

INSECT AND DISEASE CONDITIONS
MAMMOTH CAVE NATIONAL PARK, KENTUCKY

By

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ABSTRACT

Aerial and ground surveys of the 51,000-acre Mammoth Cave National Park were conducted May 18 and 19, 1970. A wide variety of insects and diseases were observed on the Park including pine sawflies, *Fomes annosus* root rot, Dutch elm disease and various heart rots. The only agents currently requiring remedial action is a *F. annosus* infection center in a shortleaf pine stand and the occurrence of Dutch elm disease in two winged elms found on the grounds of the Park Headquarters.

INTRODUCTION

Discovered in 1799, the Mammoth Cave National Park was set aside in 1938 for the enjoyment and education of the public. Since that time the recreational facilities have been constantly improved and presently include a modern motor hotel, dining room and gift shop. More than one million visitors are expected to visit the cave this year.

The Mammoth Cave National Park occupies approximately 51,000 acres of characteristic karst topography in west central Kentucky. The forest cover is composed predominately of oak-hickory-pine types with eastern red cedar, the dominant pioneer species on the numerous old fields within the Park boundary.

Aerial and ground surveys for the detection of insect and disease conditions were made on the Mammoth Cave National Park on May 18 and 19, 1970 by P.J. Barry, Division of Forest Pest Control. John Rogers, Park Ranger, assisted in both phases of the survey.

SURVEY METHODS

On May 18, 1970 a 100 percent aerial sketch-map survey was made of the 51,000 acres within the Park boundary. A Cessna 206 aircraft flying approximately 1,000 feet above the terrain at an airspeed of 100 mph was used to fly east-west flight lines spaced one mile apart. Observers plotted all trees showing symptoms of insect or disease attack within a one-half mile strip on either side of the flight lines (Fig. 1).

The ground survey was performed immediately upon completion of the aerial survey. Samples collected from suspected diseased trees were returned to the laboratory for culturing.

RESULTS

INSECT CONDITIONS - The Virginia pine sawfly, *Neodiprion pratti pratti* Dyar was found to be causing heavy defoliation of shortleaf pine, *Pinus echinata* Mill. and Virginia pine, *P. virginiana* Mill., in scattered pine stands over the Park. The defoliation this year has increased over that of last year and has also spread north of the Green River. It was also evident that most of the sawfly larvae had pupated prior to the survey. Another insect observed during the ground survey was a leafhopper feeding on honey locust, *Gleditsia triacanthos* L.

DISEASE CONDITIONS - A survey in May 1969 confirmed three infections of Dutch elm disease, *Ceratocystis ulmi* (Buism.) C Moreau: two trees on the rear lawn of the Park Headquarters and one in the hotel parking area (Cordell *et al.*, 1969). This survey evinced two new infections of the disease in winged elm, *Ulmus alata* Michx. on the rear lawn next to the trees found infected on the previous survey. Typical *C. ulmi* graphium spore stages were identified in the laboratory cultures made this year from samples collected during the ground survey. The smaller European elm bark beetle, *Scolytus multistriatus* Marsh. was not found present in the two infected trees detected during this survey.

An established annosus root rot, *Fomes annosus* (Fr.) Cke. infection center on the southwest boundary of the Park near Silent Grove was re-examined and found to be causing increased mortality in the shortleaf pine. There were 25 dead standing black tops (trees without needles), three reds and five fading shortleaf pines observed in the area. This is a loss of eight trees in one year to the root rot.



Fig. 1 Aerial Survey of May 18, 1970.

Fomes rimosus (Berk.) Cke. a heart rot of living black locust, *Robinia pseudoacacia* L. was identified from conks taken from living and dead trees. The trees were located behind the Ranger residence.

DISCUSSION

The aerial survey revealed very little insect or disease activity on the Park. The pine sawfly defoliation and the *F. annosus* infection center were the only visible symptoms of activity observed from the air. Ground observations revealed a general occurrence of oak dieback-decline symptoms. This is currently widespread throughout the oak type in the eastern United States. This problem has been attributed to a combination of physiological, climatic and biological factors (Staley, 1965; Nichols, 1968). One very obvious contributing factor on the Park is the shallow soil and limestone hard pan.

This year's defoliation of shortleaf and Virginia pine was heavier and more general than the previous three years. However, it is not felt to represent a serious threat to the pine at this time. The Virginia pine sawfly is an early spring defoliator and consumes primarily the old foliage leaving the current year's foliage to provide for the tree's photo-synthetic needs. Under conditions of repeated defoliation of over-matured trees under moisture stress, this insect can cause mortality. With conditions on the Park as they are, e.g., the relatively wet winter and spring and the age class of the pine defoliated, this insect should not cause losses.

Dutch elm disease was again cultured from two trees on the rear lawn of the Park Headquarters. These two trees were close enough to the infested trees found last year for the disease to have been transmitted through root grafts. Local spread frequently occurs in this manner. The primary means of *C. ulmi* spread is by elm bark beetles, the small European elm bark beetle (*S. multistriatus* Marsh.) and the native elm bark beetle, (*Hylurgopinus rufipes* Eichh.). This disease represents an immediate threat to the numerous elms in the Park Headquarters and Visitor Center area.

Pine mortality continues to occur in the *F. annosus* infection center near Silent Grove on Highway 70. Eight new infected trees were found this year. This makes a total of 33 dead and dying pine over a period of four years. This disease undoubtedly poses a serious threat to the remaining trees in the natural shortleaf pine stand.

F. rimosus, a heart rot of living black locust, does not normally cause mortality. However, the loss of five infected black locust behind the Chief Ranger's living quarters is believed to have been caused by a combination of factors. The shallow soil with a limestone hard pan characteristic of the area and an extended period of dry weather during late summer last year are two important factors involved.

The leafhopper damage to the honey locust is usually cyclic and should not affect the trees next spring.

RECOMMENDATIONS

1. There is no direct control method available for Dutch elm disease. The most effective type of control for the disease is sanitation of dead and/or diseased elm wood.

Sanitation involves the destruction of all dead and diseased elm wood in the area to be protected. This action eliminates breeding places for the elm bark beetles and helps to reduce their populations. Therefore, the two infected elm should be cut and burned immediately. In no case, should any of the cut wood be left in the area for any period of time.

The stumps should be treated with ammate crystals. Also, frill the primary lateral roots at the root collar and apply ammate crystals. Apply the ammate as a liberal coverage to the stump surface and the frills. The ammate should kill the stump and, thereby, prevent local spread of the disease through root grafts.

2. No direct control method has proven to be effective once *F. annosus* gains entrance into a pine stand. The best method of controlling spread is to treat any freshly cut green pine stumps with borax. The stumps should be cut as low as possible and the duff removed from the root collar to promote rapid drying and dying of the stumps.

The borax should be applied to stump surfaces of cut pine as soon after felling as practicable. Treatment should not be delayed for more than two days for most efficient use. The best method of application is to sprinkle material "salt shaker" style on the freshly cut stump surface. Apply only enough borax to lightly cover stump surface. At proper rate of application, one pound of granular borax will adequately cover 50 square feet of stump surface; that is 260 six-inch stumps.

3. Applied control of the sawfly population is not recommended. Unless severe defoliation occurs again next spring in conjunction with drought conditions, the effects of the defoliation is expected to be negligible.
4. No control is recommended for *F. rimosus* on black locust or the leafhopper on the honey locust.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

REFERENCES

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