In the future, rate of application vs. extended spray schedules need to be studied to determine the most efficacious rate and frequency of the new promising fungicides. Of special significance, these new fungicides represent 2 areas of chemistry (iprodione and vinclozolin are related) different from benomyl which has long been used and therefore means of control probably are available if resistance to benomyl occurs.

Literature Cited

1. Baker, K. F., A. W. Dimock and Lily H. Davis. 1949. Life history and control of the Ascochyta ray blight of chrysanthemum. Phytopathology 39:789-805.
2. Baker, K. F., A. W. Dimock and L. H. Davis. 1961. Cause and prevention of the rapid spread of the Ascochyta disease of chrysanthe-mum. Phytopathology 51:96-101.
3. Engelhard, A. W. 1969. Observations on cultivars of commercial chrysanthemums to Ascochyta blight, rust and three petal spot diseases. Proc. Fla. State Hort. Soc. 82:340-343.
4. Engelhard, A. W. 1972. Ascochyta blight of chrysanthemum: Symptoms and control with fungicides. Bradenton Agr. Res. Education Center Mimeo Rpt. GC1972-3.
5. Engelhard, A. W. 1978. Field evaluation of fungicides for control of Ascochyta blight of chrysanthemums, p. 86-88. In: Methods for evaluating plant fungicides, nematicides, and bactericides. Amer. Phytopathol. Soc., St. Paul, MN.
6. Jackson, C. R. and L. A. McFadden. 1966. Chrysanthemum diseases in Florida. (Revised by R. O. Magie and A. J. Overman). Fla. Agr. Expt. Sta. Bul. 637A.
7. Walker, J. and K. F. Baker. 1983. The correct binomial for the chrysanthemum ray blight pathogen in relation to its geographical distribution. Trans. Brit. Mycol. Soc. 80:31-38.

COMPUTER ASSISTED FERTIGATION DILUTION CALCULATIONS[1]

Thomas H. Yeager and Dewayne L. Ingram
University of Florida, IFAS,
Ornamental Horticulture Department,
Gainesville, Florida 32611

Additional index words. computer software.

Abstract. **Interactive computer programs have been developed to perform dilution calculations for nursery operators dissolving dry water soluble fertilizer for injection or injecting liquid fertilizers through irrigation systems. Required inputs include the fertilizer analysis (grade), injector dilution ratio(s), weight/volume ratio of concentrated liquid fertilizer or the number of gallons per ton of concentrated fertilizer, and the desired parts per million (ppm) of fertilizer element in irrigation water. The computer program calculates the dilution ratio needed to achieve desired ppm of fertilizer element in the irrigation water, indicates how to dilute the concentrated fertilizer before injection, or indicates the analysis of fertilizer you should use with the given dilution ratio to achieve desired ppm of a fertilizer element in irrigation water.**

Computations that are lengthy, cumbersome, and require several conversion factors are required before fertilizer can be accurately injected into irrigation water. Consequently, many nursery operators are reluctant to use fertilizer supplied in irrigation water. The computer programs described below have been developed to perform these calculations thus reducing risk of error and time required to make these calculations.

The first program described is to be used when fertilizers purchased as liquids, not suspensions, are to be injected into irrigation water. The second program is used when dissolving dry water soluble fertilizers for injection. The latter program is divided into 2 options based on type of fertilizer. Option A is used when dissolving blended dry fertilizers such as Peters' 20-20-20 or Miller's 20-20-20 and option B is used when dissolving individual fertilizer compounds (ammonium nitrate, calcium nitrate, etc.) to supply specific nutrients for injection into irrigation water.

Materials and Methods

Both programs were written in VAX-BASIC utilizing the Institute of Food and Agricultural Sciences' Computer Network and a VT-100 (Digital Equipment Corporation, Bedford, MA 01730) terminal. The programs will be available in the future for microcomputers using the PC-DOS or MS-DOS operating systems.

The user must obtain the analysis or grade of fertilizer, and determine the parts per million (ppm) N, P or K desired in irrigation water before using the first program or option A of the second. When purchasing true liquid fertilizers, the weight/volume ratio of the fertilizer must be obtained from the manufacturer or the label and total volume of solution in the dilution tank must be known when dissolving dry fertilizers. The injector dilution ratio must be known for both programs. For option B of the second program, the user must obtain the name of fertilizer compound used and the desired concentration of a selected fertilizer element in irrigation water.

Programs Operation

The first program described below is used when injecting fertilizers that are purchased as liquids, not suspensions. The program begins with an introduction [1] that explains the purpose of the program and what the user can obtain by using the program (Fig. 1). The grade or analysis of the fertilizer [2] is entered and the user is asked to input the element [3] for which calculations are based. The ppm [4] of desired element in irrigation water is also entered along with the naturally occurring concentration [5] of the desired element in irrigation water. If the naturally occurring concentration equals or exceeds the desired concentration [6], the fertilizer would not be needed [7]. Units for the weight/volume ratio, such as lb. of fertilizer per gal are selected [8] then the numerical weight/volume ratio [9] is entered. A default of 10 lb. of fertilizer per gal may be used. Utilizing the inputs, a maximum concentration of the desired element is computed [10] and compared with the desired concentration. If the computed maximum concentration is less than desired [11], a fertilizer containing a larger percentage

INTRO TO LOFERT [1]

INPUT FERTILIZER COMPOSITION [2]

INPUT ELEMENT FOR CALCULATION [3]

INPUT DESIRED PARTS PER MILLION [4]

INPUT NATURAL PARTS PER MILLION [5]

NATURAL > DESIRED? [6]

YES

NO FERTILIZER NEEDED [7]

NO

CHOOSE UNITS [8]

INPUT FERTILIZER WEIGHT/ VOLUME RATIO [9]

CALCULATE MAXIMUM AVAILABLE PARTS PER MILLION [10]

[11] MAXIMUM < DESIRED ?

YES

STRONGER FERTILIZER NEEDED [12]

NO

CALCULATE BEST INJECTOR SETTING

DISPLAY BEST SETTING [13]

INPUT CLOSEST INJECTOR SETTING [14]

CLOSEST < = > BEST ? [15]

CALCULATE PARTS PER MILLION

DISPLAY PPM STRONG [16]

USE MIXING TANK? [17]

INPUT TOTAL TANK VOLUME

DISPLAY MIXING INFO

DISPLAY FINAL PPM [18]

CALCULATE PPM WEAK [19]

CALCULATE NEEDED % OF FERTILIZER CHOSEN [20]

DISPLAY NEEDED %

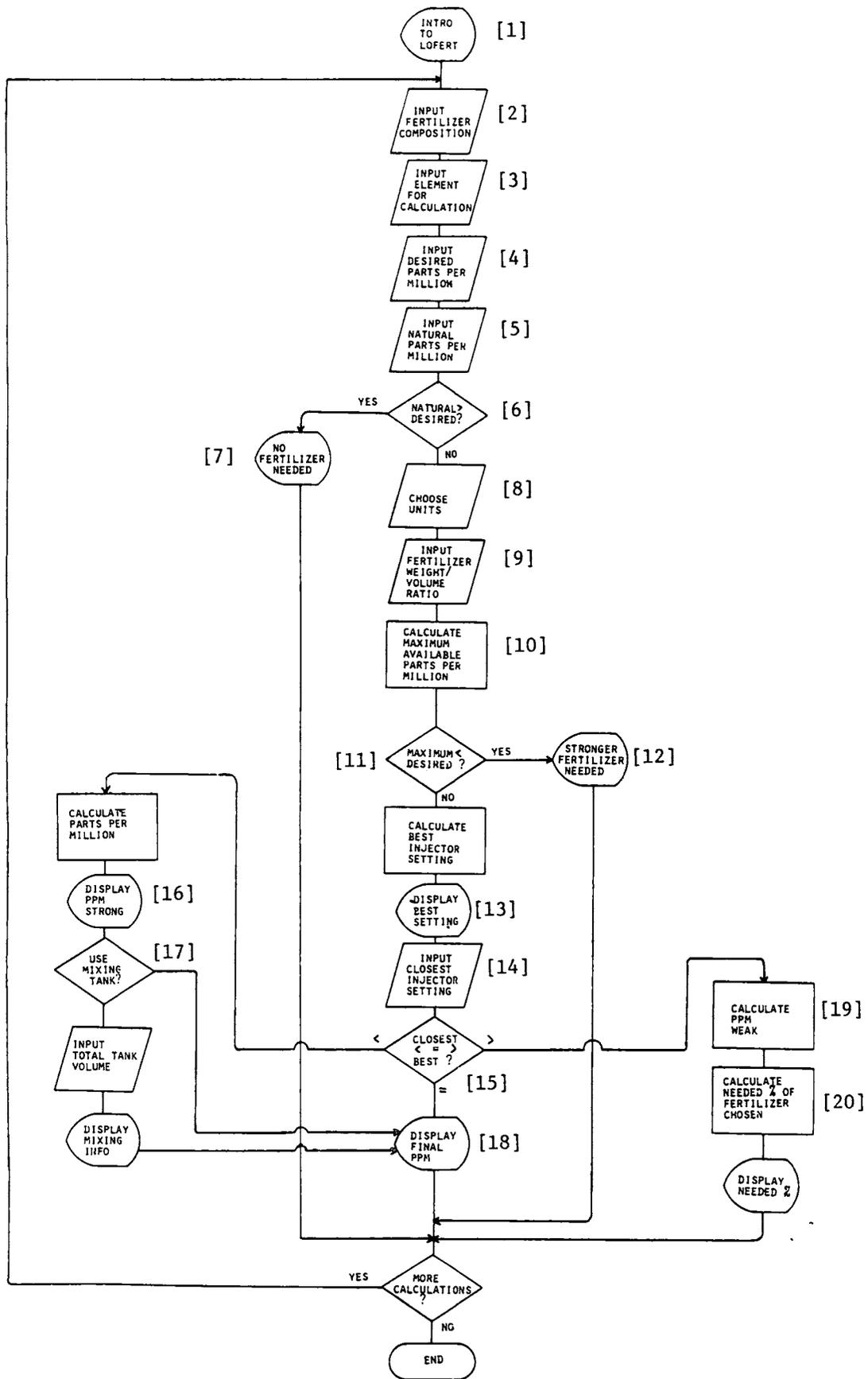MORE CALCULATIONS ?

YES

NO

END

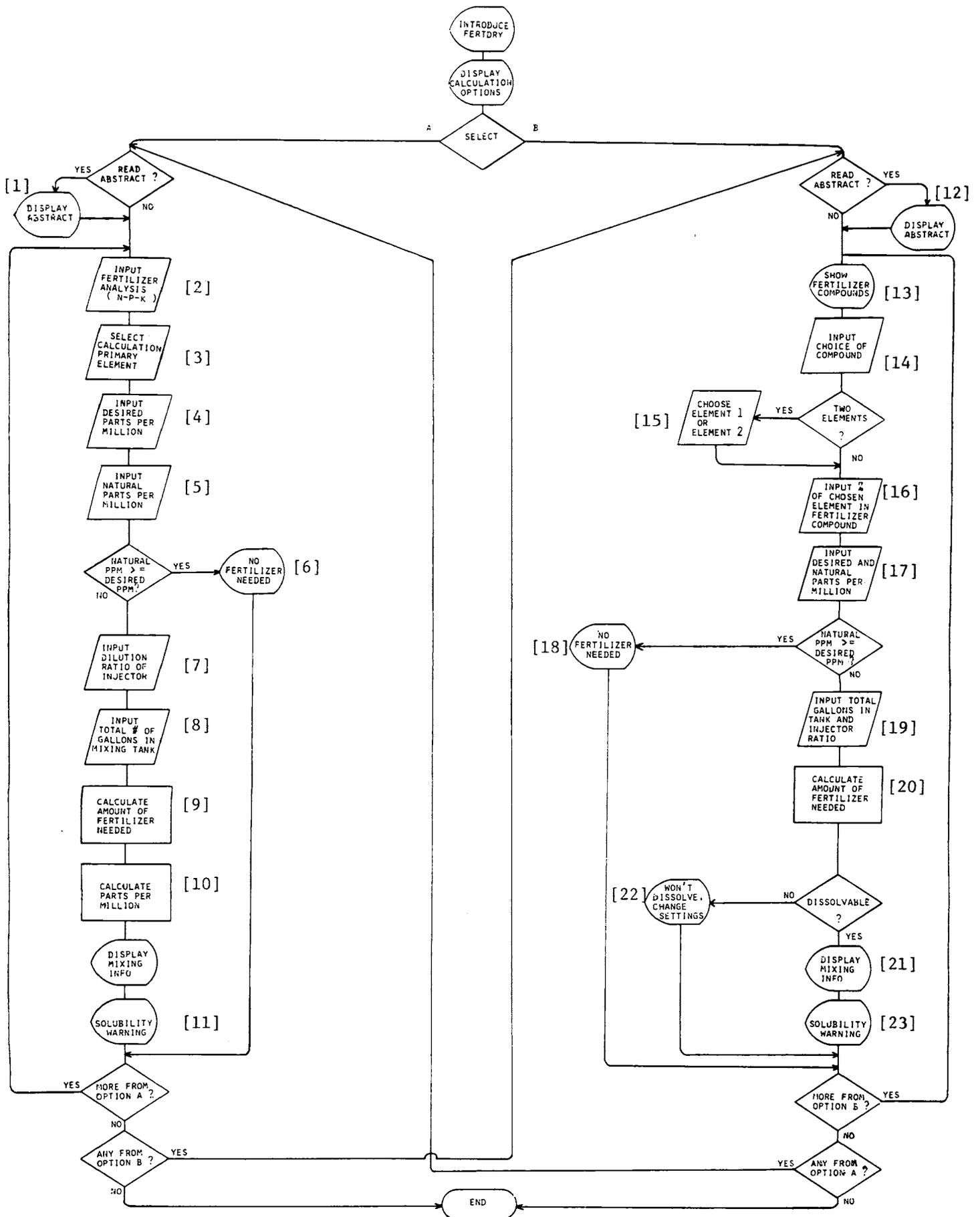Fig. 1. Liquid fertilizer dilution program flow chart.

Fig. 2. Dry fertilizer dilution program flow chart.

[12] of desired element must be used; otherwise, the injector setting needed is displayed [13]. If the user entered [14] an injector setting equal to calculated injector setting, the irrigation water would contain the desired ppm of element [15]. An injector setting less than the calculated setting may be entered and the irrigation water would contain greater than desired elemental concentration [16]. The user is then given the option to dilute the fertilizer in a mixing tank [17] prior to injection, thus resulting in the desired concentration of element in irrigation water [18]. An injector setting larger than the calculated setting may be entered and the irrigation water would contain a smaller than desired elemental concentration [19]. The desired elemental concentration in irrigation water may then be obtained by using fertilizer with a larger percentage [20] of element desired. The user may elect to repeat the program to select different inputs or end the program.

Option A of the second program is used when blended dry fertilizers are dissolved then injected into irrigation water. Option A begins with an introduction [1] that explains the purpose of the program and what the user can obtain by using the program (Fig. 2). The grade or analysis of the fertilizer is entered [2] and the user is asked to input the element [3] for which calculations are based. The ppm of desired element in irrigation water is entered [4] along with the naturally occurring concentration of the desired element [5] in irrigation water. If the naturally occurring concentration equals or exceeds the desired concentration, the fertilizer would not be needed [6]. Once the dilution ratio of injector [7] and total volume of solution [8] in mixing tank (fertilizer and water) are entered, the amount of fertilizer [9] to be added to the mixing tank and dissolved to the specified volume is displayed along with the concentration of N, P and/or K [10] in irrigation water when using the specified dilution ratio.

A caution statement is displayed to warn the user [11] that the amount of fertilizer that will dissolve depends upon concentration of natural salts in irrigation water. Therefore, an equivalent amount of fertilizer to dissolve in 1 gal, as a check; is displayed along with instructions for fertilizers that do not dissolve. The user may elect to repeat option A using different inputs, go to option B, or end the program.

Option B is used when dissolving individual fertilizer compounds to supply specific nutrients for injection into irrigation water. Option B begins with an introduction [12] that explains the purpose of the program and what the user can obtain by using the program (Fig. 2).

The user is asked to select from a list of fertilizer compounds [13] the compound [14] that will be dissolved and injected into irrigation water. If the fertilizer compound contains more than one plant required element (i.e. ammonium sulfate) the user can choose the element [15] for which calculations are based. The percent of element in fertilizer compound [16] is displayed and may be changed if the fertilizer used contains a different percentage. The ppm of desired element in irrigation water is entered along with the naturally occurring concentration of desired element [17] in irrigation water. If the naturally occurring concentration equals or exceeds the desired, the fertilizer would not be needed [18]. Once the dilution ratio of injector and total volume [19] of mixing tank (fertilizer and water) are entered, the amount of fertilizer compound [20] to be added to the mixing tank and dissolved to the specified volume is displayed along with the concentration of element desired in irrigation water [21]. If the amount of fertilizer to be dissolved exceeds maximum solubility, a message is displayed indicating the amount of fertilizer needed will not dissolve [22] in the volume specified. If the amount of fertilizer to be dissolved does not exceed maximum solubility, a caution statement is displayed to warn the user that the amount of fertilizer that will dissolve depends upon concentration of natural salts in irrigation water [23]. Therefore, an equivalent amount of fertilizer to dissolve in 1 gal, as a check, is displayed along with instructions for fertilizer compounds that do not dissolve. The user may elect to repeat option B using different inputs, go to option A or, end program.

Conclusion

These programs are designed to assist ornamental plant growers with fertilizer dilution calculations. The programs enable growers to perform computations rapidly with minimal errors, thus facilitating timely and correct fertility management decisions. Display screens of elemental concentrations injected contain pertinent inputs and important outputs, so these displays should be printed for permanent records.

CHEMICAL WEED CONTROL IN FLOWERING GLADIOLUS[1]

J. P. Gilreath [2]
University of Florida, IFAS,
Gulf Coast Research and Education Center,
5007 60th Street East,
Bradenton, FL 34203

Additional index words. herbicide, *Gladiolus* x *hortulanus.*

Abstract. Pre- and postemergence applications of 1.5 + 2.0 lb./acre of alachlor + CIPC, 2.0 lb./acre of napropamide, 2.0 lb./acre of oryzalin, 2.0 lb./acre of pronamide and 4.0 lb./acre of thiobencarb were evaluated for control of crabgrass (Digitaria ciliaris (Retz.) Koel.) and pigweed (Amaranthus hybridus L.) in flowering 'Manatee White' gladiolus (Gladiolus x hortulanus L.). Napropamide and thiobencarb reduced vigor of gladiolus plants. Crabgrass and pigweed control was excellent with each herbicide treatment after 2 and 4 applications, with the exception of thiobencarb and pronamide, which provided poor control of pigweed. Four applications of napropamide and thiobencarb reduced the number and weight of flower spikes cut, while yields with alachlor + CIPC, oryzalin and pronamide were comparable to the hoed check.

Weed control in gladiolus has been researched and documented (1-9); however, several new herbicides are now available which show varying degrees of promise for use in flowering gladiolus. Pronamide and oryzalin provide ex-