

with 2,4-D in a low volatility amine salt formulation to provide longer duration control of a wide spectrum of woody plants. This agent is similar to compositions used for aerial spraying of power line rights-of-way throughout the United States.

Desiccant agent "blue", cacodylic acid, is a contact herbicide used for rapid defoliation. It is an effective grass control agent, especially useful in keeping down heavy grassy vegetation along roadsides and around military encampments.

The basic spray plane is the twin-engine C-123 aircraft, equipped with a 1000-gallon chemical tank. Each plane is fitted with two wing booms, with 14 nozzles, and one tail boom, using 8 nozzles. Spray operations are controlled from a console located in the rear of the plane. If rains drench an area within two hours after spraying, the target must be re-sprayed. Generally, three to four hours are necessary for effective plant kill.

Normally the crew consists of pilot, co-pilot and a technical specialist who operates the spray console. The operator rides in an armored box; pilot and co-pilots don body armor and helmets for extra-added protection.

Spray equipment is calibrated to discharge the herbicide in five minutes; however, the 1000-gallon tank can be emptied in 30 seconds in case of emergency.

The spray run is made as close to the foliage as is practical, at a relatively slow speed. Viet-

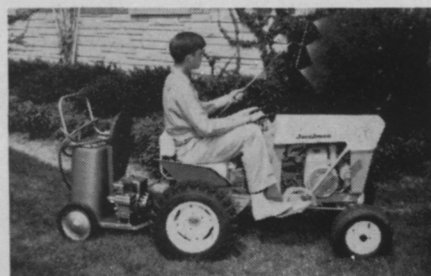
nam's forests have a canopy that can reach as high as 90 feet, with occasional trees towering to 125 feet. Generally the altitude for spray application is 150 feet. Pilots are always within range of small arms fire.

Flying their daily mission, the Ranch Hands — who call themselves "the most shot-at unit in Vietnam" — are favorite targets of the enemy. More than 3000

hits from ground fire have been taken by their planes, and that's only since they started counting, says Lt. Col. Arthur F. McConnell Jr., commander of the squadron.

"We had one UC-123 nicknamed Patches that took 546 hits from ground fire before she was sent back to the U.S. in June," McConnell added.

A Ranch mission is escorted by



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Table 1. Herbicide expenditures in Viet Nam since 1966.

Fiscal Year	Expenditures Millions of Dollars
1966	12.5
1967	45.2
1968	43.2
1969	42.7*

* Expected for delivery from U.S. manufacturers. Not necessarily a firm figure but the best estimate as of October 8, 1968.

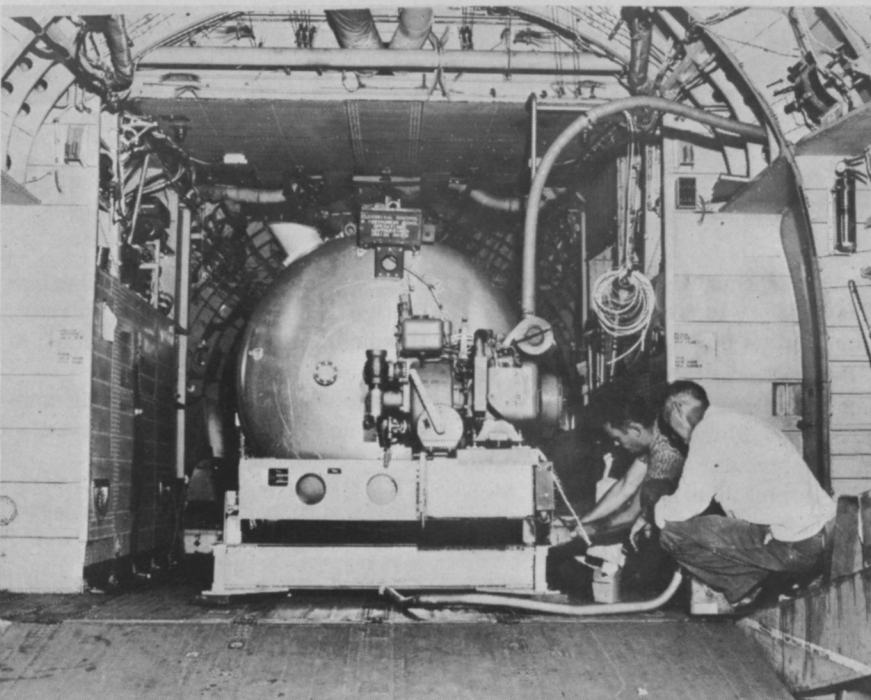
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Table 2. Scope of the Viet Nam defoliation program.

Year	Acres Sprayed		
	Defoliation	Viet Cong Crop Destruction	Total of Both
1962	17,119	717	17,836
1963	34,517	297	34,814
1964	53,873	10,136	64,009
1965	94,726	49,637	144,363
1966	775,894	112,678	888,572
1967	1,226,823	148,418	1,375,241



Spray boom is being installed on wing of twin-engine UC-123 used by the 'Ranch' for defoliation missions.



fighters who keep an eye out for trouble as spray runs are made. When a plane receives ground fire, the area is marked with purple smoke.

One plane, detailed to malaria control, makes spray runs over villages, bases and cities. Even these health-protecting missions — accompanied by loudspeakers designating them as peaceful runs — are fired on.

Wind, weather and thermal currents greatly influence the effectiveness of the spray applications. Best results are achieved in early morning—spraying must be finished no later than 11 a.m. — when the wind is calm.

Targets are selected via a complex chain of military decisions and political review. High officials—American and Vietnamese — must approve each site. Having cleared all desks, the request then goes to the U.S. Ambassador in Saigon. Occasionally, an especially ticklish request goes all the way to Washington.

Major targets include: Nipa palm and mangrove woodland in coastal areas and along traffic routes in rivers and canals in South Vietnam; moist evergreen or rainforests surrounding Viet Cong strongholds and supply dumps; dense shrubbery and second growth forests along highways, supply roads and railroads to reduce ambush threats; perimeters of villages and military bases; infiltration routes and supply trails in upland forests; and the Demilitarized Zone.

In spite of all precautions, occasional spray may drift and cause damage to rice crops or rubber trees (current price for a mature rubber tree is \$87). When claims are made, prompt action is taken to pay for damages.

Engineers and mechanics set up low-volume spray system positioned in rear of the plane. 1000-gallon tank can be emptied in 30 seconds if necessary.



John J. Spodnik, Pres.



Trade Show at the 40th International Turfgrass Conference and Show staged by the GCSAA was a major event. Practice putting at the IHC booth is Frank Thraill of Hercules, Inc., Montgomery, Ala. Looking on is Mrs. Jean Gass, Penn Turf Nurseries, Pittsburgh, Pa.

40th Meeting of Golf Course Superintendents

Leading Turfgrass Show At Miami Beach

A full course in turf culture is routine for golf course superintendents who attend their association annual meeting each year. The 40th International Turfgrass Conference and Show at Miami Beach Jan. 19-24 offered the most comprehensive information on turf research and current practices to be found.

This turf show featured leading turf researchers from universities and suppliers throughout the nation, as well as experienced superintendents from its own ranks. A major trade show with more than 300 exhibit spaces included practically every major manufacturer and supplier in the industry. The Golf Course Superintendents Association of America staged an annual event which to date has not been surpassed in the turf field in either educational program or trade show. Members attended in force. More than 2000 superintendents made the Florida trip this year. Their number was dou-

bled by wives, exhibitors, program participants, and guests. Attendance alone makes this a major show.

Topdressing Greens

Topdressing greens is often a controversial subject. All phases and methods of handling the practice were given special attention at this annual session. James Fulwider, course superintendent at Century Country Club, White Plains, N. Y., impressed the group with his philosophy. He said that the operator who carries out an extensive topdressing program must be a firm believer in the practice of topdressing. Fulwider indicated this has to be true for the superintendent to justify the extra cost of material, time and labor.

Fulwider himself is a firm believer in topdressing. He lists fewer thatch problems as one advantage of the practice. Providing other soil management prac-

actices are carried out, the presence of soil incorporated into thatch results, he said, in greater biological activity which is necessary for the decomposition of the undecayed material. Greens, he said, which have been topdressed regularly do not have a serious thatch problem.

Another plus for topdressing according to Fulwider is more resistance of greens to withstand winter injury. He pointed to metropolitan New York this past season where winter injury caused by extremely dry weather resulted in desiccation on many fairways, tees, and greens. He noted that greens which had a history of good topdressing programs came through in better shape.

Fulwider reported that as a regular practice, he topdresses greens every three or four weeks during the growing season. Soil is applied with a spreader and allowed to dry. It is then worked into the green with steel drag



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mats and wooden rakes. This practice, he said, levels the surface, cleans the green, and removes pebbles and rocks which can damage a mower. Greens are then thoroughly watered by hand so that the new soil reaches the old soil. In summary, Fulwider said that he regarded the practice of top dressing as a good, sound, preventative measure in golf course maintenance, rather than as a special effort to correct a bad situation.

Southern Turf

The preferred types and varieties of turf for use in the South were reviewed by Dr. Glenn W. Burton, USDA research geneticist at the University of Georgia, Tifton, Ga. In the case of top-quality greens, a grass must be able to withstand daily defoliation at a 3/16-inch height and still maintain a smooth, uniform surface. Leaves of the grass must be fine, soft and closely spaced. To meet these rigid needs, Burton listed only two species. He named bentgrass and bermudagrass, but added that bentgrass is not dependable in most of the South.

For tees, Burton pointed out, a variety must be tough to withstand the normal punishment. It needs dense, stiff leaves and must be able to heal rapidly. Bermudagrass, he said, with its dense, rhizomatous habit has proved to be the South's best species.

Fairways, besides being an attractive, uniform carpet with density enough to give a good lie to the ball, must be able to heal divots rapidly and tolerate heavy traffic. Further, a fairway grass must be capable of filling these needs with less water and care than normal for greens and tees. Burton listed bermudagrass above all species for fairway use in this area.

Lawn areas need to be attractive, green, and weed-free. Many lawn areas are shaded or other-

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James W. Brandt, outgoing president of the GCSAA and superintendent of the Danville, Ill., Country Club, formally opened the 40th Show of the group.



wise unfavorable for grass growth. A number of species can be used. Burton listed bermudagrass, centipedegrass, St. Augustinegrass, carpetgrass, and zoysia.

Roughs, he stated, should not be a source of weed seeds to contaminate the remainder of the course. Grass in this area should be green, reasonably weed-free and of acceptable height. Usually the fairway grasses, cut higher, will serve.

Golf Courses Expensive

Costs to build a regulation length golf course today varies from \$200,000 to \$2 million according to Colonel Harry C. Eckhoff, eastern director of the National Golf Foundation. Even though courses can be readied for play at the lower figure, Eckhoff stated that this is seldom accomplished today for less than one-half million dollars.

He pointed out that more and more people are playing golf.

Course superintendents, he said, must now grow and maintain 56 percent more and finer turf to handle a 123 percent increase in traffic. This problem of more than doubled traffic during the past 10 years has created more compaction and disease problems in turf management. Added to turf care problems, Eckhoff said, is the problem of finding and keeping labor.

He also pointed to the need for more public links to accommodate what has become America's fastest growing outdoor participant sport — golf — despite a rapid increase in the development of public facilities over the past decade.

"Only 53 percent of the nation's courses are public and 84 percent of the golfers allegedly play these courses," Eckhoff said.

He pointed out a recent NGF study.

"It showed," he said, "that 45 percent of America's 11,000,000

golfers use municipal courses; 39 percent semi-private and 16 percent private." Public courses are semi-private — privately owned but open to the public on a daily fee basis—and municipal courses which are open to anyone.

In heavily populated areas, playing conditions have become so extreme on weekends that local radio stations broadcast the waiting times for tee off as a public service, Eckhoff stated.

He said public courses, however, are increasing, indicated by the following growth factors:

—In 1968, public operations were up 11 percent over 1958: 65 percent of all new golf courses open for play were public, a gain of 4 percent over 1967.

—In the ten-year period ended December 31, 1968, semi-private courses increased 115 percent; municipal courses, 45 percent; and private clubs, 42 percent.

Houston has been selected as the site for the organization's 41st International Turfgrass Conference & Show, which will be held February 8-13, 1970, at the Albert Thomas Convention & Exhibit Center. GCSAA's last appearance in Houston was in 1960.

GCSAA president James W. Brandt, Danville (Illinois) Country Club, said the Rice Hotel will serve as Conference headquarters.

John Spodnik, golf course superintendent, Westfield Country Club, LeRoy, Ohio, was elected new president. Elected vice president was Norman W. Kramer, Point O'Woods Country Club, Benton Harbor, Michigan. Re-elected as a director was Robert V. Mitchell, Sunset Country Club, St. Louis, Missouri. New directors include Warren A. Bidwell, Philadelphia Country Club, Gladwyne, Pennsylvania and Keith Nisbet, Westview Golf Club, Aurora, Ontario, Canada. Reappointed to the board for a one-year term was Clifford A. Wagoner, Del Rio Country Club, Modesto, California.



New officers elected at the January session of the Virginia Turfgrass Council, left to right: Sheldon Betterly, president; Charles K. Curry, first vice-president; Lee C. Dieter, 2nd vice-president; R. D. Cake, secretary-treasurer; William P. Mooney, newly elected director; and Darryl McCabe, director elected last year.

Ninth Conference Staged By Virginia Turf Council

Turf management, both the techniques of managing grass and the economic aspects of a well coordinated program, was stressed at the ninth Virginia Turfgrass Conference held recently at Richmond, Va.

More than 200 members and guests of the Virginia Turfgrass Council attended a 2-day session. Sponsors along with the Council was the Cooperative Extension Service of Virginia.

Officers elected for the new year are: Sheldon Betterly, president, sod grower at Nokesville;

Charles K. Curry, Eastern sales representative for Ryan Equipment Company at Manassas, 1st vice-president; Lee C. Dieter, superintendent at Washington Golf and Country Club, Arlington, 2nd vice-president; R. D. Cake, George Tait and Sons Seed, Norfolk, secretary-treasurer; B. K. Powers, Weblite Corporation, Roanoke, director; and William P. Mooney, superintendent at Langley Air Base, director.

J. F. Shoulders, Extension Turf Specialist, served as program chairman and Roy Watson superintendent at Richmond Country Club and past president of the Council, handled local arrangements.



John Shoulders, left, program chairman, and Roy Watson, a past president, and in charge of arrangements visit during conference.