PEST MANAGEMENT STRATEGIC PLAN FOR NORTH CAROLINA / VIRGINIA PEANUTS

Summary of a Workshop held on April 4, 2002
at the Tidewater Agricultural Research and Extension Center
in Suffolk, Virginia

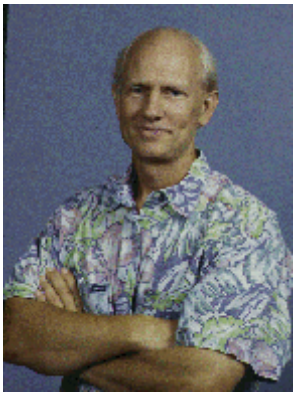
Sponsored by the:

North Carolina Pest Management Information Program
(North Carolina State University)
Virginia Pest Management Information Program
(Virginia Polytechnic Institute and State University)
Southern Region Pest Management Center
(University of Florida)
Office of Pest Management Policy, U. S. Department of Agriculture

July 15, 2002

In Memory of Jack Bailey

This document is dedicated to the memory of Dr. Jack E. Bailey, Professor and Extension Plant Pathologist at North Carolina State University, who passed away on April 12, 2002. All of us in the area of crop protection and Integrated Pest Management feel a great loss in the passing of our friend Jack.



Jack had worked at North Carolina State University since 1980 after receiving his Masters and Ph.D. degrees at Michigan State University. His work at North Carolina State University included efforts on peanuts, small grains, and cotton and focused on improving our ability to forecast disease pest problems and manage them in an economically and environmentally-sound manner. His work was innovative, creative, and always addressed applied problems that had direct applications to end users. Jack had a unique ability to explain complex concepts in a down-to-earth and easy-to-understand manner. Agents and growers alike appreciated and enjoyed their interaction with him. His expertise opened many doors for foreign travel which he thoroughly enjoyed. He helped scientists and students in locations such as China, Russia, the Philippines, Thailand, Ghana, Mali, South Korea, Australia, and Nicaragua.

More importantly, Jack was a true "people person." He was a true friend to many and his acts of kindness and caring will be long remembered by many of us. His unique sense of humor brightened our days and his passion for science and problem solving motivated many of us to work at a higher level. Jack always put people before projects. He was always there for students, staff, and fellow faculty. His untimely death, at age 50, while fighting an incurable bone marrow disorder, Myodisplasia Syndrome, is a great loss for us all. This loss extends far beyond his value as a scientist and faculty member, but more as a friend and companion for many of us. While the time we knew him was far too short, we are all better individuals for having crossed paths with Jack. May we embrace and emulate those qualities of a kind, caring individual that he displayed daily.

Rick Brandenburg

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REGULATORY BACKGROUND

The organophosphates, carbamates, and B/2 carcinogens (EPA's Phase 1 list for tolerance reassessment under FQPA) include many of the important pesticides used in peanut production in the United States. These chemistries control many of the key pests (insects, diseases, and weeds) that appear every year as well as some of the pests that appear occasionally in peanut fields. Frequently a single application is used to control two or more key pests simultaneously. These compounds are economical; pest resistance to these is not wide spread; and many do not harm key beneficial species that are part of current Integrated Pest Management (IPM) programs. These tools are at risk of being lost to peanut growers.

The EPA is in the process of re-registering pesticides under the requirements of the Food Quality Protection Act (FQPA) and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The Agency is examining dietary (including drinking water), ecological, residential, and occupational risks posed by the "high risk" pesticides (organophosphates, carbamates, and B/2 carcinogens) especially when used on foods consumed by infants and children. The priority list of pesticides that will undergo reassessment first includes several that have important uses in peanut production: organophosphates include acephate (Orthene), chlorpyrifos (Lorsban), disulfoton (Di-Syston), ethoprop (Mocap), fenamiphos (Nemacur), fonophos (Dyfonate), malathion, and phorate (Thimet); the carbamates include acephate (Temik), carbaryl (Sevin), and methomyl (Lannate); and the potential carcinogens include iprodione (Rovral), metam sodium, and Telone.

EPA's regulatory focus on theses chemistries has created uncertainty as to their future availability. At some point the EPA may propose to modify or cancel some or all uses of these pesticides. The regulatory studies that EPA requires registrants to complete may result in some companies voluntarily canceling registrations. The continued focus on risks from these pesticides may lead some processors and packers to require that growers not use them. In addition, environmental groups are raising public awareness through campaigns addressing pesticide use and residues. Public awareness can lead to consumer pressure on growers, processors, and packers to grow and sell produce that is free of pesticide residue. At this point no one can predict which of these pesticides will be available for growers in the future.

The risks and concerns regarding the use of these "high risk" pesticides are not going to go away in the near future. Agriculture needs to respond in a proactive manner by developing pest management strategic plans that reflect the needs of growers and show the EPA and the USDA what is required to reduce and/or eliminate the risks and residues associated with pesticide use. The USDA, the EPA, the land-grant universities and the peanut industry need to proactively identify regulatory, research, and educational needs for replacing the pesticides of concern with cost-effective alternatives as FQPA is implemented. The development of the specific pest by pest "To Do" list reflects these needs and is a primary goal of this document.

Several key principles were considered during the workshop:

1. First and foremost was the welfare of the peanut grower; any strategic plan developed had to allow for the continued profitability for growers by providing cost-effective alternative pest management tools.

2. Geographical regions had to be considered when developing pest management strategic plans due to differences in production practices, pest complex and pressure, environmental conditions, crop varieties, and marketing opportunities.

3. The "big picture" needs to be considered. The one chemical at a time process would not work. Discussing the issues in terms of chemical class, individual commodity, and specific pests is the most effective way to develop a pest management strategic plan.

4. The group would identify gaps and needs that would become the a "To Do" list. This "To Do" list identifies what is needed in terms of research, regulatory actions, and educational programs as peanut growers attempt to move away from use of “high risk” pesticides.

WORKSHOP AGENDA

Virginia/North Carolina Peanut Pest Management Strategic Plan Workshop
Tidewater Agricultural Research and Extension Center, 6321 Holland Road, Suffolk, Virginia
April 4, 2002

8:00 a.m. - 8:15 a.m.	Coffee and Introduction of Workshop Participants - *Steve Toth, North Carolina State University and Mike Weaver, Virginia Tech (Facilitators)*
8:15 a.m. - 8:30 a.m.	Welcome from Southern Region Pest Management Center - *Russ Mizell, Director, SRPMC* Comments from the USDA Office of Pest Management Policy - *Ted Rogers, Biologist, USDA OPMP*
8:30 a.m. - 8:45 a.m.	Purpose of Workshop and Value of Pest Management Strategic Plans in FQPA Implementation by EPA and USDA - *Steve Toth*
8:45 a.m. - 9:00 a.m.	Instructions for Preparing the VA/NC Peanut Pest Management Strategic Plan - *Steve Toth*
9:00 a.m. - 10:00 a.m.	**Small Groups:** Develop Efficacy Tables for Insect, Disease and Weed Pest Management in Peanuts
10:00 a.m. - 10:15 a.m.	Morning Break (refreshments provided)
10:15 a.m. - 12:00 noon	**Small Groups:** Continue Development of Efficacy Tables and/or Begin Work on Pest-by-Pest Profiles
12:00 noon - 1:00 p.m.	Lunch (box lunch provided)
1:00 p.m. - 3:30 p.m.	**Small Groups:** Develop Pest-by-Pest Profiles for Insect, Disease and Weed Pests in Peanuts (i.e., indicate pest status, list pest management practices, and identify research, education and regulatory needs)
3:30 p.m. - 3:45 p.m.	Afternoon Break (refreshments provided)
3:45 p.m. - 4:45 p.m.	Develop Research, Extension and Regulatory Priorities for Peanut Industry - *Steve Toth and Mike Weaver (Facilitators)*
4:45 p.m. - 5:00 p.m.	Closing Comments and Establishment of Time Frame for Completion of Pest Management Strategic Plan Document

CRITICAL NEEDS AND PRIORITIES FOR PEST MANAGEMENT ON NORTH CAROLINA AND VIRGINIA PEANUTS

The work group developed a prioritized list of critical research, regulatory, and educational needs for the peanut industry in North Carolina and Virginia. This document may be used to:

1. Identify the registration needs and priorities of the peanut industry in North Carolina and Virginia for the United States Environmental Protection Agency (EPA) and pesticide registrants;

2. Seek United States Department of Agriculture (USDA) funding for the research priorities that have been identified; and

3. Identify the research, regulatory and educational needs within the peanut industry.

Research Priorities:

- Develop an effective strategy for the control of tomato spotted wilt. Need information on etiology of the disease/biology of the organism, timing, identification, and the interaction mechanism with certain herbicides, insecticides, tillage practices, plant populations and varieties [i.e., response of peanuts after burn back with certain herbicides, spread of disease by insects (thrips)]. Learn about these interactions and use them to educate growers on control of the disease.
- Refine existing economic thresholds for potato leafhopper. Need more research on this threshold to make it work properly.
- Research on strip-till versus no-till peanut production, relative to cover crops, herbicide performance, positive impacts on fungal diseases, and potential problems with soil insects (e.g., cutworms and wireworms).
- Research on Southern corn rootworm management, i.e., improve treatment decisions (improve risk index) and development of more insecticide products to control these through the IR-4 Program. The current index tells growers to treat with insecticide more than is possibly needed. The index needs improvement [revise rootworm advisory (risk index) right now].
- Need an ovicide for two-spotted spider mites (one ovicide spray would replace two sprays for adult mites). No ovicide is labeled; Kelthane currently is used off-label.
- Need information on the conditions where growers can reduce (cut) herbicide rates.
- Research on herbicide application variables, including the timing of applications, rates, volume (some need to be used at low volume, others at high), surfactants (efficacy and will they allow growers to decrease herbicide rates versus herbicide use without surfactants), and tank mixes (need compatibility guide).
- Reduce the dependency of peanut growers on fungicides (concern with the cost of disease management). Need non-chemical disease management alternatives. The main concern of growers is the high cost of peanut production (i.e., pesticides, seed, tillage, etc.) which limits their pest management options.

- Improve disease resistance in Virginia-type peanut varieties.

Education Priorities:

- Interaction of thrips and tomato spotted wilt virus: educate growers on how disease is spread and how vectors play a role in this process.
- Make growers more aware of the Southern corn rootworm advisory (i.e., improve the advisory, educate growers, and promote the Southern corn rootworm advisory index).
- Potato leafhopper control decisions: educate growers on estimating 25 percent potato leafhopper damage (threshold) and on management strategies.
- Inform growers about generic pesticides (i.e., identify where generic pesticides work as well as trademark brands and how generic pesticides compare to trademark brands).
- Weed identification/production guides: develop diagnostic guides, Internet-based resources, and other educational materials to help growers and county Extension agents identify weed problems.
- Improve decision-making tools for disease management (e.g., improve old and develop new advisories).
- Promote the greater use of computer technology (i.e., the Internet) for information exchange and outreach. Specifically, use the Internet to supply pest management information, increase the exchange of information between growers, county Extension agents and agricultural consultants, and make publications more timely and available at lower costs to users.
- Maintain on-farm demonstrations and field days (despite budget cuts at the universities and county Extension offices).

Regulatory Priorities:

- Need to involve the IR-4 Program in the registration of new insecticides for use on peanuts (insect pest management currently is very dependent on organophosphate insecticides), and also for the registrations of new fungicides and herbicides.
- Section 18 emergency registrations: encourage the pursuit of full (Section 3) registrations of pesticides registered under Section 18 and contact U.S. Department of Agriculture to assure that Section 18 registrations are issued in time to be useful to growers (comment by Ted Rogers).
- Maintain the availability of Temik and metam-sodium for nematode and CBR control.
- Maintain the availability of chlorothalonil for resistance management to triazole and stobilurim fungicides for primarily foliar diseases (i.e., early leaf spot).
- Promote the fast track registrations of BASF 500 (Headline) for early leaf spot and web blotch and BASF 510 (nicobifen) as an alternative to Omega 500 for sclerotinia blight and web blotch control. Both products have reduced risk status.
- Promote the fast track registration of glyphosate (Roundup) for use on peanuts. Advantages of glyphosate include controlling weeds for which there is no control and controlling some weeds very effectively (i.e., sicklepod). Disadvantages of glyphosate include allowing volunteer peanuts (competition) in other crops (e.g., cotton).

Overriding Issue for Peanut Pest Management:

- Uncertainty in the future market for peanuts will have an effect on pest management strategies used by peanut growers. The peanut industry is looking for cost reductions, which could impact pest management. Also, pesticide registrants may not be willing to devote the resources necessary to develop and register products for use on peanuts given an uncertain market for peanuts.

Improvements to Pest Management Strategic Plan Workshops:

- Develop the priority lists on a laptop computer and project them on a screen.
- Continue to develop efficacy tables and other materials before the workshop to speed up process.
- Coordinate the work of all of the small groups so some workshop participants are not waiting for other workshop participants to complete their tasks.
- Provide workshop participants (particularly growers and county Extension agents) with materials and agenda before the day of the workshop (i.e., furnish advanced information so participants will know what to expect from the workshop).
- Divide workshop participants so that each small group contains people from each participating state.

PEST-BY-PEST PROFILES

INSECT PESTS

Major Pests:

Corn Earworms

This lepidopterous pest occurs frequently in the peanut crop during mid to late summer. The threshold is 4 worms per row foot until September 1 at which time it increases until September 1 at which time it increases to 8 worms per row foot. After September 15, the threshold increases to 12 worms per row foot. While several generations can occur, it is the later generations that attack peanuts. Approx. 40% of the acreage in North Carolina was treated in 1995, much less (less than 25%) now.

Growers generally control this pest with a single application of a foliar insecticide based upon scouting information. Improved scouting over the past ten years has probably reduced the acreage that is treated for this pest. Scouting and thresholds are adequate. Reduced tillage and twin row production produce modest reductions in the likelihood of an economic infestation of corn earworm. Resistance issues seen in pyrethroids in cotton, same populations move around. Alternate chemistries are important.

Organophosphates

Foliar

Acephate (Orthene): Not typical treatment, better treatments available for this pest, disrupt beneficial insects (REI- 24 hours, PHI- 14 days)

Malathion: Very limited use for this pest, better treatments available. (REI-12 hours, PHI-0 days)

Carbamates

Carbaryl (Sevin): Very limited use, better treatments available. Can flare spider mites. (REI-12 hours, PHI- 14 days)

Methomyl (Lannate): Effective, but higher toxicity, choice for mixed species (fall armyworm), limited use but sometimes "rescue" cleanup when other products "fail". (REI- 48 hours, PHI- 21 days)

Other Chemicals

Pyrethroids

lambda-Cyhalothrin (Karate): Top choice, cost effective. Dermal sensitivity can be an issue. Fish toxicity for all pyrethroids. (REI- 24 hours, PHI- 14 days)

Esfenvalerate (Asana): Lower skin sensitivity problems, cost effective. (REI- 12 hours, PHI- 21 days)

Fenpropathrin (*Danitol)*: More of a miticide, only used for worms when mixed with mites as it is an expensive treatment when used only for caterpillars. (REI- 24 hours, PHI- 14 days)

Unregistered Chemicals

Bifenthrin (Capture): Good control, some temporary control of mites, another pyrethroid and there is no manufacturer interest in pursuing peanut label.

Spinosad (SpinTor): modest performance

Non Chemical Alternatives

Twin row and reduced till has very modest effect on reducing levels of infestation. Not reliable for suppressing below threshold levels.

TO DO List

No major concerns other than resistance management due to presence of these pests in other crops. Growers typically do a good job of scouting and treating only when caterpillars exceed thresholds.

Fall Armyworms

Fall armyworms can and do occur simultaneously with corn earworm, but are generally less common and less destructive. They will sometime still be present in the field at harvest time and may be observed in peanut trailers. Due to their less destructive feeding behavior the threshold is generally about twice that for corn earworm. Fall armyworms are rarely found by themselves and since there are usually mixed populations in the field, the corn earworm threshold is often the default threshold used. Fall armyworms are a little more difficult to control than are corn earworms.

Organophosphates

Foliar

Acephate (Orthene): Not very effective. (REI- 24 hours, PHI- 14 days)

Malathion: Poor effectiveness. (REI-12 hours, PHI- 0 days)

Carbamates

Carbaryl (Sevin): Poor performance. Potential to flare spider mites. (REI- 12 hours, PHI- 14 days)

Methomyl (Lannate): Most effective, but higher toxicity, choice for mixed species, limited use but sometimes "rescue" cleanup when other "fail". (REI- 48 hours, PHI- 21 days)

Other Chemicals

lambda-Cyhalothrin (Karate): Reasonable control of this more difficult to control species, cost effective. Dermal sensitivity is an issue with some users. (REI- 24 hours, PHI- 14 days)

Esfenvalerate (Asana): Reasonable control of the more difficult to control problem, lower skin sensivity problems, cost effective. (REI- 12 hours, PHI- 21 days)

Fenpropathrin (Danitol): More of a miticide, only for worms when mixed with mites due to cost. (REI- 24 hours, PHI- 14 days)

Non Chemical Alternatives

Twin row and reduced till has very modest effect on reducing levels of infestation. Not reliable for suppressing below threshold levels.

TO DO List

No major concerns other than resistance management due to presence of these pests in other crops.

Potato Leafhoppers

Potato leafhoppers can also damage peanuts; however, research indicates the economic threshold should be 25% leaf damage. Such levels are not commonly seen, but leafhoppers have been more of a problem in recent years, particularly in fields not treated for rootworms. These tiny insects feed on leaflets and inject a toxin that disrupts photosynthesis. There is limited research available on injury, thresholds and management and the value of rescue treatments is questionable once damage symptoms are obvious.

Organophosphates

Acephate (Orthene): Good product, reasonable price. (REI- 24 hours, PHI- 14 days)

Chlorpyrifos (Lorsban): Targeted for southern corn rootworms. Effectiveness results from secondary benefit. Following application at mid season for leafhoppers effectiveness can be affected by timing. Expensive to use solely for Potato leafhopper control and can also flare spider mites. (REI- 12 hours, PHI- 21 days)

Carbamates

Carbaryl (Sevin): Reasonable performance but concern over mid to late season use and flaring of mites. (REI- 12 hours, PHI- 14 days)

Other Chemicals

Pyrethroids

lambda-Cyhalothrin (Karate): Excellent control at low rates, very cost effective. Skin sensitivity an issue for some. (REI- 24 hours, PHI- 14 days)

Esfenvalerate (Asana): Excellent control, less skin sensitivity. (REI- 12 hours, PHI- 21 days)

Fenpropathrin (Danitol): Good leafhopper control, but more expensive. Does provide secondary benefit of spider mite control so would be used when both pests are present. (REI- 24 hours, PHI- 14 days)

Unregistered Chemicals

Bifenthrin (Capture): Excellent control, but no interest from manufacturer for peanut label.

Non Chemical Alternatives

Cultural: Slight reductions in leafhopper abundance in reduced tillage systems.

TO DO List

Economic threshold research critical, host plant resistance work important for IPM programs. Education of growers on impact of leafhopper feeding and decision making key to effective insecticide use.

Southern Corn Rootworms

The southern corn rootworm is one of the most troublesome insects for peanut producers. While pests like caterpillars, thrips, and spider mites can cause severe damage that is often quite obvious above the ground, the rootworms feed below the soil surface and feed directly on the pod. The rootworm

beetles lay their eggs at the base of the peanut plants in mid summer and the larvae attack developing pods. Due to the subterranean nature of the pest, "rescue" type treatments are ineffective and growers must rely upon preventive insecticide applications. A southern corn rootworm advisory based on soil type and other factors is available through Virginia Tech University and North Carolina State University to aid growers in making decisions about preventive treatments.

Organophosphates

Chlorpyrifos (Lorsban): Excellent results, flexibility in timing (flowering to pegging), but must still in a prophylactic manner, use may flare spider mites, but has secondary benefit by providing control of potato leafhopper. (REI- 12 hours, PHI- 21 days)

Ethoprop (Mocap): Seldom used, quite toxic and quite water soluble. Average performance. Limited availability. (REI- 48 hours, PHI- 45 days)

Phorate (Thimet): Rarely used, average performance. (REI- 48 hours, PHI- 90 days)

Unregistered Chemicals

Thiamethoxam: More research needed, little manufacturer interest

Fipronil: More research needed, little manufacturer interest

Non Chemical Alternatives

Cultural : Early planting prior to April 25 (soil often too cool, however) helps pods mature before damage occurs, use of early maturing varieties, if available. Evidence that no till reduces rootworm threat.

TO DO List

Research on improved advisory index, additional work on host plant resistance, and baseline data for trends in rootworm populations.

Continued grower education on use of rootworm advisory to make wise treatment decisions.

Thrips

Thrips can be serious pests early in the season if at-planting systemic insecticides were not used, but foliar sprays can be effective. The impact from thrips is due to the stunting of plants early in the season. Thrips can also transmit tomato spotted wilt virus. The economic threshold for thrips is 25% leaf damage. It is very important to follow this guideline closely. Delaying thrips treatment will still provide control but will not provide any real benefits in plant response.

Organophosphates

Acephate (Orthene): Excellent both as foliar and in-furrow, hopper box, cost effective alternative to Temik and is much less toxic. Worker exposure concerns over old 75S formulation. At plant use saves time (includes Di-Syston and Thimet as well). (REI- 24 hours, PHI- 14 days)

Disulfoton (Di-Syston): Mediocre performance seldom used product with concerns over herbicide interactions when used as an at-plant systemic insecticide. (REI- 24 hours, PHI- 0 days)

Malathion: Little use as a foliar treatment, mediocre performance. (REI-12 hours, PHI-0 days)

Phorate (Thimet): Average performance as an at-plant systemic insecticide, some concern over phytotoxicity issues with herbicide interactions. Research indicates Thimet is a useful tool for reducing tomato spotted wilt virus despite its average performance for thrips control. Affect on virus apparently due to mechanisms other than vector control. (REI- 48 hours, PHI- 90 days)

Carbamates

Aldicarb (Temik): Excellent performance. Has been the standard for thrips control as an at plant insecticide. Highly toxic. Additional benefits suppression through nematode suppression. . Most expensive. At plant insecticide use provides benefits in time savings. (REI- 48 hours, PHI- 90 days)

Carbaryl (Sevin): Mediocre performance. Seldom used as a foliar treatment. (REI- 12 hours, PHI- 14 days)

Pyrethroids

lambda-Cyhalothrin (Karate): Excellent foliar cleanup treatment, used alone or to supplement at plant insecticides once plants are growing. (REI- 24 hours, PHI- 14 days)

Unregistered Chemicals

Bifenthrin (Capture): Good control, but no current interest from manufacturer.

Thiamethoxam: More research needed and little interest form manufacturer.

Non Chemical Alternatives

Cultural: Reduced tillage and twin rows produces modest reductions in thrips damage, as does later planting (not much of an option) due to length of growing season.

TO DO List

Research on the effect of early herbicides injury and interactions on the relationship of thrips control and the abundance of tomato spotted wilt virus. Documentation and monitoring of possible shift in thrips species and control. Evaluate varieties for thrips/virus abundance as well as continued efforts on cultural practices and insecticide use to reduce virus.

Twospotted Spider Mites

This is a pest during hot, dry conditions. Outbreaks often induced by the use of foliar insecticides or fungicides, which reduce the level of natural enemies and pathogens. Infestations often overlooked until serious damage has occurred. Infestations often occur from field edge due to movement in from field borders and adjacent corn fields.

Organophosphates

Malathion: Poor control, not used for mites. (REI- 12 hours, PHI- 0 days)

Propargite (Comite): One of the better products, but narrow spectrum, controls mites only. Considerd very expensive for use in peanuts and has no ovicidal activity and two sprays often required. Relatively easy on beneficial arthropods. Timing difficult and is often used late due to the small size of mites. Products often tank mixed with leafspot fungicide and this low volume spray application often leads to failure due to application technique. (REI- 48 hours, PHI- 14 days)

Carbamates

Aldicarb (Temik): Used at mid season, but must have rain to activate (the rain itself is often the best control measure). Rarely used for this purpose, 90-day PHI, narrow spectrum for this use, mites only. (REI- 48 hours, PHI- 90 days)

Pyrethroids

Fenpropathrin (Danitol): Good performance, two sprays often required, timing difficult as per Comite. Application techniques similar to Comite with same tank mix concerns. Danitol does offer late season worm control as an added benefit. Spider mites commonly develop resistance to miticides and the availability of an OP and Pyrethroid important for resistance management. (REI- 24 hours, PHI- 14 days)

Unregistered Chemicals

Bifenthrin (Capture): Limited company interest in pursuing a label for peanuts. Good knockdown of mites, but resurgence sometimes noted

Spinosad (Tracer): Limited testing and company interest.

Non Chemical Alternatives

Cultural: Avoid late season foliar insecticides; use leafspot advisory to minimize fungicide use during periods of hot, dry weather. Don't mow around fields in mid summer. Irrigation helps reduce mite populations but only available in a small percentage of fields.

TO DO List

Look at new chemistries and effect of newer fungicides on fungal pathogen of mites. Look for products with ovicidal activity to reduce to one spray. Label Kelthane.

Sporadic Pests:

Cutworms

Rare pest in the Virginia-Carolina area. Can feed on both vines and pods and is much more difficult to detect and control when feeding on pods.

Organophosphates

Acephate (Orthene): Foliar application not a good performer and probably a last choice. (REI- 24 hours, PHI- 14 days)

Methomyl (Lorsban): Spray or granular application will give good control. (REI- 12 hours, PHI- 21 days)

Malathion: Poor control. (REI-12 hours, PHI- 0 days)

Carbamates

Carbaryl (Sevin): Poor performance against this pest. (REI- 12 hours, PHI- 14 days)

Methomyl (Lannate): Good control, relatively toxic product. (REI- 48 hours, PHI- 90 days)

Pyrethroids

lambda-Cyhalothrin (Karate): Good performance, but only if cutworms on vines. (REI- 24 hours, PHI- 14 days)

Esfenvalerate (Asana): Good performance, but only if cutworms on vines. (REI- 12 hours, PHI- 21 days)
Fenpropathrin (Danitol): Less effective than above. (REI- 24 hours, PHI- 14 days)

Unregistered Chemicals

*Bifenthrin (Capture)*and *spinosad*: Potential for reasonable performance, but small market will probably preclude label for this pest.

Non Chemical Alternatives

Cultural: Current conventional tillage probably helps reduce cutworms, but as growers shift to reduced tillage, cutworms may become more of a problem.

TO DO List

Monitor abundance of cutworms in different tillage systems

Lesser Cornstalk Borers

Another pest of hot, dry conditions. Generally observed at damaging levels only under severe drought and rarely observed in the Virginia/Carolina area. Difficult to monitor and control. Usually only found in very sandy soils that would not be treated for southern corn rootworm.

Organophosphates

Chlorpyrifos (Lorsban): Works well, but lesser cornstalk borers are rare, found only in drought. Only product available for control. (REI- 12 hours, PHI- 21 days)

Non Chemical Alternatives

Cultural

Irrigation: Fields under irrigation will not be infested with lesser cornstalk borer.

Biological Control: Natural enemies in the field normally keeps cornstalk borers in check except under extreme drought.

TO DO List

None.

Wireworms

Wireworms are a very sporadic pest that can attack peanuts at planting or later in the season. Our survey has determined this is a rare problem.

Organophosphates

Chlorpyrifos (Lorsban): Good as a curative, problems usually not found until it is too late for corrective action. (REI- 12 hours, PHI- 21 days)

Ethoprop (Mocap): Less effective than Lorsban. (REI- 48 hours, PHI- 45 days)

Phorate (Thimet): Less effective than Lorsban. (REI- 48 hours, PHI- 90 days)

Non Chemical Alternatives

Cultural practices: Tillage helps reduce problems as does rotations that avoid following pasture or tobacco.

TO DO List

Monitor reduced tillage fields for wireworms.

DISEASES AND NEMATODE PESTS

Foliar Diseases of Peanuts (Early Leaf Spot, Late Leaf Spot, Web Blotch, Pepper Spot, Leaf Scorch)

Leaf spot advisories are issued daily (http://www.ipm.vt.edu/infonet/) to avoid the need to spray on a 14-day schedule and to maximize the efficiency of fungicide performance.

Registered Fungicides (* denotes fungicides requiring resistance management)

Fungicides that are vulnerable to resistance development in fungi are not recommended after August 15 to insure that a broad-spectrum will be used at the end of the season. Chlorothalonil is the most effective broad-spectrum fungicide for this purpose.

Chlorothalonil (Bravo, Echo, Equus): a broad-spectrum fungicide used for control of early and late leaf spot, web blotch, pepper spot, and leaf scorch. Chlorothalonil is an important tool for resistance management when using strobilurins (Abound, Flint) and triazoles (Tilt, Folicur).

Copper fungicides (ManKocide, Tribasic copper, etc.): these fungicides have only a minor role in foliar disease management because they are only partially effective in control of foliar diseases.

Ethylene bisdithiocarbamates (Dithane, Manzate, etc.): like the copper fungicides, these fungicides offer only partial control of foliar diseases.

Propiconazole + chlorothalonil (Tilt/Bravo, EchoPropiMax)*: this mixture is widely used as the first or second fungicide application of fungicide for foliar disease control.

Propiconazole + trifloxystrobin* (Stratego)*: this mixture was first introduced in 2001 and was found to provide good control of foliar diseases in the first or second fungicide application.

Tebuconazole (Folicur)*: in addition to good foliar disease control, this fungicide provides good control of certain soilborne diseases (southern stem rot, Rhizoctonia limb rot) and suppression of Cylindrocladium black rot (CBR).

Azoxystrobin (Abound)*: same as above and perhaps offers the best available control of web blotch and Rhizoctonia limb rot. However, use is limited because of high cost compared to Folicur.

Non-Chemical Control Measures

Crop rotations of three or four years are recommended

Select varieties with partial resistance and/or reduced susceptibility to disease (NC 7 for early leaf spot, Perry for web blotch)

Southern Stem Rot and Rhizoctonia Limb/Pod Rot

Registered Fungicides

Azoxystrobin (Abound): this fungicide provides good control of stem and pod rots, but high cost has resulted in minor use.

Carboxin (Vitavax): continues to be widely used as a peanut seed treatment against fungi, but it is no longer applied for control of stem and pod rot in the field.

Flutolanil + propiconazole (various names): not used widely because higher cost compared to tebuconazole.

Flutolanil (Moncut): not used due to cost and narrow spectrum of activity.

PCNB (Terraclor): not used due to the availability of less expensive and more effective products.

Mefenoxam +pcnb (Ridomil PC): not used due to availability of more effective products.

Propiconazole + trifloxystrobin (Stratego): not used due to the need for higher rate and greater cost compared to tebuconazole.

Tebuconazole (Folicur): widely used throughout region due to favorable cost and good efficacy against foliar diseases, southern stem rot, and Rhizoctonia limb/pod rot.

Unregistered Fungicides

BAS 500 (Headline): This fungicide is highly effective against leaf spot and web blotch of peanut.

Non-Chemical Control Measures

Crop rotations of three or four years are recommended.

Select varieties with partial resistance and/or reduced susceptibility to disease (NC 7 for early leaf spot, Perry for web blotch).

Sclerotinia Blight

Registered Fungicides

Sclerotinia blight advisories are issued daily (http://www.ipm.vt.edu/infonet/) to maximize the efficiency of fungicide sprays.

Iprodione (Rovral): Not used due to poor efficacy and high cost

Fluazinam (Omega): This is the most effective fungicide available for control of Sclerotinia blight, but high cost is a major concern among growers.

Unregistered Fungicides

BAS 510: This fungicide offers an alternative to use of fluazinam (Omega), and provides excellent control of Web blotch.

Non-Chemical Control Measures

Crop rotation: Three or four years between peanut or other hosts are recommended

Plant early: Planting before May 1 can provide opportunities for an early harvest which reduces crop exposure to disease in October when disease pressure is likely to be greatest.

Variety selection: Plant a partially-resistant variety (Perry)

Manage plant population: plant 80 to 100 pounds of seed per acre in single rows spaced 36 inches apart. Heavy seeding rates (120 to 140 pounds per acre) increases vine density and creates a more favorable environment for the disease.

Reduce vine injury: Since physical injury to vines increased disease severity and spread, growers are limiting trips across fields with equipment by adopting leaf spot advisories, eliminating cultivation for weed control, and eliminating needless applications of insecticides such as sprays for corn earworms and southern corn rootworm.

Limit use of chlorothalonil: Foliar applications of chlorothalonil for foliar disease control should be spaced at least 21 days apart. Where a applications are needed at less than 21-day intervals, chlorothalonil should be rotated with other fungicides (Abound, Folicur, Stratego)

Cylindrocladium Black Rot (CBR)

A web site (http://ipm-www.ento.vt.edu/nipmn/VA-IPM/cblackrot/index.htm) has been developed for growers to learn the biology of the causal fungus, factors in disease spread, and methods for proper application of soil fumigant.

Registered Biocides

Metam sodium (Metam, Vapam, Sectagon): soil fumigation at 2 weeks prior to planting with metam sodium is the only available means for effective, economical control of CBR. Varieties of peanut with partial resistance to CBR often show a favorable response to soil treatment in heavily infested fields. Growers are advised to monitor soil temperatures (http://www.ipm.vt.edu/infonet/) and weather forecasts (http://www.wunderground.com) to insure fumigant is applied under optimum conditions (greater than 60 degrees F; little rainfall for 3 to 5 days) for maximum performance.

Tebuconazole (Folicur): in-furrow and foliar applications of tebuconazole provide some suppression of CBR. In-furrow applications can enhance the level of CBR control with metam sodium in field with heavy infestations of the disease.

Non-chemical Control Measures

Crop rotation: Three or four years between peanut or other hosts are recommended.

Variety selection: Perry, NC 10C and NC 8C are partially resistant to CBR.

Delay planting: Planting about May 10 or later provides an opportunity to escape early season infection, since soil temperatures are likely to be warmer and less favorable for growth of the fungus.

Nematodes (Northern Root Knot, Lesion, Stubby Root, Sting)

Population thresholds (http://ipm-www.ento.vt.edu/nipmn/VA-IPM/updates/nematode/ frames.html) for determining the risk of damage enable identification of problems fields in late summer or early fall before peanuts are planted.

Registered Nematicides

Metam sodium (Metam, Vapam, Sectagon): Soil fumigation at 2 weeks prior to planting with metam sodium is the most effective means for control of high populations of plant parasitic nematode. Aldicarb (Temik 15G) in the seed furrow at-planting acts synergistically with metam sodium to provide control of early season insects. Growers are advised to monitor soil temperatures (http://www.ipm.vt.edu/infonet/) and weather forecasts (http://www.wunderground.com) to insure fumigant is applied under optimum conditions (greater than 60 dgrees F; little rainfall for 3 to 5 days) for maximum performance.

Aldicarb (Temik 15G): In-furrow applications of aldicarb provide early season control of nematodes and thrips. Aldicarb is particularly important when no other nematicide is used, since it provides some good control when nematode populations are near the threshold for causing crop damage.

Fenamiphos (Nemacur): An 8- to 10-inch band of fenamiphos in combination with aldicarb (Temik 15G) in the seed furrow is the most effective alternative to use of metam sodium. Nemacur has been particularly effective in control of Sting nematode.

Non Chemical Control Measures

Crop rotation: Rotation of peanut crops at intervals of 3 or 4 years with non-host crops provides good control of northern root knot nematode. Crop rotation has limited value for management of sting, stubby root and lesion nematode because of their wide host range.

No resistant varieties: All varieties of Virginia-type peanut are considered susceptible to damage by northern root knot, sting, stubby root and lesion nematodes.

WEED PESTS

Effective weed management is essential for profitable peanut production. Peanuts are not very competitive with weeds and thus require higher levels of weed control than most other agronomic crops to avoid yield losses. A weed management program in peanuts consists of good weed control in rotational crops; cultivation, if needed; establishment of a satisfactory stand and growing a competitive crop; and proper selection and use of herbicides. Non-chemical control methods used in peanut include crop rotation and cultivation. Accurate weed identification and timely herbicide applications are also keys to successful weed management.

Crop Rotation

Rotate peanuts with corn or cotton to help manage various pests, including weeds. Crop rotation allows use of different herbicides on the same field in different years. Crop and herbicide rotation, along with good weed control in the rotational crops, helps prevent the buildup of problem weeds and helps keep the overall weed population at lower levels. Crop rotation will also help reduce the chance of developing populations of weeds that are resistant to herbicides.

Cultivation

Cultivation is an excellent means of supplementing chemical weed control. One or two "non-dirting" cultivations often improve weed control. Additionally, cultivation in combination with banded herbicide applications can reduce costs. However, cultivation can damage the crop and reduce yield if not done properly. Movement of soil onto the lower branches and around the base of the plants causes physical damage and enhances development of stem and pod diseases. Deep cultivation also destroys residual herbicide barriers and brings up additional weed seeds. Peanuts should be small when cultivated. Set sweeps to run flat and shallow to avoid throwing soil onto the peanut plants.

Weed Scouting

All fields, regardless of the crop being grown, should be surveyed for weeds between mid-August and the first killing frost. Make a written record of the weed species present and the general level of infestation of each species (light, moderate, or heavy). Weeds present in the fall will be the ones most likely to be problems the following year. Knowing what problems to expect allows you to better plan a weed management program for the following crop.

Scout peanut fields weekly from planting through mid-July to determine if or when postemergence herbicide treatment is needed. Proper weed identification is necessary because species respond differently to various herbicides. Contact your county Extension center for aid in weed identification. Timely application of postemergence herbicides is critical for effective control.

HADSS (Herbicide Application Decision Support System), a computer-based programs designed to assist in making decisions pertaining to postemergence herbicide applications, is available through the North Carolina Cooperative Extension Service. Weed density, predicted crop value, predicted weed-free crop yield, herbicide cost, and herbicide efficacy are used to develop a ranking of the economics of herbicide options for a specific weed complex. This approach does not consider the long-term affect of weed seed production if weeds are not controlled. The patchiness of weeds in each field and the time needed to scout fields are limitations to this approach. However, this decision support system is beneficial in explaining herbicide options. **Appendix I** contains the competitive index value assigned to weeds typically found in North Carolina peanut fields. Cocklebur, with a ranking of 10, is considered the most competitive weed in peanuts. A survey of 52 peanut fields in North Carolina was conducted from 1997 through 2001. The percent of acres surveyed containing weed species is found in **Appendix II**.

Preplant Incorporated Herbicides

Registered herbicides and tank mixes suggested for preplant incorporated application include the following (**Appendix III**):

Prowl	Prowl + Dual or Frontier or Outlook
Sonalan	Sonalan + Dual or Frontier or Outlook
Vernam	Pursuit + Prowl or Sonalan
Dual, Dual Magnum	Pursuit + Dual or Frontier or Outlook
Pursuit	Prowl + Strongarm
Frontier	Sonalan + Strongarm
Strongarm	Strongarm + Dual or Frontier or Outlook

Prowl and Sonalan are similar products and provide similar season-long and control common annual grasses, pigweed, and lambsquarters but are inadequate for control of most other broadleaf weeds. They also do not control nutsedge.

Dual, Dual Magnum, Outlook, and Frontier control broadleaf signalgrass, crabgrass, crowfootgrass, fall panicum, foxtails, goosegrass, and pigweed but are weak on Texas panicum. They also control or suppress yellow nutsedge. Mixtures of Prowl or Sonalan plus Dual, Dual Magnum, Outlook, or Frontier provide somewhat better initial grass control, especially in heavily infested fields.

Strongarm can be applied preplant incorporated to control common ragweed, eclipta, common lambsquarters, morningglories, cocklebur, and other broadleaf weeds. Weed control with Strongarm is generally better when applied with Prowl, Sonanlan, Dual, Dual Magnum, Outlook, or Frontier. It does not control annual and perrenial grasses. Strongarm only suppresses yellow and purple nutsedge. Rotation restrictions include corn, tobacco, and sorghum, but not cotton.

Pursuit 70 DG is registered for preplant-incorporated, preemergence, at-cracking, and postemergence application to peanuts at the rate of 1.44 ounces per acre. Split applications of a half rate preplant incorporated and a half rate at late cracking or early postemergence have tended to give the most consistent control of a range of weed species. Pursuit has activity on some grasses and often has given good control of broadleaf signalgrass, especially when applied postemergence. However, it is suggested that Pursuit be used in combination with a soil-applied grass herbicide. Pursuit will suppress or control yellow and purple nutsedge, with purple nutsedge usually being the more susceptible. There are rotational restrictions of concern following use of Pursuit. Wheat and rye may be planted 4 months after Pursuit application. Corn, tobacco, and barley may be planted 8.5, 9.5, and 9.5 months, respectively, after Pursuit application. In most cases, there is an 18-month rotational restriction for cotton.

Preemergence Herbicides

Herbicide and tank-mix options include Dual, Dual Magnum, Outlook, Frontier, Lasso, Pursuit, Dual + Pursuit, Dual Magnum + Pursuit, Lasso+ Pursuit, Outlook + Pursuit, and Frontier + Pursuit.

(**Appendix III**). Lasso (alachlor) is registered for use on peanuts but some marketing contracts may exclude alachlor-treated peanuts. Before using Lasso, consult with buyers to determine if marketing restrictions exist.

Dual, Dual Magnum, Lasso, Outlook, and Frontier control annual grasses (except Texas panicum) and pigweed. Dual, Dual Magnum, Outlook, and Frontier applied preemergence may adequately control light infestations of yellow nutsedge. (Dual, Outlook, Dual Magnum, and Frontier incorporated is preferred for moderate to heavy infestations).

Strongarm can be applied preemergence as well as pre-plant incorporated. See comments under pre-plant incorporated. Nutsedge control may be better if Strongarm is incorporated.

Valor received Federal and State labels for use in peanut in 2001. Considerable injury occurred in 2001 in North Carolina. Injury was also noted in Virginia and throughout the peanut belt. Weather conditions most likely contributed to the level of injury. However, there is not a conclusive answer as to the cause of injury. Valor controls many of the small-seeded broadleaf weeds found in peanut. It does not adequately control grasses.

At-Cracking Herbicides

Herbicide and tank-mix options include Dual, Dual Magnum, Outlook, Frontier, Lasso, Paraquat (Boa or Gramoxone MAX), Paraquat + Basagran, Paraquat + Dual or Dual Magnum or Outlook or Frontier, Pursuit, and Pursuit + Dual or Dual Magnum or Outlook or Frontier (**Appendix III**).

Dual, Dual Magnum, Lasso, Outlook, and Frontier will provide residual control of annual grasses and pigweed to supplement control provided by the preplant or preemergence herbicide(s). Dual or Frontier would be preferred in fields with yellow nutsedge or with very coarse soil.

Boa or Gramoxone MAX (Paraquat) will control small annual grasses and most small broadleaf weeds. For consistent results, the weeds should be 1 inch or shorter. Paraquat controls only emerged weeds; it does not provide residual control. Application of Paraquat is of benefit only if weeds are present. Dual, Dual Magnum, Outlook, or Frontier may be added to Paraquat to provide residual control of annual grasses and small-seeded broadleaf weeds. Tank mixing 0.5 to 1 pint of Basagran with Paraquat may improve control of ragweed, prickly sida, spurred anoda, and lambsquarters and reduce Paraquat burn on peanuts.

Pursuit may be applied at-cracking and may be tank mixed with Dual, Dual Magnum, Outlook, Frontier, or Paraquat. Although late at-cracking application (small weeds) has generally given good control of many species, split application may be preferred.

Postemergence Herbicides

Postemergence herbicide and tank-mix options include 2,4-DB, Basagran, Basagran + 2,4-DB, Blazer, Blazer + 2,4-DB, Basagran + Blazer, Storm, Storm + 2,4-DB, Paraquat, Paraquat + Basagran, Paraquat + 2,4-DB, Pursuit, Pursuit + Basagran, Pursuit + Blazer, Pursuit + 2,4-DB, Pursuit + Paraquat, Cadre, Classic, Tough, Tough + 2,4-DB, Poast, Poast Plus and Select. (**Appendix IV**).

2,4-DB: 2,4-DB (Butyrac 200, Butoxone, Chemnut, others) can be applied twice per season anytime from 2 weeks after planting up to 45 days before harvest. It primarily controls cocklebur and morningglories. Unless treated when small, pitted morningglory may not be killed by 2,4-DB. Late-season applications of 2,4-DB are discouraged because of potential injury and possible adverse affects on seed quality.

Basagran: Basagran controls controls cocklebur, jimsonweed, smartweed, prickly sida, spurred anoda, velvetleaf, and yellow nutsedge. Control of common ragweed and lambsquarters may be adequate if Basagran is applied when these weeds are small. However, the label warns that in-furrow insecticides may predispose peanuts to injury from Basagran. Injury, sometimes severe, has occasionally been noted in North Carolina when Basagran was applied to peanuts receiving an in-furrow application of Di-Syston. 2,4-DB may be added to Basagran to improve control of morningglory and spurred anoda. This tank mix may be applied from 2 weeks after planting up to 45 days before harvest. The tank mix may be applied twice per season.

Blazer: Multiple postemergence applications of Blazer can be made so long as the amount of applied postemergence does not exceed 2 pints per acre per season. Blazer may be applied anytime from cracking up to 75 days prior to harvest. Blazer controls morningglories, jimsonweed, smartweed, common ragweed, tropic croton, pigweed, and small lambsquarters. Blazer may cause leaf crinkling and bronzing and sometimes leafburn. Peanuts recover and yield is generally not affected. 2,4-DB may be added to Blazer to improve control of cocklebur and large morningglories. A Blazer plus Basagran tank mix will control a broader spectrum of broadleaf weeds than either product applied alone. The best rate of each product to apply will depend upon weed species present, weed size, and growing conditions; see labels for details. This tank mix may be applied anytime from cracking up to 75 days before harvest.

Storm: This prepackaged mixture contains the active ingredients in both Basagran and Blazer. Application of 1.5 pints per acre of Storm is equivalent to applying 1 pint of Basagran plus 1 pint of Blazer. Storm may be applied anytime from cracking up to 75 days before harvest. This herbicide controls most common annual broadleaf weeds. Unless applied when weeds are small, however, Storm may not give consistent control of lambsquarters, prickly sida, spurred anoda, and velvetleaf.

Boa or Gramoxone MAX (Paraquat) may be applied postemergence in addition to an at-cracking application and should not be applied later than 28 days after cracking. Paraquat controls small annual grasses and most small broadleaf weeds. Paraquat applied to emerged peanuts will cause varying amounts of leaf burn. However, peanuts recover and yield is not affected. A second application of

Paraquat should not be made if peanuts are showing injury symptoms from the first application. Also, Paraquat should not be applied to peanuts showing thrips damage. A tank mix of Paraquat plus 1 pint of Basagran will provide better control of weeds, such as cocklebur, common ragweed, prickly sida, smartweed, spurred anoda, and velvetleaf, than Paraquat alone. Adding at least 0.5 pint of Basagran to Paraquat also reduces peanut injury from Paraquat and is highly recommended.

Pursuit: Pursuit can be applied postemergence to peanuts alone or tank mixed with Basagran, Blazer, 2,4-DB, or Paraquat. It is important that Pursuit be applied to small weeds. Adding 2,4-DB to Pursuit will enhance control of broadleaf weeds.

Cadre: Cadre controls most broadleaf weeds except croton, ragweed, lambsquarters, and eclipta. Cadre also controls purple and yellow nutsedge. Apply before weeds exceed 3 inches. Although Cadre will control escaped broadleaf signalgrass, fall panicum, and Texas panicum, a soil-applied grass control herbicide should be used. See label for rotational restrictions, especially cotton. Do not apply Cadre within 90 days of harvest.

Tough: Tough can be applied alone, but a tank mixture with 2,4-DB is generally recommended. Tough is particularly effective on lambsquarters. Tough is an option for lambsquarters control when the weed exceeds the size controlled by Basagran, Blazer, Storm, or Paraquat.

Classic: Classic is registered for late postemergence application to peanuts for control of Florida beggarweed only. Apply only from 60 days after crop emergence to within 45 days of harvest. Earlier application will stunt peanuts and reduce yield. **Do NOT apply to peanuts under drought stress. Recommended as a salvage treatment only.**

Poast, Poast Plus, and Select: Poast, Poast Plus, and Select provide good to excellent control of annual grasses. If applied twice, Poast, Poast Plus or Select also will control bermudagrass and rhizome johnsongrass.

Layby Herbicides

Dual, Dual Magnum, Outlook, and Frontier are registered for layby application to peanuts. The value of a layby herbicide application depends upon the soil texture, organic matter content, and amount of rainfall received during the first 4 to 5 weeks after planting. If above-normal rainfall is received during the first 4 to 5 weeks after planting, especially on coarse, sandy soils with very low organic matter, a layby application of Dual or Frontier banded in the row middles may improve digging efficiency or yield. The layby herbicide should be applied to a weed-free surface (cultivate first or treat with appropriate herbicide if emerged grasses, pigweed, or eclipta are present). If rainfall is at or below normal levels during the first 4 to 5 weeks after planting, a layby application will seldom be economically justified for annual grass control. **These herbicides do not control emerged weeds.**

A layby application of Dual, Dual Magnum, Outlook, or Frontier also may be beneficial in managing eclipta. **Look closely to make sure eclipta has not emerged. These herbicides will not control**

eclipta that has emerged.

Herbicide Programs for Specific Weeds

Annual Grasses

Crabgrass, Fall Panicum, Foxtails, Goosegrass: Begin the management program with either a preplant-incorporated or preemergence herbicide. Prowl, Sonalan, Dual, Dual Magnum, Outlook, Lasso, or Frontier provide good control.

Broadleaf Signalgrass: Broadleaf signalgrass is a major problem in all peanut-producing counties. A management program for broadleaf signalgrass should begin with a preplant incorporated application of Prowl, Sonalan, Dual, Dual Magnum, Outlook, or Frontier. If broadleaf signalgrass escapes the above treatments, a shallow cultivation would be an option. Alternatively, apply Poast, Poast Plus, or Select. A layby application of Dual, Dual Magnum, Outlook, or Frontier is also an option. See previous discussion of layby herbicides.

Texas Panicum: This annual grass has been observed in most peanut-producing counties in North Carolina. Infestations are relatively isolated, but further spread is expected. Management programs for Texas panicum may vary from those recommended for other annual grasses. Therefore, proper identification during fall scouting of the preceding crop is critical. Texas panicum can be controlled with a preplant-incorporated application of Prowl or Sonalan; Dual, Dual Magnum, Outlook, Lasso, and Frontier do not provide adequate control. Because of its large seed, Texas panicum can emerge from deeper in the soil than other annual grasses. Prowl or Sonalan should be incorporated to a depth of 3 inches (this is deeper than specified on Prowl label). Preemergence, at-cracking, or layby applications of Dual, Dual Magnum, Outlook, Lasso, and Frontier are of little benefit in controlling this species. A shallow cultivation could be considered if Texas panicum begins to emerge in the row middles. Also, Texas panicum is very susceptible to Poast, Poast Plus, or Select.

Nutsedge: Both yellow and purple nutsedge can be found in peanut fields. In recent years, purple nutsedge has been increasing and is now the predominant nutsedge species in many areas. Because management programs may vary for the two species, it is important to determine which species is present during fall scouting of the preceding crop. Nutsedge-infested fields should receive a preplant-incorporated application of either Dual, Dual Magnum, Outlook, or Frontier. Vernam is no longer widely available. If the annual grass population is heavy or is predominantly broadleaf signalgrass or Texas panicum, tank mix Prowl or Sonalan with Dual, Dual Magnum, Outlook, or Frontier. Follow with a preemergence or at-cracking application of Dual, Dual Magnum, Outlook, and Frontier where yellow nutsedge is expected. Dual, Dual Magnum, Outlook, and Frontier will not control purple nutsedge. If an economic infestation of yellow nutsedge is present after making the above treatments, Basagran may be applied postemergence when the yellow nutsedge is approximately 7 inches tall. As an alternative to the above strategies, one may use a split application of Pursuit. Incorporate 0.72 ounces of Pursuit 70 DG plus a grass control herbicide. Dual, Dual Magnum, Outlook, or Frontier would be the preferred grass herbicides unless a grass species is present that these herbicides do not

control. Strongarm suppresses both purple and yellow nutsedge, but does not completely control these weeds. Follow up applications of postemergence herbicides are generally needed. If Strongarm is applied, do not apply Cadre postemergence. Strongarm followed by Cadre most likely will injure cotton or corn planted the following year. Cadre controls purple and yellow nutsedge. Applications should be made when nutsedge is small. Research indicates that rainfall or irrigation that sufficiently moves Cadre into the soil improves control. Although Cadre is applied after nutsedge and other weeds have emerged, a significant amount of uptake by weeds occurs through roots.

Annual Broadleaf Weeds

Common Broadleaf Weeds: Preplant or preemergence herbicides used for annual grass control usually will provide good control of certain small-seeded broadleaf weeds such as pigweed, carpetweed, Florida pusley, common purslane, and lambsquarters (although Dual, Dual Magnum, Outlook, Frontier, and Lasso are weak on lambsquarters). These herbicides also will suppress a number of other broadleaf weeds. Tank-mix applications with Prowl or Sonalan are most effective for suppressing broadleaf weeds. If broadleaf weeds are emerged at the cracking stage of peanuts, Paraquat or Paraquat plus Basagran would be an economical option. If additional control is needed for subsequent flushes, one of the postemergence herbicides or tank mixes previously discussed could be applied. Timing of postemergence herbicide application is critical.

Sicklepod: Apply Paraquat or Paraquat plus Basagran at-cracking or early postemergence when the sicklepod are in the cotyledonary to first true leaf stage. A second application of Paraquat or Paraquat plus Basagran is an option if a new flush of sicklepod emerges. For control of sicklepod later in the season, apply 1 pint per acre of 2,4-DB before sicklepod exceeds 12 inches tall. Make a second application about 2 weeks later. Alternatively, Cadre controls sicklepod very well. Rotation restrictions, however, limit utility of Cadre.

Florida beggarweed: This broadleaf weed has traditionally been confined to the southeastern counties in North Carolina. Isolated infestations are now beginning to appear in some of the northern peanut-producing counties. Since Florida beggarweed is particularly troublesome in peanuts, growers should learn to recognize this weed and strive for the best control possible in all crops in the rotation before the weed becomes widely established. Hand-removal of isolated plants is highly recommended. For early-season control of Florida beggarweed, apply Dual, Dual Magnum, Outlook, Frontier, or Lasso preemergence. Apply Paraquat when the beggarweed is 2 inches tall or less. A second application of Paraquat can be made if needed to control beggarweed emerging after the first application. Basagran, Storm, or 2,4-DB may be tank mixed with the Starfire for additional control of other broadleaf weeds.

Eclipta: Eclipta tends to be more of a problem in lower areas of fields and in wetter years. Except for extremely heavy infestations, eclipta probably is not very competitive in peanuts because it tends to be a mid- to late-season problem and is a low-growing weed. Additionally, it does not appear to greatly interfere with digging since it usually dries down before digging time. Dual, Dual Magnum, Outlook, Lasso, or Frontier will suppress eclipta. Strongarm controls eclipta as well, generally better than these herbicides. Hence, one or more of these herbicides should be applied in fields with a history of eclipta

problems. An at-cracking application of Paraquat will control very small eclipta (1/4 inch). Blazer, Storm, or Tough applied postemergence will control small eclipta (1 inch or less). Strongarm does an excellent job controlling eclipta. Most eclipta appears to emerge after the normal postemergence herbicide application for broadleaf weeds. In fields with a history of eclipta, growers are encouraged to scout closely for 4 weeks after the normal postemergence broadleaf herbicide application. If enough eclipta emerges to indicate a problem, another postemergence herbicide application (Blazer, Storm, or Tough) may be in order. A layby application of Dual, Dual Magnum, Outlook, or Frontier may be of value in fields with a history of eclipta problems. Enhanced control of eclipta has been observed where these herbicides were applied at layby.

Perennial Broadleaf Weeds

Perennial broadleaf weeds, such as horsenettle, trumpetcreeper, maypop passionflower, and bigroot morningglory, cannot be controlled in peanuts. Blazer or 2,4-DB may give suppression but control will not be adequate. These weeds are best controlled in corn grown in rotation with peanuts. In corn, make a layby application of 2,4-D amine plus surfactant or a mixture of Beacon plus Banvel. After corn harvest, spot spray any remaining infestations with Roundup or a mixture of 1 pint per acre of 2,4-D amine plus 0.5 pint per acre of Banvel plus surfactant. See Roundup label for suggested application rates. Alternatively, Roundup can be applied preharvest in cotton.

Bermudagrass: Two applications of Poast, Poast Plus, or Select in combination with good crop competition usually will provide adequate to good control of bermudagrass. Strive for good control in rotational crops. In corn, incorporate Sutan+ or Eradicane. In cotton, apply Roundup, Assure II, Fusilade DX, Poast, Poast Plus, or Select postemergence.

To Do List

1. Increase research in reduced tillage production. Changes in farm legislation will reduce profitability of peanut at the farm level. Utilizing reduced tillage systems for peanut may be an alternative to more expensive conventional tillage systems if yields can be maintained. Determining the benefits of cover crops on weed management in these systems will be important as will determining if herbicide performance changes significantly.

2. Developing reduced rate herbicide recommendations for specific weed complexes. There are situations where herbicides can be applied at rates below those recommended by the manufacturer. Determining the consistency of performance by herbicides applied at marginal rates will be critical in determining if this approach to weed management, which theoretically could reduce input costs, is feasible.

3. Evaluating application variables such as application timing, rates, spray volume, surfactants, and compatibility issues. The goal of this effort would be to maximize performance of herbicides which would maximize the return of investment in that treatment.

4. Develop weed management programs that reduce production and weed management costs. The first three items listed above address this goal as well.

Extension Needs

1. With multiple herbicide products on the market better education on effectiveness of generic materials needs to be provided to end users.

2. Obtaining time-critical answers to specific questions is needed.

3. Development of more regional and local production guides and identification guides would be beneficial.

4. Develop educational materials and recommendations to avoid development of weed populations that are resistant to herbicides.

Regulatory Needs

1. IR 4 will become more important as value of peanut at the farm level decreases and acreage declines. Companies will see a lower return on investment and will not continue developing products specifically for peanut.

2. Roundup Ready peanut most likely would contribute to effectiveness of weed management programs. Concern about consumption issues and GMOs needs to be addressed.

3. Obtaining Special Use labels in a timely fashion is needed. However, concerns about having products used on a wide scale before all of the label requirements are met is an issue. Are the situations where products receive Special Use labels really emergencies?

4. Requirements that farmers have all product labels in their possession in the field when pesticides are being applied. This can be cumbersome.

Efficacy Tables for Peanut Pest Management Practices

Tables 1a - 1d: Efficacy ratings for various pest management tools against peanut insect and mite pests.

Tables 2a - 2d: Efficacy ratings for various pest management tools against peanut diseases and nematodes.

Tables 3a - 3d: Efficacy ratings for various pest management tools against peanut broadleaf weeds and grasses.

Table 1a. Efficacy ratings for various pest management tools against peanut insect and mite pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Insect and Mite Pests /1																			
	Corn earworms	Fall armyworms	Potato leafhoppers	Southern corn rootworms	Thrips	Twospotted spider mites	Aphids	Beet armyworms	Cutworms	Green cloverworms	Lesser cornstalk borers	Southern armyworms	Velvetbean caterpillars	Wireworms						
Registered Insecticides and Miticides																				
acephate (Orthene)	G	F	E	NU	E	NU			F		NU			NU						
aldicarb (Temik)	NU	NU	NU	NU	E	F			NU		NU			NU						
carbaryl (Sevin)	F	P	E	NU	P	NU			P		NU			NU						
chlorpyrifos (Lorsban, Pilot)	NU	NU	G	E	NU	NU			G		G			G						
lambda-cyhalothrin (Karate, Warrior)	E	G	E	NU	E	NU			E		NU			NU						
disulfoton (Di-Syston)	NU	NU	NU	NU	F	NU			NU		NU			NU						
esfenvalerate (Asana)	E	G	E	NU	NU	NU			G		NU			NU						
ethoprop (Mocap)	NU	NU	NU	G	NU	NU			NU		NU			P						
fenpropathrin (Danitol)	E	G	E	NU	NU	G			P		NU			NU						
fonofos (Dyfonate)	NU	NU	NU	G	NU	NU			NU		NU			NU						
malathion (Malathion)	P	P	F	NU	P	P			P		NU			NU						
methomyl (Lannate)	E	E	F	NU	NU	NU			G		NU			NU						
phorate (Thimet)	NU	NU	NU	G	G	NU			NU		NU			NU						
propargite (Comite)	NU	NU	NU	NU	NU	G			NU		NU			NU						

1/ aphids, beet armyworms, green cloverworms, southern armyworms, and velvetbean caterpillars are not pests in Virginia.

Table 1b. Efficacy ratings for various pest management tools against peanut insect and mite pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Insect and Mite Pests /1																			
	Corn earworms	Fall armyworms	Potato leafhoppers	Southern corn rootworms	Thrips	Twospotted spider mites	Aphids	Beet armyworms	Cutworms	Green cloverworms	Lesser cornstalk borers	Southern armyworms	Velvetbean caterpillars	Wireworms						
Unregistered/New Insecticides and Miticides																				
bifenthrin (Brigade, Capture)	E	E	E	NU	G	G			F		P			NU						
imidacloprid (Admire, Gaucho, Provado)																				
spinosad (SpinTor, Success)	G	F	NU	NU	NU	NU			P		NU			NU						
tebufenozide (Confirm, RH-5992)	?	?	?	?	?	?			?		?			?						
thiamethoxam (Actara, Adage 5 FS, Platinum)	NU	NU	NU	NU	F	NU			NU		NU			NU						

1/ aphids, beet armyworms, green cloverworms, southern armyworms, and velvetbean caterpillars are not pests in Virginia.

Table 1c. Efficacy ratings for various pest management tools against peanut insect and mite pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Insect and Mite Pests /1																			
	Corn earworms	Fall armyworms	Potato leafhoppers	Southern corn rootworms	Thrips	Twospotted spider mites	Aphids	Beet armyworms	Cutworms	Green cloverworms	Lesser cornstalk borers	Southern armyworms	Velvetbean caterpillars	Wireworms						
Cultural/Nonchemical Pest Management Practices																				
Early planting and/or use of early-maturing cultivars to reduce risk of Southern corn rootworm infestation				F																
Later planting (mid-May) to reduce thrips pressure					F															
Twin-Row	F	F			G															
No-Till	F	F			G															
Irrigation					F	E					E									

1/ aphids, beet armyworms, green cloverworms, southern armyworms, and velvetbean caterpillars are not pests in Virginia.

Table 1d. Efficacy ratings for various pest management tools against peanut insect and mite pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Insect and Mite Pests /1																			
	Corn earworms	Fall armyworms	Potato leafhoppers	Southern corn rootworms	Thrips	Twospotted spider mites	Aphids	Beet armyworms	Cutworms	Green cloverworms	Lesser cornstalk borers	Southern armyworms	Velvetbean caterpillars	Wireworms						
Biological Controls																				
Natural predators (damsel bugs and spiders) to reduce the populations of Lepidoptera pests	F	F				G	E													
Natural fungus (*Nomuraea rileyi*) to reduce populations of Lepidoptera pests	P	P																		
Natural enemies and diseases to reduce spider mite populations	F	F	F			G	E													

1/ aphids, beet armyworms, green cloverworms, southern armyworms, and velvetbean caterpillars are not pests in Virginia.

Table 2a. Efficacy ratings for various pest management tools against peanut disease and nematode pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Disease and Nematode Pests																				
	Early leaf spot	Late leaf spot	Web	Pepper spot	Botrytis blight	Tomato spotted wilt virus	Southern stem rot	Rhizoctonia limb rot	Sclerotinia blight	Cylindrocladium black rot	Pod rot	Northern root knot nematodes	Peanut root knot nematodes	Lesion nematodes	Ring nematodes	Sting nemetodes	Dagger nematodes	Spiral nemetodes	Stubby root nemetodes		
Registered Fungicides and Nematicides																					
azoxystrobin (Abound, Heritage, Quadris)	G	G	G	E			G	G													
benomyl (Benlate)	NO LONGER REGISTERED FOR USE																				
carboxin (Vitavax)	NOT USED, EXCEPT FOR SEED TREATMENT																				
chlorothalonil (Bravo)	G	G	F	G																	
copper salts of fatty and rosin acids (TennCop)	P	P	P	P																	
cupric hydroxide + sulfur (Kocide)	F	F	P	F																	
fludioxonil (Maxim, Scholar)	NOT USED																				
fluazinam (Omega)							G	G	E		F										
fluazinam + propiconazole (Montero)	NOT USED																				
flutolanil (Moncut)							E	E													
iprodione (Rovral)									P												
Harpin protein (Messenger)	NOT USED																				
mancozeb (Dithane)	F	F	P	F																	

Table 2a (continued). Efficacy ratings for various pest management tools against peanut disease and nematode pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Disease and Nematode Pests																				
	Early leaf spot	Late leaf spot	Web	Pepper spot	Botrytis blight	Tomato spotted wilt virus	Southern stem rot	Rhizoctonia limb rot	Sclerotinia blight	Cylindrocladium black rot	Pod rot	Northern root knot nematodes	Peanut root knot nematodes	Lesion nematodes	Ring nematodes	Sting nemetodes	Dagger nematodes	Spiral nemetodes	Stubby root nemetodes	
Registered Fungicides and Nematicides (continued)																					
mancozeb + copper hydroxide (Mankocide)	F	F	P	F																	
Mg EBDC (Maneb)	F	F	P	F																	
mefenoxam (Ridomil Gold)	NOT USED, EXCEPT FOR SEED TREATMENT																				
mefenoxam + PCNB (Ridomil Gold)	NOT USED																				
metam sodium (Metam,Vapam)										G	G	G	?	G	G	G	G		G		
PCNB (Terraclor)	NOT USED, EXCEPT FOR SEED TREATMENT																				
propiconazole (Tilt)	G	G	P	P																	
propiconazole + trifloxystrobin (Stratego)	E	E	G	?			G	G													
tebuconazole (Elite, Folicur, Raxil)	E	E	G	G			G	G													
sulfur	P	P																			
thiram (Thiram)	NOT USED																				
trifloxystrobin (Flint)	NOT USED ALONE																				

Table 2a (continued). Efficacy ratings for various pest management tools against peanut disease and nematode pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Disease and Nematode Pests																			
	Early leaf spot	Late leaf spot	Web blotch	Pepper spot	Botrytis blight	Tomato spotted wilt virus	Southern stem rot	Rhizoctonia limb rot	Sclerotinia blight	Cylindrocladium black rot	Pod rot	Northern root knot nematodes	Peanut root knot nematodes	Lesion nematodes	Ring nematodes	Sting nemetodes	Dagger nematodes	Spiral nemetodes	Stubby root nemetodes	
Registered Fungicides and Nematicides (continued)																				
aldicarb (Temik)												F	F	F	F	F			G	
carbofuran (Furadan)												NOT USED								
1,3-dichloropropene (Telone II)												E	E	E	E	E	E		E	
dichloropropene + chloropicrin (Telone C-17)												E	E	E	E	E	E		E	
ethoprop (Mocap)												NOT USED								
fenamiphos (Nemacur)												G	G	G	G	G			G	
metam sodium (METAM)										G	F	G		G	G	G			G	

Table 2b. Efficacy ratings for various pest management tools against peanut disease and nematode pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Disease and Nematode Pests																			
	Early leaf spot	Late leaf spot	Web blotch	Pepper spot	Botrytis blight	Tomato spotted wilt virus	Southern stem rot	Rhizoctonia limb rot	Sclerotinia blight	Cylindrocladium black rot	Pod rot	Northern root knot nematodes	Peanut root knot nematodes	Lesion nematodes	Ring nematodes	Sting nemetodes	Dagger nematodes	Spiral nemetodes	Stubby root nemetodes	
Unregistered / New Fungicides and Nematicides																				
BAS 500 (Headline)	E	E	E	E					?											
Coniothyrium minitans (Contans)									P											
tetraconazole (Eminent)	G	G	?	?																
thifluzamid (RH-0753)	?	?	?	?																
fosthiazate												P	?			P				
BAS 510	F	?	E	?					G											

Table 2c. Efficacy ratings for various pest management tools against peanut disease and nematode pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Disease and Nematode Pests /1																			
	Early leaf spot	Late leaf spot	Web blotch	Pepper spot	Botrytis blight	Tomato spotted wilt virus	Southern stem rot	Rhizoctonia limb rot	Sclerotinia blight	Cylindrocladium black rot	Pod rot	Northern root knot nematodes	Peanut root knot nematodes	Lesion nematodes	Ring nematodes	Sting nemetodes	Dagger nematodes	Spiral nemetodes	Stubby root nemetodes	
Cultural / Nonchemical Pest Management Practices																				
Crop rotation with corn, grain sorghum, fescue, cotton, etc.	G	G	G			P	G	G	G	G	G	G	G	G	G	G				
Planting resistant varieties	G	G	E			F			G	G										
Avoid planting susceptible varieties of peanuts	G	G	G			F			F	G										
Sampling nematode populations in fields to be planted to peanuts	NU									F		F	F	F	F	F				
Sanitation (removal or destruction of peanut vines)	NU								P											
Sanitation (washing equipment to avoid spread of inoculum)	NU									F										
Avoid planting soybean and leguminous crops that share diseases with peanuts	NU						F	F		G	F	G	G	G	G	G				
Altering planting dates to avoid cool, wet weather conditions	NU	F	F						F	F										
Maintaining proper soil pH	NU								?											
Reducing vine injury from equipment use	NU								G											

1/ Dagger nematodes, spiral nematodes and stubby root nematodes are not important pests

Table 2d. Efficacy ratings for various pest management tools against peanut disease and nematode pests. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Disease and Nematode Pests																			
	Early leaf spot	Late leaf spot	Web blotch	Pepper spot	Botrytis blight	Tomato spotted wilt virus	Southern stem rot	Rhizoctonia limb rot	Sclerotinia blight	Cylindrocladium black rot	Pod rot	Northern root knot nematodes	Peanut root knot nematodes	Lesion nematodes	Ring nematodes	Sting nemetodes	Dagger nematodes	Spiral nemetodes	Stubby root nemetodes	
Biological Controls																				
None effective																				

Table 3a. Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Bermudagrass	Broadleaf signalgrass	Crabgrass	Fall panicum	Foxtails	Goosegrass	Seedling johnsongrass	Rhizome johnsongrass	Texas panicum	Purple nutsedge	Yellow nutsedge	Cocklebur	Common ragweed	Eclipta	Florida beggarweed	Jimsonweed	Lambsquarter	Morningglory	Pigweed	Prickly sida
Registered Herbicides																				
Preplant Incorporated																				
alachlor (Dual)	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
diclosulam (Strongarm)	P	P	P	P	P	P	P	P	P	F-G	F-G	P	E	G		G-E	F-G	G	G	F-G
dimethenamid (Frontier, Outlook)	P	G	E	G-E	G	E	P	P-F	P-F	P	F-G	P	P-F	P		P	P	P	G-E	P-F
ethalfluralin (Sonalan)	P	G-E	E	G-E	E	E	P	G	G-E	P	P	P	P	P		P	G	P	G	P
imazethapyr (Pursuit)	P	G	F	P-F	G	P	F	G	P-F	P	F-G	G	P	P		G	G	F-G	E	G
metolachlor (Dual)	P	G	E	G	E	E	P	F	P	P	G	P	P	P		P	F	P	G-E	P
pendimethalin (Prowl)	P	G	E	G-E	E	E	P	G	G-E	P	P	P	P	P		P	G	P	G	P
vernolate (Vernam)	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
Preemergence																				
alachlor (Lasso)	P	G	E	G	E	E	P	P-F	P	P	F	P	P	P		P	F	P	E	P
diclosulam (Strongarm)	P	P	P	P	P	P	P	P	P	F-G	F-G	P	E	G		G-E	F-G	G	G	F-G
dimethenamid (Frontier, Outlook)	P	G	E	G-E	G	E	P	P-F	P-F	P	F-G	P	P-F	P		P	P	P	G-E	P-F
imazethapyr (Pursuit)	P	G	F	P-F	G	P	F	G	P-F	P	F-G	G	P	P		G	G	F-G	E	G
metolachlor (Dual)	P	G	E	G	E	E	P	F	P	P	G	P	P	P		P	F	P	G-E	P
paraquat (Gramoxone)	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU

Table 3a (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Sicklepod	Smartweed	Spurred anoda	Tropic croton	Velvetleaf															
Registered Herbicides																				
Preplant Incorporated																				
alachlor (Dual)	NU	NU	NU	NU	NU															
diclosulam (Strongarm)	P	G	F-G	F	G-E															
dimethenamid (Frontier, Outlook)	P	P-F	P	P	P															
ethalfluralin (Sonalan)	P	P	P	P	P															
imazethapyr (Pursuit)	P	G	F-G	P	F-G															
metolachlor (Dual)	P	P	P	P	P															
pendimethalin (Prowl)	P	P	P	P	P															
vernolate (Vernam)	NU	NU	NU	NU	NU															
Preemergence																				
alachlor (Lasso)	P	P	P	P	P															
diclosulam (Strongarm)	P	G	F-G	F	G-E															
dimethenamid (Frontier, Outlook)	P	P-F	P	P	P															
imazethapyr (Pursuit)	P	G	F-G	P	F-G															
metolachlor (Dual)	P	P	P	P	P															
paraquat (Gramoxone)	NU	NU	NU	NU	NU															

Table 3a (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Bermudagrass	Broadleaf signalgrass	Crabgrass	Fall panicum	Foxtails	Goosegrass	Seedling johnsongrass	Rhizome johnsongrass	Texas panicum	Purple nutsedge	Yellow nutsedge	Cocklebur	Common ragweed	Eclipta	Florida beggarweed	Jimsonweed	Lambsquarter	Morningglory	Pigweed	Prickly sida
Registered Herbicides (continued)																				
Cracking Stage																				
alachlor (Lasso)	P	G	E	G	E	E	P	P-F	P	P	P-F	P	P	P		P	F	P	E	P
dimethenamid (Frontier,Outlook)	P	G	E	G-E	G	E	P	P-F	P-F	P	F-G	P	P-F	P		P	P	P	G-E	P-F
imazethapyr (Pursuit)	P	G	F	P-F	G	P	F	G	P-F	P	F-G	G	P	P		G	G	F-G	E	G
metolachlor (Dual)	P	G	E	G	E	E	P	F	P	P	G	P	P	P		P	F	P	G-E	P
paraquat (Boa, Gramoxone)	P	E	G	E	E	E	P	F-G	E	P	P-F	E	F	F-G		E	F	F	E	P-F
Postemergence																				
acifluorfen (Blazer)	P	P	P	P	P	P	P	P	P	P	P	G	G	G		E	G	G-E	E	G
bentazon (Basagran)	P	P	P	P	P	P	P	P	P	P	G	E	F-G	P		E	F-G	F-G	P-F	G
bentazon + acifluorfen (Storm)	P	P	P	P	P	P	P	P	P	P	F-G	G-E	G	F-G		G	F-G	F-G	F-G	G
chlorimuron (Classic)	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
clethodim (Select)	G	E	E	G	E	G	F-G	G	E	P	P	P	P	P		P	P	P	P	P
2,4-DB (Butyrac)	P	P	P	P	P	P	P	P	P	P	P	E	F-G	P		F	G	E	G	F
imazapic (Cadre)	G-E	G-E	G-E	G-E	G-E	G-E	G-E	F-G	G-E	G-E	G-E	G-E	P-F	F		F-G	P-F	G-E	E	G
imazethapyr (Pursuit)	P	G	P-F	P-F	G	P	P-F	P	P-F	F-G	F-G	G	P	P		G	P	F-G	E	P
paraquat (Boa, Gramoxone)	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
pyridate (Tough)	P	P	P	P	P	P	P	P	P	P	P-F	E	F	P		G	E	G	E	F-G

Table 3a (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Sicklepod	Smartweed	Spurred anoda	Tropic croton	Velvetleaf															
Registered Herbicides																				
Cracking Stage																				
alachlor (Dual)	P	P	P	P	P															
dimethenamid (Frontier, Outlook)	P	P-F	P	P	P															
imazethapyr (Pursuit)	P	G	F-G	P	F-G															
metolachlor (Dual)	P	P	P	P	P															
paraquat (Boa, Gramoxone)	F-G	G	F-G	P	F-G															
Postemergence																				
acifluorfen (Blazer)	P	G	P	G-E	P-F															
bentazon (Basagran)	P	E	G	P	G															
bentazon + acifluorfen (Storm)	P	G	F-G	P	F-G															
chlorimuron (Classic)	NU	NU	NU	NU	NU															
clethodim (Select)	P	P	P	P	P															
2,4-DB (Butyrac)	F-G	F	P	P-F	P															
imazapic (Cadre)	E	F	G	P	G-E															
imazethapyr (Pursuit)	P	P	F-G	P	F-G															
paraquat (Boa, Gramoxone)	NU	NU	NU	NU	NU															
pyridate (Tough)																				
sethoxydim (Poast)	P	P	F	P	F															

Table 3a (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Bermudagrass	Broadleaf signalgrass	Crabgrass	Fall panicum	Foxtails	Goosegrass	Seedling johnsongrass	Rhizome johnsongrass	Texas panicum	Purple nutsedge	Yellow nutsedge	Cocklebur	Common ragweed	Eclipta	Florida beggarweed	Jimsonweed	Lambsquarter	Morningglory	Pigweed	Prickly sida
Registered Herbicides (continued)																				
Postemergence																				
sethoxydim (Poast)	G	E	E	G	E	E	F-G	G	E	P	P	P	P	P	P	P	P	P	P	P
Layby																				
dimethenamid (Frontier, Outlook)	P	G	E	G-E	G	E	P	P-F	P-F	P	F	P	P	P		P	P	P	P	P
metolachlor (Dual)	P	G	E	G	E	E	P	F	P	P	F	P	P	P		P	P	P	P	P

Table 3a (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Sicklepod	Smartweed	Spurred anoda	Tropic croton	Velvetleaf															
Registered Herbicides (continued)																				
Layby																				
dimethenamid (Frontier, Outlook)																				
metolachlor (Dual)																				

Table 3b. Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Bermudagrass	Broadleaf signalgrass	Crabgrass	Fall panicum	Foxtails	Goosegrass	Seedling johnsongrass	Rhizome johnsongrass	Texas panicum	Purple nutsedge	Yellow nutsedge	Cocklebur	Common ragweed	Eclipta	Florida beggarweed	Jimsonweed	Lambsquarter	Morningglory	Pigweed	Prickly sida
Unregistered / New Herbicides																				
dimethenamid-P (Frontier X-2)	P	G	E	G-E	G	E	P	P-F	P-F	P	F-G	P	P-F	P		P	F	P	E	P
flumioxazin (Valor)	P	P	P	P	P	P	P	P	P	P	P	F-G	F-G	G		G	E	F	G	G

Table 3b (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Sicklepod	Smartweed	Spurred anoda	Tropic croton	Velvetleaf															
Unregistered / New Herbicides																				
dimethenamid-P (Frontier X-2)																				
flumioxazin (Valor)																				

Table 3c. Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Bermudagrass	Broadleaf signalgrass	Crabgrass	Fall panicum	Foxtails	Goosegrass	Seedling johnsongrass	Rhizome johnsongrass	Texas panicum	Purple nutsedge	Yellow nutsedge	Cocklebur	Common ragweed	Eclipta	Florida beggarweed	Jimsonweed	Lambsquarter	Morningglory	Pigweed	Prickly sida
Cultural / Nonchemical Pest Management Practices																				
Crop rotation with corn	G							F		G	G									
Crop rotation with cotton	F							G		F	F									
Cultivation	P	G	G	G	G	G	G	P	G	F	F	G	G	G	G	G	G	G	G	G
Scouting for weeds	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

Table 3c (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Sicklepod	Smartweed	Spurred anoda	Tropic croton	Velvetleaf															
Cultural / Nonchemical Pest Management Practices																				
Crop rotation with corn																				
Crop rotation with cotton																				
Cultivation	G	G	G	G	G															
Scouting for weeds	E	E	E	E	E															

Table 3d. Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Bermudagrass	Broadleaf signalgrass	Crabgrass	Fall panicum	Foxtails	Goosegrass	Seedling johnsongrass	Rhizome johnsongrass	Texas panicum	Purple nutsedge	Yellow nutsedge	Cocklebur	Common ragweed	Eclipta	Florida beggarweed	Jimsonweed	Lambsquarter	Morningglory	Pigweed	Prickly sida
Biological Controls																				
None used.																				

Table 3d (continued). Efficacy ratings for various pest management tools against broadleaf weeds and grasses in peanuts. Developed by Peanut Pest Management Strategy team members. Rating scale: E = excellent; G = good; F = fair; P = poor; ? = research needed; NU = not used; * = used, but not a stand alone tool.

Pest Management Tools	Peanut Broadleaf Weeds and Grasses																			
	Sicklepod	Smartweed	Spurred anoda	Tropic croton	Velvetleaf															
Biological Controls																				
None used.																				

APPENDIX I

Competitive Indices for Weeds in Peanuts *

Common cocklebur	10.0	Fall panicum	1.8
Jimsonweed	5.8	Florida pusley	1.5
Common lambsquarter	5.2	Tropic croton	1.2
Smartweed	4.7	Dayflower	1.2
Redroot pigweed	4.0	Common purslane	1.2
Common ragweed	3.8	Prickly sida	1.2
Sicklepod	3.6	Horsenettle	1.1
Pitted morningglory	3.6	Yellow nutsedge	0.3
Entireleaf morningglory	3.2	Purple nutsedge	0.2
Velvetleaf	3.0	Goosegrass	0.2
Broadleaf signalgrass	1.8	Crabgrass	0.2
Eclipta	1.8		

* 10 = most competitive weed.

Source: Jordan, D. L. and A. C. York. 2002. Peanut Weed Management. In 2002 Peanut Information. Publication AG-331. North Carolina Cooperative Extension Service, North Carolina State University, Raleigh. pp. 23-51.

APPENDIX II

Percentage of 0.4-ha Grids Infested by Weeds From 52 Peanut Fields Scouted in North Carolina From 1997 Through 2001

Weed species	Latin Binomial	Percent of Grids
Yellow nutsedge	*Cyperus esculentus* L.	39.0
Entireleaf morningglory	*Ipomoea hederacea* var. *integriuscula* Gray	38.5
Pitted morningglory	*Ipomoea lacunosa* L.	37.2
Common cocklebur	*Xanthium strumarium* L.	27.1
Purple nutsedge	*Cyperus rotundus* L.	13.6
Broadleaf signalgrass	*Brachiaria platyphylla* (L.) Griseb.	13.2
Horsenettle	*Solanum carolinense* L.	12.6
Common ragweed	*Ambrosia artemisiifolia* L.	11.5
Prickly sida	*Sida spinosa* L.	8.0
Common lambsquarters	*Chenopodium album* L.	5.9
Bermudagrass	*Cynodon dactylon* (L.) Pers.	5.8
Spreading dayflower	*Commelina communis* L.	5.6
Large crabgrass	*Digitaria sanguinalis* (L.) Scop.	4.5
Redroot pigweed	*Amaranthus hybridus* L.	4.3
Eclipta	*Eclipta prostrata* L.	3.9
Sicklepod	*Senna obtusifolia* (L.) Irwin and Barneby	2.8
Goosegrass	*Eleusine indica* (L.) Gaertn.	2.6
Tall morningglory	*Ipomoea purpurea* (L.) Roth.	2.2
Trumpetcreeper	*Campsis radicans* (L.) Seem. Ex Bureau	2.2
Spurred anoda	*Anoda cristata* (L.) Schelecht.	2.0
Pennsylvania smartweed	*Polygonum pensylvanicum* L.	1.9
Prostrate spurge	*Euphorbia humistrata* Engelm. Ex Gray	1.9
Jimsonweed	*Datura stromonium* L.	1.7
Carpetweed	*Mollugo verticillata* L.	1.1
Citronmelon	*Citrullus lanatus* var. citroides (Bailey) Mansf.	0.9
Eastern black nightshade	*Solanum ptycanthum* Dun.	0.7
Curly dock	*Rumex crispus* L.	0.6
Common pokeweed	*Phytolacca americana* L.	0.6
Common purslane	*Portulaca oleracea* L.	0.6
Velvetleaf	*Abutilon theophrasti* Medicus	0.6
Tropic croton	*Croton glandulosus* var. septentrionalis Muell.-Arg	0.4
Common milkweed	*Asclepias syriaca* L.	0.4
Ivyleaf morningglory	*Ipomoea hederacea* (L.) Jacq.	0.4
Spotted spurge	*Euphorbia maculata* L.	0.4

Source: David L. Jordan, Department of Crop Science, North Carolina State University

APPENDIX III

Weed Response to Preplant Incorporated, Preemergence, and At-Cracking Herbicide Application in Peanuts

Weed Species	Prowl or Sonalan PPI	Prowl or Sonalan + Dual PPI	Prowl or Sonalan + Frontier or Outlook PPI	Prowl or Sonalan + Vernam PPI	Vernam PPI	Dual PPI	Outlook or Frontier PPI	Strongarm PPI or PRE
Bermudagrass	N	N	N	P	P	N	N	N
Broadleaf signalgrass	G	E	E	G	P	G	FG	P
Crabgrass	E	E	E	E	E	E	E	P
Crowfootgrass	E	E	E	E	E	E	E	-
Fall panicum	G	E	E	E	G	E	E	P
Foxtails	E	E	E	E	E	E	E	P
Goosegrass	E	E	E	E	G	E	E	P
Johnsongrass								
Seedling	G	G	G	E	G	PF	PF	N
Rhizome	P	PF	PF	F	PF	N	N	N
Texas panicum	G	G	G	G	P	PF	PF	P
Nutsedge								
Yellow	N	G	FG	FG	G	G	FG	FG
Purple	N	N	N	G	G	N	N	FG
Cocklebur	N	N	N	NP	NP	N	N	G
Common ragweed	N	P	PF	P	P	PF	F	G
Eclipta	N	G	G	FG	FG	G	G	GE
Florida beggarweed	N	PF	PF	P	NP	F	F	F

Weed Species	Prowl or Sonalan PPI	Prowl or Sonalan + Dual PPI	Prowl or Sonalan + Frontier or Outlook PPI	Prowl or Sonalan + Vernam PPI	Vernam PPI	Dual PPI	Outlook or Frontier PPI	Strongarm PPI or PRE
Jimsonweed	N	N	N	P	P	N	N	GE
Lambsquarters	G	G	G	E	G	F	FG	FG
Morningglory	P	P	P	P	P	N	N	G
Pigweed	G	E	E	E	G	G	G	G
Prickly sida	N	P	P	P	P	P	P	FG
Sicklepod	N	NP	NP	F	F	NP	NP	P
Smartweed	N	N	N	NP	NP	N	N	G
Spurred anoda	N	N	N	P	P	N	N	FG
Tropic croton	N	N	N	P	P	N	N	PF
Velvetleaf	N	N	N	PF	PF	N	N	GE

[1] Residual control only.
[2] Assumes weeds are 1- to 20 in. tall or smaller.

KEY: PPI = Preplant Incorporated; PRE = Preemergence; AC = At-Cracking; POST = Postemergence; E = excellent control, 90% or better; G = good control, 80% to 90%; F = fair control, 50% to 80%; P = poor control, 25% to 50%; N = no control, less than 25%

Weed Response to Preplant Incorporated, Preemergence, and At-Cracking Herbicide Application in Peanuts (Continued)

Weed Species	Prowl or Sonalan + Strongarm PPI	Dual, Frontier, or Outlook + Strongarm PPI or PRE	Pursuit PPI + POST	Dual PRE	Lasso PRE	Outlook or Frontier PRE	Dual AC[1]	Lasso AC[1]	Outlook or Frontier AC[1]	Paraquat[2]
Bermudagrass	N	N	N	N	N	N	N	N	N	P
Broadleaf signalgrass	G	G	G	G	FG	FG	G	FG	FG	E
Crabgrass	E	E	F	E	E	E	E	E	E	G
Crowfootgrass	-	-	-	E	E	E	E	E	E	E
Fall panicum	E	E	PF	E	E	E	E	E	E	E
Foxtails	E	E	G	E	E	E	E	E	E	E
Goosegrass	E	E	PF	E	E	E	E	E	E	E
Johnsongrass										
Seedling	G	PF	GE	PF	PF	PF	PF	PF	PF	E
Rhizome	P	N	FG	N	N	N	N	N	N	P
Texas panicum	G	PF	PF	PF	PF	PF	PF	PF	PF	E
Nutsedge										
Yellow	FG	G	FG	FG	P	F	FG	P	F	PF
Purple	FG	FG	FG	N	N	N	N	N	N	PF
Cocklebur	G	G	GE	N	N	N	N	N	N	E
Common ragweed	G	GE	P	PF	PF	F	PF	PF	F	F

Weed Species	Prowl or Sonalan + Strongarm PPI	Dual, Frontier, or Outlook + Strongarm PPI or PRE	Pursuit PPI + POST	Dual PRE	Lasso PRE	Outlook or Frontier PRE	Dual AC[1]	Lasso AC[1]	Outlook or Frontier AC[1]	Paraquat[2]
Eclipta	GE	GE	P	FG	FG	FG	FG	FG	FG	FG
Florida beggarweed	F	F	P	F	F	F	F	F	F	E
Jimsonweed	GE	GE	G	N	N	N	N	N	N	E
Lambsquarters	GE	GE	FG	F	F	FG	F	F	FG	F
Morningglory	G	G	G	N	N	N	N	N	N	F
Pigweed	E	E	E	G	GE	GE	G	GE	GE	E
Prickly sida	FG	FG	G	P	P	P	P	P	P	F
Sicklepod	P	P	P	NP	PF	NP	NP	PF	NP	G
Smartweed	G	G	G	N	N	N	N	N	N	G
Spurred anoda	FG	FG	G	N	N	N	N	N	N	P
Tropic croton	PF	PF	P	N	N	N	N	N	N	F
Velvetleaf	GE	GE	FG	N	N	N	N	N	N	F

[1] Residual control only.
[2] Assumes weeds are 1- to 20 in. tall or smaller.

KEY: PPI = Preplant Incorporated; PRE = Preemergence; AC = At-Cracking; POST = Postemergence; E = excellent control, 90% or better; G = good control, 80% to 90%; F = fair control, 50% to 80%; P = poor control, 25% to 50%; N = no control, less than 25%

Source: Jordan, D. L. and A. C. York. 2002. Peanut Weed Management. In 2002 Peanut Information. Publication AG-331. North Carolina Cooperative Extension Service, North Carolina State University, Raleigh. pp. 23-51.

APPENDIX IV

Weed Response to Postemergence Herbicide Application in Peanuts

Weed Species	2,4-DB	Paraquat	Paraquat + 2,4-DB	Paraquat +Basagran	Basagran	Basagran + 2,4-DB	Blazer	Blazer + 2,4-DB
Bermudagrass	N	P	P	P	N	N	N	N
Broadleaf signalgrass	N	GE	GE	G	N	N	NP	NP
Crabgrass	N	G	G	G	N	N	N	N
Crowfootgrass	N	GE	GE	G	N	N	P	P
Fall panicum	N	GE	GE	G	N	N	PF	PF
Foxtails	N	GE	GE	G	N	N	PF	PF
Goosegrass	N	GE	GE	G	N	N	N	N
Johnsongrass								
Seedling	N	GE	GE	GE	N	N	P	P
Rhizome	N	P	P	P	N	N	N	N
Texas panicum	N	GE	GE	G	N	N	NP	NP
Nutsedge								
Yellow	N	PF	PF	FG	G[3]	G	N	N
Purple	N	PF	PF	PF	NP	P	N	N
Cocklebur	E	G	E	E	E	E	G	E
Common ragweed	PF	F	F	G	G[4]	G[4]	E	E
Eclipta	P	F	F	F	FG	FG	G	G
Florida beggarweed	P	G	E	GE	N	P	PF	F
Jimsonweed	P	G	G	E	E	E	E	E
Lambsquarters	PF	F	F	G	FG	G[4]	G	G

Weed Species	2,4-DB	Paraquat	Paraquat + 2,4-DB	Paraquat +Basagran	Basagran	Basagran + 2,4-DB	Blazer	Blazer + 2,4-DB
Morningglory								
Pitted	FG	F	G	FG	P	G	E	E
Others	E	F	E	FG	P	E	GE	E
Pigweed	PF	G	G	G	N	P	E	E
Prickly sida	F	F	F	G	G	G	N	F
Sicklepod	G[3]	G	G	G	N	G[6]	NP	G[6]
Smartweed	PF	G	G	E	E	E	GE	E
Spurred anoda	P	P	P	FG	G	GE	P	P
Tropic croton	PF	F	F	F	F	F	G	G
Velvetleaf	P	F	F	G	G	G	PF	PF

[1] Assumes weeds are 1- to 2-in. tall or smaller.
[2] Assumes optimum rates and ratios of Basagran and Blazer; see labels.
[3] Two applications, 10 to 14 days apart.
[4] Assumes optimum conditions and addition of crop oil concentrate.
[5] Ratings assume weeds in one- to two-leaf stage.
[6] Assumes followup treatment with 2,4-DB.

KEY: E = excellent control, 90% or better; G = good control, 80% to 90%; F = fair control, 50% to 80%; P = poor control, 25% to 50%; N = no control, less than 25%

Weed Response to Postemergence Herbicide Application in Peanuts (Continued)

Weed Species	Basagran + Blazer[2]	Storm	Storm + 2,4-DB	Tough + 2,4-DB	Pursuit + 2,4-DB	Cadre	Poast or Poast Plus	Select
Bermudagrass	P	N	N	N	N	N	FG	G
Broadleaf signalgrass	P	NP	NP	N	G	G	E	E
Crabgrass	N	N	N	N	FG	FG	GE	GE
Crowfootgrass	P	P	P	N	P	G	F	G
Fall panicum	P	PF	PF	N	PF	G	E	E
Foxtails	P	PF	PF	N	G	G	E	E
Goosegrass	N	N	N	N	N	F	GE	GE
Johnsongrass								
Seedling	P	P	P	N	GE	E	E	E
Rhizome	N	N	N	N	F	FG	G	GE
Texas panicum	NP	NP	NP	N	NP	G	E	E
Nutsedge								
Yellow	G	F	F	F	F	G	N	N
Purple	P	N	N	N	FG	G	N	N
Cocklebur	E	E	E	E	E	E	N	N
Common ragweed	E	E	E	P	P[4]	PF	N	N
Eclipta	G	FG	FG	G	P	F	N	N
Florida beggarweed	F	P	P	G[5]	P	F	N	N
Jimsonweed	E	E	E	G	G	E	N	N
Lambsquarters	GE	G	G	E	P	PF	N	N

Weed Species	Basagran + Blazer[2]	Storm	Storm + 2,4-DB	Tough + 2,4-DB	Pursuit + 2,4-DB	Cadre	Poast or Poast Plus	Select
Morningglory								
Pitted	E	E	E	GE	G	GE	N	N
Others	E	GE	E	E	E	G	N	N
Pigweed	E	E	E	E	E	E	N	N
Prickly sida	G	FG	G	FG	P	G	N	N
Sicklepod	NP	NP	G[8]	G[5]	G[6]	E	N	N
Smartweed	E	E	E	P	G	F	N	N
Spurred anoda	G	F	F	F	F	G	N	N
Tropic croton	G	G	G	P	P	P	N	N
Velvetleaf	FG	FG	FG	G	FG	G	N	N

[1] Assumes weeds are 1- to 2-in. tall or smaller.
[2] Assumes optimum rates and ratios of Basagran and Blazer; see labels.
[3] Two applications, 10 to 14 days apart.
[4] Assumes optimum conditions and addition of crop oil concentrate.
[5] Ratings assume weeds in one- to two-leaf stage.
[6] Assumes follow-up treatment with 2,4-DB.
[7] Ratings based upon average to good soil and weather conditions for herbicide performance andupon proper application rate, technique, and timing.

KEY: E = excellent control, 90% or better; G = good control, 80% to 90%; F = fair control, 50% to 80%; P = poor control, 25% to 50%; N = no control, less than 25%

Source: Jordan, D. L. and A. C. York. 2002. Peanut Weed Management. In 2002 Peanut Information. Publication AG-331. North Carolina Cooperative Extension Service, North Carolina State University, Raleigh. pp. 23-51.