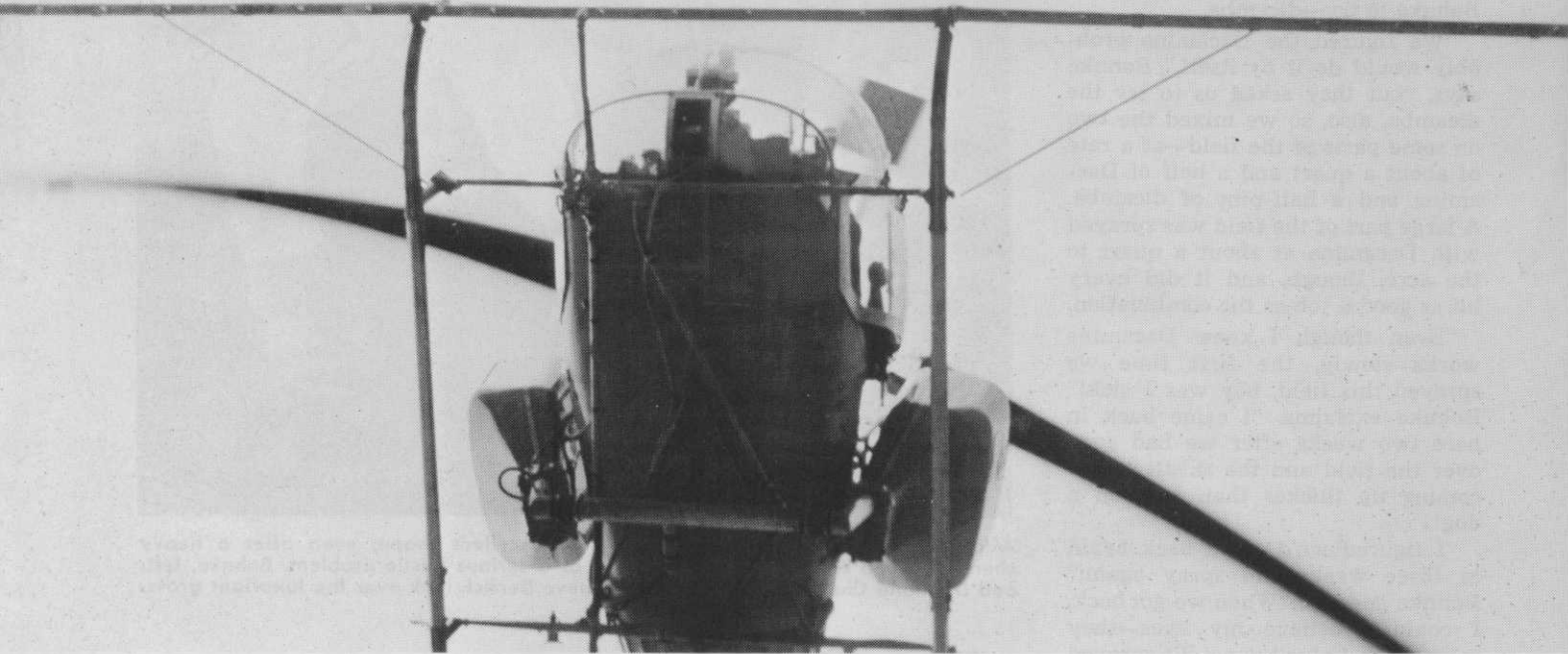


# HELP FROM ABOVE

## *For the Golf Course Superintendent*



A helicopter with a 25-ft. boom flying 30 mph sprayed the Indianapolis Motor Speedway Golf Course.

Special to WEEDS TREES and TURF  
TUCO Division, Upjohn Co.  
Kalamazoo, Mich.

**I**NCREASING play on golf courses means increasing headaches for golf course superintendents. Maintaining high standards of turf quality and course playability within the limitations of a budget isn't easy, as all of us know.

Faced with a limited amount of money, a limited labor force and a limited amount of time for maintenance, cutting corners on turf disease control can become a temptation. However, short-changing your disease-control program is bad economics.

When you invest upward of \$50,000 a year in fertilizer, weed control, water and management practices—such as verticutting, aerifying, mowing and the labor they involve—your investment deserves the protection of a complete disease control program.

Many superintendents have discovered that fairway disease control programs actually pay their own way . . . by keeping golfers happier and by eliminating the

problems and costs which arise when fairway turf is lost.

The same basic principles and practices used to control disease on the greens apply to tees and fairways, although the degree of control required on fairways is not as critical as that required on greens. Disease control on the entire course should be integrated . . . and an integral part of your overall management program.

### Helicopter Use Study

One promising new tool for economical fairway disease control is the helicopter. The same maneuverability and speed that make it an effective military weapon also make it an effective weapon in the fight against turf disease.

Many golf course superintendents have had the opportunity to observe applications of fungicide to fairways by helicopter in recent years. However, they have been skeptical about the precision of such applications, asking themselves: "Is it good enough to get the job done?"

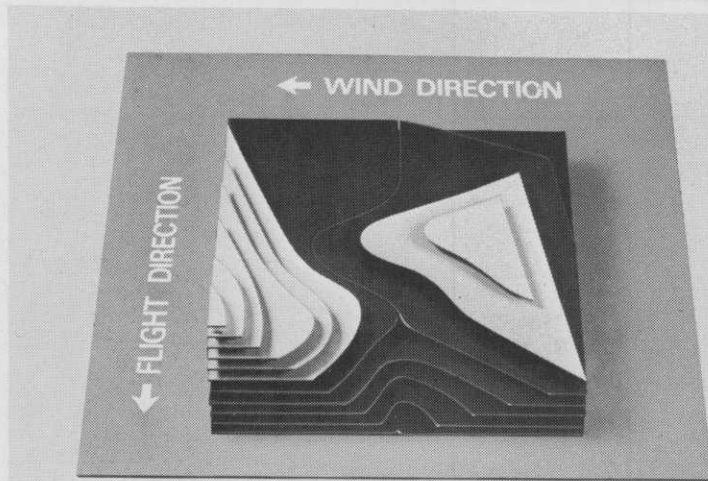
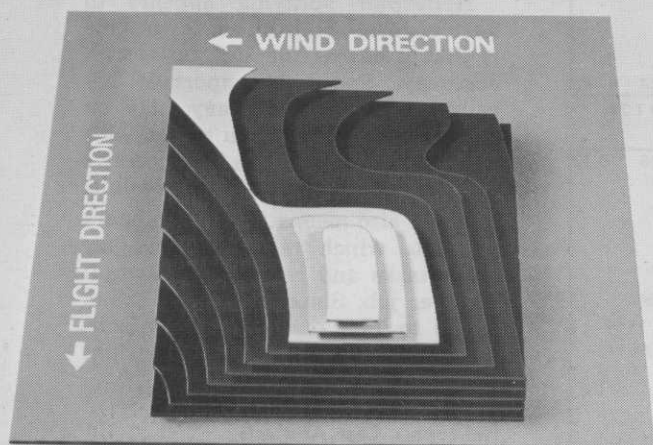
That question has now been answered in the affirmative. Results

of a three-year study conducted by TUCO, Division of The Upjohn Company, show that helicopter applications of fungicides can be made successfully at selected specific dosages. The studies have demonstrated that spray pattern distribution and droplet size are quite satisfactory for adequate coverage, and that the fungicide actually deposited falls within the required levels for the desired biological effect.

TUCO became interested in helicopter applications as part of its continuing research into fungicides for control of fairway turf diseases. Two years of biological studies were successful and most encouraging, but left this question unanswered: "Is it possible for a helicopter to spread an active amount of ingredient on the fairway when applying only five gallons to the acre?"

### Indianapolis Golf Course Test

To find out, a test was conducted last year at the Indianapolis Motor Speedway Golf Course. Dr. Kent M. Beckman, TUCO's manager of fungicide research and one of the men



In level flight, the helicopter lays the spray down smoothly. Notice how the spray actually curls up and back, then settles in a relatively even distribution pattern, as shown on the three-dimensional model. Layers of the model represent gradations in application density. Light areas represent gradations above the calculated application rate, dark areas gradations below.

In non-level flight with a gentle cross wind, the characteristic tip whirl causes the spray to pile up at the periphery of the swath. The resulting unevenness in application density is shown by the three-dimensional model. Even under these conditions, the deposit of fungicide is sufficient for biological control.

involved in the test, explains it as follows:

"We laid out four test blocks along a fairway, each block 50 feet wide and 100 feet long. Inside the blocks we placed sheets of Whitman No. 1 filter paper, held in position on the turf with nails. The function of the filter paper was to intercept the spray as it was applied by the helicopter, so that we could find out the amount of material that actually would have been deposited on a specific area of turf.

"There were 10 such sheets strategically placed within each of the four blocks for each of two chemicals tested. This gave us 40 individual sampling sites per chemical, or a total of 80 samples.

"Both TUCO chemicals tested—Acti-dione RZ and Acti-dione Ferrated—are already in use by golf courses across the country.

"The helicopter began its run at the far end of the fairway and crossed over all four of the sampling

blocks. During the test, a cross wind was coming in at about 90° to the fairway and the flight path of the helicopter, but the pilot was able to stay low over the turf.

"The boom spread of the helicopter was 25 feet, and the pilot normally flew at an altitude that would allow coverage of a 50-foot swath on each pass. The width of the swath, of course, may be altered somewhat by changing the altitude at which the helicopter is flown.

"At the tips of the boom, the spray pattern swirled like the tail feathers on a Mallard duck. This action actually helped provide a throbbing-like motion on the turf, resulting in improved and complete coverage with the chemical.

"Following the spraying, each filter paper sample was placed in an individual plastic bag to prevent cross-contamination. The bags were taken to the TUCO plant health research laboratory at Kalamazoo,

Michigan. In the lab, each sample was extracted individually and the extract assayed."

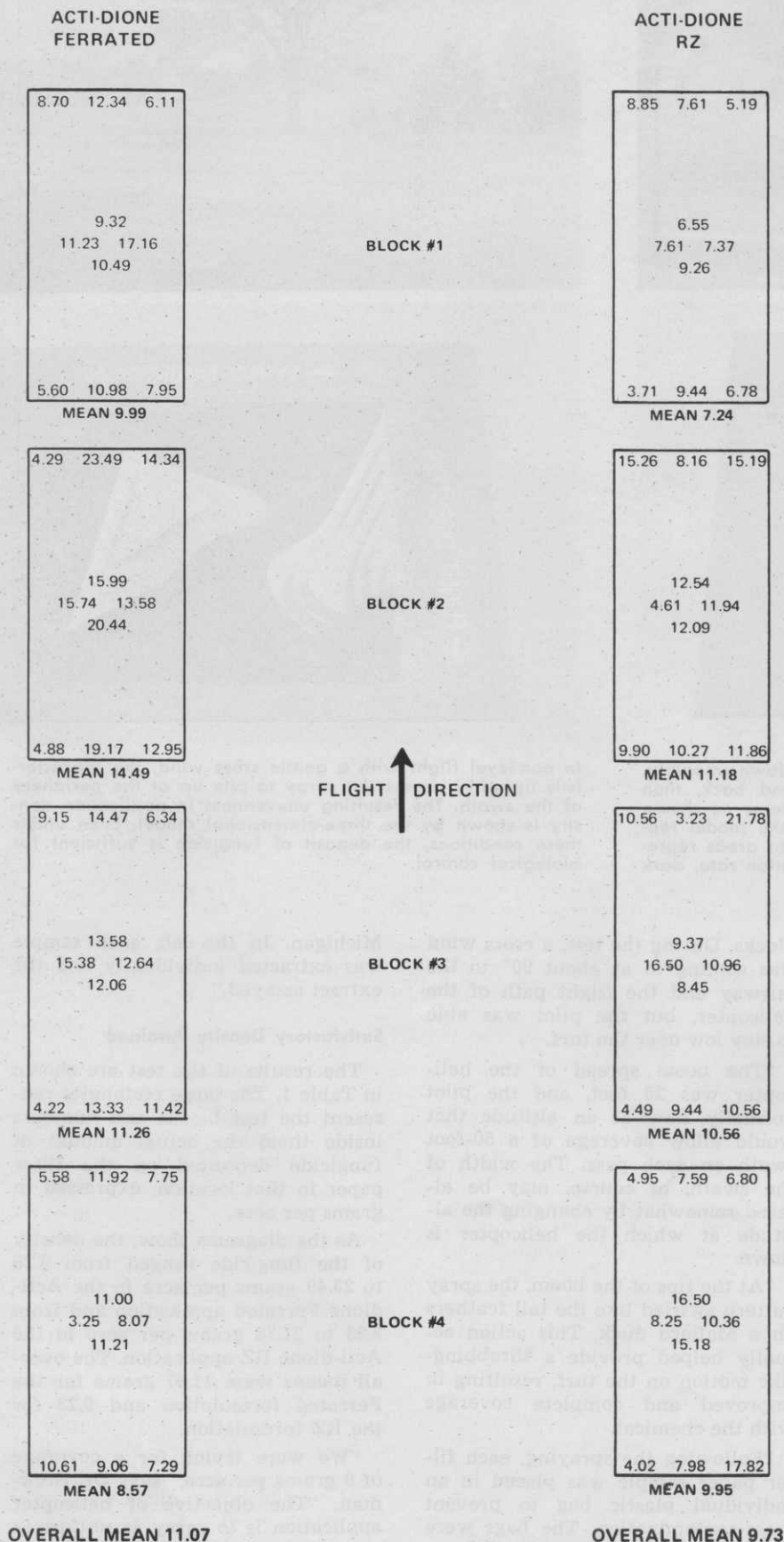
#### Satisfactory Density Attained

The results of the test are shown in Table 1. The large rectangles represent the test blocks and numbers inside them the actual amount of fungicide deposited on the filter paper in that location, expressed in grams per acre.

As the diagrams show, the density of the fungicide ranged from 3.25 to 23.49 grams per acre in the Acti-dione Ferrated application and from 3.23 to 21.78 grams per acre in the Acti-dione RZ application. The overall means were 11.07 grams for the Ferrated formulation and 9.73 for the RZ formulation.

"We were trying for a coverage of 9 grams per acre," says Dr. Beckman. "The objective of helicopter application is to spray as uniformly as possible, but factors such as wind velocity and direction, the flight

**TABLE 1. Fungicide Coverage**



attitude and altitude of the helicopter in relation to the turf, and the functioning of the spray system itself can cause some variation.

“All things considered, our studies indicate that the helicopter can deliver a satisfactory density of fungicide, and that when variations occur, they are usually in the positive direction. By that I mean that an excess of fungicide is deposited on the turf. In the case of Acti-dione products, that is not a cause for worry. However, fungicides with a narrower phytotoxic tolerance level could be detrimental to the turf and cause plant injury.”

Helicopter spraying appears to have several things in its favor. One is that it covers the turf fast—with accuracy. Speed is important because, with today’s heavy play on most courses from dawn to dusk, it’s important to have the work crews off the fairways as soon as possible.

Speed also means fewer man hours per job, which releases crews for other tasks and reduces the overall cost per job. Since labor costs make up 70 to 75% of most superintendents’ budgets, this is an important consideration.

**Helicopter Cost Analysis**

What does it cost to use a helicopter for fairway spraying? Nobody’s sure yet. More precise figures will be available after additional evaluations by TUCO this year. However, comparisons between ground spraying and helicopter spraying in citrus groves (see table below) show a definite cost advantage for the chopper. The economics on the turf should be equally favorable or even more so.

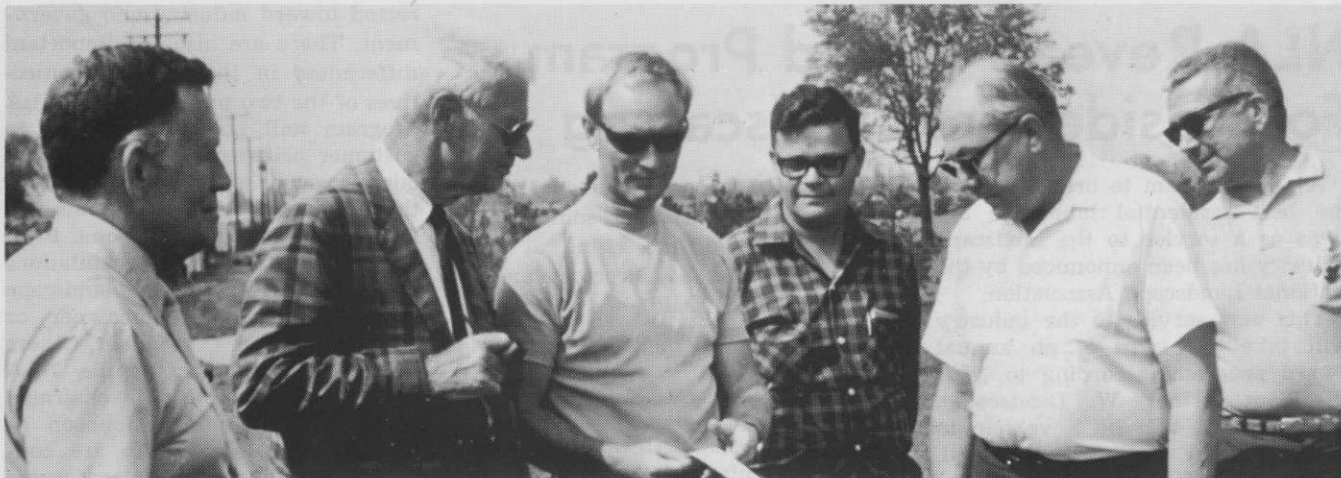
Annual per acre comparative costs of helicopters vs. ground spray in citrus industry are shown in Table 2.

One of the nice things about helicopter spraying is that you can generally put down right next to the water supply where you plan to work without damaging the turf. The skis distribute the weight of the chopper over a large area of turf, so the compaction is less than that from a golf cart.

Dr. Beckman has this advice about mixing spray solutions: “It’s always a good practice to pre-mix any wettable powder formulation before putting the material into the spray tank. Pre-mixing keeps the material from balling up and settling to the bottom of the tank.”

**Wind Factor**

As in any spraying operation, the wind needs to be considered when



Observers viewing a check tape showing spray distribution are, from the left: Joseph Kelly, Riley Lawn and Golf Equipment; Walter Hiser, Woodstock Club; George Lynn, Woodstock Club; James Joines, Mesingomesia Country Club; Marvin Scobbee, Highland Golf and Country Club; and Willard Thomas, Indianapolis Motor Speedway Golf Course.

The picture below shows the spray pattern obtained with helicopter application of Acti-dione Ferrated fungicide. The top panel is from the center of the spray swath. The bottom panel, from the edge of the spray swath, shows how the pattern thins out at the extreme periphery.

applying fungicide with a helicopter. A cross wind can carry the spray off target, and when the wind approaches 10 miles per hour it can affect the throbbing action of helicopter spraying when the pilot banks for a turn.

It is difficult to estimate wind velocity by visual observation, since, except for low altitudes, a surface wind is almost certain to be different from the wind at flight altitudes above the tree tops. However, for helicopter work, Table 3 should be of help:

Dr. Beckman's observations indicate that the use of a helicopter for applying fungicides to fairways can reduce labor costs without reducing the effectiveness of your disease-control program. It makes good business sense to consider this new tool in your overall management program for maintaining fine turf throughout the playing season.

## Weed Science Career Pamphlet is Available

An eight-page pamphlet, entitled "Careers in Weed Science," is available from Dr. W. F. Slife, Weed Science Society of America Business Manager, Department of Agronomy, University of Illinois, Urbana, Ill. 61801.

A single copy will be sent free to anyone requesting it. Teachers, counselors, and industry representatives may request — on their letterheads — up to three free copies.

Quantity prices are: Six copies for \$1; 25 copies for \$3.50; 50 copies for \$5.50, and 100 copies for \$10.

Make checks payable to Weed Science Society of America.

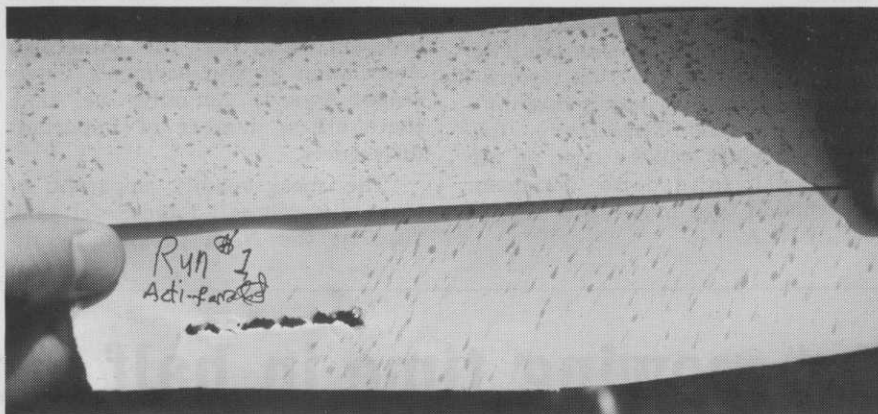


Table 2. Annual per-acre comparative application costs of helicopter vs. ground spray in citrus industry

Season	Helicopter	Ground Spray
1960-61	\$ 26.03	\$ 44.46
61-62	23.31	57.24
62-63	23.84	49.15
63-64	28.11	56.36
64-65	45.92	75.68
65-66	38.23	70.68
66-67	32.50	70.68
<b>Total</b>	<b>\$217.94</b>	<b>\$426.42</b>

Table 3. Helicopter Fairway Wind Scale

Wind Velocity	Terms Used in U.S. Weather Forecast	Land Signs
Less than 1 mph	Light	Calm; smoke rises vertically
1-3 mph	Light	Direction of wind shown by smoke drift, but not by wind vane
4-7 mph	Light	Wind felt on face; leaves rustle; ordinary vane moved by wind
8-12 mph	Gentle	Leaves and small twigs in constant motion; wind extends light flag
13-18 mph	Moderate	Dust and loose paper raised; small branches are moved.