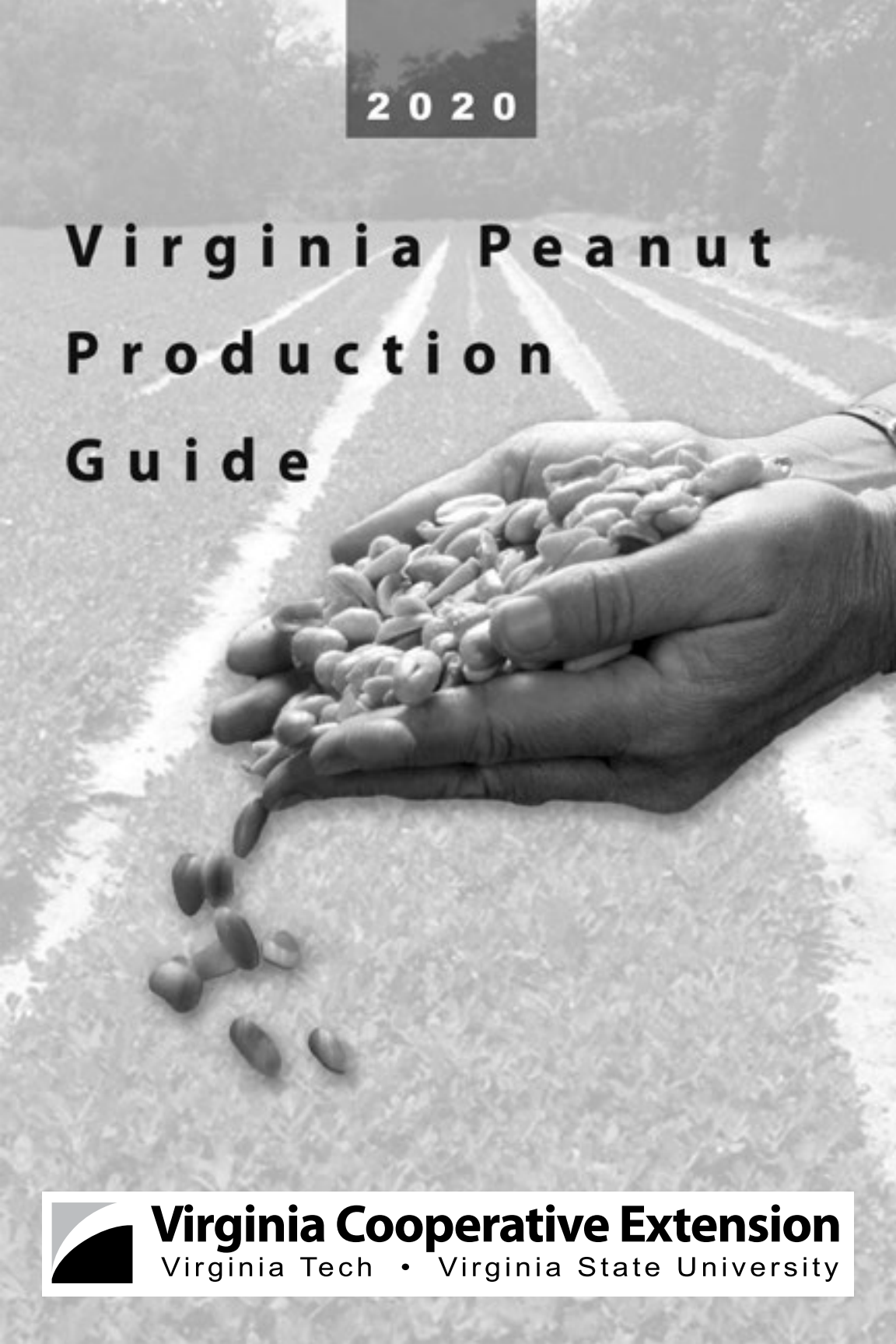
2020

Virginia Peanut Production Guide



Virginia Cooperative Extension
Virginia Tech • Virginia State University

2020

Virginia Peanut Production Guide

Contributors:

Maria Balota, Crop Physiologist

David Jordan, Weed Scientist

Hillary Mehl, Extension Plant Pathologist

Julie Shortridge, Biological Systems Engineer

Sally Taylor, Extension Entomologist

Edited by: Maria Balota

The printing of this publication was funded by the Virginia Peanut Growers Association.

In the memory of

Gail White, an appreciated colleague and devoted contributor to the Peanut Production Guide for many years.

Contents

SAFETY FIRST WITH PESTICIDES

Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by Virginia Tech nor discrimination against similar products or services not mentioned. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county Extension agent.

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 OCCURS 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 the 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.

Table 1. Personal Protective Equipment (PPE) Guide

	Label Signal Word		
Formulation	**Caution**	**Warning**	**Danger**
Dry	Long-leg trousers and long-sleeve shirt; shoes and socks.	Long-leg trousers and long-sleeve shirt; shoes and socks; wide-brim hat; gloves.	Long-leg trousers and long-sleeve 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-leg trousers; long-sleeve shirt; shoes and socks; wide-brim hat.	Long-leg trousers and long-sleeve shirt; shoes and socks; wide-brim 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-leg trousers and long-sleeve shirt, rubber boots, wide-brim hat, rubber gloves or face shield. Canister respirator if label precautionary statement says: **"Do not breathe vapors or spray mists,"** or **"Poisonous if inhaled."**
Liquid (when mixing)	Long-leg trousers; long-sleeve shirt; shoes and socks; wide-brim hat; gloves; rubber apron.	Long-leg trousers and long-sleeve shirt; shoes and socks; wide-brim 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-leg trousers and long-sleeve shirt, rubber boots, wide-brim hat, rubber gloves, goggles, rubber apron, canister respirator.

Table 1. Personal Protective Equipment (PPE) Guide (cont.)

	Label Signal Word		
Formulation	**Caution**	**Warning**	**Danger**
Liquid (prolonged exposure to spray, or application in enclosed area).	Long-leg trousers and long-sleeve shirt, boots, rubber gloves, water-proof, wide-brim hat.	Water-repellent, long-leg trousers and long-sleeve shirt, rubber boots, rubber gloves, rubber apron, waterproof, wide-brim hat, face shield, cartridge or canister respirator.	Waterproof suit, rubber boots, rubber gloves, waterproof hood or wide-brim 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 the proper treatment. These centers are located in hospitals equipped for all toxicological (poisoning) emergencies.

Poison Hotline – 1-800-222-1222

REGIONAL POISON CENTERS

CHARLOTTESVILLE, VA Blue Ridge Poison Center University of Virginia Health System P.O. Box 67 Charlottesville, VA 22908 (434) 982-3158 or (434) 924-0347 *(Serving: Central and Western Virginia)*	**RICHMOND, VA** Virginia Poison Center Virginia Commonwealth University Medical Center 600 E. Broad St., Suite 640 Richmond, VA 23298 (804) 828-4780 *(Serving: Central and Eastern Virginia)*
WASHINGTON, D.C. National Capital Poison Center George Washington University Medical Center 3201 New Mexico Avenue NW, Suite 310 Washington, DC 22016 (202) 362-3867 *(Serving: Northern Virginia and D.C. area)*	

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

GREENSBORO, N.C.
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.-N.C. border only, please)

Table 2. Emergency, Spill, Accident, and Incident Information

Incident	Contact	Phone
SPILLS, accidents and other related emergencies	**CHEMTREC** - Chemical Transportation Emergency Center Industry Hotline	(800) 424-9300
SPILLS into water	Virginia 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	Virginia 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 environment	Virginia Department of Agriculture and Consumer Services, Office of Pesticide Management	(804) 371-6560

EXTENSION PERSONNEL WORKING WITH PEANUTS

County Extension personnel with peanut responsibilities.

County	Name	Telephone	E-mail
Southampton	Josh Holland	(757) 653-2572	cvfd262@vt.edu
Greensville	Sara Rutherford	(434) 348-4223	sriggan@vt.edu
Dinwiddie	Mike Parrish	(804) 469-4514	mparrish@vt.edu
Prince George	Scott Reiter	(804) 733-2686	jreiter@vt.edu
Isle of Wight	Livvy Preisser	(757) 365-6262	livvy16@vt.edu
Suffolk	Elizabeth Pittman	(757) 514-4337	elizp16@vt.edu

Virginia Tech Extension specialists with peanut responsibilities.

Name	Department	Telephone	E-mail
Maria Balota	Peanut Variety	(757) 807-6538	mbalota@vt.edu
Dell Cotton	PGCMA	(757) 562-4103	dcotton25@cs.com
Hillary Mehl	Plant Pathology	(757) 807-6542	hlmehl@vt.edu
Julie Shortridge	Biological Systems Engineering	(540) 231-2797	jshortr1@vt.edu
Sally Taylor	Entomology	(757) 807-6546	svtaylor@vt.edu

AGRONOMIC RECOMMENDATIONS AND PROCEDURES

Maria Balota, Peanut Variety and Quality Evaluation Program Coordinator

The primary considerations when selecting peanut varieties are yield, grade factors, disease, pests, and drought and heat response. A good practice for farmers is recording for each field the variety, yield, rainfall, and disease and insect incidence every year. This will allow farmers to determine the production potential for each field and better fit the varieties to maximize return. For example, in disease prone fields, plant disease tolerant varieties. Bailey, Sullivan, and Wynne are good choices for Cylindrocladium black rot (CBR) infected fields, but Emery is susceptible to this disease. Varieties with partial resistance to the Tomato Spotted Wilt Virus (TSWV) can be planted early in the season on heavy soils but not the sensitive ones. TSWV sensitive varieties should be planted later and on sandy soils that usually warm up faster than heavy soils.

To alleviate the risks associated with peanut production plant several varieties instead of only one each year. A good source of information regarding selection of the best Virginia market type peanut varieties is the Peanut Variety and Quality Evaluation (PVQE) program. The results of multi-location tests within this program are updated every year and available at http://pubs.ext.vt.edu/category/crops.html. Hard copies of the results are also available through the VCE Extension Offices and Extension Agents.

Commercially available Virginia type peanut varieties include Bailey, Bailey II, Emery, Sullivan, Walton, and Wynne. Cultivars for niche markets such as Gregory are also available but seed is limited. From these, Bailey II, Emery, Sullivan, Walton, and Wynne are the most recent releases. The other cultivars included in some tables of this guide, such as NC-V11, Perry, Phillips, and Spain, are obsolete but they are included here for comparison with the new cultivars. These varieties were developed by the North Carolina State University and Virginia Tech breeding programs and released through the PVQE program. In general, these varieties have high yields, and big pod and kernel size. The most recent ones, Bailey II, Walton, Emery, Sullivan, Wynne, Bailey, and Sugg, have improved disease resistance, in particular early leaf spot, TSWV, CBR, and Sclerotinia blight (SB) resistance. CHAMPS is the earliest with only 135 days after planting (DAP) and Gregory the latest with 155 DAP required to reach maturity. The runners may need over 155 DAP to reach optimum maturity in Virginia. Bailey II, Walton, Emery, Sullivan, and Wynne have the high oleic fatty acid trait that extends the shelf life of peanuts from 2 weeks to 40 weeks.

Other Virginia market type varieties developed by breeding programs in Georgia and Florida are Florida Fancy, Georgia 05E, and Georgia 08V. In general, they have high yields, high oleic fatty acid trait, and good disease resistance, but require over 155 DAP to mature in Virginia.

Finally, runner type varieties, such as Georgia 09B, Georgia 06G, and Florida 07, could be grown in Virginia; from these only Georgia 09B and Florida 07 have

the high oleic fatty acid trait. In general, the runner type varieties are resistant to diseases, have great pod retention and many of them have the high oleic fatty acid trait, but have much smaller pods and kernels than the Virginia type cultivars and require over 155 DAP to mature in Virginia, for which they may be more prone to early freeze than Virginia varieties.

Tables 3a, 3b, and 3c present pod yield, crop value, and content of fancy pods (% FAN), extra large kernels (% ELK), sound mature kernels (% SMK), and total meat of the kernels (% TM), from the last 5 years of PVQE testing locations in Virginia, North Carolina, and South Carolina. Through examining yield and grade factors at different digging dates, maturity requirements of each variety can be assessed. Comparative yields, value, and grading of Virginia and runner cultivars are presented in Table 4.

Table 3a. Agronomic Performance of Commercially Available Peanut Cultivars Across Years (2012-2019), Locations (Suffolk, VA, and Williamston, NC), and Digging Date (Dig I, Early; and Dig II, at optimum maturity).

	Dig I (Early)		Dig II (Optimal)	
Variety	Yield (lb/acre)	Value ($/acre)	Yield (lb/acre)	Value ($/acre)
Bailey	5125 a	892 a	5539 a	995 ab
Bailey II	5360 a	953 a	5710 a	1035 a
Emery	5005 ab	890 a	5255 a	920 ab
Sullivan	4682 bc	786 bc	5218 a	898 ab
Walton	5173 a	861 ab	5667 a	995 ab
Wynne	4521 c	740 c	5084 a	858 b

*Averages followed by the same letters are not statistically different based on Fisher's LSD at 5% probability.

Table 3b. Agronomic Performance of Commercially Available Peanut Cultivars Across Years (2012-2019), and Locations (Suffolk, VA, and Williamston, NC) When Dug Approximately Two Weeks Early Than Optimum Maturity (Dig I).

Variety	Fancy Pods	Super Extra-large Kernels	Sound Mature Kernels	Total Meat
	---------- % ----------			
Bailey	86 bc	5 d	64 ab	71 ab
Bailey II	88 b	8 cd	66 a	71 a
Emery	92 a	13 a	66 a	71 a
Sullivan	88 b	9 bc	63 bc	69 bc
Walton	83 c	11 ab	63 bc	70 a-c
Wynne	92 a	10 bc	62 c	69 c

*Averages followed by the same letters are not statistically different based on Fisher's LSD at 5% probability.

Table 3c. Agronomic Performance of Commercially Available Peanut Cultivars Across Years (2012-2019), Locations (Suffolk, VA, and Williamston, NC) When Dug at Optimum Maturity (Dig II).

Variety	Fancy Pods	Super Extra-large Kernels	Sound Mature Kernels	Total Meat
	---------- % ----------			
Bailey	83 b	9 d	65 a	73 a
Bailey II	84 b	13 c	65 a	73 a
Emery	91 a	17 ab	65 a	73 a
Sullivan	83 b	13 c	64 a	71 ab
Walton	85 b	19 a	65 a	73 a
Wynne	91 a	14 bc	62 a	71 b

*Averages followed by the same letters are not statistically different different based on Fisher's LSD at 5% probability.

Description of Varieties

New Virginia-type Cultivars

*Denotes the mostly grown cultivars in Virginia and Carolinas

Walton

Walton was tested as '08x09-3-14-1' line and jointly released in 2019 by the University of Florida and Virginia Tech. It is a Virginia-type peanut with similar good agronomic performance when compared with Bailey, Emery, and Bailey II under "normal" production, but with superior performance ~~than~~ these cultivars under extreme water conditions. Seeds are elongated in shape and seed testa color is light pink to pink. It has dark green foliage; an intermediate growth habit and the main stem is not distinguishable from the lateral branches. Walton is a high-oleic line with resistance to leaf spot and TSWV, and it was developed for the VC region. Seed will become available after the 2021 growing season.

Bailey II

Bailey II was released by the North Carolina State University in 2017; it is a high oleic version of Bailey but seeds are slightly larger than Bailey. Bailey II has good disease resistance to CBR, Sclerotinia blight and TSWV, and it matures at the same time with Bailey. Seed will be available after the 2020 growing season.

Emery

Emery is a 2015 release by the North Carolina State University. It was named in honor of Dr. Donald A. Emery, peanut breeder at NCSU. Emery is a high oleic large-seeded Virginia-type cultivar with alternate branching pattern, intermediate runner growth habit, and medium green foliage. It was tested as 'N10046ol'line in tests at NCSU and Virginia Tech. Emery has approximately 67% jumbo and 24% fancy pods, and seeds with tan seed coat averaging 940 mg seed-1. It also has 18% super-extra-large kernel content, 44% extra-large kernel content, and 71%

sound mature kernel content. Emery is partially resistant to three of four major regional diseases: leaf spot, Sclerotinia blight, and Tomato Spotted Wilt virus, but it should be considered susceptible to Cylindrocladium black rot. Emery has bright pods and flavor comparable with runner-type standards. Yields and the number of days to maturity are similar with Bailey (145 days).

*Sullivan**

Sullivan is a 2013 release by the North Carolina State University. Sullivan is a high oleic Virginia-type cultivar with alternate branching pattern, intermediate runner growth habit, and medium green foliage. It was tested as 'N08075olCT'line in tests at NCSU and Virginia Tech. It was developed from a cross with a sister line of Bailey and, as Bailey, it has partially resistance to the four common diseases in the Virginia-Carolina peanut production area: early leaf spot, CBR, Sclerotinia blight, and TSWV. Sullivan has approximately 45% jumbo pods and 40% fancy pods, and seeds tan with seed coat averaging 931 mg seed-1. Yields and the number of days to maturity are similar with Bailey (145 days).

Wynne

Wynne was tested as 'N08081olJC' breeding line; it was released by the North Carolina State University in 2013. Plants resemble Sullivan, with which Wynne is related through a Bailey sister line. Wynne has partial resistance to early leaf spot, CBR, Sclerotinia blight, and TSWV and has the high oleic characteristic. The percentage of jumbo pods is 68 and fancy pods 21 for this cultivars. Seeds have pink seed coat and seeds average 1051 mg seed-1. Just like Sullivan, Wynne has yields and maturity similar with Bailey, but significantly higher than CHAMPS and Phillips.

*Bailey**

Bailey, released in 2008 by NCSU, is a medium to large-seeded and high yielding Virginia-type peanut. It produces high yields across multiple years and locations, which is an indication of good tolerance to fluctuations of weather and growth conditions. Bailey has a growth habit intermediate between runner and bunch types, bright pods, and tan kernel color. More importantly, it is resistant to TSWV and trips. It matures in approximately 145 DAP, just a little after CHAMPS, but it holds pods much better than ~~CHAMSP~~ if picked later.

Sugg

Sugg was released in 2009. Before release, it was known as N 03091T, a line developed at the NCSU to hold multiple disease resistance. It has resistance to TSWV, CBR, SB, and early leaf spot. Sugg has an intermediate runner growth habit and the color of seed coat is pink. Sugg produces high yields and has larger kernels than Bailey. It also has good blanching and flavor characteristics.

Titan

Titan was released in 2010 by Virginia Tech. Titan is an extra large-seeded peanut with an exceptionally high content of jumbo pods and super extra large

kernels. It is suitable for in-shell, gourmet, and green boiling products. Yields are relatively low if not irrigated. Maturity is considered early (only 5 later than CHAMPS). This variety is moderate susceptible to susceptible to TSWV, CBR, and SB.

Older Virginia-type Cultivars

(occasionally grown on very small acreages)

CHAMPS

CHAMPS has been introduced in 2004. It is a large-seeded Virginia-type peanut with a runner growth habit. It is the earliest maturing variety for which acreages planted with it in VA and NC increase every year. Yields at early digging (135-140 days after planting in Virginia) are high, and pod size, shape and color are suited for in-shell market. If an early frost advisory is in effect, CHAMPS can be harvested ten days earlier than NC-V 11 with no reduction in yield. CHAMPS is less susceptible to TSWV than most Virginia-type cultivars. CHAMPS is susceptible to CBR and SB. High yields and favorable pod characteristics were observed across years and locations and, similarly to Bailey, showed good tolerance to growth factors.

Gregory

Gregory has a growth habit intermediate between runner and bunch types. Maturity is similar to NC-V 11 (145 – 150 DAP). This variety produces an exceptionally high percentage of ELKs 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. It is medium resistant to TSWV.

Other Virginia-type Peanut Varieties

Florida Fancy

Florida Fancy is a high oleic Virginia-type peanut variety released University of Florida. It is being researched in Virginia because of its high oleic trait and its resistance to TSWV and Sclerotinia blight. This variety has an intermediate runner growth habit, pink seed-coat color, and a high proportion of ELK.

Georgia 05E

Georgia 05E is a new high oleic Virginia-type peanut released by the Georgia Agricultural Experiment Station in 2005. It is being researched in Virginia because of its improved oil quality (high O:L ratio) and its leaf spot and TSWV resistance. This peanut has a runner growth habit and a tan seed-coat color. Its medium to late maturity (over 150 DAP) may not make it suitable for Virginia.

Georgia 08V

Georgia 08V is also a new high oleic Virginia-type peanut release by the Georgia Agricultural Experiment Station. It is being researched in Virginia because

of its improved oil quality (high O:L ratio) and its leaf spot and TSWV resistance. This peanut has a runner growth habit and also require over 150 DAP to mature in V-C region.

Runner Market Types

Research thus far indicates that several runner varieties may have the potential to yield equal to Virginia-type peanuts and offer more TSWV resistance relative to Virginia market type peanuts. However, because of their late maturity, more research is needed to demonstrate their suitability for Virginia. They may be more suitable, however, for south North Carolina and South Carolina

Florida-07R

This is a medium to late runner type peanut released in 2006 by the University of Florida. It has shown good yield potential with good grades. It has larger seed size than typical runners therefore gypsum applications are recommended. It has medium resistance to TSWV. Florida-07 has high-oleic characteristic and good roasting, blanching, and processing characteristics.

FloRun-107

This is a medium maturity runner released by the University of Florida. It has shown good yield potential with good grades and a high percent of medium size kernels. It has good resistance to TSWV and medium resistance to white mold. Florida-07 has high-oleic characteristic. This cultivar is currently under testing for production in Virginia.

Georgia-06G

This is a high-yielding, large-seeded runner variety developed by the UGA Coastal Plain Experiment Station in Tifton. It seems to dominate the acreages in the South because of its high yields, grade and dollar value returns, and good TSWV resistance. It is not a high-oleic type.

Georgia-09B

This is a medium to late runner type peanut similar in maturity with Georgia Green. It produces high yields and is a high-oleic type, and had good TSWV resistance. Georgia-09B was developed by the UGA Coastal Plain Experiment Station in Tifton. It is considered a good fit for Virginia, where yields close to Bailey were obtained when the season was long, and it is favored by the shellers because of the high-oleic trait.

Georgia-12Y

Georgia-12Y was developed by the UGA Coastal Plain Experiment Station in Tifton. It is a late maturing variety, but in early plantings in the southeast U.S. can produce high yields. It is a medium-seeded variety with good resistance to the TSWV and white mold.

Georgia-13M

This is a new high-yielding and high-oleic variety developed at the UGA Coastal Plain Experiment Station in Tifton. Georgia-13M is a small seeded runner, but with resistance to TSWV and with very good roast flavor.

TufRunner 297

This extra-large seeded runner was developed by the University of Florida and released in 2014. It has the high-oleic oil chemistry, produces high yields, and has acceptable resistance to the TSWV and white mold, but it is susceptible to leaf spot.

TufRunner 511

This is another large-seeded runner from the University of Florida with medium maturity and high-oleic oil chemistry. Yields and grading traits are excellent, and white mold resistance is very good; but it only has moderate resistance to TSWV.

Older Runner Cultivars

Georgia Green

High yields, good grades and resistance to TSWV and white mold made Georgia Green a popular runner-type variety. It is susceptible to leaf spot, however. Georgia Green has high percentage of sound mature kernels in comparison to other varieties. Its medium to late maturity (over 150 DAP) may not make it suitable for Virginia, unless planted early.

Georgia Greener

Georgia Greener is a high yielding runner with a high level of resistance to TSWV. Georgia Green has high percentage of sound mature kernels in comparison to other varieties. As its name implies, Georgia Greener has dark green foliage, intermediate runner growth habit and typical runner seed size.

Table 4. Agronomic Comparisons of Runner and Virginia Peanut Varieties in research trials at Capron, Dinwiddie, and Suffolk, VA, and Rocky Mount, NC, 2016-2017.

	With Irrigation				Without Irrigation			
	Yield	ELK	SMK	Value	Yield	ELK	SMK	Value
Variety	lb/acre	%		$/acre	lb/acre	%		$/acre
Bailey	5384	43	64	953	5355	44	62	845
Bailey II	5711	48	64	1016	5806	51	66	933
Emery	6010	55	66	1086	5906	57	68	989
FloRun107	5332		66	944	4790		63	753
Florida07	5179		62	867	4916		61	728
Florunner	3920		59	630	4136		62	612
GA09B	5256		65	965	5086		66	836
Sugg	5359	44	64	935	5046	45	62	772
Sullivan	5349	45	64	930	4969	44	60	758
TUFRunner 297	5391		64	962	5373		64	851
TUFRunner 511	5552		67	1004	5338		64	827
Wynne	5365	46	62	924	5213	43	59	758

Table 5. Agronomic and Market Characteristics of Virginia Market-type Peanut Varieties Recommended for Virginia

Characteristics	Bailey	Bailey II	Walton	Sullivan	Wynne	Emery
General						
Growth Habit	Int.-Runner	Int.-Runner	Int.-Runner	Int.-Runner	Int.-Runner	Int.-Runner
Maturity[a]	0	0	0	0	+5	-3
Heat Units	2,590	2,590	2,600	2,600	2,700	2,550
Seed Coat Color	Tan	Tan	Lt. Pink	Tan	Pink	Tan
Seed Count/lb	600	575	600	600	450	535
Calcium Need	Mod.	Mod.	Mod.	Mod.	High	High
Grade & Quality Factors[b]						
% ELK	0	+	0	0	+++	+++
% SMK	0	+	++	0	-	0
% Fancy	0	+	0	0	++	++
Blanchability	0	0	0	0	0	0
Shelf-life[c]	0	+++	+++	+++	+++	+++

[a] 0 = Same as Bailey; '+' = Days later than Bailey; '-' – Days earlier than Bailey

[b] 0 = Same as Bailey; '++' = Substantially higher than Bailey; '-' = Substantially lower than Bailey; '+' = higher than Bailey

[c] +++ = Passes the high oleic fatty acid trait

Table 6. Disease and Insect Resistance Characteristics of Virginia Market-type Peanut Varieties Recommended for Virginia

Characteristics	Bailey	Bailey II	Walton	Sullivan	Wynne	Emery
Disease Resistance						
CBR	MR	MR	MR	MR	MR	S
Leaf spot	MR	MR	MR	MR	MR	MR
Pod rot	S	S	S	S	S	S
Sclerotinia blight	MR	MR	MR	MR	MR	MR
Stem rot	S	MR	S	S	S	S
TSWV	MR	MR	MR	MR	MR	MR
Web blotch	S	S	S	S	S	S
Insect Resistance						
Corn earworm	S	S	S	S	S	S
Leafhopper	S	S	S	S	S	S
Rootworm	S	S	S	S	S	S
Spider mites	S	S	S	S	S	S
Thrips	MR	S	S	S	S	S

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

Pre-Plant Information

Tillage

Peanuts can be produced successfully with many different tillage systems, but in any system, they do better on a slight bed. If sub-soiled and bedded, knock the bed down so that at least a 16" wide flat bed is available (lower than typical cotton bed). If land is disked flat, throw up a bed with coulters on the planter. Bottom plowing is not recommended unless necessary to bury residue and reduce disease and burrower bug pressure on non-rotated fields and reduce resistant pigweed pressure. Dr. David Jordan details tillage systems in Peanut Information guide at http://www.peanut.ncsu.edu/. In short, while substantial reduction of moldboard plow was observed in 2014 relative to 1998, the majority tillage used in recent years by peanut farmers include disking, ripping and bedding, and field cultivation. While reduced tillage increased in recent years, there is concern about nutrient stratification when using this system. For example potassium application to reduced-tillage cotton may allow accumulation of toxic potassium in the peanut pegging zone with potential negative effect on yield. On 65 trials from 1997 through 2013 Dr. Jordan noted that peanut yield was in average 3.4% greater in conventional than in reduced tillage with variation from 16.1% less to 27.5% more in conventional tillage.

Strip-tillage has given equivalent yields on lighter soils and when weeds could be controlled without pre-plant incorporated herbicides. Strip-tillage into a cover crop or other crop residue reduces tomato spotted wilt. Use coulters on the strip-till planter to establish a slight planting bed. Planting between the previous rows is recommended to minimize roots and stalks in the pegging zone. In general there are few worm problems in strip-till peanuts.

Twin-row Planting Patterns

The impact of twin-row planting has been somewhat inconsistent. Yield increases (5 to 10 percent) due to twin-row planting have been documented with the NC-V 11, Perry and VA 98R varieties, but data on the currently grown cultivars is not yet available. Twin-row planting more consistently resulted in yield increases on light-textured soils (sands to loamysands) than on medium- to heavy-textured soils (loam to sandy clay loams). Yield increases have been documented in twin-row plantings both with seed spaced 3 to 4 inches apart and with seed spaced 5 to 6 inches apart. Twin-row planting has also been noted to reduce the severity of TSWV disease. Good early season weed control is essential when planting in twin rows.

Crop Rotation

A long crop rotation is essential for achieving high peanut yields. Also, not all other crops rotate well with peanut. For example, soybean is a poor choice because both are legumes and share many common disease. In fact, a good rotation program is aimed to reduction of sources of soil borne diseases that can infect peanut, damage the crop, and reduce the yield. A minimum of 3 years is recommended and used at the Tidewater Agricultural Research and Extension Center in Suffolk. Good crops to rotate peanut with are corn, cotton, wheat, barley, and sorghum. If soybean has been grown, it is probably a wise decision to plant peanut after 4, 5, or more years after the bean. According to specialists at NCSU, peanut varieties have different requirements relative to crop rotation. A good example of the influence of rotation on yield is presented for Gregory in Table 7. Similarly, under the same rotations during 2001 - 2006, Perry lost only 26% of yield due to poor rotation (tobacco-corn-peanut-tobacco-corn-peanut instead of corn-corn-corn-corn-corn-peanut), while Gregory lost 40%. Unfortunately, there is no information on the new cultivars other than assumption of less yield reduction because of increased disease resistance.

Table 7. Influence of Rotation on Yield when Gregory was used*

Rotation (1997-2006)	Peanut yield, 2006 (lb/A)
Corn-Cotton-Corn-Peanut-Corn-Corn-Corn-Corn-Corn-Peanut	5,920
Peanut-Corn-Corn-Peanut-Corn-Corn-Peanut-Corn-Corn-Peanut	5,030
Corn-Peanut-Corn-Peanut-Corn-Peanut-Corn-Peanut-Corn-Peanut	4,350
Peanut-Soybean-Corn-Peanut-Soybean-Corn-Peanut-Soybean-Corn-Peanut	3,800
Peanut-Peanut-Peanut-Peanut-Peanut-Peanut-Peanut-Peanut-Peanut-Peanut	2,600

*Modified from D. Jordan. 2013. Peanut Information.

Rotation into non-legumes (cotton, corn, or other grasses) is absolutely essential to sustainable long-term peanut production. Cylindrocladium black rot (CBR) is a major root rot disease for peanut in Virginia and rotation is the most important factor in suppressing this and other diseases. An absolute minimum of 2 years (3 or 4 years better) out of legumes is recommended for sustainable peanut production. **Soybeans** should be avoided in a peanut rotation due to increased CBR and white mold problems. Due to EPA regulation for Vapam use, good rotation will

become the major control of CBR, and a 3 to 4 rotation term could become standard in the future. We, at least, recommend it!

Volunteer peanuts must be controlled in the following crop to prevent losing a year's rotation. Peanuts are tough "weeds" and often require a two-step treatment program. **If decide to use Round-up, make sure that cotton or corn is Round-up Ready!**

Table 8. Control of Volunteer Peanut in a 3-year Rotation: Peanut, Cotton and Corn or Peanut, Corn & Cotton*

Control	Time of application	Herbicide	Rate
		Cotton Following Peanut	
G**	Pre-emergent	Cotoran	1 qt/ac
G - E	Pre-emergent	Round-up WeatherMAX (**if Round-up Ready cotton**)	22 oz/ac
E	Lay-by	Envoke	0.1 oz/ac
G		MSMA	1 qt/ac
G		Cotton Pro	1.5 pt/ac
		Corn Following Peanut	
G	Pre-emergent	Lariat (mixture of Atrazine & Lasso)	3 qt/ac
		(Atrazine controls volunteer peanut)	
G		Round-up WeatherMAX (if Round-up Ready corn)	22 oz/ac

*Information provided by B. Ashburn, Farm Manager at Tidewater AREC; ** G is good, E is excellent

Planting

Planting Date: The best planting window for peanuts in Virginia has been from 1 – 15 May. Recent research showed that April planting has benefits over late planting in particular in dry years. Large acreages (300 and up) should be spread out over a 2 week planting interval to spread harvest maturity. Early plantings, April and early May, have an increased risk of tomato spotted wilt virus (TSWV) due to high thrips activity at that time; thrips carry on the virus to the plants. However, availability of varieties with improved TSWV resistance allows scheduling of early planting with no effect of yield due to the virus. Fields with high CBR risk should be planted last (May 10) to maximize early season soil temperatures. We have enough growing season to finish planting during the last week of May if absolutely necessary, but harvest conditions usually deteriorate rapidly after 1 Nov. Lower temperatures and shorter days severely limit drying time and combining hours. See the discussion on cold injury.

Soil Temperature: Should be at least 65° F at 4" depth, in particular if Vapam is applied. Peanut can be planted in 14 days after Vapam application. Not many farmers in Virginia gasify the land, however (for alternatives see the Disease section of this guide).

Seeding Rate and Plant Population: Our goal is to get a uniformly emerged stand of 3-4 plants per row ft. to help control tomato spotted wilt virus. A seeding rate of 5-6 per row foot is recommended for runners.

Table 9. Cultural Practices: Plant Population, Seed Size, and Seeding Rates for Recommended Varieties

Seeding Rates			Variety and Approximate Seed Count Per Pound					
Seed Spacing (inches)	# Seed (per foot)	# Seeds (per acre)	Bailey (600)	Bailey II (575)	Walton (600)	Sullivan (600)	Wynne (450)	Emery (535)
For 36" rows*			Lbs seed required to plant 1 acre @ 36" row spacing**					
2.0	6	81,000	135	141	135	135	180	180
3.0	5	73,000	120	127	120	120	160	160
4.0	4	58,000	95	101	95	95	130	130
5.0	3	44,000	75	77	75	75	100	100
6.0	2	29,000	50	50	50	50	65	65

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

** All numbers were rounded to the nearest approximate five pounds intervals.

Seed Quality: Peanut seed require good germination (over 85%) to achieve adequate stands. Good germination is also necessary to produce plants with high vigor and yield potential. CBR is seed-transmitted – know your seed source!

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

Seeding Depth: Assuming good seed quality (over 85% germination), a maximum depth of 3 inches in dry soil is sufficient. Under good moisture conditions, 1.5" depth is ideal and there is no need to plant shallower unless the seed has very poor vigor. Planting shallower than 1.5" will increase the risk of Valor injury and inoculants failure in marginal soil moisture.

Row Spacing: Conventional row spacing is 36 – 38" and 7" on 36-38" centers for twin-rows. For twin rows, GPS guidance is recommended to allow successful stands. On each twin row plant 3 seed per row ft.

Fertility

pH

The traditional recommended pH range for liming peanut land is 5.8 – 6.2. However, given the critical need for Ca in Virginia-type peanuts, we recommend a bias toward 6.2. At 6.4 pH increases the probability of Manganese (Mn) or Boron (B) deficiency, but decreases potential Zn toxicity problems. Mn or B needs can be met with a foliar application where needed.

Use of Inoculants

Peanut is a legume and as such can get most of its N needs from nitrogen-fixing bacteria (Bradyrhizobium) colonizing the plant's roots. To provide these needed bacteria, you absolutely must inoculate all "new" peanut land, and should also inoculate strip-tillage fields and land that has been out of peanut production for 3 years. Research at Clemson University showed that inoculation gives yield advantage even in soils regularly grown with peanut. Use liquid in-furrow inoculants. In-furrow granular inoculants are less effective than liquids and usually stop-up in the delivery tube. Seed treatment inoculants are not recommended due to having much lower bacterial counts. Inoculants are living organisms; treat them with care and make sure they are not out-of-date.

Inoculant Rules:

- Use only liquid in-furrow inoculants. Granular & seed treatments are less reliable.
- Do not expose to heat during transport and storage
- Use a minimum of 5 gal water per acre.
- Make sure the inoculant stream hits exactly in the center of the open furrow, not the dry furrow walls. Trash caught in strip tillage rigs can deflect the inoculants stream.
- Don't plant too shallow (less and 1.5") or in dry soil. Inoculant must hit moist soil or it will die.
- Do not use chlorinated water.
- Apply with a steady stream, not a pulsing pump.

Poorly inoculated fields usually will not show any yellowing until about 45 DAP. Inoculation can be checked by using a shovel to uproot plants. Simply pulling up plants will cause the lower taproot to break off and result in a low count. The presence of large (1/8" or larger) nodules on the taproot indicates successful inoculation. An average of 15 large nodules per taproot at 45 DAP is considered good; less than 10 per taproot is marginal and less than 5 indicates poor inoculation. If only small (1/16") nodules are present and these are mostly on the lateral roots rather than on the taproot, the plant has probably only been colonized by native Rhizobium bacteria, not the applied inoculants.

If inoculation fails, either by application of inoculants or natural inoculation, broadcast ammonium nitrate (375 lb/ac of 34% = 127 N units) or ammonium sulfate (600 lb/ac of 21% - 126 N units) can be used. Failure of natural inoculation can be expected in very dry planting seasons. If the canopy has not closed, liquid N can be dripped in the row middle. Foliar nitrogen applications are not cost effective and often cause unacceptable leaf burn.

P and K

Phosphorus and potash should be applied to the previous crop by soil test to the high level. Peanuts respond best to residual fertilizer, and typically no additional fertilizer is needed when the previous crop has been properly managed. Excess potash in the pegging zone can potentially interfere with Ca uptake and can cause pod rot, so avoid potash application unless soil test levels are below guidelines by the Virginia Tech's Soil Testing Laboratory, 145 Smith Hall (0465), Blacksburg, VA 24061.

Calcium

Calcium is critical for pod development and high quality peanuts. Adequate Ca uptake increases peanut yield and grade by reducing pod rot (Pythium), and preventing unfilled pods or "pops". Calcium also reduces the risk of aflatoxin. On seed peanuts, calcium is important to improve germination and seedling vigor. **Peanuts will not respond to foliar calcium application.**

Calcium can only enter the kernel by direct diffusion through the pod wall and adequate soil moisture lessens its absorption. Therefore in dry soil seed quality can be affected by reduced Ca uptake, even though plenty of Ca may be in the soil. Earlier research showed that higher Ca application can partially offset the decline in seed quality caused by drought. Virginia type peanuts require calcium application. Small runner type peanuts like Georgia Green usually do not respond to gypsum application when soil test calcium is over 600 lb/acre. Larger runner varieties such as Tifguard and Florida-07 have an intermediate need for calcium.

The critical period for calcium absorption begins about 20 days after pegs first enter the soil and extends for at least 40 days after that. The first 10 days of this interval are particularly critical. Depending on the season and planting time, peanuts first peg around 60 DAP in Virginia; so before 70 DAP we want calcium already available in soil solution. **Better early than late with land plaster.**

Landplaster-Calcium Recommendations

Table 10. Landplaster-Calcium Recommendations

Source	% $CaSO_4$	Band (16-18")	Broadcast
		lb/A	
USG Ben Franklin	85	600	-
USG 420 (granular)	83	-	1200
USG 500 (granular)	70	-	1300
Super Gyp 85	85	-	1200
Agri Gypsum	60	-	1800
Texasgulf Gypsum (Phosphogypsum)	50	-	2000
Gyp Soil	85	-	1200

Special Recommendation for Peanut Seed Production

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

a) June 10 - June 30: apply 75 percent of recommended amounts above for non-seed crop.

AND

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

c) 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.

Recommendations for Runner Market Type Peanut Production

Runner market type peanuts require less calcium (Ca) for optimum seed development than Virginia market types. To assess the need for supplemental Ca, soil samples should be taken up to a 3-inch depth in the pegging zone in mid to late June. If the ratio of calcium to potassium (K) exceeds 3 to 1 and the calcium levels exceed 250 ppm, Ca is not recommended. To calculate the ratio of Ca to K, use the following formula:

Ca to K ratio = Ca saturation (%) / K saturation (%)

To calculate Ca concentration in ppm, use the following formula:

Ca ppm = Ca saturation (%) x CEC x 200

The CEC is cation exchange capacity, and it can be found on the soil test result sheets.

Trace-element Requirements

While nitrogen is supplied through the symbiotic relationship with Rhizobium bacteria and phosphorus and potassium residues from previous crops suffice, beside calcium peanut requires minor elements called “trace elements”. For trace-elements, rates and number of applications should be based on soil test results from specialized soil testing laboratories. Virginia Tech provides soil testing through the Soil Testing Laboratory, 145 Smyth Hall (0465), Blacksburg, VA 24061. Soil samples are analyzed for pH (acidity), and content of phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), zinc (Zn), boron (B) and manganese (Mn), and results are expressed in parts per million (ppm) numbers.

Manganese

Manganese is needed in small amounts for peanut production. 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 (leafyellowing) often will occur when soil pH exceeds 6.2. On sandy soils, deficiency symptoms usually will not 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 to 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 while the veins remain green. Nitrogen deficiency is sometimes confused with manganese deficiency when the whole leaf, including the veins, is pale yellow.

Manganese Recommendations

Apply 1 to 3 applications of manganese [Tecmangam, MnSO4, MnCl2, or Mn(NO3)2] as a foliar spray as needed between mid-June and August 15 at the rate of 0.5 to 1.0 lb elemental manganese per acre per application. Manganese sources may be tank-mixed with leaf-spot sprays by earlier recommendations but we have seen sometimes severe leaf burning when mixed with Provost. Cone-type nozzles used 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 and deficiency symptoms are evident, three applications should be made at 2-week intervals, beginning mid-June.

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

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 to 1.0 lb elemental manganese per acre per application. With manganese EDTA chelated products 0.25 to 0.50 lb elemental manganese per acre per application is supplied. EDTA chelated products may be tank mixed with cupric hydroxide and with inorganic sources of boron. Apply early in the morning or on cool days to avoid leaf burn.

Liquid manganese formulations are more convenient but not any more efficient than dry formulations. Make sure liquid formulations use rates are adequate to meet the nutrient requirement. See table below for equivalent liquid rates.

Table 11. Amount of Manganese Product Needed to Supply Equivalent Amounts of Elemental Manganese*

Source	Amounts needed to supply 0.5 lb Manganese per acre
Manganese sulfate 25%	2 lb
Tecmangam 32%	1.6 lb
ManGro DF 31%	1.6 lb
**Liquid 10%	2 quarts
**Liquid 5%	0.6 gal.
**Liquid 1%	4.8 gal.

*Modified from J. Chapin. 2011. Peanut Money-maker Production Guide

**Assumes weight of approximately 10.5 lb/gal.

To calculate how much product (manganese, boron, and magnesium product) to use to achieve a certain element rate follow these steps:

Step 1. Figure the weight of element per gallon

Lb element per gal = % element in product × lb product per gal

Step 2. Figure the gallon of product per acre

Gal product per acre = desired element per acre/lb element per acre

Example:

Step 1.

0.08 × 10.5 lb manganese sulfate per gal = 0.84 lb manganese sulfate per gal

Step 2.

$$\frac{\text{0.5 lb manganese per acre}}{\text{0.84 lb manganese per gal}} = \text{0.6 gal 8\% manganese product per acre}$$

Boron

Boron is needed during kernel development; hence, it should be applied about the time of, or immediately following, flowering. Generally, boron is 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. Do not mix solubor with inorganic sources of manganese due to potential compatibility problems.

Liquid Boron applications are more convenient but not any more efficient than dry formulations. Make sure liquid formulation use rates are adequate to meet the nutrient requirement. See table below for equivalent liquid rates.

Table 12. Amount of Boron Product Needed to Supply Equivalent Amounts of Elemental Boron*

Source	Amounts needed to supply 0.3-0.5 Boron per acre
Boric acid	1.8 – 3.0 lb
Solubor	1.5 – 2.5 lb
**Liquid 10% B	38 oz – 2 quarts
**Liquid 5% B	2.4 quarts – 1 gal.
**Liquid 1% B	3-5 gal.

*Modified from J. Chapin. 2011. Peanut Money-maker Production Guide

**Assumes weight of approximately 10 lb/gal.

Excessive foliar boron is toxic to peanuts

Never exceed a seasonal total of 0.5 B/ac.

Boron Recommendation

Apply 0.3 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:

1.5 lb/A Solubor foliar applied in 10-30 gal spray/A

1.7 lb/A Boron-spray foliar applied in 10-30 gal spray/A

1.8 lb/A Boric Acid foliar applied in 10-30 gal spray/A

Apply boron at the 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, each of 0.25 lb elemental boron per acre, at 2- to 4-week intervals up to August 15 are suggested. Do not mix Solubor with Techmangam, MnS04, MnCl2, Mn(NO3)2, or with leaf-spot disease control products containing cupric hydroxide due to potential compatibility problems.

Magnesium

Peanuts have a low soil test requirement for Mg, but keep an eye on test Mg levels following peanut production. Use of excessive Ca applications to peanuts from land plaster can cause Mg to leach out of the rooting zone and lead to potential deficiencies on rotational crops (corn and cotton) which have much higher soil test Mg requirements. If Mg becomes deficient on soils with pH levels which are too high to lime, you get "boxed-in" because the only affordable way to supply Mg is in dolomitic lime. Peanuts only require a 20 lb/ac Mg soil test. But rotational crops require 60 lb/ac Mg with at least 10% of cation exchange capacity being from Mg. At Mg levels of 120 lb/ac there is no 10% CEC requirement. If the subsoil is within 15" of the surface, Mg leaching should not be a problem.

Zinc Toxicity

Peanuts are very sensitive to zinc. Beware of recommendations for Zn application in peanut rotations. Stunted, dying plants with split stems are a sign of zinc toxicity. Check zinc levels on any new land prior to planting, especially old peach orchards, pecan orchards, fields heavily treated with poultry litter or hog lagoon waste, or fields which zinc was repeatedly applied for high yield corn production. Zinc toxicity also occurs on old building sites around stock pens which had galvanized roofs. Soil test zinc levels of 10 lb/ac can cause toxicity when the soil pH is below 6.0. Liming to increase soil pH can reduce zinc toxicity in contaminated soils. Also make sure the lime source is not contaminated with zinc in fields which already have marginal Zn levels. Fields with Zn levels of 6-10 lb/ac should be limed to at least 6.2 pH; fields with Zn levels of 11 to 20 lb/ac should be limed to at least 6.4; and fields with 20-30 lb Zn/ac should be limed to 6.5. Given the risk of loss on a high value crop, the difficulty of achieving uniform pH, and the non-uniform distribution of Zn in soils, the maximum Zn level in peanut fields should probably not exceed 20 lb/ac.

Tissue Testing

Tissue testing can be useful for diagnosis of potential nutrient deficiencies. To get a representative sample, pick 20 recently mature tetra-foliate leaves from a suspected deficient area and compare to a similar sample from plants without the deficiency symptoms. Leaves should be pulled when dry and placed in a paper bag.

When diagnosing deficiency based on tissue testing always consider soil test evidence and field observations. For example, root stunting from very low pH or herbicide injury causes micronutrient deficiencies in leaves even when the nutrients are sufficient in the soil.

Table 13. Peanut Tissue Test Sufficiency Levels

N (%) 3.50 – 4.50	P (%) 0.20 – 0.50	K (%) 1.70 – 3.00	Ca (%) 0.50 – 2.00	Mg (%) 0.30 – 0.80	S (%) 0.20 – 0.35
Fe (ppm) 50-250	Mn (ppm) 20-350	Zn (ppm) 20 - 60	Cu (ppm) 5 – 20	B (ppm) 20 – 60	

Table 14. Peanut Fertility Checklist*

pH or Nutrient	Soil Test Sufficiency Level (Mehlichl)**	Recommendations / Comments
pH	5.8 to 6.5	Liming to a pH value of 6.4 is useful in maximizing soil Ca levels and reducing Zn toxicity risk where necessary, but Mn deficiency is more likely at high pH levels (see below).
Nitrogen (N)	---	Use liquid in-furrow inoculants on all fields that have been out of peanut production for 3 years.
Sulfur (S)	---	Sulfur has not been a limiting factor on peanut on coastal plain soils. Subsoil S and gypsum (CaSO4) applications can provide more than adequate S nutrition.
Phosphorus (P)	20 lb/ac	The soil test sufficiency level for both P and K on peanut is much lower than other crops because the peanut plant is very efficient at scavenging these nutrients from the soil. Add 40 lb P2O5/ac when soil test levels are medium (11-19 lb P/ac) and 80 lb P2O5/ac when soil test levels are low (<11 lb/ac). **Peanut phosphorus requirements can always be met my maintaining adequate P levels on rotational crops.**
Potassium (K)	40 lb/ac	**Maintaining adequate fertility on rotational crops eliminates the need for K application to peanut.** The soil test sufficiency level for both P and K on peanut is much lower than other crops because the peanut plant is very efficient at scavenging these nutrients from the soil. Excessive K levels can interfere with Ca uptake by pods (see Ca comments).
Calcium (Ca)	600 lb/ac and 3 : 1 Ca to K ratio (Always use gypsum on virginia types)	Runner type peanut yields seldom respond to gypsum application when soil test Ca is 600 lb/ac. However, virginia type peanuts have responded to gypsum even when Ca=1,000 lb/ac. Apply 1,500 lb gypsum (300 lb Ca) at bloom to all virginia type peanuts, all seed production peanuts, and to runners with < 400 lb/ac soil test or a Ca to K <3:1. Apply 1,000 lb/ac gypsum to runners with 400-600 lb/ac soil test. Maintain soil pH with dolomitic lime so both Ca and Mg will remain adequate.

Table 14. Peanut Fertility Checklist* (cont.)

pH or Nutrient	Soil Test Sufficiency Level (Mehlichl)**	Recommendations / Comments
Magnesium (Mg)	60 lb/ac and Mg at least 10% of total CEC for rotational crops	**Soil test Mg levels above 20 lb/ac are considered adequate for peanut.** However, rotational crops will require Mg soil test levels > 60 lb/ac and Mg at least 10% of CEC. Use dolomitic limestone (contains about 200 lb Mg per ton) to maintain soil Mg levels.
Boron (B)	0.5 lb/ac	If soil test B is below 0.1 lb/ac, apply foliar 0.3-0.5 lb B/ac (1.5-2.5 lb Solubor) as a foliar spray in the first fungicide application. Avoid toxicity from excessive B application.
Manganese (Mn)	pH / Mn lb/ac: 5.8 / 6; 5.9 / 7; 6.0 / 8; 6.1 / 9; 6.2 / 10; 6.3 / 10.5; 6.4 / 11; 6.5 / 12	If soil test Mn is below the sufficiency value at the current pH or the target pH when lime is to be applied, apply 0.5 lb Mn (2 lb manganese sulfate 25%, 1.5 lb Tecmangam, or 1.5 lb ManGro DF 31%) with both the 60 and 75 DAP fungicide applications. For pH values above those shown, the Mn sufficiency soil test value is 1 lb higher for each additional 0.1 of a pH unit.
Zinc (Zn)	Toxicity: see comments Deficiency: 1.6 lb/ac	Soil test Zn levels of 10 lb/ac can cause toxicity when the soil pH is below 6.0. To prevent Zn toxicity, lime to the pH targets listed. Given the risk of loss, the difficulty of achieving uniform pH, and the non-uniform distribution of Zn in soils; fields with Zn levels over 30 lb/ac should probably not be planted in peanuts. Zn deficiency is more likely at high pH, high soil Ca, and high soil P levels. A Zn soil test level of 1.6 lb should be adequate even under these conditions.
Copper (Cu), Chlorine (C1), Iron (Fe), Molybdenum (Mo)		There is no evidence for deficiency of these micronutrients in coast plain peanut production.

* Modified from J. Chapin. 2011. Peanut Money-maker Production Guide

** If soil test results come with amounts expressed in parts per million (ppm) multiply with 2 to get lb/ac.

Irrigation

To grow and yield profitably, peanut needs regular water throughout the growing season. Figure 1 shows the close relationship between rainfall and pod yield in 30 varieties tested in PVQE trials in Virginia and North Carolina. The data in Fig. 1 suggest a yield bonus of 200 lb/acre for each inch of water received by the crop. Critical peanut growth stages for water are emergence, flowering, pegging, and pod filling, and availability of one-inch water per week until beginning seed and up to 2 inches per week thereafter will result in high yields. Southeastern Virginia climate usually provides adequate rainfall amounts until beginning seed with weekly averages around an inch. However, for the later part of the season, weekly averages range from 0.5 to occasional 2 inches. Keep in mind; the averages here are from 2000 to 2017. Within individual years, we have seen weeks with no rain in July and August. Therefore, irrigation is critical to supplement weekly water needs of the plants.

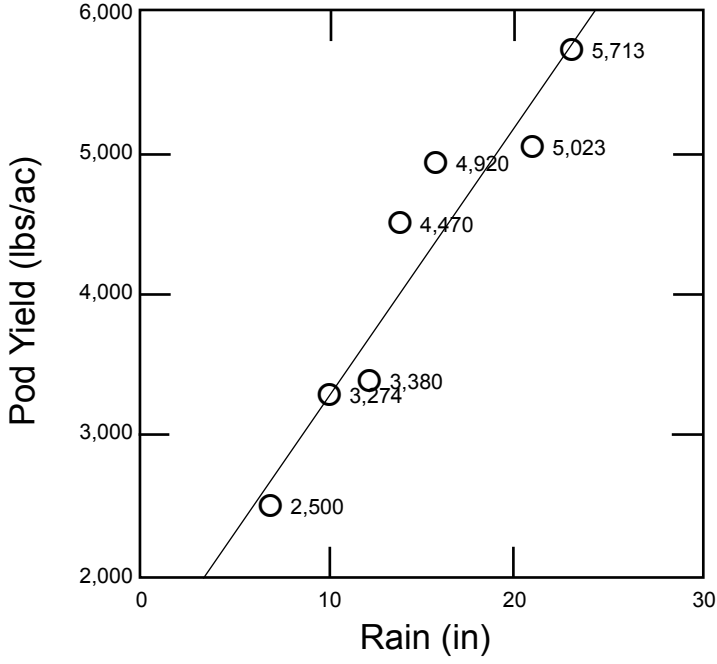


Figure 1. The dependence of yield on the amount of water received from planting to maturity.

Irrigation is critical in peanut production also because it allows better use of the inputs. Water is needed to move Ca from land plaster into the pegging zone and to keep soil Ca in solution and available to the pods.

Irrigation also improves the effectiveness of herbicides, soil fungicides, and insecticides. Without timely rain or irrigation, these inputs can be wasted. Irrigation lowers soil temperatures, which allows for normal peg development and greatly reduces aflatoxin risk.

Irrigation is also the best insect control available in that it makes the peanut plant much less susceptible to some of the most costly pest: lesser cornstalk borer, burrower bugs, corn earworm, and spider mites.

When irrigation is not available, drought tolerant varieties should be planted, in particular in fields and locations that historically are more prone to drought stress. The effect of irrigation on pod yield and value, and how Virginia and runner peanuts respond to irrigation is shown in Table 15a.

Table 15a. Effect of irrigation on pod yield and value of runner and Virginia-type peanut cultivars at two locations in 2016

	Dinwiddie, VA (2.6", 3 times)				Capron, VA (4", 2 times)			
	Irrigated		Non-irrigated		Irrigated		Non-irrigated	
Variety	Yield	Value	Yield	Value	Yield	Value	Yield	Value
	lb/acre	*$/acre*	*lb/acre*	*$/acre*	*lb/acre*	*$/acre*	*lb/acre*	*$/acre*
Bailey	5048 b*	892 c	3915 b	594 c	4197 ab	784 a	3627 ab	458 a
Sugg	4993 b	863 c	3831 b	551 c	4339 ab	880 a	3720 a	448 a
Sullivan	5075 b	878 c	3984 b	561 c	3774 b	666 a	3976 a	523 a
Wynne	4800 b	812 c	4056 b	560 c	4590 ab	871 a	3825 a	400 a
TUFRunner 297	5048 b	892 c	3915 b	594 c	4197 ab	784 a	3627 ab	458 a
TUFRunner 511	4993 b	863 c	3831 b	551 c	4339 ab	880 a	3720 a	448 a
Georgia 09B	5075 b	878 c	3984 b	561 c	3774 b	666 a	3976 a	523 a
FloRun 107	4800 b	812 c	4056 b	560 c	4590 ab	871 a	3825 a	400 a
Florida 07	5048 b	892 c	3915 b	594 c	4197 ab	784 a	3627 ab	458

*Averages followed by the same letters are not statistically different.

Growth and Development

Germination

Plants require a minimum or "base" temperature to germinate, grow, and produce yield, which is crop specific. For peanut, base temperature is 56° F. Beside temperature, seeds also need water and oxygen to germinate; water uptake is the first step in the resumption of active growth by quiescent seed after storage. Pre-harvest conditions can also influence germination. Soil fertility and nutrition, calcium uptake, and drought during seed development can affect germination and seedling vigor even under optimum temperature, moisture, and oxygen conditions. For example, soil moisture and soil calcium interact to influence pod uptake of calcium and thus affect peanut seed quality. Harvest, storage, and handling play important role in germination, too. For example, when seed moisture is high, excessively high or low temperatures may reduce seed quality.

Seed dormancy is an important factor in commercial peanut production. In Virginia type peanut dormancy may last up to 4 months, and the duration appear to depend on cultural practices, weather conditions at harvest, and storage conditions. For example, pods harvested later had seed with less dormancy than those harvested earlier. Seeds are more dormant during dry than wet harvest seasons.

Growth

Optimal temperature for peanut growth is between 77 and 86° F. Plant growth is significantly slower at temperatures below 60 and over 95° F. Leaf and stem weights increase up to a maximum value which occurs at about 90 to 100 days after planting (DAP). Good vine production is necessary for a good pod yield. Drought and heat can reduce vine production and therefore yield, even though peanut is an indeterminate plant. As such, peanut can resume growth after a drought episode even during the reproductive period, re-bloom and produce another crop of pegs. However optimal yields are produced when drought stress is avoided and extreme temperatures are minimized during the critical 60-100 DAP interval.

Development

Optimum temperature for peanut flowering and fruit-setting is between 83 and 91° F. Drought and heat stress reduces flower production and pollination, and extreme soil surface temperatures cause peg abortion. Peanut pollination and seed set hold up well under low weather as long as daily maximum temperatures do not exceed 97° F. Even under the most ideal conditions, maximum peanut pollen viability is about 90% and maximum seed set is about 75%. Above 97° F maximum temperature there is decline in both pollination and seed set. If the daily high temperature reaches 104° F pollen viability can drop to around 70% and seed set to around 50%. Although standard weather station temperatures seldom reach 104° F, peanut canopy may be greater than that measured in weather station shelters in sensitive varieties, and may be lower in tolerant once. Therefore development and use of tolerant varieties is critical in dry and hot years.

Temperature requirements to reach pod maturity can be thought of in degree days where the base temperature (56° F) is subtracted from the average daily temperature and summed over a period of time starting from planting. For example, a medium maturity Virginia type peanut such as Bailey requires about 2590 degree days (DD) after emergence to mature.

Table 15b. Peanut Growth Stages

Approximate Number Days after Planting*	Growth Stage	Description
7	Emergence	Seedling “cracking” the ground and cotyledons visible
45	Flower (R1)	One-half of the plants with a bloom
55	Beginning Peg (R2)	First visible peg
70	Beginning Pod (R3)	Peg tip swollen to twice the peg diameter
75	Full Pod (R4)	Fully-expanded pod, to dimensions characteristic of the variety
80	Beginning pod-fill (R5)	Pod in which seed is visible in cross-section
90	Full Size Seed (R6)	Seed is filling the pod cavity
130	Beginning Maturity (R7)	Pods having interior hull color and orange to brown mesocarp
150 - 160	Harvest Maturity (R8)	70% of harvestable pods have an orange, brown, or black mesocarp (scrape pod saddle with knife) and interior hull color (crack pod open)
165 – 170	Over-mature (R9)	Kernels in oldest pods develop tan-brown seed coat and pegs may have deteriorated; over-mature pods have coal-black mesocarp color

* Based on average of 30 Virginia type varieties planted on May 1 at Tidewater AREC. The numbers of days after planting increase for earlier and decrease for later plantings. If June is dry, these numbers are bigger from R1 through R4 and smaller afterwards.

Use of Growth Regulators: If vine growth control is needed for digging, Apogee (7.25 oz/ac) can be applied when 50% of the laterals touch in the row middle. A second application is made at 100% row closure. Treating “marker rows” such as the middle two of a 6-row digger pass is more cost-effective than broadcast treatment.

Effective uptake of Apogee requires addition of nitrogen to the spray solution. Use 1 pt urea / ammonium nitrate (UAN) or 1 lb ammonium sulfate (AMS) per treated acre. One quart crop oil concentrate per treated acre is also recommended.

Harvest Maturity

Determining when to dig is the most critical decision of the peanut production. Digging at the right time gives the farmer the maximum yield and grade. If dig is too early, grading factors will be lower. If dig is too late, over-mature pods can lose peg strength resulting in yield loss. There are several methods to determine the optimum digging time.

Days after Planting: This and other guides include information on the number of days after planting (DAP) that each variety needs to mature. For example, CHAMPS is the earlier Virginia-type variety available and it can mature in 135-140 DAP in Virginia, followed by Bailey, Emery, Sugg, and Sullivan with reachable maturity in 140-145 days from planting, and Gregory and Wynne with 145-150 DAP necessary to reach maturity in Virginia (Table 5). However, DAP is a general information on maturity and it should never be used alone for determining the digging date. The DAP information should rather be used to schedule planting date, and select varieties to allow spread out of planting and harvest on large acreages.

Heat Units or Degree Day Method: In order to mature, peanuts have certain temperature requirements over the growing season. For example, if the base temperature (56° F) is subtracted from the average daily temperatures (because plants will not grow bellow 56° F) and the remaining heat units are cumulated over time, from May to October there will be approximately 3000° F or degree days (DD). A medium maturity variety such as Bailey will only require 2590 DD to reach maturity. Like the DAP, the DD method is also imprecise because other factors beside temperature are important for peanut maturation. For example water, from rain or irrigation, is very important and in dry years maturity is delayed. Heat units for peanut are recorded daily at the Tidewater AREC for access by phone or internet at http://www.ipm.vt.edu/infonet/. Regional advisories for ~~Caron~~, Waverly, Suffolk, and Skippers are available by calling (800) 795-0700 (see the Peanut Disease chapter).

Hull Color Method: Pod maturity can be determined by scraping away the outer hull layer with a knife or blasting with a pressure washer (with oscillating turbo nozzle and not high psi) to reveal the color of the middle layer of the mesocarp. As peanuts mature the mesocarp color changes from white to yellow, orange, brown, and then to black. Based on hull color, Virginia-type varieties are ready to dig when 70% of pods are in the orange, brown, and black combined, 20-30% in brown and black categories combines, and only 1-2% dark black. For runners the target is to have 75% in the orange, brown, and black combined, 30-40% in brown and black categories combines, and only 5% dark black. **Maturity charts** can be used for easy identification of the percentages of pods within each color group and determine how far the sample is from optimum digging. The pods are first scraped or blasted and then laid on the charts.

Tidewater AREC and county agents co-organize pod blasting events for farmers. Please contact your county agent and let him/her know that you are interested to participate. You will bring pod samples from various fields and we will do the work for you! Please keep in mind that several determinations need to be done starting from 120 DAP in order to more precisely find the optimum digging time for each field.

Peanut Grading Definitions and Economic Significance

The following definitions are intended to assist growers in understanding the economic significance of peanut grading terminology.

Farmers' Stock Peanuts: The peanuts the grower brings to the buying point.

FM (foreign material): Everything other than loose peanut kernels and in-shell peanuts in the farmers' stock sample. Foreign material includes dirt, peanut vines, sticks, stones, insect parts, peanut hulls, and "raisins" or "twisters". Raisins or twisters are very immature, shriveled pods which cannot be commercially shelled.

Foreign material is the first component to be separated from the grade sample of farmers' stock peanuts. There is no penalty for foreign material up to 4%. At 5% FM there is a 0.05 cents/lb ($ 1/ton) penalty which increases with additional % FM. At 10% FM, the penalty is 0.3 cents/lb ($6/ton or $12/ac for 2-ton peanuts). Foreign matter penalties may vary at different buying points. For example, some charge no penalty up to 7%, but then impose a $10/ton cleaning fee.

LSK (loose shelled kernels): Kernels and parts of kernels which are free from the hull in a load of farmers' stock peanuts.

LSKs are the second component separated out in grading. **LSKs are undesirable** because they spoil **more rapidly and are more likely to be contaminated with aflatoxin**. LSKs are checked for Aspergillus mold by the grader.

LSKs are worth only$0.07/lb ($140/ton) vs. $0.18/lb ($360/ton) for an "average" 72% TSMK load. So **each percent LSK results in a $2.20/ton loss ($4.40/ac for 2-ton peanuts)**.

At this point the grade sample has had the foreign material and LSKs removed. The remaining intact pods are then run down a set of sizing rollers to pre-size them for proper shelling and to determine the percent of "fancy pods" for virginia types.

Fancy Pods: The percentage of fancy (larger) pods is determined (virginia type only) by the percentage which rides a 34/64" roller spacing. The grower is not rewarded for fancy pods other than that they must meet the 40% fancy pod minimum to qualify for the virginia type market.

At this point the sample is shelled and the kernels will be mechanically shaken on screens.

ELK (extra large kernels): An ELK screen is used only for virginia types. ELK is the percentage by weight of kernels from the shelled sample that rides a 21.5/64 x 1" screen. There is a premium of 0.0175 cents/lb (36 cents/ton) for each percent ELK. A 40% ELK has a premium value of $14.40/ton (about $29/ac for 2-ton peanuts).

SMK (sound mature kernels): The percentage by weight of kernels from the shelled sample that rides a 15/64 x 1" (virginia type) or a 16/16 x ¾" (Runner type) screen.

Each percent increase in SMK increases peanut value by about $5.00/ton. See TSMK below.

SS (sound splits): The percentage by weight of kernels from the shelled sample that consists of undamaged split kernels or broken kernels (undamaged ¼ to ¾ kernel pieces; pieces less that ¼ kernel remain in OK (other kernel category); pieces larger than ¾ kernel are considered SMKs.

There is no sound split penalty up to 4% and for each percent above 4, the penalty is only 80 cents per ton.

TSMK (total sound mature kernels): TSMK is the total of SMK (sound mature kernels) + SS (sound splits). ELKs (extra large kernels) are also included in TSMK for Virginia types.

This is the number that counts. Each percent increase in TSMK is worth about 0.25 cents/lb ($4.96/ton), or about $10.00/ac for 2-ton peanuts. So a 1 point increase in TSMK is worth more than a 10 point increase in ELK. Higher TSMK also correlates with higher yield.

OK (other kernels): The percentage by weight of kernels from the shelled sample that falls through the SMK screen. Other kernels are mostly smaller, less mature kernels. Pieces of broken kernels less than ¼ kernel size are also included in other kernels.

Other kernels are worth less than sound mature kernels. When you look at a grade sheet this might not be clear because as the percent of OKs increases from left to right on the price sheet, the sample value increases about 0.07 cents/lb ($1.40/ton) for each point increase. So it might look like higher OK values are good news, but compare that 0.07 cent/lb increase to the 0.25 cent/lb ($4.96/ton) value of a 1 point increase in TSMK (read up the chart). Immature kernels (OKs) are work something, but mature kernels (SMKs) are worth more.

DK (damaged kernels): The percentage by weight of kernels from the shelled sample that are judged to be inedible due to decay, mold, insect damage, sprouting (>1/8"), discoloration or pitting darker than light yellow, freeze damaged, or skin-discoloration (<25%).

Although graders do have picture and definition guidelines, **the determination of damaged kernels is somewhat subjective.** Minor pitting, discoloration, or other damage to the kernel skin or flesh does not constitute a damaged kernel. Notice that broken kernels are also not included in damaged kernels; instead they are classified as sound splits and thus contribute to TSMK.

Damaged kernels are the major component of total damage penalties – see below.

Freeze Damage: The percentage by weight of kernels from the shelled sample that have characteristics of freeze damage such as hard, translucent, or discolored flesh. This damage is included in damaged kernels (DK) and thus contributes to total damage.

Concealed Damage (RMD): Concealed damage – rancid, moldy, or decayed, is damage detected after the kernel sample is put through a kernel splitter and examined on a belt. This damage is added to DK to determine total damage.

Total Damage: The sum of damaged kernels (DK), including freeze damage and concealed RMD.

Once total damaged kernels reach 2.5% by weight, the penalty can be catastrophic. At damage levels slightly above 2.5%, the peanuts can sometimes be cleaned (~$10/ton cleaning fee). If they can't be cleaned below 2.5% damage, the load is classified as segregation II and is consigned to the oil market, with a potential value as low as $125 per ton (35% of loan value).

Hulls: The percentage by weight of hulls from the shelled sampled. Although no grade premiums or penalties are based on hull weight, the lower the percentage hull weight, the higher the grade. Hull weights in the lower twenties indicate excellent grades because they indicate that the total kernel weight is in the high seventies.

***Aspergillus flavus* mold:** This is mold that produces aflatoxin. Only three grade components are examined for the presence of *A. flavus* mold (LSKs, OKs, and DKs) because these components have the greatest risk. The grader indicates on the grade sheet that *A. flavus* either was or was not detected.

Detection of *A. flavus* is bad news. Detection results in the lot being cleaned (~$10/ton cleaning fee) and re-examined. If the contamination is not adequately removed by cleaning, **the peanuts are consigned to segregation III for the oil market, with a potential market value as low as $125/ton (35% of loan value).**

Table 16. Peanut Grading Terms

Grading Term	Definition	Penalty or Reward
FM Foreign Material	Everything but in-shell peanuts and loose kernels.	No penalty up to 4%. At 5% lose $1/ton and increases with each %. FM not usually a problem even in strip-till.
LSK Loose shelled kernels	Kernels free from the hull	With each percent LSK you lose $2.20/ton. More importantly, LSKs associated with & checked for aflatoxin.
Fancy pods	Pods big enough to ride a 34/64" roller spacing	No reward or penalty. Only varieties with 40% fancy pods qualify as Virginia types
ELK Extra large kernels	Kernels big enough to ride a 21.5/64 x 1" screen (Virginia types only)	Premium of $0.36/ton for each percent ELK. So a 40% ELK has a $14.40/ton premium. A variety with 10% higher ELK worth only $3.60/ton more.
SMK Sound mature kernels	Kernels mature enough to ride a screen standard: 15/64 x 1" (Virginia type) or 16/64 x ¾" (runner type)	Each percent SMK increases value by about $5.00/ton (see TSMK below).
SS Sound splits	Undamaged split kernels in the shelled sample.	No penalty up to 4%; $0.80/ton penalty for each percent above 4%.
TSMK Total sound mature kernels	ELKs + SMKs + SSs (only Virginia types are graded for ELKs)	This is the important number. **Each percent TSMK increases value by about $5.00/ton. So a 1% increase in TSMK is worth more than a 10% increase in ELK.**
OK Other kernels	Smaller, immature kernels that fall through the SMK screen standard.	Each percent increase in other kernels detracts from the sound mature kernels.
DK Damaged kernels	Kernels judged to be inedible due to mold, insect damage, sprouting, or freeze injury.	At or above 2.5% the penalty is severe because if the load can't be cleaned ($10/ton cleaning fee) it is considered segregation II with an oil market value as low as $125/ton (35% of loan).
FD Freeze damage	Freeze damage is included in damaged kernels.	Same as DK penalty above.
Concealed RMD Concealed damage-rancid, moldy, decayed.	Damage detected after kernels in the grade sample are split in half.	Cannot exceed 1% or the load becomes segregation II.
TD Total damage	The total of damaged kernels, freeze damage, and concealed damage.	Same as DK penalty above.
Aflatoxin	A toxin produced by *Aspergillus flavus* and related molds.	If the load can't be cleaned, it goes into segregation III – the oil market (as low as $125/ton). LSKs, DKs, and OKs are checked for *Aspergillus*.

Table 17. Peanut Management Calendar

BEFORE PLANTING	
September-November	Collect soil samples from fields for nematode assay to determine risk of nematode damage in fields to be planted with peanut next year. Assay forms, sample bags, and instructions are available at the Tidewater AREC, and the contact person is Dr. Hillary Mehl (hlmehl@vt.edu).
January	Soil test: Soil Testing Laboratory results will show if a nutrient is low or high; alternatively compare soil test values with the sufficiency levels in Peanut Fertility Checklist table. Lime application, if needed.
February	Take advantage of invited, out-of-state speakers on peanut production at the State Peanut Production Meeting. Plan land preparation for conventional tillage.
March	Early decisions on variety selection. The Peanut Variety and Quality Evaluation books may help you with the decision. Electronic copies are available at http://pubs.ext.vt.edu/category/crops.html.
Early April	30 days pre-plant, burn down weeds or cover crop for strip-tillage.
Late April	If Vapam fumigation is needed for CBR control, it should go out at least 14 days pre-plant when there is good soil moisture, minimal risk of rain within 3 days of application, and soil temperature is at least 60° F and forecast is for warming temperatures.

PLANTING TO DIGGING

Approx. Days After Planting	Date: Assumes 1 May Planting	Growth Stage	Management Steps
0	1 May	Planted	- Check seed germ on seed bags and plant seed with highest germination in early plantings and lower germination seed in later plantings when soil temps are 70˚ or higher. - Plant 3-4 seeds/row ft into good moisture at 1.5” depth (max. 3” if necessary). - Inoculate all new fields and fields out of peanuts for 3 years with liquid in-furrow inoculants. Hit the center of furrow! - Use in-furrow Thimet (phorate) 5 lb/acre, Admire Pro at 7-10.5 oz per acre, or Valum Total 18 oz/acre for thrips. Note that liquid in-furrow Orthene (acephate) is not labeled. - Spread planting dates of large acreage over 2-wk interval to spread harvest maturity. - Optimal planting interval about 1-15 May.

Table 17. Peanut Management Calendar

PLANTING TO DIGGING (cont.)

Days After Planting	Date: (if planted 1 May)	Growth Stage	Management Comments
0-2	1-2 May	---	- If Prowl or Sonolan are used, it must be applied at planting or within 2 days of planting. Intro and Dual can be tank-mixed.
7	7 May	Cracking Emergence	- A pegging zone (4" depth) soil test can be used to re-evaluate Landplaster needs on runner types.
7-28	7 – 28 May	Seedling	- Apply Gramoxone (plus Basagran or Storm) when needed to control first weed flush from cracking through seedling stage. - If thrips injury/stunting occurs after emergence a foliar Orthene treatment is recommended.
45	14 June	Bloom (R1)	- Land plaster applied at bloom 40 DAP (early better than late). - Typical Cadre appl. timing is about 35 DAP (no later aws it may damage peanuts if vines are too big and the herbicide reaches them). - If 2 Gramoxone applications are used instead of Cadre, the second application must be made within 28 days after cracking (about 35 DAP)
55	24 June	Beginning Peg (R2)	- Boron and manganese can be tank-mixed with the first herbicide or fungicide if indicated by soil test (<0.4 lb). - Water is needed to move gypsum into the pegging zone and sustain pod development: irrigate if it is needed and you can. - Check to see that the taproot has active nodules if inoculation problems are suspected (yellow plants). - Start weekly spot check for hopperburn on field edges.

Table 17. Peanut Management Calendar

PLANTING TO DIGGING (cont.)

Days After Planting	Date: (if planted 1 May)	Growth Stage	Management Comments
70	9 July	Beginning Pod (R3)	- 1st application of fungicide for leaf spot and stem rot control (Provost, Abound, etc.) should be applied at beginning pod stage where peanuts are planted in a 2- or 3-yr rotation. Fungicide application can be delayed until beginning seed stage (R5) if peanut is planted in rotations of 4 yrs or longer. All subsequent leaf spot sprays should be applied according to the Virginia Peanut Leaf Spot Advisory and Sclerotinia Blight Advisory Programs available on the Peanut/Cotton InfoNet (http://webipm.ento.vt.edu/cgi-bin/infonet1.cgi) or Peanut Hotline at 1-800-795-0700. - Use Storm, Basagran or Select if needed for grass control. It usually takes a minimum of 60 DAP to close the canopy. - If Lorsban 15G is used to prevent soil insects, it should be applied during pegging (about the first week of July).
75	14 July	Full size pod (R4)	- Check Peanut/Cotton InfoNet and Peanut Hotline for last effective spray dates for leaf spot and Sclerotinia blight control. - Mn can be tank-mixed with the 60 DAP fungicide appl. if required by soil test. - Spot spray escaped grasses with Select or Poast Plus. - Most critical water use period begins; apply 1.0 – 1.5”/week minus rain 60-110 DAP. - Apogee growth regulator timing is 50% vines touching for 1st application and 2nd application at 100% row closure.

Table 17. Peanut Management Calendar

PLANTING TO DIGGING (cont.)

Days After Planting	Date: (if planted 1 May)	Growth Stage	Management Comments
80	19 July	Beginning Seed (R5)	-- 1st application of fungicide for leaf spot and stem rot control should be applied no later than beginning seed stage in fields with a 4-yr or longer rotation of peanut. - Check last effective spray date for control of leaf spot and Sclerotinia blight. Scout fields for leaf spot, Sclerotinia, and stem rot weekly for early detection of disease problems. - Check weekly for corn earworm and fall armyworm starting around 1 Aug. through first week of September.
90	29 July	Full Size Seed (R6)	- Under severe drought stress watch for spider mite hits in late August to September, particularly where Lorsban is used.
110	18 Aug.	Oldest pods show internal hull color (R7)	- Continue spraying fungicide according problems found when scouting fields and last effective spray dates on the Peanut/Cotton InfoNet and Peanut Hotline.
130	7 Sept.	Early Maturity (R7)	- Begin checking fields for maturity to plan digging dates. Use the hull scrape method to determine the percentage in white, yellow, orange, and brown-black hull color categories. - Continue spraying fungicide according with problems found when scouting fields and last effective spray dates on the Peanut/Cotton InfoNet and Peanut Hotline. The final spray of fungicide for leaf spot control should be chlorothalonil (Bravo or generic) for resistance management. - Irrigate between110-130 DAP 0.75-1.0”/wk as needed to prevent wilting. - Have digger and combine ready to go.

Table 17. Peanut Management Calendar

PLANTING TO DIGGING (cont.)

Days After Planting	Date: (if planted 1 May)	Growth Stage	Management Comments
150 - 160	27 Sept. – 7 Oct.	Harvest Maturity (R8)	- Monitor Virginia Peanut Frost Advisory available at (http://webipm.ento.vt.edu/cgi-bin/infonet1.cgi) or Peanut Hotline at 1-800-795-0700 from October 1 until completion of harvest. Do not dig peanuts when a freeze is forecast occur in the next 3 to 5 days. Freshly dug peanuts contain high moisture (28-30%) and will sustain freeze damage that can reduce value to as low as 7 cents/lb compared to 25 cents or higher for peanuts without freeze damage. - Never dig strictly based on DAP. Variety, seasonal temperature and rainfall determine maturity. Use hull color guidelines to verify harvest maturity. - Optimum dig for Virginias: 70% pod color (orange + brown + black); 20-30% brown + black; 1-2% coal black; 132-135 days for medium maturity varieties. - Optimum dig for runners: 70-75% pod color (orange + brown + black); 30-40% brown + blacks; 5% coal black; 140 days for medium maturity varieties. - In October check for velvet bean caterpillar defoliation on the latest maturing fields.
170	17 Oct.	Over-mature (R9)	- Even on healthy plants, by 170 DAP there is a very high risk of pod loss from deteriorating peg strength on over-mature Virginia type pods.

WEED CONTROL IN PEANUTS

David L. Jordan, Professor, Weed Science, North Carolina State University

Escalating, efficient and effective weed control is very important to optimize peanut yield and economic return. Failure to control weeds almost always results in lower yields through weed interference and decreased digging efficiency. Detailed information on the use of herbicides cannot be included in a guide such as this. Refer to product labels for use suggestions and restrictions. Proper application is required to obtain satisfactory weed control and minimize carry-over residues.

Soil incorporation is necessary for some herbicides. Compliance with the label directions for incorporation is very important in obtaining effective weed control.

With postemergence herbicides, good spray coverage of the target plants, treatment at the proper stage of weed development, and use of relatively small droplets of spray under relatively high pressure are required to insure good control.

Effective weed management requires integration of all control strategies.

Crop Rotation

Peanuts should be grown in rotation with corn, grain sorghum, and/or cotton to aid in management of various pests including weeds. Crop rotation allows for the use of different types of herbicides on the same field in different years. A good rotation and weed management system in each crop prevents the buildup of problem weeds in the field. Most annual and perennial broadleaf weeds can be controlled more economically and easier in corn than in peanuts. For example, there are no registered herbicides for use in peanuts that will effectively control perennial broadleaf weeds such as horsenettle, trumpetcreeper, or maypop passionflower.

Crop Competition

Peanuts are relatively poor competitors with weeds. Horsenettle, common lambsquarter, cocklebur, and palmer amaranth have been shown to reduce yield by 17, 40, 70, and 28 percent, respectively. Fewer weeds are required to reduce yield and quality of peanuts than for most other crops. Generally, if peanuts are kept weed free for 6-8 weeks after planting, peanut yield will not be reduced by weed competition. However, late-season weeds often interfere with digging and combining of peanuts and reduce harvesting efficiency and peanut quality.

Cultivation

Cultivation is often required to supplement chemical weed control. In addition, cultivation permits banding of herbicides, which reduces herbicide costs. Cultivations must be flat and non-dirting. Soil must not be moved upon or around the peanut plant. Such soil movement results in physical damage to the peanut plant and often results in increased disease problems.

Weed Identification and Scouting

Proper weed identification is essential. Generally, one herbicide will not control every weed present in a typical field. Every field should be scouted and mapped for weeds present. Using graph paper, a grower should mark the approximate location of weeds in the fall of each year. Weeds present in the fall will generally have set seed and will be present the following year. Weed seeds often will stay viable in the soil for several years. As a result, they will be a problem for many years. By knowing what weeds to expect, a grower will be able to make more intelligent decisions on herbicide selection and save money and time in the process.

Herbicide Selection

To develop a herbicide program, a grower must know what weeds are present, the soil characteristics of the field, and herbicide limitations and capabilities. Seldom will one herbicide provide control of all weeds present. As a result, several herbicides must be used together for a successful program. By knowing what each herbicide provides to the program, the grower may eliminate expensive duplication or choose the herbicide that provides the best overall balance of weed control capabilities, crop safety, and economic return.

Problem Weeds

Perennial Broadleaf Weeds

Perennial broadleaf weeds such as horsenettle, alligatorweed, Virginia buttonweed, trumpetcreeper, maypop passionflower, and bigroot morningglory cannot be controlled in peanuts. These weeds can be controlled in corn grown in rotation with peanuts. In corn, make a layby application of 1.0 pt/A of 2,4-D amine plus surfactant. After corn harvest, spot spray any remaining infestations with glyphosate or a mixture of 1.0 pt/A of 2,4-D amine plus 0.5 pt/A of Clarity plus surfactant. See glyphosate product labels for suggested application rates.

Bermudagrass

In addition to controlling bermudagrass in the field, efforts should also be directed at controlling bermudagrass on field edges. This prevents encroachment into the field.

Ideally, control procedures should begin in the fall following corn harvest. This allows the grower several options and reduces the risk of yield reduction. After corn harvest, mow the stalks. If the bermudagrass foliage appears wilted or damaged, set the mower low to remove the old foliage. Do not till; allow the bermudagrass to regrow (8-10 inches tall) and be actively growing before applying glyphosate at 3.0 lb ai/A in a spray volume of 15 gpa using flat fan nozzles and 30-40 psi. Apply at least two weeks before frost and wait 14 days before tillage. Using moldboard or chisel plow followed by several diskings spaced at 4-6 week intervals (during the fall and winter if soil conditions allow) is most effective.

Glyphosate may also be applied in the spring. Remove old thatch by burning or mowing. Allow bermudagrass to regrow before applying 3 quarts of glyphosate as described above. Wait 14 days before seedbed preparation.

Two applications of Poast or clethodim (various formulations) in combination with good crop competition will usually provide good control or suppression of bermudagrass. See Table 4 for application rates and weed size for treatment. Always include a recommended adjuvant in the spray mixture.

Nutsedge

Both yellow and purple nutsedge occur in peanut fields. Know which nutsedge species is present; management practices vary for the two species.

Fields infested with yellow nutsedge should receive a preplant-incorporated or preemergence application of Pursuit, Outlook, Strongarm, or Dual Magnum. Pursuit, Outlook, or Dual Magnum may also be used as ground-cracking applications. Basagran may be applied postemergence when the yellow nutsedge is 6-8 inches tall. Apply 1.5-2.0 pt Basagran per acre. A second application of Basagran at same rate 7-10 days later may be required. The addition of 1 quart per acre of crop oil concentrate with Basagran will improve control. Either Cadre or Pursuit plus nonionic surfactant or crop oil concentrate may be applied for control of either yellow or purple nutsedge at the 1-4 inch stage.

Purple nutsedge is not controlled by Basagran, Outlook, or Dual Magnum. Soil incorporated or preemergence treatments of Pursuit or Strongarm provide suppression of purple nutsedge.

Broadleaf Signalgrass and Texas Panicum

These two annual grasses are becoming more widespread in Virginia's peanut production area. Because management programs vary for the two species, it is important to have accurate information concerning the species present.

A management program for broadleaf signalgrass should begin with a preplant-incorporated treatment of Prowl, Sonalan, Dual Magnum, Warrant, or Outlook. The preplant-incorporated treatment should be followed by a preemergence or ground-cracking application of Dual Magnum, Warrant, or Outlook. Broadleaf signalgrass which escapes soil treatments may be controlled with postemergence application of Poast or Select Max. Cracking stage application of Paraquat (various formulations) effectively controls seedling broadleaf signalgrass.

Texas panicum is not effectively controlled by Dual Magnum, Warrant, Zidua, Outlook, Intrro, or Pursuit. Management should begin with a preplant-incorporated application of Prowl or Sonalan. Texas panicum may emerge from deeper in the soil than other annual grasses. As a result, Prowl or Sonalan should be incorporated to a depth of 3 inches (this is deeper than specified on Prowl label). Dual Magnum, Warrant, Outlook, or Intrro applied preemergence or at ground-cracking provides some suppression. Texas panicum which escapes soil treatments may be controlled with postemergence application of Poast or Select Max. Cracking stage application of Paraquat (various formulations) also effectively controls seedling Texas panicum.

Table 18. Recommended Herbicides for Weed Control in Peanuts

Preplant Incorporated			
Weed Problem		**Product Per Acre**	**Remarks**
Crabgrass, goosegrass, fall panicum, johnsongrass, broadleaf signalgrass, Texas panicum, carpetweed, lambsquarters, pigweed	Pendimethalin 0.75-1.0 lb	Prowl 3.3EC 1.8-2.4 pt or Prowl H_2O 3.8 lb/gal 1.6-2.1 pt	Incorporate into the top 1 to 2 inches within 7 days of application. Incorporate 3 inches deep for Texas panicum (note this is deeper incorporation than the label specifies). Use higher rate for broadleaf signalgrass, fall panicum, or Texas panicum. May be tank mixed with Dual Magnum, Strongarm, Pursuit, Warrant, or Outlook for control of mixed infestations of nutsedge and annual grasses.
	Ethalfluralin 0.56-0.75 lb	Sonalan 3HFP 1.5-2.0 pt or Sonalan 10G 5.5-7.5 lb	Incorporate 2 to 3 inches deep within 2 days of application (incorporation as soon as possible after application is preferred). For Texas panicum incorporate 3 inches deep. Use higher rate for fall panicum, Texas panicum, or broadleaf signalgrass. See label for application rates for particular soil. May be tank mixed with Dual Magnum, Pursuit, Strongarm, Warrant, or Outlook for control of mixed infestations of nutsedge and annual grasses.

Table 18. Recommended Herbicides for Weed Control in Peanuts				
Preplant Incorporated (cont.)				
Weed Problem			**Product Per Acre**	**Remarks**
Broadleaf weeds and suppression of nutsedges	Diclosulam	0.024 lb	Strongarm 84WDG 0.45 oz	Incorporate into the top 3 inches of soil within 4 weeks of planting. When applied in tank mixture with other herbicides, follow incorporation directions for the tank-mix partner. May be tank mixed with Dual Magnum, Prowl, Sonalan, Pursuit, Warrant, or Outlook for improved control of nutsedge and annual grasses. Growers are cautioned that Strongarm applied at rates exceeding 0.024 lb/A can injure cotton the following year on soils with a shallow hardpan (less than 10 in) and/or loam soils. Cotton grown under early season stress resulting from conditions such as excessively cool, wet, dry, or crusted soils may be particularly susceptible to carryover of Strongarm.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge	s-Metolachlor 0.95-1.27 lb		Dual Magnum 7.62EC 1.0-1.33 pt or Dual II Magnum 7.64EC 1.0-1.33 pt	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 1/2 rate applied PPI and 1/2 rate applied either preemergence or at cracking. May be tank mixed with Prowl or Sonalan to obtain control of broadleaf signalgrass and Texas panicum.

Table 18. Recommended Herbicides for Weed Control in Peanuts

Preplant Incorporated			
Weed Problem		**Product Per Acre**	**Remarks**
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge, carpetweed	Dimethenamid 0.56-1 lb	Outlook 6E 12.0-21.0 oz	Incorporate 2 inches deep within 14 days of planting. May be applied in a split application with 1/2 to 2/3 the maximum rate applied PPI and 1/2 to 1/3 the maximum rate applied as a sequential application. Specifically, apply 10.0-14.0 oz/A preplant and incorporate. Follow planting with a preemergence application of Outlook at 7.0-10.0 oz/A sequentially. Do not apply more than 18.0 and 14.0 fl oz/A Outlook per season on coarse soils with 3% or more and less than 3% organic matter, respectively, and 21.0 and 18.0 oz/A on medium and fine textured soil with 3% or more and less than 3% organic matter, respectively. Will not control purple nutsedge or adequately control Texas panicum. May be tank mixed with Prowl or Sonalan for improved broadleaf signalgrass and Texas panicum control.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, carpetweed	Acetochlor 0.94-1.5 lb	Warrant 3ME 2.5-4.0 pt	Apply and incorporate in top 2 inches of soil. Do not apply more than 3 lb/A per year. Will not control nutsedge or adequately control Texas panicum.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, carpetweed	Alachlor 2-3 lb	Intrro 4EC 2-3 qt	Apply and incorporate into top 2 inches of soil. Do not apply more than 3 lb/A per year. Will not control nutsedge or adequately control Texas panicum. Before using Introo, check with buyers to determine if there are marketing restrictions on Intrro-treated peanuts.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Weed Problem		Product Per Acre	Remarks
Preplant Incorporated			
Spurred anoda, pigweeds, prickly sida, vealvetleaf, yellow nutsedge, purple nutsedge	Imazethapyr 0.063 lb	Pursuit 2EC 4.0 oz	May be applied and uniformly incorporated 1-2 inches deep prior to planting or applied to soil surface after planting. A sequential application may be used with 1/2 rate applied PPI and 1/2 rate applied either at ground crack or early postemergence. Soil incorporated treatments may be tank mixed with Prowl, Sonalan, Dual Magnum, Warrant, Outlook, or Strongarm. Do not apply more than 4.0 oz Pursuit total for all application methods.
Preemergence			
Yellow and purple nutsedges, many broadleaf weeds	Imazethapyr 0.063 lb	Pursuit 2EC 4.0 oz	Apply after planting and preferably before emergence of weeds. May be tank mixed with Dual Magnum, Warrant, Outlook, or Strongarm. Preemergence application of Pursuit has been less consistent in weed control than either soil incorporated or split (PPI + PRE) application.
Broadleaf weeds and suppression of nutsedges	Diclosulam 0.024 lb	Strongarm 84WDG 0.45 oz	Apply after planting but prior to crop or weed emergence. May be tank mixed with other herbicides registered for preemergence application. Growers are cautioned that Strongarm applied at rates exceeding 0.024 lb/A can injure cotton the following year on soils with a shallow hardpan (less than 10 in) and/or loam soils. Cotton grown under early season stress resulting from conditions such as excessively cool, wet, dry, or crusted soils may be particularly susceptible to carryover of Strongarm.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Preemergence			
Weed Problem	**Chemical Rate per Acre**	**Product Per Acre**	**Remarks**
Barnyardgrass, broadleaf signalgrass, crabgrass, fall panicum, goosegrass, pigweed, carpetweed	Alachlor 3.0 lb	Intrro 4E 3.0 qt	Generally good annual grass control except Texas panicum. Can be applied preplant incorporated, preemergence surface or at peanut ground-cracking. For Texas panicum control, applications should be as a tank mixture preplant incorporated with a labeled rate of Prowl or Sonalan. Can also be applied sequentially at ground-cracking following a labeled preplant incorporated herbicide. Will not control emerged weeds and grasses. Before using alachlor, check with buyers to determine if there are marketing restrictions on alachlor treated peanuts.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge	s-Metolachlor 0.95-1.27 lb	Dual Magnum 7.62EC 1.0-1.33 pt or Dual II Magnum 7.64EC 1.0-1.33 pt or Dual IIG Magnum 6.0-8.0 lb	Apply to the soil surface before weeds or crop emerge. Good annual grass control except for Texas panicum. Do not use Dual II Magnum, or Dual II G after peanuts have emerged.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge	Dimethenamid 0.56-1.0 lb	Outllook 6E 12.0-21.0 oz	Apply to soil surface before weeds or crop emerge. Good annual grass control except for Texas panicum. Do not apply more than 18.0 and 14.0 fl oz/A Outlook per season on coarse soils with 3% or more and less than 3% organic matter, respectively and 21.0 and 18.0 fl oz/A on medium and fine textured soils with 3% or more and less than 3% organic matter, respectively.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed	Acetochlor 0.94-1.5 lb	Warrant 3ME 2.5-4.0 pt	Apply as soon after planting as possible. Do not apply more than 3lb/A per year. Will not control nutsedge or adequately control Texas panicum.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Preemergence			
Weed Problem	**Chemical Rate per Acre**	**Product Per Acre**	**Remarks**
Controls most annual grasses and broadleaf weeds in conventional and reduced tillage production systems. Control or temporary suppression of many weeds, including hemp dogbane, yellow nutsedge, and rhizome johnsongrass. Provides residual control of large crabgrass, goosegrass, fall panicum, foxtails.	Glyphosate 0.703-0.984 lb ae/A + s-Metolachlor 0.938-1.31 lb ai/A	Sequence 2.5-3.4 pt	Apply to soil surface at planting, but before crop emerges. **Do not incorporate.** Crop injury has been observed, especially when heavy rainfall is received shortly after peanut emergence. Do not exceed 3.4 pt/A of Sequence on medium or fine textured soils. Do not apply to sands or loamy-sand soils. May be useful in no-till peanut and for suppression of yellow nutsedge. **Do not apply Sequence to cracking peanuts.**
Broadleaf weeds	Flumioixazin 0.063 oz	Valor SX 2.0 oz	Apply within 2 days following planting. Significant injury has been observed if applied 3 or more days after planting. Do not incorporate. Will not control nutsedge (purple or yellow) or sicklepod. Effective on ragweed, sicklepod, eclipta, and pigweed. Follow labeled sprayer cleanout instructions. Spray equipment used to apply Valor SX should not be used to apply other material to crop foliage. If heavy rain occurs at emergence, foliar injury from splashing Valor can occur. Peanut typically recovers by mid season. Can be mixed with Dual Magnum (1.0-1.33 pt/A), Warrant (2.5-4 pt/A), or Outlook (16-21 oz/A).

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Ground Cracking (cont.)			
Weed Problem	**Chemical Rate Per Acre**	**Product Per Acre**	**Remarks**
Annual grasses, broadleaf weeds, and suppression of nutsedge	Sulfentrazone 0.07-0.12 lb + Carfentrazone 0.008-0.014 lb	Spartan Charge 3.5F 3-5 oz	Do not apply Spartan Charge after peanuts crack soil. Application immediately after planting is advised. See label for specific rates based on soil texture and organic matter content. Do NOT use on sands with less than 1% organic matter. See product label for comments on application with other herbicides. Rotation restriction for planting cotton following Spartan Charge at recommended rates for peanut is 12 months.
Small annual grasses, broadleaf weeds	Paraquat 0.125 lb	Gramoxone SL 2.08.0 fl oz or Firestorm or Parazone 3.0 SL 5.4 fl oz	Paraquat is effective only on small emerged weeds (less than 1 inch tall) and does not provide residual control. Add 1 pt of nonionic surfactant per 100 gal of spray solution. May cause foliar burn on emerged peanuts but crop recovers and yield is not affected. May be tanks mixed with Basagran (1 pt/A), Butyrac or Butoxone (0.5-1.0 pt/A), Dual Magnum (1.0-1.3 pt/A), Outlook (see label), Warrant (2.5-4.0 pt/A) or Pursuit (2-4 oz/A, see label). Do not apply Dual II Magnum after peanuts have emerged. Do not apply later than 28 days after ground cracking. Maximum of 16 oz/A of Gramoxone Inteon may be used per season. Consult labels of Basagran, Butyrac, Dual Magnum, Outlook, Warrant, or Pursuit.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Ground Cracking (cont.)

Weed Problem	Chemical Rate Per Acre	Product Per Acre	Remarks
Barnyardgrass, broadleaf signalgrass, crabgrass, fall panicum, goosegrass, pigweed, carpetweed	Alachlor 3.0 lb	Intrro 4EC 3.0 qt or Micro-Tech 4ME 3.0 qt	Generally good annual grass control except Texas panicum. Micro-Tech can be applied preplant incorporated, preemergence surface or at peanut ground-crack. For Texas panicum control, applications should be as a tank mixture preplant incorporated with a labeled rate of Prowl or Sonalan. Can also be applied sequentially at ground-crack following a labeled preplant incorporated herbicide. Will not control emerged weeds and grasses. Before using alachlor, check with buyers to determine if there are determine if there are marketing restrictions on alachlor-treated peanuts.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge	s-Metolachlor 0.95 lb	Dual Magnum 7.62EC 1 pt or Dual 8EC 1.5 pt	Generally good annual grass control except Texas panicum. Use as a supplement to preplant or preemergence herbicides to provide additional residual control of annual grasses and certain small-seeded broadleaf weeds such as pigweed and eclipta. Will not control emerged grasses or broadleaf weeds. See product label for recommended tank mixtures with contact and systemic herbicides with foliar activity on weeds.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Ground Cracking (cont.)

Weed Problem	Chemical Rate Per Acre	Product Per Acre	Remarks
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed, yellow nutsedge	Dimethenamid 0.75-1 lb	Outlook 6L 16-21 oz	Generally good annual grass control except Texas panicum. Use as a supplement to preplant or preemergence herbicides to provide additional residual control of annual grasses and certain small-seeded broadleaf weeds such as pigweed and eclipta. Will not control emerged grasses or broadleaf weeds. See product label for recommended tank mixtures with contact and systemic herbicides with foliar activity on weeds.
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed	Acetochlor 0.95-1.5 lb	Warrant 3ME 1.25-2 qt	Generally good annual grass control except Texas panicum. Use as a supplement to preplant or preemergence herbicides to provide additional residual control of annual grasses and certain small-seeded broadleaf weeds such as pigweed and eclipta. Will not control emerged grasses or broadleaf weeds. See product label for recommended tank mixtures with contact and systemic herbicides with foliar activity on weeds.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Ground Cracking (cont.)			
Weed Problem	**Chemical Rate Per Acre**	**Product Per Acre**	**Remarks**
Crabgrass, fall panicum, goosegrass, broadleaf signalgrass, pigweed	Pyroxasulfone 0.079-0.112	Zidua 85WG 1.5-2.1 oz	Generally good annual grass control except Texas panicum. Use as a supplement to preplant or preemergence herbicides to provide additional residual control of annual grasses and certain small-seeded broadleaf weeds such as pigweed and eclipta. Will not control emerged grasses or broadleaf weeds. Apply early postemergence from at-cracking to first true leaf stage through beginning of pod development. Zidua may cause temporary leaf burn and stunting, but yield reduction is unexpected. Tank mixes with other pesticides may enhance injury. See product label for recommended tank mixtures with contact and systemic herbicides with foliar activity on weeds. DO NOT apply more than 2.1 oz/A in a single application. DO NOT apply more than the maximum cumulative amount of 5.0 oz/A per cropping season. No required preharvest interval.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Weed Problem	Chemical Rate Per Acre	Product Per Acre	Remarks
Ground Cracking (cont.)			
Broadleaf weeds and suppression of nutsedges	Diclosulam 0.024 lb	Strongarm 84WDG 0.45 oz	Strongarm can be applied through the cracking stage. Add 1 qt nonionic surfactant per 100 gallons. Spectrum of weeds controlled is much narrower when applied to emerged weeds. Strongarm will not control emerged common lambsquarters or pigweeds but will control common ragweed and morningglories and will suppress yellow nutsedge and eclipta. See product labels for information on mixing Strongarm with other herbicides. Some weed species have developed resistance to Strongarm. See product label for carryover potential to cotton, corn, and grain sorghum. Strongarm suppresses emerged marestail and dogfennel more effectively than other postemergence broadleaf herbicides when applied to small weeds.
Postemergence			
Mainly cocklebur, annual morningglory (except pitted morningglory), sicklepod **(See Tables 12 and 13)**	2,4-DB 0.2-0.25 lb	Butyrac 200 0.8-1.0 pt or Butyrac 175 0.9-1.1 pt	Use when weeds are in the seedling stage and actively growing. Apply with 10 to 30 gal/A spray volume and 20 to 40 psi spray pressure. Cocklebur and morningglory are most susceptible. Ragweed, lambsquarters, jimsonweed, pigweed, and teaweed (prickly sida) are rather tolerant and may only be suppressed. The higher rate should be used if the difficult-to-control species are present. Do not graze or feed treated forage to livestock. May be applied from 2 weeks after planting to within 45 days of harvest. Avoid drift to other crops.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

		Postemergence	
Broad-spectrum broadleaf weed control **(See Tables 12 and 13)**	Bentazon 0.5 lb + Acifluorfen 0.25 lb	Storm 4EC 1.5 pt (premix)	Apply to small, actively growing weeds with a minimum of 20 gal/A spray volume and 40 psi. Apply with 1 to 2 pt/A crop-oil concentrate or 1.0 pt of nonionic surfactant/100 gal spray solution. See label for weeds controlled. May be tank mixed with 0.5 to 1.0 pt/A 2,4-DB for improved control of certain broadleaf weeds.
Same as for bentazon alone; however, the addition of acifluorfen improves control of pigweeds, morningglories and common ragweed. **(See Table 13)**	Bentazon 0.5-1.0 lb + Acifluorfen 0.25-0.38 lb	Basagran 4SC 1.0-2.0 pt + Ultra Blazer 2L 1.0-1.5 pt (tank mix)	Apply to small, actively growing weeds. Use spray pressures of 40 to 60 psi. Do not use large-orifice nozzles. Apply with 1.0 pt nonionic surfactant/100 gal spray solution or a crop-oil concentrate at 1.0 to 2.0 pt/A. Increased leaf burn and weed control is usually observed with use of crop oil and higher rates of Blazer. Do not apply within 75 days of harvest.
Cocklebur, jimsonweed, smartweed, prickly sida (teaweed), spurred anoda, wild mustard, yellow nutsedge **(See Table 13)**	Bentazon 0.75-1.0 lb	Basagran 4SC 1.5-2 pt	Apply when broadleaf weeds are small and actively growing. Apply with 1.0 to 2.0 pt/A crop-oil concentrate. Peanuts are tolerant at any growth stage. Use minimum of 10 gal/A spray volume at 40 to 50 psi. Split applications 7 to 10 days apart, applying 1.5 to 2.0 pt each usually improves control of morningglory and spurred anoda. Do not apply more than 4.0 pt/A/season. Do not add crop oil concentrate, AMS, or other additives if Butyrac in tank mix.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

		Postemergence	
Same as for bentazon alone, however, the addition of 2,4-DB improves control of morningglories and spurred anoda.	Bentazon 0.75-1.0 lb + 2,4-DB 0.12 lb	Basagran 4SC 1.5-2.0 pt + Butyrac 2SC 8.0 fl oz	Apply in a minimum of 20 gal/A spray volume and 40 psi. Apply to actively growing small weeds. Avoid drift to other crops. Label directions prohibit addition of oil concentrate or other additives. Do not apply within 45 days of harvest or make more than 2 applications/year.
Cocklebur, eastern black nightshade, ragweed, eclipta, jimsonweed, morningglory, and pigweed	Lactofen 0.2 lb	Cobra 2 EC 12.5 fl oz	Apply to actively growing weeds after peanut reaches the 6 true leaf stage. Do not apply sequential application within 14 days of the first. Good coverage with spray solution is essential. Use a minimum of 25-40 gpa and a spray pressure of 40-60 psi. Add nonionic surfactant at 1 qt. per 100 gallons or petroleum or vegetable based crop oil concentrate at 1-1.5 pt. per acre. See label for adjuvant use. Do not apply within 45 days of harvest. May be tank mixed with Butyrac to enhance spectrum of weeds controlled. In tank mixes, use nonionic surfactants, not crop oil.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Postemergence (cont.)			
Common ragweed, jimsonweed, morningglory, pigweed, carpetweed, purslane, cocklebur, tropic croton, lambsquarters, eastern black nightshade, smartweed, spotted and prostrate spurge, wild mustard **(See Table 13)**	Acifluorfen 0.25-0.38 lb	Ultra Blazer 2L 1.0-1.5 pt	Apply when broadleaf weeds are small and actively growing. Refer to label for proper growth stage of weed. Good coverage by spray solution is important. Follow label directions concerning best application procedures and rates for different weed sizes to be controlled. Use a minimum of 25 to 40 gal/A, and spray pressures of 40 to 60 psi. Do not use flood tips. Add 2.0 pt/A crop-oil concentrate or 1.0 pt nonionic surfactant/100 gal of spray solution. Do not apply more than 2.0 pt/A of Ultra Blazer postemergence/season. Allow at least 15 days between sequential applications. Do not apply within 75 days of harvest. May be tank mixed with Butyrac to enhance spectrum of weeds controlled.
Morningglories, pigweeds, velvetleaf, yellow nutsedge, purple nutsedge	Imazethapyr 0.063 lb	Pursuit 2EC 4.0 oz	Apply from ground crack to early postemergence when weeds are actively growing and are less than 3 inches tall. Certain weeds such as common lambsquarters, prickly sida, and velvetleaf should be treated less than 2 inches in height. Apply with a nonionic surfactant (1.0 qt/100 gal spray volume) or crop-oil concentrate (1.0 qt/A). Do not apply more than 0.063 lb ai A/season. Do not apply within 85 days of harvest. See label for rotational restrictions.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Spurred anoda, morninglories, pigweeds, velvetleaf, yellow and purple nutsedge, sicklepod	Imazapic 0.063 lb	Cadre 70DG 1.44 oz	Apply when broadleaf weeds are actively growing and are less than 3 inches tall. Certain weeds such as common lambsquarters, prickly sida, velvetleaf, and spurred anoda should be treated when 2 inches tall or less. Apply with 1.0 qt/A crop-oil concentrate or 1.0 qt nonionic surfactant/100 gal spray solution. Apply as a sequential treatment following application of a soil-applied grass control herbicide. See label for rotational restrictions.
Annual grasses **(See Table 13)**	Clethodim 0.125-0.25 lb	Select 2EC 8.0-16 oz or SelectMax 0.97EC 9.0-16.0 oz or various other commercial formulations	Apply to actively growing grasses. In general, annual grasses should be 2 to 4 inches tall for best results. Do not apply within 40 days of harvest. See labels for tank-mix instructions. See table 16 for adjuvant recommendations.
	Sethoxydim 0.28 lb	Poast 1.5EC 1.5 pt	
Bermudagrass **(See Table 14)**	Clethodim 0.125-0.25 lb	Select 2EC 8.0-16.0 oz or SelectMax 0.97EC 16.0-32.0 oz	Apply to actively growing bermudagrass when stolons (runners) are 3 to 6 inches in length. If needed, a second application of 8.0 to 16.0 oz/A may be applied for control of regrowth when stolons are 3 to 6 inches in length. See table 16 for adjuvant recommendations.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

	Sethoxydim 0.28 lb	Poast 1.5EC 1.5 pt	Apply to actively growing bermudagrass before plant stolon (runner) length exceeds 6 inches. A second application of 1.0 pt/A Poast or 1.5 pt/A Poast Plus is usually necessary for good control. Make the second application when stolon regrowth is 1 to 4 inches in length. See table 16 for adjuvant recommendations.
Rhizome Johnsongrass **(See Table 14)**	Clethodim 0.125-0.25 lb	Select 2EC 8.0-16.0 oz or SelectMax 0.97EC 16.0-32.0 oz	Apply to actively growing johnsongrass when 12 to 24 inches tall. If needed, a second application of 6.0 to 8.0 oz/A may be applied for control of regrowth when plants are 6 to 18 inches tall. See table 16 for adjuvant recommendations.
	Sethoxydim 0.28 lb	Poast 1.5EC 1.5 pt	Apply to actively growing johnsongrass when 15 to 25 inches tall. A second application of 1.0 pt/A Poast or 1.5 pt/A Poast Plus may be made when new plants or regrowth are 6 to 12 inches tall. See table 16 for adjuvant recommendations.

Table 18. Recommended Herbicides for Weed Control in Peanuts (cont.)

Extended late-season residual grass control	s-Metolachlor 0.95-1.27 lb	Dual Magnum 7.62EC 1.0-1.33 pt	Apply over-the-top of peanuts for control of late-season grasses in years when excessive rains may have reduced the residual control of early-season applications. Will not control emerged grasses. Do not apply within 90 days of harvest. Do not apply more than an equivalent of 2.67 lb ai/A s-metolachlor during any one year. Dual IIG Magnum and Dual II Magnum are not registered for this method of application in peanut.
	Dimethenamid 0.56-0.98 lb	Outlook 6E 16.0-21.0 oz	Maximum Outlook rates in a single application are 12-18 fl oz/A on course-textured soils and 18-21 fl oz/A on medium or fine-textured soils and are influenced by soil organic matter. Outlook may be applied in a single application of up to 21 fl oz/A or used in split applications of 10-14 fl oz/A initially and the remaining 2-10 fl oz applied in the sequential application. Do not apply more than 21 fl oz/A of Outlook per season. See label for specific and labeled mixtures and sequential herbicide applications.
	Acetochlor	Warrant 3ME	Apply over-the-top of peanuts for control of late-season grasses in years when excessive rains may have reduced the residual control of early-season applications. Do not aaply more than 3 lb/A per year. Will not control emerged grasses.
	Paraquat See comments	Gramoxane SL See comments	Apply in a roller/wiper implement. Best control achieved when at least 60% coverage of weed foliage occurs. Do not allow paraquat to contact peanut foliage. Mix 1 part Gramoxane SL (other formulations may not be labeled) with 1 to 1.5 parts water to prepare 40% to 50% solution. Add nonionic surfacant at 1 qt per 100 gallons. Adjust equipment to apply up to 2 pints per acre of the herbicide mixture.

Table 19. Weed Species Response to Herbicides for Peanuts[1]

	Soil-applied Herbicides[2]										
Species	Sonalan PPI[2]	Prowl PPI[2]	Micro-Tech PPI	Dual PPI/PRE[2]	Outlook PPI/PRE[2]	Warrant PPI/PRE[2]	Strongarm PPI/PRE[2]	Pursuit PPI[2]	Pursuit PRE[2]	Sequence PRE[2]	Valor PRE[2]
Texas panicum	G-E	G-E	P	P	P-F	P	P	P-F	P-F	P	PF
Barnyardgrass	G-E	G-E	E	G	G	G	P	G	G	F-G	PF
Crabgrass	E	E	E	E	E	E	P	F	P-F	F-G	PF
Goosegrass	E	E	E	E	E	E	P	P	P	F-G	F
Fall panicum	G-E	G-E	G	G	G-E	G	P	P-F	P-F	F-G	PF
Signalgrass, broadleaf	G-E	G	G	G	G	G	P	G	G	P-F	P
Foxtails	E	E	E	G	G	G	P	F-G	F-G	F-G	PF
Nutsedge, yellow	N	N	F	G	F-G	P	F-G	F-G	F-G	P-F	P
Nutsedge, purple	N	N	P	P	P	P	F-G	F-G	P	P-F	P
Cocklebur	N	N	P	P	P	P	G	G	G	N	PF
Jimsonweed	P	P	P	P	P	P	G-E	G	G	N	G
Lambsquarters, common	G	G	F	F	P	F	F-G	G	F-G	P	GE
Morningglory	P	P	P	P	P	P	G	F-G	F-G	N	GE
Pigweed, common	G	G	E	G-E	G-E	G-E	N	E	E	F-G	E
Prickly sida (teaweed)	P	P	P	P	P-F	P	F-G	G	G	N	FG
Ragweed	P	P	P	P	P-F	P	G-E	P	P	P	GE
Smartweed	P	P	P	P	P-F	P	G	G	G	P	-
Eclipta	P	P	P	P	P	P	G-E	P	P	G	G
Carpetweed	G	G	F-G	F	F-G	F	G	F-G	F-G	E	F
Sicklepod	P	P	P	P	P	P	N	P	P	N	P
Spurred anoda (cottonweed)	P	P	P	P	P	P	F-G	G	G	G	F
Velvetleaf	P	P	P	P	P	P	G-E	F-G	F-G	P	F
Tropic croton	P	P	P	P	P	P	F	P	P	F	-

[1] *Control Capabilities:*
E = Excellent Control; 90% or better
G = Good Control; 80-90%
F = Fair Control; 60-80%
N = less than 20%
P = Poor Control; 20-60%

[2] *Application Method:*
PPI = Pre-plant soil incorporated
PRE = Pre-emergence

Table 19. Weed Species Response to Herbicides for Peanuts (cont.)[1]

	Postemergence Herbicides[2]										
				Paraquat +							
Species	Pursuit AC/EPOE	Paraquat AC	2,4-DB POE	2,4-DB AC	Basagran AC	Basagran POE	Ultra Blazer POE	Cadre[3] POE	Storm POE	Select Max or Poast POE	Cobra POE
Texas panicum	P-F	E	N	G-E	F	N	P	G-E	N	E	N
Barnyardgrass	G	G	P	G	P-F	N	P	G-E	N	E	N
Crabgrass	P-F	G	P	G	P-F	N	P	G-E	N	E	N
Goosegrass	P	E	P	G-E	P-F	N	P	G-E	N	E	N
Fall panicum	P-F	E	P	F-G	P-F	N	P	G-E	N	G	N
Signalgrass, broadleaf	G	E	P	G-E	P-F	N	P	G-E	N	E	N
Foxtails	G	E	P	G-E	P-F	N	P	G-E	N	E	N
Nutsedge, yellow	F-G	P-F	P	F	F-G	G	P	G-E	F	N	N
Nutsedge, purple	F-G	P	N	N	N	N	N	G-E	N	N	N
Cocklebur	G	E	E	E	E	E	G	G-E	E	N	G
Jimsonweed	G	E	F	G	E	E	E	F-G	E	N	E
Lambsquarters, common	P	F	G	F-G	F-G	G	G	P-F	G	N	P
Morningglory	F-G	F	E	G-F	F	F-G	G-E	G-E	G	N	G
Pigweed, common	E	E	G	G	G	P-F	E	E	G	N	E
Prickly sida (teaweed)	P	P-F	F	P	G	G	P	G	F-G	N	G

Table 19. Weed Species Response to Herbicides for Peanuts (cont.)[1]

	Postemergence Herbicides[2]										
Species	Pursuit AC/EPOE	Paraquat AC	2,4-DB POE	Paraquat + 2,4-DB AC	Paraquat + Basagran AC	Basagran POE	Ultra Blazer POE	Cadre[3] POE	Storm POE	Select Max or Poast POE	Cobra POE
Ragweed	P	F	F-G	F	G	F-G	G	P-F	G	N	E
Smartweed	G	G	F	G	G	E	G	G-G	E	N	F
Eclipta	P	F-G	P	P	F	P	G	F	G-E	N	G
Carpetweed	F-G	F-G	F	F-G	P	P	G	G	G	N	G
Sicklepod	P	G[5]	G[5]	G[5]	G[5]	N	P	E	P	N	P
Spurred anoda (cottonweed)	F-G	P	P	P	G	G	P	G	F	N	F
Velvetleaf	F-G	F	P	F	G	G	P-F	G-E	F-G	N	G
Tropic croton	P	F	P-F	F	F	P	G-E	P	G-E	N	G

[1] Response expressed as activity on emerged seedlings in early stages of development at relatively low rates. Control is erratic or poor on weeds if they are larger.

E = Excellent control; 90% or better *F = Fair control; 60-80%* *P = Poor control; 20-60%*

G = Good control; 80-90% *N = None; less than 20%*

[2] Application Method:

POE = Postemergence *EPOE = Early postemergence* *AC = At cracking*

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

[4] Rating assumes sequential application 10 to 14 days after initial treatment.

[5] Rating assumes sequential application of 2,4-DB 10 to 14 days after initial treatment.

Table 20. Recommended Weed Sizes for Treatment and Application Rates for Control of Annual Grasses

	Application Rates and Annual Grass Size					
	Poast[1]		Select[1]		Select Max[1]	
Species	Height (in)	Rate (oz/A)	Height (in)	Rate (oz/A)	Height (in)	Rate (oz/A)
Broadleaf signalgrass	8	16	2-6	6-8	2-6	12-16
Crabgrass	6	16	2-6	6-8	2-6	12-16
Fall panicum	8	16	2-8	6-8	2-8	12-16
Giant foxtail	8	16	2-12	6-8	2-12	12-16
Green foxtail	8	16	2-8	6-8	2-8	12-16
Yellow foxtail	8	16	2-8	6-8	2-8	12-16
Goosegrass	6	16	2-6	6-8	2-6	12-16
Seedling johnsongrass	8	16	4-10	6-8	4-10	12-16
Texas panicum	8	16	2-6	6-8	2-6	12-16
Volunteer corn	20	16	4-12	4-6	4-12	8-12
			12-24	6-8	12-24	12-16

[1] *See table 16 for adjuvant recommendations.*

Table 21. Plant Size and Application Rates for Control of Perennial Grasses

Perennial Grass	Herbicide and Application Rate		Plant Size
Bermudagrass	First Application		
	Poast	1.5 pt/A[1]	stolons (runners) 6 inches or less
	Select Select Max	8.0-16.0 oz/A[1] 12.0-32.0oz/A	stolons (runners) 3-6 inches
	Second Application		
	Poast	1.0 pt/A[1]	stolons (runners) 1-4 inches
	Select Select Max	8.0-16.0 oz/A[1] 12.0-32.0 oz/A	stolons (runners) 3-6 inches
Johnsongrass	First Application		
	Poast	1.5 pt/A[1]	plants 15-25 inches tall
	Select Select Max	8.0-16.0 oz/A[1] 12.0-32.0 oz/A	plants 12-24 inches tall
	Second Application		
	Poast	1.0 pt/A[1]	plant/regrowth 6-12 inches tall
	Select Select Max	6.0-8.0 oz/A[1] 9.0-24.0 oz/A	plant/regrowth 6-18 inches tall

[1] *See table 16 for adjuvant recommendations.*

Table 22. Recommended Weed Sizes for Treatment and Application Rates for Control of Annual Broadleaf Weeds.

	1.0 pt/A Basagran		1.5 pt/A Basagran		2.0 pt/A Basagran		1.5 pt/A Storm	
Species	**Max. Leaf Number**	**Max. Ht. (inches)**	**Max. Leaf Number**	**Max. Ht. (inches)**	**Max. Leaf Number**	**Max. Ht. (inches)**	**Max. Leaf Number**	**Max. Ht. (inches)**
Prickly Sida	–	–[a]	6	3	6-8	4	4	2
Common ragweed	–	–	–	–	4-6[b]	3[b]	4-6	3
Cocklebur	2-4	4	2-6	6	6-10	10	2-6	6
Morningglory								
Pitted	–	–	4[c]	4[c]	SUD[c]	SUD[c]	4	4
Others	–	–	4[c]	4[c]	SUD[c]	SUD[c]	4	4
Smartweed	4[g]	4[g]	6	6	6-10	10	6	6
Jimsonweed	4	4	6	6	6-10	10	6	6
Pigweed	–	–	–	–	–	–	–	–
Lambsquarters	–	–	6[d]	1.5[d]	4-8[d]	2[d]	4-6	2
Tropic croton	–	–	2	2	2-4	4	6[i]	6[i]
Spurred anoda	–	–	6	3	6-8	4	4[h]	2[h]
Velvetleaf	–	–	4[a]	2[a]	4-6	5	4[h]	2[h]
Eclipta	–	–	–	–	–	–	–[j]	–[j]

	1.0 pt/A Ultra Blazer[e]		1.5 pt/A Ultra Blazer[e]		2.0 pt/A Ultra Blazer[e]		12.5 fl oz/A Cobra	
Species	**Max. Leaf Number**	**Max. Ht. (inches)**	**Max. Leaf Number**	**Max. Ht. (inches)**	**Max. Leaf Number**	**Max. Ht. (inches)**	**Max. Leaf Number**	**Max. Ht. (inches)**
Prickly Sida	–	–	–	–	–	–	4	–
Common ragweed	2	<2	4	4	6	3	8	–
Cocklebur	–	–	–	–	2-4	2-4	6	–

Table 22. Recommended Weed Sizes for Treatment and Application Rates for Control of Annual Broadleaf Weeds. (cont.)

Species	1.0 pt/A Ultra Blazer[e]		1.5 pt/A Ultra Blazer[e]		2.0 pt/A Ultra Blazer[e]		12.5 fl oz/A Cobra	
	Max. Leaf Number	Max. Ht. (inches)	Max. Leaf Number	Max. Ht. (inches)	Max. Leaf Number	Max. Ht. (inches)	Max. Leaf Number	Max. Ht. (inches)
Morningglory							4	–
Pitted	2	<2	4	2	4	2	4[a]	–
Others	–	–	–	–	3	2		
Smartweed	–	–	–	–	4	4	–	–
Jimsonweed	3	3	6	6	8	8	4	–
Pigweed	–	–	4	2	6	3	–	–
Lambsquarters	–	–	–	–	3[e]	1[e]	–	–
Tropic croton	2	<2	2	2	2	2	4	–
Spurred anoda	–	–	–	–	–	–	–	–
Velvetleaf	–	–	–	–	–	–	–	–
Eclipta	–[f]	–[f]	–[f]	–[f]	–[f]	–[f]	6	–

[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. Add 2.0 pt of crop-oil concentrate/A.*

[e] *Add 1.0 pt of nonionic surfactant/100 gal of spray solution.*

[f] *Control not claimed on label. Experience indicates that 2.0 pt/A plus surfactant will suppress 1- to 2-inch Eclipta.*

[g] *Follow with second application of 1.0 pt/A, 7 to 14 days later if needed.*

[h] *Control may be inconsistent with this rate of Storm.*

[i] *Control not claimed on label, field experience indicates that Storm is very effective on tropic croton under 4 inches in height.*

[j] *Control not claimed on label, field experience indicates that Storm is effective on eclipta under 2 inches in height.*

Table 23. Restrictions on Feeding Herbicide-Treated Peanut Vines to Livestock and Preharvest Intervals for Peanut Herbicides

Herbicide	Preharvest Interval (PHI)	Do not feed treated vines to livestock	No feeding restrictions on label
2,4-DB (Butyrac)	45 days	X	
Basagran	through pegging	within 50 days of treatment	X
Cadre	90 days	X	
Cobra	45 Days	X	
Dual Magnum	90 days		X
Gramoxone	28 days after GC[1]		X
Intrro	GC[1]		X
Outlook	80 days	within 80 days of treatment	X
Poast	40 days	X	X
Prowl	preplanting		X
Pursuit	85 days	X	
Select Max	40 days	X	
Sonalan	preplanting	X	
Spartan Charge	Preemergence	X	
Storm	75 days	X	
Strongarm	30 days	X	
Ultra Blazer	75 days	X	
Valor			X
Warrant	90 days	within 90 days of treatment	
Zidua	0 days		X

[1]*GC = ground cracking*

Table 24. Suggested Rain-Free Periods after Applications of Postemergence Herbicides and Tank Mixes

Herbicide or tank mix	Rain-free period (hours)
2,4-DB	NR1
Basagran	NR2
Cadre	3
Cobra	0.5
Gramoxone	0.5
Poast	1
Pursuit	1
Select Max	1
Storm	NR2
Ultra Blazer	NR2

NR1 = No restrictions on label. Suggest at least 1 hour for best results.
NR2 = No restrictions on label. Suggest 4 to 6 hours for best results.

Table 25. Adjuvant Recommendations for Postemergence Herbicides

Herbicide	Application Method	Adjuvant recommendations
Basagran	Ground	2.0 pt/A crop-oil concentrate when treating lambsquarters, common ragweed, hemp sesbania, or yellow nutsedge. Vegetable oils may be used. Use 1.0 gal/A of 30% nitrogen instead of crop-oil concentrate if velvetleaf is the primary target weed.
	Air	1.0 pt/A crop-oil concentrate when treating lambsquarters, common ragweed, hemp sesbania, or yellow nutsedge. Vegetable oils may be used. Do not use 30% nitrogen with aerial applications.
Cadre	Ground only	Use 0.25 percent nonionic surfactant or 2 pt/A crop-oil concentrate.
Cobra	Ground only	Add nonionic surfactant at 1 qt/100 gallons or petroleum or vegetable based crop oil concentrate at 1 to 1.5 pt per acre (See label for specifics).
Gramoxone	Ground	Use 0.125 percent nonionic surfactant in cracking stage sprays.
Poast	Ground or Air	2.0 pt/A crop-oil concentrate. Vegetable oils may be used.
Pursuit	Ground	Use a petroleum or vegetable seed based oil concentrate at a rate of 1.5 to 2.0 pt/A **or** a nonionic surfactant containing at least 80% active ingredient at 1 qt/100 gallons of spray mixture.
Select	Ground	Always use 2.0 pt/A crop-oil concentrate.
Select Max	Ground	0.25% nonionic surfactant, 1% crop-oil concentrate or 1% methylated seed oil.
Storm	Ground or Air	2.0 pt/A crop-oil concentrate. Vegetable oils may be used.
Ultra Blazer	Ground or Air	Use 0.125 percent nonionic surfactant for most weeds. For lambsquarters, hemp sesbania, or cowpea, use 0.25 percent nonionic surfactant or 0.5 to 1.0 gal/A of 30% nitrogen.

Note: Information in this table was taken from product labels. See the labels. See the labels for adjuvant recommendations with specific tank mixes.

Adjuvant rates given in percentages are on a volume/volume basis:

0.125% - 1 pt per 100 gal of spray solution; 0.50% - 2 qt per 100 gal of spray solution;

0.25% - 1 qt per 100 gal of spray solution; 1.00% - 4 qt per 100 gal of spray solution.

Table 26. Rotation Restrictions for Peanut Herbicides

	Rotational Crop							
	Corn	Cotton	Soy-beans	Barley	Winter Rye	Winter Wheat	Sorg-hum	Tobacco
2,4-DB	NS	NS	NS	NS	NS	NS	NS	NS
Basagran	NS	NS	NS	NS	NS	NS	NS	NS
Cadre	9M	18M	9M	18M	4M	4M	18M	9M
Cobra	NR	NR	NR	NR	NR	NR	NR	NR
Dual Magnum (PRE, PPI, Cracking, POST)	NR	NR	NR	4.5M	4.5M	4.5M	NR	FY
Intrro	NR	NR	NR	NR	NR	NR	NR	NR
Outlook	NR	FY	NR	4M	4M	4M	FY	FY
Poast	NR	NR	NR	NR	NR	NR	NR	NR
Prowl	FY	NR	NR	4M	FY	4M	FY	NR
Pursuit	NR /8.5M[1]	9.5M /18M[2]	NR	9.5M	4M	4M	18M	9.5M
SelectMax	NR	NR	NR	NR	NR	NR	NR	NR
Sonalan	FY	FY	NR	AH	AH	AH	FY	FY
Spartan Charge	4	12	NR	4	4	4	10	NR
Storm	AH	AH	NR	AH	AH	AH	AH	AH
Strongarm	18M /10M[3]	10M	NR	4M	6M	4M	18M	18M
Ultra Blazer	AH	AH	NR	AH	AH	AH	AH	AH
Valor SX	0.5/1M[4]	1M	NR	4M	4M	1M	1M	1M
Warrant	NR	NR	NR	FY	FY	4	NR	FY
Zidua	NP	0-4M	0-4M	11-18M	11-18M	1-6M	6-12M	18M

The above table provides a general summary of crop rotation restrictions specified on 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 sequence not specified in label directions

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

[2] *For sandy loam to loamy sand soils 16 inches of rainfall or irrigation occurring from application through October, 9.5M; (refer to supplemental label of Virginia/North Carolina) otherwise, 18M.*

[3] *With IMI-corn (resistant/tolerant varieties) = 10 M, Non IMI-corn 18M.*

[4] *1M restriction for sweet corn, field corn (conventional), 0.5M for minimum or no-till field corn.*

INSECT CONTROL IN PEANUTS

S. Taylor, Extension Entomologist, Tidewater AREC

Thrips

Seedling peanut plants are usually attacked by thrips within the first 6 to 8 weeks after planting. These tiny, spindle-shaped insects feed primarily within the developing, unfolded leaflets causing crinkling of the leaflets and stunting of the plants. Blackening of the small leaflets occurs with severe infestations and can be mistaken for chemical injury. Under favorable conditions, plants normally outgrow this injury with no reduction in yield or grade. However, the delay in vine growth from early-season thrips injury may delay maturity. This in combination with other injury, such as herbicide burn, can reduce yield.

Thrips can be controlled with either systemic or with foliar-applied insecticides. Systemics can be incorporated in the furrow with the seed at planting. Foliar treatments can be applied as needed after crop emergence. During dry seasons or seasons with excessive rains, systemic insecticides may not give adequate thrips control due to poor systemic uptake by the plants or leaching of chemicals from the soil. Foliar treatments may be warranted, if systemics are ineffective, or if injury appears excessive. Foliar treatment is recommended when 25 percent of the leaves show thrips damage and pest populations are still active.

Table 27. Recommended Insecticides for Thrips Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar	Cyantraniliprole (Exirel)	13.5-20.5 oz/A	14 day PHI	Labeled for suppression of foliage feeding only.
	acephate (Orthene 97) band rate broadcast rate	 3.0-6.0 oz 6.0-12.0 oz	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
In-furrow	phorate (Thimet 20G)	5.0 lb	90	**RESTRICTED USE.** Distribute granules evenly in the furrow. Do not graze or feed treated hay or forage to livestock.
	imidacloprid (Admire Pro)	7.0-10.5 oz	14	Apply as an in-furrow spray during planting directed on or below seed.

Table 27. Recommended Insecticides for Thrips Control (cont.)

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
	aldicarb (AgLogic 15G, AgLogic 15GG)	7 lb	90	Do not hog-off treated fields or allow livestock to graze in treated areas before harvest. Do not feed hay or vines to livestock. Immediately deep-disk any spills at row ends or elsewhere to ensure the granules are covered with a layer of soil.
	imidacloprid + fluopyram (Velum Total)	18.0 oz	14	Apply as an in-furrow spray during planting directed on or below seed.
On seed	acephate (Acephate 90SP)	3.5 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 cup 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. Not recommended for air planters. Do not use treated seed for food or feed purposes or process for oil.

Potato Leafhopper

The potato leafhopper is a common pest of peanuts in Virginia. This small, wedge-shaped, light green to yellow insect damages the peanut plant by feeding on the undersides of leaves in a piercing-sucking manner. The injured leaf tips first turn yellow then brown and tend to curve downward. Toxins also are passed into plants at feeding sites. If enough damage is done, the toxins can stop vine growth, resulting in reductions in yield and grade. Injury may occur at any time from early June to the middle of August or later in some years. It is important to note that although late-season damage appears worse in some years, damage done early in the season probably has a greater effect on plant vigor and yield. Systemic insecticides applied at planting time will usually control potato leafhoppers that occur early, but if no pegging-time insecticide is applied, it may be necessary to make foliar applications in July or early August. Pegging-time applications of rootworm insecticides will usually control leafhoppers until harvest.

Foliar treatments should be made only if needed. When 25 percent of the leaves show tip yellowing typical of leafhopper damage and active adult and immature leafhoppers are seen, treat with an effective chemical. When foliar treatments are required, the first application usually is made about mid-July, and the second about the first of August (if needed). If scheduled treatments are being made for control of leafspot, insecticides may be tank mixed. Do not include insecticides with all leaf-spot treatments. Too many insecticide applications, or applications later in the season, could cause spider mite populations to increase, especially in dry years after adjacent corn and weedy areas have been cut. Make leafhopper applications only when problems have been identified.

Table 28. Recommended Insecticides for Potato Leafhopper Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar	methomyl (Lannate LV) (Lannate SP)	 0.75-3.0 pt 0.25-1.0 lb	 21 21	**RESTRICTED USE.** Do not feed treated vines.
	acephate (Orthene 97)	6.0-12.0 oz	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	lambda-cyhalothrin (Karate Z)	0.96-1.6 oz	14	**RESTRICTED USE.** Do not apply more than 15.36 oz/A/season. Do not graze livestock in treated areas or use treated vines or hay for animal feed.
	esfenvalerate (Asana XL)	2.9-5.8 oz	21	**RESTRICTED USE.** Do not feed or graze livestock on treated vines. Do not exceed 29 oz/A/season.
	zeta-cypermethrin (Mustang Max)	1.28-4.0 oz	7	**RESTRICTED USE.** Do not graze livestock in treated areas. Do not use treated vines for hay for animal feed.
	fenpropathrin (Danitol 2.4EC)	6.0-10.6 oz	14	**RESTRICTED USE.** Do not graze or feed treated vine forage or dried hay within 14 days of the last application. Do not exceed 2.6 pt /A/season.
	beta-cyfluthrin (Baythroid XL)	1.0-1.8 oz	14	RESTRICTED USE.
	bifenthrin (Brigade 2EC)	2.1-6.4 oz	14	**RESTRICTED USE.** Do not feed immature plants and peanut hay to livestock.

*** GENERAL** - *Apply pegging treatments in 10- to 18-inch bands on row from the last week in June through mid-July after pegging begins and before vines close in middles. Effectiveness of treatments is increased if insecticides are covered by shallow cultivation to avoid exposure to sunlight and lateral movement with heavy rains.*

Table 28. Recommended Insecticides for Potato Leafhopper Control (cont.)

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar (cont.)	chlorantraniliprole + lambda - cyhalothrin (Besiege)	5.0 - 8.0 oz	14	
	beta-cyfluthrin + imidacloprid (Leverage 360)	2.8 oz	14	**RESTRICTED USE.**
Pegging*	chlorpyrifos (Lorsban 15G)	–	–	Lorsban 15G is not labeled for use against leafhopper but will provide suppression if applied for soil insects.

* **GENERAL** - *Apply pegging treatments in 10- to 18-inch bands on row from the last week in June through mid-July after pegging begins and before vines close in middles. Effectiveness of treatments is increased if insecticides are covered by shallow cultivation to avoid exposure to sunlight and lateral movement with heavy rains.*

Southern Corn Rootworm

The southern corn rootworm, which is the immature stage of the spotted cucumber beetle, can cause extensive injury to the Virginia peanut crop. Rootworm larvae develop in the soil and feed directly on pegs and pods. Finding rootworms in the soil is very difficult and injury is often not detected until after peanuts are dug when it is too late for control measures. A preventive treatment is the best strategy. After an infestation is established, control is difficult and often ineffective. Determining the need to treat for southern corn rootworm should be done on a field-by-field basis. Decisions can be based on both adult populations and past history of peanut fields. Adult beetles can be readily detected in peanut fields. Their presence in moderate to high numbers from mid-July to early August should be a warning that a problem could develop. Adults will lay eggs that could develop into the damaging larval stage. Thus, early detection of adults can allow for timely treatment and prevention of injury.

Knowledge of the past history of rootworm injury also can be useful in determining the need for treatment. If injury has ever occurred in a field, it will likely occur in other years. Keep field records on the extent of pod and peg injury noticed at harvest time. Pay particular attention to fields with higher levels of organic matter and clay. Rootworms have a higher survival rate in those soils due to higher moisture holding capacity, and injury will typically be more severe than in “light” soils. Use the “Peanut Rootworm Advisory” (VCE Publication 444-351) to aid you in deciding which fields need insecticide treatment.

If rootworm treatments are necessary, they should be applied as 10- to 18-inch bands on the row during early pegging. Usually, this period occurs from the last week in June through mid-July. Treatment effectiveness is increased if materials are lightly incorporated using shallow cultivation. If vine growth and pegging are in an advanced stage, do not cultivate, as vine “dirting,” which leads to disease development and injury to pegs, may offset the gain from insect control. Carefully calibrate equipment to deliver recommended insecticide rates. Using more than is recommended will not increase effectiveness and using less could result in a complete insecticide failure.

Table 29. Recommended Insecticides for Southern Corn Rootworm Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Pegging[1]	chlorpyrifos (Lorsban 15G)	13.0 lb	21	Do not apply more than 13.3 lb/season. Do not feed peanut forage or hay to meat or dairy animals.

[1] **GENERAL -** *Apply pegging treatments in 10- to 18-inch bands on row from the last week in June through mid-July after pegging begins and before vines close in middles. Effectiveness of treatments is increased if insecticides are covered by shallow cultivation to avoid exposure to sunlight and lateral movement with heavy rains.*

Corn Earworm and Fall Armyworm

Annual infestations of the corn earworm and fall armyworm occur in most Virginia peanut fields. Usually there is a single generation of each species per season. Worms feed on leaf tissue causing peanuts to look ragged; however, research has shown that one-third of peanut foliage can be lost at the normal time of corn earworm infestations (mid-August to early September) without loss of yield or grade. Scouting fields is the only way to determine if treatment is needed. Scout by reaching halfway across 2 row-feet of plants and shaking foliage vigorously towards the row middle. Repeat on the opposite row. Count the worms on the ground and repeat the sample in several spots in the field. Treatment is recommended if an average of 8 or more worms are found per sample, or 4 per row-foot. This number should increase to 6 per row-foot later in the season.

If treatment is necessary, apply sprays using systems that provide good canopy penetration and coverage. If spider mites are already present in the field, use of some insecticides may allow for rapid build-up. Scout fields for treatment effectiveness and for possible increases in spider mite activity soon after applications. Pyrethroids offer poor to moderate control of corn earworm in Virginia and poor control of fall armyworm. If you decide to spray a pyrethroid, use the highest labeled rate and do not expect good control of heavy infestations or large worms.

Table 30. Recommended Insecticides for Corn Earworm Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar*	methomyl			**RESTRICTED USE.**
	(Lannate LV)	0.75-3.0 pt	21	Do not feed treated vines.
	(Lannate SP)	0.25-1.0 lb	21	
	esfenvalerate			**RESTRICTED USE.**
	(Asana XL)	2.9-5.8 oz	21	Do not feed or graze livestock on treated vines. Do not exceed 29.0 oz/season.
	zeta-cypermethrin			**RESTRICTED USE.**
	(Mustang Max)	3.2-4.0 oz	7	Do not graze livestock in treated areas. Do not use treated vines for hay for animal feed.

*__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.

Table 30. Recommended Insecticides for Corn Earworm Control (cont.)

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar (cont.)	lambda-cyhalothrin			**RESTRICTED USE.** Do not graze livestock in treated areas, or use treated vines or hay for animal feed. Do not exceed 15.36 oz/A/ season.
	(Warrior II)	2.56-3.84 oz	14	
	(Karate Z)	1.28-1.92 oz	14	
	(Karate EC)	2.56-3.84 oz	14	
	(Kaiso 24WG)	2.0 oz	14	
	fenpropathrin (Danitol 2.4EC)	10.6-16.0 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 pt/A/season.
	beta-cyfluthrin (Baythroid XL)	1.8-2.4 oz	14	**RESTRICTED USE.**
	bifenthrin (Brigade 2EC)	2.1-6.4 oz	14	**RESTRICTED USE.** Do not feed immature plants and hay to livestock.
	indoxacarb (Steward EC)	9.2-11.3 oz	14	Do not feed or graze livestock on treated fields.
	spinosyn (Blackhawk)	1.7-3.3 oz	3	Do not allow grazing of crop residue or harvest of crop residue for hay until 14 days after last application.
	spinetoram (Radiant SC)	3.0-8.0 oz	3	Do not allow grazing of peanut hay.
	beta-cyfluthrin + imidacloprid (Leverage 360)	2.8 oz	14	**RESTRICTED USE.**
	chlorantraniliprole (Prevathon)	14.0-20.0 oz	14	
	chloratraniliprole +lambda - cyhalothrin (Besiege)	6.0 - 10.0 oz	14	

*__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.

Table 30. Recommended Insecticides for Corn Earworm Control (cont.)

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar (cont.)	methaxyfen-ozide + spine-toram (Intrepid Edge)	4.0 - 8.0 oz	7	
	Bacillus thuriengiensis (Dipel ES)	1.0-2.0 pt	0	For pyrethroid resistant corn earworm when tank mixed with a pyrethroid at labeled use rate.

*__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.

Table 31. Recommended Insecticides for Fall Armyworm Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar	methomyl (Lannate LV) (Lannate SP)	 0.75-1.5 pt 0.25-0.5 lb	 21 21	**RESTRICTED USE.** Do not feed treated vines. High rates may be required for good control.
	esfenvalerate (Asana XL)	9.6 oz	21	**RESTRICTED USE.** Suppression only. Do not feed or graze livestock on treated vines. Do not exceed 29.0 oz/season.
	zeta-cypermethrin (Mustang Max)	3.2-4.0 oz	7	**RESTRICTED USE.** Do not graze livestock in treated areas. Do not use treated vines for hay for animal feed.
	acephate (Orthene 97)	12.0-16.0 oz	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.

Table 31. Recommended Insecticides for Fall Armyworm Control (cont.)

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar (cont.)	fenpropathrin (Danitol 2.4EC)	10.6-16.0 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 pt/A/ season.
	beta-cyfluthrin (Baythroid XL)	2.4-2.8 oz	14	**RESTRICTED USE.**
	bifenthrin (Brigade 2EC)	2.1-6.4 oz	14	**RESTRICTED USE.** Do not feed immature plants and peanut hay to livestock.
	indoxacarb (Steward EC)	9.2-11.3 oz	14	Do not feed or graze livestock on treated fields.
	spinosyn (Blackhawk)	1.7-3.3 oz	3	Do not allow grazing of crop residue or harvest of crop residue for hay until 14 days after last application.
	spinetoram (Radiant SC)	3.0-8.0 oz	3	Do not allow grazing of peanut hay.
	beta-cyfluthrin + imidacloprid (Leverage 360)	2.8 oz	14	**RESTRICTED USE.**
	chlorantraniliprole (Prevathon)	14.0-20.0 oz	14	
	chloratraniliprole +lambda - cyhalothrin (Besiege)	6.0 - 10.0 oz	14	
	methaxyfen-ozide + spine-toram (Intrepid Edge)	4.0 - 8.0 oz	7	
	Bacillus thuriengiensis (Dipel ES)	1.0-2.0 pt	0	For pyrethroid resistant corn earworm when tank mixed with a pyrethroid at labeled use rate.

Spider Mite

Mites, which have become more numerous during the past several years, are especially injurious during hot, dry weather. While insecticides are very valuable in controlling leafhoppers, thrips, and worms, they may be responsible for destroying some of the natural enemies of spider mites, thus promoting the build-up of mite populations. Insecticides should be used **only when needed** for insect control. Tank mixes including fungicides and insecticides are more likely to allow spider mite build-up than when either material is used separately.

Spider mites feed mainly on the undersides of the leaves. They suck the juice from the foliage and cause the leaves to turn brown and eventually drop off. Heavy infestations usually first occur around the borders of peanut fields; then they spread inward throughout the fields. Avoid mowing weedy areas next to peanut fields until peanuts are harvested. Spider mites will readily move into peanuts when corn dries down or is harvested. Be prepared to treat peanuts if adjacent corn is infested.

IMPORTANT: If you are going to treat, calibrate your equipment to deliver the right amount of pesticide per acre. Arrange and adjust the nozzles or spouts in a manner that will direct the chemical into the desired area to be treated. Adequate sprayer pressure (40 to 60 psi) will aid in getting chemicals in contact with the undersides of leaves and within denser foliage. Penetration of foliage with 20 to 30 gal of water per acre is very important for the control of spider mites.

Table 32. Recommended Insecticides for Spider Mite Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar	propargite (Comite 6.5EC) (Omite 30W)	 2.0 pt 3.0-5.0 lb	 14 14	Use a minimum of 20 gal/A with ground equipment or 5 gal by air. Make no more than 2 applications/year (either Comite **OR** Omite). Do not plant rotational crops within 6 months of last application. Do not feed hay to livestock.
	fenpropathrin (Danitol 2.4EC)	 10.6-16.0 oz	 14	**RESTRICTED USE.** Do not graze or feed treated vine forage or dried hay within 14 days of the last application. Do not exceed 2.6 pt/A/season.
	bifenthrin (Brigade 2EC)	 5.12-6.4 oz	 14	**RESTRICTED USE.** Do not feed immature plants and peanut hay to livestock.

Lesser Cornstalk Borer

Lesser cornstalk borer typically is not a problem in Virginia peanut fields. However, it does thrive under hot dry conditions and can become a problem when those conditions continue for 3 to 4 weeks. Infestations will be most severe where soils are sandy and in high, well drained areas within fields. Larvae are 0.5 to 0.75 inch long and are banded with alternating brown and blue stripes. They wiggle vigorously when disturbed. Larvae feed by burrowing into main stems, lateral limbs, plant crowns, and pods and can do extensive damage, even kill plants. Larvae produce a silk-and-sand web tube which is attached to pods or stems at the point of feeding. Evidence of web tubes is a sure sign of borer activity.

If weather conditions become favorable for borers, survey fields for damaged plants and larvae. If damage is obvious and active larvae are still present in 10 percent or more of the plants, treatment is recommended.

Table 33. Recommended Insecticides for Lesser Cornstalk Borer Control

Treatment	Insecticide (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Granular	chlorpyrifos (Lorsban 15G)	6.7-13.3 lb	21	Apply in 10- to 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/season. 10.0-13.0 lb may be broadcast by air as a rescue treatment.

Table 34. Recommended Insecticides for Grasshopper Control

Treatment	Insecticidev (Formulation)	Amount product per acre	Time limits: days before harvest	Remarks
Foliar	acephate (Orthene 97)	4.0-8.0 oz	14	Do not feed treated forage or hay to livestock or allow animals to graze treated areas.
	esfenvalerate (Asana XL)	5.8-9.6 oz	21	**RESTRICTED USE.** Do not feed or graze livestock on treated vines. Do not exceed 29.0 oz/ season.
	zeta-cypermethrin (Mustang Max)	3.2-4.0 oz	7	**RESTRICTED USE.** Do not graze livestock in treated areas. Do not use treated vines for hay for animal feed.
	beta-cyfluthrin (Baythroid XL)	1.8-2.4 oz	14	**RESTRICTED USE.**
	bifenthrin (Brigade 2EC)	2.1-6.4 oz	14	**RESTRICTED USE.** Do not feed immature plants and peanut hay to livestock.

Pesticide Usage Charts

Many pesticides control more than one pest. The three following tables summarize the effectiveness of some popular pesticides used at time of planting, at time of pegging, or as foliar treatments for the control of major insect pests which attack peanuts.

Table 35. Insecticide Activity of Products Applied at Time of Planting

	Pests			
Chemical	**Thrips**	**Leafhopper**	**Rootworm**	**Spider Mite**
Thimet	G	Early	P	No
Orthene	E	Early	No	No

Table 36. Insecticide Activity of Granules Applied at Time of Pegging

	Pests			
Chemical	**Rootworm**	**Leafhopper**	**Spider Mite**	**Corn Earworm**
Thimet	G	Aids	No	No
Lorsban[1]	E	G	No	No

[1] *NOT SYSTEMIC. Do not apply in the furrow.*

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

Table 37. Insecticide Activity of Foliar Treatments Applied When Pests are Present

		Pest Species Controlled						
Insecticide	**Formulation**	**Thrips**	**Leaf-hopper**	**Root-worm**	**Corn Ear-worm**	**Fall Army-worm**	**Less Corn-stalk Borer**	**Spider Mite**
Sevin[2]	4F, 80S, XLR PLUS	P	E	No	F	F	No	No
Lannate	L	P	G	No	E	G	No	No
Comite, Omite	6.5EC, 30W	No	No	No	No	No	No	E
Asana[2]	XL	No	E	No	F/P	G	No	No
Orthene[2]	97	E	E	No	G	F	No	No
Warrior	II	E	E	No	F/P	G	No	F
Danitol	2.4EC	No	E	No	F/P	G	No	E
Steward	1.25SC	No	No	No	E	E	No	No
Blackhawk		No	No	No	E	E	No	

There are other insecticides and other formulations which have federal registration for use on peanuts.

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

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

PEANUT DISEASES

Hillary L. Mehl, Extension Plant Pathologist, Tidewater AREC

Management Tools

Advisory Programs

A network of weather monitors in southeastern Virginia record data for improving the efficiency of disease management. Weather data are used to produce daily advisories and reports for growers and industry workers. Included are daily weather summaries (air and soil temperature, rainfall), peanut leaf spot and Sclerotinia blight advisories, heat-unit reports for peanuts, and degree-day reports for cotton. The Peanut Frost Advisory is provided during the fall-harvest period. Each program is designed to guide growers in making decisions that maximize yield, quality, and net profit. The Tidewater Agricultural Research and Extension Center (AREC) in cooperation with Extension agents, growers, and the industry make this information available in the following ways:

Peanut/Cotton InfoNet: Information from four weather monitors is available on the Internet at ~~*http://www.ipm.vt.edu/infonet/.*~~ Contact your local Extension agent or call, (757) 657-6450 and ask for Hillary Mehl, Steve Byrum, or Linda Byrd-Masters if you need assistance in accessing or interpreting the information.

Hotlines: Disease advisories, heat units, and frost advisories are recorded daily at the Tidewater AREC for access by telephone. Regional advisories for Capron, Waverly, Suffolk, and Skippers are available by calling (800) 795-0700. The information is also available through local county Extension offices.

Clinical Services

Diagnostic services for plant diseases are provided by the Tidewater AREC in Suffolk. Plant samples should be submitted with the required forms by unit Extension agents. A period of 3-5 days is needed to complete biopsy tests and e-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 the soil and recommendations on needs for control. Soil samples should be collected in the fall following harvest and no later than November 20. Local Extension offices have instructions, sample information sheets, and bags for packaging samples. Samples can be sent to the Tidewater AREC Nematode Diagnostic Lab. For additional information contact Dr. Hillary Mehln.

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. For example, changing from a 2-year to a 3 year rotation of peanuts with corn or cotton can reduce disease losses to leaf spot, Sclerotinia

blight, and Cylindrocladium black rot by as much as 50% in as few as two or three cycles. Inputs for disease control should be determined on the basis of field history, scouting, disease advisory programs, and recommendations by Virginia Cooperative Extension. This approach to disease management will enable the judicious use of chemicals while providing for a maximum return on investments.

Sanitation

Soil and decayed plant debris may contain residual inoculum of disease-causing 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 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

A 4-year rotation of peanut with corn, grain sorghum, fescue, and other grass-type crops is beneficial for 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 interfere with calcium uptake and result in pod rot by fungi such a *Rhizoctonia* and *Pythium* species. Soybean and other leguminous crops share many of the common destructive diseases with peanuts and should be avoided. Where soybean is grown in a peanut rotation, double-crop soybean with wheat and follow with either cotton, corn, or another grass-type crop.

Tillage

Recent research has demonstrated that strip tillage into a wheat or rye cover crop can reduce production costs without increasing the risk of soilborne diseases in peanut. Strip tillage has been most successful in sandy-textured soils, with peanut production in a 3-year or longer rotation.

Resistant Varieties: Virginia-Type

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

Cylindrocladium black rot (CBR): Bailey, Bailey II, Sugg, Sullivan, and Wynne are resistant to CBR and when planted to fields with good rotation practices (3-year rotation out of peanut or longer) CBR is rarely a problem. In fields with a history of severe CBR even resistant varieties may be impacted by the disease, but disease severity can be reduced by good nematode control and delayed planting to May 10 or later. Cool, wet conditions at planting favor epidemics of CBR.

Sclerotinia blight: Sullivan, Bailey, and Bailey II are partially resistant to this disease. Early planting at seed rates of 110 lb/A or lower can reduce the susceptibility of varieties in some years. However, this practice will increase the risk of tomato spotted wilt disease.

Early and leaf spot: Sullivan, Bailey, Bailey II,and Wynne are moderately esistant to early leaf spot, but they are susceptible to late leaf spot which has become the dominant foliar disease of peanut in the region.

Tomato spotted-wilt virus: Bailey, Bailey II, Wynne, and Sullivan are resistant to TSWV. Reduced plant populations and planting before May 1 sometimes increases disease incidence.

Resistant Varieties: Runner-Type

Recent releases of disease resistant runner-type varieties that mature early can be grown with reduced input costs and offer good disease resistance in southeastern Virginia. These varieties include:

Florida 07, Florun 107, GA 06G, GA 09B: resistant to TSWV; moderately susceptible to CBR.

Florida 07, Florun 107: susceptible to Sclerotinia.

Tifguard: resistant to root-knot nematodes.

Whenever growing runner-type peanuts, early planting is recommended to improve opportunities for achieving maturity between October 1 and 10.

Scouting

Peanut fields should be scouted once a week for disease after pegging. Scouts should use different entry and exit points as well as travel patterns across fields at each visit. After a canopy of foliage covers the soil, scouts should part the vines and look for signs of soilborne diseases on plant stems at the soil surface (e.g. Sclerotinia, Southern stem rot, and CBR).

Chemicals

When host resistance, crop rotation, and cultural practices are insufficient for disease management, chemical control can be employed. 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 tests in the plant pathology clinic at the Tidewater AREC. If nematode or soil fertility problems are suspected, a 1-pt sample of soil should be submitted. The Peanut/Cotton InfoNet and Peanut Hotlines are important sources of information on timing of fungicide applications to control leaf spot and Sclerotinia blight. The following tables (38, 39, and 40) provide listings of approved chemicals for control of specific disease problems. Mixing or rotating fungicides with different modes of action is necessary to prevent fungicide resistance. Apply all pesticides according to label instructions and be aware of all recommended safety precautions.

Though it primarily applies to exports, it should be noted that due to recent pesticide residue restrictions made by the European Union, certain peanut shellers will not accept ANY peanuts that have had the restricted chemicals applied. The new restrictions are NOT based on increased safety concerns, and they may still be labelled for use in the U.S. However, under the current circumstances peanut

growers should NOT use them, and many chemical suppliers are voluntarily ceasing sales of these products for use in peanut. The chemicals fall into two major categories:

1) propiconazole-containing products and

2) mono/dipotassium salts or phosphorous acid based products.

Products in category 1 are used for leaf spot management and include Tilt (propiconazole), Tilt Bravo (propiconazole + chlorothalonil), Stratego (propiconazole + trifloxystrobin), and Artisan (propiconazole + flutolanil). There are several generic products with propiconazole as well, so be sure to check labels for propiconazole as an active ingredient. Some good alternatives to propiconazole in leaf spot fungicide programs include Alto (cyproconazole) + Bravo Weather Stik (chlorothalonil), Absolute (tebuconazole + trifoxystrobin), and Priaxor (fluxapyroxad + pyraclostrobin).

Fungicides in the second category are applied for management of Pythium pod rot, and there is not widespread use of these fungicides in Virginia. However, growers still need to be aware and be sure they are not using these. Typically, a different type of fungicide for Pythium control is included in seed treatments such as Dynasty, and these products are still okay to use.

Due to these restrictions, fungicide products containing these active ingredients are no longer recommended and are not included in the fungicide tables below.

READ THE LABEL INSTRUCTIONS ATTACHED TO PESTICIDE CONTAINERS BEFORE APPLICATION.

Table 38. Seed Treatments*

Disease	Product and Formulation	Rate of Formulation	Method and Timing of Application	Precautions and Remarks
Seed decay and seedling disease	Allegiance-FL or Apron 50W or Apron XL LS	0.75 fl oz 0.5-1.0 oz 0.16-0.64 fl oz	Apply as water-based slurry with commercial seed treatment equipment.	Control Pythium seed rot and damping-off. Use in combination with a broad-spectrum fungicide.

** All rates of seed treatments are formulated product/100 lb seed. Do not use treated seed for food, feed, or oil purposes. Bags with treated seed should bear a tag or label cautioning their use for these purposes as well as against the reuse of bags for packing feed or foodstuffs. Read use restrictions on labels and follow all labeling requirements for packaging treated seed.*

Table 38. Seed Treatments* (cont.)

Disease	Product and Formulation	Rate of Formulation	Method and Timing of Application	Precautions and Remarks
Seed decay and seedling disease (cont.)	Maxim 4FS	0.08-0.16 fl oz	Same as above.	Protects against seed decay, damping-off, and seed transmission of CBR.
	Protégé (azoxystrobin)	0.153 fl oz	Same as above	Controls Aspergillus crown rot and Rhizoctonia damping off.
	Captan 30DD or Captan 400	6.0 fl oz 3.0-6.0 fl oz	Same as above.	Protects against seed decay, damping-off, and seedling blights.
	RTU-PCNB	1.75-2.5 fl oz	Same as above.	Same as above.
	42-S Thiram	3.0 fl oz	Same as above.	Same as above.
	Vitavax-30C	3.0 fl oz	Same as above.	Controls Sclerotium rot and damping-off. Use in combination with a broad-spectrum fungicide.
	Thiram 50WP	4.5 oz	Apply with dust treater.	Controls seed decay, damping-off, and seedling blights.
	Vitavax PC (captan, PCNB, Vitavax)	4.0-5.0 oz	Same as above.	Same as above.
	Trilex Optimum DS (captan, trifloxystrobin, metalaxyl)	4.0 oz	Same as above.	Controls seed decay, damping-off, and seedling blights.

** All rates of seed treatments are formulated product/100 lb seed. Do not use treated seed for food, feed, or oil purposes. Bags with treated seed should bear a tag or label cautioning their use for these purposes as well as against the reuse of bags for packing feed or foodstuffs. Read use restrictions on labels and follow all labeling requirements for packaging treated seed.*

Table 38. Seed Treatments* (cont.)

Disease	Product and Formulation	Rate of Formulation	Method and Timing of Application	Precautions and Remarks
Seed decay and seedling disease	Trilex Star DS (captan, trifloxystrobin, thiophanate-methyl, metalaxyl)	4.0 oz	Same as above.	Same as above.
	Dynasty PD (azoxystrobin, fludioxonil, mefenoxam)	4.0 oz	Same as above.	Same as above, and reduces seed transmission of CBR.
	Rancona V PD (ipconazole, carboxin, metalaxyl)	4.0 oz	Same as above	Same as above.

** All rates of seed treatments are formulated product/100 lb seed. Do not use treated seed for food, feed, or oil purposes. Bags with treated seed should bear a tag or label cautioning their use for these purposes as well as against the reuse of bags for packing feed or foodstuffs. Read use restrictions on labels and follow all labeling requirements for packaging treated seed.*

Table 39. Foliar Fungicides*

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Foliar diseases only (early and late leaf spot, web blotch)	Chlorothalonil	Bravo 720 Bravo Ultrex Echo 720 Various others	1.5 pt 1.4 lb 1.5 pt	Apply according to leaf-spot advisory program or a calendar-based program using 14-21 day intervals.	**Caution:** Sclerotinia blight will be more difficult to control when these products are applied at intervals of less than 21 days.
	Tebuconazole + trifloxystrobin	Absolute 500SC	3.7-7.0 fl oz	Same as above.	Do not apply more than 4 sprays and apply chlorothalonil as the final spray for fungicide resistance management. Also controls limb rot.
	Mancozeb	Koverall	1.0-2.0 lb	Same as above.	Only effective against early leaf spot.
	Cyproconazole	Alto 100SL	5.5 fl oz	Same as above.	Mix or alternate with another fungicide to improve foliar disease control and reduce risk of fungicide resistance.
	Flutriafol	Topguard 1.04 SC	7-14 fl oz	Same as above.	Same as above.
	Tetraconazole	Eminent 125SL	6-13 fl oz	Same as above.	Same as above.

[1] For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.

[2] Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Early and late leaf spot, web blotch, Rhizoctonia limb rot, Southern stem rot	Tetraconazole	Domark 230ME	5.25 to 6.9 fl oz	Same as above.	Do not make more than 2 applications or 13.8 fl oz per acre per year. PHI = 14 days.
	Pydiflumetofen	Miravis	3.4 fl oz	Begin applications prior to disease development. For early and late leaf spot control, apply on a 21 to 28-day interval.	Do not make more than three applications of Miravis or other Group 7 fungicides before alternating with another fungicide mode of action. Also suppresses Sclerotinia blight.
	Tebuconazole + prothiocon-azole	Provost Opti Provost 433SC	7-10.7 fl oz	Same as above.	Apply up to 4 sprays then use a fungicide with a different mode of action. Suppresses CBR at the highest rate.

[1] For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.

[2] Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Early and late leaf spot, web blotch, Rhizoctonia limb rot, Southern stem rot (cont.)	Metconazole	Quash 50 WDG	2.5-4 oz	Same as above.	Apply up to 4 sprays then use a fungicide with a different mode of action.
	Tebuconazole	Folicur 3.6F Multiple generics	7.2 fl oz	Same as above.	Many populations of leaf spot fungicide are not controlled by tebuconazole alone. Mix with chlorothalonil or another fungicide with a different mode of action.
	Penthiopyrad	Fontelis 1.67SC	12-24 fl oz	Same as above.	Apply up to 3 sprays, then use a fungicide with a different mode of action. Also suppresses Sclerotinia blight.
	Azoxystrobin	Abound 2.08F	9.0-12.3 fl oz	Apply according to leaf spot advisory program, but do not make more than two applications.	Do not apply within 50 days of harvest. Not recommended for the last spray.

[1] For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.

[2] Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Early and late leaf spot, web blotch, Rhizoctonia limb rot, Southern stem rot (cont.)	azoxystrobin + tebuconazole	Custodia SC	15.5 fl oz	Apply according to leaf spot advisory.	Make up to 2 to 4 applications in mid-season as part of an advisory program.
	fluoxastrobin	Evito 480SC Aftershock	3.8-5.7 fl oz	Same as above.	Make up to 2 applications per season and rotate or mix with another fungicide with a different mode of action.
	fluoxastrobin + tetraconazole	Evito T	6-11.2 fl oz	Same as above.	Make up to 2 to 4 applications in mid-season as part of an advisory program.
	Pyraclostrobin	Headline 2.09EC, 2.08SC	6-15 fl oz	Same as above.	Make up to 2 applications per season and rotate or mix with another fungicide with a different mode of action.
	Fluxapyroxad + pyraclostrobin	Priaxor	4-8 fl oz	Same as above.	Use 1 to 3 times per season. Use higher rates for limb rot and stem rot control.

[1] For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.

[2] Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Early and late leaf spot, web blotch, Rhizoctonia limb rot, Southern stem rot (cont.)	Azoxystrobin + benzovin-diflupyr	Elatus	7.3-9.5 fl oz	Same as above.	Make no more than 3 applications before alternating with a fungicide with a different mode of action. May also be applied as an early season banded application for suppression of soilborne diseases. Excellent stem rot control.
	Prothiocon-azole	Proline	5.0-5.7 fl oz	Same as above	Apply up to 4 sprays, then use a fungicide with a different mode of action. Also suppresses CBR.
	bixafen + flutriafol	Lucento	3-5.5 fl oz	Apply according to leaf-spot advisory program or a calendar-based program using 14-21 day intervals.	Do not apply more than 11 fl oz of product/A per year. PHI = 14 days.

[1] *For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.*

[2] *Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.*

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Early and late leaf spot, web blotch, Rhizoctonia limb rot, Southern stem rot (cont.)	mefentri-fluconazole	Provysol	2.5-7.0 fl oz	For leaf spot, apply at 14 to 21 day intervals; for soilborne diseases apply at 14 to 28 day intervals. Use the higher rate for soilborne diseases.	Do not apply more than 21 fl oz/A per year. PHI = 14 days.
	mefentri-fluconazole + pyraclostrobin + fluxapyroxad	Revytek	8.0-15.0	For leaf spot, apply at 14 to 21 day intervals; for soilborne diseases apply at 14 to 28 day intervals. Use the higher rate for soilborne diseases.	Do not apply more than 15 fl oz/A per year. PHI = 14 days.

[1] *For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.*

[2] *Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.*

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Sclerotinia blight	fluazinam	Omega 500F	1.0-1.5 pt	Make first application according to disease scouting and the Sclerotinia advisory program. Up to two additional sprays may be applied depending upon disease pressure.	Provides good control of Sclerotinia blight and suppression of southern stem rot and Rhizoctonia pod rot.
	boscalid	Endura 70 WG	8-10 fl oz	Make first application according to the Sclerotinia advisory program and disease scouting in problem fields. Up to three sprays are allowed, but do not make more than two sequential applications.	Provides partial control of Sclerotinia blight and suppression of stem rot. Also suppresses leaf spot and provides excellent control of web blotch.

[1] For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.

[2] Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.

Table 39. Foliar Fungicides* (cont.)

Disease(s) controlled	Active Ingredient	Product and Formulation	Rate per acre	Method and Timing of Application[1]	Precautions and Remarks[2]
Sclerotinia blight (cont.)	Penthiopyrad	Fontelis 1.67SC	12-24 fl oz	Apply prior to disease onset and thereafter according to scouting or Sclerotinia blight advisory.	Suppression only. Also controls leaf spot, southern stem rot, and suppresses CBR. Do not apply more than three sequential sprays or 72 fl oz/A per season.
	Prothioconazole + fluopyram	Propulse 3.34SC	13.6 fl oz	Apply the first spray when disease is initially detected, and if needed, a second application according to scouting or Sclerotinia blight advisory.	Suppression only. Also suppresses CBR and limb rot. Do not apply more than 34.2 fl oz/A per season. May also be applied to the seed furrow at planting for suppression of soilborne diseases.
Cylindrocladium black rot (CBR)	Prothioconazole	Proline 480SC	5.7 fl oz	Apply to seed furrow at planting in a volume of 5 gal/A with spray nozzle or microtube.	Use for suppression of CBR in fields with low to moderate disease pressure and crop rotation of three years or longer. Only recommended when using a CBR resistant variety.
	Prothioconazole + fluopyram	Propulse 3.34SC	13.6 fl oz	Same as above. May also be applied by chemigation.	Same as above. May also suppress nematodes.

[1] For best results, apply sprays according to leaf spot advisory program in a volume of 12.0 to 15.0 gal/A by ground sprayers or 5.0 gal/A with aircraft.

[2] Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.

Table 40. Nematicides and Soil Fumigants

Pest(s)	Product and Formulation	Rate per acre	Method and Timing of Application	Precautions and Remarks
Nematodes and Cylindro-cladium black rot (CBR)	Metam 42%, Sectagon 42%, OR Vapam HL (metam sodium)	7.5 gal	Use with resistant varieties in cases of severe disease pressure; plant other varieties only in cases of low to moderate CBR pressure. Apply 8 in. under rows at least 14 days pre-plant with one injector shank in front of bed shaper to mark rows. Do not mix treated soil with untreated soil after application.	Apply if soil temps are ≥60° F at 4 in. depth and likely to be the same or warmer for 5 days. Delay application if >1 in. of rainfall is forecast in next 72 to 96 hrs. Note: metam sodium is now a restricted use pesticide and requires growers be approved for use. See current label requirements.

Table 40. Nematicides and Soil Fumigants (cont.)

Pest(s)	Product and Formulation	Rate per acre	Method and Timing of Application	Precautions and Remark
Nematodes	Telone II (1,3 dichloro-propene)	3.0-6.0 gal	Apply 8 to 12 in. under rows at least 7 days before planting.	See label for precautions and restrictions.
	Velum Total (fluopyram + imidacloprid)	18 fl oz	Apply in-furrow during planting directed on or below seed. May also be applied by chemigation into the root-zone.	Also controls thrips and suppresses early and late leaf spot.
	Propulse (fluopyram + prothioconazole)	13.6 fl oz	May be applied by chemigation or foliar spray.	For maximum nematode suppression, Propulse should be applied 45 days after planting following an at-plant nematicide (e.g. Velum Total).
	AgLogic 15G, AgLogic 15GG (aldicarb)	7 lb	In furrow at planting.	See label for precautions and restrictions. Also controls thrips.

**All rates are listed as formulated product/A. Read labels and observe all precautions and restrictions on application, pre-harvest interval, and restrictions on feeding treated hay, vines, or hulls to livestock.*

PEANUT IRRIGATION

Julie Shortridge, Biological Systems Engineer, Virginia Tech

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 diseases such as 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- to 12-inch depth. To evaluate soil moisture, hold a sample of soil in the palm and fingers of the hand and squeezed to form a ball. Based on the appearance of the ball, the following table 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/fruiting stages, soil moisture should not be allowed to drop below the 50 percent to 60 percent plant-available water level, while during the early vegetative growth and maturation stages it could be allowed to drop below the 50 percent 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 2 tensiometers, 1 inserted to a 12-inch depth and the other at 24 inches. The shallow instrument reflects the need for irrigation while the deep one 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 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 readings exceed a set tension level as with tensiometers. Follow manufacturer’s recommendations carefully when using this method. Additional detailed information, the selection, calibration, and operation of soil moisture sensors can be found in Virginia Cooperative Extension Publication BSE 198P - Understanding Soil Moisture Sensors: A Fact Sheet for Irrigation Professionals in Virginia.

How Much Irrigation?

In peanut irrigation, it may be advisable to bring soil moisture back up to only 85 percent to 90 percent 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 following table 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
**Acre-inch of water = 27,154 gallons.*			

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.

SPRAYER INFORMATION

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 psi (at tip)	Gallons Per Acre[1]		
		3 MPH	4 MPH	5 MPH
8004[2] (50-mesh screen)	20	28	21	17
	25	31	24	19
	30	34	26	21
	40	40	30	24

[1] Values are based on a nozzle spacing of 18 inches.

[2] 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 at tip (psi)	Gallons Per Acre[1]		
		3 MPH	4 MPH	5 MPH
8008 or 11008 (no strainer)	15	26.9	20.2	16.2
	20	31.1	23.2	18.7
	30	38.1	28.6	22.9
	40	44.0	33.0	26.4
8010 or 11010 (no strainer)	15	33.7	25.3	20.2
	20	38.9	29.2	23.3
	30	47.6	35.7	28.6
	40	55.0	41.3	33.0
TK 7.5 (no strainer)	10	41.3	30.9	24.8
	20	58.3	43.8	35.0
	30	71.4	53.6	42.9
	40	82.5	61.9	49.5
TK 10 (no strainer)	10	55.0	41.3	33.0
	20	77.8	58.3	46.7
	30	95.3	71.4	57.2
	40	110.0	82.5	66.0

[1] Values are based on a nozzle spacing of 36 inches.

Flat Fan Spray Tip No.	Pressure (psi) required to achieve 40 Gallons per acre 36" Row Spacing		
	3 MPH	4 MPH	5 MPH
8008 or 11008 (no strainer)	33 psi	59 psi (NR)[1]	92 psi (NR)
8010 or 11010 (no strainer)	21 psi	38 psi	59 psi (NR)
TK7.5 (no strainer)	9 psi (NR)	17 psi	26 psi
TK 10 (no strainer)	5.3psi (NR)	9psi (NR)	15 psi
[1] NR - Not recommended, outside of the operating pressure for the nozzle.			

Information on Spray Tips for Leaf-Spot Fungicides

Orfice disc number D_2 or D_3 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 (at tip) (psi)	Gallons Per Acre - 36" Row Spacing Using 3 Nozzles Per Row		
		3 MPH	4 MPH	5 MPH
D_2-13	40 60 80	13.1 16.4 18.1	9.8 12.3 13.7	7.9 9.9 10.9
D_2-23	40 60 80	16.5 20.5 23.3	12.3 15.4 17.3	9.9 12.3 13.9
D_3-23	40 60 80	19.4 23.3 26.6	15.5 17.3 19.8	11.7 13.9 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.

Using three nozzles per row, a minimum of 560 psi spray pressure, and a spray volume of 15 gal/A are recomended. The following tables shows the speed needed to achieve 50 psi and 15 gal/A.

Combination Disc and Core No.	Speed (MPH) required to achive 15 Gallons Per Acre @ 50 psi Using 3 Nozzle Per Row
D_2-13	3 MPH
D_2-23	3.7 MPH
D_3-23	4.4 MPH

Calibration of Boom Sprayers

Be sure to calibrate your sprayer properly. NEVER exceed the labeled rate. Using too much pesticide is illegal and may injure your crop. Using too little may result in little or no pest control. Pressure, nozzle orifice size, spacing of nozzles, and speed all affect the application rate. Be sure that all of your spray equipment is in good working order and your sprayer is configured properly.

Large-area Method of Calibration

1. Measure and stake off one acre (43,560 sq ft) in the field to be treated.
2. Fill sprayer tank with water.
3. Maintain constant pressure and speed while spraying the acre. Mark pressure, throttle, and gear settings.
4. Measure the amount of water used. The amount of water necessary to refill the tank is equal to gallons per acre applied.
5. Make up the spray solution with the correct amount of chemical, based on the amount of water applied per acre.
6. Make the application at pressure, throttle, and gear settings used in calibrating.

“Ounce” Calibration Method

1. Mark off a test course, based on the chart below. (Measure nozzle spacing for booms; row spacing for directed and band rigs.)
2. Set the throttle for spraying and operate the equipment as you drive the measured distance. Operate under field conditions. Fill your tank half full (average weight). Get a running start. Drive the measured distance several times while operating the equipment, recording driving times (# of seconds).
3. Calculate the average time in seconds required to drive the measured distance.

4. Run the equipment for the average time it took to drive the course, using the same settings (RPM5, pressure). Catch output during that time in a container marked in ounces. (If you are using a boom sprayer, catch the output from one nozzle. If you are using a directed/band rig, catch the spray from all nozzles per row for the prescribed time.)

5. Output in ounces = gallons per acre (GPA) applied.

"Ounce" Method Distances Row Width or Nozzle Spacing

Spacing (inches)	Distance (feet)
40	102
38	107
36	113
30	136
28	146
24	170
20	204
18	227

This method works because the test course is 1/1 28th of an acre, and 128 ounces in a gallon - the proportions are the same.

A word of caution: If you use the "ounce" method, your calibration check is based on only one nozzle. Be sure your calibration check is based on the right nozzle (and pressure) for the job - and that the nozzle is in good condition. This method is valid ONLY if the output from each nozzle (or sets of nozzles) is uniform! So, you should check ALL nozzles (or sets of nozzles, in the case of banding/directed applications) to be sure the output from each one (or each set) is the same. You can do this by using a flow meter, or by catching the output from each for a short time (ex. 10 seconds). Replace any nozzles that do not match the pattern and flow rate of the one(s) you used in the calibration test.

For more information concerning the "Ounce" calibration method review: "Fine Tuning a Sprayer with the "Ounce" Calibration Method." Virginia Cooperative Extension, Publication 442-453, *http://www.ext.vt.edu/pubs/bse/442-453/442-453.html*

For information and/or for guidance on calibration methods for other types of equipment, contact your local Extension agent.

Travel Speed Chart

Miles per hour	Time required to travel[1]		
	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] *1 MPH = 88 feet per minute; 1 MPH = 1.466 feet per second*

Measure Equivalency Tables

Land Measure

16.5 feet = 5.5 yards OR 1 rod

66 feet = 4 rods OR 1 chain

272.25 square feet = 30.25 square yards OR 1 square rod

4,356 square feet = 16 square rods OR 1 square chain

43,560 square feet = 160 square rods OR 10 square chains OR 1 acre

Length of Row Required for One Acre

Row spacing	Length or distance
24 inches	7260 yards = 21,780 feet
30 inches	5808 yards = 17,424 feet
32 inches	5445 yards = 16,335 feet
34 inches	5125 yards = 15,374 feet
36 inches	4840 yards = 14,520 feet
38 inches	4585 yards = 13,756 feet
40 inches	4356 yards = 13068 feet

Measurement Equivalency Chart

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

80 drops	=	1	teaspoon or about 1/6 fluid ounce
	=	5	milliliters or cubic centimeters (cc)
1 tablespoon	=	3	teaspoons
		15	milliliters (ml) or cubic centimeters (cc)
		1/2	fluid ounce
1 cup	=	16	tablespoons
		8	fluid ounces
		236.6	milliliters (ml) or cubic centimeters (cc)
		1/2	pint
1 pint	=	16	fluid ounces
			(NOTE: 1 pint or quart dry measure is about 16 percent larger than 1 pint or 1 quart liquid measure.)
		473.2	milliliters (ml) or cubic centimeters (cc)
1 fluid ounce	=	2	tablespoons or 29.6 milliliters (ml) or cubic centimeters (cc)
1 U.S. gallon	=	4	quarts
		8	pints
		3,785	milliliters (ml) or cubic centimeters (cc)
		8.3	pounds (lb) water
1 milliliter	=	1	cubic centimeter (cc)
	=	0.2	teaspoon
1 liter	=	1,000	milliliters (ml) or cubic centimeters (cc)
		1.08	quarts (1 quart + 1 fluid ounce)
1 pound	=	16	ounces
		453.59	grams
1 kilogram	=	1,000	grams, approximately 2 pounds 3 ounces
1 ounce	=	28.4	grams
1 bushel of soil	=	1.25	cubic feet
1 mile	=	5,280	feet
		320	rods
		1,609.4	meters
1 acre	=	43,560	square feet
		160	square rods
		0.4047	hectare
10 millimeters (mm)	=	1	centimeter (cm)
		0.3937	inch
100 centimeters	=	1	meter (m)
		39.37	inches

ESTIMATED CROP PRODUCTION COSTS

Estimated costs and returns per acre, 2017; based on 4004 pound per acre yield

	Unit	Quantity	Cost ($) per Unit	Total ($) per Acre	Your Farm
1. GROSS RECEIPTS	lbs	4000.00	0.23	900.00	
Peanuts					
Total Receipts				**$900**	
2. VARIABLE COSTS					
Seed	lbs	130.00	0.85	110.50	
Inoculant	acre	1.00	6.00	6.00	
Fertilizer*					
Nitrogen	lbs	15.00	0.52	7.80	
Phosphate	lbs	22.00	0.69	15.18	
Potash	lbs	35.00	0.42	14.70	
Manganeze	lbs	3.00	0.35	1.05	
Boron	lbs	2.50	1.35	3.38	
Lime (Prorated)	ton	0.33	56.00	18.48	
Gypsum	ton	0.60	58.70	35.22	
Herbicides	acre	1.00	45.30	45.03	
Insecticides	acre	1.00	16.39	16.39	
Fungicides	acre	1.00	79.04	79.04	
Surfactant	acre	1.00	7.05	7.05	
Scuplting	acre	1.00	16.00	16.00	
Hauling	ton	2.00	12.00	24.00	
Drying & Cleaning	ton	2.00	45.00	90.00	
State Check-off Fee	ton	2.00	3.00	6.00	
National Assessment**	acre	1.00	8.60	8.60	
Crop Insurance	acre	1.00	30.00	30.00	
Tractor/Machinery	acre	1.00	59.43	59.43	
Labor	hrs	4.25	10.74	48.45	
Interest on OP. CAP.	dol.	$233.85	4.8%	11.11	
TOTAL VARIABLE COSTS				**$653.41**	
3. INCOME ABOVE VARIABLE COSTS				**$246.59**	
4. FIXED COSTS					
Tractor/Machinery	acre	1.00	101.25	101.25	
TOTAL FIXED COSTS				**$101.25**	
5. OTHER COSTS					
General Overhead	dol.	$653.41	7.0%	$45.74	
TOTAL OTHER COSTS				**$45.74**	
6. TOTAL COSTS				**$800.40**	
7. NET RETURNS TO LAND, RISK, AND MANAGEMENT				**$99.60**	

BREAK-EVEN YIELD		BREAK-EVEN PRICE	
VARIABLE COSTS	2743 lbs	VARIABLE COSTS	$0.16
TOTAL COSTS	3507 lbs	TOTAL COSTS	$0.20

Prepared by: Garry Bullen, David Jordan, Derek Washburn, North Carolina State University, Dept. Agricultural and Resource Economics FOR PLANNING PURPOSES ONLY AND IT DOES NOT INCLUDE LAND RENT

*Fertilizer amounts refer to amount of Nitrogen, Phosphorus, Potash required as replacement values per acre based on yield

**NATIONAL ASSESSMENT is 0.095% of GROSS RECEIPT

Agronomic

Lenticels: structures due to excessive soil Moisture (courtesy Texas AgriLife Extension)

Chemical burn on leaf margins (courtesy Texas AgriLife Extension)

Nitrogen deficiency and inoculation failure in peanut: normal plant (left) and N-deficient (right)

Calcium deficiency showing unfilled pods or "pops".

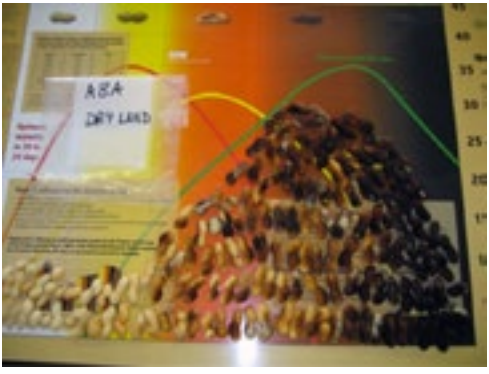
Manganese deficiency in peanut (courtesy Walt Mozingo)

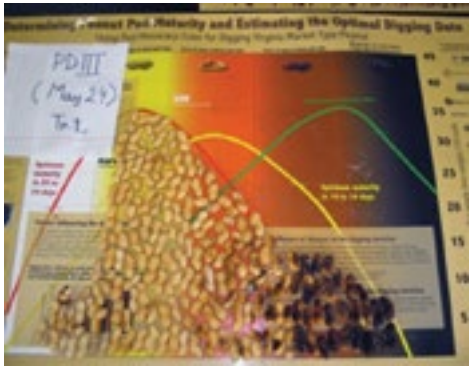
Agronomic cont.

Germination failure due to Ca (left) and B (right) deficiency (courtesy Walt Mozingo)

Drought sensitive (left) and tolerant (right) varieties

Disease susceptible (left) and resistant (right) varieties





Variety ready to harvest (left) and 3 weeks from optimum harvest (right)

Weed Control

Ragweed, young and mature plants

Sicklepod

Cocklebur

Morning glories: Pitted

Ivyleaf

Tall

Weed Control cont.

Valvet leaf

Crabgrass

Prickly sida

Eclipta

Bermudagrass

Nutsedge

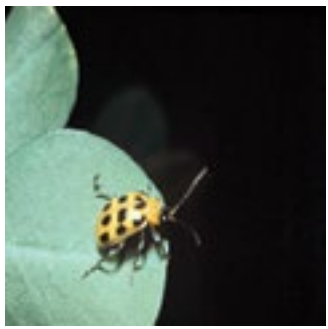
Insect Control



Thrips damage on peanut; adult and larvae feeding on leaves.



'Hooper burn' injury on peanut; adult and nymph are colored in bright green to yellow.

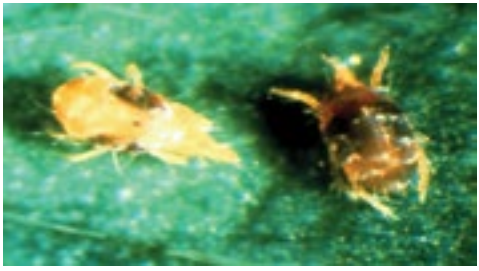




Pod damage by corn rootworm larvae; adults are also presented.

Insect Control cont.

Larvae of corn earworm feeding on leaves

Tobacco budworm (left) and fall armyworm (right)



Spider mites on peanut leaves; larvae and adult feeding on the plants

Lesser cornstalk borer damage on peanut pods; larvae feeding on the pods.

Disease Control

Early Leaf Spot

Early (Brown) and Late (black) Leaf Spot

Web Blotch

Tomato Spotted Wilt Virus on the peanut leaves

Tomato Spotted Wilt Virus showing stunned plants (courtesy Texas AgriLife Extension)

Seed of Tomato Spotted Wilt Virus infected plants (courtesy Texas AgriLife Extension)

Disease Control cont.

Cylindrocladium black rot (CBR)

Red fruiting bodies of CBR

Root and pod rot caused by CBR

Speckled seed with CBR

Southern stem rot (white mold)

Sclerotinia blight (bleached)

Root knot nematode galls

www.ext.vt.edu

Revised 2020 Publication SPES-177NP

Produced by Virginia Cooperative Extension, Virginia Tech, 2020

VT/1219/SPES-177NP