HERBICIDES AND THEIR EFFECTIVENESS ON GRASSES

Gale Buchanan, Auburn University
Auburn, Alabama

Those of us in agronomy have seen a lot of farms, and I use the term loosely, that have been planted to pines and this has done everybody a service, especially the farmers who used to try to make a living on them.

I will talk about grass control and my remarks will be confined primarily to herbicides. I'll just ignore the fact that this is a forestry meeting and discuss herbicides; show some slides of cotton, peanuts, etc. You look at the weed control and omit looking at the crops.

As pointed out by the previous speakers, we do have a lot of data on many herbicides; however, much work is needed to find herbicides that can be used in forest nurseries. About three-fourths of the work has already been done and there's no reason to question "why" if a herbicide works in one place it won't work in another. The main thing that has to be done is to evaluate the tolerance on the particular seedling that you are trying to grow. So, it would be pretty much a matter of routine in carrying on this type of work because we do have a great deal of data on the relationship of herbicides to weeds. You also have some advantages that we, as agronomists, don't have. There's no such thing as a nursery without irrigation. I assure you there are lots of farmers without irrigation, and with many of the herbicides--certainly some of the ones we've seen--moisture is a requirement for best results. I'm not saying you can't get results without water, but for best results, moisture is often necessary.

Another advantage is lack of a residue problem in your produce. For example, diphenamid (Dymid or Enide) which is a good grass herbicide, can be used in Coastal Bermuda but you get too high a residue in Coastal hay and the Company just dropped it.

What characteristics of grasses become important when we start talking about control? One of the first things is that most of the grass seed are small. Have you ever looked closely at a goosegrass seed? You have to get your hand right up to your face to see the seed. They are very tiny. Many of the grasses germinate close to the surface of the soil and if you're using a standard pre-emergence herbicide, sprayed on the surface, and the weed germinates on the surface, chances are it's going to pick up that herbicide. Of

course, there are exceptions. Grasses also have a fibrous root system which is usually near the soil surface (in contrast to a lespedeza plant which may send its roots several feet down into the soil) so you get quite a bit of difference in methods of selectivity. For example, I recall having done some work with simazine to control weeds in sericea. Simazine applied on sericea at planting time will wipe it out completely, but come in the second year after sericea has put down a good root system and you can go up to 6 to 8 pounds of simazine without any noticeable injury.

Most of the herbicides that are available to the farmer or the agronomist have some grass activity. There is a tremendous difference between herbicides, as well as between root systems.

I noticed several questions on the questionnaire regarding nutgrass (nutsedge). I would like to point out that this is not a grass--it is a sedge. There is a terrific difference between a nutsedge and annual grasses, such as crabgrass. It is much more difficult to control. It is a very persistent weed and probably one of our most important weed problems in the Southeast. There are many herbicides that have some activity on it: the carbamates, vernolate and EPTC; also dichlobenil and a few others have activity on the sedges.

For the next few minutes I'd like to discuss a few of the herbicides which have already been mentioned. If you recall the herbicides on the last slide (I believe there were trifluralin, diphenamid, DCPA, and norea), those first three are certainly considered grass herbicides.

Trifluralin has been around for the cotton and soybean farmer since about 1964-65. It's a liquid and is also available as a granular. It is an excellent grass herbicide. We had some tests during the past season where we evaluated the granular versus the emulsifiable concentrate. Essentially, we found no difference between the formulations. This means that you can apply it either as a spray or a granular, which in some cases, one formulation might be more advantageous than the other. It is also effective at low rates. The rates go down, I believe, as low as one-half pound on very light soils (somewhere between one-half and 1 pound). We've done a good bit of research and we can usually get good control with the rates as low as one-quarter pound per acre. For the first 2 to 3 weeks, crabgrass and most of the other annual grasses are controlled at this rate. This might mean something when you start working on a "program" of weed control; using perhaps an application of one-quarter to one-half pound when you plant and another application later in the season. Something of this nature certainly is a possibility. It does require incorporation. We found that if you get a good rain or have irrigation, you get good control without any type of mechanical incorporation. It has excellent grass activity but it has poor broadleaf activity. On the other hand,

when you say it has good grass activity, and I might have led you to believe that it doesn't have any broadleaf activity, this is wrong. It will give satisfactory control of Florida purslane, carpetweed, pigweed, and I'm sure some others; but weeds like cockleburr, morning glory, and coffeeweed just aren't controlled by trifluralin.

There are several other herbicides that are similar to trifluralin. Benefin, for example (for you who are familiar with peanuts) has about the same type of weed control as trifluralin. Nitralin, another herbicide, also has about the same weed control spectrum. What does this mean? We've three herbicides that have about the same weed control spectrum, but to me it means there is a difference in tolerance of some weeds or some crop plants. There's reason to believe that some of these might have selectivity on pines, sycamore, or some other seedlings you are trying to grow and are worth a trial. For example, we tried benefin and trifluralin on sericea lespedeza and there's all the difference in the world in these two herbicides in their effect on lespedeza. There's a possibility we could get some type of selectivity here on some of the species in which you are interested.

Another herbicide that I would like to mention briefly is vernolate, which is another very good grass herbicide; also good on some broadleaf weeds. We found one particularly interesting aspect in that it gives fairly good control of nutsedge.

Eptam (EPTC) another carbamate herbicide similar to vernolate has some tolerance, as you might recall. There's certainly a possibility that you might be able to use it too.

Both vernolate and benefin are used in peanuts. There is one weed, Texas millet (a very common weed in the southern part of the State) which is not controlled with vernolate. However, benefin does an excellent job of control on this weed. Florida beggarweed, which is a very common broadleaf found throughout the Southeast, is not controlled by vernolate. I have applied as much as 8 to 10 pounds per acre and still did not control this species. In fact, this weed had more tolerance than the peanut plants. You'll kill the peanuts before you kill this particular weed species.

Other carbamates having possibilities and should be investigated are: vernolate, EPTC, and several others in this same general family. These have similar weed control trends which might give you a different level of tolerance to crop species, or tree species.

Dacthal (DPCA) is a relatively old herbicide; however, within the last year and a half, the price has been cut by one-half and there has been a revival of interest in it. Again, it is an excellent grass herbicide. I noticed from the questionnaire that someone used Dacthal at 16 pounds per acre and indicated it didn't control

broadleaf weeds. I can certainly believe that; however, it is a good grass herbicide. It's one of the safest herbicides and has a terrific range of selectivity especially on garden crops, vegetables, etc.--a favorite among homeowners and part-time gardeners.

Diphenamid or Enide or Dymid, depending on the Company, is another herbicide that certainly is a good herbicide. This herbicide is very sensitive to moisture.

All of these herbicides are available and are used in various agronomic crops. Considerable data on grass, weeds, etc., has already been presented. So, it's not as difficult to get a level on these as it is on a brand new compound. I think we all agree, and are aware, that it is a monumental task in getting labels and getting this type of material on the market for you to use.

I will show a couple of slides that will illustrate some real selectivity in grass and broadleaf weeds: This is cotton; but let's look at the weeds. This is a check area--no treatment was applied. Here you have a stand of weeds. We probably had a good stand of broadleaf weeds but the grasses got the upper hand and we end up at the end of the season with primarily a stand of broadleaf weeds. Now, what happened when we used a good grass herbicide? We got rid of the grasses, at least most of them, but look what happened--the morning glory went wild.

Another check area, and believe it or not, there is sericea lespedeza planted in these plots. I think you'll agree that's a good stand of grass. Also, note the nutsedge in the background.

This is vernolate (3 pounds per acre) and good selectivity. Of course, it's hard to see the nutgrass in the check but there is some. So, essentially complete control was obtained. The few weeds you see coming through are the morning glory. That morning glory is just as healthy as the sericea. By the end of the season, this looked like a morning glory plot. But, vernolate certainly gave excellent control of grass and good control of the nutsedge that were there.

This is peanuts: another check area--not sprayed with anything. This is another good stand of grasses; but can you see the different plots in the background? These are various herbicide treatments. Some control grasses and broadleaves. Another slide of peanuts showing the check area. A good stand of grasses throughout the whole area, with some broadleaves coming through. Here we have a good stand of Florida beggarweed, perfect grass control but a good stand of beggarweeds.

Even a herbicide which doesn't have activity against this particular weed, such as trifluralin, will give some control as we increase the

rate from 1 pound to 4 pounds. We get almost a straight line of increase in weed control with increase in rate of herbicide. This is not so with vernolate. For example, if you go from 2 to 4 to 6 to 8 pounds of vernolate, the stand of Florida beggarweeds will be essentially unchanged.

The question arises, "When can you apply trifluralin and still get acceptable weed control?" This is some data from 1966. The experiment has been going for about 3 years. We've applied 1-, 2-, and 4-pound rates. This is the 1-pound rate applied in December, March, and April. This is the control. The check area had 2,683 grasses per counted area (160 square feet). We had essentially complete control of grasses when the treatment was made at all dates. All had 90+ percent weed or grass control. Now, note the broadleaf control. When we look at the December application, the broadleaves are essentially unchanged when compared to the check; when we look at the application made in April, or time of planting, these differences are significant. We did reduce the population. Whether this is worth anything would have to be determined by you. If you were using hand-weed labor, the difference could be important.

COMMENT (Carter): We sent out a questionnaire and asked for some specific questions. A number of them have already been covered by our panelists. I want to stimulate your criticism and comments by making a few recommendations. You've heard the last two speakers mention several compounds. In narrowing down to five or six, there's still a lot to choose from. So, I'm going to suggest a couple of treatments to you and if you are interested, you can try them next year.

If enough of you are interested, LeRoy and I are going to try to have a little regional weed control trial next year, with some of these materials we've been testing. We know they are good herbicides, we know they will control weeds, and they look like they might be safe on pines. I'm going to suggest some of them to you now.

This is for pine--pre-emergence control of annual broadleaf or grasses on loblolly or slash pine applied at planting time. Do you apply it before or after mulch? That's one thing we've got to find out. For loblolly and slash pines, pre-emergence weed control of broadleaves in the seedbeds, I suggest you try Prometryne (Caparol is the trade name by Geigy) in the range of 3 to 6 pounds per acre. This is active ingredient on a sprayed-acre basis (25-30 gallons of water per acre). If you have a sandy or light soil, I'd start down at the lower end with around 3 pounds; if you have a heavier soil or a highly organic soil, you might get up around the upper end. Where grasses are primarily the problem, I'd suggest you try Treflan (a product of Eli Lilly) at 1/2-pound per acre. If you have both grasses and broadleaves, try them in

combination. We don't know if this will work or not. But, as near as we can tell, loblolly and slash pines will tolerate it at the lower rates. Remember, this is applied at planting time and I don't believe we're going to find one that will last throughout the season because of irrigation, high temperatures, leaching, and degradation losses of the materials. Most likely, you're going to have to apply a second application. We have tested these two materials, at the rates I gave you, on loblolly pine about 4 to 6 inches tall and we had no damage. We sprayed it directly on top of the pines, turned on the irrigation system as soon as we finished, and washed it into the soil. If you get fair weed control with these, but it starts to fade out, I'd suggest you hand-weed your plots.

These are pre-emergence materials. They have very little contact injury; so hand-weed what few weeds are there and then come back with a second application. I suggest you evaluate your results on the basis of reduced weeding time and not on the number of weeds per square foot. The best measure we've found is the hand-weeding time and this is very easy to get. On a small plot, you just take a watch with a second hand and tell your men to start weeding. Let them weed 10 to 15 feet of bed and then go over to an untreated area and do the same thing. Compare the results. A reduction in hand-weeding time is money in your pocket.