Precision spraying: an attainable dream
PRECISION SPRAYING:
AN ATTAINABLE DREAM

Put it all where you want it. None where you don’t want it. And, hopefully, in an even pattern.

That’s the big idea when you auger your way into the sky, hopper topped off with a crop-protecting pesticide solution.

Precision placement has always been important, since the very first intrepid crop duster declared war on the boll weevil back in the ’20s. But now, with high-cost chemicals and high-value crops to protect in the fields, pesticide-sensitive crops or housing development landscaping close by, and concerned environmentalists everywhere, precision spraying is what you do if you want to stay in the fly-it-on game.

Besides the standard “stay out of strong winds” sort of rules, there are at least two newer techniques that are helping ag pilots. These are: 1) drift reduction by controlling droplet size, and 2) uniform deposition in the swath by proper nozzle orientation, and the use of an elasticizing additive.

Nalco Chemical Company representatives spearheaded the droplet size control movement after their chemists developed NALCO-TROL® drift retardant and deposition aid.

Knowing that the primary factor contributing to drift is droplet size, these chemists developed and tested a “visco-elastic thickener” that turned drift-prone tiny liquid particles into manageable droplets. The result: less drift, better deposition in the spray swath. Better by 45% or more.

Harold Hardcastle, who operates Hardcastle Ag-Air out of Vernon, Texas, was quick to see the advantage it gave him:

“I have used NALCO-TROL in about all the liquid I put on for the past three years. I got sold through working on deposition studies with Nalco. Just about every time we put it in, we got better deposition. So we started using it in 2, 4-D and 2, 4, 5-
T where we had a bad drift problem. I was real pleased with it.

“Our standard rate is 8 ounces of NALCO-TROL per 100 gallons of spray solution, depending on what we’re putting out and what the drift hazard would be and how much wind we have. We may go up as high as 16 ounces per hundred.

“I just wouldn’t work without it. From all the test work I’ve seen, you’re just consistently going to increase your deposition from 10 to 15% when you have NALCO-TROL. So I figure if you can do that on test work, a man is foolish not to use it on his other work. We sell the farmer a turnkey job. We do the consulting and the insect work, we sell him the chemical application, the whole thing.”

Mr. Hardcastle has also done a lot of work on nozzle orientation.

“I got started doing test work on nozzle orientation,” he reports, “with Texas A & M brush research people and Dow Chemical about 15 years ago. We’ve done extensive testing. Another operator and I developed and kind of pioneered the modified boom, the drop boom on the Cessna ag aircraft. That’s been about seven years ago. Then I worked extensively with the Texas group last year and the year before last in field testing all the production type aircraft at 3 gallons per acre, for a maximum deposition. This was done with Nalco’s copper tracer along with specialists from Texas A & M, and a group of operators.

“I have three 600-horse Air Tractors, and one Cessna Ag Truck. Down in this country, Ivan Rush of Nalco has done more to help operators figure out what’s the best way to set up an airplane and get the best deposition of anybody I know of.”

Down on the eastern shore of South Carolina, Don Steed operates Steed Flying Service, operating Thrush Commander aircraft.

“We have some pretty sensitive areas down here,” he states, “and we use NALCO-TROL whenever we are applying pesticides near housing developments, creeks, and park areas. In addition, we have one contract with a timber company to spray their seed orchard, and always use it on that application.”
"We go right up and down the coast here, probably 50 miles to the north, 30 miles to the south, and not over 10 miles inland. In the spring, we are primarily treating vegetable crops and go into soybeans later on. I put NALCO-TROL in my tanks as a protection for me. If I think we need it due to the close proximity of sensitive vegetation, we put it in."

**DEPOSITION TESTING**

Working with Dr. H. S. Potter, Professor of Botany and Plant Pathology at Michigan State University, Nalco initiated a research project to develop a test system that could be used in the field to measure aerial spray deposition immediately after spraying. The test was designed to yield on-the-spot results in order to allow a busy ag pilot to use the information to re-orient the nozzles on his own aircraft.

The test apparatus includes a quick-to-assemble 100-foot mobile boom, which can easily be oriented to wind direction. Participating ag pilots fly over this boom to test the deposition pattern of their own aircraft.

At each pass, spray is collected on 8½ x 11 inch Mylar sheets or in Petri dishes mounted every three to five feet on the boom. This spray is then quickly measured and analyzed to show just how uniform the spray deposition is in the swath.

Spray profiles vary with type of aircraft, type of pesticide, presence of the deposition aid NALCO-TROL, and nozzle type and orientation. Such standard variables as wind, temperature, and humidity are also recorded for each pass.

The big surprise to most ag pilots — when they were able to utilize this new test procedure — was how non-uniform the spray deposition often was, and how dramatically it could be improved by changes in nozzle placement and orientation, and by the use of an additive such as NALCO-TROL.
“There is no question,” Dr. Potter states, “regarding the efficiency of the use of chemical additive in spray materials. It makes a tremendous difference not only in the uniformity of placement of material, but also in the total quantity of spray material delivered to the target area. In many cases the quantity is doubled.

“The cost of pesticide materials is a major factor in costs of crop production. If you deliver only 50% of it to the target area, it is about the same as achieving only a 50% germination of high-cost seed.

“Also, some pesticides have been thought to fail to give results on a particular crop. In many instances, this failure is blamed on the pesticide itself. Often, the real culprit may be the fact that the pesticide never reaches the plant leaf or other target area intended. For instance, we performed one test in Yuma, Arizona, as a result of reported problems concerning the efficacy of a herbicide. We discovered that the herbicide did very well when it was delivered to its proper destination. But it was not being delivered, and in fact, by the addition of the elasticizing agent NALCO-TROL, the quantity of pesticide properly delivered to the target increased sevenfold.

“This elasticizing agent is also important in controlling drift. It helps resist the shearing action of the wind as the spray solution leaves the nozzle. No matter what size droplet is delivered by the nozzle, it stands a great risk of being further broken up by the wind shear. Proper nozzle orientation can help this. Nozzles oriented 30 to 45° backward show a dramatic improvement in drift control over nozzles oriented 90° downward. Again, the reason is a decrease in the wind-shear effect.”

The results of deposition tests for most of the leading agricultural aircraft all point to NALCO-TROL’s effectiveness as a drift retardant and deposition aid. If you want to compare the results yourself, the test data can be obtained from your Nalco field representative or Nalco Chemical Company, 2901 Butterfield Road, Oak Brook, IL 60521.