

DISTRICT 6 GROUP MEETING - FORT WORTH, TEXAS

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The travel restrictions in the respective States limited the attendance of representatives at the group meeting held to discuss problems of sodding and seeding. Copies of correspondence and specifications were compared and analyzed with Mr. Torbert Slack, Landscape Architect of the Louisiana Department of Highways, the only other landscape representative in District No. 6 at this time, and with the Maintenance Engineer of the Public Roads Administration for District No. 6. The following is a summary of the viewpoints of the above two States only, due to the inability because of the war to get the reaction of all the States in the District.

"We realize fully the advantage of standardizing methods and procedures for this work, and agree that the terminology set out by the U. S. Department of Agriculture is desirable. However, certain difficulties for standardization in this district are evident. In Louisiana the rainfall exceeds 50 in. per year, while portions of Texas receive less than 10 in. in intermittent seasons. We feel that even though standard specifications were adopted, many special items would be necessary to secure the best results. At present the Texas Highway Department has a printed standard specification on Grass Erosion Control which covers about every phase of sodding work, and has been used successfully for some time. We do not consider the re-printing of our standard specifications advisable at this time, and the use of a new specification as a special item will involve a great deal of added paper work for each project submitted. We are making use of a new specification (special) on Broadcast Sprigging, which heretofore has not been used in this State.

"We will appreciate your comments on the specification attached. If, at some future date, the entire standard specifications of the Texas Highway Department are up for revision and re-printing, we intend to make changes in line with the 'Specification for Grass Erosion Control.'"

The meeting brought out the following comments on the Texas Highway Department specifications for "Grass Erosion Control" and the "Special Item - Seed and Seeding."

(1) In Texas it is generally recommended that ground be loosened and cultivated prior to sodding and seeding. In most instances for Broadcast Sprigging, Check Sodding, Shovel Sodding, Solid Sodding and Topsoil Planting, the soil should be loosened to a depth of five in. It should be sufficiently deep to aid growth of the grass, but not too deep so as to require special scarifiers to do the work.

Salvaging of topsoil in regular construction has been done in this state and is considered a very economical and advantageous method of aiding in sodding of roadsides. It is considered desirable to make it a general policy to include it in all new construction as a part of the item of Common Road Excavation.

In this State it is not considered economically desirable to introduce topsoil for seeding or spring sodding use. When it is necessary to add topsoil, the Topsoil Planting (Mulch Sodding) method assures better results.

(2) In most instances the use of organic fertilizers is considered more desirable, but since sewerage sludge and barnyard manures are available only locally and transportation costs are excessive, it is found to be more practical to use standard inorganic fertilizers.

The extreme variation in rainfall in Texas raises peculiar problems in specifying commercial fertilizers. A high nitrogen content is not desirable since nitrogen forces rapid growth of grass during the moist spring season, and during the long, dry summer which usually follows, the tender grass "burns up." Practically all soils in this State have an excess of potash. Therefore the most desirable component is phosphoric acid, and a 4-10-0 fertilizer or a similar mix is good for our use. It is applied at the rate of $1/8$ lb. per sq. yd., which is equivalent to the rate of 600 lb. per acre, and is mixed with the soil or otherwise distributed so that it does not come in direct contact with the sod roots.

Sewerage sludge, barnyard manure, cottonseed meal, and bone meal have been used. All are satisfactory if available; however, the latter is slow in action and not particularly suited for sodding work. Barnyard manure is applied in a layer approximately one inch thick and mixed with the soil. Sewerage sludge and cottonseed meal are applied at the rate of $1/4$ -lb. per sq. yd.

(3) In general, all types of seeding on Texas highways have failed. Ryegrass, Bermudagrass, mesquitegrass, Buffalograss, clovers, various other legumes and other groundcovers have been seeded with little results. Seed has been largely purchased through seed houses, since seed collecting has not proved economical. As a temporary annual ground cover on new roads, ryegrass is planted in the fall with varying results, dependent upon the rains. Spring planting of other grasses has been even less successful. We do not consider a standard specification advisable.

(4) Topsoil planting (Mulch Sodding) has been the most successful type of sodding used in Texas. Bermudagrass has been used exclusively for this purpose. It is removed in the field in depths of from five to ten in. and applied to sterile soil areas, usually at a five in. (loose) depth. It may be placed at any season, but spring is most favorable since in summer much artificial watering is needed, and if placed in the fall, the winter rains often wash the material away. In the northern section of the State some damage is done in the winter by freezing.

Broadcast Sprigging has never been used in this State, but may prove a practical substitute for Check (Spot) Sodding.

Shovel Sodding has been used as an economical substitute for Solid (Block) Sodding, particularly in ditch bottoms.

Grass Retards, consisting of a trench, usually eight to twelve inches deep and twelve inches wide across the roadside ditch and filled with Bermuda

sod, has proved very satisfactory where other methods fail. The added depth preserves the moisture and assures growth of grass in swift flowing channels even though the upper layers are undermined or are carried away.

Bermudagrass grows readily in the eastern half of the State, and Buffalo and other native grasses grow well in the northwest, but in the semi-desert area along the Rio Grande River we have found no grass or other ground cover satisfactory; however, in that section water erosion is controlled by the construction of diversion dykes. These differences in climate and soil must be taken into consideration in preparing universal specifications.

Bermudagrass (*Cynodon dactylon*) may be used successfully for all types of sodding in all soils of reasonable fertility in the eastern half of the State and in the moist and sandy locations of the northwest.

Carpetgrass (*Axonopus compressus*) may be planted as Solid Sodding and grows well in moist locations, particularly ditch bottoms in the extreme eastern portion of the State. It will not grow in shade.

St. Augustinograss (*Stenotaphrum secundatum*) is a very desirable grass due to its low, evergreen growth, but it is limited to the more fertile, moist locations along the Gulf coast. It may be planted in any manner suitable for Bermuda but the present supply is very limited. It will grow in shade.

Centipedegrass (*Eremochloa ophiuroides*) is still in the experimental stage in this State, but promises to be a good low-growing grass for the acid soils and warmer sections of the State.

Buffalograss (*Buchloe dactyloides*) is an excellent grass for the northwest plains, but it can be planted only as Solid Sod or closely spaced Check Sod. It spreads rather slowly.

Curlymesquite (*Hilaria belangeri*) is a good grass for the central portion of the State, but it can be planted only as Solid Sod or closely spaced Check Sod, and with considerable care.

We also have experimental plots of Seaside Bent (*Agrostis palustris* - Creeping Bent); ¹

(5) Little use has been made of mulching for grass planting. In the areas where there is the greatest need, the least material is available. In any suitable soil and climate there is no need to mulch Bermudagrass.

For blow sand areas of northwest Texas, we have made use of mulching in the form of wheat straw which was mixed with the soil to prevent wind erosion. Some value, too, was derived from the resultant seeding by this method. Since the need is so rare and the exact methods are dependent upon local conditions, we do not consider the adoption of a standard specification advisable for this work.

¹ - According to standardized Plant Names, - Cocos, Coos Bay, Metropolitan, Seaside, Seashore and Washington Bentgrasses are strains of *A. palustris* used for lawns and golf greens.

Supplementary Comments and questions by the Committee are included as a basis for possible discussion at future group meetings:

FERTILIZER - The 4-10-0 fertilizer used in Texas seems to have advantages and disadvantages. If there is a general excess of potash in the soil naturally no potash is needed in the fertilizer. However, it is understood that in some parts of the State phosphorous is also present in sufficient quantities to make further application unnecessary. As to the comparatively low nitrogen content, the explanation that the stimulation of a heavy top growth is undesirable because of the hot dry summer period which follows the spring season is sound reasoning, but would not a heavier nitrogen content be desirable along the Gulf and in eastern Texas where the rainfall is comparable to the eastern States? It would seem wise to use a fertilizer most suited to conditions. A more concentrated fertilizer might be desirable, due to the savings on freight and handling.

SEEDING - The specifications for seeding and the various types of sodding and sprigging in general are very good. Occasionally it would seem desirable, as more experience is gained, to go into a little more detail or to be a bit more specific. For instance: under Excavating and Placing Sod (A) Broadcast Sprigging: the ground after sprigs are applied and disced in might be rolled with a cultipacker or some other type of roller. Under (F) Topsoil planting: a roller of 300 to 400 lb. is specified without specifying the width of roller or weight per foot of roller width. Under the special item seed and seeding the depth of seed covering is not specified. Also under measurement in the same item the unit is given as a pound of seed. Would it be preferable to use a unit of area such as 1000 square feet, etc.?

MULCH - It is noted that generally mulch is not used, the explanation being that where mulch is needed most, as in the dryer regions, it is not available. It would seem that a saving could be made for sprigging, topsoil planting and seeding if a thin mulch of hay or straw were applied. Watering could be materially reduced even in the more favorable growing regions where mulch should be available.

The general comments on the model specifications on seeding and sodding furnished by the coordinator were greatly appreciated by the Committee.

COMMENTS ON SPECIFICATIONS FOR SODDING AND SEEDING IN LOUISIANA

PREPARATION OF GROUND FOR SODDING AND SEEDING. It is generally recommended in Louisiana that the ground be loosened to a depth of about 3 in. to receive any type of sod - slab, sprig, tuft and mulch. This is accomplished through the item "Surface Dressing" or may be included in the item for sodding.

Salvaging topsoil has not been practiced in the past on regular construction. It is generally conceded that a much better result can be obtained by selecting and hauling in mulch sod (topsoil sodding) thus securing grass roots and selected topsoil at the same time. The ultimate cost of saving topsoil on regular construction, plus adding additional grass either by some type of sod or by seed would cost about as much as mulch sod. However, if mulch sod is not decided on it is now recommended that topsoil be saved on new locations. On old

locations where new concrete is being placed and on specific roadside projects on old locations there is not enough topsoil to warrant it if mulch sod can be secured.

Topsoil or mulch sod should be spread at least 4 in. thick on any part. This applies to hill sections and even the flat prairie sections some of which show badly eroded conditions where least suspected. There is an excellent example on a large gentle slope in the central part of the State where mulch sod was placed 2 in. deep on parts of it and 4 to 5 in. deep on other parts. The latter stood up excellently while the 2 in. deep mulch washed badly. The same would apply to topsoil.

FERTILIZING. Inorganic fertilizers have been used. It is not a question of preference between the two but the fact that organic fertilizers would be harder to obtain.

4-8-4; 4-12-4 and 6-8-4 at the rates of 200 to 600 lbs. per acre have been used in the past. At present 6-8-4 is being used with excellent results at 600 lbs. per acre. However, some soils should have more than this, up to about 800 lbs. It is considered that the use of fertilizers either in construction or in maintenance should not be dispensed with under any circumstances.

A high nitrogen content is not desirable for highway work in Louisiana, except perhaps where rainfall is plentiful. It is the opinion that a better root system is of first consideration.

On one or two WPA roadside projects last year, sodium nitrate was used. A quick top growth was established but later on in the year drying out seemed to prevail. The subject of fertilizers has been discussed on several occasions with the State Experiment Station officials and some experiments with various mixtures have been observed. There seem to be no definite kinds or amounts of fertilizer to use under highway conditions and there remains room for more experimental work on this line.

Cotton seed meal is preferable as an organic fertilizer. It could probably be obtained more easily than others. Barnyard manure would be impossible to obtain for highway use. It can hardly be obtained for yard use. (It should be noted that the proportioning of nitrogen is high, ranging from 6-2-1 to 9-3-2 in different grades of cottonseed meal.)

The best choice for adding organic matter to Louisiana soils is through the use of rotten sawdust and rotten rice straw in some sections. Rotten hays can sometimes be obtained. These materials worked into the soils can be of considerable use and are being advocated.

GRASS SEEDING. Seeding has not been generally recommended in the past. However, during the past year seeding was experimented with on a fair scale on a few WPA roadside projects in the flat sections. Some good results were obtained and seeding is being specified on one or two regular construction contracts in the future where the conditions warrant it.

Seeding backslopes and ditches is not recommended. Seeding, although not perfect in our trials, has given some promise for the flat sections and it is the intention to further recommend particularly Bermuda (hulled) and Carpetgrass plus Lespedeza. These are the best grasses for highway use in Louisiana.

Hulled Bermuda 5 to 6 lbs., Carpetgrass 8 to 10 lbs. and Common or Kobe Lespedeza 12 to 14 lbs., per acre make an excellent mixture. These can be planted separately or Lespedeza in combination with either Carpet or Bermuda.

Lespedeza grows wild on our highways in every section. It will grow on poor sandy soils or on heavy soils; can be mowed and still will reseed itself, and at the same time builds up the soil.

The best planting season is from February 15 to April 1st and to May 1 in the northern part of the State. Bermuda alone can be planted later and may also be planted early in the fall, if early enough to sprout before cold weather and obtain some growth. Lespedeza should be planted in the spring.

Carpetgrass is excellent for highway use. It will grow in the shade. There are wooded areas in several sections where the growth is abundant. It requires more moisture than Bermuda and a more or less acid soil condition. Although it can be found on slopes, it is not as good as Bermuda for backslope work. It will transplant well as solid slab but not as good as Bermuda for mulch sod. Seed collection would seem inadvisable. It is better to buy seed from recognized seed dealers.

Ryegrass seed has been used to hold Bermuda sod through the winter months. Sodding can be done late in the fall and the rye will hold it in place until sprouting time in the spring. This can be planted in September, October and November with excellent results.

Other seeds are the clovers which are planted in the fall. These have not been used, however, but it is the intention to get in some plantings on some future projects.

TOPSOIL PLANTING. (Mulch Sodding, Broadcast Sodding). Prior to 1941 this type of sodding was not done. It was done in 1941 on several WPA roadside projects and is now being recommended on all regular construction. Mulch sodding has a distinct advantage over sprig and tuft sodding in that both topsoil and grass are obtained.

Bermuda is the best grass for mulch sodding and can be obtained in every section of the State. Carpetgrass is not as good as Bermuda for mulch sodding but it would be hard to say what percentage grows when applied as a mulch. It does not stand "turning over" or handling like Bermuda. Carpetgrass will transplant well as solid slab.

Bermuda will grow in soils more adaptable to Carpetgrass but in time the Carpetgrass will take its place in the moist places and with more acid conditions. Hence, Bermuda mulch sod used in such localities acts temporarily until native Carpetgrass takes its place. (It is significant that ammonium sulphate used as a

top dressing for carpetgrass is better than sodium nitrate as the former is acid forming. Also that in top dressing Bermuda sodium nitrate is better.)

Bermuda mulch sod is recommended to be applied 4 in. deep on shoulders and slopes. Less than this has not been successful. It is not recommended for ditches except in very flat sections. In hill sections slab sod is recommended.

Not over 6 in. is recommended for depth in removing mulch sod.

In Louisiana mulch sodding for immediate growth may be done from about February 15 or March 1 to October 15. During the winter months it may be done provided Rye seed is added to hold it in place. The best mulch source is sandy loam areas and silt loam areas. Mulch obtained from heavy land is hard to spread properly.

Another method of mulch sodding or topsoil sodding would be the cutting method where topsoil is first added and spread and then Bermuda tops and roots (without dirt attached) spread over the surface and then disced in. This method has not yet been tried for highway use but where topsoil could be saved on new locations it might prove cheaper than mulch sod. It is the intention to try this.

MULCHING. The most available types of mulch would be rotten sawdust, rotten rice straw in the southwest part of the state plus limited quantities of rice hull ashes. There is a limited quantity of gin cleanings and oil mill cleanings but the cost is probably too much for highway use. Good woods soil (leaf mold) can be secured in some sections (Grass clippings might also be used where available.)

Mulching seeded areas has not been done. It is believed that any of the above materials would best serve by being spread and incorporated with the soil rather than using them as a cover. Once Bermuda seed gets started and has a good soil to grow it, it will do its work without mulching. It is believed that a mulch unless very loose would retard the growth somewhat. This is judged by summer cutting where heavy cut grass is left on the ground to form mats. These mats even over well established grass retards the growth directly under them. About the only advantage a mulch would do as a cover would be to keep the seed from washing off. It is believed that a much better advantage would be obtained by disking in the materials.

The possibility of mulching with native hay and depending on the seed contained therein to ultimately sprout would seem a round-about way of obtaining results when seed of a specified variety could be added at only a small extra cost.

The results of pine needle mulching and straw or hay mulching elsewhere during the past two years have been noted. Louisiana is not convinced that pine needles are the proper material, particularly for Bermuda. Needles would serve better for Carpetgrass and even then if it is applied too thick the Carpetgrass will be destroyed. The covering of slopes with mulches will prevent a good deal of washing but if it is not carefully done along with seeding the seeding will not produce the best results.

GENERAL: As time goes on and new types of sodding are desired, special provisions can be written to cover them. A set of model or standard specifications might cover many points but it certainly could not cover the varying details encountered in three or four States and after all special provisions would probably have to be written.

In the copy of the special provisions on sprig, tuft and slab sodding, your attention is called to the requirement of boards, which Louisiana practice has found is the best method of handling.

SUPPLEMENTARY COMMENTS AND QUESTIONS BY THE COMMITTEE SUGGESTED
AS A POSSIBLE BASIS FOR FUTURE DISCUSSION AT GROUP MEETINGS:

It is noted that Louisiana includes "Mulch Sodding" and "Special Provisions for Sprig, Tuft and Slab Sodding" in the State Specifications but does not have a mulching item because it is not considered necessary or practicable. This raises the question, as in Texas, whether mulch in the form of hay or straw could be thinly applied to sprigged, seeded, and topsoil planted areas with good results. Savings in watering might be made and if applied properly (thinly enough) mulch should improve growing conditions.

From the comments, it is apparent that mulch is considered more as organic matter to be added and incorporated with the soil. Although decayed materials are more desirable than fresh materials, with the exception of sawdust, fresh materials may be used to good advantage, particularly straw and hay, providing care is taken to spread the straw or hay thin enough so that it will not smother the young grass seedlings or shoots. Perhaps the negative observations reported were made where the material was applied too thick. It is rather difficult to get the men to spread the material to the desired thinness. Through proper application the action of mulch is comparable to the thin slat protection practiced by southern nurseries in propagating plants.

Topsoil is not salvaged in Louisiana since it is not considered economical. Topsoil is hauled in with topsoil planting. However, if the salvaging and replacing of topsoil is handled as part of the excavation at the unit price of excavation, the cost is cheap and probably it will be found that considerable grass will volunteer from this treatment, particularly in Louisiana where growing conditions are so favorable.

As to topsoil eroding away when applied 2 in. thick, perhaps loosening slopes more thoroughly before applying topsoil will remedy this somewhat, although there is no doubt that 4 in. is more desirable.

The State's contribution of general comments and of comments on the model specifications for seeding and sodding are very helpful to the efforts of the Committee to develop more complete specifications.