close at hand. It is proposed to draw attention to a few grasses that have attained to first rank for fodder purposes in the tropics, and to give particulars respecting the conditions under which they have been found to thrive. It is well known that the same kinds of grasses do not succeed equally well in all localities. There are certain conditions and peculiarities of climate and soil to be considered; but there is no reason to doubt that if careful experiment is made suitable grasses can be found for cultivation in almost every tropical country. In some of our colonies it is well known that grass, even for valuable horses, is gathered day by day from waste places and jungles. Such fodder is not only poor in quality, but it is liable to be infected with disease from stray animals. Further, during seasons of drought, the fodder supply is likely to fail altogether. The selection and cultivation of grasses, with particular reference to their grazing qualities, or for the production of hay, should receive more attention, and it will doubtless become, before long, a regular branch of rural industry in the tropics, as it has been for so many years in temperate countries.

Natural Herbage.

In the tropics the difficulty in establishing grasses is caused by the usually rank growth of weeds and bushes. These soon overrun any cleared area, and they have to be continually eradicated, or the grass would be completely destroyed. The natural herbage in most tropical countries would, of itself, form excellent pasture for cattle and horses. There is hardly any part of the world entirely devoid of good grasses, and these should first of all receive attention. Where no suitable fodder grasses are available, then, under such exceptional circumstances, it would be well to introduce the useful "Guinea grass" and "Para grass" for cultivation on land suitable for the purpose. In countries like Ceylon and Jamaica, there are vast stretches of lands, known as "patanas" and "savannahs," where somewhat coarse grasses have established themselves almost to the exclusion of everything else. Even these grasses, although in a fresh state they may be distasteful to cattle, become, after being cut and partially dried, very acceptable food to them. Under cultivation, good pastures can, as a rule, be established by clearing the land of weeds and bushes, and encouraging the spontaneous growth of local grasses from seed carried from neighbouring areas. This is regularly done in Jamaica in regard to Guinea grass. During the first year or two the land requires to be carefully weeded, and if the soil is poor it should also receive a dressing of manure. After the grass has become thoroughly established an annual clearing after the rains is all that is required. It should, however, be understood that continuous feeding is injurious to the permanency of good pastures. The best grasses are thus destroyed, and rank growing ones gradually take their place. Close feeding for a time is advantageous, but the pasture should have time to recover before the animals are again placed upon it. Further, it is better to keep cattle on a portion of the pasture at one time, and not allow them to wander at will over a large area.

Trees in Pastures.

Thwaites recommended that in Ceylon trees should always be planted upon land laid out for permanent pasture. The trees would afford grateful shade to the cattle, and they would prevent the grass from being entirely dried up during seasons of drought. Trees would also add to the beauty of the country. Most extensive pastures dotted over with shade trees exist in Jamaica. Many trees, such as the Saman (*Calliandra Saman*), not only give excellent shade, but the pods are a most wholesome food for cattle. The commoner and more hardy sorts of mango might be planted for the same purpose, as also the Ramoon (*Trophis americana*), the leaves of which afford a very nutritious food for cattle in tropical America; the bread nut (*Brosimum Alicastrum*); the Jack tree (*Artocarpus integrifolia*); and the bastard cedar (*Guazuma tomentosa*). The leaves as well as the fruits of the last are much liked by cattle. This brief list of useful pasture trees might be considerably enlarged. It would be noticed that many of the trees mentioned belong to the natural order, *Urticaceæ*. As the plants belonging to this order are so widely distributed over tropical regions, each country could make its own selection of suitable pasture trees. The best tree of all is, undoubtedly, the Saman. (*Kew Reports*, 1878, p. 18, *et. seq.*)

Grasses for Dry Regions.

Where the climate is moist and humid the selection of suitable grasses presents little difficulty. In countries subject to periods of prolonged droughts the circumstances are wholly different. The great want in such regions is the introduction of grasses that will maintain growth and vigour during many months when no rain falls. Grasses of this kind are to be found in the Bahama grass (*Cynodon Dactylon*), the Kangaroo grass of Australia (*Anthistiria australis*), and the Mitchell grass of Australia (*Astrebla triticoides*). These will stand periods of prolonged drought, and, in the case of the last, cattle are said to fatten on it, even when it is much dried up. In Jamaica, during severe droughts, cattle feed almost entirely on the underground stems of the Bahama grass. In dry soil impregnated with salt there are several grasses known in India affording a considerable amount of forage. A variety of *Sporobolus arabicus*, Boiss. (S. pallidus, *Duth.*) known as *Kalusra*, is mentioned by Duthie as constituting the greater

part of the grass vegetation of the *usar* tracks in the north-western provinces, and is always a sure indication of the presence of *reh* salts. Other grasses mentioned as more or less characteristic of saline salts are *Aristida depressa*, Retz. (more sandy parts): *Cynodon Dactylon*, Pers. (on less infected parts); *Chloris barbata*, Sw. (more sandy parts); *Tetropogon villosus*, Desf.; and *Diplachne fusca*, Beauv. (in moister parts).

Annual Fodder Grasses.

In dry regions not suitable for permanent pastures the Abyssinian Teff (*Eragrostis abyssinica*) might be grown during the occasional rains and made into hay. This grass will produce a heavy crop of hay in six weeks from the time of sowing. It is very nourishing, and cattle are very fond of it. There are other annual grasses that might be grown during the rains for fodder purposes. In Northern India green wheat is used as fodder, and where a large yield is desired within a short season, green oats are also used, as in St. Helena, for fodder purposes. The maize (*Zea Mays*) is often given as a green fodder, or dried and mixed with other green fodder. On sugar estates in the West Indies and elsewhere "cane tops" are largely used during crop time as fodder for working cattle, mules, &c. The tops are cut small, and sometimes mixed with molasses. They are regarded as most nourishing. In Mysore *Sorghum saccharatum* is regarded as an excellent fodder, and if cut before seeding it is well suited for cattle, especially milch cows—"their milk being enriched to an extraordinary degree by its use in small quantities." The United States Agricultural Department has declared that "the value of sorghum for feeding stock cannot be surpassed by another crop, as a greater amount of nutritious fodder can be obtained from it in a shorter time, within a given space, and more cheaply." The common sorghum (*Sorghum vulgare*), the *Juár* of India, is largely used as fodder, green or dry. It is often specially grown as a fodder crop, in which case it is sown earlier and more thickly than when cultivated for the grain.

A very valuable fodder grass belonging to this group is the Teosinte (*Euchlæna luxurians*). This yields very large crops in good land, and is regarded as one of the most prolific of annual grasses. Four good cuttings can be made in four months.

Most of these annual grasses, as also many coarse-growing perennial grasses, might be largely utilised by being preserved in the green state in silos. In South Africa silos, consisting merely of pits dug in the ground, have been found very useful in preserving fodder that would otherwise be lost, until the dry season. The cost of making silos is comparatively trifling, but it should be borne in mind that fodder preserved as hay is often more generally useful, and especially if made in good weather. Silos, on the other hand, offer a very ready and convenient means for preserving fodder during wet seasons, when it is impossible to make it into hay.

Grass Growing in India.

Voelcker* records an instance of the greatest care in grass growing in India, at Nadiad, in Gujarát (Bombay), where the cultivators do not use the village common land for their cattle. "Every one of their fields," he says, "is enclosed with a hedge, and then comes a headland of grass from 15 to 20 feet wide all round the field, and producing capital grass. There is a double object in this practice, for, as the fields are hedged, and have trees round them for supplying firewood and wood for implements, the people know quite well that crops will not grow when thus shaded, but that grass will. They obtain four or five cuttings of grass in the year as food for their cattle, and when the fields are empty the cattle are let in to graze on them. . . . Dúb grass (*Cynodon Dactylon*) as a crop for irrigation gives a great yield, and is about the only grass that keeps green in the hot weather. At Belgaum, fields are grown with grass; two cuttings are obtained yearly, and 6 annas is the sum paid for 100 lb. of green grass. No seed is ever sown, only the grass that comes up naturally being used."

To supply grass to military cantonments in India regular grass farms have recently been established. These were started by Sir Herbert Macpherson at Allahabad in 1882, and since then have been extended largely.

Previous to the introduction of the grass farm system, the practice had been to send out "grass-cutters," whose duty it was to cut and collect grass for the troops from wherever they could. Owing to a full supply of grass being now obtainable by the "grass-cutters" from Government grass lands great saving has been experienced, and the horses are believed to be healthier owing to the grass no longer coming from unprotected and suspicious sources. The amount of grass grown at military stations in India has been so increased that it is now possible to supply not only the British troops, but even the native cavalry with it. The saving at Allahabad alone for the seven years 1882-89 was estimated at R91,158. The extent of the Allahabad grass farm is 3,558 acres.

Ensilage, or the preserving of green fodder, has been carried out at many places in India. The cost as between haymaking and that of silage is, however, unfavourable to the latter. One advantage of cutting an early crop of grass for silage is that there are many grasses, such as numerous species of *Panicum*, which seed in the rains; these may be secured as silage if rain continues, whereas the other grasses, being kept back somewhat, yield a good hay crop about October, when the rains are over. It may further be said in favour of silage that by means of it some grass which would otherwise have been altogether lost owing to the heavy rains is saved by being put into the silo. Voelcker concludes: "I differ entirely from the opinion of one of my predecessors to the effect that India is the great field for the development of silage. That it is the field for haymaking I am much more ready to think. With a sun and climate such as exist over the greater part of India, I cannot see how it could well be otherwise. Hay requires no making, for it makes itself. Silage, I repeat, will only be useful when by means of it can be saved what would otherwise be lost."

* Report of the Improvement of Indian Agriculture, London, 1893.

ZOOLOGICAL NOTES FOR AGRICULTURAL STUDENTS.

The order *Rodentia* is characterised by two long incisor teeth in each jaw, separated by a