

ECOLOGY

Native Plants Feel Drought

Tree Leaves Small; Wildflower Blossoming Forced; "Crop Failure" Looms for Some Wild Plants

DROUGHT is taking its toll of wild plants as well as of cultivated crops, but on the whole it is hurting the wild plants less. This is true whether the plants are native grasses, other herbs, or trees. Their longer roots reach to lower soil levels where there is still available moisture, and thus they survive while the shorter-rooted introduced crop plants, which are less well adapted, perish.

This is the consensus of telegraphic reports obtained by Science Service from half-a-dozen well-known botanists occupying strategic points in the prairie region of the Midwest. There the drought is now reaching its most critical stage, after burning out the small grains and pastures in the Dakotas and other Great Plains farming regions to the west. Present drought conditions were ascertained in Oklahoma, Nebraska, Iowa, Minnesota, Illinois and Ohio.

The greater drought-resisting powers of native plants may be of considerable practical interest in future agricultural planning for drought-labile regions, particularly in view of Secretary of Agriculture Wallace's repeated recommendation that excess grain acreage should be put into permanent grass. Especial point is given by the fact that where grasses have been drought-killed, the introduced shorter-rooted species have always perished first, while the deep-rooted native plants survive.

Native trees in the drought area also have been able to "take it" with greater endurance than have planted trees in groves and along streets. Some of the latter have died, but relatively few native trees have been killed, and those only in the more exposed places. Even native trees, however, are not escaping unscathed. In general, their leaves are smaller and scantier this year than normal.

Early spring flowers in the woods had their blossoming season forced, rushing through flowering and seed production from two to three weeks ahead of their usual dates. Many plants of later spring and early summer have suffered an apparent "crop failure": they have been dwarfed and are impov-

erished-looking, and have either failed to blossom or to produce seed. Some of the shallower-rooted wayside weeds are already dead.

Underground, the available moisture which serves plants for life and growth is slowly ebbing to deeper and deeper levels, as the desperate roots suck the last drops out of the upper soil. When the level of available moisture sinks beneath the deepest root-point of any given plant, that plant is doomed. In drought, the survival of the fittest means, to a very large extent, the survival of the deepest-rooted.

Nebraska: Roots Determine

The moisture-bankruptcy of the soil is, of course, very unevenly distributed. In general, however, it is most severe where the midwestern prairies merge upon the Great Plains, becoming less menacing toward the eastern prairie borders.

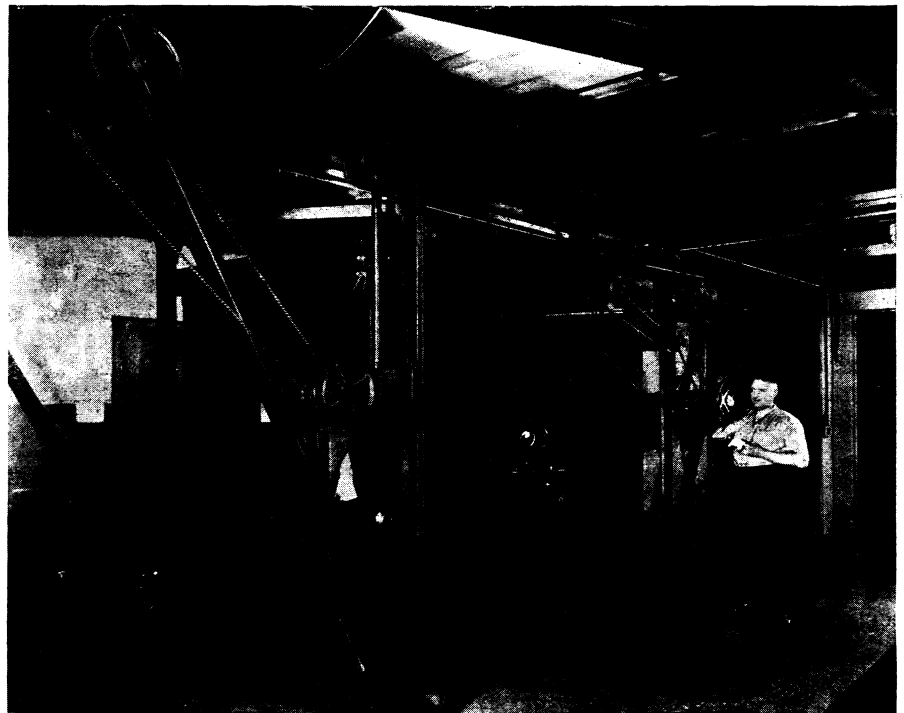
Native prairie grasses with roots four to ten feet deep have withstood continuous drought from April until the present time, Prof. J. E. Weaver, Lawrence Stoddard and William Noll, of the University of Nebraska, report.

Now, however, folded and rolled leaves are appearing on these grasses, in upland habitats.

Other prairie plants are showing the effects of the drought largely in proportion to the length of their roots. A shallow-rooted species of "everlasting," or "ladies' tobacco," is completely dried. Contrasted with this are a wild rose and two other prairie plant species with roots twelve to twenty feet deep, which are quite unharmed.

Another striking contrast appears between two sister species of the brilliant-flowered plant known as the blazing star. One, with taproots boring into the soil for seventeen feet, is still thriving; its relative, with shallow roots, is wilted and dying.

Available water in the soil has decreased markedly in the last two months.



GIANT CAMERA

This structure, not unlike a railway trestle, is a camera capable of great precision allowing the Coast and Geodetic Survey to reproduce chart revisions so accurately that they fit precisely into place on the chart of a survey. The plate-holding end is made into a darkroom so that the huge negatives can be exposed and developed without plateholders.



LIGHTNING

an address by

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Wednesday, June 20, at 3:30
p. m., Eastern Standard
Time, over Stations of the
Columbia Broadcasting Sys-
tem. Each week a prominent
scientist speaks over the
Columbia System under the
auspices of Science Service.

In the Carrington loam, a Central Nebraska soil type, there was in April 24 per cent. of available moisture in the top foot of soil. Now there is no available moisture at all to a depth of eighteen inches. Nevertheless, there are no cracks in this soil, as there are in cultivated fields, and from five to eight per cent. of available moisture can be found down to and beyond the six-foot depth.

The water content of the commonest upland grass was 80 per cent. on May 1, and is down to 48 per cent. now. Other species show similar declines.

The osmotic pressure of the cell sap of this grass, which is a means of measuring its "thickness," increased from nine atmospheres on May 1 to 12 on May 15. On May 24 it was 25 atmospheres, and on June 5 it reached 38. Grama grass sap shows osmotic pressures of from 21 to 49 per cent. The highest previously recorded pressure during drought was 30 atmospheres.

But when parched areas are given water the plants recover quickly, showing their great resistance to drought.

Iowa: Half-Size Plants

Some 25 native prairie plant species, growing on a still unplowed fragment of the old original prairie, were found to be dwarf, feeble and sterile, by Prof. H. S. Conard of Grinnell College. Yet none were killed out. Adjacent to this patch were other prairie plants, doing a little better: such typical prairie species as lead-plant, tickseed and cone-flower were only half size, but in bloom. Wild roses were normal. In a dry pasture there was abundant wild verbena in bloom, though again only half size, and nothing else growing at all. The

least advantage of slope or exposure shows plainly, Prof. Conard noted. All plants are much ahead of the season.

The leaves of trees in central Iowa show various responses to the drought. Native species are not dying, unless they were previously diseased. Planted white pine and arbor vitae, however, are mostly dead, and fir and spruce show injury. Walnuts have only half the usual number of leaves, and those only half the usual size. Elm leaves are thin, black oak leaves very thin. But oak, however, which is the typical dry-land oak of the prairies, has normal leaves. Surprisingly, several cypresses growing on the Grinnell College campus are thriving, though their normal habitat is swampy soil.

At Eldora, in northeastern Iowa, Prof. Conard found sugar maples dried down to a fourth of their normal foliage. There were many dead birches, and the white pine, which here reaches the southwestern limit of its natural range for the United States, was looking sickly.

Under the trees, hepatics were growing, but only to half size. Ferns were few, but nearly normal. Mosses were bone dry, but probably still alive, for mosses are hard to kill.

Minnesota: Native Trees Live

In central Minnesota forest trees in their natural environment have not died to any great extent on account of drought, but have shown surprising resistance, Prof. William S. Cooper of the University of Minnesota reports. In very many cases, top branchlets have been killed. Leaves of all trees are unusually small, and many are curled. The elm seems to have suffered most. Windbreaks on prairies and other planted trees have suffered severely; many are entirely dead. This is the culmination of the effect of several years' drought.

Native perennial plants are universally small and starved in appearance. The general impression is that the number of individuals is less than usual.

Carlos G. Bates, forester at the University Farm, St. Paul, at present in the field near Cass Lake in northern Minnesota, reports that death of trees from drought throughout this region is mostly confined to planted trees. In North Dakota groves have been dying through several years of drought, but principally species not native to the region.

In southern Minnesota and Wisconsin oaks and other native hardwoods

have suffered during the past two years, mostly in pastures. As result of dry winds this spring, white pines, Scotch pines and Norway spruces, all planted trees forty to fifty years old, in the same region suffered very badly, but loss in native trees shows no sharp increase as yet.

Northern Minnesota east to Cass Lake is dry enough to affect young plantations and wither shoots on most hardy shrubs, but losses in native trees affect only those weakened from other causes.

Illinois: "Forced" Wildflowers

Trees in northern Illinois and adjacent parts of northern Indiana and southern Michigan show no effects of the drought, states Prof. George D. Fuller of the University of Chicago. Their foliage is good, and seed of elm and river maple are very abundant.

Spring flowers, such as Dutchman's Breeches, are maturing very rapidly and about three weeks ahead of their ordinary season.

Other woodland vegetation is in average condition except for frost and fire damage. Heavy frost in late May damaged swamp and bog vegetation. Fires in the dune area have been numerous and destructive.

Grassland is suffering somewhat, with plants wilting and turning yellow in prairies and roadside areas. Grasses on the Lake Michigan dunes are normal. During the very hot days flowers have matured with great rapidity. This was very noticeable in the wild crabapple, where the floral display was for a few days only.

At the opposite sides of the true prairie region of the Midwest, Oklahoma and Ohio have "nothing especial" to report about the effects of drought on native vegetation. Glenn C. Couch of the University of Oklahoma wires that in his state both crops and native plants are for the most part not yet seriously affected. Prof. E. N. Transeau of the University of Ohio reports similarly, that "permanent injury of natural vegetation is very doubtful in Ohio."

Science News Letter, June 16, 1934

The name of the Bureau of Standards, in the Department of Commerce, has been restored to its original form, the "National Bureau of Standards."

Temperature for the next 24 hours can be forecast accurately four out of five times for certain sections of California, says a Weather Bureau scientist.