

THE EFFECTS OF SOME SELECTIVE HERBICIDES ON MUSKMELON CUCUMIS
MELO, L. AND WATERMELON CITRULLUS VULGARIS, SCHARD

by 3235 n.e.

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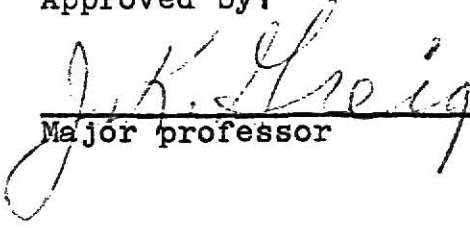
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INTRODUCTION

Herbicidal control of weeds is recognized as an essential part of improved crop production technology. The use of herbicides continues to increase in the United States. Crop research (2) stated that in 1965, nearly 120 million acres were treated with herbicides as compared with 70 million acres in 1962 and 53 millions in 1959. Approximately 64,000 acres of cucurbits were treated with herbicides in 1965. According to the 1965 report of U.S.D.A., the majority of states reported an urgent need for better herbicides for cucurbits. Chemical control of weeds in cucurbits is complicated by the sensitive nature of these species.

Muskmelon (Cucumis melo, L.) and watermelon (Citrullus vulgaris, Schard) are two important cucurbit crops. They are major crops in the south and western parts of the country, but they are also grown in other areas. Melons are tender annual vine crops grown for their fruit. They are tender to frost, seed will not germinate at low temperature, do not withstand transplanting well and require a long, relatively warm growing season for their best development. Adequate weed control by mechanical means in these crops has been a major production problem. Weeds germinating in the drill pose a problem early in the season and are chiefly controlled by costly hand hoeing. Later germinating weeds on the shoulder of the row and in the furrow between rows are likewise difficult to control by tractor cultivation because of the vining habit of growth. These weeds pose a problem late in

the season. For the lack of adequate crop safety and/or efficiency in weed control and for the keen competition for labor in recent years, development of suitable herbicides for muskmelon and watermelon is of continued interest.

This experiment was conducted to (1) evaluate five herbicides at various rates and method of application on the quality and yield of both muskmelon and watermelon. (2) to determine the effectiveness of the rate and method of application of the herbicides in controlling weed species. (3) to determine phytotoxicity of different rates of application of these herbicides to muskmelon and watermelon plants.

The herbicides used in this experiment were amiben(3-amino-2,5-dichlorobenzoic acid, methyl ester), bensulide(S-O-O-diisopropyl phosphorodithioate, of N-(2-mercaptoethyl) benzenesulfonamide, DCPA(dimethyl 2,3,5,6-tetrachloroterephthalate), naptalam(N-1-naphthylphthalamic acid) and CP 49814(not disclosed).

LITERATURE REVIEW

Herbicide treatment of cucurbits plantings totaled 64,300 acres in 1965. Of the total acreage treated 89% was treated preemergence. Crop Research (2) has stated that herbicide usage trend in cucurbits was ascending.

In 1967 King and Locascio (13) stated that melons required several hoeing before the vines were large enough to compete successfully with the weeds. A herbicide that eliminated all or even a few of these hoeing would be of benefit. A number of herbicides including amiben, bensulide, DCPA, and naptalam have been used on cucurbits (13,24). The results have been contradictory, therefore, these materials were selected to be used on melons in the soils of the Kansas River Valley.

Amiben is a benzoic acid used as a selective preemergence herbicide. It was developed by Amchem Products Inc. The important weeds it controls are crabgrass (Digitaria sanguinalis (L.) Scop.), lambsquarters (Chenopodium album L.), pigweed (Amaranthus retroflexus L.), ragweed (Ambrosia artemisiifolia L.), smartweed (Polygonum acre H.B.K.), velvetleaf (Abutilon theophrasti medic), etc, (Thomson 24). It showed excellent weed control and with little crop injury on Castor bean when used as preemergence. Verlaat (25) reported it depended on the crops. Soil incorporation decreases weed control according to Thomson (24). Weed control effect of amiben would be improved by soil moisture or rainfall or irrigation soon after application(Thomson

24, Warsham and Small 27, and Cardenas 6). Uptake is mainly through the roots but it can also occur by leaves (Cardenas 6). Translocation was greater in susceptible plants than in resistant ones, (Colly 7, Stoller and Wax 23).

The methyl ester of amiben was used in this experiment. As McLane et al (15) reported the ester of amiben was less soluble and showed considerable adsorption by soil. It leached much less than did the salt formulation. With good rainfall on light soil the ester gave better weed control and less crop injury than did the salt.

Bensulide (Thomson 24), also called Prefar, is a sulfonamide compound. It was originated by Stauffer Chemical Company. As the company stated this is a selective preplant herbicide recommended for use on mineral soil for cotton, lettuce, cole crops and cucurbits. It is reported to control smooth and hairy crabgrass (Digitaria ischaemum (Schreb.) Muhl; Digitaria sanguinalis (L.) Scop.), pigweed, lambsquarters, purslane (Portulaca oleracea L.), barnyardgrass (Echinochloa crusgalli (L.) Beauv.), etc. Neidlinger et al (19) reported that bensulide was a highly insoluble chemical acting primarily through the roots. It usually did not penetrate deeply enough into the soil to kill established plants. It showed effective grass control but broadleaf weed control was poor (Buchaman and Burns 4). It had been used on cantaloupe at 6 to 8 lb/A. It was least toxic to the crop in terms of stand count and vigor rating. Bensulide 30 lb/A caused leaf discoloration and root length reduction (Neidlinger et al 19).

DCPA, also called Dacthal, is a pre-emergent phthalic acid selective herbicide. Having little effect when applied post-emergent. It was developed by Diamond Shanrock Company in 1960. It is widely used as a crabgrass killer. The other weeds it controlled were foxtail (Setaria species L.), barnyardgrass, bluegrass (Poa annua L.), lambsquarter, purslane, chickweed (Stellaria media (L.) Cyr.), pigweed, dodder (Cuscuta spp.), etc. The important tolerant weeds include velvet leaf, ragweed, bromegrass (Bromus), jimson weed (Datura stramonium L.), etc. (Thomson 24).

The safety range and the effect of DCPA seemed dependent on species and environment. DCPA gave no adverse effect on tobacco quality such as reducing sugar content and nicotine taste (Hertogh et al, 12). At a 8-10 lb/A rate injury did not occur to strawberry plants even applied two to three times (Anonymous 1). But Pliszka (21) used DCPA 8 and 10 lb/A on three varieties of strawberry . It caused a significant reduction in the length of runners; reduction in the dry weight of the leaves and delayed the developing of second and third leaves. DCPA also caused delayed differentiation of lateral buds of cucumber seedling according to Haltvick and Struckmeyer (10). DCPA caused injury to field-seeded muskmelon and watermelon when applied as a pre-emergent treatment (Warren 26). Glaze (9) reported that pre-plant incorporation of DCPA caused less crop injury than the same compound applied pre-emergent.

Naptalam, its trade name known as Alanap, like DCPA is also a pre-emergent phthalic acid herbicide originated by Uniroyal Chemical Incorporated in 1949. It has effective weed control properties on both broadleafed weeds and grasses. It is suggested for use on light soil. It should not be applied when temperature are over 100°F. Rainfall is needed to move this material into the soil (Thomson 24).

Naptalam has been used on many crops. Baldaeu and Chiapporini (5) reported it gave poor result on controlling weeds for vegetable crops such as celery, carrot, parsley and onions. J. R. Hay (11) stated that naptalam has given promising results in some tests but they have not been uniformly good. J. H. Miller et al (16) stated pre-emergent naptalam application had varied degree of effects depending on post-application rainfall. High temperature, and dry soil were conducive to loss by volatilization of naptalam. Morgan (18) studied the influence of naptalam on the movement of IAA in plants. He stated that from the behavior of lateral growth and also from autoradiographs that naptalam blocks IAA movement in the stem.

CP 49814 is an experimental material. It is an ethylanine salt of paranitrobenze sulphonyl urea. It was developed by Monsanto Company. Ogle (20) in January 1969 reported 49814 post-emergent 2 lb/A gave excellent control of weeds, Severe stunting of the cucumber and watermelons was noted but not cantaloupes. Monaco and Miller (17) used 49814 2 lb/A as post-emergent material and crop tolerance appeared to depend on air temperature

and time of treatment. Severe injury was experienced when 49814 was applied during hot weather.

Contradictory results from the use of herbicides are often seen in the literature. S R. McLane et al (15) stated success of weed control in crops is not a simple story of crop tolerance and weed susceptibility, but a complex one of inter-relating soil, crop, weed, and environmental condition.

MATERIALS & METHODS

The experiment was conducted from May to September, 1968 at the Horticulture Farm, Kansas State University, Manhattan, Kansas.

The studies were designed as randomized complete block experiments with 4 replications. Each replication, including two checks, had twenty randomized plots which were the combination of different herbicides under various levels. The rows were six feet apart for muskmelons and twelve feet apart for watermelons. Plot length was 20 feet in both cases.

Seeds of muskmelon, var. PMR 45 and watermelon, var. Crimson Sweet were sown five seeds per hill by hand on May 16. Hills were two feet apart for muskmelon and four feet for watermelon. They were replanted on May 28. The soil type was a Sarpy fine sandy loam and prior to planting 58 lb nitrogen and 28 lb P_2O_5 per acre was applied in the row.

Herbicides and rates in pounds per acre in this study were

amiben (methyl ester) at 2, 4, and 6; bensulide at 4, 6, and 8; DCPA at 8, 10, and 12; naptalam at 2, 4, and 6; and CP 49814 at 1, 2, and 4.

All the herbicides were applied only once. Amiben, bensulide, DCPA, and naptalam were applied at the rates mentioned previously in 40 gallons of water per acre and with 30psi pressure. They were applied the day of planting as pre-emergent treatments. DCPA also was applied as a pre-plant incorporation treatment and CP 49814 was applied post-emergent to the crop at the two true leaf stage.

On July 11, the plots were thinned to one plant per hill. Periodic ratings of the treatments were made for plant stand and weed control. Six weeks after planting all the weeds in the herbicide plots were removed by hoeing. After hoeing only vigor rating were made except on July 29 and September 19 when weed control ratings were also made. Weed populations were very high on the experimental area. Principal weeds were pigweed (Amaranthus spp.), lambsquarters (Chenopodium alba), crabgrass (Digitaria spp.), and purslane (Portulaca oleracea).

Weed control data were collected by using the following scale:

- 1 equal to 5% weed cover (percent of check plot)
- 2 equal to 6- 20% weed cover
- 3 equal to 21- 40% weed cover
- 4 equal to 41- 60% weed cover
- 5 equal to 61 percent or more weed cover

Plant injury data were collected by counting the number of

plants in each plot.

Muskmelon and watermelon fruits were harvested when they were mature. The numbers of fruit, fruit weights and sugar contents which were measured by refractometer, were recorded.

All the data obtained from the experimental results were subject to analysis of variance, except the weed control data. Since they were obtained by using a rating scale, normal score transformation (14) were used to normalize the data before subject to analysis of variance.

RESULTS

The data concerning the effect of the herbicides on the number, weight and sugar content of marketable fruit produced are summarized in Table 1,2,3,4,5, and 6. Highly significant differences between herbicide treatments occurred for fruit number and fruit weight with muskmelons. Sugar content did not differ significantly due to herbicide treatments. Herbicide treatments applied to watermelons had no significant effect on any one of the three items which were chosen to represent yield and quality.

Plant stand data of watermelon showed a highly significant difference among herbicide treatments as shown in Table 7. The variance analysis of the data of plant stands of muskmelon showed there were no significant differences among treatments Table 8.

Table 1. Analysis of variance of fruit number of muskmelon.

Source	DF	M.S.	F
Treatment	19	194.67	3.07**
Replication	3	51.42	0.81
Error	57	63.50	
Total	79		

** indicates significance at 1 percent level.

Table 2. Analysis of variance of fruit weights of muskmelon.

Source	DF	M.S.	F
Treatment	19	2896.60	3.13**
Replication	3	438.70	0.47
Error	57	925.31	
Total	79		

** indicates significance at 1 percent level.

Table 3. Analysis of variance of refractometer reading of muskmelon.

Source	DF	M.S.	F
Treatment	19	0.325	0.558
Replication	3	0.913	1.566
Error	57	0.583	
Total	79		

Table 4. Analysis of variance of fruit number of watermelon.

Source	DF	M.S.	F
Treatment	19	16.99	1.35
Replication	3	49.35	3.94*
Error	57	12.54	
Total	79		

* indicates significance at 5 percent level

Table 5. Analysis of variance of fruit weight of watermelon.

Source	DF	M.S.	F
Treatment	19	9268.62	1.53
Replication	3	9620.73	1.59
Error	57	6039.82	
Total	79	6952.35	

Table 6. Analysis of variance of refractometer reading of watermelon.

Treatment	19	0.135	1.03
Replication	3	0.273	2.08
Error	57	0.131	
Total	79	0.137	

Table 7. Analysis of variance of plant stand of watermelon.

Source	DF	M.S.	F
Treatment	19	10.48	2.31**
Replication	3	9.17	2.02
Error	57	4.54	
Total	79	6.14	

** indicates at 1 percent level

Table 8. Analysis of variance of plant stand of muskmelon.

Source	DF	M.S.	F
Treatment	19	3.24	0.10
Replication	3	12.29	0.38
Error	57	32.44	
Total	79		

The variance analysis of the weed rating data of both muskmelon and watermelons showed that various treatments react differently from date to date, Table 9 and 10.

CP 49814 at 1 lb/A treated plots yielded significantly fewer muskmelon fruits than the clean cultivated plots, Table 11. DCPA at 10 lb/A plots even had fewer fruits than the weedy plots. All the other treatments, as compared to the weedy check, did not show any significant difference in fruit number. Amiben at 2 lb/A was significantly superior to any level of DCPA applied pre-emergent and to CP 49814 treatments.

The treatment effects on fruit weight of muskmelon, Table 12, showed about the same result as treatment for fruit number. DCPA 10 lb/A and CP 49814 11lb/A significantly reduced the weight of the fruits. Amiben 2 lb/A and bensulide 6 lb/A were better herbicides than DCPA treatments applied pre-emergent and CP 49814 because of increased fruit weight.

The treatment effects on the plant stands of watermelon are presented in Table 13. It shows that bensulide 4 and 8 lb/A gave the most promising result. Plants treated with bensulide at 4 lb/A showed significantly better stands than any other treatment. Plots treated with amiben 4 and 6 lb/A, incorporated DCPA 12 lb/A and naptalam 4 lb/A had significantly fewer plants compared to bensulide treatments.

Table 14 and Table 15 consist of the interaction effects of treatment X date of muskmelon and watermelon. With the exception of CP 49814, on the date of July 29, all the herbicide

treatments showed significant difference from the weedy check. Among the treatments, it was found that before hoeing, treatments with amiben, DCPA, and DCPA-incorporated highly significantly controlled weeds better than any other treatment. Weed ratings after hoeing indicated DCPA was only significantly better than amiben.

DCPA incorporated at 8 lb/A showed significantly fewer weeds than DCPA 8 lb/A applied pre-emergent. However, when a higher rate of application was used these two method of application showed no difference.

In rating weeds early in the study, bensulide was not as effective as DCPA or amiben. However, after hoeing, its performance was better than amiben and DCPA. This probably indicates longer persistence in the soil.

Compared to other herbicides treatments, naptalam gave fairly poor weed control although it was significantly better than the weedy check.

Results of application of 49814 indicated that it was highly significantly ineffective in controlling weeds when compared with any other herbicide used. However, it had some weed control effect when compared to the weedy check plots.

The weed rating data of muskmelon are shown in Table 15. The results are similar to those in Table 14 except for amiben. The data in Table 15 showed amiben, after hoeing, still gave fairly good weed control.

Table 9. Analysis of variance of weed rating of muskmelon.

Source	DF	M.S.	F
Treatment	19	6.14	55.81**
Replication	3	0.48	4.36**
Date	4	1.66	15.09**
Treatment X date	76	0.72	6.55**
Replication X date	12	0.39	3.55**
Treatment X replication	57	0.38	3.45**
Error	288	0.11	
Total	399		

** indicates significance at 1 percent level

Table 10. Analysis of variance of weed rating of watermelon.

Source	DF	M.S.	F
Treatment	19	5.69	51.72**
Replication	3	3.42	31.09**
Date	4	2.64	24.00**
Treatment X date	76	0.75	6.82**
Replication X date	12	0.18	1.64*
Treatment X replication	57	0.44	4.00**
Error	288	0.11	
Total	399		

* indicates significance at 5 percent level

** indicates significance at 1 percent level

Table 11. Treatment mean comparison of fruit number of muskmelons per plot.

Treatment		Mean
Herbicide	(lb/A)	
1. Amiben	2	36.50
2. Bensulide	6	34.75
3. Bensulide	4	32.75
4. Amiben	6	31.50
5. Naptalam	4	29.25
6. DCPA (incorporate)	10	29.25
7. Naptalam	6	29.00
8. Bensulide	8	28.50
9. Cultivate		27.25
10. Amiben	4	27.00
11. DCPA (incorporate)	12	27.00
12. Weedy		26.00
13. Naptalam	2	25.50
14. DCPA (incorporate)	8	24.00
15. DCPA (pre-emergent)	12	23.50
16. CP 49814	2	20.50
17. CP 49814	4	20.00
18. DCPA (pre-emergent)	8	17.75
19. CP 49814	1	14.25
20. DCPA (pre-emergent)	10	11.25
L.S.D.	0.05 = 11.26	
L.S.D.	0.01 = 15.20	

Table 12. Treatment mean comparison of fruit weight of muskmelon in pounds per treatment

Treatment		Mean
Herbicides	(lb/A)	
1. Amiben	2	136.20
2. Bensulide	6	128.80
3. Bensulide	4	123.30
4. Amiben	6	119.63
5. DCPA (incorporate)	10	115.53
6. Naptalam	6	107.60
7. Bensulide	8	106.98
8. Amiben	4	106.70
9. DCPA (incorporate)	12	100.25
10. Weedy		97.08
11. Cultivate		98.08
12. Naptalam	2	89.73
13. DCPA (incorporate)	8	88.13
14. Naptalam	4	85.15
15. DCPA (pre-emergent)	12	79.00
16. CP 49814	2	74.75
17. CP 49814	4	73.08
18. DCPA (pre-emergent)	8	65.50
19. DCPA (pre-emergent)	10	44.93
20. CP 49814	1	31.95
L.S.D.	0.05 = 43.02	
L.S.D.	0.01 = 57.37	

Table 13. Treatment mean comparison of plant stands of watermelon plants per treatment.

Treatment		Mean
Herbicides	(lb/A)	
1. Bensulide	4	7.25
2. Bensulide	8	5.50
3. Bensulide	6	4.50
4. DCPA (pre-emergent)	12	4.25
5. CP 49814	2	4.25
6. CP 49814	1	3.25
7. DCPA (incorporate)	8	3.25
8. Amiben	2	2.75
9. CP 49814	4	2.75
10. Weedy		2.75
11. Cultivate		2.50
12. DCPA (pre-emergent)	8	2.50
13. DCPA (pre-emergent)	10	2.25
14. DCPA (incorporate)	10	2.25
15. Naptalam	6	2.00
16. Naptalam	2	2.00
17. Amiben	4	1.00
18. Amiben	6	0.75
19. Naptalam	4	0.75
20. DCPA (incorporate)	12	1.50
L.S.D.	0.05 = 3.00	
L.S.D.	0.01 = 4.10	

Table 14. Mean of treatment X date of weed rating of watermelon.

Treatment			June 12	June 20	June 24	July 29	Sept. 19
Herbicides (lb/A)							
1.	Naptalam	2	-0.54	0.00	0.25	-0.25	-0.29
2.	Naptalam	4	0.54	0.25	0.66	0.00	0.29
3.	Naptalam	6	-0.71	0.04	0.41	-0.25	0.54
4.	Amiben	2	-1.16	-0.71	-0.58	-0.13	0.00
5.	Amiben	4	-1.16	-1.16	-1.16	0.00	0.00
6.	Amiben	6	-1.16	-1.16	-1.16	-0.38	0.29
7.	DCPA	8	-0.71	-0.41	0.29	0.17	0.12
8.	DCPA	10	-1.00	-0.71	-0.58	-0.74	-0.54
9.	DCPA	12	-1.00	-0.71	-0.54	-0.41	-0.54
10.	DCPA(inc.)	8	-1.16	-0.83	-0.66	-0.83	-0.41
11.	DCPA(inc.)	10	-1.16	-0.87	-0.41	-0.50	-0.54
12.	DCPA(inc.)	12	-1.00	-1.00	-1.00	-0.71	-0.54
13.	Bensulide	4	-0.25	-0.41	0.83	-0.12	-0.71
14.	Bensulide	6	-0.54	-0.12	0.25	-0.71	-0.83
15.	Bensulide	8	-1.16	-0.66	-0.12	-1.16	-1.00
16.	CP 49814	1	0.58	1.16	1.16	0.00	0.12
17.	CP 49814	2	0.41	1.00	0.83	0.29	0.17
18.	CP 49814	4	0.41	1.00	0.66	-0.58	0.00
19.	Weedy		1.00	1.16	1.16	0.16	1.16
20.	Cultivate		0.41	-0.83	-1.16	0.29	-0.67
L.S.D. 0.05 = 0.33							
L.S.D. 0.01 = 0.44							

Table 15. Mean of the treatment X date of weed rating of muskmelon.

Treatment			June 12	June 20	June 24	July 29	Sept. 19
Herbicides (lb/A)							
1.	Naptalam	2	0.00	0.54	0.72	-0.13	0.13
2.	Naptalam	4	-0.42	0.00	0.25	-0.00	-0.23
3.	Naptalam	6	-0.50	0.00	0.13	-0.42	0.42
4.	Amiben	2	-1.16	-1.16	-1.16	-0.71	-0.42
5.	Amiben	4	-1.16	-1.16	-1.16	-0.13	-0.50
6.	Amiben	6	-1.16	-1.16	-1.16	-0.42	-0.58
7.	DCPA	8	-1.16	-0.67	-0.50	-0.25	-0.42
8.	DCPA	10	-1.16	-1.00	-0.67	-0.83	-0.13
9.	DCPA	12	-1.16	-1.00	-0.67	-1.16	-0.58
10.	DCPA(inc.)	8	-1.00	-0.71	-0.54	-0.58	-0.29
11.	DCPA(inc.)	10	-1.16	-1.00	-1.00	-0.67	-1.16
12.	DCPA(inc.)	12	-1.16	-1.00	-1.00	-0.67	-0.87
13.	Bensulide	4	-0.71	-0.13	0.17	-0.54	-0.83
14.	Bensulide	6	-0.50	-0.13	0.00	-0.58	-0.71
15.	Bensulide	8	-0.72	-0.42	-0.42	-0.83	-1.16
16.	CP 49814	1	1.16	1.16	1.16	-0.71	-0.04
17.	CP 49814	2	0.38	1.00	0.83	-0.71	0.13
18.	CP 49814	4	1.00	1.16	0.67	-0.58	0.13
19.	Weedy		0.72	0.83	1.00	-0.13	0.87
20.	Cultivate		-0.72	-0.67	-1.16	-0.50	0.00
L.S.D. 0.05 = 0.33							
L.S.D. 0.01 = 0.44							

DISCUSSION AND CONCLUSION

All the herbicides used in this experiment, except CP 49814, generally gave acceptable weed control but were different from each other with respect to the length of control.

This experiment showed all levels of amiben applied pre-emergent to muskmelon, resulted in more and heavier fruit than the cultivated plots. However, the differences were not significant at 5% level. This is also true for the bensulide treatments. These results showed that suitable herbicides not only can eliminate the competition factors made by weeds but also can reduce the possible injury made by cultivation.

Amiben gave very good weed control in both muskmelon and watermelon. However, at 4 and 6 lb/A amiben caused severe injury to watermelon. This was probably due to different plant sensitivity. Baker (3) has reported that the dosage required for 50% inhibition of growth was 6 to 8 times greater for squash than for cucumber. This difference is attributed to greater uptake by cucumber.

Bensulide was used in this experiment at 4, 6, and 8lb/A. Though it did not give as good weed control as amiben and DCPA, it was the least toxic to these crop plants. Good fruit production, and fairly good and longer weed control was obtained with this herbicide. In the watermelon study bensulide 4 lb/A gave better plant stands than any other treatment. Warren (26) reported that he used bensulide at rates up to 16 lb/A without causing

injury to muskmelon and cucumber. Neidlinger et al (19) reported that bensulide at 30 lb/A caused leaf discoloration and root length reduction of established annual bluegrass plants without injuring creeping bentgrass.

DCPA was applied by two different method in this experiment; over all pre-emergent spray and over all pre-plant incorporated. The latter showed better weed control than the former but the difference is not significant except for the lowest level or 8 lb/A in the watermelon study.

It was found that pre-plant incorporation of DCPA caused more plant injury than the same compound applied pre-emergent. The degree of injury increased as the rate of application increased. However, reverse results were found on fruit number and weight of muskmelon.

Naptalam showed poor weed control in this experiment. Naptalam at 4 lb/A caused visible plant injury of watermelon. However, it did not affect fruit quality. Cardenas (6), Miller et al (16), and Thomson (24) stated that high temperature and dry soil caused naptalam to be lost by volatilization. This may be the reason for not obtaining good weed control in this experiment.

CP 49814 was an experimental material. It showed quite poor weed control and significantly decreased the fruit quality of muskmelon in this experiment. This result is in contrast to the results of Ogle's. He (20) reported CP 49814 used post-emergence

at 2 lb/A gave excellent control of weeds. However, severe stunting of cucumber and watermelon was noted but not cantaloupe. Crop Research (2) stated that for most herbicide treatments, environmental condition, including moisture, temperature, soil type etc. largely determine its effectiveness. The result obtained with CP 49814 may be due to a difference in environment. The role of this chemical as a potential melon herbicide looks doubtful based on the results of this study. Evidently other research workers have found similar results, because the company has discontinued the manufacturer of CP 49814 for research as a melon herbicide.

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THE EFFECTS OF SOME SELECTIVE HERBICIDES ON MUSKMELON CUCUMIS
MELO, L. AND WATERMELON CITRULLUS VULGARIS, SCHARD

by

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AN ABSTRACT OF A MASTER'S THESIS

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Five herbicides (amiben, bensulide, naptalam, DCPA, and CP 49814) at different rates and methods of application were evaluated on muskmelon (PMR 45) and watermelon (Crimson Sweet).

Highly significant difference between herbicide treatment occurred for fruit number and fruit weight with muskmelon but not on sugar content. Herbicide treatments applied to watermelon made no difference to any one of these items which were chosen to represent fruit yield and its quality.

Muskmelon stands were not influenced significantly by herbicide treatments, but they did significantly influence the stands of watermelon.

To both muskmelon and watermelon, all the herbicides, except CP 49814, generally gave acceptable weed control but none of them provided perfect weed control through the entire growing season. Among them DCPA and amiben showed more promising weed control than other herbicides. However, at higher levels they both caused severe injury to watermelon. Bensulide, though it did not give as good weed control as amiben and DCPA, was the least toxic to both crops. These plots produced well and gave adequate weed control.

Naptalam showed poor weed control in this experiment. At 4 lb/A, naptalam caused visible plant injury of watermelon. However, it did not affect the fruit quality.

The experimental material CP 49814 gave quite poor weed control and significantly decreased the fruit quality of muskmelon.

DCPA was applied by two different methods in this experiment; over all pre-emergent spray and over all pre-plant incorporated. Incorporated DCPA resulted in more effective weed control and less injury to the crop than the pre-emergent DCPA application.