

ENVIRONMENTAL IMPACT OF HERBICIDES ON ELECTRIC TRANSMISSION LINE RIGHTS-OF-WAY¹

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In 1972 Edison Electric Institute began a long-term study on the environmental impact of frequent herbicide application to electric transmission line rights-of-way. Transmission line areas at nine locations were selected: New Hampshire, New Jersey, West Virginia, Virginia, Georgia, Louisiana, Minnesota, Oregon and California. This distribution provided nationwide coverage with the heaviest concentration in those areas where herbicides are most used for vegetation control.

The study areas in each state consist of a two-mile section of right-of-way where the spraying history is known. Each study line has nine permanent study plots representing moist, average, and dry sites.

In addition, in each state studies were made of plant communities on adjacent unsprayed old fields. These off-right-of-way areas were used for comparing the artificial line communities with natural plant communities.

Plant Community and Aesthetic Study

For each study area a vegetation map was constructed showing those plant communities now present. Similar maps were also made of plant communities on unsprayed old fields. These maps give the boundaries of the herbaceous communities currently occupying the site, and the exact location, species and height of shrubs and woody plants.

During mapping note was made of the occurrence and abundance of noxious weeds that might serve as an objectionable seed source for nearby agricultural lands. Plants poisonous to livestock were also identified. Partially-killed material was recorded, as well as open and eroding soil.

Permanent photographic stations were established at many points so that a regular series of photographs could be obtained to follow seasonal changes as well as gradual changes in vegetation from one year to the next.

Results

Although there were differences between each geographic area, there were many similarities in the pattern of vegetational change from using herbicides over a decade or longer.

Plant communities on blanket-sprayed rights-of-way differed markedly from communities on unsprayed areas. Herbicide communities are generally less dense and poorer in the number of perennials, particularly the showy summer and fall wildflowers, when compared to unsprayed old fields. Between each blanket spraying re-invasion of perennial plants begins, but is interrupted again by the next spraying. In those areas where picloram is used re-invasion is slower than where phenoxies are used. It was interesting to note that the spring wildflower population was similar on both line areas and old fields. As many of these plants complete their life cycle prior to the spraying season they are less affected by the spraying program.

Where selective spraying is used, due to the smaller area actually treated by herbicide, there is much closer correlation between line communities and adjacent old fields.

Present plant communities on blanket-sprayed areas are largely composed of species somewhat resistant to herbicides. Orderly changes are gradually taking place in the communities now present. Competition is severe between existing communities. The more resistant plants now present on these line areas are gradually spreading and driving-out other more sensitive species. Thus, over a long period a "herbicide climax" will develop and dominate these areas. This climax is made up of plants favored by the herbicide treatment.

On selectively-sprayed areas the climax community that develops will differ in several ways from blanket-sprayed areas. Selectively-sprayed areas often contain a nucleus of showy shrubs that spread rapidly. Therefore, selective

1. Presented at the 50th International Shade Tree Conference in Atlanta, Georgia in August 1974.

spraying eventually results in line areas dominated by shrubs.

There are indications that blackberry communities, so disliked by line maintenance personnel, and so prevalent on upland line areas, are gradually being replaced by communities of mixed grasses and ferns. Blackberries initially invade open soil at the time of line construction. The gradual decrease in the amount of blackberry is aesthetically desirable since during the dormant season blackberry canes are unsightly and provide little protection to the soil.

Plants and communities spreading most rapidly at present are those that invade by vegetative means, particularly those that occupy new areas by root extension. This includes many perennial grasses such as broomsedge, hay-scented and bracken ferns, ground pines, such shrubs as sweet-fern, and some herbaceous perennials including whorled loosestrife.

Our studies show that sprayed line areas are not invaded by noxious weeds, and are thus not a seed source of weed seed for adjacent agricultural lands. Comparison of line areas with adjacent old fields indicates that noxious weed abundance is comparable with that on adjacent old fields, or much less in many instances. Periodic blanket sprayings evidently control noxious perennial weeds and keep them from re-invading.

Poison ivy was extremely rare on Eastern lines, even where it made up a major part of the vegetation on adjacent fields and woodlands. Poison oak in Oregon was prevalent on selectively-sprayed line areas, and appears to be spreading under their selective-spraying program. This could easily be controlled, if poison oak is included among the target species in their operations.

Only a few partially-killed woody plants were observed on these line areas. Due to the method of ground application by some operators, woody plants on the margins of the right-of-way were killed only on that portion facing the direction of spray application. On wet sites where dense vegetation protects the lower portions of small trees or shrubs, partial-kill was occasionally observed.

Color retention on line areas is better in southern locations due to the longer growing season and the short mild dormant season.

Southern lines areas also usually contain scattered evergreens to add color during the dormant season. Snow cover, however, conceals the browned vegetation in Minnesota and New Hampshire during the long dormant season.

Moss and lichen communities, usually not noticeable during the growing season, are very important in adding green color to line areas in open winters.

Wildlife Potential of Right-of-way Communities

In studying the value of right-of-way plant communities for wildlife, first the major game species in each of the study areas was determined. This was necessary since what is good for one animal may not be good for other game species. You cannot make a general statement that a particular plant community is good for all animals, as food and cover preferences vary widely. The three major game species in each state were determined by contacting the State Game Commissions.

The initial plant community study maps were used in evaluating the potential use by the major game species. To obtain the wildlife potential of each plant community, the ratings in *American Wildlife and Plants—A Guide to Wildlife Food Habits* by Martin, Zim and Nelson were used. Nearly all plants and shrubs are included in this standard reference, with a rating of their use by each species of wildlife—song birds, game birds, and mammals.

Using this information each plant community on these vegetation maps was given a rating for each of the three major game species. If two or more species of plants made up the community, then an average rating was used. This produced a series of colored overlays that quickly define the value of each study area community for the major game species.

Comparison of overlays for plant communities present on the unsprayed old fields with the communities present on line study areas showed that line area communities are comparable, or often superior, to the old fields for wildlife. This superiority can be explained by the high numbers of grasses and herbs present as a result of herbicide spraying, thus keeping succession at a lower stage than on old fields.

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