New Herbicide, Dacamine, Combines Safety of Amines, Punch of Esters

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PHENOXY herbicides, such as 2,4-D and 2,4,5-T, have been the backbone of most weed control programs involving the suppression of broadleaf weeds in both crop and noncropland areas for almost 20 years.

Most of these formulations consist of either the water-soluble amine salts of the water-emulsifiable esters of 2,4-D and 2,4,5-T. The inherent nonvolatile safety feature of the water-soluble amines is a well-known fact.

It has also become well established that at equal rates of application, the effectiveness and consistency of kill is greater with the water-emulsifiable esters. Thus, both materials, each with its particular advantage, have found their place as essential tools in spray programs.

In recent years, however, there has been a trend towards more mixed cropping in many areas of the United States. There has also been an increase in our highway and utility right-of-way areas and the spraying of these areas for broadleaf weed and brush control. An increase in suburban living, recreational facilities, and the move of industry outside of cities has also increased the spraying of turf areas.

All this has combined to bring areas of susceptible, desirable broadleaf plants in closer contact to the areas where 2,4-D and 2,4,5-T spray programs are being followed.

Many people, therefore, are claiming greater damage by the volatility from esters, both the regular-volatile and the low-volatile ones as well. In fact, litigation has often been instigated against the applicator in cases in which the grower merely suspected that these esters were being used near his crops. As a result, some states have passed legislation prohibiting the use of 2,4-D and 2,4,5-T esters, allowing only the use of the less effective and more erratic water-soluble amine salts.

In view of the above facts, it can be seen that the "ideal" phenoxy herbicide would combine both the efficacy features of the esters and nonvolatility features of the amines. Diamond's new Dacamine is such a product. The Dacamines are manufactured by reacting 2,4-D and/or 2,4,5-T acid with a long chain fatty amine. This oil-soluble material is then formulated to produce a water-emulsifiable amine salt of 2,4-D, 2,4,5-T or mixtures of D and T.

Characteristics of Dacamines—

—Physical

The Dacamines are brown viscous liquids. Under extremely cold conditions, they become stiff and pour with difficulty. There is no precipitation, however, or separation of the toxicant from other components of the formulation (as there is with the water-soluble amines). Therefore, heating to the point where the Dacamines will flow once more is all that is needed for proper use of this material after a long period of cold weather. Normal temperature changes between the winter and spring seasons will usually bring about this reduction in viscosity. This physical characteristic should not be taken as being exceptionally unusual since other formulations react in a similar fashion during periods of extreme cold.

The bloom (white, fluffy characteristics of emulsions when concentrate enters water) associated with the Dacamines should also be noted. Dacamines do not produce the immediate bloom associated with ester formulations. But it is common knowledge that the degree of immediate bloom is in no way correlated with the killing power of any emulsifiable concentrate. With slight agitation the Dacamines will produce a very sound and stable emulsion.

Present Dacamine formulations, being oil-soluble and water-emulsifiable, may be used in the same fashion as the esters, insofar as spray tanks, pumps, nozzles, strainers, pressure, water, etc., are concerned.

Dacamines, being oil-soluble, have been incorporated into formulations in which 90:10 water: oil mixtures may be used in any given final spray mixture. In brush control work, this means that the Dacamines can be used later in the growing season than the water-soluble amines. The possibility of adding oil to spray mixes to be used late in the season is very important in brush-control work and shows another advantage of the Dacamines. Formulations for use in a straight oil carrier are also available.

—Chemical

Technical Dacamines do not possess the characteristic odor associated with water-soluble amines. Any odors from the various formulations of this particular product would be ones emanating from the solvents used in the formulation. Under certain conditions, this lack of "fish-like" odor is another advantage of the Dacamines over the water-soluble amines.

Volatility comparisons made at Boyce-Thompson Institute of Plant Research, using the proce-

Spraymen have long sought a phenoxy herbicide which, while fast-acting and effective, is still relatively safe to desirable plants near treatment area. Dacamine may be the answer, this article contends.

dure officially approved by the Association of Official Agricultural Chemists, show the Dacamine salts of 2,4-D and 2,4,5-T are in a class safer than the standard low-volatile esters being used commercially today. To detect smaller volatility differences, the plants were held for an additional 7 days, after which leaf modification readings were recorded.

Diamond's oil-soluble, water-emulsifiable amine salts of 2,4-D and 2,4,5-T showed no leaf modifications, while some of the low volatile 2,4-D formulations showed a degree of leaf modification, indicating some minor volatility during this 7-day period.

—Physiologic Action

Plant morphological responses to the Dacamines, as one might expect, are quite similar to those exhibited from applications of other phenoxy acid formulations. The characteristic twisting and leaf malformations become evident. This is then followed by a chlorotic condition which in turn is followed by death and browning of the plant.

In many instances, the apparent rate of physiologic action with the Dacamines is considerably slower than that obtained with other phenoxy acid formulations. This appears to be a definite advantage in the control of deep-rooted and creeping perennial weeds such as field bindweed, Canada thistle, leafy spurge, and Russian knapweed. The important consideration in the control of these deep-rooted perennial species is the completeness of kill and lack of regrowth. Oftentimes a rapid top kill does not allow an adequate amount of the weedkiller to be translocated to the extensive storage and reproductive organs of these plants. In many instances, therefore, a slower kill may eventually achieve more satisfactory results than those obtained with rapid browning and top kill.

The Dacamines, of course, contain the normal limitations that one would expect with a phenoxy herbicide. That is, they will not control perennial grasses such as Johnsongrass and quackgrass. Then, too, control with these materials is not as good when applied to mature plants. As in the case with all hormonal herbicides, greater effect is obtained when application is made to young, vigorously growing plants.

Some Results with the Dacamines —Dacamine-D

In the northwest, comparative tests were conducted on the small grains such as wheat and barley. Dacamine, at rates ranging from ½ to 2 pounds of active ingredient per acre, was doing a better job against bindweed, Russian knapweed, and Canada thistle than the water-soluble amines, the butyl esters, and the low volatile esters applied at equivalent rates.

This material has also looked good in corn trials against witchweed in North Carolina. An Ohio farmer felt that the Dacamines gave better control in a comparative test with the iso-propyl formulations. The material was applied pre-emerge and the Dacamine appeared to also do a better job against the annual grasses. This same phenomenon has also been noted in other tests. Dacamine at ¼ pound active ingredient per acre has also been equal to or better than the esters in the control of water plantain in Arkansas rice trials. The 2 pound Dacamine rate is also giving exceptional control of alligator weed in Florida and Louisiana drainage ditches and waterways.

—Dacamine-T

A southern railroad tested Dacamine on a right-of-way adjoining cotton. They purposely used a high rate of 8 to 14 pounds of active ingredient per acre to check volatility. There was no report of cotton damage in any of their tests. In other tests, Dacamine has been as effective as ester formulations against such species as sumac, sassafras, locust, oak, maple, sweet gum, cherry, and hickory. It has also looked more effective than the esters against the conifers.

A herbicide that combines the safety of amines with the punch of esters has long been sought by the weed and brush control industry. With the current demand for greater herbicide safety, this need has become increasingly critical. It appears that Diamond's Dacamine may well fit this need.