Intern. Organ. Citrus Virol., Univ. Calif., Berkeley, Div. Agr. Sci.
14. Moll, J. N. and S. P. Van Vuuren. 1977. Greening disease in Africa. Proc. Intern. Soc. Citriculture 3:903–912.
15. Reil, W. O. and J. A. Beutel. 1976. A pressure machine for injecting trees. Calif. Agr. 30(12):4–5.
16. Schwarz, R. E., J. N. Moll and S. P. Van Vuuren. 1976. Control of citrus greening and its psylla vector by trunk injections of tetracyclines and insecticides. p. 26–29. In: E. C. Calavan (ed.). Proc. 7th Conf. Intern. Organ. Citrus Virol., Univ. Calif., Riverside.
17. Schwarz, R. E. and S. P. Van Vuuren. 1971. Decrease in fruit greening of sweet orange by trunk injection of tetracyclines. Plant Dis. Rptr. 55:747–750.
18. Smith, P. F. and H. J. Reitz. 1977. A review of the nature and history of citrus blight in Florida. Proc. Intern. Soc. Citriculture 3:881–884.
19. Su, H. J. and S. C. Chang. 1976. The responses of the likubin pathogen to antibiotics and heat therapy. p. 27–34. In: E. C. Calavan (ed.). Proc. 7th Conf. Intern. Organ. Citrus Virol., Univ. Calif., Riverside.
20. Tucker, D. P. H., F. W. Bistline, and D. Gonsalves. 1974. Observations on young tree decline-affected citrus trees treated with tetracycline. Plant Dis. Rptr. 58:895–896.
21. Van Vuuren, S. P. 1979. The determination of optimal concentration and pH of tetracycline hydrochloride for truck injection of greening-infected citrus trees. Phytophylactica 9:77–81.
22. Van Vuuren, S. P., J. N. Moll, and J. V. da Graca. 1977. Preliminary report on extended treatment of citrus greening with tetracycline hydrochloride by trunk injection. Plant Dis. Rptr. 61:358–359.
23. Wells, J. M., D. J. Weaver, and B. C. Raju. 1980. Distribution of rickettsialike bacteria in peach and their occurrence in plum, cherry, and some perennial weeds. Phytopathology 70:817–820.
24. Wutscher, H. K., M. Cohen, and R. H. Young. 1977. Zinc and water-soluble phenolic levels in the wood for the diagnosis of citrus blight. Plant Dis. Rptr. 6:572–576.
25. Young, R. H. 1979. Water movement in limbs, trunks, and roots of healthy and blight-affected Valencia orange trees. Proc. Fla. State Hort. Soc. 92:64–67.
26. Young, R. H. and S. M. Garnsey. 1977. Water uptake patterns in blighted citrus trees. J. Amer. Soc. Hort. Sci. 102:751–753.

J. Amer. Soc. Hort. Sci. 107(3):432–436. 1982.

Effect of Oryzalin and Other Herbicide Treatments on Selected Quality Factors of Sweet Potatoes[1]

Larry K. Hammett and Thomas J. Monaco[2]
U.S. Department of Agriculture and Department of Horticultural Science, North Carolina State University, Raleigh, NC 27650

Additional index words. chloramben, diphenamid, storage, carotene, ascorbic acid, firmness, intercellular space, *Ipomoea batatas*

Abstract. **Oryzalin (3,5-dinitro N[4], N[4]-dipropylsulfanilamide), oryzalin/chloramben (3-amino-2,5-dichlorobenzoic acid) combinations, and diphenamid (N,N-dimethyl-2,2-diphenylacetamide) were evaluated for their influence on root quality of sweet potato [*Ipomoea batatas* (L.) Lam.] at harvest and during storage. Mineral analysis and foliage dry matter were evaluated with no significant differences observed between the oryzalin rates, diphenamid, and the controls. Soluble carbohydrates, reducing carbohydrates, ascorbic acid, and carotene content were not influenced by the herbicidal treatments. Intercellular space values were all within an acceptable range at harvest storage. The 3 rates of oryzalin utilized were not detrimental to quality and comparable to the diphenamid, weedy control, and cultivated control treatments.**

Oryzalin is a selective preemergence herbicide that is presently registered on many agricultural crops for controlling most annual grasses and some broadleaf weeds such as carpetweed [*Mollugo verticillata* (L.)], common purslane [*Portulaca oleracea* (L.)], lambsquarters (*Chenopodium sp.*), and pigweeds (*Amaranthus sp.*). One advantage of oryzalin, in addition to its spectrum of weed control, is that it does not leach readily in sandy soils (12). Diphenamid is presently registered for use on sweet potatoes and recommended (15) for the selective preemergence control of annual grasses and several broadleaf weeds. Diphenamid will leach rapidly in sandy soils (12). Chloramben, used in sweet potatoes for the control of seedling grass and broadleaf weeds, also leaches rapidly in sandy soils (12).

Greig and Al-Tikriti (5) found no herbicide-induced differences in the Ca, Mg, or K content of sweet potato roots or in the content of carotene. N content of the vines was higher with diphenamid treatments than with chloramben or DCPA (dimethyltetrachloroterephthalate) treatments. Sweet potato quality was not influenced by herbicide applications according to the work of Constantin et al. (3). They did find that EPTC (S-ethyl dipropylthiocarbamate) and DCPA influenced the quality of canned sweet potatoes. Weight loss in storage, protein content, and firmness of the canned product was not influenced. There were significant differences in root dry matter content with use of the herbicides, but no consistent trend was evident. Alvarez er al. (1) found a reduced dry matter content of sweet potatoes with glyphosine [N,N-bis(phosphonomethyl)glycine] but found no differences in total soluble solids content.

[1]Received for publication Sept. 4, 1981. Paper No. 7083 of the Journal Series of the North Carolina Agricultural Research Service, Raleigh, N.C. The use of trade names in this publication does not imply endorsement by the U.S. Dept of Agriculture or N.C. Agricultural Research Service of the products named, nor criticism of similar ones not mentioned.
The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.
[2]Plant Physiologist, USDA and professor, respectively.

This investigation was initiated to study the influence of oryzalin and oryzalin/chloramben combinations on sweet potato quality at time of harvest and throughout storage. Since oryzalin inhibits root development as its mode of action, particular emphasis was placed on differences between the controls, diphenamid, and the oryzalin/chloramben combinations with regard to biochemical and physical measurements of sweet potato quality at harvest and during storage.

Materials and Methods

Sweet potato plots were established on an Orangeburg loamy sand soil at the Horticultural Crops Research Station, Clinton, N.C., in 1979 and 1980 using 'Jewel' transplants. In both years, slips were transplanted into the fields on May 30 with harvest on Oct. 9, 1979, (132 days from transplant) and Sept. 24, 1980 (117 days from transplant). Fertilizers were applied to the plots according to the established recommendations (15). All herbicide treatments were applied by over-top broadcast immediately after transplanting (Table 1). Treatments were replicated 4 times in randomized complete block design. Plots consisted of 3 rows with each 6.1 m in length and 1.07 m apart. Plants were spaced 30.5 cm within rows and 1.52 m between replications.

At harvest, roots in all treatments were evaluated for grade distribution and yield (unpublished data). Roots in the U.S. No. 1 classification were taken to the laboratory. Roots from each plot were subdivided into 4 samples of 20 roots each for laboratory analysis at harvest, after curing, and at 2 storage samplings. All samples were placed in curing conditions (29.4 ± 0.5°C and 85% relative humidity) for 7 days as soon as possible after harvest and then in storage conditions (12.8 ± 0.5°C) and 85% relative humidity) until analyzed. Weights of 20-root samples were taken before start of curing and samples were reweighed when analyzed for the determination of percent weight loss.

Table 1. Rate and formulation of herbicide treatment combinations applied to 'Jewel' sweet potato transplants in 1979 and 1980.

Trt. No.	Treatment	kg/ha (A.I.)[z]	A.I. in formulation
1	Control-weedy	—	—
2	Control-cultivated	—	—
3	Oryzalin	0.6	75 WP
4	Oryzalin	0.8	75 WP
5	Oryzalin	1.7	75 WP
6.	Oryzalin +	0.6	75 WP
	chloramben	1.7	2 E
7.	Oryzalin +	0.6	75 WP
	chloramben	3.4	2 E
8.	Oryzalin +	0.6	75 WP
	chloramben	6.7	2 E
9.	Oryzalin +	0.8	75 WP
	chloramben	1.7	2 E
10	Oryzalin +	0.8	75 WP
	chloramben	3.4	2 E
11	Oryzalin +	0.8	75 WP
	chloramben	6.7	2 E
12	Oryzalin +	1.7	75 WP
	chloramben	1.7	2 E
13	Oryzalin +	1.7	75 WP
	chloramben	3.4	2 E
14	Oryzalin +	1.7	75 WP
	chloramben	6.7	2 E
15	Diphenamid	4.5	50 WP

[z]A.I., active ingredient

On July 31, 1979, (62 days from transplant) the first fully developed leaf from 20 vines per plot was removed for mineral analysis (2) and dry weight determinations.

In 1979 and 1980, various quality measurements were made on the sweet potato roots at harvest, after curing, and at various storage sampling periods. Five of the 20 sweet potato roots per sample underwent washing, removal of damaged tissue, grating, and the tissue was thoroughly mixed before samples were removed for various chemical analyses. An equal weight of grated tissue and 80% ethanol was homogenized in a blender for 3 min. The homogenate was centrifuged at 17,300 × g for 20 min. This supernatant was used for determination of total soluble carbohydrates by the anthrone reagent method of Johnson et al. (7) and of reducing sugars by the method of Sumner and Somers (14). Grated tissue was used for the determination of carotene by the method of Reddy and Sistrunk (13). One millimeter of the hexane layer was diluted with 9 ml of hexane and the absorbance was read at 440 nm. Carotene concentrations were determined using the extinction coefficient of β-carotene.

Additional grated tissue was used for the determination of ascorbic acid. Ascorbic acid was stablized with 1% oxalic acid solution (13) and determined by a modified Morrell (11) procedure in which 2 ml of dye and 2 ml of sample were placed in a reaction tube and absorbance read at 520 nm. Concentrations of ascorbic acid in the samples were determined by comparison with a standard curve.

In 1979, 5 roots per sample were used to measure tissue firmness. A cylinder of tissue was removed with a 1.5-cm cork borer from the center of each root (perpendicular to the longitudinal axis) and cut to a 2-cm length. The cylinder was compressed to 1 cm on an Instron Universal testing instrument, Model TM with a 50-kg, full-range compression load cell, Model CCM. Force required to compress or fracture the cylinder was recorded. Five roots per sample were used to measure intercellular space, and dry matter content was determined using the procedure of Kushman and coworkers (8, 10).

Statistical analysis was conducted at each sampling period using the general linear model procedure (6). The same procedure of statistical analysis was used for the sampling periods within each year and the combined 1979 and 1980 analyses for harvest and end of curing samples. Factorial analysis was conducted at each sampling by deleting the 2 controls and the diphenamid treatments from the data sets. The three by four factorial was used for determination of oryzalin and chloramben rate effects.

Results

Weight loss of 'Jewel' sweet potatoes was analyzed statistically at each sampling period with no significant differences between the treatments for both years. There were significant differences between storage times and between years (Table 2).

Mineral analysis (data not shown) conducted on the first fully developed leaf in 1979 did not show any significant treatment differences for nitrogen (range 3.03 to 3.78%), phosphorus (range 0.32 to 0.37%), magnesium (range 2117 to 2500 ppm), and calcium (range 2270 to 3020 ppm). Significant differences were detected for leaf potassium levels (range 2.73 to 3.20%), but no treatment trends were noticeable with the 2 control, 3 oryzalin rates, and diphenamid treatments being similar. Leaf sodium levels (range 517 to 678 ppm) were also significantly different

Table 2. Year and storage influence on certain quality factors of 'Jewel' sweet potatoes[z].

Year	Storage time (days)	Weight loss (%)	Soluble carbo-hydrates (mg/g)	Reducing carbo-hydrates (mg/g)	Ascorbic acid (mg/100 g)	Carotene (mg/g)	Dry matter (%)	IS values (ml/100 ml)
1979	Harvest, 0	—	48.2 a	8.55 b	12.1 b	0.127 a	23.6 a	7.8 a
	After curing, 7	6.02 a	45.8 a	7.34 a	15.9 a	0.139 a	23.5 a	7.9 a
	81 days	8.24 b	62.4 b	9.93 c	8.6 c	0.133 a	23.3 a	9.2 b
	199 days	15.84 c	81.3 c	11.98 d	6.9 d	0.137 a	23.1 a	11.9 c
1980	Harvest, 0	—	49.5 b	7.11 a	7.7 a	0.139 a	24.4 a	6.9 a
	After curing, 7	5.18 a	35.8 a	6.91 a	3.8 b	0.156 b	23.2 b	7.9 b
	119 days	10.23 b	67.5 c	7.88 b	4.2 b	0.145 a	22.7 c	9.1 c
	184 days	17.14 c	70.3 d	9.33 c	4.0 b	0.166 c	22.6 c	9.0 c

[z]Mean separation within columns by years by Duncan multiple range test, 5% level.

for treatments, but the cultivated control, 3 oryzalin rates, and diphenamid treatments were similar.

Significant treatment differences were detected in leaf dry matter (Table 3). The 2 controls and diphenamid treatments were similar to the 3 rates of oryzalin. Factorial analysis of the data resulted in significant differences being detected for oryzalin main effect rate (Table 4).

There were significant treatment differences in soluble carbohydrates at harvest both years (Table 3) and at 81 and 199 days storage in 1979. Oryzalin rate did not influence the soluble carbohydrate content at any sampling in 1979 and 1980. Chloramben (Table 4) significantly influenced soluble carbohydrates in 1979 but the trends were not consistent for the various storage periods. Statistical analysis of the soluble carbohydrates (Table 2) showed significant differences between storage times in any year and differences between years.

In 1979, reducing carbohydrate levels of the 'Jewel' sweet potato roots at harvest and during storage were not influenced by the herbicide treatments. In 1980, significant treatment differences were detected at harvest (Table 3) and after 119 days in storage for reducing carbohydrate levels. Factorial analysis revealed significant main effect differences for chloramben at 199 days storage in 1979 and 119 days storage in 1980 (Table 4). Statistical analysis of reducing carbohydrate levels over storages for each year and with combined years revealed significant differences being detected between storage samplings for each year and differences between years (Table 2).

In 1979, ascorbic acid content of the roots was not influenced by the various herbicide treatments with the exception of 81 days in storage. The low rate of chloramben significantly increased ascorbic acid content (Tables 3 and 4). In 1980, significant treatment differences were detected at harvest (Table 3). Treatment differences by factorial analysis were detected for oryzalin rate at harvest, 119 days, and 184 days in storage (Table 4). Statistical differences were detected between storage samplings each year and between years (Table 2).

Carotene content of the roots was not influenced by any of the herbicide treatments at each sampling time during both years. In general, carotene content was consistently 0.134 mg/g throughout harvest and storage during 1979 and slightly higher in 1980 at 0.152 mg/g (Table 2).

Significant treatment differences were detected in 1979 after curing and after 81 days storage in root tissue firmness (Table 3). At both sampling periods, the 2 controls, 3 oryzalin, and diphenamid treatments were similar. The trend of increased tissue fracturing pressure was evident with increased chloramben rate at the 2 sampling periods (Table 4).

Root dry matter content (data not shown) was significantly different for various treatments in 1979 after curing and after 199 days storage. No trends were evident with the weedy control, 3 oryzalin, and diphenamid treatments being similar (range 21.0 to 24.7%). In 1980, significant treatment differences were detected after curing and after 184 days storage. Factorial analysis did not reveal significant trends in 1979 or 1980. There was a decrease in dry matter with an increase in storage time (Table 2).

Significant treatment differences were detected in root intercellular space values (IS) at harvest in 1980 and after curing in both years (Table 3). In each case, the controls, 3 oryzalin, and diphenamid treatments were similar. No trends could be detected by factorial analysis. When analyzed over years, year and storage time were significant (Table 2).

Discussion

In determination of the herbicide influence on sweet potato quality, certain parameters should be weighed heavier than others; such as, weight loss, DM, and IS for storage potential. Weight loss during storage of the 'Jewel' root was not influenced by any herbicide treatment and appeared to be normal with the progressive increase during storage. The roots lost 5 to 6% weight during curing and then 1.5 to 2.0% weight for each month in storage after curing. Since there were no significant treatment differences, oryzalin treatments were as acceptable as the controls or diphenamid treatments.

Mineral analysis of the foliage did not result in detection of detrimental effects due to oryzalin. With all elements studied, oryzalin treatments were no different than the controls or the diphenamid treatments. With increased oryzalin rate, leaf dry matter was increased by 1% from the low to high rate. Increased photosynthetic capability cannot be assumed with increasing oryzalon rates since leaf surface area was not measured. Increased root yield might indicate a positive correlation between photosynthetic capacity and oryzalin rate.

Root carbohydrate levels, both soluble and reducing, were not influenced by the various rates of oryzalin. Some rate responses were detected for chloramben at various storage times, but no trends could be developed for soluble or reducing carbohydrates. A sharp change in carbohydrate levels as compared to the controls would have indicated that the mode of herbicide action might be injuring the crop by interfering with metabolism.

Table 3. Influence of various herbicide combinations on certain quality factors of 'Jewel' sweet potatoes[z].

Treatment	Oryzalin (kg/ha A.I.)[y]	Chloramben (kg/ha A.I.)	Dry matter leaf, 1979 (%)	Harvest soluble carbohydrates (mg/g) 1979	Harvest soluble carbohydrates (mg/g) 1980	Harvest reducing carbohydrates 1980 (mg/g)	Ascorbic acid (mg/100 g) 81 days storage (1979)	Ascorbic acid (mg/100 g) Harvest 1980	Root firmness (kg) After curing (1979)	Root firmness (kg) 81 days storage (1979)	Intercellular space (ml/100 ml) After curing (1979)	Intercellular space (ml/100 ml) Harvest (1980)	Intercellular space (ml/100 ml) After curing (1980)
1) Control-weedy	—	—	13.6 abc	50.9 ab	47.9 bc	6.13 b	8.6 ab	7.0 abc	27.9 c	22.2 cde	9.6 ab	6.8 abc	7.9 abc
2) Control-cultivated	—	—	13.3 abc	47.2 bc	52.6 ab	7.59 ab	7.5 b	7.9 abc	29.0 abc	27.8 bcde	6.8 c	7.4 a	8.6 a
3) Oryzalin	0.6	—	12.6 c	46.7 c	50.1 abc	7.62 ab	8.4 ab	7.9 abc	28.3 bc	27.3 abcde	8.2 ab	7.2 abc	8.0 abc
4) Oryzalin	0.8	—	14.4 ab	46.6 c	48.6 bc	6.87 ab	8.5 ab	7.0 abc	31.0 abc	25.2 e	7.5 bc	6.5 c	7.6 bc
5) Oryzalin	1.7	—	14.2 ab	48.7 abc	55.4 a	8.26 a	7.3 b	9.8 a	28.3 bc	27.1 cde	7.8 abc	6.7 bc	7.7 bc
6) 3 w/chloramben	0.6	1.7	13.0 abc	47.6 bc	49.9 abc	6.88 ab	9.8 ab	7.4 abc	32.3 a	27.7 abcde	8.1 ab	6.9 abc	7.8 abc
7) 3 w/chloramben	0.6	3.4	13.3 abc	48.2 bc	45.6 c	6.78 ab	8.8 ab	7.0 abc	30.5 abc	29.4 abcde	7.5 bc	6.9 abc	7.8 abc
8) 3 w/chloramben	0.6	6.7	14.5 a	49.3 abc	49.5 abc	7.28 ab	7.7 b	8.5 ab	30.4 abc	29.9 abcd	8.1 ab	7.2 ab	7.9 abc
9) 4 w/chloramben	0.8	1.7	14.5 a	46.3 c	51.2 abc	6.88 ab	11.2 a	6.3 bc	31.8 ab	30.2 abcd	7.8 abc	7.1 abc	7.8 abc
10) 4 w/chloramben	0.8	3.4	13.3 abc	51.9 a	50.6 abc	8.35 a	7.8 b	9.0 ab	28.6 abc	27.6 abcde	7.9 abc	6.8 abc	7.7 abc
11) 4 w/chloramben	0.8	6.7	13.4 abc	47.8 bc	48.1 bc	7.20 ab	8.4 ab	5.5 c	30.5 abc	31.7 a	8.3 ab	6.8 abc	7.8 abc
12) 5 w/chloramben	1.7	1.7	14.3 ab	48.6 abc	47.0 bc	6.79 ab	11.3 a	9.4 a	32.3 a	26.1 e	7.9 abc	6.8 abc	7.3 c
13) 5 w/chloramben	1.7	3.4	14.5 a	48.7 abc	49.8 abc	6.91 ab	8.1 ab	8.1 abc	31.6 abc	31.6 ab	8.8 a	7.2 abc	8.5 ab
14) 5 w/chloramben	1.7	6.7	14.0 abc	47.4 bc	46.2 bc	6.41 b	9.1 ab	6.9 abc	30.5 abc	31.4 abc	7.7 abc	6.9 abc	7.6 c
15) Diphenamid[x]	(4.5)	—	12.8 bc	47.3 bc	49.9 abc	6.70 ab	7.6 b	8.6 ab	29.3 abc	27.9 abcde	8.0 abc	6.6 bc	8.0 abc

[z]Mean separation within columns by Duncan multiple range test, 5% level.
[y]A.I. = active ingredient.
[x]Rate of diphenamid, kg/ha, A.I.

Table 4. Factorial analysis of various herbicide combinations on certain quality factors of 'Jewel' sweet potatoes[z].

Quality factor	Year	Storage days	Oryzalin rate (kg/ha) 0.6	Oryzalin rate (kg/ha) 0.8	Oryzalin rate (kg/ha) 1.7	Chloramben rate (kg/ha) 0	Chloramben rate (kg/ha) 1.7	Chloramben rate (kg/ha) 3.4	Chloramben rate (kg/ha) 6.7
Dry matter leaf (%)	1979	0	13.3 b	13.9 ab	14.2 a	NS	—	—	—
Soluble	1979	0	NS	—	—	47.31 b	47.48 b	49.59 a	48.18 ab
carbohydrates		7	NS	—	—	46.74 a	45.98 ab	46.59 a	43.77 b
(mg/g)		81	NS	—	—	64.07 a	60.33 b	61.83 ab	63.55 a
Reducing	1979	199	NS	—	—	12.61 a	12.16 a	11.04 b	11.85 ab
carbohydrates	1980	119	NS	—	—	8.26 a	8.33 a	7.23 b	7.30 b
(mg/g)									
Ascorbic	1979	81	NS	—	—	8.07 b	10.71 a	8.24 b	8.40 b
acid	1980	0	7.70 ab	6.95 b	8.51 a	NS	—	—	—
(mg/g)		119	4.23 ab	3.39 b	4.64 a	NS	—	—	—
		187	4.09 ab	4.73 a	3.29 b	NS	—	—	—
Root	1979	7	NS	—	—	29.2 b	32.1 a	30.2 ab	30.4 ab
firmness		81	NS	—	—	26.6 c	28.3 bc	29.5 ab	31.0 a

[z]Mean separation within lines by the Duncan multiple range test, 5% level.

Two compounds that are important in human nutrition and that can be supplied by sweet potatoes are ascorbic acid and carotene. In 1980, oryzalin significantly influenced ascorbic acid content at 3 sampling times, but consistent response curves could not be developed with oryzalin rate. All samples exhibited the typical reduction in ascorbic acid content with storage. Carotene content was very stable with no treatment or storage effects. From the standpoint of these 2 nutritionally important compounds, oryzalin had no detrimental effects on their concentrations and was comparable to diphenamid and the control treatments.

Relative humidity in the storage facility and cell turgor pressure plays an important part in root tissue firmness (4). Low root-pressure readings tend to indicate firmer tissue as compared to tissues with higher root-pressure values. Using the uniaxial compression of sweet potato tissue, treatment differences were detected but could not be associated with rates of oryzalin. There was some indication that chloramben reduced the firmness of the roots as indicated by increased pressure reading after curing and after 81 days storage.

Even though significant treatment differences were present at certain sampling times for root dry matter in 1979 and 1980, oryzalin and chloramben rates did not consistently influence dry matter. No significant effects were detected with factorial analysis. Oryzalin alone or in combination with chloramben was not different than the controls, so that their use was neither an advantage or disadvantage to production of root dry matter.

Intercellular space values are an important measurement in determining the storage potential of sweet potatoes. Intercellular space values that are low at harvest (6 to 8) indicate long-term storage potential and little chance for development of pithiness under good storage conditions. If IS values are high (10 to 11) at harvest, these sweet potatoes would have a very short storage potenntial (9). When IS values reach 12 during storage, pithiness is usually present and visible. In all herbicide treatments, the IS values were low at harvest and remained so throughout storage. In both years, the 3 oryzalin rates were not different from the diphenamid treatment or one of the 2 control treatments.

No significant rate effects were present either year for oryzalin or chloramben, indicating that these 2 herbicides at the prescribed rates do not reduce storage potential.

It is evident from the analysis of weight loss, carbohydrate values, ascorbic acid content, carotene content, and IS values that oryzalin at all rates appeared to be equivalent to the commercially recommended practice of using diphenamid and that both are no different than the weedy and cultivated controls in regard to root quality at harvest and throughout storage. Although there were differences between years, the acceptable trends are still the same.

Literature Cited

1. Alvarez, M. N., B. T. Whatley, J. H. Henderson, and B. R. Phills. 1978. Effects of Polaris on yield, dry matter, and soluble solids of sweet potato roots. J. Amer. Soc. Hort. Sci. 103:206–207.
2. Chapman, H. D. and P. F. Pratt. 1961. Methods of analysis for soils, plants, and water. Univ. of California, Davis.
3. Constantin, R. J., T. P. Hernandez, and B. W. Wascom. 1975. Effects of herbicides on quality of sweet potatoes. Proc. South. Weed Sci. Soc. 28:194–200.
4. Diehl, K. C., D. D. Hamann, and J. K. Whitfield. 1979. Structural failure in selected raw fruit and vegetables. J. Texture Studies 10:371–400.
5. Greig, J. K. and A. S. Al-Tikriti. 1966. Effects of herbicides on some chemical components of sweetpotato foliage and roots. Proc. Amer. Soc. Hort. Sci. 88:466–471.
6. Helwig, J. T. and K. A. Council. 1979. SAS user's guide. Statistical Analysis Systems, Inc., Raleigh, N.C.
7. Johnson, G., C. Lambert, D. K. Johnson, and S. G. Sunderwirth. 1964. Colorimeter determination of glucose, fructose, and sucrose in plant material using a combination of enzymatic and chemical methods. J. Agr. Food Chem. 12:216–219.
8. Kushman, L. J. and D. T. Pope. 1968. Procedure for determining intercellular space of roots and specific gravity of sweet potato root tissue. HortScience 3:44–45.
9. Kushman, L. J. and D. T. Pope. 1972. Causes of pithiness in sweet potatoes. N.C. Agr. Expt. Sta. Tech. Bul. 207.
10. Kushman, L. J., D. T. Pope, and J. A. Warren. 1968. A rapid method of estimating dry matter content of sweetpotatoes. Proc. Amer. Soc. Hort. Sci. 92:814–822.
11. Morrell, S. A. 1941. Rapid determination of ascorbic acid in plant materials. Indust. Eng. Chem. Anal. Ed. 13:793.
12. Mullison, W. R., R. W. Bovey, A. P. Burkhalter, T. D. Burkhalter, H. M. Hull, D. L. Sutton, and R. E. Talbert. 1979. Herbicide handbook of the Weed Science Society of America. Weed Sci. Soc. Amer., Champaign, Ill.
13. Reddy, N. N. and W. A. Sistrunk. 1980. Effect of cultivar, size, storage, and cooking method on carbohydrates and some nutrients of sweet potatoes. J. Food Sci. 45:682, 684.
14. Sumner, J. E. and G. T. Somers. 1949. Laboratory experiments in biological chemistry. Academic Press, New York.
15. Wilson, L. G., C. W. Averre, J. V. Baird, E. A. Estes, K. A. Sorenson, E. O. Beasley, W. A. Skroch, C. F. Abrams, W. W. Collins, L. K. Hammett, E. G. Humphries, T. J. Monaco, J. W. Moyer, and J. J. Nicholaides. 1980. Growing and marketing quality sweet potatoes. AG-09, N.C. Agr. Ext. Serv., Raleigh.