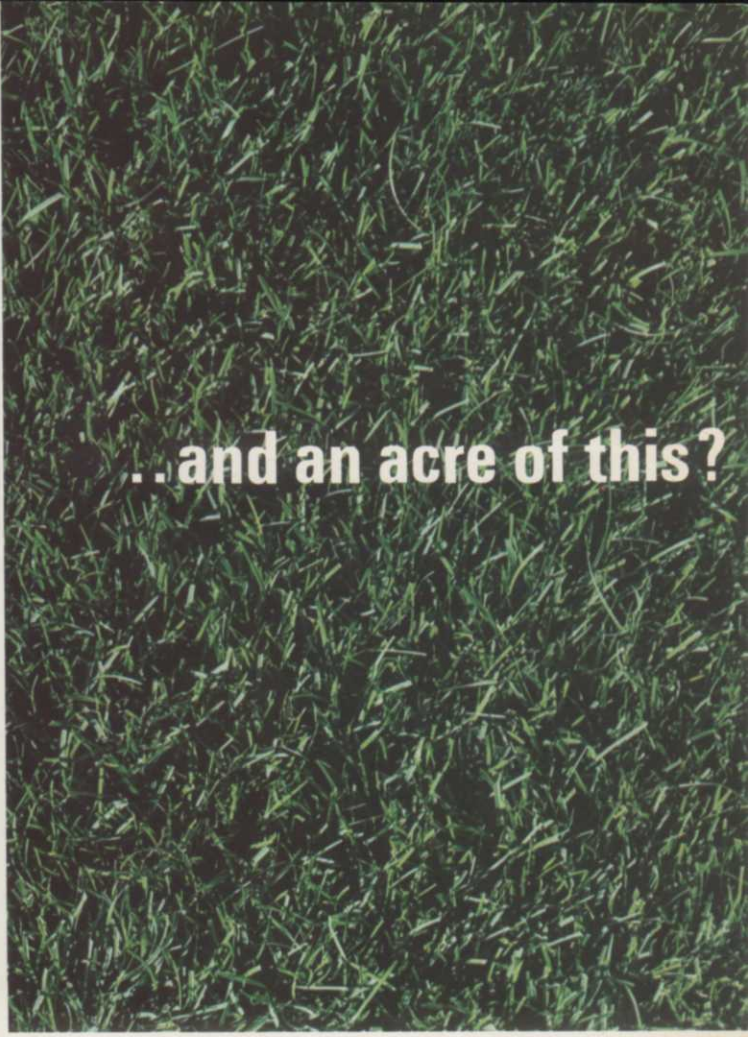

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Balan is weatherproof.

Some herbicides form a thin surface barrier. Here's a weed-control zone that stays in place to kill weedy grass seeds as they germinate.

Balan latches on, doesn't leach out.

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Turf Enemy No. -1-

Young, immature Poa Annua plant is typical of those found in turf areas. This particular plant was pulled from a green at Beverly Country Club, Chicago, Ill.

Poa Annua

By Cecil F. Kerr

Turf Manager, Rhodia, Inc., Chipman Division

Why is *Poa Annua* such an unsavory weed? It grows vigorously (part of the time); it reseeds itself (much of the time); it is fine textured (even at putting green height of cut); and it survives in some bad areas (when conditions are favorable). A professor said, "Review is good for the soul." Let's then, before we go further into any discussion, review what *Poa Annua* is:

Scientific *Poa Annua* name: Annual bluegrass, misnomer for common name. This is a short growing tillering plant which grows well in cool weather, which tolerates low or high fertility and whose seed germinates quickly whether fresh or old seed. Also, rapid growth makes it very competitive. Then why did Dr. Daniel, Turf Specialist at Purdue University in a 1966 Midwest Turf Newsletter say, "I'm tired of *Poa Annua*"?

Many turf managers do a good job of maintaining *Poa Annua* and hope to keep it as turf. They may water frequently to avoid wilt; fertilize often and lightly to avoid stress; and avoid mowing when stress could occur.

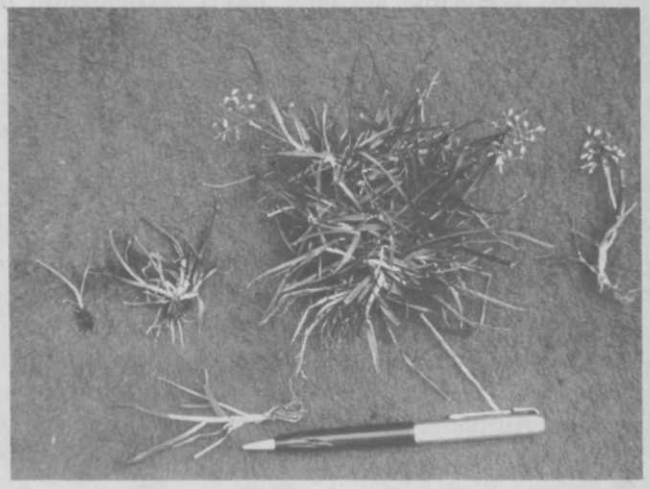
Why Poa Annua Fails:

In the north where cool season grasses predominate, turf managers fear the loss of *Poa* throughout the summer. The fear, however, in the southern warm season grass area is loss of *Poa Annua* during the early transition period from *Poa* to green bermudagrass. During this critical period the area is spotted and poor golfing conditions prevail.

(a) *Poa Annua* is easily smothered by ice and snow. Superintendents in the south experience ice damage almost as often as they do in the northern climate.

(b) During the summer, turf managers are confronted with hot humid days and nights. Disease rapidly infests *Poa Annua* —our turf enemy is dead! It can happen literally over night.

(c) Hot, dry winds will cause our enemy to fail. Dr. Daniel of



Pencil gives an idea of size of Poa Annua plant, seedhead and parts.

Indianapolis Country Club Golf Course Superintendent Terry Pfotenhauer checks one of his **Poa Annua** free fairways, Indiana.

Bare areas may exist when **Poa Annua** is removed, shown here by Norman Kramer, Point-of-Wood Country Club, Benton Harbor, Mich.

Purdue University states, "The shallow-rooted *Poa Annua* is comparatively weak and its transpiration rate is high. Also, it has little drouth protection mechanism — rolling, folding hairs are missing and the result is 'failure grass,' measured in hours, not days." The author has watched a fairway wilt one afternoon in Cleveland during the month of September. The superintendent thought his problems were over, but *Poa Annua* was still going out from dry wind.

(d) Wear destroys our enemy. *Poa Annua* has a contiuous fight to exist with the increased number of golfers and golf carts.

(e) Excessive watering following the establishment of new fairway watering systems has caused many fairways to be over 90% *Poa Annua.*

James L. Homes, USGA Green Section, Agronomist, stated in his 1967 report at the Illinois Turf Grass Conference, "Golf course superintendents in this area can not trust *Poa Annua* any given year." He further states, "Of real significance is the encroachment following irrigation, and a reduced height of cut. *Poa Annua* is extremely difficult and expensive to control. Arsenicals are effective when used properly." This leads to the point of our further discussion— when used properly. We have to understand *Poa Annua* and the chemical used to restrict this enemy.

Background:

We have all been aware of increased crabgrass and *Poa Annua* in recent years. The installation of watering systems, decreased useage of arsenicals as insecticides, and increased useage of chlorinated hydrocarbons have caused this enemy to be a golf course menace.

We have reported in the past that Purdue University initiated *Poa Annua* control research with lead arsenate as early as 1951. Tri-calcium arsenate was first tested in 1954. Purdue tested four arsenical formulations in 1958. Ten out of seventeen of these tests averaged 98% crabgrass reduction.

Dr. Ralph E. Engel, Dr. Richard D. Ilnicki, and Alan Morrison of Rutgers University have reported recent arsenical research on preemergence chemical effects on annual bluegrass. Eight materials were included in the test. Treatments with calcium arsenate on bentgrass gave the only effective control of annual bluegrass after 16 months. The estimated control ranged from 64 to 94% for their three test locations. This report further states that a split application of 5 pounds of actual calcium arsenate or more 1,000 square feet should not be applied except in cool growing periods when more cool growing weather is certain to follow. Also, it seems desirable that all retreatments be no higher than three to five pounds.

Formulations:

This study discussed turf quality. Turf quality was measured by the amount of playable area present after *Poa Annua* was removed in areas where the *Poa Annua* is the predominant species. The removal of all the *Poa Annua* at once will result in a poor playing surface. Calcium arsenate did not injure bentgrass. Abundant stands of *Poa Annua* will be removed with one treatment if too heavy rates are applied. It is, however, advisable to apply higher rates of tricalcium arsenate on soils that contain high rates of phosphates; otherwise it may take so many years to reach *Poa* toxicity that the turf manager may become discouraged with the program.

There are many powdered tri-calcium arsenate formulations on the market that vary in availability of free arsenite. Many agricultural formulations manufactured as a cotton insecticide can be as toxic as sodium arsenite. In 1960 48% tri-calcium arsenate was granulated on a vermiculite base which afforded more uniform application and a more gradual release. Research has continued to improve this formulation. Most superintendents prefer the safety and ease of application of the granular formulation.

Arsenic Toxicity:

Purdue University has reported on the relationship of arsenic toxicity to phosphorus ion uptake in the roots. It is important to use little or low phosphate fertilizer while weakening *Poa Annua*. It is also important to maintain arsenic toxicity with light annual applications after arsenic is present in toxic levels in the rootzone.

Arsenic toxicity will control smooth and hairy crabgrass, foxtails, common and mouse-eared chickweed and *Poa Annua* species.

The major fine turf grasses (bluegrass, bentgrass, bermuda and zoysia) are tolerant to arsenical levels which control weedy grasses.

During the early history of *Poa Annua* programs, golf course superintendents applied full, even excessive rates of arsenicals eliminating all the existing *Poa Annua*. It was difficult to reseed these areas because of excessive dosages and inadequate watering systems.

Injury often occurred in the low pockets. It occurred in areas that did not drain rapidly. Representatives of many organizations such as the Milwaukee Sewerage Commission and the USGA Green Section observed that heavy rates were unpredictable as were applications to poorly drained areas. Therefore, improving drainage with trenching and vertical slitting should be part of the improvement program. Light split spring and fall applications of tri-calcium arsenate are essential. They observed that desirable seed readily germinated after light applications were applied. They also observed that adequate watering systems and proper aeration were necessary for a successful program.

Through continued university and industrial testing, golf course superintendents, practical experience, and guidance from Milwaukee Sewerage Commission, and the USGA Green Section, the arsenical program became more practical.

A paper, "*Poa Annua* Restriction," related several earlier case histories of problems and progress from arsenical users. This paper will review recent progress made by golf course superintendents using tri-calcium arsenate.

Recent Case History Changes:

Len Hazlett, superintendent, The Country Club, Cleveland, O., started test work in the spring of 1959. His fairways were approximately 80% *Poa Annua*. Len applied 24 and 36 pounds in one application of 48% tri-calcium arsenate granular per 1000 square feet, in duplicated plots. These plots were completely covered with bent the following spring. Hazlett was still reluctant to initiate a broad scale program, so tested several gradual application plots and was quite satisfied with the results. Since then he has tried to manage for best bent growth and has seeded some bent into his fairways each year. Meanwhile he has added much drain tile and now plans to do some surface contouring. Hazlett has established good communications with his membership. They are, after extensive testing, starting a gradual *Poa Annua* control program on all turf areas.

James W. Brandt of Danville Country Club, Danville, Ill., did some of the earliest testing of tri-calcium arsenate in 1958. He applied four separate plots of 2 parallel 10 foot strips across the fairways. Seeing the dramatic control of crabgrass, all fairways were treated in March, 1959, with 435 pounds of 85% tri-calcium arsenate per acre. In 1961, 1964 and since, an annual application of 80 pounds per acre per year has controlled chickweed, *Poa Annua* and crabgrass.

Recently this course has installed watered fairways. Crabgrass was the only original problem. *Poa Annua* could become a problem. Brandt plans on applying 1 to 2 pounds per 1000 square feet of 48% tri-calcium arsenate granular twice during the season, applications being made in May and September.

The turf at Kensington Metropolitan Park Golf Course, Milford, Mich., consisted of 50% bent, 45% *Poa Annua* and 5% bluegrass. Jim Smith ran five test strips across number 14 fairway. Each was 30 feet wide with a 10 foot untreated check between. On strip A, 8 pounds of 48% tri-calcium arsenate per 1000 sq. ft. was applied in the fall of 1966, spring of 1967 and fall of 1967.

This program stunted *Poa* visibly yet didn't leave objectionable dead spots or voids. Bentgrass appeared undamaged and was beginning to compete with *Poa* for room. Meanwhile the *Poa* was generally yellow-green and stunted. Sufficient bent germinated from overseeding to help compete with the weakened *Poa Annua*, but some retarding was evident.

On strip B, 12 pounds was applied at the same intervals. On strip C, 16 pounds was applied only fall and spring. This test left many small voids. The overseeded bent was retarded. On strip D, 16 pounds was applied in the fall of 1966 followed by two 8 pound applications. On

strip E, two 8 pound split applications were applied in the fall of 1966 and followed by two 8 pound split applications the spring of 1967. These applications were made 13 days apart. It appeared that a split application produced more yellowing on the *Poa Annua*.

In all the tests conducted, no injury was observed on the existing bent and the bent spread. In the areas where less than 8 pounds was applied at one time; objectionable dead spots were not evident and overseeding survived.

In the fall of 1967 Smith started an overall program of 4 pounds per 1000 sq. ft. on all fairways with plans for repeat applications in the spring and fall of 1968.

Earl Dowell, superintendent of Lafayette Country Club, gradually developed a successful *Poa Annua* restriction program on a new 18 hole course at Battleground, Indiana. Dowell is going to prevent *Poa* from becoming a problem by gradually building arsenical toxicity. Both spring and fall, Earl is applying 4 pounds of 48% tri-calcium arsenate granular, and expects to achieve toxicity in two years.

The Country Club of Indianapolis has one of ten better *Poa Annua* programs. The original program was started in 1961, by Don Clemans, then Terry Pfotenhauer continued in 1964, 1965, and 1966. Nine pounds of 48% tri-calcium arsenate granular per 1000 sq. ft. were applied half each about March first and August first. In 1967, 5 pounds was used. The total application for these 4 years was 32 pounds of 48% tri-calcium arsenate granular to all fairways and tees with the exception of #17, which was not treated due to the fact that it was 99% *Poa Annua*. This is his next project. Meanwhile, lead arsenate is being applied to the green for *Poa Annua* prevention.

At Louisville Country Club, Ray Phillips started an arsenical program on bent fairways. He applied 200 pounds per acre of 48% tri-calcium arsenate granular in October 1966 plus another 200 pounds in March of 1967. These applications were made with an E-Z Flo spreader. A brief thinning of *Poa* was noted in May, but there was no discoloration to the bent. There was excellent control of soft crabgrass throughout the season, but small infestations of silver crabgrass existed in localized areas.

Louis E. Miller, now superintendent, continued the program by applying the third 200 pounds on October 22, 1967, and plans on applying 200 pounds of 48% tri-calcium arsenate granular each spring and fall until control is achieved. The control of soft crabgrass has been excellent and 10% *Poa Annua* is the current estimate.

Edward Riley, Manufacturers Golf and Country Club, Oreland, Pa., started testing tri-calcium arsenate in 1960 and 1961. Silver crabgrass control was most encouraging so the spring of 1962 he treated most of his 18 hole golf course with 10 pounds of 48% tri-calcium arsenate granular per 1000 sq. ft. The fairways were comprised of silver crabgrass, *Poa Annua* and very little bent grass. This treatment controlled the silver crabgrass and reduced the *Poa Annua*. Riley continued to treat the fairways every other year with 10 pounds of 48% tri-calcium arsenate. In some fairways where *Poa* was not prevalent, applications of 5 pounds per 1000 sq. ft. were applied. This year Riley plans to treat all fairways at 2½ to 3 pounds. Riley has not reseeded to any extent since 1959; yet today the fairways are over 90% bentgrass!

Norman Kramer, superintendent of Point O'Woods Country Club, Benton Harbor, Mich., applied 10 pounds of 85% tri-calcium arsenate to his greens in the spring of 1960. Norm states, "We followed this program every year since 1960, and I feel it has done a fine job of keeping *Poa Annua* out of the greens plus we have had no crabgrass, chickweed or earthworms on the greens."

Kramer started a complete program on all fairways in 1964. He applied 5 pounds of 85% tri-calcium arsenate powder with a broadcast type spreader in August, which gave a poor spread of powder.

Since 1965, he has applied 85% tri-calcium arsenate each year with a single fan jet nozzle mounted on the back of his sprayer. This nozzle handles one pound of powder per gallon of water well.

From his experience Kramer concludes:

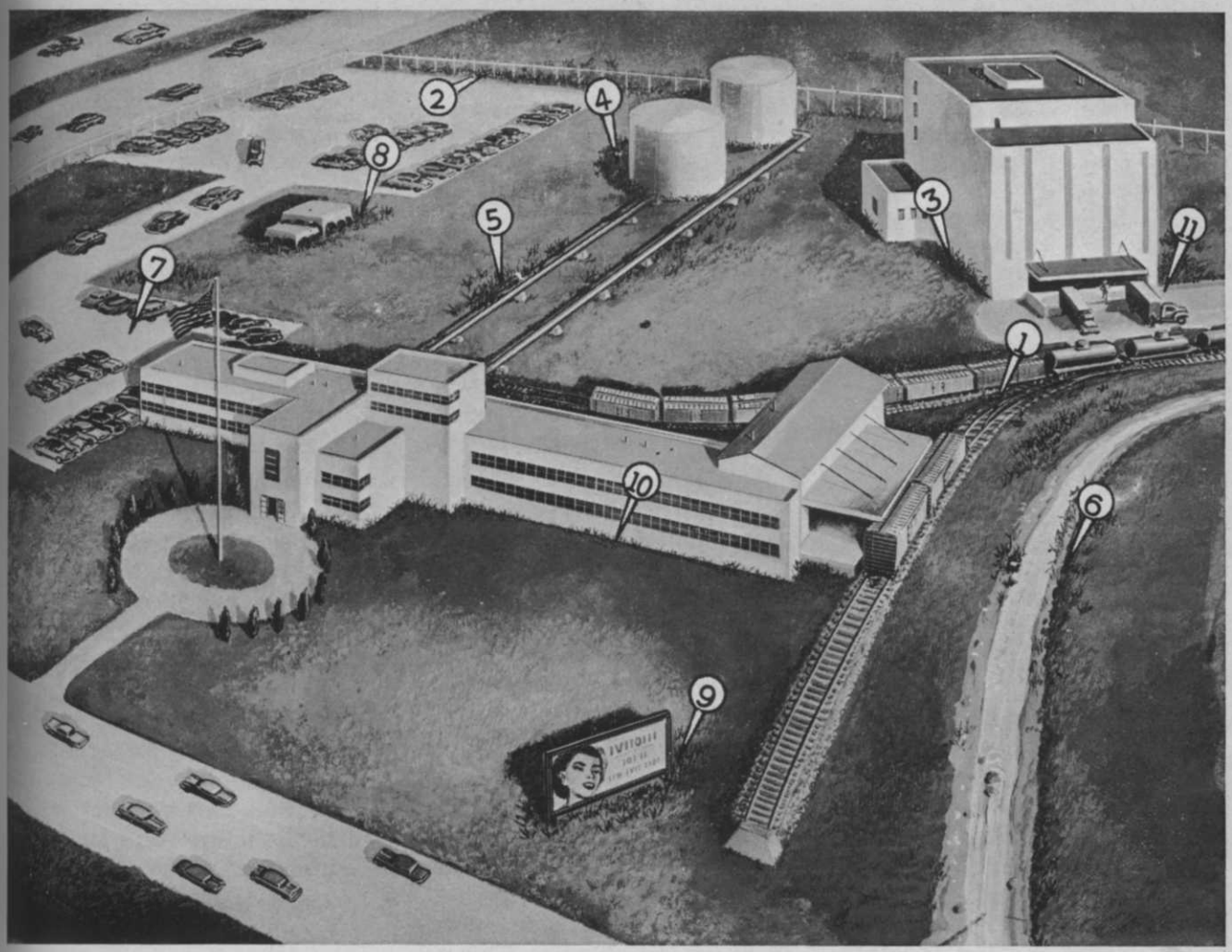
1. Make certain soil moisture is near field capacity.
2. Spray tri-calcium arsenate on with fan jet nozzle.
3. Use as little phosphate fertilizer as possible.
4. Overseeding can be done after applying tri-calcium arsenate.
5. Early spring and early August seemed to be the best time of application.

Our crabgrass, chickweed and earthworm problems on the fairways are completely controlled. Do not mow for at least two days after spraying tri-calcium arsenate.

Ted Woehrle, superintendent of Beverly Country Club, Chicago, Ill., attempted to establish a good cover of bluegrass. The pH was 6.5 and P_2O_5 level was high (400 to 600 available per acre). He seeded a mixture of 25 pounds bluegrass per acre with an alfalfa seed drill. He had not been applying phosphates for several years in an attempt to lower the phosphate level.

Ted sprayed two applications of 4 pounds of 85% tri-calcium arsenate per 1000 sq. ft. two

(Continued on page 43)



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Real or Imaginary

Claims Call For Care In Handling

By WILLIAM D. DITMAN

Rights-of-Way Maintenance Supervisor, Appalachian Power Co., Roanoke, Virginia

CLAIMS may well be a necessary evil of industry, but they exist and will continue to plague even the most public relations-conscious company. Company policy, however well attuned to the technical and safety aspects of operating, cannot always avoid either the valid or the imaginary claim.

Proper handling of claims is a most important aspect of the pesticide business in our company, as it is in practically every similar organization. We give every claim prompt and careful consideration. We feel it is not only in the public interest to do so, but also is required public relations policy for us.

This does not mean we pay a damage claim every time we get a call. However, it does mean that we set in motion a previously determined procedure for settlement which we believe to be fair to all parties; that is, to the company and to the claimant.

With the tremendous increase in the use of pesticides, there will be a corresponding increase in the number of claims, real and imaginary, that will be given to the applicator. Those engaged professionally in the pesticide business must evaluate this phase of their activities — handling claims—to insure that conditions are not established which could create an undesirable public reaction that would result in restrictive legislation affecting the business of the applicator and the best interests of the public at large.

All too frequently, claims have been handled with the philosophy that if you ignore them they will go away. Sometimes they do, but frequently they result in bitter emotional conflicts that not only tarnish the name of the applicator but also the image of the profession. The other extreme is to settle all claims, real or imaginary, at any price, in the mistaken belief that a policy of "instant money" is good public relations and that it is cheaper to pay than it is to make a thorough investigation. This policy is as disastrous as the first. It does not take the public long to recognize that there is a "patsy" available to compensate them for all types of problems in or near the vicinity of the work. Settlement without proper investigation also creates in the mind of the public an impression that there may be problems which are not apparent.

Handle Each Claim As Soon As Possible

In my opinion there is a technique of handling claims, real and imagined, that is in keeping with the image which the professionals would like to establish. First, handling the problems of the public is a very difficult job and should be the responsibility of properly trained and highly motivated personnel interested in exercising responsible business citizenship.

Second, the complaint must be handled in a timely manner with the investigator arriving on the scene as soon as possible. It must be kept in mind that time destroys the evidence of what really happened. Responsive action also impresses the inquiring party with the fact that you are truly concerned about his problem. Lost time also results in hardened attitudes, and each hour that passes makes it more difficult to arrive at an amiable settlement.

Third, the most important ingredient is the attitude of the agent assigned the task. It is imperative that he make a fair and thorough investigation of the incident with the attitude that he will find the basis of the problem. It has been the experience of one company that over 50 per cent of the complaints have no connection with its activities. These include quacks, damage from other sources, and people just looking for conversation and information. All must receive prompt, courteous, and reasonable attention. There is no room for abrupt attitudes.

Every company must accept the fact that claims are a real, if negative, part of the business, and one must react in a positive manner. There must be a stated policy and plan for handling complaints. This is really very simple. The policy:

I. All claims will receive a thorough, fair investigation.

II. Adequate compensation will be given for damage resulting from the operation.

III. Claims received but resulting from a condition not related to the operation must be settled by clearly establishing the real problem.

Cause At Times Is Difficult to Spot

Frequently, the real cause of the problem is not readily identifiable. In these situations the applicator and prime user must take action to discover the nature of the problem. Outside help from knowledgeable personnel such as plant pathologists, plant physiologists, horticulturists, agronomists, and veterinarians should be sought. Claims concerning plant damage can normally be resolved in conjunction with the state agriculture extension service and the state agriculture school.

A prerequisite for properly handling claims is the acquisition of sufficient information and data on similar situations. Complaints involving plant damage are relatively simple to handle, as there is a wealth of data available at all the state agricultural colleges and the symptoms are easy to spot. If the investigation is timely, there is no reason why these cannot be settled most of the time.

There is one area where an investigator can be in trouble because of a lack of valid information, and that is when the damage claim involves animals. These are the most difficult and sensitive problems that the claim agent has to handle. We have hired a consulting veterinarian to represent us and to investigate all animal complaints. We believe it is imperative that a trained man handle these complains, as it is impossible for a layman to arrive at the true cause of the problem. This policy is also good for our public relations as frequently the vet is able to ascertain the real problem and advise the farmer so that he can take remedial action and prevent further losses.

Frequently, the vet must become a detective and try to determine from his investigation of the herd and the farm area the cause of the problem. There is a limit at the present time as to how far he can go because there is a lack of information available which will help him in making his investigation. There is no single source of information that he can turn to for help. There is a real need for regional animal poison control centers that would have all information pertaining to all pesticides, poisonous plants, pathogens, and other causes of animal deaths. The resources of this center should be readily available to the vet. Information should be funneled into these centers from the chemical companies, other centers, and the field vets. In this way, all knowledge of pesticides would be available to claims agents.

Finally, an exact record of every complaint—real or imagined—must be maintained. This record should be established as soon as an incident is noted and every contact or change in the situation noted. In the event of legal action or investigation by outside sources, it will be of extreme value to have this information.

Handling of complaints is one of the most important tasks associated with our business. The manner in which we perform this task will be reflected in the public attitude toward our companies, the public attitude toward our profession, and the government's attitude toward our activities. We must make certain that we have done everything in our power to create the type of professional image for which all of us are striving.

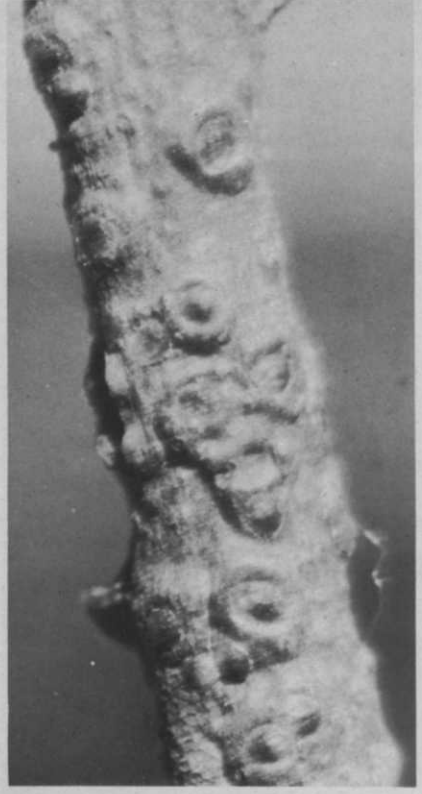

Figure 1. Pit scales on twig of Valley oak.

Research Report

Control of Pit Scales On Oak

By C. S. KOEHLER
University of California, Berkeley

R. L. CAMPBELL
Ohio Agricultural Research and Development Center, Wooster

C. S. DAVIS
University of California, Berkeley

SEVERAL species of *Asterolecanium* pit scales attack many species of oak trees both in the eastern and western United States. These scales suck juices from the twigs and cause a dieback of that growth; this damage first becomes apparent in mid and late summer. The presence of dead twigs, the premature appearance of brown foliage, together with the persistence of dead leaves on the killed twigs during the winter, cause infested trees to assume an unsightly appearance. Young trees may be killed by pit scales when heavy attacks occur year after year.

The pitting effect is most noticeable on the bark of young twigs. Each pit is doughnut-shaped, and the insect is found in the central depression. The scale is brown or dull green in color, flattened and circular, and measures between 1/16 to ⅛-inch in diameter when mature, depending on the particular species involved. Where large numbers occur, the twig surface takes on a roughened, dimpled appearance (Figure 1).

Life Cycle

Studies on the biology of *Asterolecanium minus* Lindinger, the dominant species on Valley oak *(Quercus lobata* Née) in California, were conducted during 1962-3. The adult scales, all of which are females, produce living crawlers from April until October. These young are typically produced in two rather distinct "broods," the first of which reaches maximum proportions in May, and the second in July (Figure 2). The crawlers move about for several hours before settling on a twig, where they remain for the rest of their lives. Crawlers, except those produced very late in the season, reach maturity by the fall of the year, and the cycle begins again the following spring. There is never more than a single generation each year.

Young, current season growth is the place of settling preferred by the immature scales, but they can be found, in greatly decreased numbers, on wood up to seven years old. The lower limbs of the tree are invariably more heavily infested than the upper branches, and sprout growth always supports higher numbers than normal twig growth.

Spray Chemicals Are Evaluated

Several pit scale control trials were conducted in coastal central California during 1962-3. Each treatment was applied as a spray to the point of run-off. Applications were made in the

Table 1. Evaluation of sprays applied May 10 for control of Asterolecanium scales on valley oak. Woodside, Calif. 1962.

Material	Active toxicant in lbs./100 gals.	Gallons oil[1] per 100 gals.	Avg. no. scales per sq. cm. twig surface[2]
Carbaryl	1.0	1.0	0.3 a
Dimethoate	1.0	1.0	0.5 ab
Diazinon	0.75	1.0	0.8 ab
Malathion	1.0	1.0	1.4 abc
Diazinon	0.75	—	1.7 bc
Ethion	0.32	1.9	2.7 c
Untreated	—	—	5.8 d

[1] Supreme oil, with the exception of ethion-oil, which was a commercial mixture of ethion and light-summer oil.
[2] Means followed by the same letter are not significantly different at the 5% level.