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1999 VIRGINIA PEANUT PRODUCTION GUIDE



Published by:

Tidewater Agricultural Research and Extension Center
Virginia Polytechnic Institute and State Univ.
Suffolk, Virginia 23437

In cooperation with:

Virginia Peanut Growers' Association
Capron, Virginia



VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Tidewater Agric. Res. and Ext. Center
Information Series No. 416
February 1999

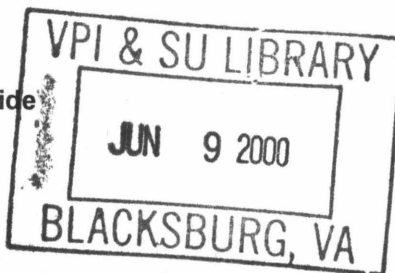


1999

Peanut Production Guide



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Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U. S. Department of Agriculture cooperative. C. Clark Jones, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; Lorenza W. Lyons, Administrator, 1890 Extension Program, Virginia State, Petersburg.

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ESTIMATED PRODUCTION COSTS

ACKNOWLEDGMENT

*We are indebted to the Virginia Peanut Growers Association
for making the printing of this publication possible.*

SAFETY FIRST WITH PESTICIDES

Keys to Proper Use of Pesticides

1. Read the label on each pesticide container before each use. Follow the printed instructions to the letter; heed all cautions and warnings; note precautions about residues.
2. Store pesticides in the containers in which you bought them. Put them where children and animals cannot get to them — preferably locked-up and away from food, feed, seed, and other materials that may become harmful if contaminated.
3. Dispose of empty containers in the manner specified on the label.

***SEE YOUR DOCTOR IF SYMPTOMS OR ILLNESS OCCUR DURING
OR AFTER USE OF PESTICIDES!***

IN CASE OF SUSPECTED POISONING

The procedure to be followed is:

1. Call a physician immediately. If the family physician is not available, the patient should be **taken** to the nearest physician or hospital emergency department together with the **container of the poisoning agent**.
2. If necessary, the **physician** will call the nearest poison control center for further information concerning toxicity of the suspected agent, treatment, and prognosis.

PROTECTIVE CLOTHING AND EQUIPMENT GUIDE

Use this table as a guide to the selection of protective clothing and equipment. Cross-reference the signal word from the product label and the type of formulation to determine the minimum protection you should wear. This guide is not to be used in place of label statements; refer to the label for specific information.

Formulation	Label Signal Word		
	Caution	Warning	Danger
Dry	Long-legged trousers and long-sleeved shirt; shoes and socks.	Long-legged trousers and long-sleeved shirt; shoes and socks; wide-brimmed hat; gloves.	Long-legged trousers and long-sleeved shirt; shoes and socks; hat; gloves; cartridge or canister respirator if dusts in air or if label precautionary statement says: "Poisonous or fatal if inhaled."
Liquid	Long-legged trousers; long-sleeved shirt; shoes and socks; wide-brimmed hat.	Long-legged trousers and long-sleeved shirt; shoes and socks; wide-brimmed hat; rubber gloves. Goggles if required by label precautionary statement. Cartridge or canister respirator if label precautionary statement says: "Do not breathe vapors or spray mists," or "Poisonous if inhaled."	Long-legged trousers and long-sleeved shirt; rubber boots, wide-brimmed hat, rubber gloves or face shield. Canister respirator if label precautionary statement says: "Do not breathe vapors or spray mists," or "Poisonous if inhaled."

Label Signal Word			
Formulation	Caution	Warning	Danger
Liquid (when mixing)	Long-legged trousers; long-sleeved shirt; shoes and socks; wide-brimmed hat; gloves; rubber apron.	Long legged trousers and long-sleeved shirt; shoes and socks; wide-brimmed hat; rubber gloves; goggles or face shield; rubber apron. Respirator if label precautionary statement says: " Do not breathe vapors or spray mist. " or " Poisonous (or fatal or harmful) if inhaled. "	Long-legged trousers and long-sleeved shirt, rubber boots, wide-brimmed hat, rubber gloves, goggles, rubber apron, canister respirator.
Liquid (prolonged exposure to spray, or application in enclosed area).	Long-legged trousers and long-sleeved shirt, boots, rubber gloves, waterproof, wide brimmed hat.	Water-repellent, long-legged trousers and long-sleeved shirt, rubber boots, rubber gloves, rubber apron, waterproof, wide-brimmed hat, face shield, cartridge or canister respirator.	Waterproof suit, rubber boots, rubber gloves, waterproof hood or wide-brimmed hat, face shield, canister respirator.

Source: Apply Pesticides Correctly: A Guide for Private and Commercial Applicators. USDA/USEPA - 1984, p. 102.

EMERGENCY INFORMATION

POISON TREATMENT:

In the event of a known or suspected exposure to a toxic (poisonous) substance, one of the Regional Poison Centers listed below should be contacted immediately. These centers provide 24-hour information and consultation services by poison information specialists and board-certified medical toxicologists. If possible, these centers should be called in advance of a person's admission to a local hospital or emergency department so the poison center experts can provide information on proper treatment. These centers are located in hospitals equipped for all toxicologic (poisoning) emergencies.

REGIONAL POISON CENTERS

CHARLOTTESVILLE, VA Blue Ridge Regional Poison Center Blue Ridge Hospital - Box 67 Medical Center University of Virginia Charlottesville, VA 22901 (804) 924-5543 or (800) 451-1428	RICHMOND, VA Central Virginia Poison Center Virginia Commonwealth University Box 522 - MCV Station Richmond, VA 23298 (800) 552-6337 (VA only) (Calls from Central and Eastern Virginia only)
WASHINGTON, DC National Capital Poison Center Georgetown University Hospital 3201 New Mexico Avenue, NW, Suite 310 Washington, DC 22016 (202) 625-3333 (Call Collect - DC and metropolitan area only)	

In addition to the Regional Poison Centers, there are several area hospitals with staff members that will provide some poison information by telephone. These hospitals are equipped for most toxicologic emergencies.

GREENSBORO, NC Triad Poison Center Moses H. Cone Memorial Hospital 1200 North Elm Street Greensboro, NC 27401-1020 (919) 574-8105 (800) 953-4001 (Calls from Virginia counties on the VA-NC border only, please)
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EMERGENCY INFORMATION

SPILLS , accidents and . other related emergencies	CHEMTREC - Chemical Transportation Emergency Center Industry Hotline	(800) 424-9300
SPILLS into water	Department of Environmental Quality	(804) 527-5194 (8:00 a.m. to 5:00 p.m.) (804)527-5200 (after 5:00 p.m.)
24 Hour Medical Consultation	National Pesticide Telecommunication Network	(800) 858-7378
FOR ASSISTANCE WITH SPILLS AND EMERGENCIES	State Department of Emergency Services	(804) 674-2400 or (800) 468-8892 (24-hours/day)
ACCIDENTS OR INCIDENTS that constitute a threat to any person, public Field Operations safety and health or the environments	Virginia Department of Agriculture and Consumer Services Office of Pesticide Management	(804) 371-6560

AGRONOMIC RECOMMENDATIONS AND PROCEDURES

*Charles W. Swann
Extension Agronomist/Weed Scientist*

PEANUT VARIETAL DESCRIPTIONS

NC 6

NC 6 has an a growth habit intermediate between runner (spreading) and bunch types. This variety is moderately resistant to the southern corn rootworm, potato leaf hopper and tobacco thrips. NC 6 generally sustains about 50 percent less rootworm damage than other virginia-type varieties. It matures 10-14 days later than NC 7. NC 6 has good resistance to early leaf spot, but is very susceptible to CBR. Due to southern corn rootworm resistance, NC 6 is an excellent choice for planting on heavy soils.

NC 7

NC 7 has an a growth habit intermediate between runner (spreading) and bunch types and is considered to be of medium maturity (145 to 155 days depending upon growing season). It is somewhat resistant to early leaf spot disease and has high yield potential. NC 7 produces a high percentage of ELK's and Fancy pods. NC 7 is very susceptible to CBR (black rot) and sclerotinia blight diseases. It does well on both loamy and sandy soils.

NC 9

This variety matures three to five days earlier than NC 7. It has a runner (spreading) growth habit. It has a high yield potential and performs well on both sandy and loamy soils. NC 9 is somewhat resistant to CBR, and is a good choice whenever seed of NC 10C or NC12C are not available. However, NC 9 is highly susceptible to sclerotinia blight and leaf spot.

NC 10C

NC 10C has moderate resistance to CBR (black rot). However, it is susceptible to all other major peanut diseases of the region. In fields severely infested with CBR, a preplant application of a metam-sodium product is recommended. It has a spreading runner growth habit. NC 10C

is 10 to 15 days later in maturity than NC 7. NC 10C has the lowest percentage of extra large kernels of any of the virginia-type varieties grown in this region.

NC-V 11

Under good conditions, NC-V 11 has very high yield and dollar value per acre. Maturity is three to five days earlier than NC 7. NC-V 11 produces fewer fancy pods and a lower percentage of ELK's than NC 7. NC-V 11 has a spreading runner growth habit. It is less susceptible to tomato spotted wilt virus than other virginia-type varieties.

NC 12C

NC 12C is a large-seeded CBR-resistant variety similar in maturity, plant type, seed size, shape, seed coat color and yield to NC 7. NC 12C is very susceptible to sclerotinia blight. The pods of NC 12C have a thin hull with a tendency to darken on roasting. Care should be taken to avoid pod damage in combining to minimize price penalty resulting from excessive levels of loose shelled kernels. Under close plant spacing or conditions of high water availability, NC 12C produces excessive vine growth.

VA-C 92R

VA-C 92R is an exceptionally high yielding variety which is characterized by a spreading (runner) growth habit. Maturity is three to five days earlier than NC 7. The SMK percentage of VA-C 92R is equal to NC 7. The ELK percentage of VA-C 92R is approximately equal to NC 6 and exceeds that of all other varieties with the exception of NC 7. Pods of VA-C 92R are generally darker in appearance than pods of other varieties. It is susceptible to all of the major diseases of the region.

VA 93B

VA 93B has some resistance to sclerotinia blight but is very susceptible to early leaf spot and southern stem rot. Its growth habit is a distinct bunch type, and it is 7-10 days earlier in maturity than NC 7. It can be planted later than other varieties while maintaining yield and grade; however, to take advantage of its earliness it should be planted as early as possible so it can be dug early. The earliness of this variety provides some protection against southern corn rootworm damage. VA 93B has a bright hull color which is desirable for in-shell processors.

VA 98R

VA 98R is a new release which has a runner (spreading) growth habit and an exceptionally high yield potential. Maturity is considered early (three to five days earlier than NC 7). This variety has pod-size, shape and color which is well suited for in-shell uses. The SMK percentage is equal to NC 7 while ELK percentage is approximately equal to that of VA-C 92R, but lower than NC 7, NC 12C and Gregory. Fancy pod percentage is approximately equal to NC-V 11, but lower than NC 7, NC 12C or Gregory. VA 98R is susceptible to the major peanut diseases of the V/C production area.

Gregory

Gregory has a growth habit intermediate between runner (spreading) and bunch types. Maturity is equivalent to NC 7. This variety produces an exceptionally high percentage of ELK's and Fancy pods. Due to large seed size, Gregory has a high soil calcium requirement which may result in reduced seedling vigor if seed is produced under conditions which limit calcium uptake.

AGRONOMIC AND MARKET CHARACTERISTICS OF VIRGINIA MARKET-TYPE PEANUT VARIETIES RECOMMENDED FOR VIRGINIA

Characteristic	VARIETY									
	NC 7	NC 12C	Gregory	VA 93B	VA 98R	NC-V 11	NC 9	VA-C 92R	NC 6	NC 10C
General										
Growth Habit	Intermediate	Intermediate	Intermediate	Bunch	Runner	Runner	Runner	Runner	Intermediate	Runner
Maturity ^a	0	0	0	-7	-5	-3	-3	-3	+13	+15
Pod Retention ^b	0	0	0	0	0	+	0	+	+	+
Seed Coat Color	Tan	Tan	Pink	Pink	Pink	Pink	Pink	Pink	Tan	Pink
Soil Type (Adapt.) ^c	M-L	M-L	M-L	M	M-L	M-L	M-L	M-L	M-H	M-L
Seed Count/lb	500	500	450	575	550	600	575	550	550	600
Calcium ^d	Low	Low	Low	Mod.	Mod	Mod.	Mod.	High	Low	Mod.
Seed Vigor ^b	0	0	-	++	++	+	++	++	-	+
Grade & Quality Factors^b										
% ELK	0	0	+	-	-	-	-	-	-	-
% SMK	0	0	0	-	0	0	0	0	0	-
% Fancy	0	0	+	-	-	-	-	-	0	-
Blanchability	0	0	0	0	+	+	+	+	0	+
Shelf-life	0	0	0	-	-	--	--	-	-	--
Splitting	0	0	0	0	0	0	0	0	0	0

^a 0 = Same as NC 7; '+' = Days later than NC 7; '-' = Day earlier than NC 7

^b 0 = Same as NC 7; '++' = Substantially higher than NC 7; '--' = Substantially lower than NC 7

^c Performs best on L = light; M = medium; H = heavy soil type

^d Ability to absorb calcium

**DISEASE AND INSECT RESISTANCE
CHARACTERISTICS OF VIRGINIA MARKET-TYPE PEANUT VARIETIES
RECOMMENDED FOR VIRGINIA**

VARIETY										
Characteristic	NC 7	NC 12C	Gregory	VA 93B	VA 98R	NC-V 11	NC 9	VA-C 92R	NC 6	NC 10C
<u>Disease Resistance^e</u>										
Leaf spot	MR	MR	S	VS	S	S	VS	S	MR	S
Sclerotinia	VS	VS	VS	MR	S	S	VS	S	S	S
Stem Rot	S	S	S	VS	S	S	S	S	S	S
Pod Rot	S	S	S	S	S	S	S	S	S	S
CBR	VS	MR	S	VS	S	S	MR	S	VS	MR
<u>Insect Resistance^e</u>										
Rootworm	S	S	S	S	S	S	S	S	R	S
Thrips	S	S	S	S	S	S	S	S	MR	S
Leafhopper	S	S	S	S	S	S	S	S	MR	S
Corn earworm	S	S	S	S	S	S	S	S	MR	S
Spider mites	S	S	S	S	S	S	S	S	S	S

^e VS = Very Susceptible; S = Susceptible; MR = Moderately Resistant

PLANT POPULATION, SEED SIZE AND SEEDING RATE
FOR RECOMMENDED VARIETIES

Seed requirements for one acre at 4 intra-row seed spacings in 36 inch rows

			Variety and Approximate Seed Count Per Pound				
Seed Spacing (inches)	# Seed (per foot)	# Seed (per acre)	Gregory 450	NC 7 NC 12C 500	VA-C 92R NC 6 550	NC 9 VA 93B 575	NC-V 11 NC 10C 600
----- For 36" rows*-----			----- Lbs seed required to plant 1 acre in 36" rows -----				
2.0	6	81,120	180	174	160	152	145
3.0	4	58,080	129	116	106	101	97
4.0	3	43,560	97	87	80	76	73
6.0	2	29,040	65	58	53	51	48

* For any seed spacing in 32" , 34" , or 38" rows multiply the pounds of seed required to plant 36 inch rows as noted below:

Row spacing	Multiply lbs for 36# rows by:
32"	1.125
34"	1.060
38"	0.947

TWIN-ROW PLANTING PATTERNS

Performance of most currently available varieties have been evaluated when planted in twin rows spaced seven inches apart. Slight yield increases have been demonstrated with twin row planting of VA 93B and NC 6.

When planting in twin rows, seed should be spaced 5-6 inches apart in the row. Good early season weed control is essential when planting in twin rows.

TRACE ELEMENT REQUIREMENTS

Manganese

Manganese is needed in small amounts for peanut production. Soils in the peanut area, until recent years, contained adequate available manganese but now most sandy soils are deficient in this nutrient. Manganese availability to plants, most commonly becomes critical with a soil pH of 6.2 to 6.5 or higher. In the heavier and more poorly drained soils, manganese deficiency symptoms (leaf-yellowing) will occur when soil pH exceeds 6.2. On sandy soils deficiency symptoms will not usually occur until the soil pH exceeds 6.5. Since peanut yields are not increased by pH values which exceed 6.2, it is recommended that peanut soils retain a pH value of 5.8 - 6.2. Generally, if soil tests indicate less than 3 ppm manganese, one or more foliar applications of the nutrient will be required. Monitor the crop for visual symptoms of manganese deficiency. If deficiency symptoms appear, foliar applications of the nutrient will be required. Soil application of manganese is not recommended. Typical plant deficiency symptoms are yellowing of leaflet tissues between the veins, with the veins remaining green. Nitrogen deficiency is sometimes confused with manganese deficiency when the whole leaf, including veins, is pale yellow.

Manganese Recommendations

Apply 1-3 applications of manganese [Tecomangam, MnSO_4 , MnCl_2 , or $\text{Mn}(\text{NO}_3)_2$] as a foliar spray as needed between mid-June and August 15 at the rate of 1.0 lb/A elemental manganese per application. Manganese sources may be tank-mixed with leaf spot* sprays. Cone type nozzles used

* Do not mix solubor or leaf spot disease control products containing cupric hydroxide with inorganic sources of manganese due to potential compatibility problems.

for leaf spot sprays are well suited for application of manganese. If other manganese materials are available, spray the material to deliver 1.0 lb elemental manganese per acre. Do not mix Solubor with any of these manganese products. Boric acid may be mixed with these manganese products.

When soil tests for manganese are 3.0 ppm or below, three preventative applications should be made at 2 week intervals, beginning mid-June.

Liquid Manganese Products

A number of liquid formulations containing manganese are available for use on peanuts. When used according to label instructions many of these products provide less than 1.0 lb elemental manganese per acre. Recent Virginia research results have shown that liquid manganese formulations should be applied in multiple applications, which supplies a total of at least 0.5 - 1.0lb/A elemental manganese per application. With manganese EDTA chelate the material should supply 0.25 to 0.50 lbs/A of elemental manganese per application. EDTA chelated products may be tank mixed with cupric hydroxide and with inorganic sources of boron.

Soil Application - Application of manganese to the soil in fertilizer has been ineffective in providing this element to the crop.

Boron

Boron is needed during kernel development; hence, it should be applied about the time or, or immediately following, flowering. Boron is generally applied as a wettable powder or liquid spray with the leaf spot fungicides*. When plants are under stress or if the recommended rates are exceeded, leaf burning will occur. Excessive use of boron can cause severely reduced yields even when foliage burning is not obvious. Boron can be applied satisfactorily as a soil application in fertilizer.

Boron Recommendation

Apply 0.5 lb elemental boron per acre at the early bloom stage to prevent internal damage. The application of boron is especially important on light sandy soils. The following sources and rates are suggested:

2.5 lb/A Solubor foliar applied in 10-30 gallons spray per acre*

2.8 lb/A Boro-spray foliar applied in 10-30 gallons spray per acre*

2.9 lb/A Boric Acid foliar applied in 10-30 gallons spray per acre*

Do not mix Solubor with Techmangam, MnSO_4 , MnCl_2 , or $\text{Mn}(\text{NO}_3)_2$ because a precipitate will form.

LANDPLASTER-CALCIUM RECOMMENDATIONS

Source	% CaSO_4	Band (16-18")	Broadcast
		-----lb/A -----	
US Gypsum Bagged	85	600	
US Gypsum Bulk 420 (gran.)	85		900-1200
US Gypsum Bulk 500 (gran.)	70		900-1200
Texasgulf Gypsum (Phosphogypsum)	50	---	1500-1800
JTM Industries Peanut Maker (Semi-Granular)	71	---	1100-1500
Buckshot	*		1200-1500

- Registered with Virginia Department of Agriculture and Consumer Services as a calcium-sulfur supplement for peanut production. Guaranteed analysis Calcium (Ca) 20%, Sulfur (S) 9%.

Time of application: June 10 - July 15.

* Apply at time of second or third leaf spot application. Do not apply when plants are under moisture stress. Do not apply with sulfur or other chemicals which tend to burn foliage and do not exceed 0.5 lb/A elemental Boron. Split applications of 0.25 lb/A elemental boron each, at 2-4 week intervals up to August 15 are suggested.

Special Recommendation for Peanut Seed Production:

It is essential that peanuts being grown for seed receive a continuous available supply of calcium from pegging through seed development to insure high germination. This can be accomplished by either using two (2) applications or by increasing the amount used at the first application by 50%; being certain to apply it after June 10. Specific recommendations are:

- | | | | |
|----|----|-------------------|---|
| 1. | a) | June 10 - June 30 | Apply 75% of recommended amounts above for non-seed crop. |
| | b) | July 1 - July 20 | Apply 400-500 lb/A of bagged or dry USG 420 or USG 500 landplaster in a band over the row |

OR

- | | | |
|----|-------------------|---|
| 2. | June 10 - June 30 | Apply the higher rate of the above rate ranges.
CAUTION: If soil potash level is relatively low, this choice could cause a potash deficiency to occur unless potash is applied prior to planting. |
|----|-------------------|---|

WEED CONTROL IN PEANUTS

Charles W. Swann

Extension Agronomist/Weed Scientist

Perennial Broadleaf Weeds: Perennial broadleaf weeds such as horsenettle, trumpet creeper, maypop, passionflower, and bigroot morningglory cannot be effectively controlled in peanuts. Treatment with Blazer plus 2,4-DB will provide some foliage burn and growth suppression of these weeds. Perennial weeds rapidly recover from these treatments.

Perennial weeds can be controlled in corn grown in rotation with peanuts. In corn, make a layby application of 1 pint per acre of 2,4-D amine plus surfactant. After corn harvest, spot spray remaining infestations with either Roundup or a mixture of 1 pint per acre of 2,4-D amine plus 0.5 pint per acre of Banvel plus surfactant. See Roundup label for suggested application rates.

Bermudagrass: Two applications of Poast, Poast Plus or Select will usually provide adequate to good control of bermudagrass in vigorously growing peanuts. See Table 2 for application rates and weed size for treatment. Strive for good control in rotational crops. In soybeans and cotton, Assure II, Fusilade DX, Fusion, Poast, Poast Plus and Select are registered for postemergence control of bermudagrass.

Broadleaf signalgrass: Sequential herbicide applications are usually necessary to provide adequate control of this annual grass. Apply Prowl, Dual, or Sonalan as a preplant incorporated treatment and follow with an application of Dual, Frontier or Lasso about the time peanuts emerge. Shallow cultivation and/or a postemergence application of Poast, Poast Plus and Select may be required in addition to use of soil applied herbicides.

Texas Panicum: This annual grass is expanding as problem weed in most peanut-producing counties in Virginia. Lasso, Dual, Frontier, Pursuit, and Vernam will not control Texas panicum. Soil incorporated treatments of Prowl or Sonalan will generally provide good to excellent control. Prowl, or Sonalan should be incorporated to a depth of 3 inches (this is deeper than specified on Prowl label). Poast, Poast Plus and Select provide excellent postemergence control of Texas panicum. Starfire (paraquat) will provide good to excellent control if applied to seedlings with 3 leaves or less.

Nutsedge: Both yellow and purple nutsedge occur in Virginia's peanut production area. For either species sequential herbicide application and/or cultivation may be necessary to obtain satisfactory control. Yellow

nutsedge suppression or control can be achieved with soil applications of Vernam, Pursuit, Frontier or Dual. Lasso, Frontier or Dual may be applied as a preemergence or an at-cracking treatment to improve control or suppression of yellow nutsedge. Purple nutsedge suppression can be obtained with soil applications of either Vernam or Pursuit.

If yellow nutsedge escapes soil applied herbicides, Basagran may be applied postemergence to improve control. Apply Basagran when yellow nutsedge is 6 to 8 inches tall. Both yellow and purple nutsedge can be controlled or suppressed with a postemergence application of either Cadre or Pursuit to nutsedge 1 to 3 inches in height.

Prickly sida, ragweed, tropic croton, eclipta, spurred anoda and velvetleaf: A soil incorporated treatment of Pursuit usually provides good control of prickly sida and spurred anoda, and fair to good control of velvetleaf. No soil applied treatments are available which will satisfactorily control common ragweed, tropic croton or eclipta.

Basagran, Cadre or Tough may be used for effective postemergence control of prickly sida. Blazer provides good to excellent control of ragweed and tropic croton. Postemergence application of Blazer at 2 pt/A will suppress and may control eclipta less than 2 inches tall. (Control not claimed on Blazer label.) Cadre provides good postemergence control of spurred anoda, prickly sida and velvetleaf. Refer to product labels for specific details of application information based on weed species and size.

Lambsquarters: Soil incorporated Sonalan, Pursuit, Prowl, or Vernam will provide good lambsquarters control. Postemergence application of Tough provides excellent control of lambsquarters up to 4 inches in height. For postemergence control with either Basagran or Blazer; treatments must be applied when lambsquarters seedlings are two inches in height or less. Tank mixture of 2,4-DB with Tough, Blazer or Basagran improves consistency of lambsquarters control.

HERBICIDE INJURY

Early season peanut injury may occasionally result from use of soil applied herbicides. Symptoms of this injury include excessive swelling of the hypocotyl, curling or corkscrew-like growth of the hypocotyl, moderate to severe inhibition (pruning) of root growth, failure of seedlings to emerge or slow seedling emergence and stunted growth of emerged seedlings. These symptoms may be mimicked or aggravated by weather conditions and low seed vigor or quality. Peanuts usually outgrow this injury with no reduction in yield.

Injury has most commonly been noted with soil incorporated

applications to very sandy soils where the herbicide has been non-uniformly mixed with the soil and rainfall has been received or irrigation applied within several days of planting. Preemergence and cracking stage applications are less likely to cause injury than soil incorporated treatments. Sequential applications of chloroacetamide herbicides (Frontier, Dual or Lasso) may increase the potential for injury.

REGISTERED TANK MIXES COMMONLY USED FOR PEANUTS

Basagran + Blazer	Prowl + Vernam	Sonalan + Vernam
Basagran + 2,4-DB	Pursuit + Dual	Starfire + 2,4-DB
Basagran + Starfire	Pursuit + Sonalan	Starfire + Basagran
Blazer + 2,4-DB	Pursuit + Vernam	Starfire + Dual
Frontier + Prowl	Pursuit + Basagran	Starfire + Frontier
Frontier + Sonalan	Pursuit + Blazer	Starfire + Pursuit
Frontier + Pursuit	Pursuit + Starfire	Storm + Starfire
Frontier + Vernam	Pursuit + 2,4-DB	Storm + 2,4-DB
Prowl + Dual	Sonalan + Dual	Tough + 2,4-DB
Prowl + Pursuit		

WEED RESPONSE TO HERBICIDES

HERBICIDES																		
	Prowl	Sonalan	Vernam	Dual	Frontier	Lasso	Pursuit	Basagran	Blazer	Butryac/ Butoxone	Cadre	Poast/ Poast Plus	Select	Starfire + 2,4-DB	Starfire +	Storm	Pursuit	Tough + 2,4-DB
Application Method	PPI	PPI	PPI	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE	PPI PRE
Grasses & Sedges																		
Broadleaf signalgrass	G-E	G-E	F	G	F-G	G	G	N	P	N	G-E*	E	E	F	F	N	G	P
Crabgrass	E	E	E	E	E	E	F	N	P	N	G-E*	G	G	F	F	N	P-F	P
Fall Panicum	G-E	G-E	G	G-E	G-E	G-E	P-F	N	P	N	G-E*	E	E	F	F	N	P-F	P
Goosegrass	E	E	G	E	E	E	P	N	N	N	G-E*	E	E	F	F	N	P	P
Texas panicum	G-E	G-E	P	P-F	P-F	P-F	P-F	N	P	N	G-E*	E	E	F-G	P-F	N	P	P
Johnsongrass seedlings	G	G	F	F	P-F	F	G-E	P	P	N	G-E*	E	E	F	P	P	G-E	P
Purple nutsedge	P	P	F-G	P	P	P	G	P	P	N	G-E	N	N	F	F	P	F-G	P
Yellow nutsedge	P	P	E	F-G	F-G	P-F	F-G	G	P	N	G-E	N	N	F	F	P	F	F
Broadleaf Weeds																		
Cocklebur	P	P	P	P	P	P	G-E	E	G	E	G-E	N	N	E	E	E	G	E
Eclipta	P	P	P	P	P	P	P	P	F	P	F	N	N	F	P	P-F	P	F
Horsenettle	P	P	P	P	P	P	P	P	P	P	P	N	N	P	P	P	P	P
Jimsonweed	P	P	P	P	P	P	G	E	E	P	F-G	N	N	G	G	E	G	G
Lambsquarters	G	G	G	P-F	F	F	G	F	F-G	P-F	P-F	N	N	P-F	G	G	P	E

- Cadre provides G-E control of emerged annual grasses which escape soil applied grass control herbicides.

WEED CONTROL Preplant Incorporated

Product and Formulation Rate/A	Weeds	Remarks and Precautions
Dual 8E, Dual or Dual II 7.8 EC (metolachlor)	Crabgrass, fall panicum, goosegrass, barnyardgrass, broadleaf signalgrass, pigweed, yellow nutsedge	Incorporate 2 inches deep within 14 days of planting. Will not control purple nutsedge or adequately control Texas panicum. A sequential application may be used with 1.5 pt/A applied PPI and 1.5 pt/A applied either PRE or at "ground cracking." May be tank mixed with Prowl, Pursuit or Sonalan for PPI application. Do not use Dual II or Dual II Magnum after peanuts have emerged.
Dual Magnum 7.62 EC or Dual II Magnum 7.64EC (s-metolachlor)	Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge	Incorporate 2 inches deep within 14 days of planting. May be applied in a split application with ½ to ¾ the maximum rate applied PPI and ½ to ⅓ the maximum rate applied as a sequential application. Will not control purple nutsedge or adequately control Texas panicum. Soil incorporated treatments may be tank mixed with Prowl, Pursuit or Sonalan.
Frontier 6EC (dimethanamid)	Crabgrass, goosegrass, fall panicum, seedling johnsongrass, pigweed, lambsquarters, Texas panicum, broadleaf signalgrass	Incorporate no deeper than 2 inches within 7 days after application (incorporation as soon as possible after application is preferred). Under heavy weed pressure, use highest rate for soil type. May be tank mixed with Dual, Pursuit, Frontier, or Vernam
Pursuit 70DG (imazethapyr)	Yellow and purple nutsedge and many broadleaf weeds.	Incorporate no deeper than 2 inches within 45 days of planting. A sequential application may be used with ½ rate applied PPI and ½ rate applied either at "ground cracking" or postemergence. Soil incorporated treatments may be tank mixed with Prowl, Sonalan, Vernam, or Dual.

Product and Formulation Rate/A	Weeds	Remarks and Precautions
Sonalan 3HFP (ethalfluralin)	1.5-2 pt	Incorporate 2-3 inches deep within 2 days of application (incorporation as soon as possible after application is preferred). Incorporate 3 inches deep for Texas panicum. Use minimum of 2 pints/A for fall panicum, Texas panicum, and broadleaf signalgrass. May be tank mixed with Dual, Pursuit, Frontier, or Vernam.
Vernam 7EC (vernolate)	2.33-3 pt	Incorporate 3 inches deep immediately after application according to label instructions. Provides control for about 4-5 weeks. Under cool, wet conditions, temporary plant injury may occur. Effective on yellow and purple nutsedge. Weak on broadleaf signalgrass and Texas panicum. May be tank mixed with Prowl or Sonalan.
Dual Magnum 7.62EC or Dual II Magnum 7.64EC (s-metolachlor) + Prowl 3.3EC (pendimethalin) or Sonalan 3HFP (ethalfluralin)	1-1.33 pt or 1-1.33 pt + 1.8-2.4 pt or 1.5-2 pt	Not effective on purple nutsedge. Follow instructions for incorporation on Sonalan, or Prowl label. Deep incorporation may dilute Dual and reduce control. Incorporate up to 14 days before planting. Good season long control of annual grasses including broadleaf signalgrass and Texas panicum. Do not apply Dual II or Dual II Magnum after peanuts have emerged.

Product and Formulation Rate/A	Weeds	Remarks and Precautions
Dual, Dual 8E or Dual II (metolachlor) + Prowl 3.3EC (pendimethalin) or Sonalan 3HFP (ethalfluralin)	Yellow nutsedge control and extended late season annual grass control.	Not effective on purple nutsedge. Follow instructions for incorporation on Sonalan, or Prowl label. Deep incorporation may dilute Dual and reduce control. Incorporate up to 14 days before planting. Good season long control of annual grasses including broadleaf signalgrass and Texas panicum. Do not apply Dual II or Dual II Magnum after peanuts have emerged.
Frontier 6EC (dimethenamid) + Prowl 3.3EC (pendimethalin) or Sonalan 3HFP (ethalfluralin)	Yellow nutsedge control and extended late season annual grass control	Not effective on purple nutsedge. Follow instructions for incorporation on Sonalan or Prowl label. Incorporate up to 14 days before planting. Good season long control of annual grasses including Texas panicum.
Vernam 7EC (vernolate) + Prowl 3.3EC (pendimethalin) or Sonalan 3HFP (ethalfluralin)	Yellow and purple nutsedge, crabgrass, goosegrass, fall panicum, seedling johnsongrass, Texas panicum, broadleaf signalgrass, lambsquarters, pigweed, velvetleaf.	Follow incorporation directions on Vernam label. Compared to Vernam alone, these combinations improve control of broadleaf signalgrass and Texas panicum and extend control of other annual grasses.

Product and Formulation Rate/A	Weeds	Remarks and Precautions
PREEMERGENCE CONTROL		
Dual, Dual 8E or Dual II 7.8E or Dual II G (metolachlor)	Annual grasses and small-seeded broadleaf weeds, yellow nutsedge (suppression)	Apply after planting and before emergence of weeds or peanuts. Will not control established weeds. Good annual grass control (except Texas panicum). Do not apply Dual II or Dual II Magnum after peanuts have emerged.
Dual Magnum 7.62EC or Dual II Magnum 7.64EC (s-metolachlor)	Annual grasses and small-seeded broadleaf weeds, yellow nutsedge (suppression)	Apply after planting and before emergence of weeds or peanuts. Will not control established weeds. Good control of most annual grasses (except Texas panicum).
Frontier 6EC (dimethenamid)	Annual grasses and small-seeded broadleaf weeds, yellow nutsedge (suppression)	Apply after planting and before emergence of weeds or peanuts. Will not control established weeds. Good control of most annual grasses (except Texas panicum).
Lasso 4EC or Lasso II 15G or Micro-Tech 4ME or Partner 65 WDG (alachlor)	Annual grasses and small-seeded broadleaf weeds	Apply after planting and before emergence of weeds or peanuts. Good annual grass control (except Texas panicum). Will not control established weeds. NOTE: In recent years a number of manufacturers notified shellers that they reserve the right to reject peanuts which contained alachlor metabolite residues. Before using products which contain alachlor check with your buyer concerning marketing implications.
Pursuit 70DG (imazethapyr)	Yellow and purple nutsedge and many broadleaf weeds	Apply after planting, preferably before emergence of weeds. May be tank mixed with Dual, Frontier or Lasso. Preemergence application of Pursuit has been less consistent in weed control than either soil incorporated or split (PPI + PRE) application.

Product and Formulation Rate/A	Weeds	Remarks and Precautions
GROUND CRACKING AND EARLY POSTEMERGENCE		
Starfire 1.5SC (paraquat)	11 fl oz	Apply to small actively growing weeds; no residual control. Do not apply more than twice per season, later than 28 days after ground crack or to peanuts stressed by weather, thrips or previous herbicide treatments. Add 1 pt of nonionic surfactant per 100 gallons spray solution. Will cause foliar burn to peanut; but yield is usually not affected. May be tank mixed with Dual, Frontier, or Pursuit to obtain residual control.
Starfire 1.5SC (paraquat) + Basagran 4S (bentazon)	11 fl oz + 1 pt	See comments for Starfire alone. Tank mixture of Basagran with Starfire improves control of prickly sida, spurred anoda, common ragweed, smartweed, and cocklebur, and reduces peanut injury. Apply from ground cracking up to 28 days after cracking. Do not apply more than twice per season. Add 1 pt nonionic surfactant per 100 gal of spray solution.
Starfire 1.5SC (paraquat) + Butyrac 200 2L or Butoxone 1.75L (2,4-DB)	11 fl oz + 0.5-1.0 pt or 0.5-1.0 pt	See comments for Starfire alone. Tank mixture of 2,4-DB with Starfire improves morningglory and cocklebur control. Peanuts should be at least 2 weeks old. Do not apply later than 28 days after ground cracking. Do not apply more than twice per season. Add 1 pint nonionic surfactant per 100 gal of spray solution. Avoid drift to other crops.
Starfire 1.5SC (paraquat) + Dual or Dual 8E (metolachlor) or Frontier 6EC (dimethenamid)	11 fl oz + 1.5-2 pt or 1.6-2 pt	Dual or Frontier provides residual control of annual grasses and certain small-seeded broadleaf weeds such as pigweed. Starfire kills small emerged annual grasses and broadleaf weeds. Add 1 pt of nonionic surfactant per 100 gal spray solution. May cause severe burn on peanut foliage, however, in most cases peanuts outgrow injury symptoms.

Product and Formulation Rate/A	Weeds	Remarks and Precautions
POSTEMERGENCE FOR BROADLEAF WEEDS		
Basagran 4SC (bentazon)	1.5-2 pt Cocklebur, common ragweed, velvetleaf, jimsonweed, smartweed, prickly sida, spurred anoda, wild mustard, yellow nutsedge. See Table 3 for weed size and application rate.	Use minimum 20 gpa water and 40 psi. Complete spray coverage is needed for control. Weeds under stress from adverse growing conditions may not be controlled. Refer to label for weed seedling treatment size, appropriate rates, and use of spray adjuvants.
Basagran 4SC (bentazon) + Butyrac 200 ZSC (2,4-DB) or Butoxone 1.75SC (2,4-DB)	1-2 pt + up to 1 pt or up to 1 pt Same as for Basagran alone, however, the addition of 2,4-DB improves control of annual morningglories and spurred anoda.	See comments for Basagran. Avoid drift to other crops.
Basagran 4SC (bentazon) + Blazer 2SC (acifluorfen)	1-2 pt + 1 pt Weed species listed for Basagran plus improved control of pigweed, common ragweed and morningglories. See Table 5 for weed size and application.	See comments on Basagran and Blazer alone. This tank mixture controls a broader spectrum of weeds than either product used alone. See label for weeds controlled, maximum weed size to treat, and use of adjuvants. Blazer may be included at rates up to 2 pt/A if needed.
Blazer 2SC (acifluorfen)	1-2 pt Morningglories, pigweed, purslane, ragweed, smartweed, wild mustard, carpetweed, cocklebur, tropic croton and jimsonweed. See Table 4 for recommended weed size and application rate.	Use a minimum of 20 gpa at 40 to 60 psi. Thorough spray coverage is necessary. Apply when weeds are in the 2 to 4 leaf stage and actively growing. See label and Table 3 for weeds controlled, weed size to treat and use rates. Apply a maximum of 2 pt/A of Blazer per season. Check label for use of adjuvants. Use flat fan or hollow cone tips.

Product and Formulation Rate/A		Weeds	Remarks and Precautions
Blazer 2SC (acifluorfen) + Butyrac 200SC or ButoxoneSC (2,4-DB)	1 pt + up to 1 pt or up to 1 pt	Weeds listed for Blazer alone plus improved control of lambsquarters, large cocklebur, morningglories, and certain other weeds which exceed the size specified on Blazer label.	This tank mixture may be used when weed size exceeds that specified on Blazer 2L label. See label for suggestions on use of surfactant and weed size limitations. Apply when peanuts are at least 2 weeks old and before pod filling begins. Make only one application of tank mix per year. Avoid drift to other crops.
Butyrac 200 2SC or Butoxone 1.75SC ((2,4-DB)	0.8-1 pt or 0.8-1 pt	Cocklebur and annual morningglory (except pitted morningglory)	May be applied from 2 weeks after planting up to 45 days prior to harvest. Two treatments may be applied per season. Avoid drift to other crops.
Cadre 70DG (imazapic)	1.44 oz	Spurred anoda, morningglories, velvetleaf, yellow and purple nutsedge (See Table 5)	Apply when broadleaf weeds are actively growing and are less than 3 inches tall. Certain weeds such as spurred anoda, lambsquarters, and morningglories must be treated when 2 inches tall or less. Apply with 1.0 qt/A crop oil concentrate or 1.0 qt nonionic surfactant per 100 gal spray solution. Apply as a sequential treatment following application of a soil-applied grass control herbicide.
Pursuit 70DG (imazethapyr)	1.44 oz	Yellow and purple nutsedge and certain broadleaf weeds (See Table 5)	Apply as an early postemergence treatment when weeds are actively growing and before they exceed a height of 3 inches unless the label indicates otherwise. Certain weeds such as spurred anoda, lambsquarters, and morningglories must be treated when 2 inches tall or less. May be tank mixed with Basagran, Blazer, Starfire, or 2,4-DB. Apply with nonionic surfactant (1 qt/100 gal) or crop oil concentrate (1.5 pt/A).

Product and Formulation Rate/A	Weeds	Remarks and Precautions
Storm 4EC (prepackage mix containing bentazon and acifluorfen)	1.5 pt See comments Table 4.	Either Storm or a tank mix of Basagran + Blazer is an excellent treatment for most problem broadleaf weeds. Storm may be applied any time from cracking up to 75 days prior to harvest. Storm provides consistent control of lambsquarters, prickly sida, spurred anoda, and velvetleaf only if applied when seedlings are small. May be tank mixed with 0.5 to 1.0 pt/A of 2,4-DB to improve control of larger morningglory, common ragweed, pigweed and jimsonweed. Consult Storm label for information concerning use of spray adjuvants.
Tough 3.75EC or Tough 5EC (pyridate) + Butoxone 200 2SC or Butoxone 1.75SC (2,4-DB)	2-3 pt or 24-36 oz + 0.9 pt or 1.0 pt	Apply with a minimum of 20 gpa at 30 to 40 psi. Thorough spray coverage is necessary. Apply when susceptible weeds are in the 2 to 4 leaf stage or less. Tough may be applied alone, however, tank mixtures of 2,4-DB + Tough provide a broader spectrum of weed control than either of these products used alone. Avoid drift to other crops.
POSTEMERGENCE FOR NUTSEDGE		
Basagran 4SC (bentazon)	1.5-2 pt Yellow nutsedge	Apply when yellow nutsedge is 6 to 8 inches tall. Repeat application in 7 to 10 days if needed. Apply with 1 qt/A crop oil concentrate. Not effective on purple nutsedge.
Cadre 70DG (imazapic)	1.44 oz Yellow nutsedge, purple nutsedge	Apply when nutsedges are no more than 4 inches tall. Add 1 qt nonionic surfactant per 100 gal spray solution or 1 qt/A crop oil concentrate.
Pursuit 70DG (imazethapyr)	1.44 oz Yellow nutsedge, purple nutsedge	Apply when nutsedges are no more than 3 inches tall. Add 1 qt nonionic surfactant per 100 gal spray solution or 1 qt/A crop oil concentrate.

Product and Formulation Rate/A	Weeds	Remarks and Precautions
POSTEMERGENCE FOR ANNUAL GRASSES		
Poast Plus 1EC or Poast 1.5EC (sethoxydim) + Crop Oil Conc. or Dash	1.5 pt or 1 pt + 2 pt or 2 pt	Apply when grasses are actively growing. Annual grasses should be 2 to 4 inches tall for best results. Apply any time after planting (to emerged grasses) up to 40 days prior to harvest. Apply with either Dash or a crop oil concentrate. Do not apply more than 2.5 pt/A Poast or 3.75 pt/A Poast Plus per season.
Select 2EC (clethodim) + Crop Oil Conc.	6-8 oz + 1% V/V	Apply to actively growing grasses. May be applied to emerged grasses up to 40 days prior to harvest. See label for tank mix instructions.
POSTEMERGENCE FOR PERENNIAL GRASSES		
Poast Plus 1EC or Poast 1.5EC (sethoxydim) + Crop Oil conc. Or Dash	2.25 pt or 1.5 pt + 2 pt or 2 pt	Apply to actively growing grass before stolon length exceeds 6 inches. A second application of 1 pt/A Poast or 1.5 pt/A Poast Plus is usually necessary for good control. Make the second application when stolon length or regrowth of new plants is 1 to 4 inches. Apply with either a crop oil concentrate or Dash.
Select 2EC (clethodim) + Crop Oil Conc.	8-16 oz + 1% V/V	Apply to actively growing bermudagrass when stolons (runners) are 3-6" in length. If needed a second application of 8-16 oz per acre may be applied for control of regrowth when stolons are 3-6" in length.

Product and Formulation Rate/A		Weeds	Remarks and Precautions
Poast Plus 1EC or Poast 1.5EC (sethoxydim) + Crop Oil Conc. or Dash	1.5 pt or 1.0 pt + 2 pt or 2 pt	Rhizome, johnsongrass	Apply to actively growing grass when 10-15 inches tall. A second application of 1 pt/A Poast or 1.5 pt/A Poast Plus may be made when new plants or regrowth are 6-12 inches tall. Apply with either a crop oil concentrate or Dash. (See Table 2)
Select 2EC (clothodim) + Crop Oil Conc.	8-16 oz + 1% V/V	Rhizome johnsongrass	Apply to actively growing johnsongrass when 12-14 inches tall. If needed a second application of 6-8 oz per acre may be applied for control of regrowth when plants are 6-18 inches tall. (See Table 2)
LAYBY APPLICATION FOR EXTENDED ANNUAL GRASS CONTROL			
Dual 8EC (metolachlor)	1.5-2 pt	Controls late season grasses that my germinate late in the growing season or following cultivation	Use following a cultivation if emerged weeds are present. Dual II and Dual II Magnum are not registered for this method of application in peanut

Table 1. Weed sizes for treatment and application rates for control of annual grasses with Poast, Poast Plus and Select.

	Application Rates and Annual Grass Size					
	Poast*		Poast Plus*		Select**	
	Height (in)	Rate (oz/A)	Height (in)	Rate (oz/A)	Height (in)	Rate (oz/A)
Broadleaf signalgrass	8	16	8	24	2-6	6-8
Crabgrass	6	16	6	24	2-6	6-8
Fall panicum	8	16	8	24	2-8	6-8
Giant Foxtail	8	16	8	24	2-12	6-8
Green Foxtail	8	16	8	24	2-8	6-8
Yellow Foxtail	8	16	8	24	2-8	6-8
Goosegrass	6	16	6	24	2-6	6-8
Seedling johnsongrass	8	16	8	24	4-10	6-8
Texas panicum	8	16	8	24	2-6	6-8
Volunteer corn	20	16	20	24	4-12 12-24	4-6 6-8

Table 2. Plant size and application rates for control of perennial grasses with Poast, Poast Plus and Select.

Perennial Grass	Herbicide and Application Rate		Plant Size
Bermudagrass	<u>First application</u>		
	Poast	1.5 pt/A*	stolons (runners) 6" or less
	Poast Plus	2.25 pt/A*	stolons (runners) 6" or less
	Select	8-16 oz/A**	stolons (runners) 3-6"
Johnsongrass	<u>Second application</u>		
	Poast	1.0 pt/A*	stolons (runners) 1-4"
	Poast Plus	1.5 pt/A*	stolons (runners) 1-4"
	Select	8-16 oz/A**	stolons (runners) 3-6"
Johnsongrass	<u>First application</u>		
	Poast	1.5 pt/A*	plants 15-20" tall
	Poast Plus	2.25 pt/A*	plants 15-20" tall
	Select	8-16 oz/A**	plants 15-20" tall
Johnsongrass	<u>Second application</u>		
	Poast	1.0 pt/A*	plants/regrowth 6-12" tall
	Poast Plus	1.5 pt/A*	plants/regrowth 6-12" tall
	Select	8-16 oz/A**	plants/regrowth 6-12" tall

* Apply Poast or Poast Plus with 2.0 pt/A crop oil concentrate.

** Apply Select with 1% v/v crop oil concentrate.

Table 3. Recommended weed sizes for treatment and application rates for control of annual broadleaf weeds with Basagran.

Species	1.0 pt/A Basagran		1.5 pt/A Basagran		2.0 pt/A Basagran	
	Max leaf number	Max height (inches)	Max leaf number	Max height (inches)	Max leaf number	Max height (inches)
Cocklebur	2-4	4	2-6	6	6-10	10
Common ragweed	-	-	-	-	4-6 ^b	3 ^b
Eclipta	-	-	-	-	-	-
Jimsonweed	4	4	6	6	6-10	10
Lambsquarters	4 ^d	1 ^d	6 ^d	1.5 ^d	4-8 ^d	2 ^d
Morningglory						
Pitted	SUD ^c	SUD ^c	SUD ^c	SUD ^c	SUD ^c	SUD ^c
Others	SUD ^c	SUD ^c	SUD ^c	SUD ^c	SUD ^c	SUD ^c
Pigweed	-	-	-	-	-	-
Prickly sida	- ^a	- ^a	6	3	6-8	4
Smartweed	4	4	6	6	6-10	10
Spurred anoda	-	-	6	3	6-8	4
Tropic croton	-	-	2	2	2-4	4
Velvetleaf	-	-	4 ^b	2 ^b	4-6 ^b	5 ^b

^a Control not claimed on label.

^b Add crop oil concentrate according to label directions.

^c See label for special use directions. Label claims control only with two applications.

^d Control of this species not claimed on peanut label but is claimed on soybean label. Apply with 2 pt/A crop oil concentrate.

Table 4. Recommended weed sizes for treatment and application rates for control of annual broadleaf weed with Blazer.*

Species	1.0 pt/A Blazer		1.5 pt/A Blazer		2.0 pt/A Blazer	
	Max leaf number	Max height (inches)	Max leaf number	Max height (inches)	Max leaf number	Max height (inches)
Cocklebur	-	-	-	-	4	4
Common ragweed	2	<2	2	4	6	3
Eclipta	- ^a	- ^a	- ^a	- ^a	- ^a	- ^a
Jimsonweed	3	3	6	6	8	8
Lambsquarters	-	-	-	-	3 ^b	1 ^b
Morningglory						
Pitted	2	<2	4	2	4	2
Others	-	-	-	-	3	2
Pigweed	2	<2	4	2	6	3
Prickly sida	-	-	-	-	-	-
Smartweed	-	-	-	-	4	4
Spurred anoda	-	-	-	-	-	-
Tropic croton	2	<2	2	2	2	2
Velvetleaf	-	-	-	-	-	-

* Add 1 pt of nonionic surfactant per 100 gallons of spray solution unless indicated otherwise.

^a Control not claimed on label. Experience indicates that 2 pt/A plus surfactant will suppress 1- to 2-inch Eclipta.

^b Add 2 pt of nonionic surfactant per 100 gallons of spray solution unless label indicates otherwise.

Table 5. Recommended weed sizes for treatment and application rates for control of annual broadleaf weeds with Basagran tank mixtures, Cadre and Pursuit.*

Species	1.0 pt/A Basagran** + 1.0 pt/A Blazer OR 1.5 pt/A Storm**		1.0 pt/A Basagran + 11 fl oz/A Starfire		1.44 oz Cadre 70DG		1.44 oz/A Pursuit 70DG	
	Max leaf number	Max height (inches)	Max leaf number	Max height (inches)	Max height (inches)	Max leaf number	Max height (inches)	Max leaf number
Cocklebur	6-8	4	6	3	6	8	8'	
Common ragweed	6	3	6	3	2	-	-	
Eclipta	- ^a	- ^a	-	-	-	-	-	
Jimsonweed	6	6	4	6	-	4	3	
Lambsquarters	6	2	-	-	2	2 ^b	2 ^b	
Morningglory								
Pitted	4	4	6	4	3	2	2	
Others	4	4	6	4	3	2	2	
Pigweed	6	3	6	4	4	8	8	
Prickly sida	4	2	6	3	2	-	-	
Smartweed	6	6	6	6	2	-	-	
Spurred anoda	4	2	6	3	2	2 ^b	2 ^b	
Tropic croton	2-4	4	2 ^c	2 ^c	-	-	-	
Velvetleaf	4	2	4	2	2	4	3	

* Apply these products and/or tank mixtures with a crop oil concentrate or nonionic surfactant as specified by label directions.

** A maximum of 2 pt/A Basagran may be tank mixed with 1.0 pt/A Blazer. Use of 1.5 to 2.0 pt/A of Basagran improves consistency of control of lambsquarters, prickly sida, spurred anoda and velvetleaf. Storm applied at 1.5 pt/A is equivalent to a tank mixture of 1.0 pt/A Blazer + 1.0 pt/A Basagran.

^a Control not claimed on label. Experience indicates that Storm plus 1 quart of crop oil concentrate per acre will suppress small eclipta. Pursuit provides more consistent control of lambsquarters and spurred anoda with soil incorporated or split (PPI + Early Post) applications than with postemergence applications.

^c Basagran + Starfire does not control tropic croton satisfactorily.

Table 6. Restrictions on feeding herbicide-treated peanut vines to livestock.

Herbicide	Do not feed treated vines to livestock	No feeding restrictions on label
Basagran		X
Blazer	X	
Cadre	X	
Dual		X
Frontier		No restrictions on feeding 80 days after last application
Lasso		X
Poast/Poast Plus	X	
Prowl		X
Pursuit	X	
Select	X	
Sonalan	X	
Starfire		X
Storm	X	
Tough	X	
Vernam		X
2,4-DB	X	

Table 7. Suggested rain-free periods and preharvest interval for application of postemergence herbicides.

Herbicide or tank mix	Rain-free period (hours)	Preharvest interval (days)*
2,4-DB	NR ¹	45
Basagran	NR ²	NR ³
Blazer	NR ²	75
Cadre	1	NR ³
Poast, Poast Plus	1	40
Pursuit	1	85
Select	1	40
Starfire	0.5	28 GC**
Storm	NR ²	75
Tough	1-2	68

* Do not apply within the designated number of days of harvest.

28 GC** May be applied as late as 28 days after ground crack.

NR¹ No restriction listed on label. Suggest at least 1 hour for best results.

NR² No restriction listed on label. Suggest 4 to 6 hours for best results.

NR³ No preharvest interval listed on label.

Table 8. Rotational restrictions for peanut herbicides.

	Rotational Crop						
	Corn	Cotton	Soybeans	Winter			Tobacco
				Barley	Rye	Wheat	Sorghum
Basagran	NS	NS	NS	NS	NS	NS	NS
Blazer	AH	AH	NR	AH	AH	AH	AH
Cadre	9M	18M	9M	18M	4M	4M	18M
Dual (PRE, PPI, Cracking)	NR	NR	NR	4.5M	4.5M	4.5M	NR
Dual (layby)	FY	FY	FY	FY	FY	FY	FY
Frontier	NR	FY	NR	4M	4M	4M	FY
Lasso	NR	NR	NR	NR	NR	NR	NR
Poast	NR	NR	NR	NR	NR	NR	NR
Poast Plus	NR	NR	NR	NR	NR	NR	NR
Prowl	FY	NR	NR	4M	FY	4M	FY
Pursuit	NR/8.5M*	9.5M/18M**	NR	9.5M	4M	4M	18M
Select	1M	1M	1M	1M	1M	1M	1M
Sonalan	FY	FY	NR	AH	AH	AH	FY
Storm	AH	AH	NR	AH	AH	AH	AH
Tough	NR	FY	FY	FY	FY	FY	FY
Vernam	NS	NS	NS	NS	NS	NS	NS
2,4-DB	NS	NS	NS	NS	NS	NS	NS

The above table provides a general summary of crop rotation restrictions specified in the labels of herbicide products commonly used for peanuts. Consult product labels for details and specific information.

KEY: M = month; FY = Following year; NR = No restrictions; AH = After harvest; "NS" = Crop rotation sequences not specified in label directions

* IMI-Corn (resistant/tolerant varieties) = NR, Non IMI-Corn = 8.5M

** Postemergence application on sand-loamy sand soils with 16 inches of rainfall or irrigation occurring from application through October, 9.5M; (refer to supplemental label of Virginia/North Carolina) otherwise, 18M.

INSECT CONTROL IN PEANUT

*D. Ames Herbert, Jr.
Extension Entomologist*

Numerous insect pests found in Virginia have the potential to reduce peanut yield, quality and consequently net profit. Effective management of those pests is therefore essential to successful peanut production. The most effective management program utilizes an integrated pest management (IPM) approach that combines strategies that lower pest numbers, reduce crop susceptibility, use crop scouting and economic thresholds and reduce populations with effective insecticide treatments. Using IPM strategies can reduce losses to insect pests and increase profit. For additional information on peanut insect control consult the VCE and VPI & SU Pest Management Guide, Pub. 456-016.

ESSENTIALS OF A GOOD PEANUT INSECT PEST MANAGEMENT PROGRAM

1. **Know peanut insect pests.** It is important that you know how to identify the various peanut insect pests and/or the damage they cause to plants. Some of the symptoms of insect damage can be similar to those caused by plant diseases or there stresses. Also, different insects have different economic thresholds (see page 40) and can require different insecticides for effective control. Before deciding on a treatment, be sure of the problem. Various extension publications are available that can be useful in identifying insect pests. Also, consult you local County Extension Agent.
2. **Know pest economic thresholds.** An economic threshold is the number of a particular insect pest that must be controlled to prevent economic loss to the crop, or the point at which it pays to treat. It is easy to recognize crop damage due to insect feeding and equate that damage with profit loss, but there is also a potential for loosing profit by making insecticide treatments that are not needed. Peanuts can withstand a certain amount of insect damage without affecting yield, so a certain number of insects should be tolerated before treatments are applied. Knowing the point at which it is economically feasible to treat, and waiting for that point before treating is an IPM strategy that will save you dollars. Realize that economic thresholds were developed under 'normal' crop conditions and should therefore serve as a guide in decision making. Unusual conditions such as multiple pests, drought stress or market value fluctuations should all be considered when applying thresholds. Most pest species have unique economic thresholds and you should be familiar with those numbers (see page 40).

3. **Scout your fields regularly.** Scouting fields is an essential part of successful economic management of insect pests. You must base your treatment decisions on knowledge of what pest species and numbers are in your fields. This information will be essential in making economically sound decisions for this year, but can also be useful in developing field histories that will help in future planning. When scouting, take random samples (see procedures on page 38) throughout each field. Vary your pattern on successive scouting visits so that all areas of the field are sampled at some point during the season. Be sure to check field edges because some insects, e. g., spider mites, may invade from edges. To maximize your scouting effort, scan plants in the vicinity of each sample and as you move from one sample spot to the next.
4. **Treat only if insects are active in the crop.** Plant damage may be the first indicator of an insect problem. However, before treating be sure to verify that insects are still actively feeding. Often, by the time plant damage is noticeable, insects may have left the crop, or changed to a non-damaging stage. Treatments under those circumstances will not increase yield and will decrease profit.

SAMPLING PROCEDURES

Different insect pests require different sampling procedures. Before you begin sampling, familiarize yourself with insect identification and plant damage symptoms.

Tobacco thrips - Check for thrips infestations by watching for misshapen, curled leaflets, especially on older leaves, within the first 8 weeks after planting. Severe infestations will cause new leaflet tips and terminals to turn brown. If damage appears to be significant, verify that thrips populations are still active by closely inspecting the undersides of leaves and insides of folded developing leaflets.

Potato leafhopper - Leafhopper damage causes leaflet tips to turn yellow, then brown and turn downwards. Begin sampling for leafhopper damage in June, expecting the most severe damage in July and August. Sample by estimating the percent of leaves injured in several area representative the field.

Corn earworm and fall armyworm - Typically, infestations of these worms occur in Virginia peanut fields in August and early September. They are leaf feeders and fields with heavy infestations will look 'ragged'. To determine if treatment is necessary, sample in several locations to see if a threshold situation exists (see page 40). Sample by reaching halfway

across 2 row feet of plants and shaking foliage vigorously toward the row-middle. Repeat on the opposite row. The worms on the ground in the row-middle will represent the number per 2 row feet. Divide that number by 2 to get the number per row foot.

Southern corn rootworm - Sampling for rootworm larvae requires troweling through roots, pegs, pods and associated soil of several plants in each field. This is usually not practical for most producers. An alternative system can be useful. Check pods for damage after peanuts have been dug, before combining, and keep records of those fields that show 5 percent or more pod damage. Pay close attention to fields having soils with higher percentages of organic matter or those that tend to hold moisture. As rootworm infestations tend to recur, treatment should be considered if pest history and soil conditions suggest probable cause. Heightened adult activity during mid-June to mid-July may also signal a potential problem.

Spider mite - Spider mite infestations can be detected by noticing the yellowing leaves and webbing, especially in spots or on field edges, caused by feeding. Mite infestations will begin showing up in mid-July through September, especially following 10-14 day periods of dry weather, or the cutting or corn, set-aside fields of roadside weeds. If damage is evident, verify that populations are still active by checking the undersides of individual leaves for mite movement, or checking for the 'balls' of living mites of leaf tips.

ECONOMIC THRESHOLDS

Pest	When to treat	Comments
Tobacco thrips	25% leaflets injured before mid-June and thrips are still alive.	At plant insecticide applications generally prevent serious damage. If none were applied, treat with foliar sprays if damage threshold occurs.
Potato leafhopper	Early season - when 25% leaflets show characteristic yellowing and hoppers are still alive. Late season - when 30% leaflets show yellowing	Early season injury will reduce growth and affect yields. Late season injury makes leaves more susceptible to certain foliar diseases.
Southern corn rootworm	Treat field at early pegging if a history of SCR injury is known. Fields or areas high in organic matter (1.3% or greater) or that tend to stay moist are more likely to have problems. All fields may have more problems in years when June and July are wet.	Treatment is preventative and must be applied before infestations occur to be most effective. NC 6 variety is rootworm resistant. On light soils the resistance alone may be adequate. On heavier soils ½ rate of insecticide will suffice.
Corn earworm and Fall armyworm	Treat when 4 or more worms per row foot are found. If foliage is lush or later in the season, plants can tolerate 6 or more worms per foot.	Spraying for worms may increase likelihood of spider mite problems. Avoid unnecessary sprays in dry weather.
Spider mite	Treat when mites are found, especially in dry weather. Border treatments may be effective if detected early.	In hot, dry weather mites can complete a generation in 5 days. Severe infestations are difficult to control. Good plant coverage is necessary for good control.

INSECT CONTROL

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Thrips (foliar treatment)	Lannate L	2-4 pt	21	RESTRICTED USE. AIDS ONLY. Do not feed treated vines.
	Orthene 75S band rate	0.25-0.5 lb	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	broadcast rate	0.5-1 lb	14	
	Malathion 57EC	1.5 pt	0	AIDS ONLY. May be harvested or grazed on the day of application.
Thrips (in-furrow treatment)	Karate 1EC	2.56-3.84 oz	14	RESTRICTED USE. Do not apply more than 15.36 oz per acre per season. Do not graze livestock in treated areas, or use treated vines or hay for animal feed.
	Di-Syston 15G*	6.7-13.3 lb	-	RESTRICTED USE. Place granules in a band on each side of the seed furrow at planting, or as a side dressing after emergence. May also be applied in a band over the row or as a side dressing at pegging. Do not apply directly on the seed. Do not feed treated vines.
	Thimet 20G*	5 lb	-	RESTRICTED USE. Distribute granules evenly in the furrow. Do not graze or feed treated hay or forage to livestock.

***GENERAL:** These systemic insecticides may help suppress early-season leafhoppers.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Thrips (in-furrow treatment con't.)	Temik 15G* In twin rows	7 lb 35-4 lb/row	90	RESTRICTED USE. Apply granules in seed furrow and cover with soil. Do not hog-off treated fields. Do not feed green forage, hay or straw to livestock.
	Orthene 75S Liquid in furrow	1-1.33 lb	14	Apply as a liquid into the seed furrow in 3-5 gallons of water per acre with a system that insures good seed coverage. Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	Planter box seed	4 oz/100 lb seed	14	Mix in the planter to obtain good coverage of ALL seed by layering seed and product. Fill the planter box 1/3 full of seed with 1/3 of the product, add the next 1/3 of the seed and product, then add the last 1/3 of the seed and product. Gently stir each layer before adding the next. CAUTION: Do not use with seed inoculants. Do not use treated seed for food, feed purposes or process for oil.

***GENERAL:** These systemic insecticides may help suppress early-season leafhoppers.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Potato leafhopper (foliar treatments)	Sevin 80S	1.25 lb	0	Apply to achieve good plant coverage. To avoid possible injury to tender foliage, do not apply to wet foliage or during periods of high humidity.
	Sevin XLR PLUS	1 qt	0	
	Lannate L	1-4 pt	21	RESTRICTED USE. Do not feed treated vines.
	Orthene 75S	.5 - 1 lb	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	Malathion 57EC	1.5 pt	0	May be harvested or grazed on the day of application.
	Asana XL	2.9-5.8 oz	21	RESTRICTED USE. Do not feed or graze livestock on treated vines. Do not exceed 0.15 lb a.i. per season. Extremely toxic to fish.
	Karate 1EC	1.92-3.2 oz	14	RESTRICTED USE. Do not apply more than 15.36 oz per acre per season. Do not graze livestock in treated areas, or use treated vines or hay for animal feed.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Potato leafhopper (pegging treatments)*	Thimet 20G	10 lb	-	RESTRICTED USE. Distribute granules as a band over the fruiting zone at pegging. Work into the top few inches of soil immediately. Do not graze or feed treated hay or forage to livestock.
Potato leafhopper (in-furrow treatment for early season control)	Di-Syston 15G	6.7-13.3 lb	-	RESTRICTED USE. Place granules in a band on each side of the seed furrow at planting, or as a side dressing after emergence. May also be applied in a band over the row or as a side dressing at pegging. Do not apply directly on the seed. Do not feed treated vines.

***GENERAL:** Apply pegging treatments in 10-18 inch bands on row during the first two weeks in July after pegging begins and before vines close in middles. Effectiveness of treatments increased if insecticides are covered by shallow cultivation to avoid exposure to sunlight and lateral movement with heavy rains. Labels stipulate light incorporation.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Potato leafhopper (in-furrow treatment for early season control contd.)	Thimet 20G	5 lb	-	RESTRICTED USE. Place granules on each side of the seed furrow at planting, or as a side dressing after emergence. May also be applied in a band over the row or as a side dressing at pegging. Do not apply directly on the seed. Do not feed treated vines.
	Temik 15G in twin rows	7 lb 3.5-4 lb/row	90	RESTRICTED USE. Apply granules in seed furrow and cover with soil. Do not hog-off treated fields. Do not feed green forage, hay, or straw to livestock.
Southern corn rootworm (pegging treatments)*	Lorsban 15G	13 lb	21	Do not apply more than 13.3 lb per season. Do not feed peanut forage or hay to meat or dairy animals.

***GENERAL:** Apply pegging treatments in 10-18 inch bands on row during the first two weeks in July after pegging begins and before vines close in middles. Effectiveness of treatments increased if insecticides are covered by shallow cultivation to avoid exposure to sunlight and lateral movement with heavy rains. Labels stipulate light incorporation.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Southern corn rootworm (pegging treatments don't.)*	Thimet 20G	10 lb	-	RESTRICTED USE. Distribute granules as a band over the fruiting zone at pegging. Work into the top few inches of soil immediately. Do not graze or feed treated hay or forage to livestock.
	Mocap 10G	25 lb	-	Lightly soil incorporate immediately after application.
Corn earworm**	Sevin XLR PLUS	2-3 pt	0	To avoid possible injury to foliage, do not apply to wet foliage or during periods of high humidity.
	Orthene 75S	1-1.33 lb	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	Lannate L	1-4 pt	21	RESTRICTED USE. Do not feed treated vines.

***GENERAL:** Apply pegging treatments in 10-18 inch bands on row during the first two weeks in July after pegging begins and before vines close in middles. Effectiveness of treatments increased if insecticides are covered by shallow cultivation to avoid exposure to sunlight and lateral movement with heavy rains. Labels stipulate light incorporation.

****GENERAL:** Treat only if foliage loss is heavy (1/3 or more). Earworms are easier to control when they are less than ½ inch long.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Corn earworm* (con't.)	Asana XL	2.9-5.8 oz	21	RESTRICTED USE. Do not feed or graze livestock on treated vines. Do not exceed 0.15 lb a.i. per season. Extremely toxic to fish.
	Karate 1EC	2.56-3.84 oz	14	RESTRICTED USE. Do not apply more than 15.36 oz per acre per season. Do not graze livestock in treated areas, or use treated vines or hay for animal feed.
	Danitol 2.4EC	10.6-16 oz	14	RESTRICTED USE. Do not graze or feed treated peanut vine forage or dried hay within 14 days of the last application. Do not exceed 2.6 pints total application per acre per season.
	Lannate L	1-2 pt	21	RESTRICTED USE. Do not feed treated vines. Two pints may be required for good control.
Fall armyworm*	Asana XL	9.6 oz	21	RESTRICTED USE. Suppression only. Do not feed or graze livestock on treated vines. Do not exceed 0.15 lb a.i. season. Extremely toxic to fish.
	Karate 1EC	2.56-3.84 oz	14	RESTRICTED USE. Do not apply more than 15.36 oz per acre per season. Do not graze livestock in treated areas, or use treated vines or hay for animal feed.
	Orthene 75S	1-1.33 lb	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	Sevin XLR PLUS	2-3 pt	0	To avoid possible injury to foliage, do not apply to wet foliage or during periods of high humidity.

***GENERAL:** Treat only if foliage loss is heavy (1/3 or more). Earworms are easier to control when they are less than 1/2 inch long.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Spider mite	Comite 6.55EC	2 pt	14	Use a minimum of 20 gallons per acre with ground equipment or 5 gallons by air. Make no more than two applications per year (either Comite or Omite). Do not plant rotational crops within six months of last application. Do not feed hay to livestock.
	Omite 30W	3-5 lb	14	Use a minimum of 20 gallons per acre. Make no more than two applications per year.
	Temik 15G	7 lb	90	RESTRICTED USE. Apply in 12-18 inch band on the row at pegging, immediately soil incorporate. Do not hog-off treated fields. Do not feed green forage, hay, or straw to livestock. Must be applied at the onset of pegging to comply with 90 day tolerance time.
	Karate 1EC	3.84 oz	14	RESTRICTED USE. Suppression only. Do not apply more than 15.36 oz per acre per season. Do not graze livestock in treated areas, or use treated vines or hay for animal feed.
	Danitol 2.4EC	10.6-16 oz	14	RESTRICTED USE. Do not graze or feed treated peanut vine forage or dried hay within 14 days of the last application. Do not exceed 2.6 pints total application per acre per season.

Pests	Insecticide and Formulation	Rate/A	Days to Harvest	Remarks
Lesser cornstalk borer	Lorsban 15G	7-13 lb	21	Apply in 10-18 inch band on row at first sign of borer. Do not feed peanut forage or hay to meat or dairy animals. Do not apply more than 13.3 lb per season. 10-13 lb may be broadcast by air as a rescue treatment.
Grasshopper	Sevin 80S Sevin XLR PLUS	1.5 lb 1-2 pt	0 0	To avoid possible injury to foliage, do not apply to wet foliage, or during periods of high humidity.
	Orthene 75S	0.33-0.5 lb	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	Asana XL	5.8-9.6 oz	21	RESTRICTED USE. Do not feed or graze livestock on treated vines. Do not exceed 0.15 lb a.i. per season. Extremely toxic to fish.

PESTICIDE USAGE CHARTS

Many pesticides control more than one pest. The three tables below summarize the activity of some popular insecticides used at time of planting and at time of pegging for control of major insects which attack peanuts.

Insecticide Activity of Products Applied At Time of Planting

Chemical	PESTS			
	Thrips	Leafhopper	Rootworm	Spider mite
Temik	E	Early	P	May aid early
Mocap*	P	P	P	P
Di-Syston	G	Early	P	P
Thimet	G	Early	P	P
Orthene	E	Early	No	No

Insecticide Activity of Granules Applied At Time of Pegging

Chemical	PESTS			
	Rootworm	Leafhopper	Spider mite	Corn earworm
Thimet	G	Aids	No	No
Mocap*	G	Aids	No	No
Temik	P	Aids	Aids	No
Lorsban*	E	Aids	No	No

P=poor control, F=fair control, G=good control, E=excellent control, No=not labeled or no activity expected.

*Not systemic. Do not apply in the furrow.

**Insecticide Activity of Foliar Treatments Applied
When Pests are Present**

		Pest species controlled						
Insecticide	Formulation *	Thrips	Leafhopper	Rootworm	Corn earworm	Fall armyworm	Lesser cornstalk borer	Spider mite
Sevin	4F, 80S, XLR PLUS	P	E	No	E	F	No	No**
Malathion	57EC	P	G	No	P	P	No	P
Lannate	L	P	G	No	E	G	No	No**
Comite, Omite	6.55EC, 30W	No	No	No	No	No	No	E
Asana	XL	No	E	No	E	F	No	No**
Orthene	75S	E	E	No	G	G	No	No**
Karate	1EC	E	E	No	E	G	No	F
Danitol	2.4EC	No	E	No	E	No	No	E

P=poor control, F=fair control, G=good control, E=excellent control, No=not labeled, no activity expected, or not recommended.

* There are other insecticides and other formulations which have federal registration for use on peanuts, but are not labeled for use in Virginia at this time.

** Use of these insecticides may allow rapid build-up of spider mites. Use with caution during extended periods of dry weather.

DISEASES OF PEANUT

Patrick M. Phipps
Extension Plant Pathologist

New Technology

Advances in technology provide new avenues for improving the efficiency of crop production. Recent advances include the new computer-driven weather monitoring system which is referred to as The Peanut/Cotton Weather Network. This system is designed to electronically collect data from remote weather stations in the peanut and cotton producing areas of southeastern Virginia. These data are used to develop leaf spot and Sclerotinia blight advisories, heat unit reports for peanuts, and degree-day reports for cotton. The Peanut Frost Advisory is another weather-based program that is provided during the fall-harvest period. Each program is designed to guide growers in making decisions that maximize yield, quality and net profit. Because of constant changes in weather and pest populations during the growing season, information must be updated daily and made readily available to growers. The Tidewater Agricultural Research and Extension Center (TAREC) in cooperation with Extension agents, growers, and industry make this information available in the following ways:

- **Peanut/Cotton InfoNet:** Information from 13 weather monitors is available on the Internet at www.cals.vt.edu/infonet. In rural areas without affordable access to the Internet, information can be obtained through an electronic bulletin board system. The system provides daily weather summaries, crop management bulletins, heat units for peanut and degree days for cotton, and advisories to aid in crop management. Included are advisories for peanut leaf spot, Sclerotinia blight, and a 7-day frost advisory. The system also provides a weekly update of moth counts for predicting infestations of corn earworm in soybean and peanut and boll worm in cotton. A personal computer, communication software, and a modem with phone connection are required to access the bulletin board. Set the modem at 9600 to 19,200 BAUD, ANSI terminal emulations, ZMODEM file transfer protocol, EIGHT bits/character, ONE stop bit, and NONE parity. The local access number is 657-9727 or 1-800-479-9727 if long distance inside Virginia. Outside Virginia, the access number is 1-757-657-9727. Contact your local Extension agent or call 757-657-6450 and ask for Pat Phipps or Barron Keeling if you need assistance.

- **Hotlines:** Disease advisories, heat units, and frost advisories are recorded daily at the Tidewater AREC for access by telephone. Regional advisories for Capron, Waverly, and Suffolk are available by calling 1-800-795-0700. Leaf spot and heat unit reports for several additional monitoring sites are recorded by local county Extension offices. Numbers for obtaining these reports are announced annually in agent newsletters.
- **Radio Broadcasts:** Recordings of advisories from the Tidewater Center are broadcast daily by WLPM 1450 AM and WLQM 101.7 FM in Franklin, Virginia.

Clinical Services

Diagnostic services for plant diseases are provided by the Tidewater Agricultural Research and Extension Center in Suffolk. Plant samples should be submitted with the required forms by unit Extension agents. A period of 5 to 10 days is needed to complete biopsy tests and mail reports. Diagnostic tests for nematodes and soil fertility problems during the season are also performed in cooperation with laboratories at Virginia Tech.

Predictive Nematode Assay

This program provides data on the numbers and kinds of nematodes in soil and recommendations on needs for control. Soil samples must be collected in the fall and not later than November 20. Local Extension offices have instructions, sample information sheets and bags for packaging samples. A service charge of \$11 per sample is required at the time of sample submission.

Management Inputs

The most effective and economical strategy for disease control combines the benefits of sanitation, crop rotation, resistant varieties, scouting, and judicious use of pesticides. Inputs for disease control should be determined on the basis of field history, scouting, and daily reports of advisory programs from the Tidewater Center. This approach to disease management will enable the judicious use of chemicals while providing for a maximum return on investments.

Sanitation

Moldboard plowing to bury residues of crop is an important form of sanitation prior to planting peanuts. Soil and decayed plant debris may

contain residual inoculum or organisms. Wash equipment frequently to avoid transport of inoculum from field to field. Peanut combines should be cleaned to remove loose soil and plant material after harvesting fields with heavy infestations of soil-borne diseases. The removal and/or destruction of peanut vines after harvest has limited value for disease management because much of the diseased plant parts and inoculum remains intact in the field. Furthermore, this practice negates a significant part of the soil fertility benefits of peanut hay in the following year.

Crop Rotation

Corn, grain sorghum, fescue, and other grass-type crops are beneficial to control of peanut diseases. Cotton is also a good rotational crop for peanuts in Virginia, but growers should not apply potash (K) in excess of recommended rates of the soil test report. Elevated levels of potash can result in pod rot by fungi such as *Rhizoctonia* and *Pythium* species. Soybean and other leguminous crops share many of the common destructive diseases with peanuts and should be avoided.

Resistant Varieties

No peanut varieties are immune to disease, but there is a wide range in susceptibility. Some important differences are noted below with respect to certain diseases.

- **Cylindrocladium black rot (CBR):** NC 10C and NC 12C are partially resistant to CBR. Resistance is improved by good nematode control and delaying planting to May 10 or later. Cool, wet conditions at planting favor epidemics of CBR.
- **Sclerotinia blight:** VA 93-B is partially resistant to the disease. Early planting at seed rates of 110 lb/A reduces the susceptibility of varieties in some years. NC 12C is highly susceptible to *Sclerotinia* and should be avoided.
- **Early leaf spot:** NC 16 has some resistance to leaf spot, while NC 7 and NC-V 11 are moderately susceptible.
- **Tomato spotted wilt virus:** NC-V 11 may be the least susceptible. NC 7 is highly susceptible.

Scouting

Peanut fields should be scouted once a week for disease using different entry and exit points as well as travel patterns across fields. After a canopy of foliage covers the soil, scouts should frequently part the vines and look for signs of soilborne diseases on plant stems at the soil surface.

Chemicals

A wide array of chemicals are registered for disease control in peanuts. Selection of the most effective/economical chemical requires knowledge of the target disease and other diseases in the field. Whenever the cause of disease is uncertain, plant samples should be submitted for diagnostic testing in the plant pathology clinic at the Tidewater Center. The Peanut/Cotton InfoNet and Peanut Hotlines are an important source of information for timing of fungicide applications to control leaf spot and Sclerotinia blight. The following tables provide listings of approved chemicals for control of specific disease problems. **READ THE LABEL INSTRUCTIONS ATTACHED TO PESTICIDE CONTAINERS BEFORE APPLICATION.**

Disease	Product and Formulation	Rate of Formulations/A	Method and Timing of Application	Precautions and Remarks
SEED TREATMENTS				
Seed decay and seedling disease	Gustafson 4-way (captan + maneb + PCNB + etridiazole)	4.0-6.0 oz	Apply with any type dust treater that will insure complete coverage of seed.	Do not use treated seed for food, feed or oil purposes. Bags with treated seed should bear a tag or label cautioning against their use for food, feed, or oil purposes as well as reuse of bags for packing feed or food stuffs.
	Gustafson Apron-Terraclor dust	4.0-8.0 oz	Same as above.	Same as above.
	Gustafson Proized II (42-S thiram + PCNB + SP Extender)	15.0 fl oz	Use this product only in Gustafson's Flowable Peanut Seed Treater. Mix components as directed on label prior to application.	Same as above.
	Gustafson Proized III (42-S thiram + PCNB + Vitavax-30C + SP Extender)	15.0 fl oz	Same as above.	Same as above. Do not graze or feed livestock on hay grown from seed treated with Vitavax.
	Vitavax 300 (carboxin + captan)	4.0-6.0 oz	May be applied as dust, spray or slurry	Same as above.
	Vitavax PC (captan + PCNB + Vitavax)	4.0-5.0 oz	Apply with dust treater.	Same as above.
	Vitavax 75W	2.0-3.0 oz	Apply in combination with other seed-protectant fungicide, such as captan or thiram.	Same as above.

Disease	Product and Formulation	Rate of Formulations/A	Method and Timing of Application	Precautions and Remarks
Seed decay and seedling disease cont.	captan + maneb	4.0-6.0 oz	Apply with dust treater	Same as above, except no restriction on feeding hay grown from treated seed.
FOLIAR FUNGICIDES				
Cercospora leaf spot	Benlate 50 WP OR Topsin M 70WP + Manzate 200DF	4.0 oz 4.0-8.0 oz 1.5 lb	Apply according to leaf spot advisory program. Use a spray volume of 12-15 gal/A with ground sprayers and 3 to 5 gal/A with aerial sprayers.	Use of Benlate or Topsin may result in yield loss to leaf spot fungi which are resistant to these fungicides. Consult labels for the minimum interval between last treatment and harvest. Do not feed treated vines, hay, or hulls to livestock.
	OR Dithane M45 80W OR Penncozeb 75 DF OR Dithane F45 4F	1.5 lb 1.5 lb 1.2 qt		
	Bravo 720 Bravo Ultrex 82.5 WDG Bravo S Echo 720 Echo 90DF Terranil 6F Terranil 90DF	1.5 pt 1.4 lb 4.25 pt 1.5 pt 1.2 lb 1.5 pt 1.2 lb	Same as above.	Caution: Sclerotinia blight will be more difficult to control in problem fields when these products are applied at intervals of less than 21 days.
	Bravo 720 + SoyOil 937	1.0-1.5 pt 0.5-1.0% (v/v)	Same as above.	Same as above.

Disease	Product and Formulation	Rate of Formulations/A	Method and Timing of Application	Precautions and Remarks
Cercospora leaf spot cont.	Dithane M45 80W, DF Dithane F45 4F Penncozeb 75DF Manzate 200DF Mankocide	2.0 lb 1.6 qt 2.0 lb 2.0 lb 2.0-4.0 lb	Same as above.	Labeled rates of these fungicides are only partially effective in leaf spot control. Do not feed treated vines, hay, or hulls to livestock. Consult label for the minimum interval between last treatment and harvest.
	Tilt 3.6EC	4.0 fl oz	Same as above.	Not recommended after Aug. 15. Full season use may select resistant strains of leaf spot fungi. See label for precautions and restrictions.
	Tilt/Bravo Twin Pack (equal to Tilt 3.6EC 2 fl oz Bravo 720 1pt/A)	Use contents to treat 10 acres.	Same as above.	Do not add Latron AG-98 or Latron B-1956 as phytotoxicity may result.
	Folicur 3.6F + Surfactant	7.2 fl oz Use lowest rate recommended on label of surfactant	Same as above.	Not recommended after Aug. 15. Full season use may select resistant strains of leaf spot fungi.
	Folicur 3.6F + Bravo 720 or one half rate of other chlorothalonil product listed above	4.8 fl oz 12.0 fl oz	Same as above.	Six applications on 14-day schedule are required for control of stem rot and limb rot. Follow advisory if leaf spot is only target.

Disease	Product and Formulation	Rate of Formulations/A	Method and Timing of Application	Precautions and Remarks
Cercospora leaf spot cont.	Around 2.08F	18.5-24.6 fl oz	Apply according to leaf spot advisory program, but use only two applications during the time period of 60 to 90 days after planting. Use other products before and after the 60- to 90-day period to achieve season-long disease control.	Do not apply more than 49.2 fl oz/season. Abound also controls Rhizoctonia pod rot and Southern stem rot. Do not apply within 50 days of harvest. Do not feed peanut hay.
SOIL FUNGICIDES				
Southern stem rot (<i>sclerotium rolfsii</i>) and Rhizoctonia pod and limb rot	Folicur 3.6F + Surfactant	7.2 fl oz Use lowest rate recommended on label of Surfactant	Apply with leaf spot nozzles at spray volume of 15 gal/a on 14-day schedule starting at pegging. Four applications may be required to control soil-borne diseases.	Also controls leaf spot, but not recommended after August 15. Read label for additional precautions and restrictions.
	Moncut 50WP	1.5-2.0 lb	Tank mix with a leaf spot fungicide spray or band over row in spray volume of 40 gal/A. Two or three applications may be necessary depending on disease pressure.	Read label for precautions and restrictions.
	Around 2.08F	18.5-24.6 fl oz	Make two applications in spray volume of 15 gal/A between 60 and 90 days after planting.	Do not use more than 49.2 fl oz/season. Abound also controls early leaf spot. Do not apply within 50 days of harvest. Do not feed peanut hay.

Disease	Product and Formulation	Rate of Formulations/A	Method and Timing of Application	Precautions and Remarks
Sclerotinia blight (<i>Sclerotinia minor</i> S. <i>sclerotiorum</i>)	Rovral 4F + Nu-Film-17 OR other sticker/extender at manufacturer's recommended rate	1.0 qt 8.0 fl oz	Make first application according to the Sclerotinia advisory program in problem fields or when disease first appears. Up to two additional sprays on a 14- to 21-day interval may be required.	Do not apply within 10 days of harvest. No restriction on feeding vines, hay, or hulls. See label for additional details.
Cylindrocladium black rot (CBR) (<i>Cylindrocladium</i> <i>parasiticum</i>) and nematodes	Vapam HL 42% Metam 42%	7.5 gal 7.5 gal	Use with NC 10C or NC 12C in cases of severe disease pressure; plant other varieties only in cases of light CBR pressure. Apply 6-8 inches deep at least 14 days preplant with injector shanks (one or two/bed) in front of a bed shaper to mark rows. Do not mix treated soil with untreated soil by tillage or other cultural practices	Read cautionary statements and all other information on product label.
Pod rot (Pythium only)	Ridomil 5G	12.0 lb (36 inch rows)	Apply in 8- to 12-inch band over row at early pegging. Do not apply to wet foliage.	No restrictions on feeding vines, hay, or hulls to livestock.
	Ridomil 2E	1.0-2.0 qt	Apply at early pod set through irrigation water. Apply early in set to insure adequate flushing into soil.	Same as above.

Disease	Product and Formulation	Rate of Formulations/A	Method and Timing of Application	Precautions and Remarks
Pod rot (<i>Pythium, rhizoctonia</i> , and suppression of <i>sclerotium rolfsii</i>)	Ridomil PC 11G	20.0 lb (36-inch rows)	Apply in a 14-inch band over rows at early pegging. Use the higher rate where the history of pod rot is severe.	Do not feed treated vine, hay, or hulls to livestock.
NEMATOCIDES				
Nematodes	Temik 15G	7.0 lb	Apply Temik 15G in furrow for suppression of nematodes and thrips.	Label prohibits the use of hay, vines, or hulls from treated soil as a livestock feed.
	Nemacure 15G	10.0-17.0 lb	Apply in 12-inch band and incorporate into top 3 inches of soil.	Same as above.
	Temik 15G	14.0-20.0 lb	Apply to the seed furrow or apply 12-inch band as described above.	Same as above.
	Telone II	3.0-6.0 gal	Apply 8-12 inches deep in row and bed soil. Wait 7-14 days before planting.	See label for precautions and restrictions.
	Vapam HL 42% metam 42%	7.5 gal 7.5 gal	Same as above, but wait 14 days before planting.	Same as above.

PEANUT IRRIGATION

B. B. Ross

Extension Agricultural Engineer

Although considered to be somewhat drought resistant, peanuts exhibit a variation in drought tolerance depending upon the stage of growth and variety. There are critical times during the growth of the peanut plant that a soil moisture deficit can severely limit yields and/or diminish quality. The table below divides the peanut growing season into four stages and indicates the relative response of the plants to a lack of moisture during each stage.

Response of Peanut Plants to Irrigation at Various Growth Stages

Plant Growth Stage (Duration)	Plant Indicators	Relative Drought Susceptibility
germination (1-2 weeks)	planting to emergence	high
early vegetative growth (5-6 weeks)	emergence to flowering/pegging	low
nut development/fruiting (8-9 weeks)	flowering/pegging to pod formation	high
maturation (5-6 weeks)	pod formation to harvest	moderate

While adequate moisture during the germination stage is necessary for a good, uniform stand, the mid-season nut development, or fruiting stage, is the most critical time for irrigation if there is a shortage of rainfall. In addition to being the stage in which the peanut plant is most susceptible to drought stress, it is also the stage of maximum water use by the plant.

In Virginia, the critical part of the nut development/fruiting period includes the latter part of July and the month of August. Irrigation in June or earlier is discouraged, unless extremely dry conditions persist, because excess moisture can trigger excessive vine growth. Irrigation of peanuts in September is also not preferred because too much moisture during the plant maturing stage can increase the severity of CBR, Sclerotinia blight and leaf spot diseases. Late unnecessary irrigation can also delay maturity and

promote the development of small pods. In dry years, irrigation can reduce the threat of Aflatoxin and suppress the outbreak of spider mites.

Irrigation Scheduling Methods

Soil Feel Method: A soil sample should be taken from several sites, representative of the predominant soil type in the field, by digging down to a 6-12 inch depth. To evaluate soil moisture, after the sample is taken, it is held in the palm and fingers of the hand and squeezed to form a ball. Based on the appearance of the ball, the table following can be used to estimate plant available water. The upper end of the ranges given should be used for coarse-textured soils, such as loamy sands, while medium-textured soils, such as sandy loams, apply to the lower end of the ranges.

Estimating Soil Moisture By The Soil Feel Method

Plant Available Water Remaining In Soil	Feel or Appearance at 6-12 Inches
100%	No free water appears on soil, but wet outline of ball is left on hand
75-100%	Forms a ball that breaks easily
50-75%	Forms a weak ball that falls apart
<50%	Appears dry, will not form a ball
0%	Dry, loose, flows through fingers

In deciding whether to irrigate or not, the plant growth stages described earlier should be considered. For the germination and nut development/fruitlet stages, soil moisture should not be allowed to drop below the 50-60% plant available water level, while during the early vegetative growth and maturation stages it could be allowed to drop below the 50% level. The amount of irrigation water which should be applied, once an irrigator has determined the approximate soil moisture content, will be discussed below.

Tensiometer Methods: Tensiometers are well-suited to the light, sandy soils found in southeast Virginia. Depending upon the size of the irrigated field and the variability in soil textures, one or more tensiometer stations should be installed. A station consists of two tensiometers, one inserted to

a 12-inch depth and the other at 24 inches. The shallow instrument reflects the need for irrigation while the deep tensiometer provides an indication of whether or not irrigation amounts have been adequate. If the deep tensiometer continues to dry during the season while irrigation is continuing, it indicates that insufficient irrigation water is being applied. Manufacturers' recommendations should be closely followed regarding installation and interpretation of tensiometer readings.

The following table relates tensiometer gauge vacuum reading to approximate soil moisture content. In the case of soil tension, readings differ according to soil texture.

Soil Water Availability at Various Tensiometer Readings

Irrigation Trigger Point		Tensiometer Reading (Centibars)	
Peanut Plant Growth Stage	Plant Available Water Remaining in Soil (%)	Sandy loam	Loamy sand
germination	60	40	20
early veg. growth	40	60	40
nut devel./fruiting	60	40	20
maturation	40	60	40

Electrical Resistance Methods: A gypsum soil block is an "electrical resistance" device which uses gypsum as a porous material in which electrodes are embedded. Electrical resistance between the electrodes varies with soil water content. Gypsum has a characteristic much like a very heavy clay with small pores. Gypsum blocks, therefore, are not recommended for the light, sandy soils of southeast Virginia.

Another electrical resistance type sensor that has been developed in recent years is called the Watermark sensor. As with the gypsum block, the sensor's resistance varies with the electrical conductivity of solution between the electrodes. Pore sizes in this matrix are larger than those of the gypsum block, thereby making it more suitable for coarse-textured soils. Unlike gypsum blocks, Watermark sensors may be reused year after year.

Watermark sensors (and gypsum blocks) come with a meter that is attached to the terminals. Some meters give an instant reading of soil water tension while others provide a digital readout which can be converted to tension using a simple chart. Irrigation should occur when sensor reading exceed a set tension level as with tensiometers. Follow manufacturer's recommendations carefully when using this method.

How much irrigation?

In peanut irrigation, it may be advisable to bring soil moisture back up to only 85 to 90% of plant available water holding capacity in the event that rainfall occurs shortly thereafter. This will allow the soil to accommodate part of the rainfall and may help to reduce associated disease incidence.

The amount of water to apply depends on soil texture, root zone depth, and the plant available water level when irrigation is begun as well as the sprinkler irrigation efficiency. The table below provides irrigation estimates considering these factors for two soil textures.

**Maximum Water Application at Various Growth Stages,
Soil Moisture Levels and Soil Textures**

Peanut Plant Growth Stage	Plant Available Water Remaining in Soil (%)	Maximum Amount of Irrigation Water to Apply (Inches)	
		Sandy Loam	Loamy Sand
germination	60	0.33-0.50	0.25-0.33
early veg. growth	40	2.00-2.25	1.25-1.50
nut devel./fruiting	60	1.25-1.50	0.75-1.00
maturation	40	2.00-2.25	1.25-1.50

To determine if these applications are adequate an irrigator can evaluate the deep tensiometer readings or examine deep soil samples by the soil feel method.

INFORMATION ON SPRAY TIPS FOR HERBICIDES

Tip No. 8004 is recommended for application of preplant and at-cracking herbicides.

Flat Fan Spray Tip No.	Liquid Pressure in p.s.i. (at tip)	Gallons Per Acre*		
		3 MPH	4 MPH	5 MPH
8004** (50-mesh screen)	20	28	21	17
	25	31	24	19
	30	34	26	21
	40	40	30	24

* Values are based on a nozzle spacing of 18 inches.

** or equivalent.

INFORMATION ON SPRAY TIPS FOR SOIL FUNGICIDES

Tip numbers 8008 LP, 8010 LP, TK 7.5, and TK 10 are recommended for application of soil fungicides (i.e., Terraclor 75W, Rovral 4F, Vitavax 3F). Center each nozzle directly over the row, and calibrate to deliver 40 gal of spray per acre.

Flat Fan Spray Tip No.	Liquid Pressure in p.s.i. (at tip)	Gallons Per Acre*		
		3 MPH	4 MPH	5 MPH
8008 LP (no strainer)	10	36	27	21
	15	44	33	26
	20	51	38	30
	30	61	45	36
8010 LP (no strainer)	10	45	34	27
	15	55	41	33
	20	66	50	40
	30	77	58	46
TK 7.5 (no strainer)	10	41	31	24
	15	51	38	30
	20	61	43	36
	30	72	53	43
TK 10 (no strainer)	10	55	41	33
	15	66	50	40
	20	77	58	46

* Values are based on a nozzle spacing of 36 inches.

INFORMATION ON SPRAY TIPS FOR LEAFSPOT FUNGICIDES

Office disc number D₂ or D₃ and core number 13 or 23 are routinely used to spray leaf spot fungicides. Three nozzles per row, a minimum of 50 lb spray pressure, and a spray volume of 15 gal/A are recommended.

Combination Disc and Core No.	Liquid Pressure in p.s.i. (at tip)	Gallons Per Acre - 36" Row Spacing Using 3 Nozzles Per Row		
		3 MPH	4 MPH	5 MPH
D ₂ -13	40	13.1	9.8	7.9
	60	16.4	12.3	9.9
	80	18.1	13.7	10.9
D ₂ -23	40	16.5	12.3	9.9
	60	20.5	15.4	12.3
	80	23.3	17.3	13.9
D ₃ -23	40	19.4	15.5	11.7
	60	23.3	17.3	13.9
	80	26.6	19.8	16.0

NOTE: Consult a commercial spray guide and/or your Extension Agent for selection of suitable tips to achieve special low or high volume spray needs.

TRAVEL SPEED CHART

Miles per hour	Time required to travel		
	88 feet	176 feet	352 feet
1	1 minute	2 minutes	4 minutes
2	30 seconds	1 minute	2 minutes
3	20 seconds	40 seconds	1 minute 20 seconds
4	15 seconds	30 seconds	1 minute
5		24 seconds	48 seconds
6			40 seconds
7			34 seconds

1 MPH = 88 feet per minute

1 MPH = 1.466 feet per second

LAND MEASURE

16.5 feet = 5.5 yards OR 1 rod
 66 feet = 4 rods OR 1 chain
 272.25 sq. feet = 30.25 square yards OR 1 square rod
 4,356 sq. feet = 16 square rods OR 1 square chain
 43,560 sq. feet = 160 square rods OR 10 square chains OR 1 acre

LENGTH OF ROW REQUIRED FOR ONE ACRE

Row spacing	Length or distance
24 inch	7260 yards = 21,780 feet
30 inch	5808 yards = 17,424 feet
32 inch	5445 yards = 16,335 feet
34 inch	5125 yards = 15,374 feet
36 inch	4840 yards = 14,520 feet
38 inch	4585 yards = 13,756 feet
40 inch	4356 yards = 13,068 feet

UNITS OF MEASURE

A teaspoonful or tablespoonful throughout this table refers to a level, standard measuring teaspoon or tablespoon.

<u>80 drops</u>	=	1	teaspoonful or about 1/6 fluid ounce
<u>1 tablespoonful</u>	=	3 15 1/2	teaspoonful milliliter (ml) or cubic centimeter (cc) fluid ounce
<u>1 cup</u>	=	16 8 236.6 1/2	tablespoonful fluid ounce milliliter (ml) or cubic centimeter (cc) pint
<u>1 pint</u>	=	16 473.2	fluid ounce (NOTE: 1 pint or quart dry measure is about 16 percent larger than 1 pint or quart liquid measure.) milliliter (ml) or cubic centimeter (cc)
<u>1 fluid ounce</u>	=	2	tablespoonful or 29.6 milliliter (ml) or cubic centimeter (cc)
<u>1 U.S. gallon</u>	=	4 8 3,785 8.3	quart pint milliliter (ml) or cubic centimeter (cc) lb water
<u>1 liter</u>	=	1,000 1.08	milliliter (ml) or cubic centimeter (cc) quart (1 quart + 1 fluid ounce)
<u>1 pound</u>	=	16 453.59	ounce gram
<u>1 kilogram</u>	=	1,000	gram approximately 2 pound 3 ounce
<u>1 ounce</u>	=	28.4	gram
<u>1 bushel of soil</u>	=	1.25	cubic feet
<u>1 mile</u>	=	5,280 320 1,609.4	feet rod meter
<u>1 acre</u>	=	43,560 160 0.4047	square feet square rod hectare
<u>10 millimeter (mm)</u>	=	1 0.3937	centimeter (cm) inch
<u>100 centimeter</u>	=	1 39.37	meter (m) inch

ESTIMATED CROP PRODUCTION COSTS BASED ON 3000/ACRE YIELD

Eastern Extension District Farm Management Agents

Operating Costs	Cost Per Acre	Your Farm
Seed	\$ 99.00	_____
Fertilizer, Lime, Landplaster	69.68	_____
Chemicals	203.41	_____
Machinery	125.16	_____
Miscellaneous	43.00	_____
Interest	21.94	_____
Total Operating Costs	<u>\$ 562.49</u>	_____
Fixed Costs		
Machinery	\$132.69	_____
Labor	65.31	_____
Total Fixed Costs	<u>\$198.00</u>	_____
Total Costs (excluding land)	<u>\$760.49</u>	_____

ESTIMATING PER ACRE RETURNS TO LAND AND MANAGEMENT WITH VARYING YIELDS AND PRICES*

Yield Per Acre (lb)	Total Cost Per lb*	Price Received Per Pound				
		\$0.19	\$0.22	\$0.25	\$0.28	\$0.31
2400	\$0.31	(\$288.28)	(\$216.28)	(\$144.28)	(\$72.28)	(\$0.28)
2700	\$0.28	(\$239.38)	(\$158.38)	(\$77.38)	\$3.62	\$84.62
3000	\$0.25	(\$190.49)	(\$100.49)	(\$10.49)	\$79.51	\$169.51
3300	\$0.23	(\$141.60)	(\$42.60)	\$56.40	\$155.40	\$254.40
4600	\$0.22	(\$92.71)	\$15.29	\$123.29	\$231.29	\$339.29

* Drying and hauling costs were adjusted for various yields.

NOTE: Figures in parenthesis are losses.

Blank lined paper for writing.

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This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal black lines running across the width of the page, providing a guide for handwriting or typing. The background is a solid off-white color.

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This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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