The gavel is passed. Dr. Richard Behrens, outgoing WSSA president, University of Minnesota, St. Paul, Minn., left, turns over duties to newly elected president, Dr. Boysie E. Day, University of California, Riverside, Calif.

Scientists discuss experience with surfactants, Dr. J. Robert Barry, Louisiana State University, Chase, La., left, and Dr. George E. Barrier, DuPont Co., Wilmington, Del.

Weed Science Society of America Meets at New Orleans, Feb. 5-8

Herbicides are still in the public eye. With more being used every year, citizen groups continue to debate the right of the industry to push chemical control. Thus, it becomes mandatory that weed scientists inform the citizenry as to the toxicity and residual effect of all types of application.

This need for public judgements on herbicide use to be made with all facts in hand was cited by Richard Behrens, weed scientist at the University of Minnesota, St. Paul, Minn., and president of the Weed Science Society of America. Behrens, speaking at the 8th annual Weed Science Society of America session at New Orleans, La., Feb. 5-8, said that herbicide use had increased 25% yearly in each of the past 4 years. He pointed out that a liaison committee of WSSA is now working closely with groups concerned with pesticide use. Behrens stressed that weed scientists have a responsibility to develop herbicides which involve minimum risks to man and his environment. He pointed out that much of the erroneous information about toxicity and residue problems stem from failure to provide the public with available facts. Benefits to mankind far in excess of risks must be assured if the industry is to move ahead, Behrens said.

More Weeds Becoming Resistant to 2,4-D

Field bindweed has become another pest weed which is

WSSA officer slate for the coming year, left to right: Drs. Glenn C. Klingman, Eli Lilly & Co., secretary; Boysie E. Day, University of California, Riverside, president; L. L. Danielson, USDA secretary elect; Fred W. Slife, University of Illinois, treasurer-business manager; and Earl G. Rodgers, University of Florida, editor.

showing resistance to control chemicals. Some bindweed strains can now absorb 2,4-D and survive. Dr. Thomas J. Mizik, Washington State University researcher, Pullman, Wash., reported that the lower the hormone supply, the higher a plant's resistance to hormone-type chemicals such as 2,4-D.

New information on Johnsongrass which is a perennial weed pest in many areas was presented by Jerry Caulder, University of Missouri, Columbia, Mo. Because Johnsongrass does not grow well in shade, tests were made using shade as a means of eradicating the plant. The theory was that perhaps seeds might germinate and seedlings die if a shady nurse crop was provided. However, Caulder said the theory proved to be a failure. Rather, it merely slowed development of Johnsongrass and postponed the problem, rather than solving it.

Spraymen still have problems of spray loss by drift and evaporation. With more low volume applications and higher toxicity in chemicals, losses are even more critical. At the WSSA session, two University of Missouri engineers, L. E. Bode and M. R. Gebhardt, reported on such losses when using fan-type spray nozzles.

They measured the amount of spray lost between the nozzle orifice and the target area. Losses with low volumes of herbicides ranged from ½ to 5 gallons per acre. Generally, more than ¼ of the spray was lost when discharge rates were under 2 gallons per acre. But when 10 gallons or more per acre were used, loss dropped to less than 10%.

An increase in spray pressure, Bode and Gebhardt said, caused an increase in losses for nozzles discharging more than one-tenth gallon per minute; but for nozzles discharging less than one-tenth gallon per minute, an increase in pressure caused a decrease in spray loss. Spray distribution patterns for all the nozzles tested were similar. The most uniform patterns occurred when operating at higher pressures.

Atrazine With Oils Is More Effective

Atrazine mixed with emulsifiable oils for postemergence control of annual grassy and broadleaf weeds is more effective. An Ohio research study, reported by Dr. Glover B. Triplett, Jr., Wooster, O., showed that once absorbed by a plant, atrazine moves outward from the stem to the tips of the leaves. When atrazine is mixed with oil, the activity at the leaf tip is up to 5 times as great as when atrazine-water combinations are used.

Atrazine with 0.1% to 1.0% oil produced about twice as much activity as the atrazine-water combination. With the 10% oil mix, the atrazine proved to be 5 times more effective.

Residue is a problem when

Regulatory agency personnel who served as program and technical consultants during a discussion of licensing problems which affect spraymen are, left to right: Dr. Ellsworth Carlson, Lincoln, Neb.; Freeman E. Biery, Topeka, Kan.; Albert E. Thomas, Oklahoma City, Okla.; Robert F. Odem, Baton Rouge, La.; and Edward H. Hansen, USDA, Washington, D. C.

pesticides are used in surface waters. Research by William K. Averitt, University of Southwestern Louisiana, Lafayette, La., showed a high concentration for 3 days following spraying. But, he said, there is a drastic decrease on the 4th day, and a gradual decrease thereafter.

Averitt said that when methyl amine salt of 2,4-D was applied to control water hyacinth, residue was higher the 2nd day after application than the first. A sharp drop occurred on the 3rd day, and a severe drop on the 4th day. No 2,4-D could be detected after 102 days. Use of Kuron and Esteron 99 showed results similar to 2,4-D.

Laser beams and sonic energy are being studied by army engineers as a means of controlling weeds in waterways. Laser or light energy beams and sound energy have been used to destroy underwater weed growth. Sound energy has been used to temporarily and harmlessly repel fish from an area while it is being treated for weed control.

These novel approaches to aquatic weed control were presented by Dr. Ralph A. Scott, Jr., Washington, D.C. Studies are continuing, he said, on such aquatic plant pests as water hyacinth, watermilfoil, and alligatorweed. These weeds, he said, threaten to choke many of the nation's essential navigation channels. Dr. Scott also pointed to biological agents such as Argentine flea beetle which has produced excellent results in control of alligatorweed. In the long run, he stated, such agents may prove to be our most effective weapons against weed infestation.

Field tests with acrolein and copper sulfate as the control agents have proved effective in suppressing rooted forms of aquatic weeds. Bureau of Reclamation researchers report that acrolein used over a 5-year period in the Pacific Northwest showed that the liquid herbicide controlled pondweed, elodea, water buttercup, and filamentous green algae.

W. Dean Boyle and Thomas R. Bartley, at the Bureau's Denver, Colo., Center, said that pondweed suppression was excellent along a 15- to 20-mile reach, when acrolein was added at channels at a concentration of 0.10 ppm over a 48-hour period on a 2- to 4-week schedule. Flows ranged from 700 to 2000 cubic feet per second during the treatment schedule. Where streams carry less than 700 cubic feet per second of flow, this treatment is not sufficient. Concentrations of 0.6 to 15 ppm of acrolein are needed in the smaller streams. Another finding was that acrolein failed to control horned pondweed in these field tests.

Copper sulfate, dispensed by a screw-type volumetric feeder with a timing device, effectively controlled leafy pondweed and sago pondweed on a 9-mile reach on unlined channel or irrigation canal near Loveland, Colo., the researchers stated. Tests began in June, 1966, and the first leafy pondweed injury downstream was apparent 34 days later. Tests a year later, in 1967, were more readily apparent, likely due to the effects of residual copper in the ditch bottom soil and cooler water temperatures in early season, according to Boyle and Bartley.

Dr. T. F. Hall, Jr., botanist with the Tennessee Valley Authority, Muscle Shoals, reported that picloram (Tordon) is a promising chemical control for a stubborn aquatic weed, *Cephalanthus occidentalis* L. — or buttonball, as it is commonly known. This aquatic weed has posed problems on TVA lakes and elsewhere for years.

In TVA's tests with picloram, the phase of buttonball resprouting apparently had no bearing on the effectiveness of the chemical, but time of applications was important. Excellent control was obtained from a mixture of picloram and 2,4-D applied at the rate of ½ pound picloram and 2 pounds of 2,4-D per acre. This mixture was diluted with parts of water and applied to first-year buttonball coppice in three reservoirs in mid-August and mid-September, 1966. Thus, the results indicate a potential for controlling buttonball with pic-

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Eron foam generator will handle controlled volume of foamy herbicide in 12 mph wind according to the developer, Robert Eron. Unit can be used to spray minute amounts of foam on a single plant, or to deliver large quantities.

Florida Weed Specialist Develops Foam Generator

Robert Eron, pest control operator and weed control specialist, St. Petersburg, Fla., is working on a new method for foamy herbicides.

Eron describes his system as a positive-pressure foam generator. The idea, he says, is to carefully target herbicides on pest type vegetation. Eron's unit is still in the developmental stage. He is now using it in his own business in Florida and has made patent application. Eron reports the foam generator has been used to treat cattails, hyacinths and similar weeds. The foamy herbicide produced by his generator clings to leaves and stems. Especially important to the weed control operator, he said, is the fact that the new unit foams herbicides onto plants so that the chemical clings to leaves and stems rather than running or blowing off. At the same time, the foam produces the desired extended wetting period.

Biggest problem in development of the new system, Eron says, has been in developing a formula for each type control which would foam properly. None is on the market at the present time.

Eron's hope is to further develop the system, complete patent clearance, and then fabricate the unit for sale.

WSSA Meeting
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loram at a cost which compares favorably with the cost of mechanical mowing.

Officers for WSSA are elected by mail balloting prior to the formal meeting. New officers for 1968 are: Dr. Boysie E. Day, chairman of the Department of Horticultural Science, University of California, Riverside, Calif., president; Dr. Glenn C. Klingman, director of plant science research, Eli Lilly and Co., Indianapolis, Ind., secretary; Dr. Fred W. Slife, agronomist, University of Illinois, Urbana, Ill., treasurer and business manager; Dr. Earl G. Rodgers, department of Agronomy, University of Florida, Gainesville, Fla., editor of the Society's technical journal, Weed Science, reelected as editor; and Dr. Loran L. Danielson, ARS, USDA, Beltsville, Md., secretary-elect.

Dr. R. E. Doersch, chairman of the WSSA awards committee presented the award for the outstanding paper at the 8th annual meeting to Dr. R. Prasad, Dr. C. L. Foy, Virginia Polytechnic Institue, Blacksburg, Va., and Dr. A. S. Crafts, University of California, Davis, Calif., for their paper "Effects of Relative Humidity on Absorption and Translocation of Foliarly Applied Dalapon."

Doersch also presented Dr. G. F. Warren, Purdue University, a plaque and an honorary membership in WSSA. Final registration was 744. More than 200 scientific papers were presented, plus 50 in a special Latin American section. Latin American papers were translated simultaneously during the event.

New Spray Adjuvants Now On the Market

Stull Chemical Company has developed 3 spray application adjuvants for weed, brush, and grass control with presently used herbicides.

Bivert AMX, Bivert DPN and Bivert MSMA have been developed to go hand-in-hand with Stull's Bifluid application system for invert emulsion sprays.

Bivert-AMX is a specially formulated spray adjuvant for use with Ammonium Sulfamate (Dupont "Ammage X" Weed and Brush killer). Bivert-DPN for use with Dalapon (Dow "Radapon" or "Dowpon") provides another weed killer usable in the invert system. The third, Bivert MSMA for use with Monosodiun Methanearsonate through invert spraying, makes it more effective on grasses, weeds, and some brush species.

Power sprayers now using these herbicides may be quickly converted to apply water-in-oil emulsions. This requires a simple, inexpensive device called a Stull Bi-Vac Inverter, which is connected to the regular pump suction, and an additional tank

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