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2003 Environment Impact of Burley Tobacco Production in the Eight State Burley Belt

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In the United States, tobacco is grown in 16 states, two of which—Kentucky and North Carolina—produce about two-thirds of all domestic tobacco. Kentucky is the leading burley tobacco producing state with approximately 65% of the acreage. There are eight states which grow the majority of burley tobacco which is often referred to as the burley belt. Further, it is grown in over 100 countries. Until recently, the United States was the world's leading exporter of unmanufactured tobacco.

The production of tobacco in the burley belt impacts the environment in which it grows in many different aspects. Since practices vary by region, a survey was developed so that it would pertain to burley tobacco production in all of the major burley producing states.

Questions covered pre and post harvest practices as well as nutrient management and chemical usage. The target participants were the Cooperative Extension County Agricultural Agents. Potential counties were determined based on data from the Agricultural Statistics Data Base (11). The number of potential respondents totaled 228 and was as follows: Kentucky – 109, Indiana - 12, Missouri - 6, North Carolina - 16, Ohio - 9, Tennessee - 59, Virginia - 13 and West Virginia - 4. The number of responses totaled 156 or 68.42% and the numbers per states (with the percentage) were as follows: Kentucky – 82 (76.15%), Indiana – 10 (83.33%), Missouri – 2 (33.33%), North Carolina – 10 (62.5%), Ohio – 8 (88.88%), Tennessee – 32 (54.24%), Virginia – 8 (61.54%) and West Virginia – 2 (50%). Total acreage represented was based on 2002 quota allotment of 158,600 acres for the belt with counties responding representing 130,768 acres or 82.45%. Acreage per state was as follows: Kentucky – 88,516 out of 103,000 acres or 85.94%, Indiana – 3,319 out of 4,000 acres or 82.98%, Missouri – 1,025 out of 1,300 acres or 78.85%, North Carolina – 3,547 out of 6,300 acres or 56.30%, Ohio – 5,230 out of 5,500 acres or 95.09%, Tennessee – 21,620 out of 30,000 acres or 72.07%, Virginia – 6,931 out of 7,200 acres or 96.26% and West Virginia – 580 out of 1,300 acres or 44.62%.

Although Missouri had a low percentage of counties responding, these counties represented a large percentage of the acreage of burley tobacco grown in that state. North Carolina had a low percentage of acreage represented, but this was primarily due to one county, Madison, which produces about one-third of the burley tobacco in North Carolina. Madison County did not have a county agricultural agent at the time of the survey. Although Virginia provided eight responses from 13 counties the percentage of acreage represented was over 96%. The five non-responding counties have very small amounts of burley acreage.

Float System

The adaptation of the float system has been a major change for burley producers. The first float beds to be implemented in the burley area were built in the late 1980's. The trend caught on and by the mid 1990's only a small percentage of the tobacco being transplanted was from conventional plant beds with the majority coming from a float system. The rapid adoption of the float system reduced the need for methyl bromide, a fumigant used to reduce weed, insect and disease pressure in conventional beds. Under The Montreal Protocol of 1991, methyl bromide was defined as a chemical that contributes to depletion of the Earth's ozone layer. The definition was based on scientific data. Accordingly, the manufacture and importation of methyl bromide will be phased out in developed countries as follows: 25-percent reduction in 1999, 25-percent reduction in 2001, 20-percent reduction in 2003, and complete phase out in 2005. In developing countries, consumption will be frozen in 2002 at 1995-98 average levels, followed by 20-percent reduction in 2005 and complete phase out in 2015. Exemptions for developed and developing countries include

quarantine, critical uses and certain pre-shipment uses. By switching to the float system, tobacco farmers have gradually reduced dependence on methyl bromide which, in turn, reduced the amount released into the environment from tobacco production sources.

One aspect of the float production surveyed was disposal of the material left from float systems such as the water, plastic and Styrofoam trays.

Float System Water Disposal

As a whole, 58.6 percent of the producers in the burley belt allow the water to evaporate from the beds. This leaves the chemical residue on the plastic and even poses a potential hazard for wildlife that could drink the water or otherwise utilized the contaminated water source. Chemicals may evaporate or volatilize into the air, however, the dilution should be low enough to pose little risk. Of those polled 29.8 percent puncture the plastic and allow the water to drain out. This water has the potential to contaminate ground water or streams through run off. Location of bed sites away from streams is advised. In many cases the pesticides are broken down into non-toxic metabolites by the plants or microorganisms in the float system or after reaching the soil. After several years a concentrated area of contamination could occur under the bed site. However, since few pesticides are used in the float water, the risk is considered low. Moving the bed site on a regular basis could help reduce any build up. Only 10.3 percent of those surveyed use the float water as transplant water. Some chemical labels state that if the product is used in the float system that the float water should be disposed of by using the water in the transplant process. This approach may be inconvenient and pose a disease problem by introducing disease contaminated water into the field.

Float System Plastic Disposal

The plastic bed liner used in float system production is not biodegradable and therefore presents an environmental problem. Forty-nine and seven tens of a percent of farmers use the plastic to underlay the following year's bed. This, however, only postpones the inevitable. The plastic will have to be disposed of at some point. While 44.5 percent take the plastic to the landfill, only 5.1 percent recycle the plastic. The number of farmers recycling the plastic is so low because many areas don't have facilities that can recycle this type of material, and those facilities that do often place restrictions on the type of plastic they accept. Although not listed in the survey, some surveyed indicated that some farmers still continue to burn the plastic. This releases toxins into the air, which in turn, can precipitate back and contaminate water and soil. An alternative, burning pesticides and containers in special high temperature incinerators, is a safe method of disposal. These incinerators are specially designed so that the pesticides will be reduced to harmless gases and solid ashes. This special incineration method is often only carried out in EPA-approved landfill facilities. It is a safer and more reliable disposal method than ordinary incineration. If pesticide residue remains on the plastic after use, it should be disposed of at an approved landfill.

Float Tray Disposal

Float trays are typically made from expanded polystyrene (EPS). Disposal and impact on the environment can be a problem for any products made from EPS. Many have tried to find a solution for this, with limited success.

There are other concerns that face producers such as disease incidence. Reused trays may contain pathogens that are hard to eliminate by sterilization. Sterilization may introduce other harmful chemicals such as chlorine bleach (most common) or even methyl bromide. Some have turned to disposable trays making this a substantial issue. However, even disposable trays may be reused a second season.

Seventy-two and eight tens of a percent of float trays are reused each year. Although this sounds like the opportune action to be taken by producers, this only delays the inevitable disposal problem. There are some recycling facilities that accept polystyrene around the country. They require that polystyrene products be clean and free of debris. This material is then recycled into packaging material. Only 6.3 percent recycle the polystyrene. This number could be low for a

number of reasons. There may not be recycling centers in many of the counties in the burley belt, many producers may not be aware of their recycling options for these trays, or many producers may find that the cost and effort required to meet requirements for recycling are prohibitive. This is an avenue that potentially needs to be advertised and stressed more to producers in the burley belt as an alternative to burning the trays or taking them to landfills which will, in turn, ease environmental concerns. Attempts to develop trays from more durable material and that are more easily and economically sterilized continue.

Crop Rotation

Crop rotation is an important aspect to consider when assessing environmental issues. Crop rotation in tobacco refers to rotation as a change to a different crop the following year. However, most producer plant a small grain cover crop after their tobacco crop (See Cover Crops). This, too, is crop rotation offering many environmental benefits.

Crop rotation is a long established way to combat disease, weed and insect pressure and rotation to a different cropping system the following year my offer considerably more benefits than a cover crop. This, in turn, reduces the amount of herbicides, fungicides and insecticides that are needed. Nineteen and six tenths of a percent surveyed said that producers in the burley belt use a one year rotation scheme in their crops. In this type of rotation system, tobacco is grown in a location for one year followed, typically, by a small grain cover crop with forage or row crops planted the following and subsequent years. This is not an economical rotation scheme for many producers who don't have the cropping system to utilize such a frequent rotation. Thirty percent of producers use a two year rotation scheme. This is a good rotation, but still may be unrealistic for many tobacco farmers. The majority, 50.4 percent, use a three or more year rotation scheme. This can increase the likelihood of disease buildup that might require greater chemical input to achieve control, but seems to be the most practical and economical for most producers. Even in such a rotation scheme, producers are still required to use a small grain or other cover crop after removing the tobacco. These cover crops prevent soil erosion, return nutrients and organic matter to the soil and reduce carryover of some disease organisms that tend to buildup during the growing season. The Cooperative Extension Service promotes rotation as an effective means of reducing disease incidence and reducing pesticide needs. A good rotation sequence can return nutrients that reduce fertilizer needs.

Nutrient Management

Soil Testing

Soil testing is a good way to spot nutritional problems and to reduce unneeded nutrient applications. This will help reduce leaching of nutrients into ground water and allow the producers to apply the precise amount of each nutrient required, saving them money. Soil testing is widely available through extension offices or local agribusinesses. Forty-two and nine tenths of a percent of burley tobacco producers are reported to soil test. This number may not include all of those producers who soil test through agribusiness. The Cooperative Extension Service is a leader in promoting soil testing to reduce cost, potentially increase yields and as a way to reduce excessive nutrient application. Soil testing is a wise investment of a minor amount of time, effort and money.

Nutrient Application

A high nutrient level is essential for productive agriculture. However, the use of both natural and chemical fertilizers may result in an excess of nutrients which can pose a problem in water bodies and contribute to health risks. Nitrates are highly soluble and therefore may quickly reach water bodies. Phosphates tend to be fixed to soil particles and therefore can potentially reach water courses when soil is eroded.

Nitrogen

Nitrogen is water-soluble and can move to ground water or volatilize. There are also some surface water concerns. The average amount of

nitrogen applied per acre belt wide is 270 pounds. Soil testing is not recommended for nitrogen rate determination due to the transient nature of this compound. However, cropping history and crop rotation schemes can help when assessing the actual needs for nitrogen. Nitrogen use rates are trending downward to more optimum rates.

Phosphorus

Phosphorus may be one of the most over applied nutrients in tobacco due to the fact that many soils are high in this nutrient initially. Survey responses indicated that the average application of phosphorus in the burley belt was 139.6 pounds per acre. While there are some ground water concerns regarding this nutrient, most of those problems stem from animal confinement and not crop applications. Surface water contamination due to runoff/erosion can cause stream or lake eutrophication. Following soil test recommendations could eliminate any phosphorus concerns from tobacco production sources.

Potassium

Burley tobacco producers apply 229.4 pounds per acre of potassium on average. This nutrient is more highly utilized by the tobacco plant than phosphorus, but still is over applied in many cases. Tobacco crops that develop better initial root systems will more readily take up available potassium and not show deficiency symptoms. Deficiency symptoms on tobacco crops seldom represent actual deficiency in the soil, but are commonly present due to soil pH problems and root development problems that affect the plants ability to take up this nutrient. Soil testing is still the best approach for assessing pH problems and applying the right amount of potassium.

Pest Management

In the 1990s, domestic growers commonly used 37 pesticides approved for use on tobacco by EPA. However, the National Center for Food and Agriculture Policy (NCFAP) listed 29 pesticides used in the eight state burley belt in the 2000 Pesticide Use in US Crop Production: National Summary Report. Pesticides play a significant role in increasing production of tobacco, food, and other crops by reducing the number of crop-destroying pests. Approved pesticides have trended away from more persistent, environmentally unfriendly chemicals such as chlorinated hydrocarbons and organophosphates to less persistent, low volume pesticides that pose less of an impact on the environment and to worker. If used improperly, pesticides can have significant adverse health effects and use restrictions and guidelines need to be carefully considered prior to application.

Tobacco is the nation's ninth highest valued crop, and in terms of the amount of pesticide applied per acre, tobacco ranks sixth—behind potatoes, tomatoes, citrus, grapes, and apples. In the eight state burley belt tobacco production uses 2.1% of the total pound of active ingredient of pesticides used in crop production. By comparison corn uses almost 40% and soybeans approximately 14% (Figure 1).

Figure 1. Percentage of Total Pesticide Use in Burley Belt States

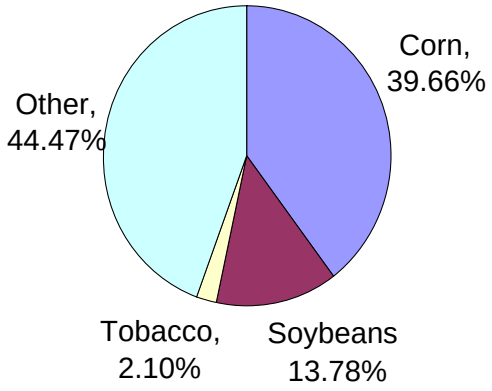

Figure 1 is a comparison of the total amount of pesticides used for corn, soybeans, tobacco and other crops. Because of the relative amount of acres, tobacco production has a far less impact on the environment as compared to soybeans and corn

Kentucky has the highest percentage of pesticides used for tobacco crop protection at 21.01% of the total. Due to the smaller acreage the other states range from approximately 5% for Tennessee to 0.06% in Missouri (Appendix C).

Fumigants

Fumigants are not used to a significant extent in burley tobacco compared to flue-cured tobacco. Only 5.0 percent of the burley tobacco crop used a fumigant as a control method.

Herbicides

Herbicides reduce cultivation needs, thus, reducing fuel consumption which has a positive effect on the environment through lower fuel usage and lower soil erosion potential. However, if not properly applied, these chemicals can be hazardous to water sources, humans and animals. Eighty and seven tenths of a percent of the tobacco included in the survey used herbicides. The uses of herbicides are primarily pre-plant applications with limited post-emergence application.

Tobacco growers have historically controlled weeds through mechanical means. Herbicide use was limited. Cultivation and hand hoeing were the primary means of weed control. Increasingly, tobacco producers are using herbicides for weed control. This benefits the environment, contrary to popular belief. Through using herbicides, cultivation is decreased reducing the amount of erosion and fuel consumption, thus, having a positive effect on the environment. (See also No-till Tobacco)

Insecticides

Pesticide use tends to change over time as pests develop resistance to the pesticides, as new pesticide uses on tobacco are approved and as older pesticides are cancelled. Pesticide use is considerably higher in vegetable crops compared to tobacco. As compared to corn and soybeans, tobacco and vegetable crops have considerably more applications. Tobacco may require applications of pesticides throughout the growing season. But in comparison the environmental impact is greater for row crops than tobacco and thus, ultimately total use is higher in row crops (Figure 2).

Soil Applied

Insecticides were applied to the soil on 20.7 percent of the acres. Pesticides applied via granules can be a potential environmental hazard

Figure 2. Percent of Total Pounds of Pesticide Use on Specific Crops in Burley Belt States

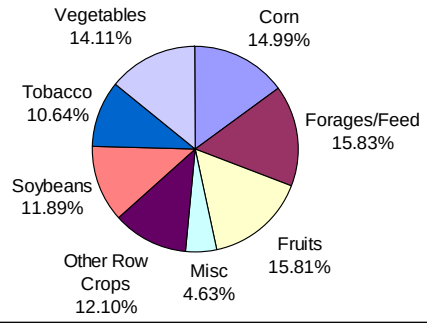

Figure 2 is a comparison of the total pounds of pesticides used per crop across the burley belt in 1997. Tobacco acreage has decreased from the time this data was collected, and thus the total impact of pesticides for tobacco will be lower relative to corn and soybeans.

to wildlife. Birds can eat the granules or consume dead or dying insects, thus, ingesting the pesticide. Incorporation of the pesticide into the soil (where allowed by label) may provide some protection. Soil applied chemicals may also provide an advantage for worker safety when compared to foliar applications.

Transplant Water or Tray Drench Applied

Transplant water or tray drench applications of insecticides were applied in 60.8 percent of the burley crop. Although transplant water treatments have been used in burley tobacco for many years, new chemistry allows producers to apply insecticides that control aphids season long in either the transplant water or as a drench to trays of plants. Aphid control would otherwise require multiple applications potentially harming beneficial insects, requiring more fuel consumption and creating more potential for worker exposure. Potential residues from labeled chlorinated hydrocarbons could be reduced using these new chemicals.

Foliar Applied

A foliar application of insecticides was used in 88.7 percent of the burley crop surveyed with 40.3 percent of the acres receiving one

application of foliar pesticide. Twenty-nine and nine tenths of a percent of the acres received two applications of foliar pesticide while only 18.5 percent of the acres received three or more applications of foliar pesticide. The number of applications varies by location and insect infestation.

Fungicide

The incidence of many plant diseases is closely correlated to the amount of rainfall, resulting in greater use of fungicides in years with high rainfall.

Soil Applied

Fungicides were applied to the soil on 30.9 percent of burley acres surveyed. Fungicides are generally not as harmful to wildlife, although some may harm fish if leached into a water system. Fungicide use can potentially be reduced through production practices which would benefit the environment. By using a crop rotation system and resistant varieties, the farmer can reduce the incidence of disease in tobacco fields reducing the need for fungicides.

Foliar Applied

Thirty-two and nine tenths of a percent of tobacco acres received one foliar fungicide application. As with the insecticide, fewer applications mean less potential chemical impact on the environment. Nineteen and nine tenths of a percent of acres received two foliar fungicide applications while only 8.0 percent applied foliar fungicide three or more times.

Most foliar fungicide applications are aimed at blue mold control. However, breeding for resistance to blue mold has produced encouraging results.

Container Disposal

Most chemical containers are plastic and can have considerable environmental impact if not disposed of properly. They may also remain toxic to people, domestic animals and wildlife. These containers can be recycled once properly washed. They must be triple rinsed, have the labels removed and be punctured on the bottom in order to qualify for recycling. Each county has a schedule of when and where these chemical containers can be dropped off for recycling. In addition to the Rinse and Return Program, there is also a program where the respective state's Departments of Agriculture offers a free pick up program for old pesticides and chemicals. They will pick these chemicals up from the producer's farm, package them, and properly dispose of them at no cost to the producer. Although these programs are in place in most states, only 21.2 percent of chemical containers used by burley producers are recycled. That leaves the majority of the container disposed of improperly. Burying or burning these containers is an environmental hazard. Keeping the chemical containers around the farm also poses an environmental and health hazard and prolongs the inevitable problem of disposal. The recycling program should be stressed to producers in order to raise awareness of such programs.

IPM

Chemical pesticides will continue to play an important role in the IPM program. The primary difference, however, is that these products will be used selectively. Through the use of IPM, producers seek to decrease the dependence on pesticides as the exclusive tool for pest control. IPM strives to meet the needs of producers and modern society. The main focus of IPM is on two main areas: crop protection and environmental quality. IPM (1) protects the health and welfare of producers, workers, consumers, and society as a whole by reducing pesticide entry into the environment, i.e., the food chain, the water, the air and the soil system, and (2) controls pests in a more effective, economical, and ecologically stable manner. Only 2.6 percent of the acres surveyed use a formal IPM production program. However, Extension programs often use IPM concepts such as economic thresholds, disease and insect warning systems, and timing of applications to reduce pesticide use and improve performance and control. Small field size and frequent monitoring during cultivation and other production practices reduces a producer's desire to adopt a formal IPM programs.

Arguments for IPM:

Resistance: Several pests have developed resistance to commonly used pesticides. This resistance has rendered pesticides less effective against certain pests and shortened the useful life of the chemical. Pest resistance generally leads to (a) an increase in the amount of pesticides applied; (b) a search for newer, more effective replacement chemicals; (c) more sensible use of pesticides; or (d) a search for alternatives to pesticide usage.

Misuse of Chemical Pesticides: Pesticides are relatively inexpensive and easy to apply, and producer's often resort to a higher number of pesticide applications than might actually be necessary in order to protect the crop. Not only is this economically unsound, it also increases other problems associated with pesticide use.

Secondary Pest Outbreaks: Complete control of one pest by means of pesticides often leads to secondary population outbreaks. Eliminating one pest upsets the ecological balance and other organisms may proliferate. An insect that was previously not harmful could emerge as a pest.

Non-target Organisms: The broad spectrum pesticides kill not only pests, but also their natural enemies.

Resurgence: Using pesticides can lead to a resurgence of the original pest population which could call for the use of more and more pesticides for effective control. This occurs because the use of pesticides upsets the ecological balance by eliminating both pests and non-target organisms (like natural enemies). Thus, any pests which survived or re-invaded would have an excellent opportunity for increasing their numbers, even to a level higher than before pesticide application because neither their natural enemies nor competitors are present.

IPM strives for producers to provide more effective pest control to maintain and even improve quality and yield. IPM will supply a more efficient and sensible approach to pesticides, thus increasing their effectiveness and useful life span and decreasing possible adverse effects. IPM will control pest populations more economically. And finally, IPM will better safeguard people's health and the environment from possible harmful side effects associated with pesticides. (An Integrated Pest Management Primer)

Irrigation

Irrigation can add salinity to soil by depositing soluble salts from the water source. In burley tobacco growing regions of the US, rainfall is sufficient to prevent any substantial buildup. Irrigation may deplete water reserves in ponds and streams to the point that wildlife is impacted. Irrigation can also introduce pathogens to clean fields requiring additional chemical control to achieve desirable yields.

The changing hydrological regime associated with irrigation schemes may alter the capacity of the environment to assimilate water soluble pollution. In particular, further reductions in low flows result in increased pollutant concentrations already discharged into the water course either from point sources, such as industry, irrigation drains and urban areas, or from non-point sources, such as agrochemicals leaking into groundwater and soil erosion. Reduced flood flows may remove beneficial flushing, and reservoirs may cause further concentration of pollutants. (Dougherty & Hall)

From those surveyed, 23% get their irrigation water from wells, 23% from streams with the majority, 54%, coming from ponds.

No-Till

No-till methods reduce the consumption of fossil fuels for land preparation and reduce soil erosion and runoff, thus, preserving productive cropland, and minimizing the negative impacts on surrounding water bodies. There is an increase in the use of chemical herbicides compared to conventional tobacco, but other positive aspects outweigh this point. Only 2 percent of the acres in the burley belt are in no-till production, a figure that is expected to rise in the future.

Cover Crops

Eighty-one percent of the acres surveyed use a cover crop. By using a cover crop, leachable soil nitrate is conserved within the roots and top-growth of cover crops, especially grasses. Excesses of phosphorus and potassium are utilized by the cover crop and released back into the soil as the cover is turned under in preparation for the next tobacco crop or rotational crop. Roots of the cover crops anchor soil and the top-growth slows water and wind movement of soil particle. Roots and top-growth contribute soil organic matter, which improves water-holding capacity, fertility, aeration and microbial activity. Cover crops also help reduce run-off, which increases water infiltration and shades the soil, which reduces evaporation. (Nutrient Manager, Vol. 2, Issue 2, 1995).

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Appendix A

Nation-wide regulations and programs

Through NRCS and FSA, there is a Conservation Plan Program. This program is for farmers who are involved in the production of crops on highly erodible land. Although this plan isn't required in order to grow tobacco, it is required if a farmer farms on highly erodible land and wishes to receive government price supports for his crops. This Conservation Plan is designed to help prevent erosion and chemical runoff.
The Conservations Plan is administered by FSA and NRCS. FSA take the applications from the farmers and refers the farmers to the NRCS office. NRCS develops the Conservation Plan for the farmer. FSA does status reviews while the NRCS implements checks and observations of the farmers to ensure they are following the plan.

The main parts of the Conservation Plan are rotation, cover crops, contouring, and grass waterways.

The Sod Buster program, which was part of the 1985 Food and Security Act, works in accordance with the Conservation Plan. It establishes an erosion plan for any land that was previously sod and has been turned under and used as a production field.

CRP Crop Reserve Program establishes buffers along streams and rivers to help control pesticide leaching.

There is no cover crop requirement if the land is not highly erodible

Nutrient Management

A nutrient budget for nitrogen, phosphorus, and potassium shall be developed that considers all potential sources of nutrients including, but not limited to animal manure and organic by-products, waste water, commercial fertilizer, crop residues, legume credits, and irrigation water.

Realistic yield goals shall be established based on soil productivity information, historical yield data, climatic conditions, level of management and/or local research on similar soil, cropping systems, and soil and manure/organic by-products tests. For new crops or varieties, industry yield recommendations may be used until documented yield information is available.

Plans for nutrient management shall specify the form, source, amount, timing and method of application of nutrients on each field to achieve realistic production goals, while minimizing nitrogen and/or phosphorus movement to surface and/or ground waters.

Erosion, runoff, and water management controls shall be installed, as needed, on fields that receive nutrients.

Nutrient planning shall be based on current soil test results developed in accordance with Land Grant University guidance or industry practice if recognized by the Land Grant University. Current soil tests are those that are no older than five years.

This plan governs the following nutrients and their application:
Nitrogen Application
Phosphorus Application
Potassium Application
Starter Fertilizers

Plans developed to minimize agricultural nonpoint source pollution of surface or ground water resources shall include practices and/or management activities that can reduce the risk of nitrogen or phosphorus movement from the field.

The plan includes the following components:

- Aerial photograph or map and a soil map of the site,
- Current and/or planned plant production sequence or crop rotation,
- Results of soil, plant, water, manure or organic by-product sample analyses,
- Realistic yield goals for the crops in the rotation,
- Quantification of all nutrient sources,
- Recommended nutrient rates, timing, form, and method of application and incorporation,
- Location of designated sensitive areas or resources and the associated, nutrient management restriction,
- Guidance for implementation, operation, maintenance, recordkeeping, and
- Complete nutrient budget for nitrogen, phosphorus, and potassium for the rotation or crop sequence.

In many states there is a cost share program associated with the nutrient management program. Various cost share programs include:

- Reimbursement per acre on land in a developed nutrient management plan
- Soil test reimbursement
- Annual manure test reimbursement

Pesticide Regulation

The primary federal requirements pertaining to the registration, sale, and use of pesticides are in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA), both as amended by the Food Quality Protection Act (FQPA). Pesticides must generally be registered with EPA in order to be sold or distributed. EPA will register a pesticide if it determines, among other things, that the pesticide will not generally cause unreasonable adverse effects on human health or the environment when used in accordance with conditions specified on the label.

In 1988 FIFRA was amended to require that EPA review pesticides initially registered prior to November 1984—when less toxicity data were available—to consider their health effects and to determine whether and how they might continue to be registered. These reviews are designed to ensure that older pesticides meet contemporary

health and safety standards and that their risks are mitigated. Essentially, manufacturers of the older pesticides must provide EPA with substantially the same toxicity, chemistry, and other data as are now required to register a new pesticide. Five EPA reviews of the older pesticides are called re-registrations. Most of the pesticides used on tobacco during the 1990s were initially approved before 1984 and therefore are subject to re-registration. In addition, the FQPA amendments to FIFRA passed in 1996 require EPA to reevaluate the amounts of pesticide residues allowed on or in food—known as tolerances.

EPA must ensure that there is a reasonable certainty that no harm will result from all pesticide exposures from food and nonfood uses for which there is reliable information. In doing so, unless another safety factor is determined to be appropriate, EPA is required to apply an additional 10-fold safety factor in setting tolerances to ensure the safety of foods for children. EPA is also required to ensure that there is reasonable certainty that no harm will result to children specifically from "aggregate" exposure to a single pesticide—that is, from all sources, such as lawn treatments, household uses, drinking water, and food. EPA must also consider available information concerning the cumulative effects on children of pesticides that act in a similar harmful way (known as a common mechanism of toxicity). (GAO, March 2003)

NRCS

State-wide programs

Water Protection Regulations

Kentucky

- The Kentucky Agriculture Water Quality Act (KRS 224.71-100 through 224.71-140) was passed by the 1994 General Assembly. The law focuses on the protection of surface water and groundwater resources from agriculture and silviculture activities. The Act creates the Kentucky Agriculture Water Quality Authority (KAWQA), a 15-member peer group made up of farmers and representatives from various agencies and organizations.

- The Authority will establish statewide and regional agriculture water quality plans. The Division of Conservation is the lead agency in the implementation of this act. To date, three KAWQA products are available: State Water Quality Plan, Producers' Workbook, and Biennial Report. An electronic version is available to help you develop a plan.

- The Kentucky Division of Water and the USDA Natural Resources Conservation Service (NRCS) were the lead agencies in developing a Unified Watershed Assessment for Kentucky. Additionally, the Kentucky Department of Fish and Wildlife Resources and the U.S. Fish and Wildlife Service were asked to provide input on their priority watersheds for the prioritization process.

- In fulfillment of its reporting requirements to Congress under Section 305(b) of the Clean Water Act, the Kentucky Division of Water compiles and evaluates all existing and readily available water quality data from many agencies, universities, contractors, and project grantees. As such, the 305(b) list provides the most comprehensive, unified

assessment for Kentucky. All monitored streams in Kentucky's 1998 305(b) list were included in the Unified Watershed Assessment. Stream segments that have been monitored and are listed as impaired in the 305(b) list (Table 1) comprise Kentucky's 303(d) list of impaired waters.
These data were further evaluated using guidance from the Clean Water Action Plan - Unified Watershed Assessment Framework.

The Kentucky Clean Water Act is guided by the following existing programs:

- USDA Environmental Quality Incentives Program
- USDA Wetland Reserve Program
- USDA Wildlife Habitat Incentives Program
- USDA Conservation Reserve Program
- Section 319(h) Nonpoint Source Grants
- Division of Conservation State Cost Share Program
- Direct aid to Conservation Districts
- Equipment Revolving Loan Fund
- Wastewater State Revolving Loan Fund
- Drinking Water State Revolving Loan Fund for land acquisition
- Personal Responsibility In A Desirable Environment (PRIDE) grants and loans

Additionally, Kentucky has a Cost Share Program that tobacco farmers can take part in. This cost share program is directly linked with the Phase I money and is ambiguous as to if it benefits the environment.

Source: Kentucky Division of Water

Ohio

- Under the Clean Water Act, every state must adopt water quality standards to protect, maintain and improve the quality of the nation's surface waters. These standards represent a level of water quality that will support the goal of "swimmable/fishable" waters. Water quality standards are ambient standards as opposed to discharge-type standards. These ambient standards, through a process of back calculation procedures known as total maximum daily loads or waste load allocations form the basis of water quality based permit limitations that regulate the discharge of pollutants into surface waters under the National Pollutant Discharge Elimination System (NPDES) permit program.

- Narrative "free forms" are general water quality criteria that apply to all surface waters. These criteria state that all waters shall be free from sludge, floating debris, oil and scum, color and odor producing materials, substances that are harmful to human, animal or aquatic life, and nutrients in concentrations that may cause algal blooms.

- Aquatic life and human health water quality criteria for individual chemicals are derived from laboratory studies of biological organisms' sensitivity to specific chemicals or combinations of chemicals. In these studies, organisms are exposed to known concentrations of a chemical under varying conditions. For aquatic life water quality criteria, the organisms exposed are a variety of fish, benthic macro invertebrates and zooplankton. For human health water quality criteria, the organisms exposed are mammals, usually mice or rats. Based on these tests, guidelines or national criteria recommendations are established by U.S. EPA. Ohio EPA uses these national criteria recommendations in combination with the latest scientific information in setting the appropriate chemical water quality criteria for Ohio's surface waters.
Another class of chemical criteria are those associated with the Agricultural Water Supply use designation. These criteria protect against long term adverse effects on crops and livestock as a result of crop irrigation and livestock watering.

Chemical water quality criteria are in Chapter **3745-1** of the OAC

Source: Ohio EPA Division of Surface Water

Missouri

- Riparian buffer is the vegetative buffer strip along a stream. Research found that riparian buffers significantly reduce agricultural nonpoint source water pollution. There is a national effort to construct riparian buffers for reducing agricultural nonpoint source pollution, improving water quality and protecting stream habitat.

Atrazine Abatement Projects

Ambient Water Quality Monitoring

Indiana

- H.R. 806 created a fund established from fines, penalties, and other monies collected through enforcement of the Clean Water Act. The money in the fund would be used to help cleanup the polluted waters for which enforcement actions and fines were necessary.

Virginia

-The purpose of the Virginia Water Quality Improvement Act (WQIA) is to restore and improve the quality of state waters and to protect them from impairment and destruction for the benefit of current and future citizens of the Commonwealth of Virginia. Because this is a shared responsibility among state and local governments and individuals, the Water Quality Improvement Fund (WQIF) was created. The purpose of the fund is to provide water quality improvement grants to local governments, soil and water conservation districts and individuals for point and nonpoint source pollution

prevention, reduction and control programs (Section 10.1-2128.B. of the Code of Virginia).

A primary objective of WQIF is to fund grants that will reduce the flow of excess nitrogen and phosphorus into the Chesapeake Bay through the implementation of the tributary strategies. The Virginia Department of Environmental Quality (DEQ) is responsible for administering point source grants and the Virginia Department of Conservation and Recreation (DCR) administers nonpoint source grants. WQIF funds are provided, in accordance with the guidelines, to help stimulate nonpoint source pollution reduction through the Virginia Agricultural Best Management Practices Cost-share Program and water quality improvement projects within the regions listed above

-The Agriculture Stewardship Act's objective is to work with farmers and local Soil and Water Conservation Districts to resolve, in a timely and commonsense manner, water quality problems reported to the Virginia Department of Agriculture and Consumer Services (VDACS) concerning nutrients, sediment and toxins from agricultural activities.

The ASA program is administered by the VDACS Commissioner's Office which will receive all complaints. If a complaint is under the jurisdiction of the ASA, the local Soil and Water Conservation District is contacted and given the opportunity to investigate. After a complaint is investigated, the Commissioner's Office reviews the findings and determines if the complaint is founded and requires further action under the ASA. If so, the farmer is required to develop a plan to correct the problem and then complete plan implementation within eighteen months. The Commissioner's Office contacts complainants to inform them of the findings.

-Farm*A*Syst is a partnership between government agencies and private business that enables you to prevent pollution on farms, ranches, and in homes using confidential environmental assessments.

Farm*A*Syst can help you determine what risks -- whether from livestock waste disposal, pesticide management or petroleum storage -- could threaten your family's health and financial security. A system of step-by-step fact sheets and worksheets helps you to identify the behaviors and practices that are creating those risks

-The State of Virginia is developing guidelines for trading and other market-based incentives for use in conjunction with Water Quality Improvement Fund grants. (The WQIF is one of the main components of the Water Quality Improvement Act of 1997. The Act is one of the State's mechanisms for implementing its tributary strategies. Tributary strategies are the operational documents of the interstate Chesapeake Bay Agreement to limit nutrient loads to the Bay by 40 %.) The WQIF, which currently targets only the Potomac-Shenandoah basin but will soon target other Bay basins, aims to provide incentives for point sources to decrease their total nitrogen and total phosphorus discharges beyond levels established by the tributary strategy. The WQIF grants provide cost-share funds to POTW's and some private WWTP's for biological nutrient control and other nutrient control systems. Under the proposed trading provision, if a point source were to implement controls so as to discharge less than its tributary strategy goal, a credit would be created that the point source could bank for one year, sell to other WQIF grantees, or transfer to the State for a bonus payment. If a point source were to fall short of its expected reduction, it would be expected to repay to the State the annualized cost share amount (plus interest as a "monetary assessment"). No trading has been implemented yet; the program is under discussion by a water issues advisory group.

Sources:
U.S. Environmental Protection Agency, Office of Water
Department of Conservation and Recreation
Virginia Department of Agriculture and Consumer Services

West Virginia

- The West Virginia Water Pollution Control Act provides regulatory authority to the Office of Water Resources ("OWR") of the DEP over all discharges to both surface and ground waters, any litter or refuse deposited on any land surface within 100 yards of any river, stream, creek, branch, brook, lake or pond, as well as jurisdiction and supervision of the administration and enforcement of all laws relating to dams, streams, and water area beautification, and the conservation, development and protection of the enjoyment and use of the water resources of the State. West Virginia is authorized to administer the National Pollutant Discharge Elimination System ("NPDES") program established by the federal Clean Water Act, via permits, conducting inspections, issuing administrative orders to compel compliance with permits and regulations, preventing discharges to State waters, and taking remedial action for impairment of State waters. The authority to promulgate water quality standards relating to ground and surface water is delegated to the West Virginia Environmental Quality Board ("Board"). The authority to issue permits and enforce the regulations is delegated to the Chief of the OWR. The Board also functions as an intermediate appellant body for appeals from contested permit conditions and orders issued by the Chief of the OWR.

North Carolina

- 30-Foot Buffer Rule -- The Coastal Resources Commission adopted a rule requiring structures to be built at least 30 feet from the water on coastal waterfront property. Buffers help water quality by filtering pollutants and nutrients from runoff. They also help protect houses and other structures against flooding. The rule applies to property along rivers, streams, sounds, marshes and other navigable waters in the 20 coastal counties.

- 1999 Sedimentation Act Amendments – The Sedimentation Pollution Control Act was strengthened by increasing the maximum fine for violations from $500 to 5,000 per day. The examination for licensing of contractors must include questions on the applicant's knowledge of the requirements of the Sedimentation Pollution Control Act and rules.

- Conservation Reserve Enhancement Program - $275 million agreement between the state and the federal government to reduce pollution in several major North Carolina waterways. Under the agreement the USDA and North Carolina will offer farmers incentives to restore up to 100,000 acres of wetlands and streamside areas and habitats through the Conservation Reserve Enhancement Program (CREP). CREP uses financial incentives to encourage farmers to enroll highly environmentally sensitive land adjacent to targeted streams and rivers in 10-year to 15-year contracts. Under the contracts, farmers agree to remove the lands from agricultural production and plant and maintain long-term, resource-conserving vegetative covers. Under the program, land along streams

and riverbanks in the Neuse, Tar-Pamlico and Chowan river basins and the Jordan Lake watershed will be planted with hardwood trees, grass filter strips, streamside buffers, and vegetation serving as habitat for wildlife and restored wetlands. The vegetation and wetlands will filter contaminants from water runoff before it enters streams and rivers.

- Clean Water Management Trust Fund - The fund was established to help finance projects that specifically address water pollution problems and focus on upgrading surface waters, eliminating pollution, and protecting and conserving unpolluted surface waters, including urban drinking water supplies. This fund is also intended to be used to build a network of riparian buffers and greenways for environmental, educational and recreational benefits. It is also expected to enhance wildlife and marine fisheries habitats in the state. The trust fund generates approximately $50 million annually.

Source: N.C. Department of Environment and Natural Resources

Appendix B

FSA FORMS

Certify Pesticide Use MQ 38.

This form certifies:

- All pesticide products that were used in connection with the production were approved by the EPA
- Producer agrees to pay the No Net Costs Tobacco Account established within the Commodity Credit Corporation the applicable assessment for each pound of tobacco marketed from his/her farm during the marketing year
- Tobacco being considered for price support has not been nested

Acreage Report FSA 578

This form certifies the number of acres of tobacco the tobacco producer is claiming. This acreage number is to be used in case of a disaster or crop failure

Lease and Transfer of Burley Tobacco FSA 375

This form allows tobacco producers to lease their tobacco quota and transfer that burley quota to another farm or producer

Sale and Purchase Quota ASCS 375

This form allows tobacco producers to sell their quota and have it transferred to another farm or producer.

All of above are required in order for the Market Card to be issued.

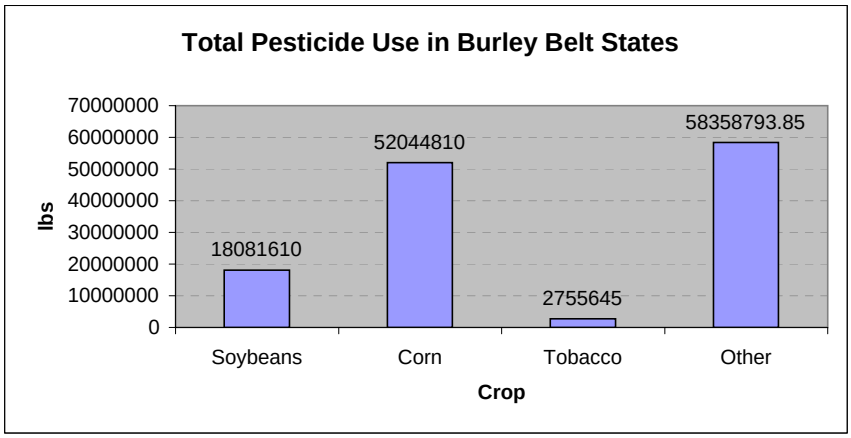
-Designation of Market FSA 808

This form designates what warehouse, receiving station and dealer the tobacco producers plans to sell his crop to. He also designates a market location in which to sell his crop. This form also allows the tobacco producer to designate the pounds he is selling and the number of marketing cards he has.

-Carry Over MQ 108

This form certifies the number of unmarketed pounds of tobacco the tobacco producer has remaining at the end of the marketing season.

Appendix C


Total Pesticide Use in Burley Belt States
70000000
60000000
50000000
40000000
30000000
20000000
10000000
0
lbs
18081610
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2755645
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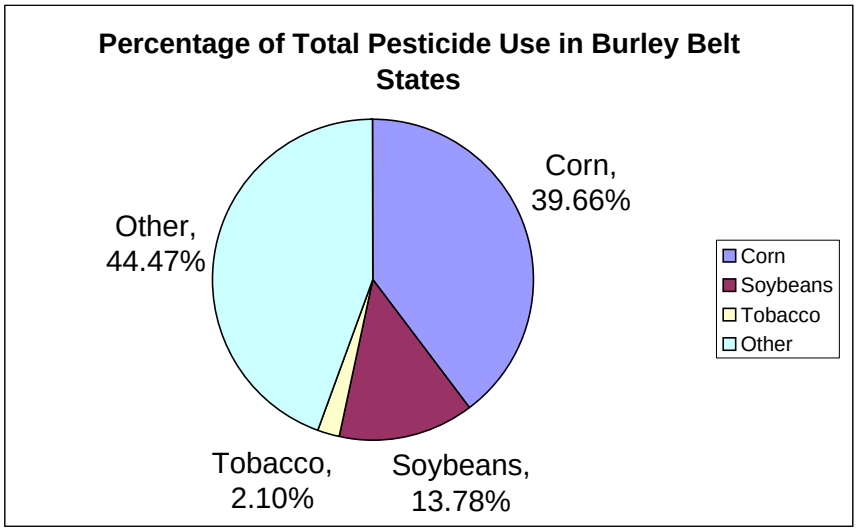
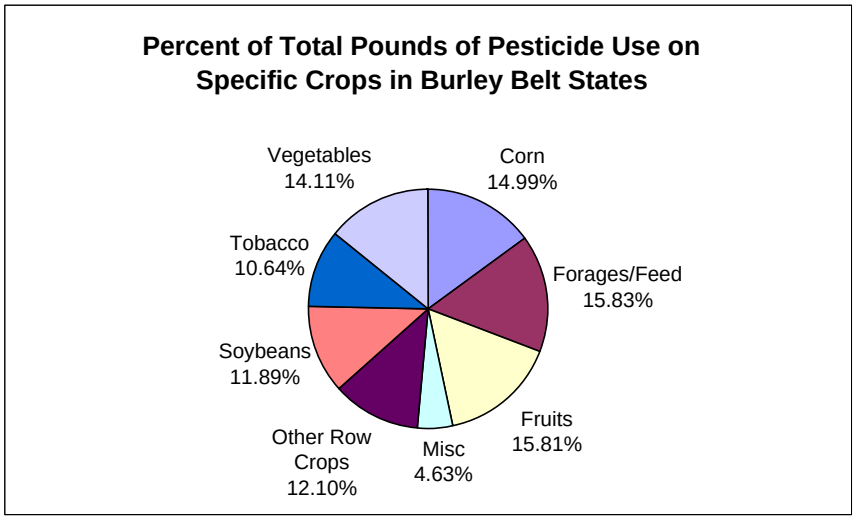
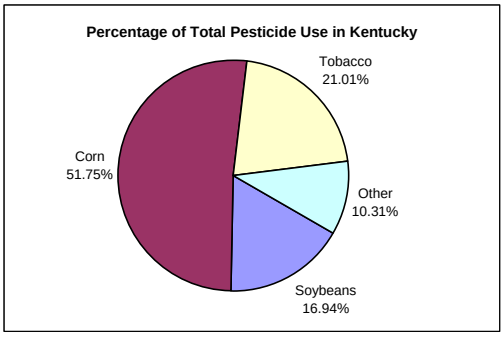
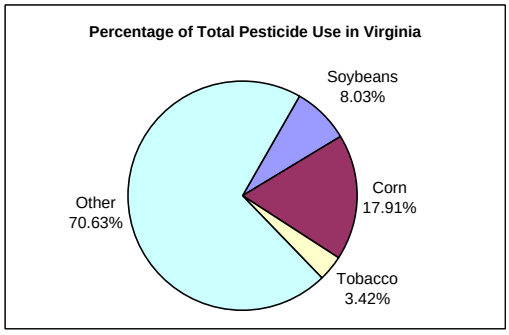
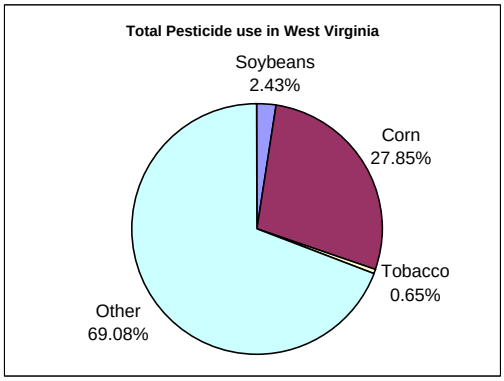
Soybeans
Corn
Tobacco
Other
Crop

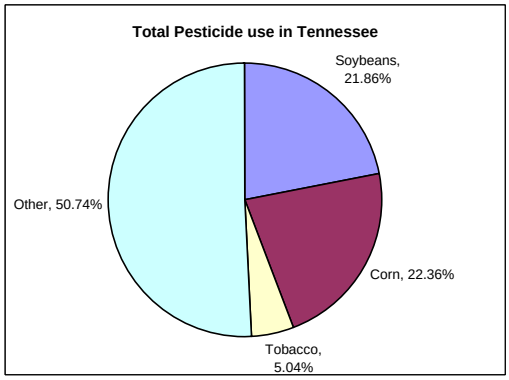

Percentage of Total Pesticide Use in Burley Belt States
Corn, 39.66%
Soybeans, 13.78%
Tobacco, 2.10%
Other, 44.47%
Corn
Soybeans
Tobacco
Other

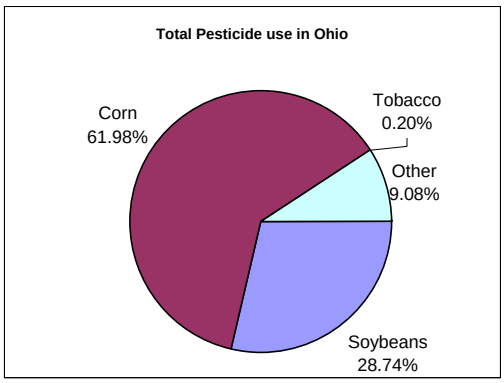

Percent of Total Pounds of Pesticide Use on Specific Crops in Burley Belt States
Vegetables 14.11%
Corn 14.99%
Tobacco 10.64%
Forages/Feed 15.83%
Soybeans 11.89%
Fruits 15.81%
Other Row Crops 12.10%
Misc 4.63%

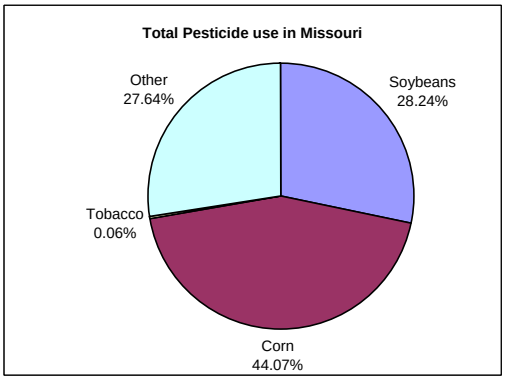

Percentage of Total Pesticide Use in Kentucky
Tobacco
21.01%
Corn
51.75%
Other
10.31%
Soybeans
16.94%

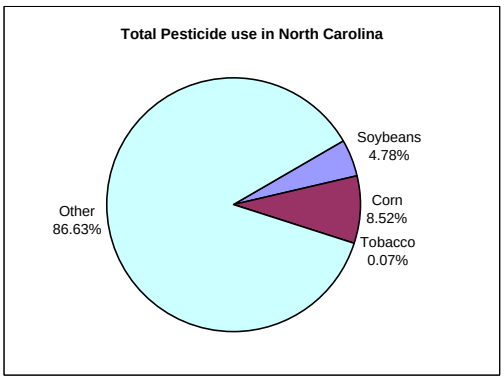

Percentage of Total Pesticide Use in Virginia
Soybeans
8.03%
Other
70.63%
Corn
17.91%
Tobacco
3.42%

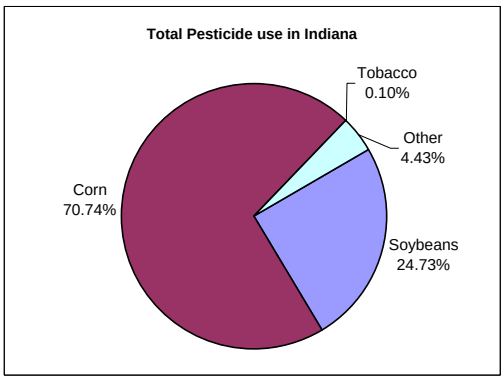

Total Pesticide use in West Virginia
Soybeans
2.43%
Corn
27.85%
Tobacco
0.65%
Other
69.08%


Total Pesticide use in Tennessee
Soybeans,
21.86%
Other, 50.74%
Corn, 22.36%
Tobacco,
5.04%


Total Pesticide use in Ohio
Corn
61.98%
Tobacco
0.20%
Other
9.08%
Soybeans
28.74%


Total Pesticide use in Missouri
Other
27.64%
Soybeans
28.24%
Tobacco
0.06%
Corn
44.07%

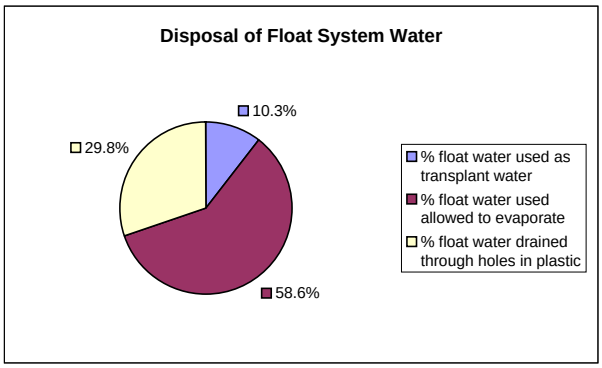

Total Pesticide use in North Carolina
Soybeans
4.78%
Other
86.63%
Corn
8.52%
Tobacco
0.07%


Total Pesticide use in Indiana
Tobacco
0.10%
Other
4.43%
Corn
70.74%
Soybeans
24.73%

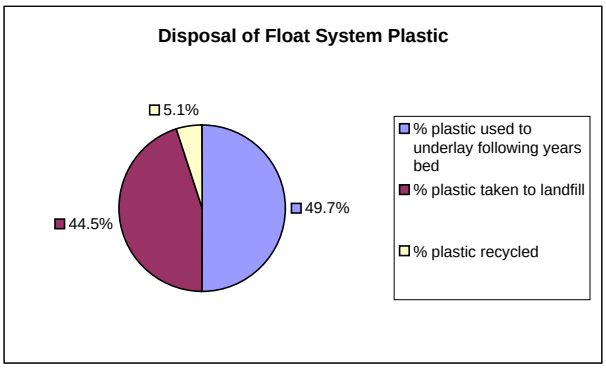
Appendix D

Question #		
	Total number of responses	157
	Total number of acres of burley tobacco	135729
1	% of tobacco transplants from container system	88.8%
2	% float water used as transplant water	10.3%
3	% float water used allowed to evaporate	58.6%
4	% float water drained through holes in plastic	29.8%
5	% plastic used to underlay following years bed	49.7%
6	% plastic taken to landfill	44.5%
7	% plastic recycled	5.1%
8	% discarded float trays recycled	6.3%
9	% of float trays reused annually	72.8%
10	% of float trays disposed of in landfill	20.3%
11	% tobacco acreage in one year rotation	19.6%
12	% tobacco acreage in two year rotation	30.0%
13	% tobacco acreage in three+ years rotation	50.4%
14	% tobacco acreage that uses soil test	42.9%
15	Average lbs per AC of nitrogen applied	262
16	Average lbs per AC of phosphorus applied	142.4
17	Average pounds per AC of potassium applied	229.4
18	Average tons per AC of lime spread	1.6
19	% tobacco AC where fumigant was applied	5.0%
20	% tobacco AC where herbicide was used	80.7%
21	% tobacco where soil applied insecticide used	27.0%
22	% tobacco where transplant water/tray drench used	60.8%
23	% tobacco AC with 1 application of foliar insect.	40.3%
24	% tobacco AC with 2 applications of foliar insect.	29.9%
25	% tobacco AC with 3+ applications of foliar insect.	18.5%
26	% tobacco AC where soil applied fungicide was used	30.9%
27	% tobacco AC where foliar fungicide applied 1 time	32.9%
28	% tobacco AC where foliar fungicide applied 2 times	19.9%
29	% tobacco AC where foliar fungicide applied 3+ times	8.0%
30	% chemical containers recycled	21.2%
31	% tobacco AC in contracts for IPM	1.5%
32	% tobacco AC where irrigation was used	11.9%
33	Avg number of irrigations/crop	1.9
34	Avg quantity of irrigation water applied/irrigation	0.9
35	% wells	17.9%
36	% streams	42.8%
37	% ponds	39.3%
38	% tobacco AC in no till	2%
39	% tobacco AC using cover crops	81%

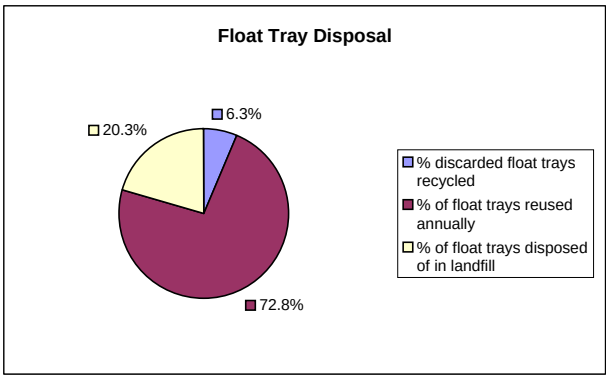
Summary from Questions 2-13



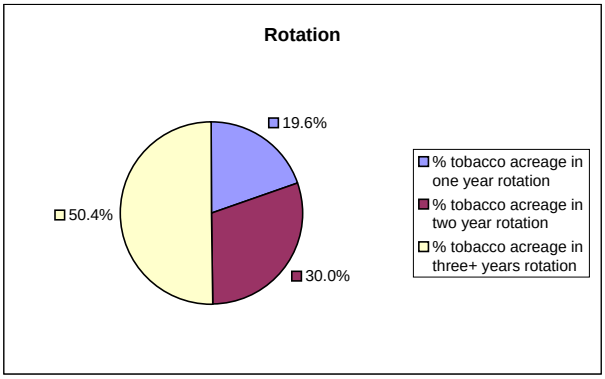
Questions 2,3,4
Float System Water Disposal



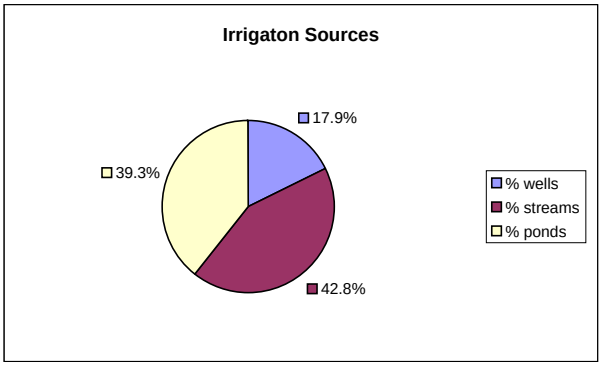
Questions 5,6,7
Float System Plastic Disposal



Questions 8,9,10
Float System Tray Disposal



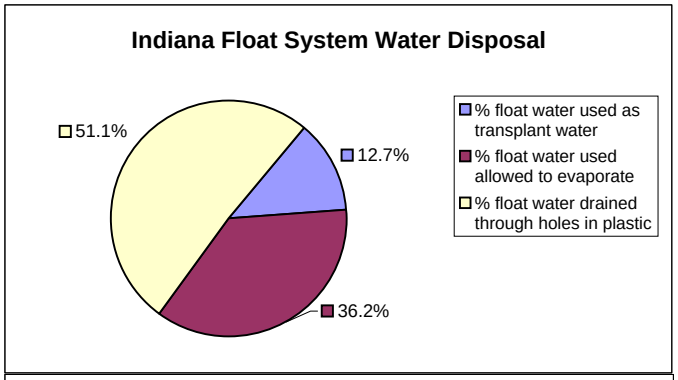
Questions 11,12,13
Rotation

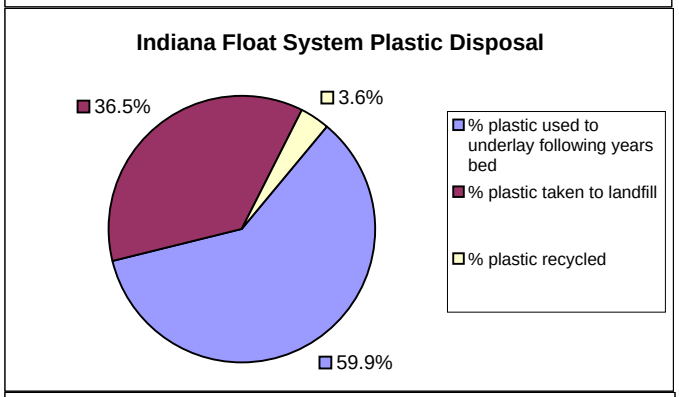


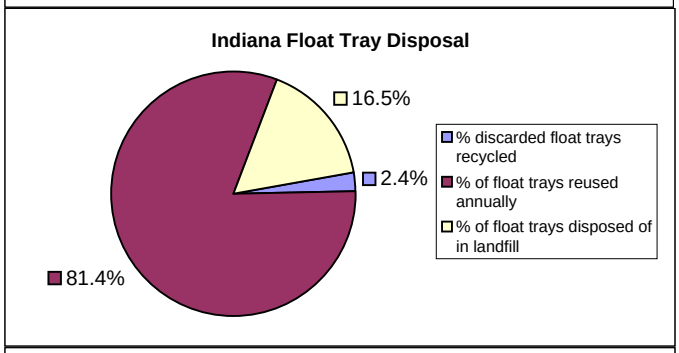
Questions 35, 36, 37
Irrigation

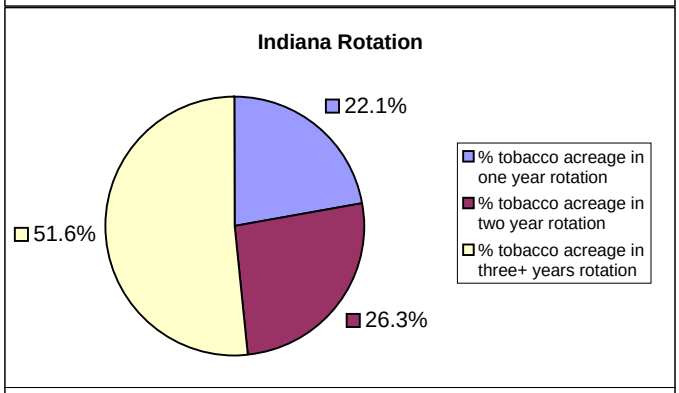
INDIANA

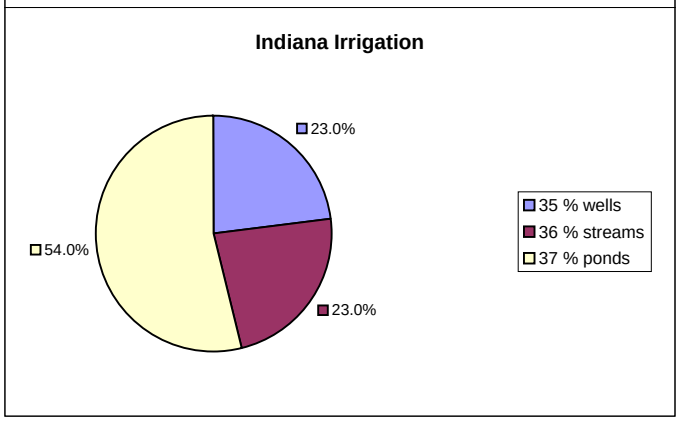
Question #		
	Total number of responses	10
	Total number of AC in Burley	3532
1	% of tobacco transplants from container system	94.2%
2	% float water used as transplant water	12.7%
3	% float water used allowed to evaporate	36.2%
4	% float water drained through holes in plastic	51.1%
5	% plastic used to underlay following years bed	59.9%
6	% plastic taken to landfill	36.5%
7	% plastic recycled	3.6%
8	% discarded float trays recycled	2.4%
9	% of float trays reused annually	81.4%
10	% of float trays disposed of in landfill	16.5%
11	% tobacco acreage in one year rotation	22.1%
12	% tobacco acreage in two year rotation	26.3%
13	% tobacco acreage in three+ years rotation	51.6%
14	% tobacco acreage that uses soil test	57.0%
15	Average lbs per AC of nitrogen applied	303.5
16	Average lbs per AC of phosphorus applied	156
17	Average pounds per AC of potassium applied	266.5
18	Average tons per AC of lime spread	1.45
19	% tobacco AC where fumigant was applied	10.5%
20	% tobacco AC where herbicide was used	96.2%
21	% tobacco where soil applied insecticide used	45.5%
22	% tobacco where transplant water/tray drench used	52.0%
23	% tobacco AC with 1 application of foliar insect.	40.0%
24	% tobacco AC with 2 applications of foliar insect.	42.3%
25	% tobacco AC with 3+ applications of foliar insect.	12.0%
26	% tobacco AC where soil applied fungicide was used	35.0%
27	% tobacco AC where foliar fungicide applied 1 time	40.5%
28	% tobacco AC where foliar fungicide applied 2 times	22.5%
29	% tobacco AC where foliar fungicide applied 3+ times	5.5%
30	% chemical containers recycled	25.0%
31	% tobacco AC in contracts for IPM	2.6%
32	% tobacco AC where irrigation was used	11.8%
33	Avg number of irrigations/crop	1.7%
34	Avg quantity of irrigation water applied/irrigation	0.6%
35	% wells	23.0%
36	% streams	23.0%
37	% ponds	54.0%
38	% tobacco AC in no till	11.2%
39	% tobacco AC using cover crops	75.5%





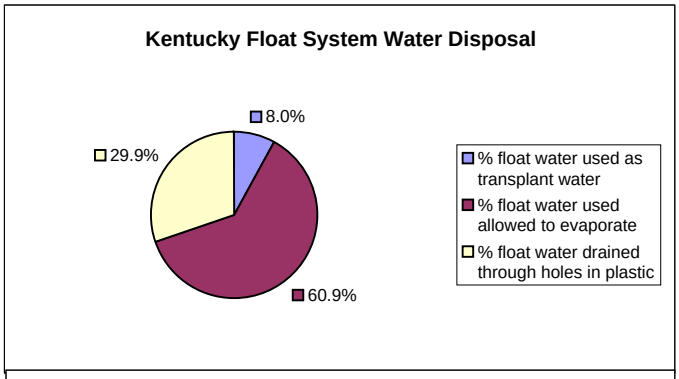


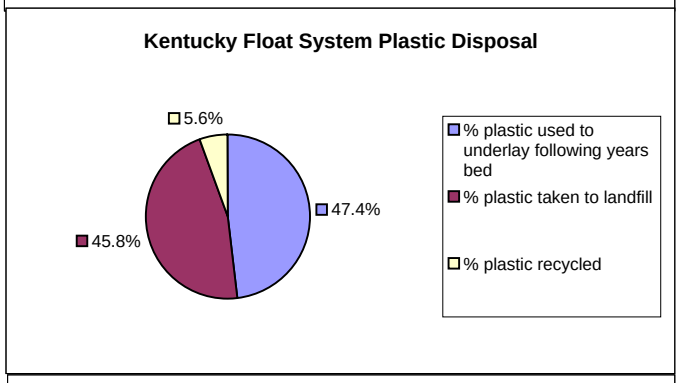


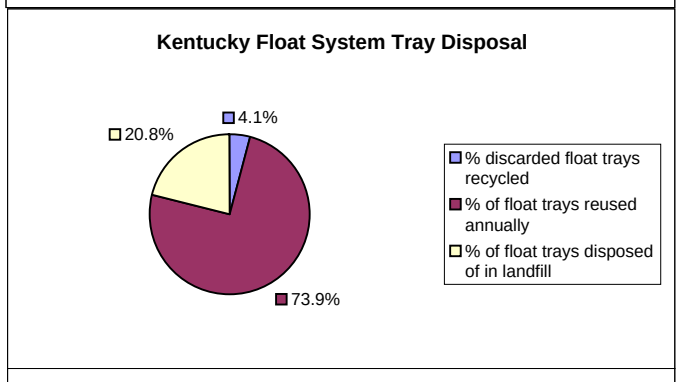


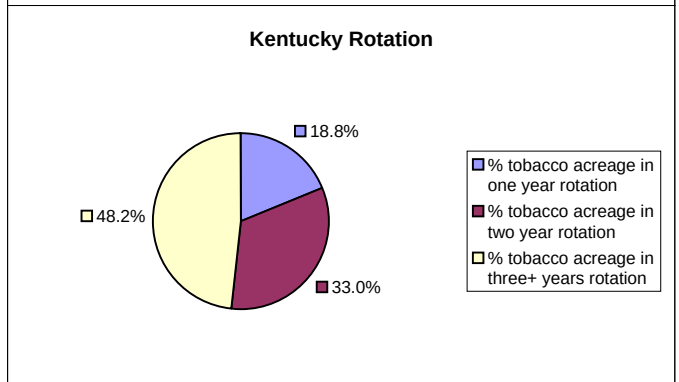
KENTUCKY

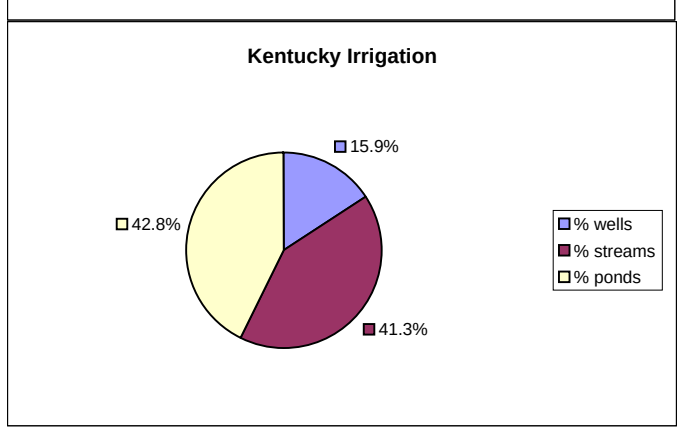
Question #		
	Total number of responses	83
	Total number of AC in Burley	93126
1	% of tobacco transplants from container system	90.4%
2	% float water used as transplant water	8.0%
3	% float water used allowed to evaporate	60.9%
4	% float water drained through holes in plastic	29.9%
5	% plastic used to underlay following years bed	47.4%
6	% plastic taken to landfill	45.8%
7	% plastic recycled	5.6%
8	% discarded float trays recycled	4.1%
9	% of float trays reused annually	73.9%
10	% of float trays disposed of in landfill	20.8%
11	% tobacco acreage in one year rotation	18.8%
12	% tobacco acreage in two year rotation	33.0%
13	% tobacco acreage in three+ years rotation	48.2%
14	% tobacco acreage that uses soil test	42.8%
15	Average lbs per AC of nitrogen applied	313.1
16	Average lbs per AC of phosphorus applied	144.6
17	Average pounds per AC of potassium applied	228.9
18	Average tons per AC of lime spread	1.9
19	% tobacco AC where fumigant was applied	3.5%
20	% tobacco AC where herbicide was used	78.4%
21	% tobacco where soil applied insecticide used	23.4%
22	% tobacco where transplant water/tray drench used	66.6%
23	% tobacco AC with 1 application of foliar insect.	43.4%
24	% tobacco AC with 2 applications of foliar insect.	28.5%
25	% tobacco AC with 3+ applications of foliar insect.	16.4%
26	% tobacco AC where soil applied fungicide was used	29.5%
27	% tobacco AC where foliar fungicide applied 1 time	32.7%
28	% tobacco AC where foliar fungicide applied 2 times	14.9%
29	% tobacco AC where foliar fungicide applied 3+ times	4.0%
30	% chemical containers recycled	18.9%
31	% tobacco AC in contracts for IPM	1.2%
32	% tobacco AC where irrigation was used	13.6%
33	Avg number of irrigations/crop	1.7%
34	Avg quantity of irrigation water applied/irrigation	1.1%
35	% wells	15.9%
36	% streams	41.3%
37	% ponds	42.8%
38	% tobacco AC in no till	1.0%
39	% tobacco AC using cover crops	82.0%





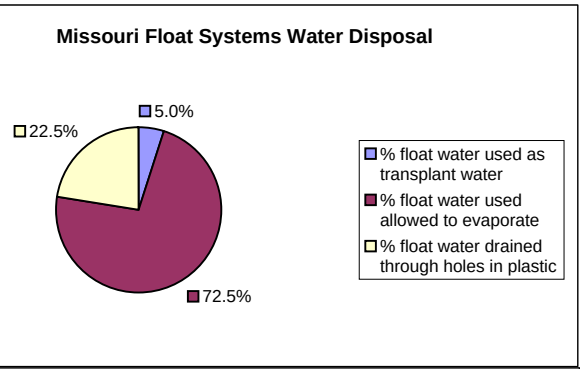


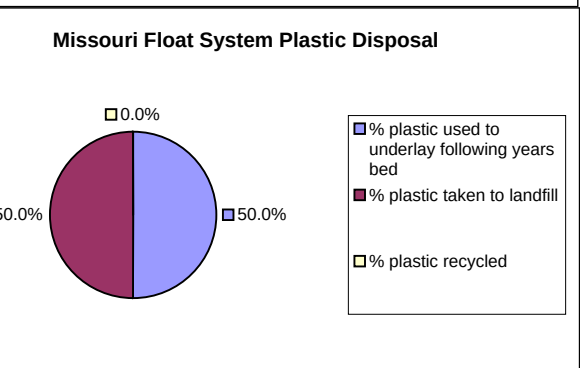


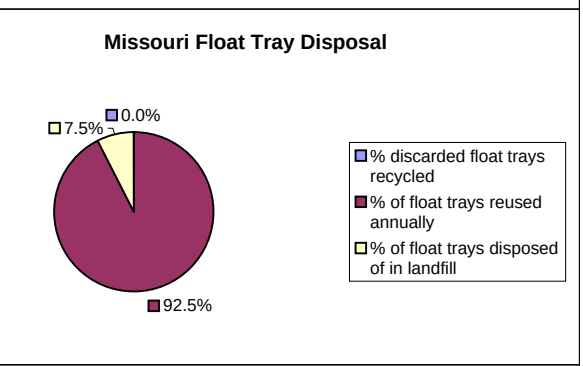


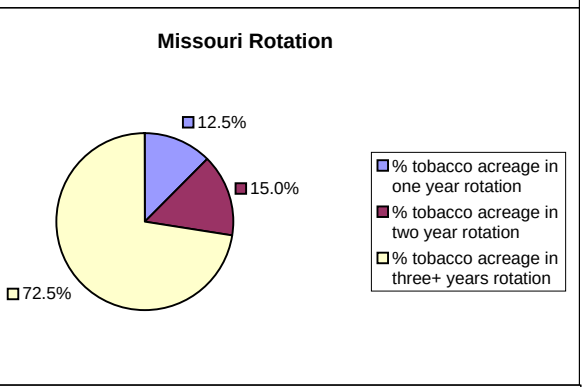
MISSOURI

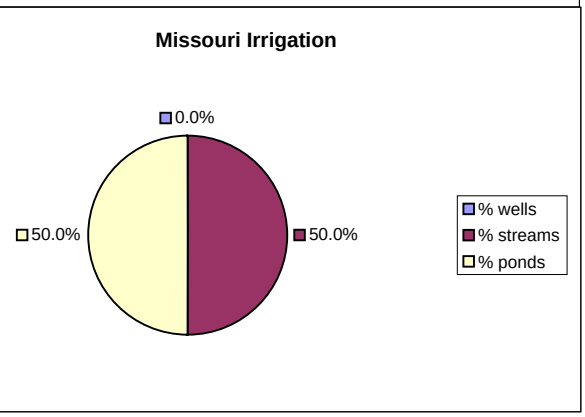
Question #		
	Total number of responses	2
	Total number of AC in Burley	1025
1	% of tobacco transplants from container system	96.5%
2	% float water used as transplant water	5.0%
3	% float water used allowed to evaporate	72.5%
4	% float water drained through holes in plastic	22.5%
5	% plastic used to underlay following years bed	50.0%
6	% plastic taken to landfill	50.0%
7	% plastic recycled	0.0%
8	% discarded float trays recycled	0.0%
9	% of float trays reused annually	92.5%
10	% of float trays disposed of in landfill	7.5%
11	% tobacco acreage in one year rotation	12.5%
12	% tobacco acreage in two year rotation	15.0%
13	% tobacco acreage in three+ years rotation	72.5%
14	% tobacco acreage that uses soil test	12.5%
15	Average lbs per AC of nitrogen applied	300.0
16	Average lbs per AC of phosphorus applied	200.0
17	Average pounds per AC of potassium applied	200.0
18	Average tons per AC of lime spread	0.2
19	% tobacco AC where fumigant was applied	0.0%
20	% tobacco AC where herbicide was used	92.5%
21	% tobacco where soil applied insecticide used	10.0%
22	% tobacco where transplant water/tray drench used	12.5%
23	% tobacco AC with 1 application of foliar insect.	7.5%
24	% tobacco AC with 2 applications of foliar insect.	22.5%
25	% tobacco AC with 3+ applications of foliar insect.	3.5%
26	% tobacco AC where soil applied fungicide was used	3.5%
27	% tobacco AC where foliar fungicide applied 1 time	0.0%
28	% tobacco AC where foliar fungicide applied 2 times	0.0%
29	% tobacco AC where foliar fungicide applied 3+ times	0.0%
30	% chemical containers recycled	27.5%
31	% tobacco AC in contracts for IPM	0.0%
32	% tobacco AC where irrigation was used	2.0%
33	Avg number of irrigations/crop	1.0%
34	Avg quantity of irrigation water applied/irrigation	1.5%
35	% wells	0.0%
36	% streams	50.0%
37	% ponds	50.0%
38	% tobacco AC in no till	0.0%
39	% tobacco AC using cover crops	55.0%





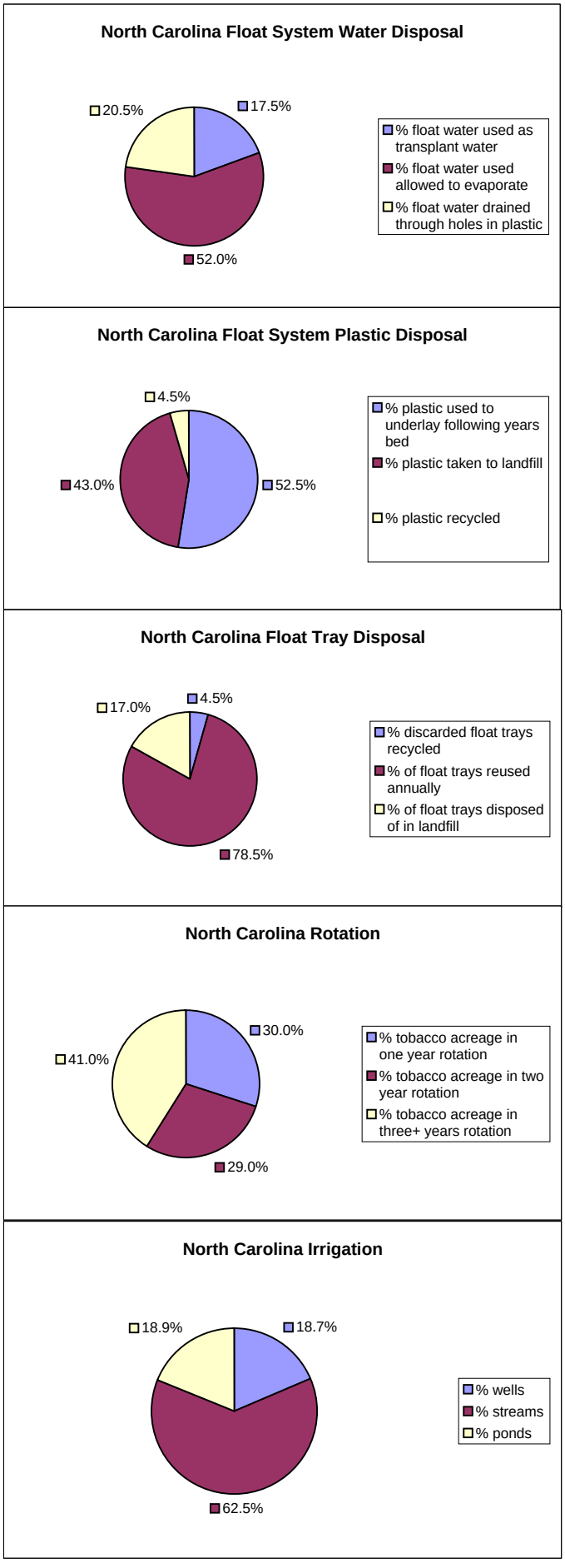






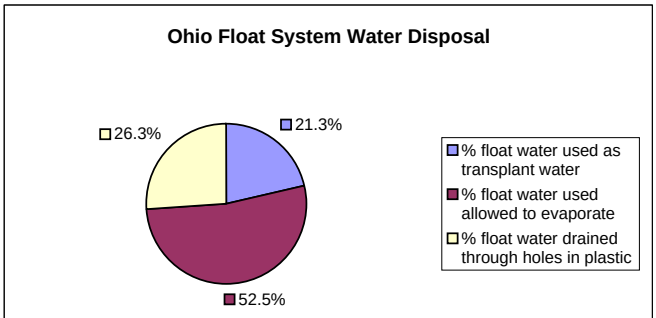
NORTH CAROLINA

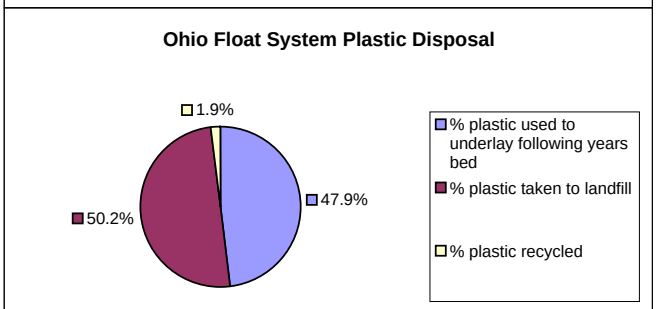
Question #		
	Total number of responses	10
	Total number of AC in Burley	3434
1	% of tobacco transplants from container system	70.5%
2	% float water used as transplant water	17.5%
3	% float water used allowed to evaporate	52.0%
4	% float water drained through holes in plastic	20.5%
5	% plastic used to underlay following years bed	52.5%
6	% plastic taken to landfill	43.0%
7	% plastic recycled	4.5%
8	% discarded float trays recycled	4.5%
9	% of float trays reused annually	78.5%
10	% of float trays disposed of in landfill	17.0%
11	% tobacco acreage in one year rotation	30.0%
12	% tobacco acreage in two year rotation	29.0%
13	% tobacco acreage in three+ years rotation	41.0%
14	% tobacco acreage that uses soil test	33.5%
15	Average lbs per AC of nitrogen applied	178.0
16	Average lbs per AC of phosphorus applied	121.0
17	Average pounds per AC of potassium applied	178.0
18	Average tons per AC of lime spread	1.1
19	% tobacco AC where fumigant was applied	10.5%
20	% tobacco AC where herbicide was used	76.5%
21	% tobacco where soil applied insecticide used	12.6%
22	% tobacco where transplant water/tray drench used	61.0%
23	% tobacco AC with 1 application of foliar insect.	47.0%
24	% tobacco AC with 2 applications of foliar insect.	25.0%
25	% tobacco AC with 3+ applications of foliar insect.	9.0%
26	% tobacco AC where soil applied fungicide was used	20.5%
27	% tobacco AC where foliar fungicide applied 1 time	34.0%
28	% tobacco AC where foliar fungicide applied 2 times	22.0%
29	% tobacco AC where foliar fungicide applied 3+ times	27.0%
30	% chemical containers recycled	34.5%
31	% tobacco AC in contracts for IPM	0.5%
32	% tobacco AC where irrigation was used	7.7%
33	Avg number of irrigations/crop	2.8%
34	Avg quantity of irrigation water applied/irrigation	0.6%
35	% wells	18.7%
36	% streams	62.5%
37	% ponds	18.9%
38	% tobacco AC in no till	5.4%
39	% tobacco AC using cover crops	77.5%

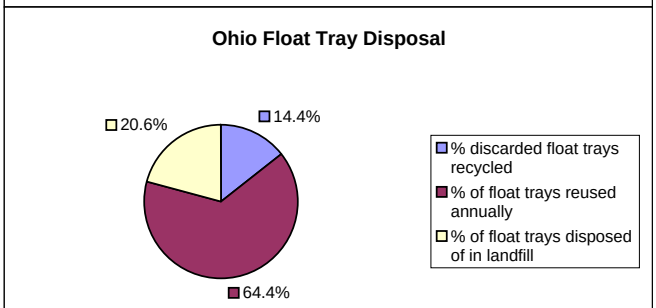


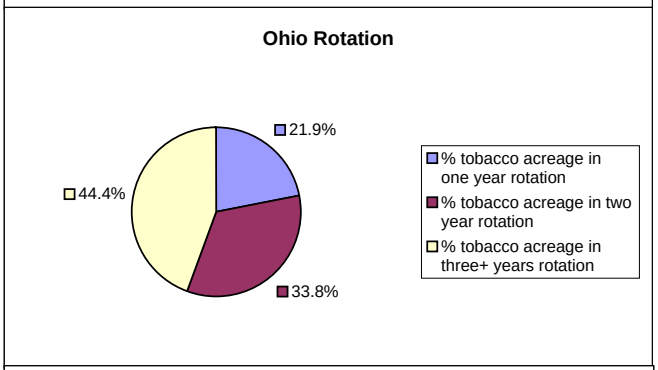
OHIO

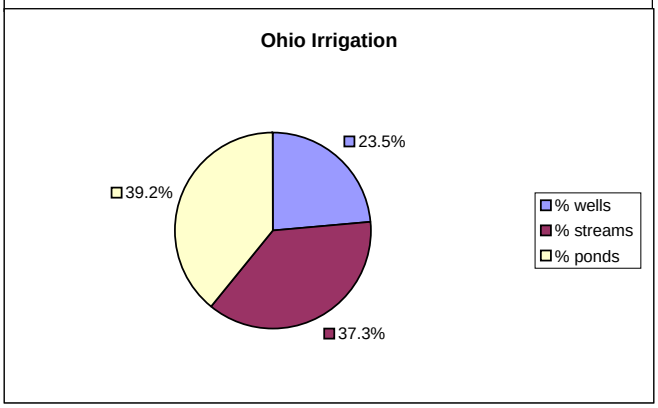
Question #		
	Total number of responses	8
	Total number of AC in Burley	5380
1	% of tobacco transplants from container system	91.8%
2	% float water used as transplant water	21.3%
3	% float water used allowed to evaporate	52.5%
4	% float water drained through holes in plastic	26.3%
5	% plastic used to underlay following years bed	47.9%
6	% plastic taken to landfill	50.2%
7	% plastic recycled	1.9%
8	% discarded float trays recycled	14.4%
9	% of float trays reused annually	64.4%
10	% of float trays disposed of in landfill	20.6%
11	% tobacco acreage in one year rotation	21.9%
12	% tobacco acreage in two year rotation	33.8%
13	% tobacco acreage in three+ years rotation	44.4%
14	% tobacco acreage that uses soil test	48.1%
15	Average lbs per AC of nitrogen applied	196.3
16	Average lbs per AC of phosphorus applied	104.4
17	Average pounds per AC of potassium applied	160.0
18	Average tons per AC of lime spread	0.9
19	% tobacco AC where fumigant was applied	2.0%
20	% tobacco AC where herbicide was used	89.4%
21	% tobacco where soil applied insecticide used	42.5%
22	% tobacco where transplant water/tray drench used	55.6%
23	% tobacco AC with 1 application of foliar insect.	45.6%
24	% tobacco AC with 2 applications of foliar insect.	26.4%
25	% tobacco AC with 3+ applications of foliar insect.	6.3%
26	% tobacco AC where soil applied fungicide was used	56.9%
27	% tobacco AC where foliar fungicide applied 1 time	45.6%
28	% tobacco AC where foliar fungicide applied 2 times	27.5%
29	% tobacco AC where foliar fungicide applied 3+ times	5.0%
30	% chemical containers recycled	22.5%
31	% tobacco AC in contracts for IPM	3.1%
32	% tobacco AC where irrigation was used	5.0%
33	Avg number of irrigations/crop	1.9%
34	Avg quantity of irrigation water applied/irrigation	0.8%
35	% wells	23.5%
36	% streams	37.3%
37	% ponds	39.2%
38	% tobacco AC in no till	5.3%
39	% tobacco AC using cover crops	77.5%





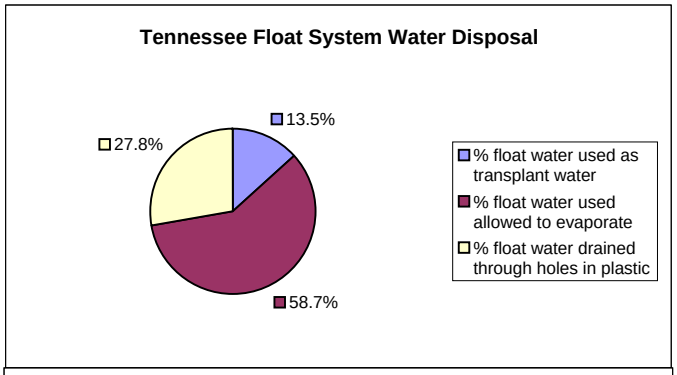


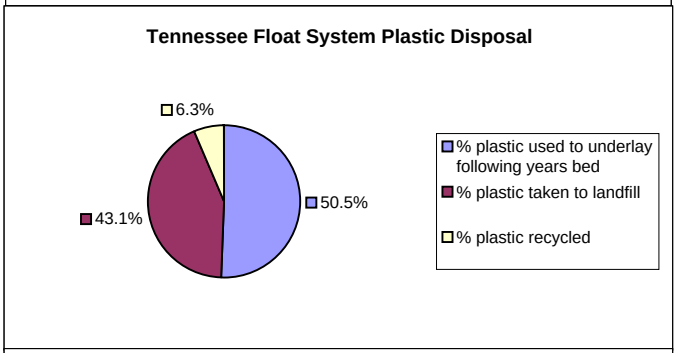


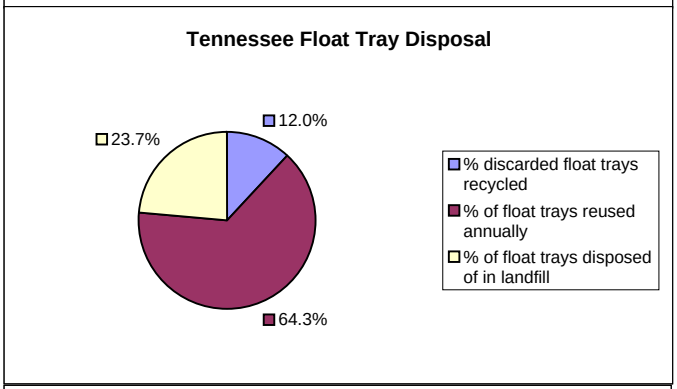


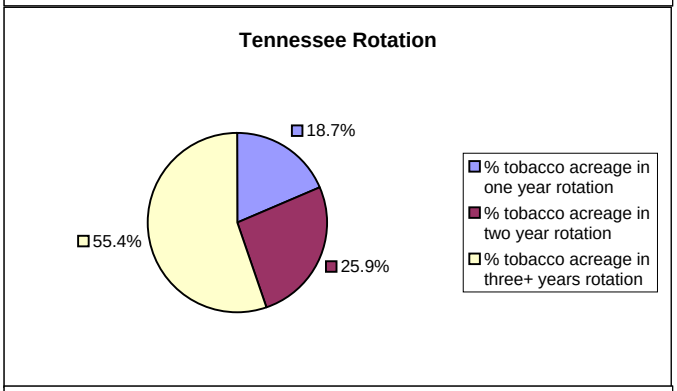
TENNESSEE

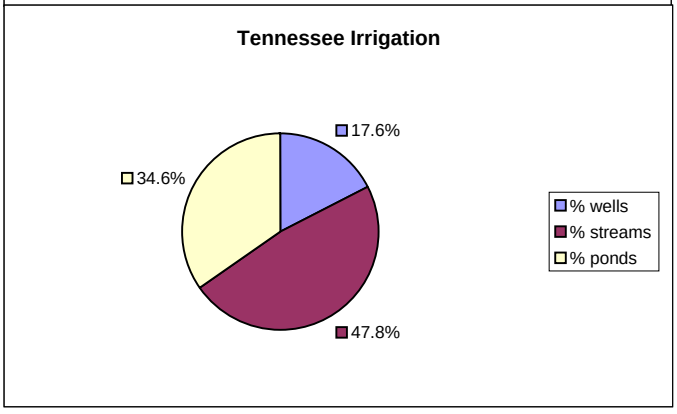
Question #		
	Total number of responses	32
	Total number of AC in Burley	21650
1	% of tobacco transplants from container system	88.5%
2	% float water used as transplant water	13.5%
3	% float water used allowed to evaporate	58.7%
4	% float water drained through holes in plastic	27.8%
5	% plastic used to underlay following years bed	50.5%
6	% plastic taken to landfill	43.1%
7	% plastic recycled	6.3%
8	% discarded float trays recycled	12.0%
9	% of float trays reused annually	64.3%
10	% of float trays disposed of in landfill	23.7%
11	% tobacco acreage in one year rotation	18.7%
12	% tobacco acreage in two year rotation	25.9%
13	% tobacco acreage in three+ years rotation	55.4%
14	% tobacco acreage that uses soil test	44.3%
15	Average lbs per AC of nitrogen applied	216.9
16	Average lbs per AC of phosphorus applied	130.5
17	Average pounds per AC of potassium applied	215.6
18	Average tons per AC of lime spread	1.4
19	% tobacco AC where fumigant was applied	7.8%
20	% tobacco AC where herbicide was used	83.9%
21	% tobacco where soil applied insecticide used	27.7%
22	% tobacco where transplant water/tray drench used	56.6%
23	% tobacco AC with 1 application of foliar insect.	32.2%
24	% tobacco AC with 2 applications of foliar insect.	36.9%
25	% tobacco AC with 3+ applications of foliar insect.	34.1%
26	% tobacco AC where soil applied fungicide was used	36.0%
27	% tobacco AC where foliar fungicide applied 1 time	32.3%
28	% tobacco AC where foliar fungicide applied 2 times	30.0%
29	% tobacco AC where foliar fungicide applied 3+ times	13.8%
30	% chemical containers recycled	25.3%
31	% tobacco AC in contracts for IPM	1.4%
32	% tobacco AC where irrigation was used	14.9%
33	Avg number of irrigations/crop	2.6%
34	Avg quantity of irrigation water applied/irrigation	1.0%
35	% wells	17.6%
36	% streams	47.8%
37	% ponds	34.6%
38	% tobacco AC in no till	1.4%
39	% tobacco AC using cover crops	80.0%





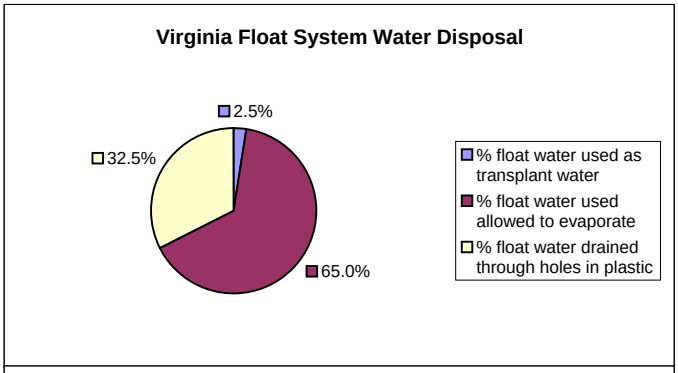


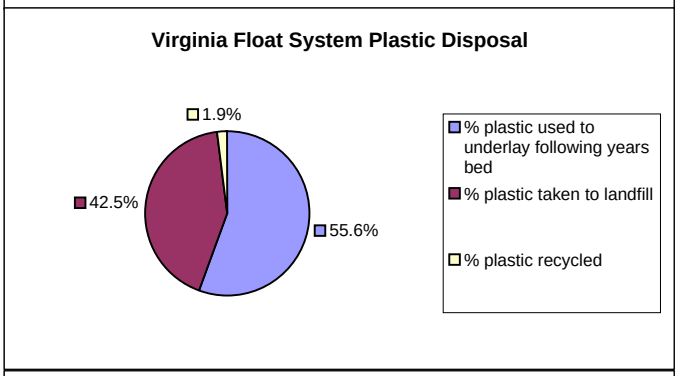


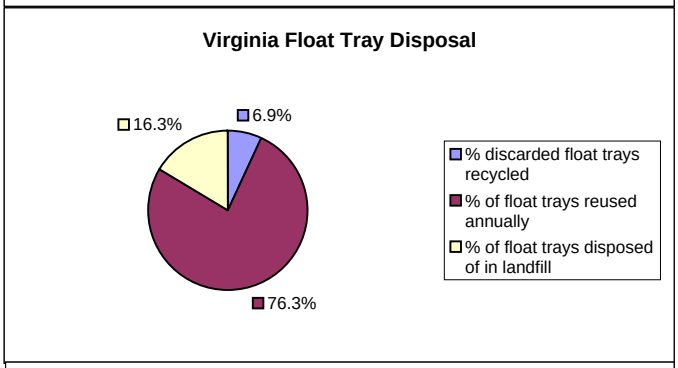


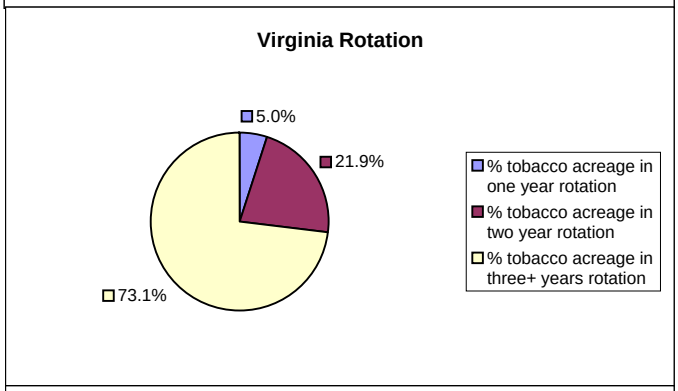
VIRGINIA

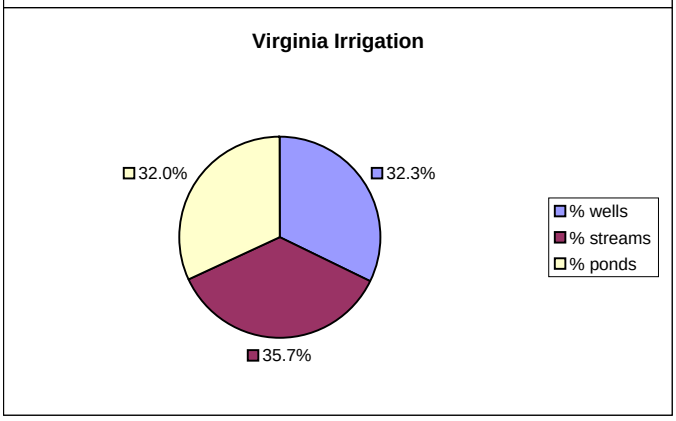
Question #		
	Total number of responses	8
	Total number of AC in Burley	7006
1	% of tobacco transplants from container system	85.4%
2	% float water used as transplant water	2.5%
3	% float water used allowed to evaporate	65.0%
4	% float water drained through holes in plastic	32.5%
5	% plastic used to underlay following years bed	55.6%
6	% plastic taken to landfill	42.5%
7	% plastic recycled	1.9%
8	% discarded float trays recycled	6.9%
9	% of float trays reused annually	76.3%
10	% of float trays disposed of in landfill	16.3%
11	% tobacco acreage in one year rotation	5.0%
12	% tobacco acreage in two year rotation	21.9%
13	% tobacco acreage in three+ years rotation	73.1%
14	% tobacco acreage that uses soil test	36.3%
15	Average lbs per AC of nitrogen applied	195.9
16	Average lbs per AC of phosphorus applied	151.9
17	Average pounds per AC of potassium applied	310.0
18	Average tons per AC of lime spread	1.0
19	% tobacco AC where fumigant was applied	1.3%
20	% tobacco AC where herbicide was used	76.4%
21	% tobacco where soil applied insecticide used	41.3%
22	% tobacco where transplant water/tray drench used	52.8%
23	% tobacco AC with 1 application of foliar insect.	27.5%
24	% tobacco AC with 2 applications of foliar insect.	14.4%
25	% tobacco AC with 3+ applications of foliar insect.	0.0%
26	% tobacco AC where soil applied fungicide was used	10.0%
27	% tobacco AC where foliar fungicide applied 1 time	26.3%
28	% tobacco AC where foliar fungicide applied 2 times	27.5%
29	% tobacco AC where foliar fungicide applied 3+ times	13.8%
30	% chemical containers recycled	0.4%
31	% tobacco AC in contracts for IPM	0.0%
32	% tobacco AC where irrigation was used	0.0%
33	Avg number of irrigations/crop	0.4%
34	Avg quantity of irrigation water applied/irrigation	0.1%
35	% wells	32.3%
36	% streams	35.7%
37	% ponds	32.0%
38	% tobacco AC in no till	1.5%
39	% tobacco AC using cover crops	89.6%





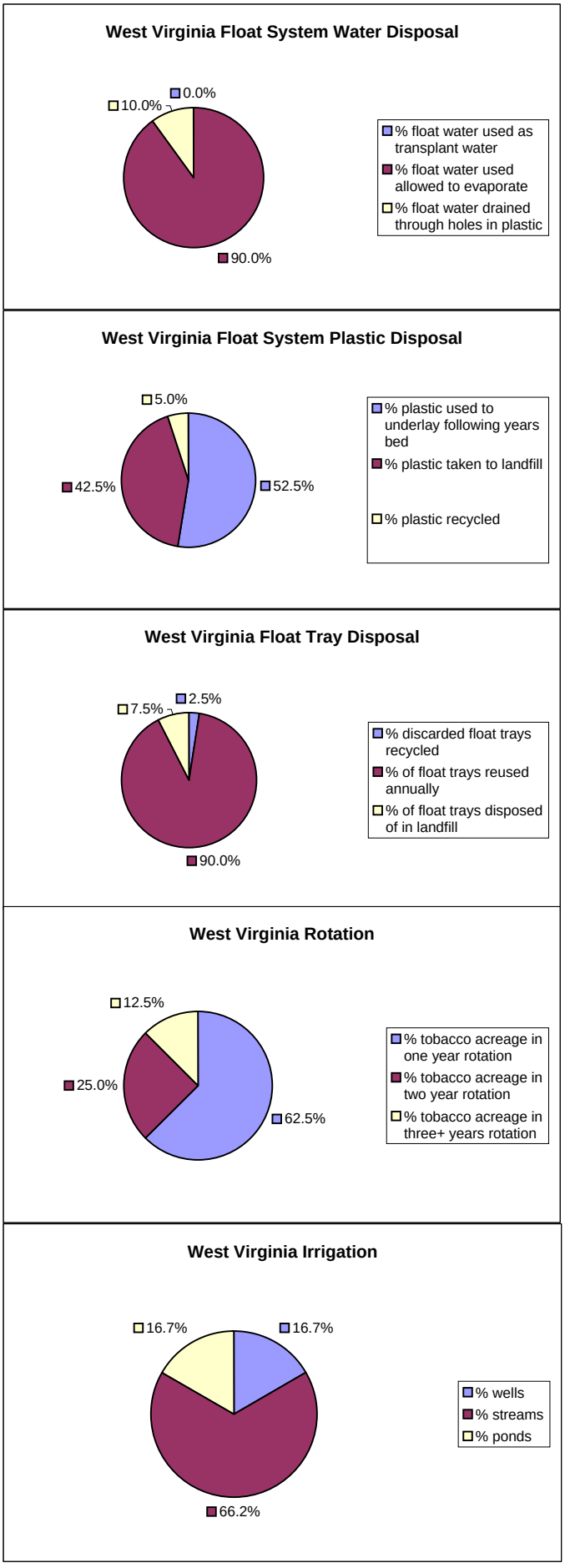






WEST VIRGINIA

Question #		
	Total number of responses	2
	Total number of AC in Burley	576
1	% of tobacco transplants from container system	89.5%
2	% float water used as transplant water	0.0%
3	% float water used allowed to evaporate	90.0%
4	% float water drained through holes in plastic	10.0%
5	% plastic used to underlay following years bed	52.5%
6	% plastic taken to landfill	42.5%
7	% plastic recycled	5.0%
8	% discarded float trays recycled	2.5%
9	% of float trays reused annually	90.0%
10	% of float trays disposed of in landfill	7.5%
11	% tobacco acreage in one year rotation	62.5%
12	% tobacco acreage in two year rotation	25.0%
13	% tobacco acreage in three+ years rotation	12.5%
14	% tobacco acreage that uses soil test	40.0%
15	Average lbs per AC of nitrogen applied	175.0
16	Average lbs per AC of phosphorus applied	120.0
17	Average pounds per AC of potassium applied	180.0
18	Average tons per AC of lime spread	2.5
19	% tobacco AC where fumigant was applied	0.0%
20	% tobacco AC where herbicide was used	42.5%
21	% tobacco where soil applied insecticide used	45.0%
22	% tobacco where transplant water/tray drench used	35.0%
23	% tobacco AC with 1 application of foliar insect.	72.5%
24	% tobacco AC with 2 applications of foliar insect.	22.5%
25	% tobacco AC with 3+ applications of foliar insect.	5.0%
26	% tobacco AC where soil applied fungicide was used	45.0%
27	% tobacco AC where foliar fungicide applied 1 time	15.0%
28	% tobacco AC where foliar fungicide applied 2 times	0.0%
29	% tobacco AC where foliar fungicide applied 3+ times	0.0%
30	% chemical containers recycled	42.5%
31	% tobacco AC in contracts for IPM	15.0%
32	% tobacco AC where irrigation was used	5.0%
33	Avg number of irrigations/crop	1.5%
34	Avg quantity of irrigation water applied/irrigation	0.5%
35	% wells	16.7%
36	% streams	66.2%
37	% ponds	16.7%
38	% tobacco AC in no till	1.0%
39	% tobacco AC using cover crops	75.0%



Appendix E

Tobacco

Chemical	Class	Oral LD50	Category
CHLOROPICRIN	Fumigant	250	II
DIMETHOMORPH	Fungicide	3900	III
MANCOZEB	Fungicide	4500	III
MEFENOXAM	Fungicide	1172	III
METALAXYL	Fungicide	1800	III
CLOMAZONE	Herbicide	1369	III
NAPROPAMIDE	Herbicide	>5000	IV
PEBULATE	Herbicide	1120	III
PENDIMETHALIN	Herbicide	1250	III
SETHOXYDIM	Herbicide	2676	III
SULFENTRAZONE	Herbicide	2000	III
ACEPHATE	Insecticide	700	III
ALDICARB	Insecticide	0.9	I
BT	Insecticide	>5000	IV
CARBARYL	Insecticide	246	II
CHLORPYRIFOS	Insecticide	96	II
DISULFOTON	Insecticide	1.4	I
ENDOSULFAN	Insecticide	22.7	I
ETHOPROP	Insecticide	33	I
FENAMIPHOS	Insecticide	3	I
FONOFOS	Insecticide	8	I
IMIDACLOPRID	Insecticide	>4870	II
MALATHION	Insecticide	1375	III
METHOMYL	Insecticide	17	I
SPINOSAD	Insecticide	>5000	IV
ETHEPHON	Plant Growth Regulator	1600	III
FLUMETRALIN	Plant Growth Regulator	3100	III
MALEIC HYDRAZIDE	Plant Growth Regulator	1400	III
1,3-dichloro-1-propene	Nematicide	150	II

Category	Number	Percentage
Category I	7	24.14%
Category II	5	17.24%
Category III	14	48.28%
Category IV	3	10.34%

Corn

Chemical	Class	Oral LD50	Category
2,4-D	Herbicide	375	II
ACETOCHLOR	Herbicide	1426	III
ALACHLOR	Herbicide	930	III
AMETRYN	Herbicide	1000	III
ATRAZINE	Herbicide	1750	III
BENTAZON	Herbicide	1100	III
BROMOXYNIL	Herbicide	190	II
BUTYLATE	Herbicide	3500	III
CLOPYRALID	Herbicide	4300	III
CYANAZINE	Herbicide	182	II
DICAMBA	Herbicide	1040	III
DIMETHENAMID	Herbicide	1570	III
EPTC	Herbicide	1367	III
FLUMETSULAM	Herbicide	>5000	IV
GLYPHOSATE	Herbicide	4900	III
HALOSULFURON	Herbicide	8865	IV
IMAZETHAPYR	Herbicide	>5000	IV
METOLACHLOR	Herbicide	2780	III
METRIBUZIN	Herbicide	2200	III
NICOSULFURON	Herbicide	>5000	IV
OXYFLUORFEN	Herbicide	>5000	IV
PARAQUAT	Herbicide	150	II
PENDIMETHALIN	Herbicide	1250	III
PRIMISULFURON	Herbicide	5050	IV
PROSULFURON	Herbicide	986	III
RIMSULFURON	Herbicide	>5000	IV
SIMAZINE	Herbicide	>5000	IV
CHLORETHOXYFOS	Insecticde	1.8	I
CARBARYL	Insecticide	246	II
CARBOFURAN	Insecticide	8	I
CHLORPYRIFOS	Insecticide	96	II
CYFLUTHRIN	Insecticide	291	II
ESFENVALERATE	Insecticide	325	II
ETHOPROP	Insecticide	33	I

LAMBDACYHALOTHRIN	Insecticide	56	II
METHYL PARATHION	Insecticide	6	I
PERMETHRIN	Insecticide	430	II
PHORATE	insecticide	13.5	I
TEBUPIRIMPHOS	Insecticide	1.8	I
TEFLUTHRIN	Insecticide	22	I
TERBUFOS	Insecticide	1.3	I

Category	Number	Percentage
Category I	8	19.51%
Category II	10	24.39%
Category III	15	36.59%
Category IV	8	19.51%

Soybeans

Chemical	Class	Oral LD50	Category
2,4-D	Herbicide	375	II
2,4-DB	Herbicide	700	III
ACIFLUORFEN	Herbicide	1370	III
ALACHLOR	Herbicide	930	III
BENTAZON	Herbicide	1100	III
CHLORIMURON	Herbicide	4102	III
CLETHODIM	Herbicide	1360	III
CLOMAZONE	Herbicide	1369	III
DIMETHENAMID	Herbicide	1570	III
FENOXAPROP	Herbicide	2357	III
FLUAZIFOP	Herbicide	1490	III
FLUMETSULAM	Herbicide	>5000	IV
FLUMICLORAC	Herbicide	>5000	IV
FOMESAFEN	Herbicide	1250	III
GLYPHOSATE	Herbicide	4900	III
IMAZAQUIN	Herbicide	>5000	IV
IMAZETHAPYR	Herbicide	>5000	IV
LACTOFEN	Herbicide	5960	IV
LINURON	Herbicide	1500	III
METOLACHLOR	Herbicide	2780	III
METRIBUZIN	Herbicide	2200	III
PARAQUAT	Herbicide	150	II

PENDIMETHALIN	Herbicide	1250	III
PERMETHRIN	Insecticide	430	II
QUIZALOFOP	Herbicide	1182	III
SETHOXYDIM	Herbicide	2676	III
SODIUM CHLORATE	Herbicide	1200	III
THIFENSULFURON	Herbicide	>5000	IV
TRIFLURALIN	Herbicide	3700	III
CARBARYL	Insecticide	246	II
ESFENVALERATE	Insecticide	325	II
LAMBDACYHALOTHRIN	Insecticide	56	II
METHOMYL	Insecticide	17	I
THIODICARB	Insecticide	466	II
TRALOMETHRIN	Insecticide	99.2	II

Category	Number	Percentage
Category I	1	2.86%
Category II	8	22.86%
Category III	20	57.14%
Category IV	6	17.14%

Appendix F

Expanded Polystyrene (EPS) packaging Recycling Collection Sites

Indiana
Createc Corporation 219-726-9333 Portland
EFP Corporation 219-295-4690 Elkhart
Foam Fabricators 812-948-1696 New Albany
Tuscarora Incorporated 219-879-8618 Michigan City

Kentucky
Somerset Recycling Services, Inc. 606-274-4170 Somerset
FP International 270-475-2100 Hopkinsville

Missouri
Foam Fabricators 417-876-6880 El Dorado Springs
*NPS Corporation 800-888-2332 Perryville

North Carolina
Modern Polymers 704-435-5825 Cherryville
Orange County Recycling Services, Inc. 919-688-5660 Durham
Storopack, Inc. 704-992-1614
Tuscarora Incorporated 919-575-5100 Butner

Ohio
Archbold Foam Company 419-445-8865 Archbold
Cincinnati Foam Products, Inc. 513-741-7722 Cincinnati
Createc Corporation 419-420-0029 Findlay
Plymouth Foam Products 740-498-4181 Newcomerstown
Polysource, Inc. 800-290-6323 Sidney
Rays Recycling 419-394-6344 St. Marys
Storopack, Inc. 513-874-0314 Cincinnati
Storopack, Inc. 216-941-7225 Cleveland
Tuscarora Incorporated 740-383-6027 Marion

Tennessee
Createc Corporation 931-454-9000 Tullahoma
EFP Corporation 615-683-6700 Gordonsville
Foam Fabricators 901-423-3161 Jackson
Inter-Pac, Inc. 601-690-6500 Memphis
RAPAC 901-465-6333 Oakland
Storopack, Inc. 901-259-2763 Memphis
Tuscarora Incorporated 931-359-2555 Lewisburg
Tuscarora Incorporated 423-638-1205 Greeneville

Virginia
Insulated Building Systems, Inc. 540-662-0882 Winchester
RADVA Corp. 540-639-2458 Radford
RADVA Corp. 540-639-2458 Portsmouth
Storopack, Inc. 757-498-9828 Virginia Beach
Tuscarora Incorporated 703-450-4814 Sterling

West Virginia
No EPS recycling available

Sites are listed by state, but my not be in close proximity to burley producing areas.

http://www.epspackaging.org/info.html