

Highway Materials Research Laboratory
132 Graham Avenue, Lexington 29, Ky.
March 19, 1947

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To: Dean D. V. Terrell
Director of Research

At the January 27, meeting of our Research Board, experiments with mulches for roadside grasses as proposed by a committee of the Highway Research Board, National Research Council, was discussed. The matter - as noted in item 7 of the minutes of that meeting - was directed to Professor Shaver and me with a request by Mr. Cutler that we confer with men in the Agricultural Experiment Station, University of Kentucky, and at our next meeting report on the practicability of these experiments.

On the afternoon of March 7, Prof. N. R. Elliott, Acting Head of the Department of Horticulture at the University, Prof. Shaver, and I had a conference in our Research Laboratory. Prof. Elliott reviewed the proposed experiments, commented on the favorable and unfavorable aspects, and in general made counter proposals which he thought could be correlated with the Highway Research Board objectives but which would be more suited to conditions peculiar to Kentucky.

These suggestions are outlined on the attached sheet, the original of which was prepared by Prof. Elliott. Further discussion of the original proposals and these suggestions appears to be in order before more specific action regarding experiments can be taken.


L. E. Gregg
Associate Research Engineer

LG:k

cc: Research Board Members:
Commissioner Watkins
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T. R. Lannon
H. D. Metcalf
C. B. Owens
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SUGGESTIONS RELATIVE TO DEMONSTRATIONS OF
GRASSES, FERTILIZERS AND MULCHES THAT MIGHT
BE USED ON BACK SLOPES OF KENTUCKY HIGHWAYS

1. Kentucky has several different types of soil that more or less define sections of the State. For example, the Jackson Purchase, in the extreme west part; the Pennyrile in the south central part; the Bluegrass in the central part; the northern section and the mountains of the eastern part. From the soil variations alone it would appear that it would not be feasible to attempt grass growing demonstrations unless one or more would be set up for each section.
2. The climate and rainfall also varies in different parts of the State and these would be factors in the growing of grasses.
3. The fertilizer recommendations for the different sections are fairly well established and for the most part could be given for any demonstration that might be set up in each section.
4. There are certain grasses that could be recommended for each section with a reasonable assurance that they would grow. However, there may be some overlapping even in a section. Generally speaking the following grasses might be used: Bluegrass, Redtop, Italian Rye, some Fescue, Lespedeza and Bermuda in a few places.
5. As to the mulches -
There might be some question relative to the use of sawdust since there would be a possibility of toxic effects in the soil. Wheat straw when held in place should be workable. Burlap when available should be workable. Would not want to say as to the Asphalt Emulsion or Soil Paint because that is untried insofar as I know.
6. Since Kentucky has such a variety of soils and some difference in climate and rainfall it might be worthwhile to give consideration to having demonstrations that would show results from seeding the different kinds of grasses or mixtures at different times of the year.

Prepared by Prof. N. R. Elliott,
Acting Head of the Department
of Horticulture, University
of Kentucky.

HIGHWAY RESEARCH BOARD
Committee on Roadside Development
Subcommittee on Mulches and Ground Covers

August 1, 1946

On July 24, 1946, the subcommittee held its first meeting and drafted a plan for continuing research to discover the best mulching materials, and methods for the establishment of roadside ground cover seeded at all times of the year.

In order to avoid duplication of effort in research work, it was considered advisable that this committee should be composed of representatives not only of the various highway departments, but also of the State agricultural experiment stations.

The research planned is a study, by means of replicated field test plots established each year over a period of at least five consecutive years, of the germination, emergence, and continued growth of various grasses when seeded under or through various mulching materials on highway roadside soils at all times of the year.

It is suggested that considerations be given by the various State Highway Departments which contemplate experimental work of this type to a cooperative arrangement with the State agricultural experiment station for the conduct of the project. This would permit the fullest use of trained personnel in planning details of establishment, taking required data as well as analyzing results and preparing reports.

Title of Project: "The Effective Use of Mulches in Establishing Roadside Grasses"

Objective: To compare different mulching materials and different rates and methods of applying them as aids in the establishment of a vegetative cover on roadsides.

Introduction: Establishing and maintaining a vegetative cover on roadsides, following new construction of highways, presents a special problem because:

1. The removal of fertile topsoil in grading operations creates an unfavorable soil for seedling establishment.
2. Erosion on steep slopes makes it difficult to hold seed, soil and plants in place, and
3. The time of seeding most favorable for the contractor often is an unfavorable season for plant establishment.

In solving these problems, additional information concerning the effect of mulching materials applied at different rates and used with grass seedings made at all times of the year is desirable.

Plan: Use field plots at least ten feet wide and extending from the roadway to the right of way line. In seeding one species of grass to a plot, it will require twenty plots to study four species of grass under four kinds of mulch and one set of un-mulched plots. Replicated four times, these plots will amount to eighty. If similar seedings are made each month from March to October and one in mid-winter, the number of plots will amount to 9 x 80, or 720 plots per year. Where the effect of exposure can be observed by establishing test plots on opposite sides of the highway, the number of plots will be doubled.

Any other variable introduced into this study will, of course require additional plots in each replicated series. Such variables are soil types, rates of application of mulch or seed or fertilizer.

The choice of grass species, the number of species used, the preparation of soil and fertilizer treatment, will be left to the discretion of the supervising engineers of the various States conducting these tests. It is suggested, however, that each State include redtop as one species of grass used.

The following mulching materials are suggested for trial: Asphalt, sawdust, straw, and roadside mowings carrying matured seed. Additional materials may be tested by any State interested in trying other materials. Specifications covering the use of these mulches are given under Test Procedure.

Additional plots may also be added to compare or test the effect of different methods of holding the mulch in place.

Standard practice in these experiments will be to sow the seed before applying the mulch, but additional plots may be seeded on top of the mulch, especially when mulching is done on dates now considered unfavorable for seeding.

In addition, seed and mulch may be applied in one operation by using for mulch mature plants with seed attached.

Measuring Results: Results will be measured by observing:

1. The effectiveness of the mulch in holding seed and soil and plants in place.
2. The influence of the mulch on seedling emergence and survival, and on the subsequent growth of the grass.

Observations or measurements of these results should be made one week, two weeks, and four weeks after seeding and at monthly intervals thereafter during the growing season. The comparative density of the vegetative cover may be classified by assigning to each plot a numerical value ranging from 1 to 5, 1 indicating maximum density. Quantitative measurements of the comparative

stand density of the several different species under different mulches should also be made by means of a point quadrat or other suitable sample device. Each plot should also be observed for any evidence of soil erosion.

In order to evaluate the results, it is essential that the amount, intensity, and frequency of rainfall be measured by means of a recording rain gauge located near the plots. It would also be desirable to measure and record the air and soil temperatures by means of suitable recording thermometers. It might also be desirable to measure soil moisture.

Records and observations are to be supported by a complete photographic record made at each determination period.

Any observed effect of snow cover and frost action should be reported.

Test plots should be protected from fire and insect damage, if possible.

To be of greatest value, the work of making observations, servicing the automatic weather gauges, taking photographs, and keeping records must be done at regular and frequent intervals and at favorable times. This cannot be done unless the observer can make this research his primary work with no other duties which will interfere with it. The Experiment Station may be helpful in finding a competent observer who can be employed by the State Highway Department for this work.

Test Procedure: A strip of roadside, approximately 1000 feet in length and as uniform as possible throughout its length shall be selected for each experiment.

This area shall be divided into nine equal sections. At each seeding date, one section shall be prepared for seeding by adding lime and fertilizer in advance of discing and harrowing. The preparation of the soil for seeding and the corrections for acidity and lack of fertility shall be left to the judgment of the supervising engineer.

Grass seed should be broadcast and harrowed or drilled to the proper depth of seeding and when used under asphalt mulch seed shall be from 1/4 to 1/2 inch below the surface. The rate of seeding shall be left to the judgment of the supervising engineer and shall be uniform for any one species throughout the entire series of plots. Grass seed shall be of high quality and free from objectionable weed seeds.

Plots to be mulched with asphalt should be rolled smooth with a light roller following seeding. The surface shall be slightly dampened before the application of asphalt. Soil paint--a proprietary product which is a specially-prepared asphalt cutback with a specially-selected kerosene--shall be used at the rate of 2/10 gallon per square yard.

Soil paint may be applied at atmospheric temperature or heated to about 165°F., depending upon the ability of the equipment used to produce an even coating of asphalt on the soil surface.

Soil paint for these tests may be procured by placing your order with Mr. Rollin J. Smith, 2531 West 50th Street, Kansas City 3, Kansas. The material will probably be produced in or near your State in accordance with the special specifications developed by the Lion Oil Company and the Texas Company.

Plots to be mulched with straw should be seeded and covered with loose cereal straw, preferably free from grain seed, to an average depth of approximately 1/2 inch, requiring from one to one and one-half tons of loose dry straw per acre.

Plots mulched with sawdust should be seeded and covered with loose sawdust to a depth of approximately 1/2 inch, requiring approximately twenty tons of sawdust per acre.

Plots mulched with seed mulch should not be seeded but should be prepared for seeding and then covered with a roadside mowing, which contains considerable matured seed attached to the mowings, to a depth of approximately 1/2 inch. Samples of seed from such seed mulch should be tested for germination prior to seeding operations to insure the use of mulch containing viable seed.

Sub-Committee Members

- Brown, Dr. E. Marion, University of Mo. College of Agric.,
Columbia, Mo.
- Bruto, F. R., Turf Engineer, C.A.A., 24th Floor City Hall,
Kansas City, Mo.
- Eckert, E. C., Michigan State Highway Department,
Lansing 13, Mich.
- Hottenstein, W. L., Department of Highways, Harrisburg, Pa.
- Musser, Dr. H. B., Pennsylvania State College,
State College, Pa.
- Nolting, J. P., State Road Commission of West Virginia,
Morgantown, W. Va.
- Shisler, E. P., State Department of Highways,
Columbus 13, Ohio
- Turner, E. W., Virginia Department of Highways, Richmond, Va.
- Willard, Dr. C. J., Ohio State University, Columbus 10, Ohio

SAMPLE PLAN FOR SEEDING HIGHWAY TEST PLOTS AT ALL TIMES OF THE YEAR

<u>APRIL</u>				<u>MARCH</u>			
<u>170 feet</u>				<u>170 feet</u>			
Sod	Alta_Fescue Bluegrass Bromegrass Redtop	Alta_Fescue Bluegrass Bromegrass Redtop	Alta_Fescue Bluegrass Bromegrass Redtop	Sod	Alta_Fescue Bluegrass Bromegrass Redtop	Alta_Fescue Bluegrass Bromegrass Redtop	Alta_Fescue Bluegrass Bromegrass Redtop
	Sawdust	Straw	Asphalt		Sawdust	Straw	Asphalt

----- HIGHWAY CENTERLINE -----

Notes:

Make similar seedings in May, June, July,
August, September, October and one in midwinter.

Species of grasses will vary in accordance with
the choice of the operators for different states
and locations, with the exception of redtop which
is to be used in all tests.