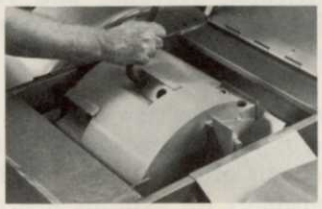
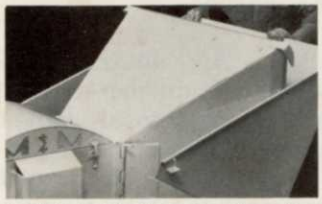
More than 120 years of manufacturing experience goes into every Mitts & Merrill Brush Chipper



Double-edged knives staggered around the large 16-in. diameter solid steel rotor provide smooth, efficient cutting without an external flywheel. Easily accessible.

Telescoping discharge chute rotates to give maximum flexibility to fill dump boxes. An adjustable bonnet at end of the chute controls direction of discharge.



Feed chute folds to enclose the cutter chamber during storage or transportation. It is side hinged so it may be swung away for easy access to cutter chamber.

For 30 years Mitts & Merrill Brush Chippers have been considered the standard of the industry by many buyers. That's because, over 120 years of engineering and manufacturing experience goes into each unit. This reputation for excellence has won for our Brush Chippers international recognition . . . has helped us maintain and build our market position.

And, over the years, we have modified and improved our chippers. Some of our design features and available options are given below.

For further information on the various models of M&M Brush Chippers, write: Mitts & Merrill, Inc., 109 McCoskry, Saginaw, MI 48601 or Phone 517-752-6191.

Other standard features . . .

- Safety-lock pin helps prevent the accidental throw-out of knives not properly tightened.
- All steel rotor made in segments from steel plate and supported by ball bearings.
- Double-edged knives provide twice the cutting time between sharpenings.
- Easy loading is provided by the wide-angle feed chute which is free of obstructions.
- Tubular steel frame and torsion spring axle assure excellent roadability . . . rigidity.
- Integral rotor blower forces chips through discharge chute.

Optional features . . .

"Sound Conditioning"* to reduce noise level • Torque converter reduces shock loads on engine • Engine tachometer to determine optimum rpm • Engine hour meter for positive maintenance schedules • Electric wheel brakes for towing at highway speeds • Flasher warning lights for increased visibility • Engine side panels • Fuel gauge • Ignition cut-off switch from feed chute • Solinoid idle control at feed chute

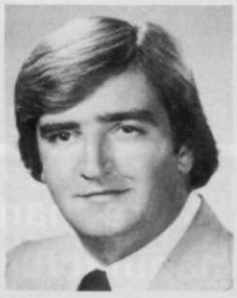
mitts & merrill — subsidiary walco — walco national corporation

109 McCoskry St., Saginaw, Michigan 48601

People on the Move

Jacobsen Manufacturing has named **Roger J. Thomas** as vice president, International Sales Operations for the Turf Products Division. The promotion comes as part of the Division's Forward Business Plan to increase the international segment of their turf business. Thomas will take charge of developing worldwide sales distribution and coordinating international product planning, service, training, advertising and engineering. He began with Jacobsen in 1947. **Gary Foote** has joined Jacobsen as a field sales representative for the Turf Products Division. Based in Fort Lauderdale, Fla., he will serve Jacobsen's Southeast region, which includes North Carolina, South Carolina, Florida, Georgia, Alabama, Tennessee, and Kentucky. **Jeffrey D. Pinnow** has been appointed General Parts Marketing Manager of Jacobsen's Parts Division. He will have overall responsibility for the development and implementation of parts marketing activity, merchandising, and sales cataloging, as well as planning strategies to satisfy the current and future needs of Jacobsen Parts Division and its customers.

Foote



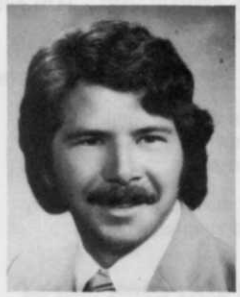
Gaumer

Neil Strong has been promoted to manager, Sales Service of the Logistics Department for CIBA-Geigy. He joined CIBA-Geigy as a sales representative in 1970 and was promoted to sales service coordinator in 1973.

The Davey Tree Expert Company has named **George M. Gaumer** as assistant advertising manager. He will be responsible for Davey Tree's national Yellow Page listings and direct mail advertising program. He will also work in developing national and local media advertising and marketing research studies.

Mario D. Federico, president of Firestone Tire and Rubber Company has been appointed to the board of directors of the Musser International Turfgrass Foundation. He expressed deep interest in the goals of the foundation, particularly the aspect of problem solving through grants to exceptional graduate students working for their advanced degrees at turf-oriented universities. Other recent appointments to the board are **John J. Weinberg** of South Africa and **J. Nakatsukasa** of Tokyo, Japan. Weinberg deals in building and hardware and in professional turfgrass machinery. Nakatsukasa is managing director of the Mikuni Shoko Co. Ltd. His firm represents several well-known American and U.K. firms which deal in irrigation and turfgrass equipment.

Gray



Hurley

Pinnow

Lofts Pedigreed Seed has announced the appointment of **Richard H. Hurley** as Director of Research and Development. He will be in charge of Lofts research and development of all new varieties and will be Lofts' contact with universities. He is a member of the American Society of Agronomy, the Crop Science Society of America, the Weed Science Society of America, and the Golf Course Superintendents Association of America, as well as many other organizations.

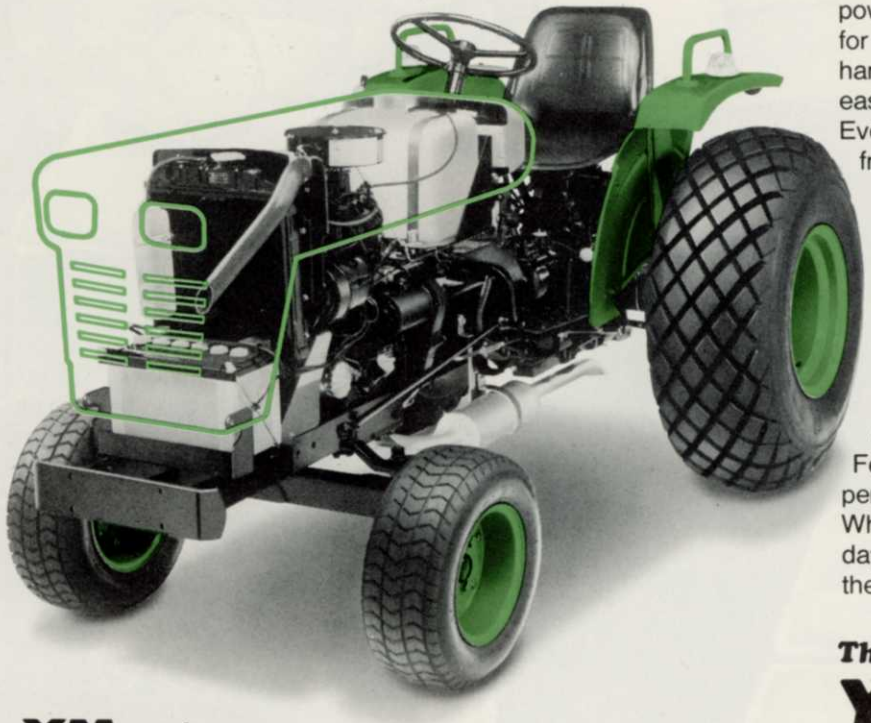
Kitten & Bear Chemicals, St. Louis pesticide formulator, has announced the company's new marketing organization. Area sales representatives are: **Warren Rickards**, New England; **Jim Harris**, Carolinas, Georgia, Florida; **David Cline**, Alabama, Mississippi, Tennessee; **Kerry Rothstein**, Michigan, Indiana, Ohio, W. Virginia, Kentucky; **Bern Karsch**, New York, New Jersey; **Randy Butcher**, Texas, Arkansas, Oklahoma; **John Martin**, Texas; **David Lester**, California, Arizona, Nevada; and **Ray Schroeder**, Special Pest Control Industry Representative.

John R. Froines is the new director of OSHA's office of Toxic Substances. As the first director of this office, Dr. Froines has primary responsibility for assuring that applicable standards are developed to protect workers against toxic substances found in the workplace. Prior to this appointment, he was head of the Vermont Health Department's Division of Occupation Health, and has lectured extensively on epidemiology and occupational health.

Dick Gray has been promoted to executive technical representative of the ProTurf Division of O. M. Scott & Sons. He has been a ProTurf technical representative for four years and handles sales in central Indiana. Prior to joining ProTurf, Gray was the superintendent at Crooked Stick Country Club in Carmel, Indiana.

PMC Corporation's Agricultural Chemical Group has announced a number of changes within the northeast department. **James J. Rife** has been named area manager for Indiana and Michigan. **Steve M. Barry** has joined the department as a sales representative in Virginia, and **Neil DeStefano** will assume sales responsibilities for the eastern part of New York. FMC is headquartered in Chicago.

All the features. Without the fat. The Yanmar over-achievers.



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REVEGETATION

Putting the Puzzle Back Together

Revegetation is more than putting the pieces of a puzzle back together. In the case of strip mining, land can rarely be restored to its original state. It is a compromise based on the extreme need for energy in the United States today.

Reclamation of surface mined land is not new, but the number of acres entailed, their location, and how the spoils affect revegetation efforts are.

In North Dakota an estimated 20,000 acres per year will be disturbed by surface mining. It is predicted that more than a tenth of western North Dakota will be mined. Most of this land (50-60 percent) is now used as range for cattle, vegetation consisting primarily of cool and warm season grasses.

The states of Montana, Wyoming, New Mexico and North Dakota have become the preferred areas for strip mining because coal is in thick veins not far from the surface, the coal is relatively low in sulfur, there are fewer natural and man-made obstacles, and fewer people are affected. Data from the Department of Interior show a savings of 30-50 percent over eastern strip mining.

These western states have written laws to prevent abuse of natural resources by mining companies. Regulations in general require that the productivity of the land be restored , the contour of the land be preserved, and erosion and water pollution avoided. It is not known at this time whether these requirements can be met. Research has been taking place since 1970 to determine this.

Perhaps most perplexing at this point is the difference how mine spoils respond to revegetation efforts in the west as opposed to in the Appalachians and the midwest. The extra pressure from regulations is forcing mining companies to develop permanent, not just temporary, measures for revegetation.

The grasses present in the west apparently cannot get reestablished by mere chemical alteration of spoils. Research is showing that a layer of soil must be placed over the spoils to provide adequate water absorption (infiltration), prevent salty spoils from sealing out moisture, and to avoid runoff problems. Limited rainfall, roughly 15 to 20 inches per year, with little in summer months, may create the need for irrigation for the first two to five years after reseeding.

Surface soil must be stockpiled during mining operations and replaced over spoils after the coal is removed. Continuous fertilization is required due to a general lack of phosphorus and nitrogen in range soil. In the east, woody material cleared during mining could be chipped into a suitable mulch. Very little woody material is available in the west and soil is the only mulch available.

Researchers have been experimenting with different depths of soil over spoils. Optimum depth seems to be in the neighborhood of 30 inches. However, with time the high salt content of the spoils appears to migrate upward into the soil layer making water uptake by roots difficult.

Gypsum has been mixed with both spoils and soil to reduce the sodium content. Leaching the sodium out by natural rainfall is unlikely and leaching by irrigation is expensive.

Reclamation and revegetation consequently have become major cost considerations of mining firms in the west. Years of time and hundreds of dollars per acre are required to do the job properly.

History of U.S. Revegetation Efforts

The Forest Service was the first Federal agency to perform research into reclamation of surface-mined land in the 30s. Initial research centered around reforestation of spoils in southeastern Ohio. Most revegetation theories today stem from this research.

Following World War II surface mining increased in the midwest. It was then discovered that similar revegetation techniques could not be applied with consistent results throughout the U.S. Regional differences in weather, topography, geology, geography, and laws made alterations necessary.

Appalachian mining efforts brought new insight into erosion and runoff. Spoils there tended to be more acid than in the midwest.

In the 60s interest grew in the west toward surface mining. Today surface mining of coal in western states doubles nearly every year. Whereas in 1947 only ten percent of coal mined came from surface mines, today the figure approaches 50 percent. Furthermore, the National Energy Progam, still under consideration in Congress, calls for an additional one billion tons of coal production per year by 1985.

Certainly surface mining will play a greater and greater role in energy production in the near future.

Revegetation Technology

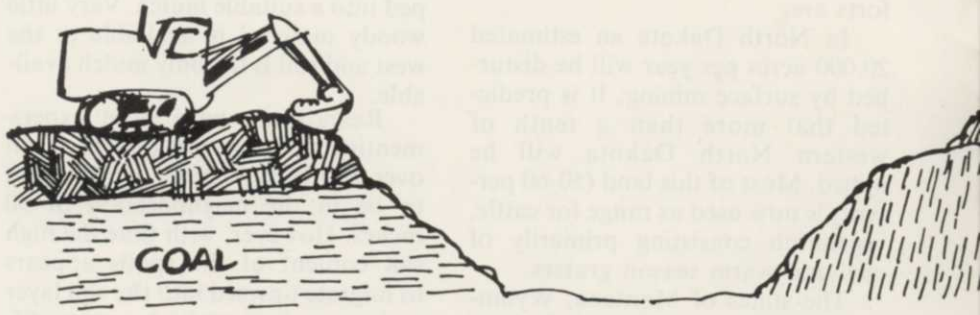
Research on revegetation in western states has centered around reclaiming spoils, thickness of soil above spoils, moisture holding characteristics, soil chemistry and fertility, and irrigation.

The original hope of mining companies was that spoils could be restored by amendments, leaching, and fertilizer. Gypsum was the primary amendment tested. Gypsum (calcium sulfate) was applied at 20 tons per acre to replace exchangable sodium with calcium. High exchangeable sodium reduces the infiltration rate of spoils. The effect of high exchangeable sodium is lessened in sandy soil or soil with high organic matter content. Results showed that gypsum treatment reduced the exchangeable sodium content 30-50 percent in the top foot of spoils after three years.

Leaching in the west is difficult due to a lack of rainfall. Leaching is used to reduce the content of soluble salts and exchangeable sodium in the root zone. Soluble salts increase the osmotic potential of the soil layer making it more difficult for the plant to extract moisture from the soil.

Almost all spoils in the west lack adequate phosphorus and nitrogen. Potassium and minor element levels appear to be sufficient. Annual fertilization of nitrogen and phosphorus is necessary to revegetate most western mine areas.

Despite all their efforts, researchers found the sodium problem too great for gypsum to correct. The only effective way they found to correct the problem was to use more soluble calcium salts such as calcium chloride and calcium nitrate. However, these solutions require leaching out and are too expensive for large scale use. Costs for calcium chloride treatment would run $1,300 per foot per acre.



Consequently, tests have shown that chemical reclamation of strip mine spoils is not practical in large scale. A more practical method of reclamation is to apply a layer of soil over the spoils.

The Northern Great Plains Research Center, Mandan, ND, is the source of most information regarding soil thickness over spoils. Dramatic improvements in erosion control, infiltration, and plant growth have been found with as little as two inches of topsoil over spoils. Mixing topsoil with the top few inches of spoils proved less effective.

The center tested thicknesses of soil over spoils from 2-100 inches. Results show a topsoil depth of 8 inches, and a total soil depth of 28 inches, to provide the most efficient improvement. This combination provided the maximum yield per acre of spring wheat. Mixing the topsoil into the subsoil considerably reduced the benefit of the topsoil.

Research has not conclusively determined the relationship between soil thickness and the upward migration of sodium into the soil layer. Two-year studies have shown that sodium does migrate upward but that this migration is largely restricted to the first four inches above spoils.

Moisture retention and erosion are directly related. The more moisture taken into the soil the less there is to erode poorly compacted soil or spoils. Western precipitation characteristics cause a new twist to infiltration and erosion problems. Most of the approximately 15 to 20 inches of precipitation falls during the growing season when temperatures are high and evaporation potential is highest. Most of this rain takes place during storms, each storm producing less than ½-inch of rain in a 24-hour period. Consequently, very little moisture is retained in the root zone between rainfalls. Vegetation can get established on undisturbed land during normal rainfall conditions. In periods of less than normal precipitation new seedlings often suffer water stress and fail. Also, precipitation is insufficient to leach sodium, salts, and other undesirable chemicals beneath the root zone.

Irrigation is a way to overcome a number of moisture problems of mine spoils. However, researchers have discovered that changes from standard agricultural irrigation practices are needed. Too much water can have the same effect as too little. A change from normal precipitation patterns can also influence the types of vegetation established. If irrigation is used only to establish normal range vegetation and then stopped, then it must be used in such a way to insure standard moisture conditions and not to create artificial ones.

In irrigation for establishment less water is needed therefore water of lower quality can be used. A number of universities are studying the use of effluent for irrigation on spoils.

Conclusion

The demand for coal for energy is enormous. The desire to mine coal in western states is just as great. However, most of the research needed to guarantee the proper re-establishment of natural vegetation is incomplete. Political and economic pressure could easily overpower the need for delay for more complete data. State laws set standards which aren't clearly understood, such as the degree of restoration of vegetation or for what period of time. The United States Department of Agriculture is performing most of the research with cooperation from mining companies.

Irrigation studies are incomplete, sodium uptake studies are incomplete, soil thickness studies are incomplete, as are other studies. It almost seems that the research has raised more questions than it has answered.

Any national policy for expansion of coal production must also include provisions for support of research to answer important questions as soon as possible. An energy program must not neglect the residual effects of production. *Bruce F. Shank, Editor.*

Southern Oak Wilt Linked to Fungus

by Jim Crowley

A healthy oak.

Oak with root damage from road construction.

A microscopic fungus is slowly destroying oaks in southern United States. Often confused with natural decline, the fungus causes a slow thinning and eventual death of oaks and other tree varieties.

Texas A&M University Professor of Plant Sciences, Dr. Eugene Van Arsdel, is experimenting with a systemic fungicide to stop oak decline on the university campus. The fungus, Cephalosporium, can kill a full-grown tree within 10 to 20 years.

The fungus also causes persimmon wilt and has infected varieties of elm, soapberry, pecan, hackberry, and mulberry. Because the fungus thrives in the summer heat of the South, oak decline is more serious in the southern United States than the faster killing oak-wilt fungus, which has trouble surviving the heat.

The wilt is difficult for the layman to spot, but trained personnel can get a general idea of a tree's condition by observing. Oak decline is usually suspected when there is a thinning of the oak's crown. As the fungus grows, the vessels are blocked preventing water transport within the tree. The leaves die back leaving exposed limbs in the crown. This "fingering" of the crown is often the first and only visual symptom of oak decline. Occasionally, the leaves of an infected tree are smaller than normal leaves. The only positive identification of

Oak in advanced stage of decline (left) and second one showing characteristic resprouting from main truck and branches midway in decline.

the fungus is its cultivation in the laboratory from a wood sample.

The prognosis is usually death of the tree within 20 years.

"There's no good answer concerning the time before an infected tree will die. Often it's only four years for a fungi-infected sycamore, while some oaks may survive for 20 years. Sometimes the host can hold out, while nearby oaks may die rapidly," said Van Arsdel. "Usually the tree will die so slowly that most people don't notice it. They think it's natural."

The disease is as difficult to control as it is to diagnose. Because the fungus spreads throughout the tree one must use systemic fungicides to treat the disease.

Since the fungus can travel from one tree to another through the often-present common root networks that are under stands of oak, the disease can rapidly spread from one tree to others in the same area. Two methods are suggested by Van Arsdel to slow or eliminate the disease's spread. First, when planting a

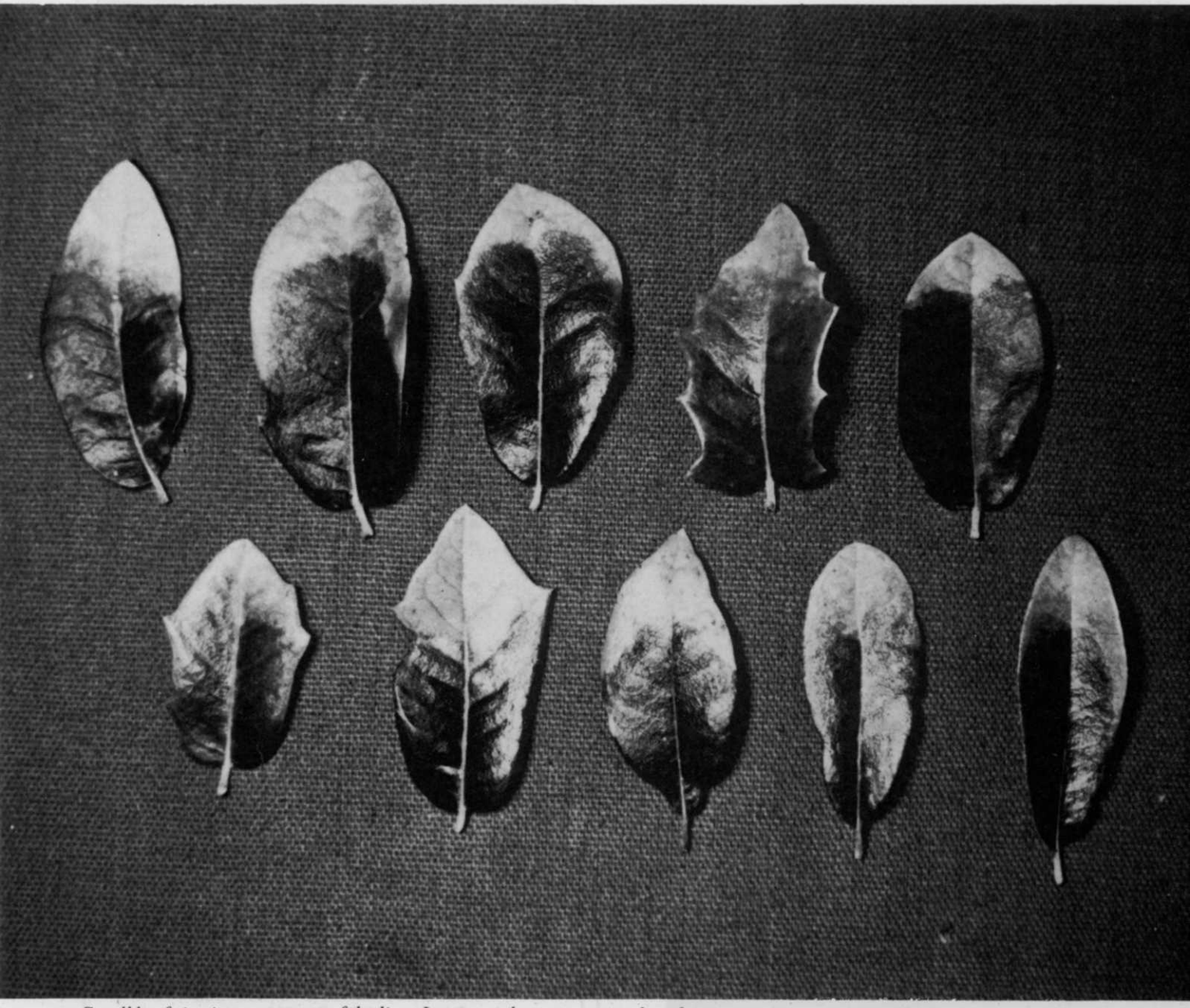
An infected live oak in less advanced state of decline with fingering in crown.

large number of trees, such as a golf course, mix species of trees. This diminishes the chance of natural root grafting and the spread of the disease. Second, when treating an individual tree, cut the root grafts by ditching. This separates the infected tree from the nearby uninfected trees.

Since July 1970, Van Arsdel has been treating many of the Texas A&M campus oaks for oak decline. Treatment has been centered around the experimental application of two benzimidazole compounds to the base and foliage of the infected trees. This research has shown that a systemic fungicide, benomyl, is relatively effective against the fungus.

Currently, the use of benomyl in a special penetrating agent (DMF) to treat fungal oak decline has not been approved by the Environmental Protection Agency (EPA) although the chemical has been approved for treating other tree diseases. The EPA has yet to allow the listing of benomyl in DMF as an effective treatment, but Van Arsdel is slowly working toward full EPA acceptance. He hopes for at least a listing of the benomyl in the penetrating agent as an approved treatment in the near future.

The Texas A&M researcher has established through clinical tests



Small leaf size is a symptom of decline. Leaves on bottom were taken from untreated infected tree. Top leaves, slightly larger came from treated tree.