

# Plants for Erosion Prevention and Control

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AS THE erosion control program of the federal government and state agencies gets under way and as data from the various experimental agencies accumulate, there is a quite definite increase in the demand for erosion plants. This increased demand is brought about by two factors; first the extensive control program; second, the increased relative demand for plants as the cheapest, most permanent, and most effective means of preventing and controlling erosion.

To meet this demand for the development of erosion plants Erosion Control Nurseries of the Bureau of Plant Industry in the Department of Agriculture were established during the early part of 1934. The purposes of these nurseries are two in number; namely, to supply planting stock (trees and shrubs) for the large erosion control projects of the Soil Erosion Service of the Department of Interior, and to introduce and develop better erosion plants. To supply this need throughout the United States a total of thirteen nurseries, varying in size depending on their regional location and the scope of work needing to be done, were established.

The nursery serving the western part of the corn belt is located at Ames, Iowa. Here a site of approximately eighty acres, furnished by the Iowa State College, is being developed to supply plants for the Soil Erosion Service Projects at Bethany, Missouri; Shenandoah, Iowa; Albion, Nebraska, and new projects that may be set up in this region. First year production contemplates the growing of approximately 13,000,000 seedlings of some 32 different species. The species to be grown are those which have shown themselves to be the most completely adapted to the soils and climatic factors of the region.

The problems to be met in growing such a large number of species for such a diversity of growing conditions are without number. Rainfall in the region varies between 23 and 40 inches. The rate of evaporation from a free water surface or from plants increases as one goes south and west. Soils vary from the typical frequently underlain with a hardpan in the west to those pedalfars of the eastern more

humid part of the region. Distinct areas of sand are also to be found, as are all nature and manner of subsoils. In addition all of the areas to be planted are eroded to some degree so that another planting condition variably enters. With all these variables to consider only the most careful selection of species and the most careful cultural practice and field planting can assure success.

Within this region there are also marked variations in the character and structure of the natural vegetation. Travelling from the eastern part of the region to the western the natural vegetative climax changes from the tall prairie grasses intermingled with areas of eastern deciduous forest to the mixed tall and short grass prairie and in some places to the short grass plains. Planting conditions become more severe toward the west and the number of adapted species becomes smaller. In addition, the role played by grass in the rehabilitation of the western areas become more marked. Species to be used



*Three-year-old Black Locust seedlings used in erosion control plantings.*

in the eastern region include the ubiquitous black locust, walnuts, burr and white oaks, elms, maple, willow, cottonwood and others. Farther west will be used green ash, hackberry, Chinese elm, Siberian pea tree, buckthorn, Russian olive, wild plum, western yellow pine, black hills spruce, red cedar and Austrian pine.

The plants to be used in erosion planting work should be more than plants which will merely prevent or control erosion

and do nothing else. They should have secondary characteristics which would make them doubly valuable to the land owner or to society. For example: An ideal erosion plant would be one which would give an additional return to society through supplying a wood, fruit, or nut need of the farm or market; or through affording wind protection or just an immeasurable quantity of beauty. If it had none of the above characteristics, it might serve a purpose by giving food or shelter to birds and animals, by rebuilding impoverished soils, or by furnishing one of the many products which the plant kingdom normally does. Plants having any of these characteristics as well as being able to prevent erosion are doubly desirable.

At present, the number of plants which are definitely known to be valuable for erosion work is rather small. The reason for this is not that a wealth of plants are not available for this work but rather that many of the plants naturally growing in the region have never been tried. Certain introductions of exotic plants have been made but there has been no conscientious attempt to determine the value of the abundant native species. This is more particularly true of the shrubs and herbaceous plants than of the trees.

One of the chief objectives of the erosion control nursery is to work with the abundant native species and determine their value and uses for this work. Trees, shrubs, grasses and other herbaceous plants will be grown in the nursery under observation. Methods of culture will be determined. All the characteristics of the plant bearing on erosion control or related fields will be noted. These facts plus a knowledge of the plant's native habitat will serve as an index to its value. Once having determined the value of the plant as accurately as is possible in the nursery, field tests of the species in various habitats will be conducted. The end objective is to fit specific erosion planting conditions with plants which will grow and serve a purpose on that site. For example, dry shoulders of gullies call for a species which will penetrate with its roots to water, which will grow under adverse soil conditions such as are presented by a highly calcereous clay subsoil, which will withstand excessive drought, and which will afford protection to the bank and make the conditions favorable for other invading plants to become established. This is indeed a difficult assignment for any plant and none will fill it completely. A canvass of the available plants might, however, indicate that the red cedar (*Juniperus scopulorum*) would be the nearest approach to a perfect plant for this site. On a site such as presented by a sand soil with an extremely low water table and severe climatic conditions, where wind blowouts occur, the only



*Gully planted with Black Locust.*

species to fit the needs of the site might be such sand binding grasses as *Calamovilfa-Redfieldia* or *Sporobolus*.

For each of the many planting conditions encountered it is believed that there is one plant which if more were known about it, would serve a purpose on that site better than any other plant. It is the object, then, of the erosion control nurseries to ferret out this information and determine the value of individual plants.

In making plantings and recommendations for erosion plantings, the ecology of introduced plants and of the native species in the region should be given full consideration. If mixtures can be used successfully many areas will be planted to mixtures of a variety of species. Such plantings are frequently more satisfactory in the long run and are the general rule in nature. A complete erosion planting on an area might consist of trees or shrubs to give top cover and deep root penetration while underneath would be placed some shade tolerant grass or herbaceous annual or perennial affording a sheet cover to the soil. On other areas by virtue of extremely unfavorable habitat factors the margin of existence for an erosion plant may be so narrow as to exclude all but one species.

One of the largest problems faced by conservation forces concerns the rehabilitation of land on which grass was the climax vegetation and which it seems desirable to return to

native grass because of wind erosion or overgrazing. The problem is an acute one because introduced tame grasses are not well suited to the areas and because so very little is known about the habits of the native grasses which originally grew there. The biggest part of the problem of using native grasses is in finding a satisfactory method of propagating them on a large scale. Practically nothing is known about the seed habits of the native grasses, how much seed is produced, where to collect it, how to get it to grow, what the germination percentage is and lastly how to collect or harvest and obtain it as pure seed. Before field tests of the species can be carried out on various sites these preliminary questions must be answered. From collections made by the Ames nursery last fall and from threshing and cleaning tests made during the past winter some valuable information on many of the native grasses, chief of which are blue grama grass (*Bouteloua gracilis*) and big bluestem (*Andropogon furcatus*), has been obtained. Further tests are now being carried out to determine whether there is not some collecting and cleaning method available for the native grasses which will allow these species to be collected in quantities large enough to return extensive areas of former grassland to native sod.

Of the many native plants which might possibly be used for erosion work, there are undoubtedly certain individuals of a species which are slightly different and have characteristics which would make them better or worse, as the case might be, for a given purpose. Those variations may be due to the environment or perhaps to a different combination of genes in the plant, but if they are such that they can be recognized by a trained person such plants make valuable introductions for agencies seeking better plants. To illustrate the point, various plants in nature may have one of the following characteristics: slow growth, small or inedible fruit or seed, dull colored foliage, or flowers, low production of resins, gums, or alkaloid substances frequently produced by plants, etc. If, then, of a species possessing any of the above characters, a variant were found, having a characteristic such as rapid growth, large or tasty fruit or seed, bright, beautiful, harmonious foliage or flower, or yielding high of resins, gums, or alkaloids, the variant would be extremely valuable and methods would be worked out for propagating it vegetatively, so that its desirable character would not be lost. Such variants frequently occur in nature and close observation or a little experimentation will frequently reveal them. In such a way new plants having greater economic value are brought into common usage.

Summarizing briefly then the purpose of the erosion nurseries is to grow plants for erosion prevention and control planting.