

Golf Course Grasses in Tropical and Subtropical Regions

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As the number of golf courses increases in regions of perpetual warm weather, the interest in securing the best turf grasses develops in proportion. None of the temperate grasses are at all adapted as perennials to regions free from any real winter weather. To meet the needs of the warmer countries, an entirely different series of grasses is a requisite. Thus far the turf grasses of warm countries have received but a small fraction of the attention that has been devoted to the study of temperate grasses. The tropical and subtropical turf formers are far more numerous than the temperate species, and with the exception of a few, little is proved of their capabilities except in the region to which each is native.

The information here set forth is based on observation and studies in south Florida, Louisiana, California, Cuba, Panama Canal Zone, Philippine Islands, China, Java, India, Ceylon and Egypt. It includes also such information as has been published by competent investigators.

On many tropical golf courses the fairways are made up of grasses which appeared spontaneously. Where fairways have been sown or planted, Bermuda grass has most frequently been used, but not rarely other grasses have taken preponderating or complete possession.

There is as yet no tropical turf former known which will make putting greens of equal quality to either creeping bent or velvet bent. However several of them properly managed make putting greens of very excellent quality, at least in certain regions. These include Bermuda grass, Acapulco grass, and Manila grass. There is reason to believe that eventually tropical grasses will be found which will produce putting greens of the highest quality. The information here set forth should be of at least suggestive value to all golf clubs in warm countries.

The extent to which any of these grasses will be purposely used, so far as fairways are concerned, will depend largely upon commercial seed supplies, and partly on the ability of the grass to spread from a small start. As to putting greens, quality is of all importance, and the vegetative method of production is not too expensive if the grass possesses the desirable fine quality.

Commercial seeds of Bermuda grass and of carpet grass are available in quantity. Where either or both of these grasses succeed well there is little use of securing other fairway grasses. Where neither succeeds well it will be desirable to start small plots of other turf grasses, as one or more of them is practically sure to spread of its own accord. Of course this process can be speeded up by planting vegetatively small patches here and there throughout the fairways and rough.

For putting greens the finer strains of Bermuda grass give at least fair satisfaction especially if the soil be fairly heavy. Acapulco grass holds much promise as a putting green turf grass, and Panama carpet grass is worth careful trials. Manila grass is inclined to be a little stiff, but in the Philippines at least makes beautiful turf.

It would be a splendid thing if every tropical golf club would devote an experimental area to the testing of the grasses here described and any others which appear promising. In this way a large amount of information would soon be accumulated.

Bermuda Grass (Cynodon dactylon).—This is the best known of all the tropical turf grasses. In India it is called doob or hariali; in Australia

couch grass; in other countries wire grass and devil grass. Perhaps Bermuda is purposely employed on warm-country golf courses more than all other grasses combined. It thrives well from the equator far northwards and southwards, the hardier strains surviving even zero weather. It is rarely used however, where truly temperate grasses will thrive, as its brown color in the cold season is not attractive. There are numerous varieties or strains of Bermuda grass, and the best of them make very excellent putting turf especially on heavy soils. While commercial seed is plentiful, the fine strains must be propagated in the vegetative way, as the seed produces many different strains.

Carpet Grass (Axonopus compressus).—Carpet grass is a native of Central America and the West Indies, introduced about New Orleans before 1832, as a specimen collected then is still preserved. The grass has spread over the whole coastal plain area from Norfolk to Galveston and inland about 200 miles. It is a splendid turf grass for fairways—indeed ideal. Typical examples of its excellence may be found on the golf courses at New Orleans; Biloxi, Mississippi; Jacksonville, Florida; Charleston, South Carolina; and Wilmington, North Carolina. Commercial seed is available in quantity and the grass is easily established by sowing on other turf, wherever the conditions are suitable. The grass will not grow on the drier lands, but in soils of reasonable moisture capacity it will quickly replace all other grasses in the regions to which it is adapted, especially on sandy soils.

Giant Carpet Grass (Axonopus furcatus).—This grass is native in the coastal plain of the South and in the West Indies. It is coarser than carpet grass and requires more moisture. For very shady places it is excellent. The seed falls off promptly even before ripe, so it will never be a commercial article. In other words, the grass if planted will ordinarily have to be planted vegetatively. Giant carpet grass shows considerable tendency to invade putting greens where it is not desirable. On the whole the grass is valuable only where it occurs naturally.

Panama Carpet Grass (Axonopus purpusi).—This is a fine-leaved rather bunchy sort of carpet grass native in Central America. On the golf courses of the Canal Zone it makes better turf on the fairways than any other grass. It is likely however to be valuable only where it is native and in regions where it will spread of its own accord. The turf of Panama carpet grass will probably prove highly satisfactory for putting greens.

Bahia Grass (Paspalum notatum).—This is the grass which makes up most of the turf at the Havana Country Club. On the moister ground it is practically pure and forms a very dense, tough turf, moderately coarse in texture, that is of superb quality for fairways. On the Canal Zone golf courses and lawns it is likewise abundant. Bahia grass occurs naturally from the West Indies and Mexico to Uruguay and Argentina. In many places, as in western Cuba, Costa Rica, parts of Uruguay, it is the most abundant pasture grass. By the natives it is called "cano mazo," that is "mat grass," in Cuba; "gengibrillo," or "ginger grass," in Costa Rica; "pasto dulce," or "pasto manso," in Argentina. Bahia grass is succeeding admirably in Florida and along the Gulf Coast. Seed is obtainable from Cuba and from Costa Rica, but does not germinate as well as might be desired. However the grass spreads naturally when once established, so much indeed that it is safe to prophesy that in time it will

be one of the most abundant grasses of Florida. Bahia grass forms a heavy tough turf even on very sandy soil. This is due to its thick tough horizontal rootstocks, which make a sort of pavement, as it were. For this reason it is a particularly desirable fairway grass on light soils. It remains green down to the freezing point.

Acapulco Grass (Opizia stolonifera).—This perennial creeping grass was discovered 100 years ago at Acapulco, Mexico. It is now known to grow over a wide area in the western part of southern Mexico, a region with a long period of drought each year. In some way it became introduced into Cuba about 1906 or earlier. The reasons for this conclusion are that the grass was not reported by the botanists who explored Cuba previous to 1906; and besides, very few plants occur naturally either in Cuba or in southwest Mexico. Furthermore, its rapid spread in Cuba and the manner in which it crowds out native plants, suggest that it is an introduced grass. In a general way it resembles Bermuda grass, but botanically is very different, as it has two very different kinds of flower clusters on the same plant, one consisting of male flowers, the other of female flowers. It makes very dense turf and grows even on the surface of practically bare limestone rock. It is doubtless very drought resistant, as the dry season of southwest Mexico is a prolonged one.

Wherever the grass occurs in patches in Cuba it is closely grazed by animals, and thus treated it makes a very splendid turf. Our present knowledge of its value for golf courses is largely the result of the investigations of Mr. Frederick Snare, of the Country Club of Havana, whose attention was called to the splendid turf this grass made about the Colon Cemetery. It bids fair to make putting greens superior to those of Bermuda grass. Under Cuban conditions various weeds invade Bermuda greens, so that the greens must be renewed frequently to be really satisfactory. Acapulco grass, however, to judge from an area of about 100 square feet, holds its own against all the weeds. Mr. Snare has plugged all his greens with hole-cutter sized pieces of Acapulco turf, and these rapidly increase in size, so that in a comparatively short time the greens will be solid Acapulco grass. The texture is at least equal to Bermuda, and the color a little paler; but with the practical assurance that weeds can not invade the Acapulco grass, the turf will be perfectly uniform.

For fairways Acapulco grass will provide ideal turf, and it should be particularly valuable in regions where long droughts occur. It is quite likely that it will be useful in south Florida, in southern California, and probably in Chile, South Africa and Australia.

Java Grass (Polytrias praemorsa).—This grass forms the natural covering of lawns and parks on the heavy soils of western Java, making a pure turf in which few weeds appear. It is a low-growing grass, rarely over five inches high when in bloom. The flowers are in dense spikes of a brownish purple color. In periods of drought or of cool weather the leaves attain a distinct purple color, as is the case with crab grass, but in Java grass the color is more pronounced. The grass was introduced at Manila about 1908, and large patches of it show that it will there crowd out Bermuda grass and also Manila grass. At Miami, Florida, it has persisted for years and has spread in the lawns making large patches and crowding out other grasses. In Cuba it seems perfectly at home.

Java grass has not been tested for putting greens and it is hardly likely that it will prove as good as Bermuda. For fairways, however, it

should prove an excellent grass, as when once established it will continue to spread. The turf is very dense, but is inclined to be a little loose like short-mowed crab grass.

St. Augustine Grass (Stenotaphrum secundatum).—This is the rather coarse grass often used for lawns in Wilmington, Charleston, Savannah, and Florida. It is especially useful for its ability to grow in shade. No seed is available, so the grass is propagated vegetatively. It makes good fairway grass, as may be seen on many southern courses. The grass is naturally a seashore plant and will stand being overflowed by sea water without harm. This was clearly demonstrated on the course at Brunswick, Georgia, some years ago when a high tide overflowed the fairways. Carpet grass was entirely destroyed but the St. Augustine grass was unharmed.

Korean Lawn Grass (Osterdamia japonica).—This grass forms extremely tough sod and is probably the best of all for teeing grounds, besides making splendid fairway turf. At the Palm Beach Country Club are tees formed of this grass. The toughness of the sod is due to the rootstocks, each as large as a goose-quill. They form a layer beneath the soil often an inch thick, the rootstocks making a dense network. Seed is produced in Japan, but its entrance into the United States is prohibited, as it always carries an abundance of a fungous disease, an ergot, which might prove dangerous. Therefore its propagation will for the time being necessarily be by vegetative methods or by its natural spread from the seed produced.

Manila Grass (Osterdamia matrella).—This is closely related to the preceding grass and similar in habits, but the turf is much finer and very beautiful. It is the grass which covers the Luneta in Manila. The leaves are a trifle stiff, otherwise it would be an ideal putting green grass.

Centipede Grass (Eremochloa ophiuroides).—This is a common grass in China which makes up pastures and lawns. It is a very distinct plant, perhaps more resembling carpet grass than any other turf former. It spreads by creeping stolons which lie flat on the ground and grow about three feet long in a season. The grass is dwarf and rarely grows as high as six inches. During the first year it is rarely over 2 inches high. Centipede grass is beautifully adapted to the sandy soils of Florida, and even better to the clay soils of Cuba. For fairway purposes it will probably succeed in most tropical countries.

Blue Couch (Digitaria didactyla).—Blue couch is a native of Australia, not unlike fine Bermuda grass in appearance, but with a distinctly bluish cast. Its seed habits are not very good, so vegetative methods of propagation must ordinarily be employed. It shows marked ability to hold the ground against competitors, in Florida at least, and in some places spreads readily. In Miami are a few lawns of this grass which are very attractive. It probably is not superior to Bermuda grass for putting greens but seems fully equal to it.

Carabao Grass (Paspalum conjugatum).—This is a common turf grass of Central America and the West Indies, also found in Florida and Louisiana. It has been introduced and has become very abundant in Hawaii, where it is called Hilo grass, and in the Philippines, where it is called Carabao grass. It is much disliked by stockmen, as animals refuse to eat it. However, it makes excellent fairway turf, closely comparable to carpet grass in color and texture. There is considerable of it on the courses at New Orleans, some at Palm Beach, and it is rather plentiful on the Havana Country Club course. It prefers the moister ground. This grass is now wide-

spread in the tropics and may be expected to succeed wherever the moisture conditions are good. It should not be introduced into new localities, on account of its tendency to spread and to replace better pasture grasses. This grass has some tendency also to invade putting greens where it is not desirable.

Marvel (Andropogon caricosus).— This grass, native of India, where it is called marvel, was introduced by some means into Antigua about 1900. It spreads rapidly and adds to the herbage furnished by pastures. In fact, under many soil conditions this grass crowds out all others. Since 1900 it has spread to many of the islands of the West Indies. It was observed particularly at the Country Club of Havana. On rich land it will grow two to four feet high and will yield good crops of excellent hay. Where constantly pastured or mowed, the grass spreads by surface runners which root more or less at the joints. It makes rather coarse but fairly good turf. In general it behaves in the tropics about as crab grass does in midsummer at Washington, but unlike crab grass it is perennial and grows the year around unless drought is too severe. Marvel is a remarkable grass with astonishing ability to spread by its seed and to occupy the land. It is likely to be a valuable turf former in places where better grasses will not thrive.

Grama Grass (Bouteloua americana).— This grama grass is native and abundant in Cuba, and was observed particularly at the Country Club of Havana, where it is particularly valuable on the highest and driest parts, where the heavy soil is sometimes a bit gravelly. It is a perennial with much the habit of crab grass; that is, the branches radiate along the ground from the central crown, but do not root at the joints. The turf is therefore much like that of crab grass, not of the highest quality, but valuable because it makes a good ground cover on which most other grasses do not thrive. This grass has never been cultivated nor the seed handled in the trade. It is of interest and value where it occurs naturally, but probably not of sufficient value to justify its especial cultivation.

Weedy Plants.— On nearly every tropical golf course, turf-forming weeds make patches in the fairways. Some of them make really excellent turf, but probably none are really as desirable as grasses, unless the latter can be grown only with difficulty. Among these weedy plants are the following. *Meibomia triflora*, a very fine clover-like plant, native to India, now common everywhere in the tropics. The flowers are minute and purple and the small pods are jointed. It is common throughout Florida. *Lippia nodiflora*; this is used as a lawn plant in California, and it or similar species are widespread in warm countries. In Florida, Cuba and Louisiana great patches of it may be found in the fairways. *Dichondra Carolinensis*; this weed is a minute-flowered morning-glory in the South, and patches of it may be seen on the fairways and greens of most golf courses in that region. The leaves are kidney-shaped and the turf much like that of white clover. Patches of it may be 6 feet in diameter. *Alysicarpus vaginalis*; this plant is native to India, but is now found nearly everywhere in warm countries. It is a legume and makes patches of turf not unlike white clover, but the leaflets are single, not in threes as in clover. *Meibomia supina*; this is a legume native to Florida and Cuba. In fairways and lawns, patches of it may be found 12 feet in diameter. It spreads by creeping underground, and makes a very good turf.