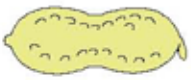




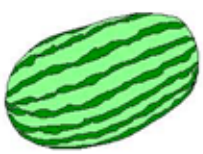
1999 GEORGIA PLANT DISEASE LOSS ESTIMATES











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THE UNIVERSITY OF GEORGIA
COOPERATIVE EXTENSION

College of Agricultural and Environmental Sciences
College of Family and Consumer Sciences

1999 Georgia Plant Disease Loss Estimates

It is estimated that 1999 plant disease losses, including control costs, amounted to approximately $580.25 million. The value of the crops used in this estimate was $4.124 billion, resulting in a 14.07 percent total disease loss across all crops included in this summary.

The estimated values for most crops used to compute these disease losses are summarized in: Georgia Agricultural Statistics Service, Georgia Farm Report Vol. 00, No. 4. Estimates for tobacco are based on Market News Service figures for growers net sales and do not include warehouse resales. Estimates for vegetables, ornamentals, and turf rely on specialists knowledge of the industry and industry sources for information.

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1999 PLANT DISEASE CLINIC ANNUAL SUMMARY

Extension Plant Pathology maintains three clinics as educational resources for county Extension agricultural faculty to use to aid their clients in diagnosing and correcting disease- and insect-related plant problems. Plant samples are submitted directly to the county Extension faculty who, at their discretion, forward samples to the appropriate clinic. Commercial turf, fruits, forage crops, greenhouse and ornamental nursery samples are sent to the Plant Disease Clinic in Athens. Diagnoses of and control recommendations for commercial samples of field crops, pecans and vegetables are handled by the Plant Disease Clinic at the Rural Development Center in Tifton, Georgia. All non-commercial plant samples are sent to the Homeowner IPM Clinic in Athens for disease and/or insect diagnoses and recommendations. Diagnoses and educational recommendations are returned to the county faculty. The clinics maintain a computerized database of samples and their diagnoses, as well as a reference library for use by Extension agents, specialists, researchers, and students.

As in 1998, ornamentals (trees, herbaceous and woody ornamentals) and turf comprised most of the samples received in 1999. The high number of turf samples is attributed to two factors; 1) early summer drought stress compounded in many cases by over watering through the remainder of the summer and 2) an unusually warm fall created ideal conditions for disease when warm season turf grasses should have been going dormant.

CLINIC SUMMARIES: 1999 PLANT SPECIMEN DIAGNOSES

Crop	Commercial Samples	Homeowner IPM Clinic: Disease	Insect	Digital Imaging Samples	Total
Field Crops	181			92	273
Vegetables	360	121	19	231	731
Fruits & Nuts	66	48	11	67	192
Herbaceous Ornamentals	233	131	17	164	545
Woody Ornamentals	295	449	53	232	1029
Trees	149	147	42	163	501
Turf & Forages	583	613	14	124	1334
Miscellaneous	10	23	330	29	392
TOTAL	1877	1532	486	1102	4997

APPLE

Apple producers experienced problems with several pathogens in 1999. Principle among these were fire blight and rots, and these diseases substantially reduced yield in some orchards. Cost of control included increased pesticide usage for both fire blight and summer rots. Often, chemical fungicides or antibiotic applications did not adequately suppress disease. This indicates likely resistance buildup in pathogen populations; this is especially true for fire blight.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Fire Blight	1.0	34.2	90.0	124.2
Bitter Rot	5.0	170.9	132.0	302.9
Bot Rot	3.0	102.5	91.0	193.5
Black Rot	2.0	68.4	60.0	128.4
Alternaria Leaf Spot	1.0	34.2	5.0	39.2
Powdery Mildew	0.3	10.3	22.0	32.3
Sooty Blotch	0.3	10.3	--[1]	10.3
Fly Speck	0.3	10.3	--[1]	10.3
Cedar Apple Rust	0.1	3.4	--[1]	3.4
Scab	0.1	3.4	1.0	4.4
Other Diseases	0.5	17.1	1.0	18.1
Total	**13.6**	**465.0**	**402.0**	**867.0**

[1] Controlled with fungicides applied for other diseases.

Estimated by Phil Brannen, Extension Plant Pathologist

BUNCH GRAPE

1999 Disease Loss Estimates for Bunch Grape Are Not Available

MUSCADINE GRAPE

1999 Disease Loss Estimates for Muscadine Grape Are Not Available

BLUEBERRY

With a total production of 11,000,000 lbs. valued at $10.1 million, Georgia blueberry yields were up from 1998, but still below the long-term average. In rabbiteye cultivars, considerable yield losses occurred due to poor fruit set, a result of the low-chill winter in combination with spring drought and arthropod (thrips, gall midge) infestation. The incidence of mummy berry disease was below average, primarily because of the dry spring. Botrytis blight was essentially absent as no predisposing freezes occurred during bloom. In southern highbush cultivars, problems due to foliar diseases and dieback increased compared with previous years, as did Phytophthora root rot (primarily in the production of nursery stock).

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Mummy Berry	1.5	151.2	350.0	501.2
Botrytis Blight	<0.1	10.1	0.0	10.1
Foliar Disease	1.0	100.8	40.0	140.8
Dieback	1.0	100.8	0	100.8
Phytophthora Root Rot	0.3	30.2	10.0	40.2
Total	**3.9**	**393.1**	**400.0**	**793.1**

Estimate by Harald Scherm, Research Plant Pathologist, and Phil Brannen, Extension Plant Pathologist

CANOLA

Canola is an emerging agricultural commodity in Georgia and neighboring states. Acreage in Georgia has varied from over 15,000 to less than 5,000 in recent years, depending on market prices and weather at planting time. Disease losses from the potentially most devastating disease, blackleg, have been kept well below 5 percent by moving production to new areas where the disease is not established and limited use of moderately resistant cultivars. Ample seed supplies of a highly resistant cultivar were available for the 1999-2000 crop but only a few hundred acres were planted across the southeastern United States. Yield losses from Sclerotinia stem rot were well below 5 percent due to an extremely dry 1999-2000 season. Foliar and pod diseases were present at very low levels and did not reduce yields. Overall disease losses for the 1999-2000 season were well below 5 percent.

CANOLA DISEASES FOUND IN GEORGIA

Disease	Pathogen	% Reduction in Crop Value
Black Leg	*Leptosphaeria maculans*	< 5.0
Sclerotinia Stem Rot	*Sclerotinia sclerotiorum*	< 5.0
Alternaria Black Spot	*Alternaria brassicicola & A. brassicae*	0.0
White Leaf Spot	*Pseudocercosporella capsellae*	0.0
Downy Mildew	*Peronospora parasitica*	0.0
Powdery Mildew	*Erysiphe cruciferarum*	0.0
Damping Off	*Rhizoctonia solani & Pythium sp.*	0.0
TOTAL		< 5.0

Estimate by Dan Phillips, Research Plant Pathologist

CORN

Drought caused significant damage to the 1999 corn crop in Georgia, though not as much as to the 1998 crop. Approximately 350,000 acres were planted, but only 300,000 acres were harvested with statewide yields averaging 105 bu/A. The total crop value in Georgia was estimated at $69,525,000. Aflatoxin levels were slightly below than average in the 1999 corn crop causing an estimated $4,172,000 in losses. Damage from nematodes was less than in 1998. The hot, dry weather reduced foliar disease problems.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Root & Stalk Rot	0.1	0.07	0.0	0.07
Nematodes	2.5	1.74	1.0	2.74
Mycotoxins	6.0	4.17	0.0	4.17
Leaf Diseases	5.0	3.48	0.0	3.48
Total	**13.6**	**9.46**	**1.0**	**10.46**

Estimate by Richard Davis, Extension Nematologist

COTTON

Approximately 1,470,000 acres of cotton were planted in 1999, but only 1,300,000 acres were harvested. Severe drought in many areas caused significant yield loss and even caused the complete loss of some acreage. Statewide average yields of 580 pounds of lint per acre were similar to 1998, but lower than in other recent years. Low prices reduced the total crop value for Georgia to an estimated $341,381,000, which was lower than recent years. Losses to boll rot were much lower than in 1998. Damage from nematodes was similar to recent years, though much of the damage was difficult to distinguish from drought damage: nematode-damaged root systems were less able to take up water, so the effect of drought conditions was more severe. Dry weather following planting reduced seedling disease levels.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Boll Rot (lint)	5.0	17.07	0.0	17.07
Nematodes	5.0	17.07	11.13	28.2
Seedling Disease	1.0	3.41	2.5	5.91
Fusarium Wilt	0.5	1.71	0.0	1.71
Total	**11.5**	**39.26**	**13.63**	**52.89**

Estimate by Richard Davis, Extension Nematologist

ORNAMENTALS

The ornamental industry comprises greenhouse and floriculture crop production, container and field-grown nursery crop production, and commercial landscaping. It had an estimated economic value of $991 million in Georgia in 1999. Root rot diseases accounted for the largest percentage of disease loss in ornamentals as a result excessive heat stress on roots in containerized nursery production. Powdery mildew infection was increased over 1998 largely due to warmer, humid summer conditions. Drought conditions through much of the state resulted in reduced losses from foliar diseases.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Bacterial diseases (fire blight, leaf spots)	0.1	0.99	0.1	1.09
Fungal leaf spots, branch and stem cankers	1.0	9.91	6.8	16.71
Root and crown rots	3.0	29.73	5.1	34.83
Powdery mildew	0.3	2.97	0.9	3.87
Botrytis blight	0.2	1.98	1.0	2.98
Virus (TSWV, INSV, CMV)	0.2	1.98	0.0	1.98
Minor diseases (rust, downy mildew, nematode)	0.1	0.99	0.0	0.99
Total	**5.1**	**48.55**	**13.9**	**62.45**

Estimate by Jean Williams-Woodward, Extension Plant Pathologist

PEACH

Peach production in 1999 (105,000,000 lbs. valued at $39.2 million) was almost twice that of 1998. Small fruit size was compensated for by excellent color and quality. Despite the relatively dry spring, considerable scab pressure developed, leading to unanticipated quality problems. Brown rot incidence was very low in early-maturing cultivars but picked up as the season progressed and rains became more frequent. Bacterial spot was essentially absent due to dry spring weather. Problems with Armillaria root rot, for which there are currently no effective controls, increased.

Cost of control included cost of pesticides, equipment, and labor. Costs associated with certain cultural practices (flail mowing to reduce gummosis; detailed pruning for control of Phomopsis shoot blight) are directly related to disease control and were therefore considered in the assessment.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Brown Rot	8.0	3.13	1.0	4.13
Scab	6.0	2.35	1.0	3.35
Bacterial Spot	<0.1	0.03	0.01	0.04
Gummosis	0.2	0.08	0.02	0.10
Phomopsis Shoot Blight	0.1	0.04	0.01	0.05
Armillaria Root Rot	0.1	0.04	0.0	0.04
Total	**14.5**	**5.67**	**2.04**	**7.71**

Estimate by Harald Scherm, Research Plant Pathologist, and Phil Brannen, Extension Plant Pathologist

PEANUT

The 1999 Georgia peanut crop was about normal for recent years with 546,000 acres harvested and an average yield of 2600 lb/A. The total crop value was $386 million. Although there were heavier localized rains in July that resulted in some early disease pressure, most of the state had relatively dry conditions. Leaf spot losses were very low and white mold pressure was significantly less than in 1998. Cylindrocladium black rot was somewhat reduced also, but there was more present at harvest than was evident earlier in the year. The University of Georgia TSWV Risk Index has been widely implemented and estimated losses for that disease were the same as in 1998. There were some seed quality and stand establishment problems, particularly in early planted peanuts subjected to the cold temperatures in late April. This caused an increase in losses to seedling disease, and actual losses were probably higher due to the higher incidence of TSWV that no doubt resulted from the sparse stands.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Leaf spots	1.0	3.9	40.0	43.9
White mold	4.0	15.4	20.0	35.4
Limb Rot	2.0	7.7	--[1]	7.7
Pod Rot	1.0	3.9	--[2]	3.9
Nematodes	3.0	11.6	8.0	19.6
Cylindrocladium Black Rot	2.0	7.7	1.0	8.7
Seedling Disease	2.0	7.7	0.5	8.2
Aspergillus Crown Rot	0.2	0.8	0.0	0.8
Tomato Spotted Wilt	4.5	17.4	0.0[3]	17.4
Total	**19.7**	**76.1**	**69.5**	**145.6**

[1] Folicur or Montero/Moncut treatment costs about $16/acre. Many growers made 2-4 applications of these or Abound for white mold, limb rot and leaf spot. Abound costs about twice as much, but only two applications are required.

[2] The cost of gypsum treatments applied to reduce pod rot has not been estimated.

[3] Additional costs for use of increased seeding rates for management of TSWV have not been calculated.

Estimate by Tim Brenneman and Albert Culbreath, Research Plant Pathologists

PECAN

Dry weather from April through June reduced disease pressure at most locations during 1999. July rains resulted in some disease pressure but control remained quite good at most locations. Loss potential for 1999 was variable as usual running ~5%-80%.[1]

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Scab[2]	1.00	0.49	13.80	14.29
Brown Spot	0.00	0.00	--[1]	0.00
Downy Spot	0.00	0.00	--[1]	0.00
Powdery Mildew[3]	0.00	0.00	-	-
Zonate Leaf spot	0.00	0.00	-	-
Total	**1.00**	**0.49**	**13.80**	**14.29**

[1] This data is based on the response of unsprayed trees ("Desirable") in test plots at 10 locations.

[2] Eight treatments on 150,000 acres @ $11.50/A; scab sprays also effective against downy spot and brown spot.

Estimate by Paul Bertrand, Extension Plant Pathologist

SOYBEAN

An estimated 190,000 acres of soybeans were harvested in 1999 with an average yield of 19 bushels/acre for a total value of $16,606,000. Approximately 220,000 acres were planted but 30,000 were not harvested due primarily to severe drought conditions. Growing conditions were similar to those in 1998. Seedling disease problems, caused primarily by *Rhizoctonia*, were much lower than in 1998.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Soybean cyst nematode	3.0	0.50	0	0.50
Root-knot nematodes	3.0	0.50	0	0.50
Other nematodes	0.5	0.08	0	0.08
Anthracnose	0.1	0.02	0	0.02
Brown leaf spot	0.1	0.02	0	0.02
Charcoal rot	0.2	0.03	0	0.03
Diaporthe/*Phomopsis* complex	0.4	0.07	0	0.07
Downy mildew	0.1	0.02	0	0.02
Frogeye leaf spot	0.5	0.08	0	0.08
Red crown rot	0.4	0.07	0	0.07
Pod and stem blight	0.1	0.02	0	0.02
Purple stain	0.1	0.02	0	0.02
Seedling diseases (*Rhizoctonia*/*Pythium*/*Fusarium*)	0.6	0.10	0.09	0.18
Southern blight	0.2	0.03	0	0.03
Stem canker	0.5	0.08	0	0.08
Virus diseases	0.1	0.02	0	0.02
Bacterial diseases	0.0	0.00	0	0.00
TOTAL	**9.9**	**1.66**	**0.08**	**1.74**

[1] Resistant varieties are used to manage most nematode and disease problems. Typically, the only fungicides used are seed treatments to reduce seedling diseases.

Estimate by Richard Davis, Extension Nematologist

STRAWBERRY

Commercial strawberry production has rapidly increased over the past 2-3 years. This increase has largely been centered in small "pick your own" and roadside operations, but larger wholesale commercial operations have also increased. Methyl bromide fumigation accounted for the largest single expenditure for disease control. Control of leaf spots also required a relatively large financial expenditure.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Botrytis	3.0	135.0	38.0	173.0
Fungal Leaf Spots	5.0	225.0	17.5	242.5
Anthracnose	2.0	90.0	2.0	92.0
Root Rots & Nematodes	3.0	135.0	230.0	365.0
Angular Leaf Spot	1.0	45.0	3.0	48.0
Total	**14.0**	**630.0**	**290.5**	**920.5**

Estimated by Phil Brannen, Extension Plant Pathologist

TOBACCO

Blue Mold activity began in a few plant beds and plant houses in mid-March. By mid-May the disease was well scattered over the Georgia tobacco belt south of Douglas with isolated activity north of Douglas. Dry weather beginning in April and improved use of Acrobat MZ prevented a major epidemic. Plant house operators who encountered blue mold found after the fact control by chemicals and sanitation all but useless.

Losses to tomato spotted wilt virus (TSWV) were higher than ever before. The average stand loss across the state is estimated at 35- 40 percent with stand losses in excess of 70 percent in some cases.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Blue Mold	0.1	0.08	0.75[1]	0.83
Black Shank	T	-	0.98	0.98
Root Knot Nematode	0.2	0.16	2.40	2.56
Tomato Spotted Wilt Virus	18.0	25.00	3.78[2]	28.78
Other Virus[3]	1.0	0.82	0.00	0.82
Total	**19.3**	**26.06**	**7.91**	**33.97**

[1] Includes chemical cost plus plants to reset ~ 1200 acres set initially with plants having systemic blue mold.

[2] Even though Admire 2F is not labeled for TSWV ~ 90% of the plants used to produce the 1999 crop were treated, almost exclusively for TSWV suppression.

[3] Other viruses included TMV, PVY and traces of TEV and CMV. Most loss is to TMV or TMV + PVY.

Estimate by Paul Bertrand, Extension Plant Pathologist

TURF

It is estimated that there are 1.6 million acres of turf with the maintenance value of $1.56 billion in Georgia. Soilborne diseases are present wherever turf is grown and are responsible for much of the disease losses. Nematodes have been attributed to increased damage and stress. This stress has predisposed turfgrass to soil borne and foliage diseases. Soil test for nematode to verify problems. Foliage diseases continue to be problematic during hot humid summers.

Turf Diseases	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Soil Diseases	3.3	51.48	28.60	80.08
Foliage Diseases	1.7	26.52	17.38	43.9
Nematodes	3.8	59.28	7.50	66.68
Total	**8.8**	**137.28**	**53.38**	**190.66**

Estimate by Ed Brown, Extension Plant Pathologist

VEGETABLES

About 170,000 acres of vegetables are grown in Georgia worth a total of ca. $500 million. TSWV in tomatoes was very severe in the spring crop and losses up to 80 percent in some fields were observed. Hot, dry temperatures suppressed disease development in spring and early summer, thus reducing losses to fungal diseases. Botrytis Neck Rot caused up to 30 percent loss in CA stored onions.

Major Vegetable Crops	%Reduction in Crop Value[1]	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Watermelon	8.00	5.8	4.10	9.90
Squash (yellow + zuc.)	9.00	3.2	1.10	4.30
Tomato	12.00	9.9	2.10	12.00

Other Vegetable Crops	% Reduction in Crop Value[1]	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($Millions)
Pepper (bell)	8.00	1.9	1.10	3.00
Cucumber	5.00	1.3	1.10	2.40
Snap Bean	5.00	1.4	0.72	2.12
Greens	4.00	1.25	0.84	2.09
Cabbage	7.00	1.8	0.33	2.13
Onion (dry)	13.00	11.7	1.70	13.40
Cantaloupe	6.00	1.40	0.93	2.33
Eggplant	6.00	0.2	0.16	0.36
Total	**8.4**	**40.15**	**15.11**	**54.99**

[1] This column is not additive due to the way losses for vegetables are tabulated.

Estimated by David B. Langston, Jr., Extension Plant Pathologist

WHEAT

Foliar diseases caused only low amounts of damage to wheat during 1999 due to planting of resistant cultivars and a dry spring which did not favor foliar diseases. Leaf rust caused some losses on susceptible cultivars. However, many growers applied foliar fungicides to control rust and other leaf diseases. Leaf rust reduced yield 22 percent on a susceptible cultivar in fungicide trials at Plains. Powdery mildew caused more damage than in 1998 but most cultivars are resistant and therefore overall losses were low. Stagonospora (Septoria) leaf and glume blotch was low to moderate due to dry spring weather. Barley yellow dwarf was variable but lower than levels observed in previous years. In a few fields Fusarium foot rot caused substantial losses, as much as 70 percent yield reduction. This disease, also known as dryland root rot, occurs in the lower rainfall areas of the western United States. However, the drought conditions in the winter and spring of 1999 created low moisture conditions that favored the disease. Wheat was harvested on about 240,000 acres with an average yield of 43 bu/A.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control[1] ($ Millions)	Total ($ Millions)
Leaf Rust	0.5	0.13	1.35	1.48
Glume Blotch	1.0	0.26	----	0.26
Powdery Mildew	0.2	0.05	0.30	0.35
Barley Yellow Dwarf Virus	1.0	0.26	0.30	0.56
Total	**2.7**	**0.70**	**1.95**	**2.65**

[1] Fungicides used to control leaf rust also control glume blotch. Estimated that 50% of the wheat acreage received fungicide treatment costing approximately $13.50/acre.

Estimate by Barry Cunfer, Research/Extension Plant Pathologist

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA - 1999

Crop or Commodity	Estimated Crop Value ($ Millions)	% Reduction in Crop Value[1]	Value of Damage ($ Millions)	Cost of Control ($ Millions)	Total Disease Loss (Damage & Control) ($ Millions)	Total % of Loss [1, 2]
Apple	3.42	13.6	0.46	0.40	0.86	25.35
Blueberry	10.1	3.9	0.39	0.40	0.79	7.85
Corn	69.52	13.6	9.46	1.00	10.46	15.04
Cotton	341.38	11.5	39.26	13.63	52.89	15.49
Ornamental	991.0	5.1	48.55	13.9	62.45	6.30
Peach	39.2	14.5	5.67	2.04	7.71	19.67
Peanut	386.0	19.7	76.1	69.5	145.6	37.72
Pecan	76.1	1.0	0.49	13.8	14.29	18.78
Soybean	16.6	9.9	1.66	0.08	1.74	10.48
Strawberry	4.5	14.0	0.63	0.29	0.92	20.46
Tobacco	104.0	19.3	26.06	7.91	33.97	32.66
Turf	1560.0	8.8	137.28	53.38	190.66	12.22
Vegetable	500.0	8.4	40.15	15.11	54.99	11.00
Wheat	22.25	2.7	0.70	1.95	2.65	11.91
TOTALS	**4124.07**	**9.3**	**386.86**	**193.39**	**580.25**	**14.07**

[1] This column is not additive.

[2] Total % loss for each crop and the grand total is figured on the basis of: $\frac{\text{Value of Damage + Cost Control}}{\text{Crop Value}}$

ATTENTION!
Pesticide Precautions

1. Observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful and illegal to do otherwise.

2. Store all pesticides in original containers with labels intact and behind locked doors. **"KEEP PESTICIDES OUT OF REACH OF CHILDREN."**

3. Use pesticides at correct label dosage and intervals to avoid illegal residues or injury to plant and animals.

4. Apply pesticides carefully to avoid drift or contamination of non-target areas.

5. Surplus pesticides and containers should be disposed of in accordance with label instructions so that contamination of water and other hazards will not result.

6. Follow directions on the pesticide label regarding restrictions as required by State and Federal Laws and Regulations.

7. Avoid any action that may threaten an Endangered Species or its habitat. Your County Extension Agent can inform you of Endangered Species in your area, help you identify them and through the Fish and Wildlife Service Office identify actions that may threaten Endangered Species or their habitat.

Trade names are used only for information.

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