

count of labor supply, and shipping troubles, dealers at present are somewhat reluctant to accept large contracts, or orders for future delivery.

The future of the Blue Ridge drug industry is therefore somewhat uncertain. It is quite true that many of the products of this region could well be spared, but others would be sadly missed. Apparently no marked increase in output is to be looked for, at anything like present prices. The recent widespread interest in drug cultivation will hardly affect most of these products. The very few which are produced by cultivation, like red clover flowers and corn silk, are only incidental by-products of commercially more important crops. Natural supplies of the majority of important items are, no doubt, sufficient for many years to come. It is not unreasonable to suppose that increasing prices will result in sufficient collections of indispensables, while many of the useless species which have heretofore competed with them for the herb-gatherer's attention will, it is to be hoped, fall by the wayside.

COUCH GRASS *versus* BERMUDA GRASS.*

BY E. N. GATHERCOAL.

The drug couch grass, *Triticum* U. S. P., has been recently reported as adulterated or substituted with the dry rhizome of Bermuda grass.¹ *Triticum* is defined in the U. S. Pharmacopoeia as the dried rhizome and roots of *Agropyron repens* (Fam. Gramineae) gathered in the spring. Other English synonyms for *Triticum* are quack grass, dog grass, twitch grass, quickens, quitch, etc. Bermuda grass is the dried rhizome and roots of *Capriola dactylon*. It is also called Scotch grass, dog-tooth grass, wire grass, cane grass, Bahama grass, etc.

Bermuda grass is native to the Mediterranean basin and couch grass is common a little further north and throughout Europe. Both grasses are also found in North America, South America and Asia, the couch grass extending the further north and the Bermuda grass more into the tropics.

In the days of Dioscorides, 2000 years ago, perhaps the discussion as to the relative medicinal value of these two grass roots was a live issue. At least we know from the writings of this great teacher that the underground part of one or more grasses was used in his time as a diuretic and for vesical calculus.

The early writers on medicine generally include mention of grass root under the Greek name *Agrostis* and the Latin name *Gramen*.

Galen² speaks of the grass-root native to Parnassus as of greater power than that growing elsewhere and ascribes to it not only refrigerent and demulcent properties but also diuretic and lithontriptic powers. He refers also to the more slender form of the Parnassus kind of grass root and of its sweet yet very slightly sharp and bitter taste. Perhaps Galen and his disciples recognized a distinction between the grass roots we now name couch grass and Bermuda grass.

The German, French and English herbals of the 15th to 17th centuries usually

* Read before Scientific Section, A. Ph. A., Chicago meeting, 1918.

¹ U. S. Department of Agriculture.

² Galen, *De simplicium medicamentorum facultatibus*, lib. VI. *Agrostis—sed interdum tamen lapides frangere assolet, siquis eam decoctam ebibat. At semen alterius quidem imbecillum estieius vero quae in Parnaso nascitur, urinam ciet—tenuium partium et subcerba.*

mention and describe the drug *Gramen* (Dodonaeus, Gerarde). During this time an attempt at the classification of plants was being made and an increased knowledge of their characteristics acquired.

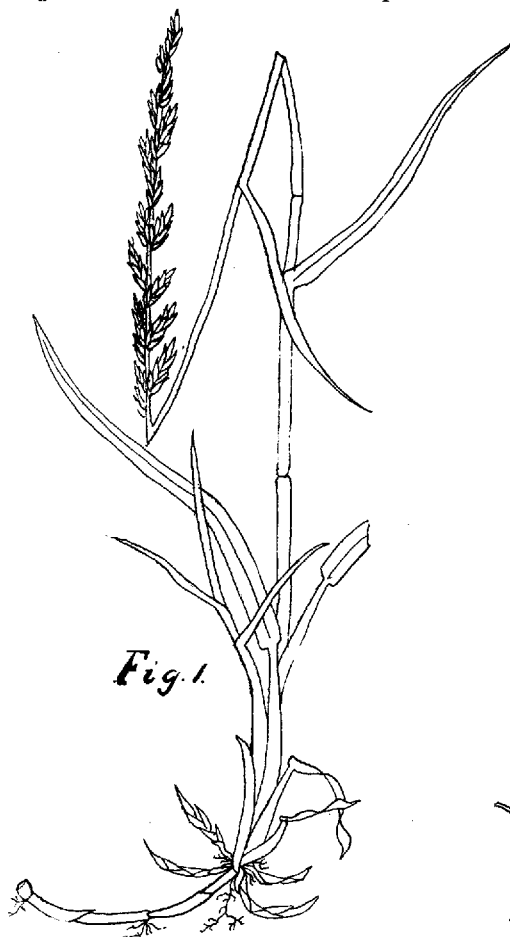


FIG. 1.—Couch Grass $\times \frac{1}{4}$.

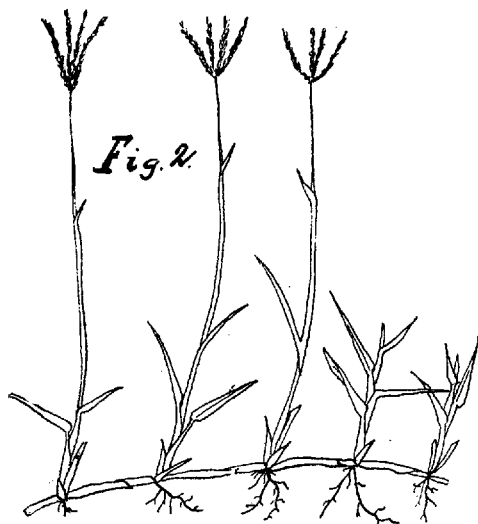


FIG. 2.—Bermuda Grass $\times \frac{1}{4}$.

J. Dalecamps (1587) describes three common grasses under the title *Gramen vulgare*. Of these, *Gramen vulgare, Dodonaei*, in description and illustration much resembles couch grass, while *Gramen vulgare, Dalecampii* is undoubtedly our Bermuda grass. He says, describing the grass of Dodonaeus (our couch grass):

"The grass of Dodonaeus, the French *Dent de chien*, is in leaves, stalks and crest not unlike the small reed-grass. Its leaves are narrow, tapering and much smaller than the leaves of the reed-grass, but tougher and larger than those of the meadow grass. The stalks are round, one and a half feet or a little more in height with four or five small nodes, and it bears a crest rather than a spike as does millet or the reed-grass but smaller and less dense. It creeps with long, white, jointed, knotty roots with a not unpleasant sweet taste, intertwining with one another, which send forth buds in many places, producing leaves and stems. It grows especially in productive fields and open lands and is destructive of the crops and a pest obnoxious to farmers, for in plowed land they must rake out the roots, gather them together and burn them. The roots are so tenacious of life that if covered with earth again, even after being dried, they revive or come to life. This grass blooms and fruits in the summer. In the autumn the roots are gathered together."

Writing of the grass of Dalecamps (our Bermuda grass), he says:

"It creeps along the ground with graceful, long, jointed, vine-like shoots, thrusting forward from its joints little roots which cling to the earth. It has long, narrow, herbaceous foliage, many stems, three-quarters as high as the grass of Dodoneus, distinct internodes and the flower spike-like, round, consisting of four or five protruding little spikes." Dalecamps refers to this elsewhere as "five-fingered grass."

Couch grass is still named in France *Petit Chiedent* and the Bermuda grass as *Gros Chiedent*.

Linne in his Flora of Sweden (1745) mentions couch grass under the title *Triticum radice repente*, as native to Sweden and the source of the medicinal grass root. Among its synonyms he mentions *Gramen caninum arvense* and states that while swine like it and grow fat upon it, dogs will vomit if they eat its leaves. Swedish names mentioned by Linne are quick-hwete, quicka- and quick-rot.

Couch grass is recognized in the early English dispensatories (Edinburgh) under the name *Gramen Caninum* and in later editions aperient and nutritive properties are ascribed to it. In the early French Codex, it is recognized under the name *Chiedent*. In the early editions of the U. S. Dispensatory it is described as a European drug extensively used in Paris hospitals. Not until the thirteenth edition is reference made to its value therapeutically as a diuretic.

Couch grass is included in the U. S. Pharmacopoeia first in the 1880 revision. It has retained its place in the U. S. P even in the latest revision and is also recognized in the British, French, Swiss, Belgian, Austrian and Hungarian pharmacopoeias.

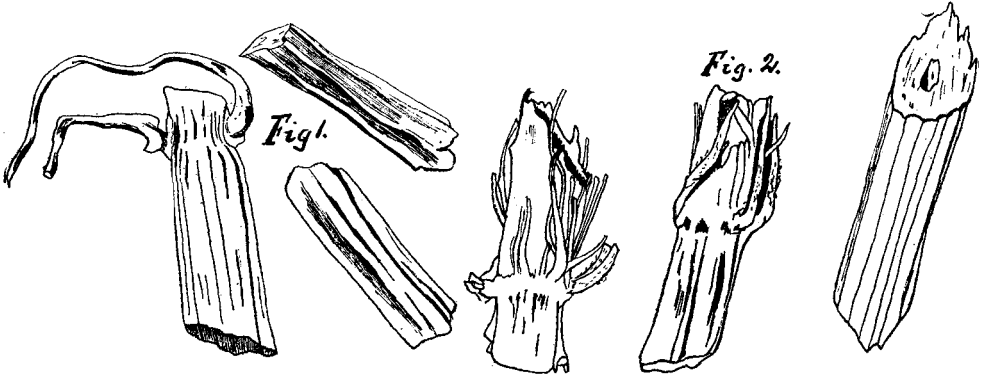


FIG. 1.—Couch Grass, rhizome and roots. FIG. 2.—Bermuda Grass, rhizome and roots $\times \frac{1}{4}$.

Bermuda grass has not generally been mentioned as a drug by authors from the central and northern parts of Europe, but has been given a place in the works of Italy, Spain and Portugal. It is official in the latest pharmacopoeias of Portugal and Spain as also in that of Mexico.

Botanically both plants are perennial grasses, the couch grass being 1 to 4 feet high and the Bermuda grass from 6 inches to 1 foot tall. The leaves of couch grass are the larger, being up to 12 inches long while those of Bermuda grass seldom exceed 2 or 3 inches in length. The flower-head on couch-grass is a spike, 2 to 8 inches long and somewhat resembles that of wheat. The flower-head of Bermuda grass is much shorter and consists of 4 or 5 small spikes which separate from one another somewhat like the fingers of the hand.

In external appearance the two drugs are quite similar. Couch grass itself varies quite markedly in size and color in various lots. Especially is the German drug thinner and darker colored than the French. Quoting from the latest revision of the U. S. Pharmacopoeia, *Triticum* is well described as follows:

"Usually in pieces from 4 to 12 mm. in length and from 1 to 2.5 mm. in diameter; externally light yellow or yellowish brown, longitudinally furrowed, smooth, lustrous, nodes with circular leaf-scars, a few root-scars and occasional slender roots; fracture tough, fibrous; internally lemon-yellow and with a large, hollow pith; odor slight, aromatic taste sweetish. Roots filiform, irregularly branching, attaining a length of about 5 cm. and not more than 0.5 mm. in thickness, light brown or yellowish brown, frequently covered with long root hairs."

However, the French *Triticum* frequently exceeds 2.5 mm. in thickness and in one lot at least was cut into pieces much longer than 12 mm.

The pieces of Bermuda grass rhizome are decidedly thicker, from 1 to 4.5 mm. thick, the average about 2.5 mm. The furrows are rather delicate and frequently appear as flutings. The internal color is inclined to be white and the cut surface mealy and the hollow pith is usually much smaller than in couch grass. The taste is mildly sweet and closely resembles that of couch grass.

Histologically—The excellent description of the structure of *Triticum* as given in the U. S. P is as follows:

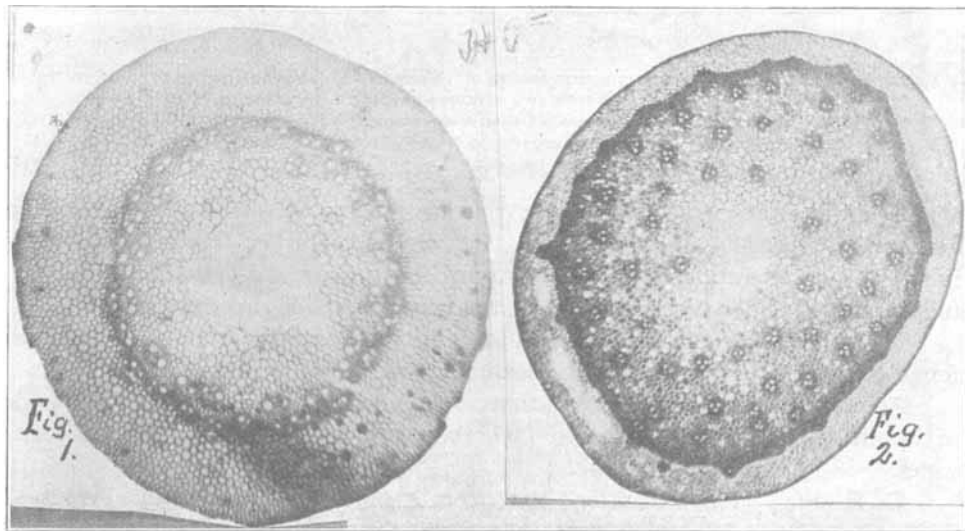


FIG. 1.—Couch Grass, transverse section of rhizome $\times 40$. FIG. 2.—Bermuda Grass, section of rhizome $\times 30$.

"Under the microscope, transverse sections of *Triticum* show a single layer of strongly lignified epidermal cells; a hypodermis of from 3 to 6 rows of more or less polygonal cells with strongly lignified walls; a cortex of from 10 to 16 rows of thin-walled parenchyma cells, occasionally with nearly spherical starch grains about 0.005 mm. in diameter, or with irregular masses of a more or less soluble carbohydrate; among the parenchyma cells and near the hypodermis occur small, widely separated fibro-vascular bundles, each with a closed sheath of sclerenchymatous fibers; an endodermis, the lateral and inner walls of the cells moderately thickened, strongly lignified and somewhat porous; several layers of sclerenchymatous fibers immediately inside the endodermal ring, in which are imbedded an interrupted circle of collateral fibro-vascular bundles having large tracheae; adjoining these are usually 8 to 10 rows of parenchyma cells with a few fibro-vascular bundles and a pith in which the parenchyma cells are more or less broken or absent."

The structure of Bermuda grass presents three striking points of difference; *viz.*, the parenchyma cells of cortex and pith are filled with starch; the endodermal layer is very inconspicuous or absent and many bundles are found inside the bast ring instead of a very few as is the case with couch grass.

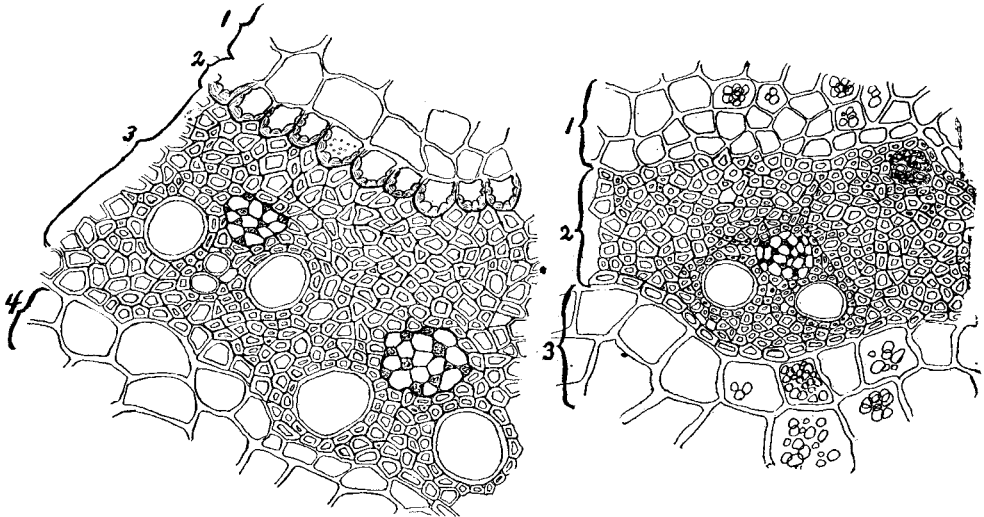


FIGURE ON LEFT.—Couch Grass, transverse section of rhizome x 230 (about); 1, parenchyma of cortex, 2, endodermis, heavily lignified; 3, woody ring with two bundles; 4, parenchyma of pith, without starch. FIGURE ON RIGHT.—Bermuda Grass, transverse section of rhizome x 210 (about); 1, parenchyma of cortex, containing starch; 2, woody ring with one wood bundle and traces of another; 3, parenchyma of pith, containing starch.

Regarding the chemistry of these rhizomes, a number of investigations have been made especially of couch grass. Ludwig and Mueller (1872) review very fully the early literature on the chemistry of couch grass and present a very carefully prepared and extensive report on the constituents of this drug.

Marggraf (1767), in discussing sources of sugar, mentions the grass-root as found in the apothecary's shops as yielding a sweet juice, but no solid sugar.

Apothecary Graff (1800) found that 20 pounds of grass-root yielded 7 pounds of "Loth" sugar, which compared favorably with the yield from certain sugar canes.

C. H. Pfaff (1808) mentions that from a pound of crushed and expressed fresh grass-root, 5 ounces of sweet juice could be obtained and this evaporated to the consistency of honey gave *Mellago* with a pleasant peculiar sweet taste. Out of 40 pounds of cut root he obtained 7 pounds *Mellago*. In 1821 Pfaff obtained a crystallized sugar from *Mellago*.

Berzelius (1837) says that Pfaff's sugar from grass-root closely resembles mannite.

Stenhouse (1844) obtains two sugars from grass-root and neither are mannite.

Ludwig and Mueller quote many other references. They summarize their own investigations as follows: Grass-root contains (1) a strongly laevogyrate (fruit) sugar; (2) a dextrogyrate sugar (not cane sugar); (3) a peculiar, nitrogenous gummy substance, easily split to a laevogyrate sugar; (4) a sweet-tasting, nitrogenous, easily split substance between the gum and fruit sugar.

Mueller further investigated the sugars of couch grass-root and triticin and concluded that neither dextrose nor cane sugar were present, but only fruit sugar to the extent of 2.5 to 3.33 percent. Triticin, present to the extent of 6 to 8 percent, is obtained by extraction with diluted alcohol and repeated purification with lead acetate which precipitates the other gummy substances. Mueller later gives the molecular formula as $C_{12}H_{22}O_{11}$ —an isomer of cane sugar. By hydrolysis it forms $C_6H_{12}O_6$ (Laevulose.) Triticin is an amorphous, tasteless and odorless, white powder, very deliquescent.

Bermuda grass was investigated chemically by Semmola (1841), who separated cynodin, which according to Flückiger and Hanbury is probably asparagin.

Undoubtedly with the onset of the present war and the cutting off of exports from Central Europe, our supply of *Triticum* has come largely from France and Southern Europe. As Bermuda grass rhizome is generally recognized there as equivalent to, if not better than couch grass rhizome, it is not to be wondered at that quantities of the former were sent to our markets as a substitute for the latter, especially in view of the fact that couch grass rhizome had, meantime, increased enormously in value.

With the detection of this substitution by our Government authorities and the warning issued to exporters and importers, we will probably not be troubled again with this substitution.

SUMMARY.

Historically—Probably the rhizomes of both of these grasses have been employed medicinally since the times of Dioscorides and Galen. To-day, couch grass is recognized in the pharmacopoeias of the United States, Great Britain, Belgium, France, Austria Hungary and Switzerland, while Bermuda grass is official in the pharmacopoeias of Mexico, Spain and Portugal.

Botanically—The plants yielding couch grass and Bermuda grass differ quite widely, not only in size and the size of the leaves and flower cluster but also in the shape of the flower cluster and in other more minute botanical features.

Pharmacognostically—Bermuda grass is rather stouter, though the actual average diameter of the rhizomes is but slightly greater than that of the coarser lots of couch grass. Because of the starch present in Bermuda grass the cut surfaces are whiter and more solid in appearance and the pieces not so straw-like as are those of couch grass. However, nearly all the pieces of Bermuda grass do contain a hollow pith.

Histologically—The differences between the two rhizomes are pronounced. The Bermuda grass contains in its parenchyma cells much starch which is absent in couch grass. The Bermuda grass contains a larger number and rather coarser bundles than in couch grass. On the other hand, couch grass contains a characteristic endodermis which is not present in Bermuda grass.

Chemically—Couch grass contains triticin about 8 percent, and sugar totaling about 4 percent. Triticin is hydrolyzed to a sugar by heating in aqueous solution to 100°. Bermuda grass contains asparagin.

Therapeutically—Neither of these grass rhizomes possesses pronounced activity. Perhaps as a nutritive demulcent, the decoction of either is of value as a drink in fevers. Probably both possess slight diuretic powers. Couch grass has

come into favor in recent years particularly as of value in irritated and inflamed conditions of the bladder.

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THE APPEARANCE OF A PACKAGE AND ITS CONTENTS AS A FACTOR IN MERCHANDIZING.*

BY F. W. NITARDY.

When a stranger is introduced to us, we usually form an opinion of his or her general qualities, as a result of impressions made by the individual and recorded by our various senses. As the impressions made through our sense of sight are the easiest recorded and remembered, it is quite logical that first impression is based largely on appearance, hence the saying "clothes make the man." While such first impressions are not always correct, the value of making them favorable is generally recognized.

Similarly should we cause the first impression of merchandise to be favorable, for it is daily introduced, so to speak, to many customers and people coming into or passing the store. They make its acquaintance through the medium of windows, show-cases, or the personal introduction by the salesmen. On making the proper first impression depends to a large degree the volume of new business that can result from the display or showing of goods and when such goods are your own this impression frequently forms the basis by which you and your store are judged. In few lines of business is appearance of more importance than in ours, for quality is not always a visible attribute, especially not in the various medicinal preparations, drugs and chemicals usually packaged by the retailer and daily sold on demand over the counter. It is in these preparations that the character of the Pharmacy

* Read before Section on Commercial Interests, A. Ph. A., Chicago meeting, 1918.