

# Getting The Most Out Of Butyrac 200 (2,4-DB Amine) And Bucril (Bromoxynil) Applications

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## **Abstract:**

Butyrac 200 (2,4-DB amine) with adjuvants provided as effective control of certain broadleaved weeds as was obtained with Butoxone (2,4-DB ester). Bucril (bromoxynil) has been repeatedly demonstrated to be effective for the selective control of many broadleaved weeds in newly planted alfalfa. The importance of proper timing of the application of these herbicides relative to the growth of the weeds and the alfalfa cannot be over emphasized. Their timely use can enhance weed control in alfalfa.

## **Introduction:**

It is doubtful whether you could find another person who conducted as many applied research trials during the past 30 years as I have in evaluating 2,4-DB and bromoxynil for selective weed control in alfalfa.

Neither of these compounds are new and it is a sad commentary on the pesticide approval and labeling procedures in the United States that it required thirty years to obtain a label for the use of bromoxynil in alfalfa. We knew a quarter century ago how to get the most from the application of Bucril in newly planted alfalfa.

Bromoxynil was first synthesized in Germany in 1896 and was patented in the United States in 1963. Bromoxynil is an inhibitor of photosynthesis. It moves in the plant to a very limited extent, therefore it is called a contact herbicide. At present it is classified as a restricted use pesticide hence it can be applied only by certified applicators or persons under their supervision.

## **Twenty-Five Years of Trials**

The past 25 years I have conducted many trials in the San Joaquin Valley evaluating Bucril on many different varieties of newly planted alfalfa. The trials were conducted in fall, winter and spring planted fields on different soil types and methods of irrigation.

The label on Bucril indicates that it should be applied when the alfalfa has a minimum of four trifoliolate leaves. I have applied Bucril on alfalfa having 1 to 2 trifoliolate leaves and the only time I observed injury was when the temperature exceeded 75 to 80°F at the time of treatment or 2 to 3 days after treatment. The symptoms observed were chlorosis or necrosis of leaflets and some growth retardation, however these symptoms were short lived.

Rather than bore you with the results obtained in trials conducted years ago and reported at numerous alfalfa symposia, other meetings, and in Runcina, let me briefly outline how to get the most from the application of Bucril.

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Proper weed identification is essential. Buctril does not control grasses neither does it control the following commonly occurring broadleaved weeds:

|           |           |
|-----------|-----------|
| chickweed | purslane  |
| henbit    | clovers   |
| nettle    | red maids |

There are a number of broadleaved weeds that are effectively controlled with Buctril when seedlings however, many become more tolerant to the herbicide as they develop beyond their seedling stage; a few of the more commonly occurring ones are filaree, common knotweed, cudweed and cheeseweed. Therefore proper timing of its application is essential.

In our studies we also found that more effective control was obtained with Buctril when it was applied in 60 to 70 gallons of water per acre - than was observed when lower gallonage was used. In fact we have been able to obtain more effective control when injected into sprinkler irrigation systems; it is labeled for this type of application.

#### **In Summary,**

To get the most from the application of Buctril:

- a. know the weed population
- b. treat weeds in their seedling stage  
apply when the alfalfa has 3 to 4 trifoliolate leaves
- d. apply in 50 to 60 gallons of water per acre, this is especially important when the weeds are beyond their seedling stage
- e. don't apply when the temperature is 80°F or above
- f. inject into irrigation system if proper conditions can be met

In recent years we have been evaluating the effectiveness of Buctril in combination with other herbicides to obtain a broader spectrum of weed control. However, at present I better turn to discuss the second part of my original topic.

#### **Getting the Most Out Of 2,4-DB Amine**

As bromoxynil, 2,4-DB amine is not a new herbicide. My first evaluation of different formulations of 2,4-DB for the selective control of weeds in alfalfa dates back to the early 60's.

2,4-DB was discovered in 1942 as a foliar absorbed synthetic growth regulator. It is readily translocated in plants principally to meristematic areas of high metabolic activity where it interferes with nucleic acid formation, disruption of translocation, metabolism and photosynthesis. There are numerous salts and formulations of 2,4-DB and Butyrac 200 is an amine salt of 2,4 dichlorophenoxybutyric acid.

2,4-DB is not an effective herbicide but in certain plants it is converted to 2,4-D acid through beta oxydation. In alfalfa and clovers this does not occur as effectively as in other broadleaf plants, hence the selectivity.

During the early 60's we learned that the ester formulation of 2,4-DB provided significantly better control at lower rates than was obtained with the amine formulation. Consequently 2,4-DB ester was used by alfalfa growers until 1990 when its manufacturer discontinued its marketing.

#### **2,4-DB Amine vs 2,4-DB Ester**

Trials were initiated during 1990 to reevaluate the amine formulation of 2,4-DB in combination with different adjuvants and other herbicides to study whether its effectiveness could be enhanced. These studies were summarized and published in Runcina Vol. 45.

2,4-DB amine plus adjuvants were applied on alfalfa at different stages of its growth. It was also evaluated in combination with Buctril, and several grass herbicides. The results of the studies and observations can be briefly summarized as follows:

2,4-DB amine (Butyrac 200) with an adjuvant provided as effective control of broadleaved weeds as was obtained with the 2,4-DB ester formulation (see tables).

- The addition of X-77 at 1/4 and 1/2% of the spray volume or a paraffin based adjuvant at 1.0 quart per acre resulted in equally as effective control of the susceptible weeds with Butyrac 200 as was obtained with 2,4-DB ester.

~~Both formulations of 2,4-DB (ester and amine) caused temporary retardation in the growth (vigor) of the alfalfa, however this was short lived.~~

2,4-DB amine with X-77 or a paraffin based adjuvant caused chlorosis and necrosis of some leaflets.

The alfalfa seedlings exhibited greater tolerance to 2,4-DB amine when treated in the first trifoliate leaf than in later stages of its growth. See the following tables.

- When applied in combination with Poast (sethoxydim) or Select (clethodim) plus a paraffin based adjuvant good broadleaf and grass control was obtained with excellent alfalfa tolerance.

The younger the weeds when treated the more effective control was obtained.

Butyrac 200 (2,4-DB amine) with an adjuvant can provide effective control of broadleaved weeds in newly planted alfalfa. Timing of its application relative to the weed growth is critical. Many species of weeds effectively controlled in their seedling stage became more tolerant to the herbicide as they grow. Cheeseweed, chickweed, cudweed and several other species of broadleaved weeds are not controlled by 2,4-DB as shown in chart 1.

#### **In Summary**

Butyrac 200 plus an adjuvant and Buctril are effective herbicides for the selective control of broadleaved weeds. Alfalfa growers can obtain the most from their application only through correct identification of the weed population and proper timing of their application relative to the growth of the weeds and the alfalfa. If the conditions outlined above are met these herbicides can be effective tools in the arsenal of alfalfa growers for the control of unwanted competing vegetation in their fields.

# CHART 1 Susceptibility of Weeds to Herbicides Evaluated in Alfalfa Production

| BROADLEAF WEEDS        | PREPLANT     |               | POSTEMERGENCE         |   |                   |                     | ESTABLISHED STANDS |                  |                        |                      |
|------------------------|--------------|---------------|-----------------------|---|-------------------|---------------------|--------------------|------------------|------------------------|----------------------|
|                        | INCORPORATED | EPTAM<br>EPTC | BUCTRIL<br>bromoxynil | BUTYRAC 200<br>2,4-DB amine +<br>adjuvant | KERB<br>pronamide | POAST<br>sethoxydim | EPTAM<br>EPTC      | KARMEX<br>diuron | TREFLAN<br>trifluralin | VELPAR<br>hexazinone |
| CHEESEWEED             | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| CHICKWEED              | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| COCKLEBUR              | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| CUDWEED                | W + S        |               |                       |   |                   |                     |                    |                  |                        |                      |
| CLOVERS                | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| FIDDLENECK             | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| FLAREE                 | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| FLAXLEAF FLEABANE      | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| GOOSEFOOT              | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| GROUNDCHERRY           | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| GROUNDSEL              | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| HENBIT                 | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| HORSEWEED (MARESTALL)  | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| KNOTWEED               | W + S        |               |                       |   |                   |                     |                    |                  |                        |                      |
| LAMBSQUARTER           | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| LONDON ROCKET          | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| MINERS LETTUCE         | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| MUSTARD                | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| NETTLE                 | W + S        |               |                       |   |                   |                     |                    |                  |                        |                      |
| NIGHTSHADE             | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| PIGWEED                | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| PINEAPPLEWEED          | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| PRICKLY LETTUCE        | W + S        |               |                       |   |                   |                     |                    |                  |                        |                      |
| PUNCTUREVINE           | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| PUSLANE                | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| RED MAIDS              | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| RUSSIAN THISTLE        | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| SHEPHERD'S PURSE       | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| SOWTHISTLE             | W + S        |               |                       |   |                   |                     |                    |                  |                        |                      |
| SPURGE                 | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| SPEEDWELL              | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| WILD RADISH            | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| <b>GRASSY WEEDS</b>    |              |               |                       |   |                   |                     |                    |                  |                        |                      |
| ANNUAL BLUEGRASS       | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| BARNYARDGRASS          | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| BROMEGRASS             | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| CANNARYGRASS           | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| CRAIGGRASS             | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| FESCUES                | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| FOXTAIL (BRISTLEGRASS) | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| LOVEGRASS              | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| RABBITFOOTGRASS        | W + S        |               |                       |   |                   |                     |                    |                  |                        |                      |
| RYEGRASS               | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| SANDBUR                | S            |               |                       |   |                   |                     |                    |                  |                        |                      |
| WILD BARLEY            | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| WILD OATS              | W            |               |                       |   |                   |                     |                    |                  |                        |                      |
| WITCHGRASS             | S            |               |                       |   |                   |                     |                    |                  |                        |                      |

W - WINTER ANNUAL  
S - SUMMER ANNUAL

\* NOT LABELED FOR USE IN

This chart is not a recommendation for the use of herbicides. Please check the label whether they are registered and their rates of application. Proper timing and accurate application is imperative. The information in this chart is tentative, based on studies conducted in Fresno County. Additional studies may warrant changes. B. Fischer

**CHART 2**  
**Summary of Herbicide Performance Evaluated in Alfalfa Production in the Central San Joaquin Valley**

| Method of Application        | Herbicide                                | Conditions That Resulted In Most Effective Control  | Conditions That Resulted in Poor Control or Injury   |
|------------------------------|--|---|--|
| <b>PREPLANT INCORPORATED</b> | Balan® (benefin)                         | Shallow incorporated in well prepared seed bed. When temperature was favorable for rapid seedling growth. Only susceptible weeds were present.  | Cool temperature, deep incorporation, volunteer cereals and other resistant weed species were present.   |
|                              | Eptam® (EPTC)                            | Thorough incorporation early fall or in spring planted fields. Where nutsedge was present; where 4 to 8 weeks control was needed.   | Winter application, cloddy seed bed and resistant weeds present. Where longer than 6 weeks of residual control was needed.   |
| <b>POST-EMERGENCE</b>        | Butyrac 200 (2,4-DB amine + adjuvant)    | When broadleaf weeds in their seedling stage were the only weeds present.   | Broadleaf weeds beyond their seedling stage were present.  |
|                              | Kerb® (pronamide)                        | When alfalfa had two trifoliolate leaves and weeds were not emerged or in their seedling stage; rainfall or sprinkler irrigation was applied following treatment.   | When alfalfa was in the seedleaf or unifoliolate leaf stage of growth severe injury occurred. When weeds were beyond their seedling stage. When water was not applied soon after treatment.                              |
|                              | Buctril®** (bromoxynil)                  | When the alfalfa had 2 to 3 trifoliolate leaves and the broadleaf weeds were in their seedling stage. Applied in 60 gallons of water per acre and the alfalfa and broadleaf weeds were growing vigorously.  | When grasses, chickweed and redmaids were prevalent. Weeds were beyond their seedling stage and air application in 10 gpa was used. When the temperature was above 80°F temporary yellowing of the alfalfa was observed. |
|                              | Poast® (sethoxydim)                      | When grasses are in their seedling stage and growing vigorously.  | Grasses beyond their seedling stage and moisture stressed.   |
|                              | Velpar® (hexazinone)                     | Alfalfa well established with a well developed root system 6" long or longer with a top growth that is 6" to 8". Most effective on weeds in their seedling stage. Sprinkler irrigation or rainfall shortly after application is desirable for most effective control. | Alfalfa seedlings not having 6" long roots. Weeds predominantly grasses and broadleaf weeds 5" to 6" or older. No rainfall or irrigation following treatment.  |
| <b>ESTABLISHED STANDS</b>    | Eptam® (EPTC)                            | Applied in the irrigation water and only when thorough wetting of the bed top was obtained. Timely repeated application was made.   | Poor water distribution and not wetting the bed top. Repeated application was not made.  |
|                              | Karmex® (diuron)                         | When applied on soil free of clods and volunteer alfalfa seed germination. Addition of paraquat improved weed control when groundsel was present.   | Applied on trashy or cloddy soil. Applied after Feb. 1st on non-dormant varieties resulted in injury.  |
|                              | Treflan® (trifluralin)                   | Thoroughly incorporated with rolling cultivators in fields free of established weeds. Summer annual grasses, pigweeds and lambsquarter, the only weeds present.   | Not incorporated thoroughly or when resistant weed species predominated.   |
|                              | Treflan TR-10 (trifluralin 10% granular) | Uniformly distributed by mid February before dodder seed germination. Rainfall occurs or irrigation applied within 4 to 6 days following application. Will provide effective preemergence grass control.  | Applied after dodder is attached. Rainfall does not occur or field not irrigated within a week following application.  |
|                              | Velpar® (hexazinone)                     | Alfalfa was established one year or longer. Applied during December and January when the alfalfa growth was short (4 to 6 inches). Rainfall occurred shortly after application and weeds were 2 to 4 inches tall.   | Established grasses were the predominant weeds. Broadleaf weeds 8 to 10 inches tall or taller. Applied after the middle of February.   |

\* This is not a recommendation for the use of herbicides. It is a progress report of observations made in applied research trials conducted in Fresno County.

\*\* As of December 1990, registered by EPA but not labeled for use in California.

**Table 1 - Effect Of Postemergence Applied 2,4-DB Herbicides On Weed Control And Tolerance  
In Newly Established Alfalfa**  
04, 42, 425, 94, 10, 90-13

|            |                                    |             |                            |
|------------|------------------------------------|-------------|----------------------------|
| LOCATION:  | West Side Field Station            | PLANTED:    | 5/4/90                     |
| SOIL TYPE: | Panoche clay loam                  | IRRIGATION: | Furrow                     |
| VARIETY:   | CUF-101                            | PLOT SIZE:  | 5' (2 beds) x 30', Reps. 4 |
| TREATED:   | 5/23/90                            | EVALUATED:  | 5/30, 6/13, 6/19/90        |
| ALFALFA:   | Unifoliate to 1st trifoliate stage |             |                            |

VIGOR 1/ , INJURY 2/ , AND WEED CONTROL EVALUATIONS

| Herbicide              | lbai/<br>Acre | 5/30/90        |                  | 6/13/90        |                    |                       | 6/19/90       |                   |                   |
|------------------------|---------------|----------------|------------------|----------------|--------------------|-----------------------|---------------|-------------------|-------------------|
|                        |               | Alf.<br>Injury | % Brd.<br>Contr. | Alf.<br>Injury | % Brdlf.<br>Contr. | Weeds*<br>Present     | Alf.<br>Vigor | % Brdlf.<br>Cont. | Weeds*<br>Present |
| A 2,4-DB ester         | 0.75          | 0              | 58               | 0              | 86                 | B,I,Jr,Ps             | 10.0          | 91                |                   |
| B 2,4-DB amine         | 0.75          | 0              | 31               | 0              | 69                 | B,I,Jr,La,<br>Ps,S    | 10.0          | 85                | ,La               |
| C 2,4-DB amine<br>X-77 | 0.75<br>1/2%  | 1.0            | 76               | 0              | 90                 | B,I,Jr,Ps             | 10.0          | 93                | I                 |
| D 2,4-DB amine<br>X-77 | 1.0<br>1/2%   | 2.5            | 86               | 0              | 94                 | B,I,Jr,La,Ps          | 9.5           | 97                | I                 |
| E 2,4-DB amine         | 1.5           | 0.3            | 54               | 0              | 85                 | B,I,Jr,La,<br>Mu,Ps   | 10.0          | 89                | I,La              |
| F 2,4-DB amine<br>X-77 | 1.5<br>1/2%   | 3.0            | 73               | 0              | 87                 | B,C,I,Jr,<br>La,Ps,Pv | 9.5           | 99                |                   |
| X Untreated            |               | 0              | 0                | 0              | 0                  | B,I,Jr,La,<br>Ps,Pv,S | 9.8           | 0                 | I,Gc,La,Pv        |

\*Weeds Present: B = barnyardgrass, C = crabgrass, Gc = ground cherry, I = pigweed, Jr = jungle rice, La = lambsquarter, Mu = mustard, Ps = purslane, Pv = puncturevine, S = sowthistle

1/ Vigor rating based on a scale of 0 to 10; 0 = dead plants, 10 = vigorously growing plants.

2/ Injury rating based on a scale of 0 to 10; 0 = no injury, 10 = severe injury or dead plants.

**Table 2 - Effect Of Postemergence Applied 2,4-DB Amine Herbicides On Vigor, Injury, And Weed Control In Newly Established Alfalfa**

04, 42, 425, 94, 10, 90-15

LOCATION: West Side Field Station, Fld. 10  
 SOIL TYPE: Panoche clay loam  
 VARIETY: CUF-101  
 TREATED: 5/30/90  
 ALFALFA: 2 to 3 trifoliate leaves

PLANTED: 5/4/90  
 IRRIGATION: Furrow  
 PLOT SIZE: 30" (1 bed) x 20', Reps 3  
 EVALUATED: 6/1, 6/13, 6/19/90

VIGOR <sup>1/</sup>, INJURY <sup>2/</sup>, AND WEED CONTROL EVALUATIONS

| Herbicide                         | lbai/<br>Acre       | 6/13/90                     |                  |                   |                    |                   | 6/19/90          |                    |                   |
|-----------------------------------|---------------------|-----------------------------|------------------|-------------------|--------------------|-------------------|------------------|--------------------|-------------------|
|                                   |                     | 6/1/90<br>Alfalfa<br>Injury | Alfalfa<br>Vigor | Alfalfa<br>Injury | % Brdlf.<br>Contr. | % Grass<br>Contr. | Alfalfa<br>Vigor | % Brdlf.<br>Contr. | % Grass<br>Contr. |
| A 2,4-DB amine<br>X-77            | 1.0<br>1/2%         | 4.7                         | 6.7              | 1.0               | 99                 | 35                | 8.3              | 97                 | 0                 |
| B 2,4-DB amine<br>Surfel          | 1.0<br>1 qt.        | 2.0                         | 6.0              | 1.3               | 90                 | 0                 | 8.0              | 98                 | 0                 |
| C 2,4-DB amine<br>X77             | 1.5<br>1/2%         | 5.3                         | 4.7              | 2.0               | 99                 | 0                 | 8.0              | 95                 | 0                 |
| D 2,4-DB amine<br>Surfel          | 1.5<br>1 qt.        | 3.0                         | 4.0              | 2.0               | 99                 | 0                 | 7.0              | 95                 | 0                 |
| E 2,4-DB amine<br>Poast<br>Surfel | 1.0<br>0.3<br>1 qt. | 4.3                         | 5.3              | 1.7               | 90                 | 100               | 8.3              | 90                 | 100               |
| F Untreated                       |                     | 0                           | 10.0             | 0                 | 0                  | 0                 | 9.8              | 0                  | 0                 |

\*Weeds Present: B = barnyardgrass, I = pigweed, Jr = jungle rice, La = lambsquarter, Ps = purslane

1/ Vigor rating based on a scale of 0 to 10; 0 = dead plants, 10 = vigorously growing plants.

2/ Injury rating based on a scale of 0 to 10; 0 = no injury, 10 = severe injury or dead plants.

**Table 3 - Effect Of Postemergence Applied 2,4-DB Herbicides On Vigor, Injury, And Weed Control In Newly Established Alfalfa**  
04, 42, 425, 94, 10, 90-6

SOIL TYPE: El Peco loam  
 VARIETY: CUF 101  
 TREATED: 3/15/90  
 ALFALFA: 5 to 10 trifoliolate stage

PLANTED: First week of December, 1989  
 IRRIGATION: Flood  
 PLOT SIZE: 10' x 40', Reps. 3  
 EVALUATED: 3/23, 3/30, 4/11, 4/18/90

| Herbicide                | lbai/<br>Acre | ALFALFA VIGOR <sup>1/</sup> , INJURY <sup>2/</sup> , AND SHEPHERD'S PURSE CONTROL EVALUATIONS |                |               |                |                   |               |                   |               |                |                   |
|--------------------------|---------------|---|----------------|---------------|----------------|-------------------|---------------|-------------------|---------------|----------------|-------------------|
|                          |               | 3/23/90   |                | 3/30/90       |                |                   | 4/11/90       |                   | 4/18/90       |                |                   |
|                          |               | % Weed<br>Control   | Alf.<br>Injury | Alf.<br>Vigor | Alf.<br>Injury | % Sp.*<br>Control | Alf.<br>Vigor | % Sp.*<br>Control | Alf.<br>Vigor | Alf.<br>Injury | % Sp.*<br>Control |
| A 2,4-DB ester           | 0.75          | 17 cd   | 0.3 cd         | 8.3           | 0              | 13                | 8.7 cd        | 33 abc            | 9.0 ab        | 0              | 23 de             |
| B 2,4-DB amine           | 1.5           | 23 bcd  | 1.3 bc         | 8.0           | 0              | 15                | 8.3 bc        | 37 bc             | 9.0 ab        | 0              | 38 cde            |
| C 2,4-DB amine<br>Surfel | 1.5<br>1 qt.  | 25 bcd  | 1.7 b          | 5.0           | 1.0            | 38                | 8.3 bc        | 43 bc             | 7.7 c         | 0              | 47 cd             |
| D 2,4-DB amine<br>Surfel | 1.5<br>2 qts. | 22 bcd  | 1.3 bc         | 5.3           | 0.3            | 17                | 7.7 cd        | 32 c              | 7.3 c         | 0              | 30 de             |
| E 2,4-DB amine<br>X-77   | 1.5<br>1/2%   | 30 bc   | 1.7 b          | 7.3           | 0              | 13                | 8.0 bc        | 37 bc             | 8.0 bc        | 0              | 55 bcd            |
| K Untreated              |               | 0 d   | 0 d            | 10.0          | 0              | 0                 | 9.7 a         | 10 a              | 0.0 a         | 0              | 0 e               |

Note: Values followed by the same letter are not statistically different at the 5% level (Duncan).

\*Sp = shepherd's purse

1/ Vigor rating based on a scale of 0 to 10; 0 = dead plants; 10 = vigorously growing plants.

2/ Injury rating based on a scale of 0 to 10; 0 = no injury, 10 = severe injury or dead plants.



**Table 4 - Effect of Postemergence Applied Herbicides  
on Weed Control in Alfalfa**  
02, 43, 425, 94, 10, 91-2

LOCATION: Kearney Agricultural Center      IRRIGATION: Flood, 1/31/91  
 SOIL TYPE: Hanford sandy loam      PLOT SIZE: 10' x 20', Reps 4  
 VARIETY: Hay mix      PLANTED: 10/31/90  
 TREATED: 2/23/91; Alfalfa, 4 to 7 trifol. lvs.      EVALUATED: 5/24/91  
 Weeds in bud stage

| Herbicides                        | Lbai/<br>Ace          | Yield in Grams Per 4 ft <sup>2</sup> Area, Avg. of 4 Replications |         |                 |                    |                     |                |
|-----------------------------------|-----------------------|---|---------|-----------------|--------------------|---------------------|----------------|
|                                   |                       | Total<br>Yield  | Alfalfa | Cudweed         | Pineapple-<br>weed | Shepherd's<br>Purse | Other<br>Weeds |
| A 2,4-DB amine<br>X-77            | 1.0<br>1/2%           | 753   | 719     | 21              | 11                 | 1                   |                |
| B 2,4-DB amine<br>X-77            | 1.0<br>1/4%           | 744   | 708     | 26              | 9                  | 1                   | 0              |
| C 2,4-DB amine<br>X-77            | 1.5<br>1/4%           | 656   | 629     | 18              | 7                  | 2                   | 0              |
| D 2,4-DB amine<br>X-77            | 1.5<br>1/2%           | 698   | 664     | 22              | 10                 | 1                   |                |
| F Pursuit<br>Buctril<br>X-77      | 0.125<br>0.33<br>1/2% | 726   | 681     | 34              | 8                  | 1                   | 1              |
| F Buctril                         | 0.33                  | 705   | 690     | 1               | 5                  | 0                   | 9              |
| G Pursuit<br>2,4-DB amine<br>X-77 | 0.125<br>1.0<br>1/2%  | 692   | 683     | 0               | 3                  | 0                   | 6              |
| H Untreated                       |                       | 704   | 643     | 49              | 5                  | 0                   | 7              |
| Statistical Notation:             | LSD @5%<br>C.V.       |   | NS      | 17.95<br>86.74% | NS                 | NS                  | 4.54<br>142.8% |

\*Other Weeds : fiddleneck, groundsel, horseweed, sowthistle

**Table 5 - Effect of Postemergence Applied Herbicides  
on Vigor, Injury and Weed Control in Alfalfa**  
02, 43, 425, 94, 10, 91-2

|            |                                      |             |                   |
|------------|--------------------------------------|-------------|-------------------|
| LOCATION:  | Kearney Agricultural Center          | IRRIGATION: | Flood             |
| SOIL TYPE: | Hanford sandy loam                   | PLOT SIZE:  | 10' x 20', Reps 4 |
| VARIETY:   | Hay mix                              | PLANTED:    | 10/31/90          |
| TREATED:   | 2/23/91: Alfalfa 4 to 7 trifol. lvs. | EVALUATED:  | See below         |

Weeds in bud to early flower stage

|                               |                                 | Vigor, Injury and Weed Control Evaluations, Avg. 4 Reps. |         |         |         |         |         |         |         |         |     |
|-------------------------------|---------------------------------|--|---------|---------|---------|---------|---------|---------|---------|---------|-----|
|                               |                                 | 3/12/91  |         |         | 3/28/91 |         |         |         | 5/1/91  |         |     |
| Herbicides                    | Lbai/<br>Acre                   | Alfalfa  |         | Weed    | Alfalfa |         | % Sp**  | % Y**   | % R**   | Alfalfa |     |
|                               |                                 | Vigor*   | Injury* | Control | Vigor*  | Injury* | Control | Control | Control | Vigor*  |     |
| A                             | 2,4-DB amine<br>X-77            | 1.0<br>1/2%  | 8.5     | 2.5     | 39      | 9.5     | 1.8     | 0       | 0       | 0       |     |
| B                             | 2,4-DB amine<br>X-77            | 1.0<br>1/4%  | 9.0     | 1.8     | 49      | 10.0    | 0.5     | 25      | 0       | 0       |     |
| C                             | 2,4-DB amine<br>X-77            | 1.5<br>1/4%  | 8.3     | 2.3     | 46      | 9.3     | 1.8     | 19      | 6       | 0       | 9.8 |
| D                             | 2,4-DB amine<br>X-77            | 1.5<br>1/2%  | 7.8     | 2.5     | 44      | 9.3     | 1.5     | 39      | 31      | 19      |     |
| E                             | Pursuit<br>Buctril<br>X-77      | 0.125<br>0.33<br>1/2%                                    | 7.5     | 2.8     | 69      | 8.0     | 2.3     | 49      | 13      | 19      | 9.8 |
| F                             | Buctril                         | 0.33   | 8.5     | 0.8     | 81      | 9.3     | 1.8     | 99      | 18      | 13      |     |
| G                             | Pursuit<br>2,4-DB amine<br>X-77 | 0.125<br>1.0<br>1/2%                                     | 8.3     | 0.5     | 78      | 9.0     | 0.5     | 94      | 56      | 46      | 9.8 |
| H                             | Untreated                       |  | 10.0    | 0       | 0       | 10.0    | 0       | 0       | 0       | 0       |     |
| Statistical Notation: LSD @5% |                                 |  | 0.60    | 0.67    | 11.4    | 0.64    | 0.54    | 35.68   | 23.51   | 15.88   |     |
| C.V.                          |                                 |  | 6.89%   | 39.72%  | 21.81%  | 6.71%   | 41.86%  | 84.6%   | 146.16% | 126.92% |     |

\* Vigor rating based on a scale of 0 to 10; 0 = dead plants, 10 = vigorously growing plants.  
Injury rating based on a scale of 0 to 10; 0 = no injury; 10 = severe injury or death.

\*\*Weed abbreviations: Sp = shepherd's purse, Y = pineappleweed, R = redmaids.