# Interaction of 2,4-DB With Postemergence Graminicides

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**ABSTRACT**

Field experiments were conducted in North Carolina, Georgia, and Texas to determine if grass control is affected when postemergence-applied graminicides are mixed with 2,4-DB. Grass species evaluated included broadleaf signalgrass [*Brachiaria platyphylla* (Griseb.) Nash], goosegrass [*Eleusine indica* (L.) Gaertn.], johnsongrass [*Sorghum halepense* (L.) Pers.], large crabgrass [*Digitaria sanguinalis* (L.) Scop.], southern crabgrass [*Digitaria ciliaris* (Retz.) Koel.], and Texas panicum (*Panicum texanum* Buckl.). Mixing 2,4-DB with the graminicides reduced grass control 8 to 15% at five of 11 locations. The antagonism was not specific for a particular grass species or graminicide, and it was not restricted to grasses under adverse growing conditions. Applying the 2,4-DB 24 hours after graminicide application alleviated the antagonism. Applying the 2,4-DB 24 hours before the graminicides overcame the antagonism at three of the five locations.

Key Words: Clethodim, fluazifop-p, quizalofop-P, sethoxydim, antagonism, herbicide mixtures, *Brachiaria platyphylla, Digitaria ciliaris, Digitaria sanguinalis, Eleusine indica, Panicum texanum, Sorghum halepense.*

The aryloxyphenoxypropionic acid herbicides fenoxaprop {(±)-2-[4-[(6-chloro-2-benzoxazolyl)oxy]phenoxy]propanoic acid}, fluazifop-P { (R)-2-[4-[[5-trifluoromethyl)-2-pyridinyl]oxy]phenoxy] propanoic acid}, haloxyfop {2-[4-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanoic acid, quizalofop {(±)-2-[4-[(6-chloro-2-quinoxalinyl)oxy]phenoxy]propanoic acid}, and quizalofop-P {(R)-2-[4-[(6-chloro-2-quinoxalinyl)-oxy]phenoxy]propanoic acid} and the cyclohexanedione herbicides clethodim {(*E*,*E*,)-(±)-2-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one} and sethoxydim {2-[1-(ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one} control annual and perennial grasses in peanut (*Arachis hypogaea* L.) and other broadleaf crops (3, 16, 28, 29). These postemergence-applied herbicides, commonly referred to as postemergence graminicides, selectively inhibit lipid biosynthesis in susceptible species (18).

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[2]Agridex (a mixture of 83% paraffin base petroleum oil and 17% surfactant blend). Helena Chemical Co., 5100 Poplar Ave., Memphis, TN 38137.

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Only fenoxaprop and sethoxydim are registered for use in peanut (28). Fenoxaprop is not widely used by peanut producers (2). However, depending upon the state, sethoxydim is used on 5 to 22% of the peanut acreage in the United States as the primary means of controlling perennial grasses or to control annual grasses escaping preplant or preemergence herbicides (2, 28). Although currently not registered for use on peanut, other postemergence graminicides such as clethodim, fluazifop-P, and quizalofop-P will control annual and perennial grasses without injuring peanut (14, 16).

The phenoxyalkanoic acid herbicide 2,4-DB [4-(2,4-dichlorophenoxy)butanoic acid] is one of the most commonly used herbicides on peanut in the United States (2, 9). Peanut growers apply 2,4-DB postemergence to control common cocklebur (*Xanthium strumarium* L.), sicklepod (*Cassia obtusifolia* L.), *Ipomoea* morningglory species, and smallflower morningglory [*Jacquemontia tamnifolia* (L.) Griseb.] (4). Growers also mix 2,4-DB with other postemergence-applied broadleaf herbicides to enhance weed control or to broaden the spectrum of weeds controlled (4, 27, 28).

Within a growing season, peanut producers may apply both a postemergence graminicide and 2,4-DB (2). If the optimum timing of application for both herbicides coincides, applying the two herbicides as a mixture would be desirable because a single application would reduce fuel and labor costs, equipment wear, and mechanical damage to the crop and soil (13). Growers, however, need to be cognizant of interactions that may occur when two or more herbicides or other pesticides are used in combination (12).

Antagonism may occur when benzoic acid (1, 25), aliphatic acid (5), imidazolinone (21, 22), sulfonylurea (22), diphenylether (11, 15, 22), benzothiadiazole (15, 17, 20), pyridazine (15), amide (5), phenylcarbamate (8), phenylurea (3), and organic arsenical (3) herbicides are mixed with the postemergence graminicides. Antagonism also may occur when phenoxyalkanoic acid herbicides such as 2,4-D [(2,-4-dichlorophenoxy)acetic acid] and MCPA [(4-chloro-2-methylphenoxy)acetic acid] are mixed with postemergence graminicides (5, 7, 10, 24, 25).

Variable results have been observed with mixtures of postemergence graminicides and 2,4-DB. Minton *et al.* (22) observed antagonism on barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.] with mixtures of 15 g ae ha$^{-1}$ of 2.4-DB and fluazifop-P but not with mixtures of 2,4-DB and clethodim, fenoxaprop, haloxyfop, quizalofop, or sethoxydim. In other studies (23), antagonism was observed on red rice (*Oryza sativa* L.) with mixtures of fenoxaprop or fluazifop-P and

15 g ha$^{-1}$ of 2,4-DB but not with mixtures of clethodim, haloxyfop, quizalofop, or sethoxydim and 2,4-DB. Grichar and Boswell (17) observed antagonism on Texas panicum (*Panicum texanum* Buckl.) and large crabgrass [*Digitaria sanguinalis* (L.) Scop.] when 340 g ha$^{-1}$ of 2,4-DB was mixed with fluazifop-P or sethoxydim but not when 2,4-DB was mixed with haloxyfop. Grichar (15) reported that 70 g ha$^{-1}$ of 2,4-DB plus 2.24 kg ae ha$^{-1}$ of naptalam {2-[(1-naphthalenylamino)carbonyl]benzoic acid} reduced control of southern crabgrass [*Digitaria ciliaris* (Retz.) Koel.] by sethoxydim 30% in one year while having no effect in another year.

The objective of our study was to determine the potential for interactions between 2,4-DB and four postemergence graminicides when applied in combination or sequentially to several grass species under a range of environmental and geographical conditions.

## Materials and Methods

The experiment was conducted with six grass species at 11 locations in North Carolina, Georgia, and Texas in 1991 and 1992 (Table 1). Grass species included Texas panicum, large crabgrass, southern crabgrass, broadleaf signalgrass [*Brachiaria platyphylla* (Griseb.) Nash], goosegrass [*Eleusine indica* (L.) Gaertn.], and johnsongrass [*Sorghum halepense* (L.) Pers.]. Soils were loamy sands or sandy loams typical of the peanut-producing regions of the states where the tests were conducted. Test sites with a history of heavy grass infestations were selected. The test sites were disked, and grasses were allowed to establish uninhibited. A crop was not planted.

Treatments were arranged in a randomized complete block design and replicated three times in Georgia and Texas and four times in North Carolina. Plot size was 1.8 by 6 m.

Treatments at all locations except Wilson and Kinston, NC in 1991 included clethodim, sethoxydim, fluazifop-P, and quizalofop-P applied alone or mixed with 280 g ha$^{-1}$ of the dimethylamine salt of 2,4-DB. Additional treatments included sequential applications of the graminicides and 2,4-DB, with the 2,4-DB applied 24 hours before or after the graminicides. Clethodim and sethoxydim were applied at 105 and 210 g ai ha$^{-1}$, respectively, while the butyl ester of fluazifop-P and the ethyl ester of quizalofop-P were applied at 210 and 56 g ae ha$^{-1}$, respectively. Non-treated checks and 2,4-DB applied alone also were included. A crop oil concentrate[2] at 0.9 L ha$^{-1}$ was included with all applications of the graminicides. An adjuvant was not included when 2,4-DB was applied alone. Treatments at Wilson and Kinston, NC in 1991 were similar except that clethodim was not included.

Herbicides were applied with $CO_2$-pressurized sprayers equipped with flat fan nozzles delivering 187 L ha$^{-1}$ at 138 kPa in Georgia, 187 L ha$^{-1}$ at 207 kPa in Texas, or 234 L ha$^{-1}$ at 207 kPa in North Carolina. Grass size and density and the soil moisture status at the time of herbicide application are listed in Table 1.

Johnsongrass control was estimated visually 15 and 40 days after treatment (DAT) using a scale of 0 = no control to 100 = complete kill. Control of other species was estimated similarly 28 DAT in North Carolina and Georgia or 35 DAT in Texas.

No response of the grasses to 2,4-DB applied alone was noted at any location. The treatment of 2,4-DB applied alone and the non-treated checks were deleted, and data were subjected to analysis of variance with basic partitioning for a 4 by 4 (graminicide by 2,4-DB) factorial treatment arrangement. Data were transformed to the arcsine square root prior to analysis. Means for significant main effects and interactions were separated by Fisher's Protected LSD at the 5% level of probability. Non-transformed means are presented with statistical interpretation based upon transformed data.

## Results

A 2,4-DB by graminicide interaction was observed only with control of broadleaf signalgrass and seedling johnsongrass in North Carolina in 1992 (Table 2). Excellent control of broadleaf signalgrass was obtained with the graminicides applied alone. Clethodim, quizalofop-P, and sethoxydim were similarly effective, controlling broadleaf signalgrass 97 to 100%. Although less effective than the other three graminicides, fluazifop-P controlled broadleaf signalgrass 92%.

Regardless of time of application, 2,4-DB had no effect on control of broadleaf signalgrass by clethodim, fluazifop-P or sethoxydim in 1992 (Table 2). There also was no effect of 2,4-DB on control of broadleaf signalgrass by quizalofop-P when the 2,4-DB was applied 24 hours before or 24 hours after

**Table 1. Grass height and density and drought stress at time of herbicide application.**

| Grass species | Location | Year | Grass height | Grass density | Drought stress at application |
|---|---|---|---|---|---|
| | | | cm | plants/m$^2$ | |
| Goosegrass | Goldsboro, NC | 1991 | 15 to 30 | 150 | None |
| Texas panicum | Poth, TX | 1991 | 20 to 36 | 25 | Moderate |
| | Attapulgus, GA | 1991 | 5 to 10 | 20 | None |
| Large crabgrass | Kinston, NC | 1991 | 5 to 10 | 20 | Severe |
| | Rocky Mount, NC | 1992 | 10 to 15 | 20 | None |
| Southern crabgrass | Yoakum, TX | 1992 | 15 to 20 | 45 | None |
| Broadleaf signalgrass | Wilson, NC | 1991 | 8 to 13 | 250 | Severe |
| | Rocky Mount, NC | 1991 | 8 to 15 | 60 | Severe |
| | Rocky Mount, NC | 1992 | 20 to 23 | 25 | None |
| Seedling johnsongrass | Goldsboro, NC | 1992 | 60 to 90 | 40 | None |
| Rhizomatous johnsongrass | Smithville, GA | 1991 | 30 to 90 | 2 | None |

**Table 2. Interaction of 2,4-DB and postemergence graminicides on control of broadleaf signalgrass and seedling johnsongrass. North Carolina, 1992.[a]**

| Treatments[b,c] | Broadleaf signalgrass 28 DAT[d] | Johnsongrass 15 DAT | Johnsongrass 40 DAT |
|---|---|---|---|
| | % | | |
| Clethodim | 98 a | 100 a | 100 a |
| Clethodim + 2,4-DB | 100 a | 100 a | 96 ab |
| Clethodim fb 2,4-DB | 96 ab | 100 a | 98 ab |
| 2,4-DB fb clethodim | 100 a | 100 a | 97 ab |
| Fluazifop-P | 92 cd | 100 a | 100 a |
| Fluazifop-P + 2,4-DB | 90 d | 98 a | 98 ab |
| Fluazifop-P fb 2,4-DB | 91 d | 100 a | 100 a |
| 2,4-DB fb fluazifop-P | 94 bcd | 100 a | 100 a |
| Quizalofop-P | 100 a | 100 a | 100 a |
| Quizalofop-P + 2,4-DB | 85 e | 100 a | 100 a |
| Quizalofop-P fb 2,4-DB | 96 ab | 100 a | 100 a |
| 2,4-DB fb quizalofop-P | 100 a | 100 a | 100 a |
| Sethoxydim | 97 ab | 100 a | 97 ab |
| Sethoxydim + 2,4-DB | 97 ab | 94 b | 80 c |
| Sethoxydim fb 2,4-DB | 96 abc | 98 a | 85 c |
| 2,4-DB fb sethoxydim | 98 ab | 97 a | 94 b |

[a]Means within a column followed by the same letter are not different at $P \leq 0.05$.

[b]Clethodim, fluazifop-P, quizalofop-P, sethoxydim, and 2,4-DB applied at 105, 210, 56, 210, and 280 g $ha^{-1}$, respectively.

[c]Fb = followed by 24 hours later.

[d]DAT = days after treatment.

quizalofop-P; mixing 2,4-DB with quizalofop-P, however, reduced control 15%.

Clethodim, fluazifop-P, and quizalofop-P completely controlled seedling johnsongrass 15 and 40 DAT in 1992 (Table 2). Control by these three graminicides was unaffected by 2,4-DB. Seedling johnsongrass control by sethoxydim applied alone was comparable with control by the other graminicides. However, mixing 2,4-DB with sethoxydim reduced control 6% at 15 DAT. At 40 DAT, control was reduced 12 to 17% when 2,4-DB was mixed with sethoxydim or applied 24 hours before sethoxydim. Control at 40 DAT with sethoxydim applied alone and with sethoxydim followed 24 hours later by 2,4-DB was similar. Reduced control at 40 DAT with combinations of sethoxydim and 2,4-DB was due to regrowth of the johnsongrass.

A 2,4-DB by graminicide interaction was not observed with broadleaf signalgrass in North Carolina in 1991 nor with rhizomatous johnsongrass in Georgia in 1991. Broadleaf signalgrass control generally was poor at both locations in North Carolina in 1991 (Table 3). This probably is attributable to moisture stress when the weed was treated (Table 1) (19, 26). Greater control was obtained at both locations with sethoxydim than with either fluazifop-P or quizalofop-P

**Table 3. Comparison of postemergence graminicides for control of broadleaf signalgrass and rhizomatous johnsongrass.[a,b]**

| Graminicides[c] | Broadleaf signalgrass NC, 1991 Wilson 28 DAT[d] | Broadleaf signalgrass NC, 1991 Rocky Mount 28 DAT | Johnsongrass GA, 1991 15 DAT | Johnsongrass GA, 1991 40 DAT |
|---|---|---|---|---|
| | % | | | |
| Clethodim | -- | 61 a | 92 a | 75 a |
| Fluazifop-P | 29 b | 12 c | 83 b | 58 b |
| Quizalofop-P | 11 b | 13 c | 83 b | 42 c |
| Sethoxydim | 86 a | 35 b | 69 c | 37 c |

[a]Means within a column followed by the same letter are not different at $P \leq 0.05$.

[b]Data pooled over 2,4-DB treatments.

[c]Clethodim, fluazifop-P, quizalofop-P, and sethoxydim applied at 105, 210, 56, and 210 g $ha^{-1}$, respectively. Clethodim was not included at Wilson.

[d]DAT = days after treatment.

(Table 3). Clethodim, included only at Rocky Mount in 1991, was the most effective graminicide on broadleaf signalgrass.

Clethodim was the most effective of the four graminicides on rhizomatous johnsongrass; quizalofop-P and sethoxydim were the least effective (Table 3). Control by all treatments decreased to 75% or less at 40 DAT due to regrowth. Two applications of postemergence graminicides often are necessary for adequate control of rhizomatous johnsongrass (29).

Control of rhizomatous johnsongrass in Georgia or broadleaf signalgrass at Rocky Mount, NC in 1991 was not affected by 2,4-DB (Table 4). Broadleaf signalgrass control at Wilson, NC in 1991 was reduced 5% when 2,4-DB was mixed with the graminicides.

**Table 4. Effect of 2,4-DB mixed with or applied sequentially with postemergence graminicides on control of broadleaf signalgrass and rhizomatous johnsongrass.[a]**

| Treatments[b,c] | Broadleaf signalgrass NC, 1991 Wilson 28 DAT[d] | Broadleaf signalgrass NC, 1991 Rocky Mount 28 DAT | Johnsongrass GA, 1991 15 DAT | Johnsongrass GA, 1991 40 DAT |
|---|---|---|---|---|
| | % | | | |
| Graminicides alone | 32 a | 40 a | 81 a | 57 a |
| Graminicides + 2,4-DB | 27 b | 37 a | 82 a | 49 a |
| Graminicides fb 2,4-DB | 32 a | 44 a | 80 a | 56 a |
| 2,4-DB fb graminicides | 32 a | 46 a | 85 a | 49 a |

[a]Means within a column followed by the same letter are not different at $P \leq 0.05$.

[b]Data pooled over clethodim, fluazifop-P, quizalofop-P, and sethoxydim applied at 105, 210, 56, and 210 g $ha^{-1}$, respectively. 2,4-DB applied at 280 g $ha^{-1}$.

[c]Fb = followed by 24 hours later.

[d]DAT = days after treatment.

A 2,4-DB by graminicide interaction also was not observed with Texas panicum, goosegrass, large crabgrass, or southern crabgrass. In Georgia, all graminicides controlled Texas panicum at least 95% (Table 5). In Texas, Texas panicum control was similar with clethodim, fluazifop-P, and sethoxydim; quizalofop-P was less effective than the other three graminicides. Grichar (14) also reported less control of Texas panicum with quizalofop than with clethodim or fluazifop-P.

**Table 5. Comparison of postemergence graminicides for control of Texas panicum, goosegrass, large crabgrass, and southern crabgrass.[a,b]**

| | Texas panicum | | Goosegrass | Large crabgrass | | Southern crabgrass |
|---|---|---|---|---|---|---|
| | TX | GA | NC | NC | NC | TX |
| | 1991 | 1991 | 1991 | 1991 | 1992 | 1992 |
| Graminicides[c] | 35 DAT[d] | 28 DAT | 28 DAT | 28 DAT | 28 DAT | 35 DAT |
| | % | | | | | |
| Clethodim | 92 a | 95 a | 64 c | -- | 98 a | 89 a |
| Fluazifop-P | 97 a | 95 a | 79 b | 55 a | 70 b | 77 b |
| Quizalofop-P | 82 b | 95 a | 76 b | 45 b | 72 b | 67 c |
| Sethoxydim | 94 a | 96 a | 89 a | 59 a | 93 a | 86 a |

[a]Means within a column followed by the same letter are not different at $P \leq 0.05$.

[b]Data pooled over 2,4-DB treatments.

[c]Clethodim, fluazifop-P, quizalofop-P, and sethoxydim applied at 105, 210, 56, and 210 g $ha^{-1}$, respectively.

[d]DAT = days after treatment.

Sethoxydim was the most effective of the four graminicides on goosegrass while clethodim was the least effective (Table 5). Sethoxydim and clethodim were equally effective on large crabgrass in North Carolina in 1992 and on southern crabgrass in Texas. At these two locations, both cyclohexanedione herbicides were more effective than the aryloxyphenoxypropionic acid herbicides. None of the graminicides controlled large crabgrass adequately in North Carolina in 1991. However, fluazifop-P and sethoxydim were more effective than quizalofop-P. The poor control of large crabgrass in 1991 likely was due to the severe moisture stress when the weed was treated (Table 1).

There was no effect of 2,4-DB on control by the graminicides applied to Texas panicum in Georgia, large crabgrass in North Carolina in 1991 and 1992, or southern crabgrass in Texas (Table 6). Mixing 2,4-DB with the graminicides reduced control of Texas panicum 8% in Texas. Goosegrass control was reduced 18% when 2,4-DB was mixed with the graminicides and 10% when 2,4-DB was applied 24 hours before the graminicides.

## Discussion

Our results demonstrate that clethodim, fluazifop-P, quizalofop-P, and sethoxydim may be antagonized when mixed with 2,4-DB. However, the antagonism was inconsistent and relatively minor. Mixing 2,4-DB with the graminicides reduced grass control at only five of 11 locations. When antagonism was observed, grass control was reduced only 5 to 18%. Reductions of this magnitude may not adversely affect peanut yield as complete grass control is not necessary for optimum yields (15).

**Table 6. Effect of 2,4-DB mixed with or applied sequentially with postemergence graminicides on control of Texas panicum, goosegrass, large crabgrass, and southern crabgrass.[a]**

| | Texas panicum | | Goosegrass | Large crabgrass | | Southern crabgrass |
|---|---|---|---|---|---|---|
| | TX | GA | NC | NC | NC | TX |
| | 1991 | 1991 | 1991 | 1991 | 1992 | 1992 |
| Treatments[b,c] | 35 DAT[d] | 28 DAT | 28 DAT | 28 DAT | 28 DAT | 35 DAT |
| | % | | | | | |
| Graminicides alone | 94 a | 95 a | 85 a | 51 a | 84 a | 84 a |
| Graminicides + 2,4-DB | 86 b | 95 a | 67 c | 59 a | 83 a | 75 a |
| Graminicides fb 2,4-DB | 94 a | 95 a | 75 b | 49 a | 84 a | 78 a |
| 2,4-DB fb graminicides | 90 ab | 95 a | 81 a | 55 a | 82 a | 82 a |

[a]Means within a column followed by the same letter are not different at $P \leq 0.05$.

[b]Data pooled over clethodim, fluazifop-P, quizalofop-P, and sethoxydim applied at 105, 210, 56, and 210 g $ha^{-1}$, respectively. 2,4-DB applied at 280 g $ha^{-1}$.

[c]Fb = followed by 24 hours later.

[d]DAT = days after treatment.

Other researchers also have reported inconsistent responses with mixtures of postemergence graminicides and various broadleaf herbicides (3, 15, 19, 21). The magnitude of antagonism we observed when 2,4-DB was mixed with the graminicides is similar to that observed previously with mixtures of phenoxyalkanoic acid herbicides and postemergence graminicides (5, 17, 22, 23, 24) but less than that often observed when other types of broadleaf herbicides are mixed with the graminicides (3, 19, 20, 22).

In previous research (17, 22, 23, 24), some of the postemergence graminicides were more susceptible to antagonism by a given broadleaf herbicide than were other graminicides. In our experiment, there was no indication that one graminicide was consistently more susceptible to antagonism by 2,4-DB than were the other graminicides.

We can not explain why antagonism with mixtures of 2,4-DB and the postemergence graminicides occurred at some locations but not at others. Some research has indicated that antagonism with mixtures of broadleaf herbicides and graminicides is more likely to occur on grass species less susceptible to the graminicides (3, 11). We did not observe that relationship in our work. Goosegrass, Texas panicum, and broadleaf signalgrass are more susceptible to at least some of the graminicides than is large crabgrass (6, 16). We observed antagonism with mixtures of graminicides and 2,4-DB on goosegrass, Texas panicum, and broadleaf signalgrass but not on large crabgrass. Seedling johnsongrass generally is more susceptible to sethoxydim than is rhizomatous johnsongrass (30). We observed antagonism with mixtures of sethoxydim and 2,4-DB on seedling johnsongrass but not on rhizomatous johnsongrass.

Some researchers (11, 19, 21) have reported a greater likelihood of antagonism with mixtures of broadleaf herbicides and postemergence graminicides when conditions for control with the graminicides, such as soil moisture, are less than optimum. We did not observe that relationship in our experiment. The grasses were under drought stress at only two of five locations where antagonism was observed with mixtures of 2,4-DB and the graminicides. As further evidence for the lack of a relationship between adverse growing conditions and antagonism with mixtures of graminicides and 2,4-DB, we observed 85% or greater control with the graminicides applied alone at four of the five locations where antagonism was noted.

Antagonism with mixtures of 2,4-DB and the postemergence graminicides could be overcome by applying the graminicides 24 hours prior to applying the 2,4-DB. Similar results were observed when other broadleaf herbicides were applied 1 day after graminicide application (11, 20, 21, 25).

It also may be possible to overcome antagonism with mixtures of 2,4-DB and graminicides by increasing the rate of the graminicides. Although we did not investigate the effect of increasing graminicide rates, previous research suggests an increase in the graminicide rate likely would alleviate the antagonism (5, 10, 17, 19, 24). The cost of increasing the graminicide rate may be more than offset by the costs associated with a separate application. A grower also may be willing to invest in more graminicide in the mixture to compensate for a shortage of time, labor, or equipment.

## Summary and Conclusions

One or more of the four postemergence graminicides we evaluated was antagonized in 45% of the experiments when mixed with 2,4-DB. The antagonism was not specific for a grass species or a particular graminicide, and it was not restricted to situations where the grasses were drought-stressed at the time of application. The antagonism was relatively minor, however, with grass control being reduced only 5 to 18%.

In peanut fields where both 2,4-DB and a postemergence graminicide are needed, greater efficacy from the graminicide may be obtained if it is applied separately from the 2,4-DB. No antagonism would be expected if the 2,4-DB is applied 24 hours or more after applying the graminicide. However, because of additional costs with separate applications and potential time, labor, or equipment constraints, growers prefer to combine as many operations as possible to reduce trips over the field. Our research indicates that while there is a potential for antagonism, 2,4-DB and clethodim, fluazifop-P, sethoxydim, or quizalofop-P can be applied simultaneously with only minor reductions in grass control.

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