AIRFIELDS AND FLIGHT STRIPS

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THE ESTABLISHMENT of adapted grasses and grass mixtures is the most effective and economical means of checking dust and erosion on airfields and flight strips where soil and climate are favorable.

Paved runways, taxiways, and parking aprons of commercial, Navy, and Air Force airfields seldom constitute more than 15 percent of the total surface. Consequently, at least 85 percent of such installations and the entire landing areas of the smaller fields, which are used primarily for light aircraft and private planes, are other than hard surfaced.

To serve the purpose for which they are intended, these unpaved surfaces require inexpensive treatments that will eliminate dust and erosion problems and at the same time provide a satisfactory wearing surface on the shoulders of paved runways and on the entire area of smaller fields. Wear-resistant perennial species of grasses have proved to be most satisfactory for this purpose.

As a result of the excavation, filling, and grading required in the construction of an airfield or flight strip, most of the existing ground cover is destroyed, and a considerable portion of the topsoil is often removed or buried in a fill. The resultant graded surfaces on which a vegetative cover is necessary are usually made up of infertile subsoil materials, on which it is hard to establish and maintain desirable grasses. In contrast to agricultural practice, relatively high rates of seeding are necessary. Heavy applications of commercial fertilizers are essential, especially on infertile soils.

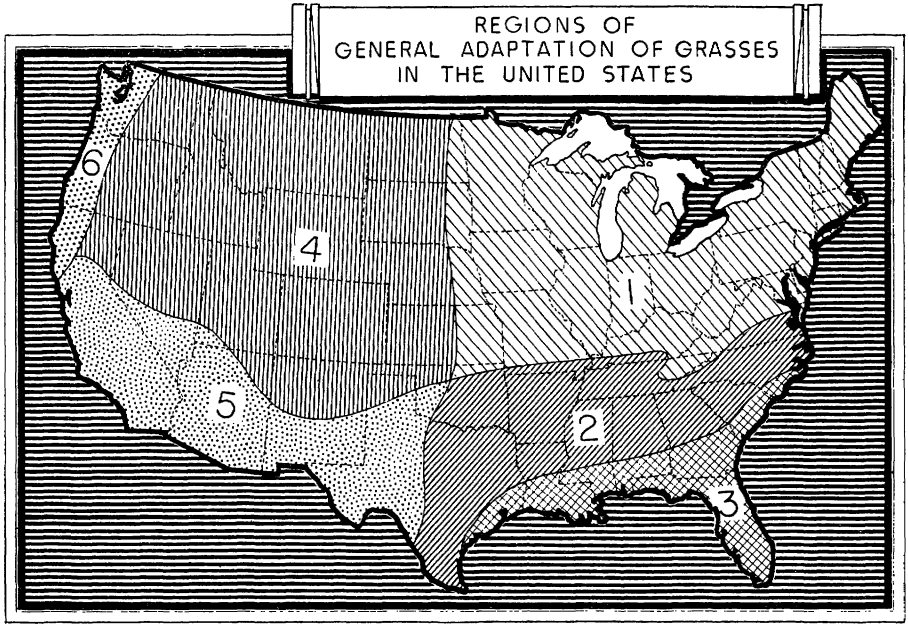
When several sites for a turfed airfield or flight strip are being evaluated, consideration should be given to the one having soil and drainage conditions most suitable for establishing and maintaining adapted grasses.

A well-drained and friable loam or sandy clay loam soil containing at least 2 percent of organic matter is most desirable. A tile drainage system may be necessary for turf production and to facilitate all-weather flying operations. Adequate surface and subsurface drainage must be provided. Construction that ignores these items may cause the failure of an otherwise well-built airfield or flight strip.

Drainage, especially surface drainage, must be considered in areas of relatively low rainfall no less than in humid sections. A soil covered by a dense sod may have as much as four times the water-holding capacity of similar soil that is devoid of vegetative cover. The infiltration rate changes with the type of soil structure, the ground cover, the moisture content of the soil, and the amount of organic matter present. The runoff of surface water from a turfed area is slow as compared to the rapidity of runoff from a bare soil or a paved area. To insure the rapid disposal of surface water from a sodded area, minimum slopes of 2 percent should be provided in construction.

Local soil and climatic conditions will govern the composition of the seed mixture to be planted and the rates and dates of seeding. The most desirable grasses are those that are adapted to local conditions; that can form a dense sod; resist wear, heavy use and abuse, and drought; recover quickly after periods of hard use; bear heavy loads; require relatively low fertility; and be maintained easily and inexpensively.

Few, if any, grasses now available possess all these characteristics, but experiments and field experience have shown that many of the known species of grasses occurring in the United States are satisfactory for use on airfields and flight strips. The sod-forming grasses are most desirable in the areas in which they can be grown.



Grasses generally adapted to the regions are: *Region 1*—Colonial bentgrass, Canada bluegrass, Kentucky bluegrass, smooth bromegrass, Chewings fescue, creeping red fescue, quackgrass, and redtop. *Region 2*—Bermuda-grass and redtop. *Region 3*—Bermuda-grass, carpetgrass, and centipedegrass. *Region 4*—Buffalograss, smooth bromegrass (Eastern), blue grama grass, crested wheatgrass, and western wheatgrass. *Region 5*—Bermuda-grass (under irrigation), Indian ricegrass, sand dropseed, and weeping lovegrass. *Region 6*—Colonial bentgrass, Kentucky bluegrass, Chewings fescue, creeping red fescue, redtop, and perennial ryegrass.

Other species that have proved satisfactory for airfield use are the Zoysias, Lehmann lovegrass, Bahiagrass, kikuyugrass, and tall and Arizona fescues. They and other species are being tested further to see if they can be used more widely on airfields. Several of the recommended grasses are not turf grasses in the true sense and do not form sods, but in the low-rainfall areas in which they are adapted they give satisfactory control of dust and erosion.

In Regions 4 and 5, as indicated on the map, the establishment of turf grasses, such as Bermuda, bluegrasses, and the fescues, is impractical without supplemental irrigation. The wheatgrasses, lovegrasses, sand dropseed, and similar species, however, have proved to be the best of those now available for use in low-rainfall areas.

In the cool humid region of the Eastern States, designated as Region 1, and in Region 6 of the northern Pacific coast area, the bluegrasses, fescues, redtop (and possibly colonial bentgrass in the northern parts of the regions) are preferred for airfields and flight strips. Mixtures of these grasses should be compounded according to the climatic and soil adaptations of the component grasses. Kentucky bluegrass will predominate on the heavier, more fertile soils and the fescues on the less fertile, sandy soils.

Bermuda-grass, the most important grass for vegetating airfields and flight strips in the Southeastern States and as far west as central Texas, may be established by seeding or sprigging. Most success with seeding has been attained by timely planting in the spring. When

immediate germination is required, scarified seed should be used. If seasonal or other factors make it hard to decide which is the better method, a combination of sprigging and seeding is desirable.

In the Bermuda-grass area, where soil characteristics make it necessary to obtain the earliest possible protection against erosion, temporary grasses such as redtop, Sudangrass, cereal grains, and millets are preferable to annual lespedezas. Temporary grasses should be selected on the basis of effectiveness in control of erosion, ease of eradication, and degree of competition with perennial grasses. The tall-growing temporary grasses should be planted in drills spaced not less than 14 inches apart.

The establishment of buffalograss on flight strips and airfields in places where it is adapted has been facilitated by the use of processed seed. The low germination of untreated seed makes its establishment by seeding methods impractical, and planting by vegetative means is generally considered to be too expensive. By the timely spring planting of processed seed, buffalograss will provide a satisfactory cover on an airfield in one good growing season.

Crested wheatgrass is one of the best grasses now available for airfields and flight strips in the Northern Great Plains. Western wheatgrass is considered to be well adapted to the heavier soils where drainage is deficient.

When subject to extremely heavy traffic, the hay grasses, such as timothy, orchardgrass, and smooth bromegrass, are not considered as wear resistant as the sod-forming species, including Bermuda-grass, buffalograss, Kentucky and Canada bluegrass, Chewings fescue, creeping red fescue, and sheep fescue.

From the standpoint of wear resistance, the inclusion of such legumes as alfalfa, red clover, and sweetclover in seeding mixtures for airfields and flight strips does not seem advisable. Annual lespedezas serve well in providing temporary cover during the summer, but generally they do not stand up well under intensive use.

The use of domestic ryegrass in seed mixtures has been a common practice as a means of insuring a quick cover. The competitive nature of this species for available plant food and moisture is such that its presence is usually harmful and interferes with the rapid establishment of the desirable perennial species in the mixture. Where adapted, redtop is recommended in preference to domestic ryegrass for inclusion in seed mixtures where a temporary or semipermanent species is required to provide quick cover. Domestic ryegrass, if it is used, should not be more than 10 percent by weight of the seed mixture. Cereal grains, such as rye, oats, or wheat, as well as Sudangrass, may be used to provide temporary cover and dust control when the grading work is completed during the months when seeding with desirable perennials is not advisable.

Timeliness is one of the most important factors to be considered in all seeding operations. Seedings made out of season are extremely hazardous and usually result in partial or complete failures. In instances when the unseasonal planting of grasses is necessary because of the completion of construction, the use of mulching materials like straw will increase the chances of establishing a satisfactory stand. Successful seedings of perennial grasses may be made in the humid areas in summer when mulch is applied or when supplemental irrigation is provided.

The use of anchored mulch at the rate of approximately 2 tons an acre is recommended with all seedings of dry-land grasses on sites where stubble is not present. In the Northeastern and North Central States, dormant seedings made late in the fall are preferable to late spring seedings.

Sound practices should be observed in regard to the optimum depth of planting. Improperly prepared seedbeds that are not well firmed, plus the deep planting of grass seed, will necessitate many expensive reseeding

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jobs. The use of a seed drill or a seeding attachment on a cultipacker will insure an optimum depth of planting.

If the seed is to be broadcast, provision must be made for covering it; a spike-toothed harrow, cultipacker, or similar equipment can be used. Excessively high rates of seeding will not compensate for faulty planting methods. In seeding, an advantage in uniformity is gained by planting one-half of the seed each way across the airfield or flight strip. The rates and dates of seeding in the humid sections will be governed by local soil and climatic conditions. The rates of seeding in these areas will vary from 40 to 80 pounds an acre, depending on the species included in the mixture. However, Bermuda-grass should be planted at the rate of 10 to 15 pounds an acre. Dry-land seedings are usually made at rates of from 6 to 15 pounds an acre. Irrigation in the establishment of Bermuda and other grasses may be justified in areas of limited rainfall. Irrigated grasses are much less expensive to establish and maintain than mechanically stabilized surfaces.

Irrigation will insure a good grass cover in many areas where it would otherwise fail because of low rainfall or prolonged hot, dry seasons.

The expense of top-soiling airfields and flight strips is seldom justified in the establishment of desirable species of perennial grasses. Frequently the existing surface soil on an airfield site is of no higher fertility than the subsoil material. If it has suitable physical structure, the graded subsoil material, although it may be infertile, can be made to produce a wear-resistant cover by the timely planting of adapted species and the heavy application of commercial fertilizers of the correct analyses.

Top soil also is often high in weed-seed content. The cost of commercial fertilizer represents only a small fraction of the expense involved in the stock piling, hauling, and distribution of top soil. The top-soiling or mucking of runway shoulders at airfield sites where the soil is extremely sandy may be necessary to provide for the economical establishment of grass cover.

If the soil on the site of an all-over turfed airfield or flight strip will not permit the economical establishment and maintenance of perennial grasses without top-soiling, the field should be relocated on an area where soil conditions are more desirable.

Fertilization and Liming

The use of commercial fertilizers in high quantities is essential in both the establishment and maintenance of airfields and flight strips in the humid areas of the United States. Grasses grow vigorously, dominate undesirable weeds, and form dense sods if they are well fertilized and if soil moisture is not a limiting factor. Applications of as much as 800 to 1,000 pounds of a 10–6–4 fertilizer or a fertilizer of similar analysis at planting time is advisable.

Applications of nitrogeneous fertilizers give economical results in the establishment of grasses in areas where its use has not been practiced in agricultural production. Applications of as much as 40 pounds of available nitrogen per acre at seeding time under some dry-land conditions will insure the early establishment of the desirable grasses.

Liming may be necessary on some soils to promote the healthy growth of adapted grasses. If soil tests indicate a need for lime, the required quantity should be applied before seeding.

Maintenance

The proper maintenance of an airfield or flight strip must include timely periodic mowing. The type of management followed on a hay field is not satisfactory in maintaining the intensively used areas on an airfield.

The grass cover on an airport should not be cut to a height of less than 3 inches. It should not be allowed to attain a height which will prohibit the use of a reel-type gang mower in its

maintenance. If most grasses are allowed to grow to mature heights, they do not develop vegetatively and closely knit sods are not produced.

Extremely close mowing inhibits the desirable development of root systems, encourages damage from drought, decreases resistance to wear, and opens the soil surface to damage from propeller blast and erosion.

The frequency of mowing is governed by soil and climatic conditions, as well as the growth habits of the grass or grasses on the field. All grasses should be mowed often enough to permit the clippings to remain on the ground without danger of smothering the grass. If the clippings are allowed to remain on the field, their value as mulch and fertilizer is not lost. Gang mowers have been developed specifically for use in the maintenance of turfed airfields. These mowers can be operated at relatively high rates of speed and will cover six to eight times as many acres in a day as will the conventional sickle-bar mowers.

Annual applications of nitrogen are essential in the maintenance of grass cover on airfields and flight strips throughout the humid section. A minimum of 40 pounds an acre each year of available nitrogen will be required on most soils to maintain the grasses in a healthy condition. If the soil requirements for lime, phosphorus, and potash are fulfilled at seeding time, these elements will not usually be required again for 3 to 5 years.

The control of traffic, removal of debris, timely repair of eroded areas, the renovation of heavily worn or depleted critical areas, the control of weeds, the control of insects and diseases, and required irrigation are maintenance operations which must be attended to promptly on a seasonal basis if the grasses are to be kept in a serviceable condition for their intended use.

Any airfield or flight strip that warrants the expenditure of funds for the establishment of adapted perennial grasses also warrants the expenditure of additional funds to provide practical management and maintenance. A well-established sod represents a sizable investment and unless this investment is protected by timely maintenance operations, the turf soon deteriorates; dust and erosion problems become evident; flight hazards in the form of ruts and gullies develop; weeds become dominant, and expensive renovation and reseeding projects become necessary.

The best way to insure the proper and timely performance of the necessary grass-maintenance work is by the employment of a qualified and experienced grounds-maintenance supervisor. Such an individual will save his salary many times over if labor, materials, and equipment are made available to him as needed for the performance of the necessary maintenance work.

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