

Leading Research Problems  
&  
Priorities  
In  
Pennsylvania's  
Christmas tree Industry

Produced For



by



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# I

## EXECUTIVE SUMMARY

This report reviews and summarizes the findings from four focus groups conducted for PCTGA in summer 2006 by *Michael Young Strategic Research*. The objective of the research was:

1. To generate a listing of the leading problems and issues confronting the industry that requires research support.
2. To prioritize the research needs of the industry among competing problems and solutions.

### **Overview and Summary**

#### **Priority Problems**

The Focus groups utilized a modified “brainstorming” methodology in which respondents were asked to first list research problems or issues confronting the industry—and secondly prioritize these problems or issues in terms of their importance. Three levels of importance were measured: First most important; second most important; and third most important. Respondents initially listed some 70 problems or issues as “research problems” confronting the industry. They then went on during the priority setting exercise to identify some 40 of these problems as having priority, with some 20 of them having top priority.

It seems clear that there are a considerable number of problems under discussion within the industry. Certainly there was some consensus on priorities within one or two groups. However, there is considerable diversity of view from group to group –and even within some of the groups.

## Summary of Individual Groups

Harrisburg Group produced the lowest consensus on what was most important. Only three problems were listed by more than one respondent. Six separate problems were listed in Harrisburg as “most important.”

### Harrisburg: First Most Important Research Problem

#### Most Important Problem

- Consumer research examining why there is a decline in purchasing real trees
- Research to eradicate bad insects, e.g. White pine weevil
- Selection of business management software optimum for industry
- Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)
- Research of the adaptability of various species to PA climate (compare tree in indigenous settings)
- The Phytophthera Root rot problem

The Indiana Group showed somewhat more consensus than the Harrisburg Group with one problem listed by three respondents. However, it also listed all separate problems for “most important.”

## Indiana First Most Important Research Problem

### Most Important Problem

- Research the chemical labeling problem – losing available chemicals to government regulations without replacements.
- Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest
- Consumer research to increase sales in PA
- Genetic research to find Nordmann and Noble fir that will grow well in PA
- Needle retention study on Canaan fir (what would improve the trees needle retention?)
- Research to improve control of insects and diseases in trees

The Bloomsburg Group showed the highest consensus on priorities. One problem was listed by five respondents while another five problems were listed three times each by individual respondents.

### **Bloomsburg First Most Important Research Problem**

- Genetic research to find trees that can grow in PA
- Eliminate drop cones on Fraser Firs
- Research with recommendations about use, efficacy and timing of fertilizers
- Consumer Research into question of why we are losing market share (declining purchase of live trees)
- Genetic research to find trees that can grow in PA
- Insect Control e.g. elongated hemlock scale
- Research to develop a natural non toxic insect repellent
- Insect Control e.g. elongated hemlock scale
- Insect Control e.g. elongated hemlock scale

## Types of Research Problems

Four types of research problems can be classified from the groups according to its general focus on business problems or science problems –and according to whether the needed research is original, empirical research or secondary derivative research.

Type of Research Problems		
	Primary Research	Secondary Research
Science Oriented	<u><b>Type 1</b></u> Primary Research/Science Oriented	<u><b>Type 3</b></u> Secondary Research/ Science Oriented
Business Oriented	<u><b>Type 2</b></u> Primary Research/Business Oriented	<u><b>Type 4</b></u> Secondary Research /Business Oriented

**In order of the rank order frequency of the Type of research:**

**1. Type I Research –**

**Original/empirical research & science oriented  
(28 research problems)**

**2. Type II research –**

**Original/empirical research & business oriented  
(16 research problems)**

**3. Type IV research—**

**Secondary derivative research & business oriented  
(13 research problems)**

**4. Type III research –**

**Secondary derivative research & science oriented  
(12 research problems)**

## Problem Types in Individual Focus Groups

The individual focus groups showed clear patterns in terms of the **Type Problem (I, II, III, IV) most characteristic for that group.**

- The Harrisburg Focus Group listed a total of 24 research problems. Type I problems, Primary Research, Science Orientation dominated the list with 14 mentions (58 % of all problems).

Problem Type	<b>Harrisburg</b> Number of Mentions
Type I Research: Primary Research, Science Oriented	14
Type II Research: Primary Research, Business Oriented	3
Type III Research: Secondary Research, Science oriented	3
Type IV Research: Secondary Research, Business oriented	4

- The Indiana Focus Group listed a total of 22 research problems. Type II Research: Primary Research, Business Oriented dominated the list with 9 mentions (41 % of all problems).

Problem Type	<b>Indiana</b> Number of Mentions
Type I Research: Primary Research, Science Oriented	5
Type II Research: Primary Research, Business Oriented	9
Type III Research Secondary Research Science oriented	4
Type IV Research: Secondary Research, Business oriented	4

- The Bloomsburg Focus Group listed a total of 21 research problems. Type I problems, Primary Research, Science Orientation dominated the list with 10 mentions (48 % of all problems).

**Bloomsburg**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented	10
Type II Research: Primary Research, Business Oriented	4
Type III Research: Secondary Research, Science Oriented	5
Type IV Research: Secondary Research, Business Oriented	2

## **Summary of Key Research Findings**

### **1) Total Number of Problems Listed**

Focus Group Respondents in the four groups listed a total of 71 individual problems or issues that require research.

### **2) Total number of Priority Problems**

From the initial listing of 71 problems, Focus Group Respondents in the four groups listed just over half of them (56%) --- a total of 40 problems and issues -- as priorities that require research. Of these 40 priority problems, there were 20 unique problems listed at least once as "most important"; another 9 unique problems were mentioned at least once as "second most important"; and a further 11 unique problems were list as "third most important."

### **3) 20 Most important problems**

From the listing of 40 problems listed by all groups, respondents identified 20 unique problems listed at least once as "most important problem."

### **4) 9 Second Most Important problems**

Respondents identified an additional 9 unique problems as "second most important."

### **5) 11 Third Most Important problems**

Respondents identified an additional 11 unique problems as "third most important."

### **6) Harrisburg Group Priority Problems**

The Harrisburg Group listed a total of 12 problems as top priorities (#1, 2 or 3). Among the group there was little overlap. Overall, only 3 problems were listed twice and none more than twice.

### **7) Indiana Group Priority Problems**

The Indiana Group listed a total of 14 problems as top priorities (#1, 2 or 3). Among the group there was some overlap. Overall, one problem was listed three times and two others were listed twice.

### **8) State College Group Priority Problems**

The State College Group listed a total of 4 problems as top priorities.

### **9) Bloomsburg Group Priority Problems**

The Bloomsburg Group listed a total of 12 problems as top priorities (#1, 2 or 3). Among the group there was some considerable overlap; across all three rankings, some seven different problems were mentioned at least twice: one problem was listed five times; one problem was mentioned four times; and five problems were mentioned three times each.

### **10) Type I Research Problems**

There are four distinct types of research problems found. Type I Research -- Original/empirical research & science oriented generated 28 problems.

### **11) Type II Research Problems**

Type II research --Original/empirical research & business oriented generated 16 separate problems.

### **12) Type III Research Problems**

Type III research --Secondary derivative research & science oriented generated 12 separate problems.

### **13) Type IV Research Problems**

Type IV research-- Secondary derivative research & business oriented generated 13 separate problems.

#### **14) Harrisburg Type of Problems**

The Harrisburg Focus Group listed a total of 24 research problems. Type I problems, Primary Research, Science Orientation dominated the list with 14 mentions (58 % of all problems).

#### **15) Indiana Type of Problems**

The Indiana Focus Group listed a total of 22 research problems. Type II Research: Primary Research, Business Oriented dominated the list with 9 mentions (41 % of all problems).

#### **16) Bloomsburg Type of Problems**

The Bloomsburg Focus Group listed a total of 21 research problems. Type I problems, Primary Research, Science Orientation dominated the list with 10 mentions (58 % of all problems).

#### **17) Most important Problems by Problem Type**

Problems rated as first most important were distributed among three of four main problem types. However, Type II problems (Primary Research, Business Orientation) were most numerous with 10 of 20 (50%) first priority problems being characterized as a Type II problem.

## Discussion & Conclusions

1. There are a considerable number of research problems under discussion within the industry. There is considerable diversity of view from group to group –and even within some of the groups.
2. Harrisburg Group produced the lowest consensus on what was most important. Only three problems were listed by more than one respondent. Six separate problems were listed in Harrisburg as “most important.”
3. The Indiana Group showed somewhat more consensus than the Harrisburg Group with one problem listed by three respondents. However, it also listed all separate problems for “most important.”
4. The Bloomsburg Group showed the highest consensus on priorities. One problem was listed by five respondents while another five problems were listed three times each by individual respondents.
5. Four types of research problem can be classified from the groups according to a problem’s general focus on either business problems or science problems –and according to whether the needed research is original, empirical research or secondary derivative research.

### Type of Research Problems

	Primary Research	Secondary Research
Science Oriented	<u>Type 1</u> Primary Research /Science Oriented	<u>Type 3</u> Secondary Research /Science Oriented
Business Oriented	<u>Type 2</u> Primary Research /Business Oriented	<u>Type 4</u> Secondary Research /Business Oriented

6. Type I research (original/empirical research & science oriented) was the most frequent type statewide with a total of 28 research problems classified as Type I problems. Harrisburg named the largest number of Type I problems (13) followed by Bloomsburg (10) and Indiana (5).
7. Type II research (original/empirical research/business oriented) was the second most frequent type with a total of 16 research problems classified as Type I problems. Indiana named the largest number of Type II problems (8) followed by Bloomsburg (4), Harrisburg (3) and State College (1).
8. Type IV research (secondary derivative research & business oriented) was the third second most frequent type statewide with a total of 13 research problems. Indiana (4) and Harrisburg (4) named the largest number of Type IV problems followed by State College (3) and Bloomsburg (2).
9. Type III research (Secondary derivative research & science oriented) was the least most frequent type statewide with a total of 12 research problems classified as Type III problems. Bloomsburg named the largest number of Type II problems (5), followed by Indiana (4), and Harrisburg (3).
10. The diversity of research problems among the focus groups was considerable. One way to illustrate these differences is to compare and contrast the different listing of most important research problems produced by each group.
11. Two main indices of diversity can be observed in the data. The first is that there is minimal overlap within each group. A second measure of diversity is to compare top tier problems across all the groups. There was very little overlap among top tier problems across groups.

## II

### Background to the Research

#### Introduction

The Pennsylvania Christmas Tree Growers Association (PCTGA) is comprised of over 300 businesses that produce and sell Christmas trees, as well as sell products/services for growers, in Pennsylvania. According to the USDA Agricultural Census, Pennsylvania ranks fourth in the nation in the number of Christmas tree farms. The state industry is spread across all of Pennsylvania. According to the 1998 Census of Horticultural Specialties conducted by the National Agricultural Statistics Service, there are 19,444 acres of trees in production in the state. And in any given year, over 1,391,000 trees are sold having a retail value of \$20,182,000.

Pennsylvania Christmas Tree growers contribute to every aspect of this seasonal industry through wholesaling, retailing, marketing tree related products, and providing family recreation, as well as supporting educational and research projects within the Commonwealth of Pennsylvania. Christmas trees alone generate over \$20 million in Pennsylvania agricultural revenue. This does not include nursery stock, landscape stock, and Christmas tree related products or the investment in labor and materials producers put back into Pennsylvania's economy.

A particular focus has evolved in the industry toward issues of marketing and sales. An accumulating body of research points to lower demand for live trees tied to growing acceptance by consumers of artificial trees.

Many consumers still believe that artificial trees are better for the environment, reduce fire hazards, and are easier to care for than real trees. These attitudes and steady erosion of market share for live trees cause some alarm. The number of people planning to purchase a real tree continues to decline. This is evidenced by information from the National Christmas Tree Association (NCTA) which indicates that 32% of Christmas trees displayed in the United States are real trees while 49% are fake trees.

## **The Research Cycle**

The research reported here is designed to fit into the cycle of ongoing research sponsored by the PCTGA research committee. That cycle is summarized below. This research will support that research cycle by providing a research agenda, grounded in the perception of those working in the industry.

### **Research Cycle Now in Place**

- October 1 – RFP's sent to researchers from Pennsylvania State University and other universities. The RFP's include key issues facing the industry and request the researchers focus their attention on these issues. Proposals in response to the RFP's are due back to PCTGA by December 31.
- January – Researchers making proposals are asked to make presentations on their proposed projects to the PCTGA Research Committee. The Committee reviews the proposals and the presentations, and decides which projects to fund, based on availability of funds.
- Results from projects funded in the previous year are presented to the industry at the winter conference held in January each year. The results are also posted to the PCTGA website and included in the printed newsletter. Quarterly updates, when available, are also made public.

### III

## Research Design & Methodology

### Design and Procedures

The research adopted a modified focus group methodology designed to generate a listing of leading problems or issues in the industry that could be addressed by research. The group procedures discussed below were designed to gather a wide and representative listing of problems in each group –as well as rank or prioritize those problems within each group and eventually statewide among all groups.

### Brief Description of Discussion Topic

The Discussion Groups were made up of key audiences of the Pennsylvania Christmas Tree Growers Association --- member growers, extension agents, Penn State University (PSU) personnel, and Pennsylvania Department of Agriculture (PDA) representatives. The general topic of group discussion was Christmas tree farming and the challenges facing the industry - - i.e. pests, diseases, marketing, and safety/regulatory, etc. -- that need further research.

### Broad Purpose of the Discussion Groups

The broad purpose of the Discussion Groups was to define and prioritize the research needs of key audiences of PCTGA with respect to leading issues and problems confronting the industry. These leading issues may include research relating to:

- Marketing
- Needle retention
- Hemlock scale (Eastern portion of state)
- White Pine Weevil
- Rhadocline
- Genetic seed source
- Fertilization
- Weed control

## Specific Research Objectives of the Discussion Groups

The Discussion Groups had two main research objectives:

1. To generate a listing of the leading problems and issues confronting the industry that require research support
2. To prioritize the research needs of the industry among competing proposals and solutions

### Procedures Followed In Conducting Each Discussion Group

- Group respondents were given an opportunity to briefly introduce themselves and Moderator provided a brief description of what the group will be doing.
- Respondents (with pads and pen) were given 10 -15 minutes to privately list problems or issues that are confronting the Christmas tree growers industry and that need researched. They were instructed to put the problems in rough priority of importance if possible. This step in the process was conducted at the beginning of the discussion and privately for each respondent so each gets a chance to participate fully in the later group discussion.
- After private listing of problems or issues, *Round One* began with the discussion as each respondent was asked to list and to describe BRIEFLY one AND only one idea or problem. Each idea or problem was written down by moderator on Easel Board visible to respondents.
- Round Two and subsequent rounds as necessary follow until respondents ran out of ideas – each round as the first allowing respondents to list one and only one idea.
- After ideas are all out --and written down in front of group, Moderator leads group through a discussion of each preparatory to voting of respondents for the three most important problems to be researched. Purpose of the discussion of each idea is to clarify each for respondents. Respondents were given three index cards and asked to write down privately the first, second and third most important/ urgent research problem. Respondents do this privately so the judgment of the group didn't influence their own choices.

- Cards were collected and 10 to 15 minute concluding discussion was held basically debriefing respondents on their final thought or observations. Results will be analyzed later by group moderator in preparation of the report.
- Written report of group to be prepared includes the results of the final vote, as well as any useful material from the audio recording of the groups.

## IV

### Findings of the Study

#### ❖ FINDING # 1

Focus Group Respondents in the four groups listed a total of 71 individual problems or issues that require research. A comprehensive listing of these problems is presented below.

**Table 1  
Comprehensive Listing of Problems**

<ul style="list-style-type: none"> <li>• Research to eradicate bad insects, e.g. White pine weevil</li> </ul>	<ul style="list-style-type: none"> <li>• Research into methods for improving profitability of farm and equipment e.g. to sell firewood, sell mulch, sell topsoil, landscaping, etc.</li> </ul>
<ul style="list-style-type: none"> <li>• Exotic firs that tolerate various soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Research of the elongate hemlock scale (specific pest)</li> </ul>
<ul style="list-style-type: none"> <li>• Research of growth regulators for Douglas Fir (to make a better tree)</li> </ul>	<ul style="list-style-type: none"> <li>• Research into spruce needle rust control</li> </ul>
<ul style="list-style-type: none"> <li>• Selection of business management software optimum for industry</li> </ul>	<ul style="list-style-type: none"> <li>• Continue research into weed control (Kuhn's research)</li> </ul>
<ul style="list-style-type: none"> <li>• Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA Need newer chemicals to replace them</li> </ul>	<ul style="list-style-type: none"> <li>• Tissue culture research of the rocky mountain strain of the Douglas Fir</li> </ul>
<ul style="list-style-type: none"> <li>• Phytophthera Root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>• Research of the adaptability of various species to PA climate (compare tree in indigenous settings)</li> </ul>
<ul style="list-style-type: none"> <li>• Insurance industry practices: determine insurance coverage for cut trees—implications for the industry</li> </ul>	<ul style="list-style-type: none"> <li>• Research tracking best genetic seed source in the industry</li> </ul>
<ul style="list-style-type: none"> <li>• Research needle retention in exotic firs</li> </ul>	<ul style="list-style-type: none"> <li>• Research best opportunities for growers to pool resources, to leverage discounts from suppliers (e.g. buying fertilizers)</li> </ul>
<ul style="list-style-type: none"> <li>• Consumer research examining why there is a decline in purchasing real trees</li> </ul>	<ul style="list-style-type: none"> <li>• Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry</li> </ul>
<ul style="list-style-type: none"> <li>• Advertising: need to document best advertising practices in the industry</li> </ul>	<ul style="list-style-type: none"> <li>• Research to improve control of insects and diseases in trees</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the Douglas Fir needle midge- only host for midge is the Douglas Fir</li> </ul>	<ul style="list-style-type: none"> <li>• Marketing/ consumer research to promote "real trees" to younger generation 5 – 18 year olds</li> </ul>

<ul style="list-style-type: none"> <li>• Rhadocline (Douglas Fir)</li> </ul>	<ul style="list-style-type: none"> <li>• Research the chemical labeling problem – losing available chemicals to government regulations without replacements.</li> </ul>
<ul style="list-style-type: none"> <li>• Research into elements of business profitability what works? How to do it?</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop a scouting system (guidelines and procedures) to identify pest problems</li> </ul>
<ul style="list-style-type: none"> <li>• Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)</li> </ul>	<ul style="list-style-type: none"> <li>• Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.</li> </ul>
<ul style="list-style-type: none"> <li>• Research into best planting care techniques for survivability of trees from nurseryman to field transplants</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer research to increase sales in PA</li> </ul>
<ul style="list-style-type: none"> <li>• Research to develop a flame retardant spray that doesn't dry out cut trees</li> </ul>	<ul style="list-style-type: none"> <li>• Insect Control e.g. elongated hemlock scale</li> </ul>
<ul style="list-style-type: none"> <li>• Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>• Eliminate drop cones on Fraser Firs</li> </ul>
<ul style="list-style-type: none"> <li>• Consumer research of the public image of the Christmas tree industry</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop a natural non toxic insect repellent</li> </ul>
<ul style="list-style-type: none"> <li>• Genetic research to find Nordmann and Noble fir that will grow well in PA</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer Research into the question of why we are losing market share/declining purchase of live trees.</li> </ul>
<ul style="list-style-type: none"> <li>• Product Development of a tree species that will grow in PA (find the next Fraser Fir)</li> </ul>	<ul style="list-style-type: none"> <li>• Research into question of whether there should be a standard for cut trees(regulated by state)</li> </ul>
<ul style="list-style-type: none"> <li>• More reliable and consistent research on the problem of the White Pine weevil</li> </ul>	<ul style="list-style-type: none"> <li>• Develop better needle retention for Canaan firs</li> </ul>
<ul style="list-style-type: none"> <li>• Research that documents optimum fertilization practices for popular trees grow in PA</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a better variety of trees for PA (e.g. Norman Fir)</li> </ul>
<ul style="list-style-type: none"> <li>• Research data base on Christmas trees ( How to )</li> </ul>	<ul style="list-style-type: none"> <li>• Research to provide members with full and timely information on new chemicals, fungicides, and herbicides</li> </ul>
<ul style="list-style-type: none"> <li>• Consumer research on internet/web marketing of product ( best practices)</li> </ul>	<ul style="list-style-type: none"> <li>• Research into methods of chemical or mechanical shearing of Fraser Firs</li> </ul>
<ul style="list-style-type: none"> <li>• Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy</li> </ul>	<ul style="list-style-type: none"> <li>• Encouraging Plant Pathology at PSU to get back involved in doing research (LAST WAS Scotch Pine)</li> </ul>
<ul style="list-style-type: none"> <li>• Study of the long term (8-10 years) supply and demand characteristics of the industry (impact on future sales)</li> </ul>	<ul style="list-style-type: none"> <li>• Genetic research to find new (varieties) trees that can grow in PA</li> </ul>
<ul style="list-style-type: none"> <li>• The labor shortage: why and what to do about it</li> </ul>	<ul style="list-style-type: none"> <li>• Research with recommendations about nutrients and fertilizers –their use, efficacy and timing (what works best?)</li> </ul>

<ul style="list-style-type: none"> <li>• Research turning unsold trees into bio-energy</li> </ul>	<ul style="list-style-type: none"> <li>• Research that addresses product promotion, advertising and marketing issues (how to sell it?)</li> </ul>
<ul style="list-style-type: none"> <li>• Research of greater productivity in industry to make labor, equipment, more profitable</li> </ul>	<ul style="list-style-type: none"> <li>• Disease Control research</li> </ul>
<ul style="list-style-type: none"> <li>• Research to develop best procedures/practices for shearing Fraser fir throughout life cycle</li> </ul>	<ul style="list-style-type: none"> <li>• Causes and cures for Phytophthora root rot (soil borne)</li> </ul>
<ul style="list-style-type: none"> <li>• Research to develop a non toxic systemic chemical that will kill B.T.A.</li> </ul>	<ul style="list-style-type: none"> <li>• Research re the chemical residue left on cut trees (Baseline: how much now is actually left; what should standard be?)</li> </ul>
<ul style="list-style-type: none"> <li>• Information Management</li> </ul>	<ul style="list-style-type: none"> <li>• Research to identify why industry is not more influential in Harrisburg (e.g. in legislation)</li> </ul>
<ul style="list-style-type: none"> <li>• Cultural Management</li> </ul>	<ul style="list-style-type: none"> <li>• Research re use of chemical mowing (to spray herbicide between rows to stunt grass)</li> </ul>
<ul style="list-style-type: none"> <li>• Need to regionalize our research efforts in the northeast</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop a state seed forest (to develop more varieties)</li> </ul>
<ul style="list-style-type: none"> <li>• Dissemination of Secondary research</li> </ul>	<ul style="list-style-type: none"> <li>• Research into labor shortage – (migrant laborers) in industry (why does it exist and what to do about it?)</li> </ul>
	<ul style="list-style-type: none"> <li>• Document the costs of raising a tree from start to finish</li> </ul>

## ❖ FINDING # 2

From the initial listing of 71 problems Focus Group Respondents in the four groups listed just over half of them (56%) -- a total of 40 problems and issues -- as priorities that require research. Of these 40 priority problems, there were 20 unique problems listed at least once as "most important"; another nine unique problems were mentioned at least once as "second most important"; and another eleven unique problems were list as "third most important." A comprehensive listing of these problems is presented below.

**Table 2**

**Listing of 40 Priority Problems  
From all Groups Categorized by  
1st  
2nd  
3rd**

Priority Problems		
1	2	3
Most Important Problem	2 <sup>nd</sup> Most Important Problem	3 <sup>rd</sup> Most Important Problem
<ul style="list-style-type: none"> <li>Consumer research examining why there is a decline in purchasing real trees</li> </ul>	<ul style="list-style-type: none"> <li>The Phytophthora root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field</li> </ul>
<ul style="list-style-type: none"> <li>Research to eradicate bad insects, e.g. White pine weevil</li> </ul>	<ul style="list-style-type: none"> <li>Research into elements of business profitability what works? How to do it?</li> </ul>	<ul style="list-style-type: none"> <li>Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry</li> </ul>
<ul style="list-style-type: none"> <li>Election of business management software optimum for industry</li> </ul>	<ul style="list-style-type: none"> <li>Research into elements of business profitability what works? How to do it?</li> </ul>	<ul style="list-style-type: none"> <li>Advertising: need to document best advertising practices in the industry</li> </ul>
<ul style="list-style-type: none"> <li>Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)</li> </ul>	<ul style="list-style-type: none"> <li>Exotic firs that tolerate various soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>Consumer research examining why there is a decline in purchasing real trees</li> </ul>
<ul style="list-style-type: none"> <li>Research of the adaptability of various species to PA climate (compare tree in indigenous settings)</li> </ul>	<ul style="list-style-type: none"> <li>Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA-- Need newer chemicals to replace them</li> </ul>	<ul style="list-style-type: none"> <li>Research of growth regulators for Douglas Fir (to make a better tree)</li> </ul>
<ul style="list-style-type: none"> <li>The Phytophthora root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>Rhadocline (Douglas Fir)</li> </ul>	<ul style="list-style-type: none"> <li>Research into spruce needle rust control</li> </ul>

<ul style="list-style-type: none"> <li>Genetic research to find trees that can grow in PA</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>	<ul style="list-style-type: none"> <li>Document the costs of raising a tree from start to finish</li> </ul>
<ul style="list-style-type: none"> <li>Eliminate drop cones on Fraser Firs</li> </ul>	<ul style="list-style-type: none"> <li>Research to develop a natural non toxic insect repellent</li> </ul>	<ul style="list-style-type: none"> <li>Research into labor shortage in industry (why is it happening and what to do about it?)</li> </ul>
<ul style="list-style-type: none"> <li>Research with recommendations about use, efficacy and timing of fertilizers</li> </ul>	<ul style="list-style-type: none"> <li>Research into question of whether there should be a standard for cut trees (regulated by state)</li> </ul>	<ul style="list-style-type: none"> <li>Research into methods of chemical or mechanical shearing of Fraser Firs</li> </ul>
<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>	<ul style="list-style-type: none"> <li>Research re the chemical residue left on cut trees--how much is actually left; what should standard be?</li> </ul>	<ul style="list-style-type: none"> <li>Genetic research to find trees that can grow in PA</li> </ul>
<ul style="list-style-type: none"> <li>Genetic research to find trees that can grow in PA</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging Plant Pathology at PSU to get back involved in doing research</li> </ul>	<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>
<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate drop cones on Fraser Firs</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>
<ul style="list-style-type: none"> <li>Research to develop a natural non toxic insect repellent</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging Plant Pathology at PSU to get back involved in doing research</li> </ul>
<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>	<ul style="list-style-type: none"> <li>Research to develop a natural non toxic insect repellent</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging Plant Pathology at PSU to get back involved in doing research</li> </ul>
<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>	<ul style="list-style-type: none"> <li>Document the costs of raising a tree</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>

<ul style="list-style-type: none"> <li>Research the chemical labeling problem – losing available chemicals to government regulations without replacements</li> </ul>	<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Research data base on Christmas trees (How to)</li> </ul>
<ul style="list-style-type: none"> <li>Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest</li> </ul>	<ul style="list-style-type: none"> <li>Study of the long term (8-10 years) supply and demand characteristics of the industry ( impact on future sales)</li> </ul>	<ul style="list-style-type: none"> <li>Consumer research on internet/web marketing of product (best practices)</li> </ul>
<ul style="list-style-type: none"> <li>Consumer research to increase sales in PA</li> </ul>	<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Product Development of a tree species that will grow in PA (find the next Fraser Fir)</li> </ul>
<ul style="list-style-type: none"> <li>Genetic research to find Nordmann and Noble fir that will grow well in PA</li> </ul>	<ul style="list-style-type: none"> <li>Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.</li> </ul>	<ul style="list-style-type: none"> <li>Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-energy</li> </ul>
<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Research to develop a flame retardant spray that doesn't dry out cut trees</li> </ul>	<ul style="list-style-type: none"> <li>The labor shortage: why and what to do about it</li> </ul>
<ul style="list-style-type: none"> <li>Research to improve control of insects and diseases in trees</li> </ul>	<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-energy</li> </ul>
<ul style="list-style-type: none"> <li>Information Management</li> </ul>	-----	-----
<ul style="list-style-type: none"> <li>Cultural Management</li> </ul>	-----	-----
<ul style="list-style-type: none"> <li>Need to regionalize our research efforts in the northeast –</li> </ul>	-----	-----
<ul style="list-style-type: none"> <li>Dissemination of Secondary research</li> </ul>	-----	-----

## FINDING # 3

From the listing of 40 problems listed by all groups, respondents identified 20 unique problems listed at least once as “most important problem.”

**Table 3**  
**Most Important Research Problems**

1. Consumer research examining why there is a decline in purchasing real trees
2. Research to eradicate bad insects, e.g. White pine weevil
3. Election of business management software optimum for industry
4. Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)
5. Research of the adaptability of various species to PA climate (compare tree in indigenous settings)
6. The Phytophthera Root rot problem
7. Research the chemical labeling problem – losing available chemicals to government regulations without replacements
8. Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.
9. Consumer research to increase sales in PA
10. Genetic research to find Nordmann and Noble fir that will grow well in PA
11. Needle retention study on Canaan fir (what would improve needle retention?)
12. Research to improve control of insects and diseases in trees
13. Information Management
14. Cultural Management
15. Need to regionalize our research efforts in the northeast
16. Dissemination of Secondary research
17. Genetic research to find trees that can grow in PA
18. Eliminate drop cones on Fraser Firs
19. Research with recommendations about use, efficacy and timing of fertilizers
20. Research to develop a natural non-toxic insect repellent

## ❖ FINDING # 4

From the listing of 40 problems listed by all groups, 20 were listed at least once as “most important” and an additional nine unique problems were mentioned at least once as “second most important.”

**Table 4**  
**Second Most Important Research Problems**

21. Research into elements of business profitability what works? How to do it?
22. Exotic firs that tolerate various soil conditions
23. Rhadocline (Douglas Fir)
24. Study of the long term (8-10 years) supply and demand characteristics of the industry (impact on future sales)
25. Research to develop a flame retardant spray that doesn't dry out cut trees
26. Research into question of whether there should be a standard for cut trees (regulated by state)
27. Research re the chemical residue left on cut trees (how much is actually left; what should standard be?)
28. Encouraging Plant Pathology at PSU to get back involved in doing research
29. Document the costs of raising a tree from start to finish

## ❖ **FINDING # 5**

From the listing of 40 problems listed by all groups, 20 were listed at least once as “most important,” an additional nine unique problems were mentioned at least once as “second most important,” and 11 unique problems were listed as “third most important.”

**Table 5**  
**Third Most Important Research Problems**

30. Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field
31. Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.
32. Advertising: need to document best advertising practices in the industry
33. Research of growth regulators for Douglas Fir (to make a better tree)
34. Research into spruce needle rust control
35. Research data base on Christmas trees (How to)
36. Consumer research on internet/web marketing of product (best practices)
37. Product Development of a tree species that will grow in PA (find the next Fraser Fir)
38. Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio—energy
39. The labor shortage: why and what to do about it
40. Research into methods of chemical or mechanical shearing of Fraser Firs

**❖ FINDING # 6**  
**Priority Problems Reported by Harrisburg Group**

The Harrisburg Group listed a total of 12 problems as top priorities (#1, 2 or 3). Among the group there was little overlap; there were no duplicates for the #1 ranking, only one for #2 ranking, and one duplicate for #3 ranking. Overall, only three problems were listed twice and none more than twice.

**Table 6**  
**Harrisburg**  
**First, Second and Third Most Important Priority Problems**

1 Most Important Problem	2 Second Most Important Problem	3 Third most important problem
<ul style="list-style-type: none"> <li>• Consumer research examining why there is a decline in purchasing real trees</li> </ul>	<ul style="list-style-type: none"> <li>• The Phytophthera Root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>• Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field</li> </ul>
<ul style="list-style-type: none"> <li>• Research to eradicate bad insects, e.g. White pine weevil</li> </ul>	<ul style="list-style-type: none"> <li>• Research into elements of business profitability what works? How to do it?</li> </ul>	<ul style="list-style-type: none"> <li>• Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.</li> </ul>
<ul style="list-style-type: none"> <li>• Selection of business management software optimum for industry</li> </ul>	<ul style="list-style-type: none"> <li>• Research into elements of business profitability what works? How to do it?</li> </ul>	<ul style="list-style-type: none"> <li>• Advertising: need to document best advertising practices in the industry</li> </ul>
<ul style="list-style-type: none"> <li>• Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)</li> </ul>	<ul style="list-style-type: none"> <li>• Exotic firs that tolerate various soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer research examining why there is a decline in purchasing real trees</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the adaptability of various species to PA climate (compare tree in indigenous settings)</li> </ul>	<ul style="list-style-type: none"> <li>• Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA Need newer chemicals to replace them</li> </ul>	<ul style="list-style-type: none"> <li>• Research of growth regulators for Douglas Fir (to make a better tree)</li> </ul>
<ul style="list-style-type: none"> <li>• The Phytophthera Root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>• Rhadocline (Douglas Fir)</li> </ul>	<ul style="list-style-type: none"> <li>• Research into spruce needle rust control</li> </ul>

The Harrisburg Focus Group ranked the following problems as first most important research problems; there were no duplicates for #1.

**Table 7**  
**Harrisburg:**  
**First Most Important Research Problem**

Most Important Problem

<ul style="list-style-type: none"> <li>• Consumer research examining why there is a decline in purchasing real trees</li> </ul>
<ul style="list-style-type: none"> <li>• Research to eradicate bad insects, e.g. White pine weevil</li> </ul>
<ul style="list-style-type: none"> <li>• Selection of business management software optimum for industry</li> </ul>
<ul style="list-style-type: none"> <li>• Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the adaptability of various species to PA climate (compare tree in indigenous settings)</li> </ul>
<ul style="list-style-type: none"> <li>• The Phytophthera Root rot problem</li> </ul>

The Harrisburg Focus Group ranked the following problems as second most important research problems. There was one duplicate problem for #2.

**Table 8**  
**Harrisburg:**  
**Second Most Important Research Problem**

Second Most Important Problem

<ul style="list-style-type: none"> <li>• The Phytophthora Root rot problem</li> </ul>
<ul style="list-style-type: none"> <li>• Research into elements of business profitability what works? How to do it?</li> </ul>
<ul style="list-style-type: none"> <li>• Research into elements of business profitability what works? How to do it?</li> </ul>
<ul style="list-style-type: none"> <li>• Exotic firs that tolerate various soil conditions</li> </ul>
<ul style="list-style-type: none"> <li>• Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA Need newer chemicals to replace them</li> </ul>
<ul style="list-style-type: none"> <li>• Rhadocline (Douglas Fir)</li> </ul>

The Harrisburg Focus Group ranked the following problems as third most important research problems; there was one duplicate for #3.

**Table 9**  
**Harrisburg:**  
**Third Most Important Research Problem**

Third Most Important Problem

- Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field
- Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.
- Advertising: need to document best advertising practices in the industry
- Consumer research examining why there is a decline in purchasing real trees
- Research of growth regulators for Douglas Fir (to make a better tree)
- Research into spruce needle rust control

## ❖ FINDING # 7

### Priority Problems Reported by Indiana Group

The Indiana Group listed a total of 14 problems as top priorities (#1, 2 or 3). Among the group there was some overlap; there were no duplicates for the #1 ranking, but there was one duplicate for #2 ranking, and one duplicate for #3 ranking. Overall, one problem was listed three times (Needle retention study on Canaan fir) and two others were listed twice.

**Table 10**  
**Indiana**  
**First, Second and Third Most Important Priority Problems**

Priority Problems		
1	2	3
Most Important Problem	Second Most Important Problem	Third most important problem
<ul style="list-style-type: none"> <li>Research the chemical labeling problem – losing available chemicals to government regulations without replacements</li> </ul>	<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Research data base on Christmas trees (How to)</li> </ul>
<ul style="list-style-type: none"> <li>Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest</li> </ul>	<ul style="list-style-type: none"> <li>Study of the long term (8-10 years) supply and demand characteristics of the industry (impact on future sales)</li> </ul>	<ul style="list-style-type: none"> <li>Consumer research on internet/web marketing of product (best practices)</li> </ul>
<ul style="list-style-type: none"> <li>Consumer research to increase sales in PA</li> </ul>	<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Product Development of a tree species that will grow in PA (find the next Fraser Fir)</li> </ul>
<ul style="list-style-type: none"> <li>Genetic research to find Nordmann and Noble fir that will grow well in PA</li> </ul>	<ul style="list-style-type: none"> <li>Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.</li> </ul>	<ul style="list-style-type: none"> <li>Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-energy</li> </ul>
<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Research to develop a flame retardant spray that doesn't dry out cut trees</li> </ul>	<ul style="list-style-type: none"> <li>The labor shortage: why and what to do about it</li> </ul>
<ul style="list-style-type: none"> <li>Research to improve control of insects and diseases in trees</li> </ul>	<ul style="list-style-type: none"> <li>Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy</li> </ul>

The Indiana Focus Group ranked the following problems as first most important research problems; there were no duplicates for #1.

**Table 11**  
**Indiana**  
**First Most Important Research Problem**

Most Important Problem

- Research the chemical labeling problem – losing available chemicals to government regulations without replacements
- Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest
- Consumer research to increase sales in PA
- Genetic research to find Nordmann and Noble fir that will grow well in PA
- Needle retention study on Canaan fir (what would improve the trees needle retention?)
- Research to improve control of insects and diseases in trees

The Indiana Focus Group ranked the following problems as second most important research problems. There was one duplicate problem for #2.

**Table 12**  
**Indiana Focus Group**  
**Second Most Important Research Problem**

Second Most Important Problem

- Needle retention study on Canaan fir (what would improve the trees needle retention?)
- Study of the long term (8-10 years) supply and demand characteristics of the industry
- (impact on future sales)
- Needle retention study on Canaan fir (what would improve the trees needle retention?)
- Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.
- Research to develop a flame retardant spray that doesn't dry out cut trees
- Needle retention study on Canaan fir (what would improve the trees needle retention?)

The Indiana Focus Group ranked the following problems as third most important research problems; there was one duplicate for #3.

**Table 13**  
**Indiana**  
**Third Most Important Research Problem**

Third Most Important Problem

- Research data base on Christmas trees (How to)
- Consumer research on internet/web marketing of product (best practices)
- Product Development of a tree species that will grow in PA (find the next Fraser Fir)
- Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-energy
- The labor shortage: why and what to do about it
- Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy

**❖ FINDING # 8**  
**Priority Problems Reported from State College Group**

**Table 14**  
**State College**  
**Most Important Priority Problems**

1. Information Management
2. Cultural Management
3. Need to regionalize our research efforts in the northeast –
4. Dissemination of Secondary research

## **Discussion of State College Priority Problems**

Asked to prioritize research problems, the State College Group listed a total of 4 problems as top priorities

### **1. Information Management**

There needs to be some kind of ongoing efforts related to information management. Information Management would include discussion forums. Some things are now available—PSU has a Christmas tree web page, PCTGA has a web page and the National Christmas Tree Association (NCTA) has one. But more information management needs to be done. At least three sub-categories of Information Management can be distinguished

- Web based information sharing
- Growers forums
- National's research clearing house

### **2. Cultural Management**

The Christmas tree industry is a business that needs a new product or two to roll out and develop. There are several approaches to new product development:

- a. New trees
- b. New uses for existing trees
- c. Improvement on existing species
- d. Testing of potential species
- e. New ways to use the product

### **3. Regional organization of research**

There is a need to regionalize industry research efforts in the northeast – regional area organization rather than the state is optimum. Coordination among state services and academic entities is the direction to go. A key goal should be to create a loose association of individuals involved with industry research that maintain communication, share results, and collaborate on specific research projects.

### **4. Dissemination of Secondary research**

The National Christmas Tree Association (NCTA) is developing a clearing house for published results relating to the Christmas tree industry – it will probably start with refereed journals – and may be expanded. A related thing that would really be useful is a forum or discussion board, statewide regional or even national (interactive) to address the kinds of business and other practical topics members may have (maybe different rooms within a larger forum). It would require a broad base of users on the forum to make it useful (issues to work out now unknown: the cost of hardware, costs of hardware, logistics, etc.). One way to do it is set up a subscription basis.

Beyond a listing of research topics, a subsequent step is necessary to determine

- What secondary research may have already been done
- What research is feasible of research that is desirable

An additional step would be to prioritize those researchable topics that remain.

**❖ FINDING # 9**  
**Priority Problems Reported by Bloomsburg Group**

The Bloomsburg Group listed a total of 12 problems as top priorities (#1, 2 or 3). Among the group there was some considerable overlap; two problems were mentioned a total of five times for the #1 ranking, two problems were mentioned twice each for the #2 ranking, and two problems were mentioned twice each for the #3 ranking.

**Table 15**  
**Bloomsburg**  
**First, Second, and Third Most Important Priority Problems**

1	2	3
<ul style="list-style-type: none"> <li>Genetic research to find trees that can grow in PA</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>	<ul style="list-style-type: none"> <li>Document the costs of raising a tree from start to finish</li> </ul>
<ul style="list-style-type: none"> <li>Eliminate drop cones on Fraser Firs</li> </ul>	<ul style="list-style-type: none"> <li>Research to develop a natural non toxic insect repellent</li> </ul>	<ul style="list-style-type: none"> <li>Research into labor shortage in industry (why is it happening and what to do about it?)</li> </ul>
<ul style="list-style-type: none"> <li>Research with recommendations about use, efficacy and timing of fertilizers</li> </ul>	<ul style="list-style-type: none"> <li>Research into question of whether there should be a standard for cut trees (regulated by state)</li> </ul>	<ul style="list-style-type: none"> <li>Research into methods of chemical or mechanical shearing of Fraser Firs</li> </ul>
<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>	<ul style="list-style-type: none"> <li>Research re the chemical residue left on cut trees (how much is actually left; what should standard be?)</li> </ul>	<ul style="list-style-type: none"> <li>Genetic research to find trees that can grow in PA</li> </ul>
<ul style="list-style-type: none"> <li>Genetic research to find trees that can grow in PA</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging Plant Pathology at PSU to get back involved in doing research</li> </ul>	<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>
<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate drop cones on Fraser Firs</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>
<ul style="list-style-type: none"> <li>Research to develop a natural non toxic insect repellent</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging Plant Pathology at PSU to get back involved in doing research</li> </ul>
<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>	<ul style="list-style-type: none"> <li>Research to develop a natural non toxic insect repellent</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging Plant Pathology at PSU to get back involved in doing research</li> </ul>
<ul style="list-style-type: none"> <li>Insect Control e.g. elongated hemlock scale</li> </ul>	<ul style="list-style-type: none"> <li>Document the costs of raising a tree from start to finish</li> </ul>	<ul style="list-style-type: none"> <li>Consumer Research into question of why we are losing market share.</li> </ul>

The Bloomsburg Focus Group ranked the following problems as first most important research problems; two problems were mentioned a total of five times for the #1 ranking.

**Table 16**  
**Indiana Focus Group**  
**First Most Important Research Problem**

Most Important Problem

- Genetic research to find trees that can grow in PA
- Eliminate drop cones on Fraser Firs
- Research with recommendations about use, efficacy and timing of fertilizers
- Consumer Research into question of why we are losing market share (declining purchase of live trees)
- Genetic research to find trees that can grow in PA
- Insect Control e.g. elongated hemlock scale
- Research to develop a natural non toxic insect repellent
- Insect Control e.g. elongated hemlock scale
- Insect Control e.g. elongated hemlock scale

The Bloomsburg Focus Group ranked the following problems as second most important research problems; two problems were mentioned twice each for the #2 ranking.

**Table 17**  
**Bloomsburg Focus Group**  
**Second Most Important Research Problem**

Second Most Important Problem

- Research to develop a natural non toxic insect repellent
- Research into question of whether there should be a standard for cut trees (regulated by state)
- Research re the chemical residue left on cut trees (how much is actually left; what should standard be?)
- Encouraging Plant Pathology at PSU to get back involved in doing research
- Eliminate drop cones on Fraser Firs
- Consumer Research into question of why we are losing market share (declining purchase of live trees)
- Research to develop a natural non-toxic insect repellent
- Document the costs of raising a tree from start to finish

The Bloomsburg Focus Group ranked the following problems as third most important research problems; two problems were mentioned twice each for the #3 ranking.

**Table 18**  
**Bloomsburg**  
**Third Most Important Research Problem**

Third Most Important Problem

- Research into labor shortage in industry (why is it happening and what to do about it?)
- Research into methods of chemical or mechanical shearing of Fraser Firs
- Genetic research to find trees that can grow in PA
- Insect Control e.g. elongated hemlock scale
- Consumer Research into question of why we are losing market share (declining purchase of live trees)
- Encouraging Plant Pathology at PSU to get back involved in doing research
- Encouraging Plant Pathology at PSU to get back involved in doing research
- Consumer Research into question of why we are losing market share (declining purchase of live trees)

## Discussion: The Types of Research Problems

Research problems tend to fall into two broad dimensions: PRIMARY research, which is original empirical research into issues confronting growers; and SECONDARY research, which is derivative and disseminative in nature, and relies on using available data or findings and published results from original sources.

Research orientations also tend to fall into two broad dimensions SCIENCE oriented, which is research that focuses on questions of science, including horticulture, etc.; and BUSINESS oriented, which focuses on questions of business including management, consumer research and related business problems or issues.

In principal this mix of *types* of research problem and *orientation* of research problem produces four basic types of research.

- **Type I Research**
- **Type II Research**
- **Type III Research**
- **Type IV Research**

- **Type I Research**

Original/empirical research that is science oriented

Type I Research in this study generated 28 problems listed in Table 20 below.

- **Type II research**

Original/empirical research that is business oriented

Type II research generated 16 separate problems listed in Table 21 below.

- **Type III research**

Secondary derivative research that is science oriented

Type III research generated 12 separate problems listed in Table 22 below.

- **Type IV research**

Secondary derivative research that is business oriented

Type IV research generated 13 separate problems listed in Table 23 below.

**Table 19  
Type of Research Problems**

	<b>Primary Research</b>	<b>Secondary Research</b>
<b>Science Oriented</b>	<b><u>Type 1</u></b> Primary Research/Science Oriented	<b><u>Type 3</u></b> Secondary Research/ Science Oriented
<b>Business Oriented</b>	<b><u>Type 2</u></b> Primary Research/Business Oriented	<b><u>Type 4</u></b> Secondary Research /Business Oriented

**❖ FINDING # 10**  
**Type I Research**

Original/empirical research & science oriented generated 28 separate problems.

**Table 20**  
**Type I Research Problems**

<ul style="list-style-type: none"> <li>• Research to eradicate bad insects, e.g. White pine weevil</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop a natural non toxic insect repellent</li> </ul>
<ul style="list-style-type: none"> <li>• Exotic firs that tolerate various soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Develop better needle retention for Canaan firs</li> </ul>
<ul style="list-style-type: none"> <li>• Research of growth regulators for Douglas Fir (to make a better tree)</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a better variety of trees for PA (e.g. Norman Fir)</li> </ul>
<ul style="list-style-type: none"> <li>• Phytophthera Root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>• Encouraging Plant Pathology at PSU to get back involved in doing research (Last was Scotch Pine)</li> </ul>
<ul style="list-style-type: none"> <li>• Research needle retention in exotic firs</li> </ul>	<ul style="list-style-type: none"> <li>• Genetic research to find new (varieties) trees that can grow in PA</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the Douglas Fir needle midge (only host for midge is the Douglas Fir)</li> </ul>	<ul style="list-style-type: none"> <li>• Disease Control research</li> </ul>
<ul style="list-style-type: none"> <li>• Rhadocline (Douglas Fir)</li> </ul>	<ul style="list-style-type: none"> <li>• Causes and cures for Phytophthera root rot (soil borne)</li> </ul>
<ul style="list-style-type: none"> <li>• Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop a state seed forest ( to develop more varieties)</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the elongate hemlock scale (a specific pest)</li> </ul>	<ul style="list-style-type: none"> <li>• More reliable and consistent research on the problem of the White Pine weevil</li> </ul>
<ul style="list-style-type: none"> <li>• Research into spruce needle rust control</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop a non toxic systemic chemical that will kill B.T.A.</li> </ul>
<ul style="list-style-type: none"> <li>• Continue research into weed control (Kuhn's research)</li> </ul>	<ul style="list-style-type: none"> <li>• Genetic research to find Nordmann and Noble fir that will grow well in PA</li> </ul>
<ul style="list-style-type: none"> <li>• Tissue culture research of the rocky mountain strain of the Douglas Fir</li> </ul>	<ul style="list-style-type: none"> <li>• Research to improve control of insects and diseases in trees</li> </ul>
<ul style="list-style-type: none"> <li>• Research tracking best genetic seed source in the industry</li> </ul>	
<ul style="list-style-type: none"> <li>• Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	

## FINDING # 11

Type II research --Original/empirical research & business oriented generated 16 separate problems.

**Table 21**  
**Type II Research Problems**

<ul style="list-style-type: none"> <li>• Research into elements of business profitability what works? How to do it?</li> </ul>	<ul style="list-style-type: none"> <li>• Information Management such as growers forums</li> </ul>
<ul style="list-style-type: none"> <li>• Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer Research into the question of why we are losing market share/declining purchase of live trees.</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the adaptability of various species to PA climate (compare tree in indigenous settings)</li> </ul>	<ul style="list-style-type: none"> <li>• Research into question of whether there should be a standard for cut trees (regulated by state)</li> </ul>
<ul style="list-style-type: none"> <li>• Marketing/ consumer research to promote "real trees' to younger generation 5 – 18 year olds</li> </ul>	<ul style="list-style-type: none"> <li>• Research that addresses product promotion, advertising and marketing issues (how to sell it?)</li> </ul>
<ul style="list-style-type: none"> <li>• Research to develop a flame retardant spray that doesn't dry out cut trees</li> </ul>	<ul style="list-style-type: none"> <li>• Document the costs of raising a tree from start to finish</li> </ul>
<ul style="list-style-type: none"> <li>• Consumer research of the public image of the Christmas tree industry</li> </ul>	<ul style="list-style-type: none"> <li>• New ways to use the product</li> </ul>
<ul style="list-style-type: none"> <li>• Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-energy</li> </ul>	<ul style="list-style-type: none"> <li>• Dissemination of Secondary research/Clearing house for published results relating to Christmas tree industry</li> </ul>
<ul style="list-style-type: none"> <li>• The labor shortage: why and what to do about it</li> </ul>	
<ul style="list-style-type: none"> <li>• Research turning unsold trees into bio-energy</li> </ul>	
<ul style="list-style-type: none"> <li>• Research of greater productivity in industry (to make labor, equipment, more profitable)</li> </ul>	
<ul style="list-style-type: none"> <li>• A new product or two to roll out and develop</li> </ul>	

## FINDING # 12

Type III research --Secondary derivative research & science oriented generated 12 separate problems.

**Table 22**  
**Type III Research**

<ul style="list-style-type: none"> <li>• Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA Need newer chemicals to replace them</li> </ul>	<ul style="list-style-type: none"> <li>• Research re use of chemical mowing (to spray herbicide between rows to stunt grass)</li> </ul>
<ul style="list-style-type: none"> <li>• Research into methods for improving profitability of farm and equipment e.g. to sell firewood, sell mulch, sell topsoil, landscaping, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Research to provide members with full and timely information on new chemicals, fungicides, and herbicides</li> </ul>
<ul style="list-style-type: none"> <li>• Research into opportunities and challenges of carrying on public education of young people re: Christmas tree industry</li> </ul>	<ul style="list-style-type: none"> <li>• Research into methods of chemical or mechanical shearing of Fraser Firs</li> </ul>
<ul style="list-style-type: none"> <li>• Research the chemical labeling problem – losing available chemicals to government regulations without replacements.</li> </ul>	<ul style="list-style-type: none"> <li>• Research with recommendations about nutrients and fertilizers –their use, efficacy and timing (what works best?)</li> </ul>
<ul style="list-style-type: none"> <li>• Research to develop a scouting system (guidelines and procedures) to identify pest problems</li> </ul>	<ul style="list-style-type: none"> <li>• Research re the chemical residue left on cut trees (Baseline: how much now is actually left; what should standard be?)</li> </ul>
<ul style="list-style-type: none"> <li>• Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest</li> </ul>	<ul style="list-style-type: none"> <li>• Research that documents optimum fertilization practices for popular trees grow in PA</li> </ul>

## ❖ FINDING # 13

Type IV research-- Secondary derivative research & business oriented generated 13 separate problems

**Table 23**  
**Type IV Research:**  
**Secondary Research, Science Oriented**

Listed Problem	Source of Problem Listing
<ul style="list-style-type: none"> <li>• Selection of business management software optimum for industry</li> </ul>	<ul style="list-style-type: none"> <li>• Dissemination of Secondary research/Clearing house for published results relating to Christmas tree industry</li> </ul>
<ul style="list-style-type: none"> <li>• Insurance industry practices: determine insurance coverage for cut trees—implications for the industry</li> </ul>	<ul style="list-style-type: none"> <li>• Research to identify why industry is not more influential in Harrisburg (e.g. in legislation)</li> </ul>
<ul style="list-style-type: none"> <li>• Consumer research examining why there is a decline in purchasing real trees</li> </ul>	<ul style="list-style-type: none"> <li>• Research into labor shortage – (migrant laborers) in industry (why does it exist and what to do about it?)</li> </ul>
<ul style="list-style-type: none"> <li>• Research best opportunities for growers to pool resources, to leverage discounts from suppliers (e.g. buying)</li> </ul>	<ul style="list-style-type: none"> <li>• Research to develop best procedures/practices for shearing Fraser fir throughout life cycle</li> </ul>
<ul style="list-style-type: none"> <li>• Research data base on Christmas trees (How to)</li> </ul>	<ul style="list-style-type: none"> <li>• Information Management such as growers forums</li> </ul>
<ul style="list-style-type: none"> <li>• Consumer research on internet/web marketing of product (best practices)</li> </ul>	<ul style="list-style-type: none"> <li>• Need to regionalize our research efforts in the northeast – Coordination among state services and academic entities.</li> </ul>
<ul style="list-style-type: none"> <li>• Study of the long term (8-10 years) supply and demand characteristics of the industry (impact on future sales)</li> </ul>	

**Table 24**  
**Number of Mentions for Each Problem Type**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	Total Type I Problems  = <b>28 Problems</b>
Type II Research: Primary Research, Business Oriented (PR/BO)	Total Type II Problems  = <b>16 Problems</b>
Type III Research: Secondary Research, Science Oriented (SR/SO)	Total Type III Problems  = <b>12 Problems</b>
Type IV Research: Secondary Research, Business Oriented (SR/BO)	Total Type IV Problems  = <b>13 Problems</b>

**Table 25**  
**Problem Types Compared for individual groups**  
**HARRISBURG --- INDIANA --- STATE COLLEGE --- BLOOMSBURG**

<b>Problem Type</b>	<b>Number of Mentions</b>			
	<b>HAR</b>	<b>IND</b>	<b>STCOL</b>	<b>BLOOMS</b>
<b>Type I Research:</b> Primary Research, Science Oriented (PR/SO)	13	5	0	10
<b>Type II Research:</b> Primary Research, Business Oriented (PR/BO)	3	9	1	4
<b>Type III Research:</b> Secondary Research, Science oriented (SR/SO)	3	4	0	5
<b>Type IV Research:</b> Secondary Research, Business Oriented (SR/BO)	4	4	3	2

**❖ FINDING # 14**  
**Harrisburg Group**

The Harrisburg Focus Group listed a total of 24 research problems. Type I problems, Primary Research, Science Orientation dominated the list with 13 mentions (54 % of all problems).

**Table 26**  
**Harrisburg**  
**Number of Mentions for Each Problem Type**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	14
Type II Research: Primary Research, Business Oriented (PR/BO)	3
Type III Research: Secondary Research, Science oriented (SR/SO)	3
Type IV Research: Secondary Research, Business Oriented (SR/BO)	4

**Table 27**  
**Harrisburg Group**  
**List of Problems by Type of Problem**

<b>List of Problems cited</b>	<b>Type of Problem</b>
1. Research to eradicate bad insects, e.g. White pine weevil	Type I (PR/SO)
2. Exotic firs that tolerate various soil conditions	Type I (PR/SO)
3. Research of growth regulators for Douglas Fir (to make a better tree)	Type I (PR/SO)
4. Selection of business management software optimum for industry	Type IV (SR/BO)
5. Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA Need newer chemicals to replace them	Type III (SR/SO)
6. Phytophthera Root rot problem	Type I (PR/SO)
7. Insurance industry practices: determine insurance coverage for cut trees—implications for the industry	Type IV (SR/BO)
8. Research needle retention in exotic firs	Type I (PR/SO)
9. Consumer research examining why there is a decline in purchasing real trees	Type IV (SR/BO)
10. Advertising: need to document best advertising practices in the industry	Type IV (SR/BO)
11. Research of the Douglas Fir needle midge (only host for midge is the Douglas Fir)	Type I (PR/SO)
12. Rhadocline (Douglas Fir)	Type I (PR/SO)
13. Research into elements of business profitability what works? How to do it?	Type II (PR/BO)
14. Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)	Type I (PR/SO)
15. Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field	Type II (PR/BO)
16. Research into methods for improving profitability of farm and equipment e.g. to sell firewood, sell mulch, sell topsoil, landscaping, etc.	Type III (SR/SO)

17. Research of the elongate hemlock scale (specific pest)	Type I (PR/SO)
18. Research into spruce needle rust control	Type I (PR/SO)
19. Continue research into weed control (Kuhn's research)	Type I (PR/SO)
20. Tissue culture research of the rocky mountain strain of the Douglas Fir	Type I (PR/SO)
21. Research of the adaptability of various species to PA climate (compare tree in indigenous settings)	Type II (PR/BO)
22. Research tracking best genetic seed source in the industry	Type I (PR/SO)
23. Research best opportunities for growers to pool resources, to leverage discounts from suppliers (e.g. buying fertilizers)	Type IV (SR/BO)
24. Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry	Type III (SR/SO)

## ❖ FINDING # 15

### Indiana Group

The Indiana Focus Group listed a total of 22 research problems. Type II Research: Primary Research, Business Oriented dominated the list with 9 mentions (41 % of all problems).

**Table 28**  
**Indiana**  
**Number of Mentions for Each Problem Type**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	5
Type II Research: Primary Research, Business Oriented (PR/BO)	9
Type III Research: Secondary Research, Science oriented (SR/SO)	4
Type IV Research: Secondary Research, Business Oriented (SR/BO)	4

**Table 29**  
**Indiana Group**  
**List of Problems by Type of Problem**

1. Research to improve control of insects and diseases in trees	Type I (PR/SO)
2. Marketing/ consumer research to promote "real trees" to younger generation (5–18 year olds)	Type II (PR/BO)
3. Research the chemical labeling problem – losing available chemicals to government regulations without replacements.	Type III (SR/SO)
4. Research to develop a scouting system (guidelines and procedures) to identify pest problems	Type III (SR/SO)
5. Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	Type III (SR/SO)
6. Consumer research to increase sales in PA	Type II (PR/BO)
7. Research to develop a flame retardant spray that doesn't dry out cut trees	Type II (PR/BO)
8. Needle retention study on Canaan fir (what would improve the trees needle retention?)	Type I (PR/SO)
9. Consumer research of the public image of the Christmas tree industry	Type II (PR/BO)
10. Genetic research to find Nordmann and Noble fir that will grow well in PA	Type I (PR/SO)
11. Product Development of a tree species that will grow in PA (find the next Fraser Fir)	Type II (PR/BO)
12. More reliable and consistent research on the problem of the White Pine weevil	Type I (PR/SO)
13. Research that documents optimum fertilization practices for popular trees grown in PA	Type III (SR/SO)
14. Research data base on Christmas trees (How to)	Type IV (SR/BO)
15. Consumer research on internet/web marketing of product (best practices)	Type IV (SR/BO)
16. Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy	Type II (PR/BO)

17. Study of the long term (8-10 years) supply and demand characteristics of the industry (impact on future sales)	Type IV (SR/BO)
18. The labor shortage: why and what to do about it?	Type II (PR/BO)
19. Research turning unsold trees into bio-energy	Type II (PR/BO)
20. Research of greater productivity in industry (to make labor, equipment, more profitable)	Type II (PR/BO)
21. Research to develop best procedures/ practices for shearing Fraser fir throughout life cycle	Type IV (SR/BO)
22. Research to develop a non toxic systemic chemical that will kill B.T.A.	Type I (PR/SO)

**❖ FINDING # 16**  
**Bloomsburg Group**

The Bloomsburg Focus Group listed a total of 21 research problems. Type I problems, Primary Research, Science Orientation dominated the list with 10 mentions (48 % of all problems).

**Table 30**  
**Bloomsburg**  
**Number of Mentions for Each Problem Type**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	10
Type II Research: Primary Research, Business Oriented (PR/BO)	4
Type III Research: Secondary Research Science oriented (SR/SO)	5
Type IV Research: Secondary Research, Business Oriented (SR/BO)	2

**Table 31**  
**Bloomsburg Focus Group**  
**List of Problems by Type of Problem**

List of Problems cited	Type of Problem
1. Insect Control e.g. elongated hemlock scale	Type I (PR/SO)
2. Eliminate drop cones on Fraser Firs	Type I (PR/SO)
3. Research to develop a natural non toxic insect repellent	Type I (PR/SO)
4. Consumer Research into the question of why we are losing market share/declining purchase of live trees.	Type II (PR/BO)
5. Research into question of whether there should be a standard for cut trees (regulated by state)	Type II (PR/BO)
6. Develop better needle retention for Canaan firs	Type I (PR/SO)
7. Develop a better variety of trees for PA (e.g. Norman Fir)	Type I (PR/SO)
8. Research to provide members with full and timely information on new chemicals, fungicides, and herbicides	Type III (SR/SO)
9. Research into methods of chemical or mechanical shearing of Fraser Firs	Type III (SR/SO)
10. Encouraging Plant Pathology at PSU to get back involved in doing research (last was Scotch Pine)	Type I (PR/SO)
11. Genetic research to find new (varieties) trees that can grow in PA	Type I (PR/SO)
12. Research with recommendations about nutrients and fertilizers –their use, efficacy and timing (what works best?)	Type III (SR/SO)
13. Research that addresses product promotion, advertising and marketing issues (how to sell it?)	Type II (PR/BO)
14. Disease Control research.	Type I (PR/SO)
15. Causes and cures for Phytophthora root rot (soil borne)	Type I (PR/SO)

16. Research re the chemical residue left on cut trees (Baseline: how much now is actually left; what should standard be?)	Type III (SR/SO)
17. Research to identify why industry is not more influential in Harrisburg (e.g. in legislation)	Type IV (SR/BO)
18. Research re use of chemical mowing (to spray herbicide between rows to stunt grass)	Type III (SR/SO)
19. Research to develop a state seed forest (to develop more varieties)	Type I (PR/SO)
20. Research into labor shortage – (migrant laborers) in industry (why does it exist and what to do about it?)	Type IV (SR/BO)
21. Document the costs of raising a tree from start to finish	Type II (PR/BO)

**❖ FINDING # 17**  
**First Priority Problems by Problem Type**

- Type II problems were most numerous among top priority problems with 10 of 20 (50%) first priority problems being characterized as a Type II problem.
- Type I Problems were next most numerous with 5 of 20 problems (25 %) first priority problems characterized as Type I.
- Type III problems produced no top priority problem mentions.
- Type IV Problems produced a total of three mentions as first priority problems.

**Table 32**  
**First Priority Problems**  
**By**  
**Problem Type**

	Type I (PR/SO)	Type II (PR/BO)	Type III (SR/SO)	Type IV (SR/BO)
Consumer research examining why there is a decline in purchasing real trees		x		
Research to eradicate bad insects, e.g. White pine weevil	x			
Selection of business management software optimum for industry				x
Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)	x			
Research of the adaptability of various species to PA climate (compare tree in indigenous settings)		x		
The Phytophthora Root rot problem	x			

Genetic research to find trees that can grow in PA		x		
Eliminate drop cones on Fraser Firs		x		
Research with recommendations about use, efficacy and timing of fertilizers				x
Dissemination of Secondary research				x
Insect Control e.g. elongated hemlock scale	x			
Research to develop a natural non toxic insect repellent		x		
Research the chemical labeling problem – losing available chemicals to government regulations without replacements				x
Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest		x		
Consumer research to increase sales in PA		x		
Genetic research to find Nordmann and Noble fir that will grow well in PA		x		
Needle retention study on Canaan fir (what would improve the trees needle retention?)		x		
Research to improve control of insects and diseases in trees	x			
Cultural Management		x		
Need to regionalize research in the NE				x

## **V. Discussion of Findings**

It seems clear that there are a considerable number of problems under discussion within the industry. There is some consensus on priorities within one or two groups. But there is considerable diversity of view from group to group –and even within some of the groups.

### **Summary of Individual Groups**

- Harrisburg Group produced the lowest consensus on what was most important. Only three problems were listed by more than one respondent. Six separate problems were listed in Harrisburg as “most important.”
- The Indiana Group showed somewhat more consensus than the Harrisburg Group with one problem listed by three respondents. However, it also listed all separate problems for “most important.”
- The Bloomsburg Group showed the highest consensus on priorities. One problem was listed by five respondents, while another five problems were listed three times each by individual respondents.

### **Types of Research Problems**

Four types of research problem can be classified from the groups according to

1. A problem’s general focus on either business problems or science problems.
2. According to whether the needed research is original, empirical research or secondary derivative research.

**This study has identified those four types as:**

- 1. Type I**
- 2. Type II**
- 3. Type III**
- 4. Type IV**

The types of research problems that a particular focus group names, as well as the type of research named across all groups can provide important insights into the nature of research problems within the industry. In this study there is a definite pattern of problem types.

- Type I research (original/empirical research & science oriented) was the most frequent type statewide, with a total of 28 research problems classified as Type I problems. Harrisburg named the largest number of Type I problems (13) followed by Bloomsburg (10) and Indiana (5).

	HAR	IND	STCOL	BLOOMS
<b>Type I Research:</b> Primary Research, Science Oriented (PR/SO)	13	5	0	10

- Type II research (original/empirical research & business oriented) was the second most frequent type statewide with a total of 16 research problems classified as Type I problems. Indiana named the largest number of Type II problems (8) followed by Bloomsburg (4), Harrisburg (3) and State College (1).

	HAR	IND	STCOL	BLOOMS
<b>Type II Research:</b> Primary Research, Business Oriented (PR/BO)	3	9	1	4

- Type IV research (secondary derivative research & business oriented) was the third second most frequent type statewide with a total of 13 research problems. Indiana (4) and Harrisburg (4) named the largest number of Type IV problems followed by State College (3) and Bloomsburg (2).

	HAR	IND	STCOL	BLOOMS
<b>Type IV Research:</b> Secondary Research, Science oriented (SR/SO)	4	4	3	2

- Type III research (Secondary derivative research & science oriented) was the least most frequent type statewide with a total of 12 research problems classified as Type III problems. Bloomsburg named the largest number of Type II problems (5), followed by Indiana (4), and Harrisburg (3).

	HAR	IND	STCOL	BLOOMS
<b>Type III Research:</b> Secondary Research, Science Oriented (SR/SO)	3	4	0	5

### **Problem Diversity**

The diversity of research problems among the focus groups was considerable. One way to illustrate these differences is to compare and contrast the different listing of most important research problems produced by each group. The table below shows for each group, Harrisburg, Indiana, and Bloomsburg, the top tier problems.

**Table 33**  
**Comparing First Most Important Research Problems**

Harrisburg	Indiana	Bloomsburg
<ul style="list-style-type: none"> <li>• Consumer research examining why there is a decline in purchasing real trees</li> </ul>	<ul style="list-style-type: none"> <li>• Research the chemical labeling problem – losing available chemicals to government regulations without replacements</li> </ul>	<ul style="list-style-type: none"> <li>• Genetic research to find trees that can grow in PA</li> </ul>
<ul style="list-style-type: none"> <li>• Research to eradicate bad insects, e.g. White pine weevil</li> </ul>	<ul style="list-style-type: none"> <li>• Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest</li> </ul>	<ul style="list-style-type: none"> <li>• Eliminate drop cones on Fraser Firs</li> </ul>
<ul style="list-style-type: none"> <li>• Selection of business management software optimum for industry</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer research to increase sales in PA</li> </ul>	<ul style="list-style-type: none"> <li>• Research with recommendations about use, efficacy and timing of fertilizers</li> </ul>
<ul style="list-style-type: none"> <li>• Research into causes of the dieback leader problem on the Douglas fir (Douglas Fir Leader dieback)</li> </ul>	<ul style="list-style-type: none"> <li>• Genetic research to find Nordmann and Noble fir that will grow well in PA</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer Research into question of why we are losing market share (declining purchase of live trees)</li> </ul>
<ul style="list-style-type: none"> <li>• Research of the adaptability of various species to PA climate (compare tree in indigenous settings)</li> </ul>	<ul style="list-style-type: none"> <li>• Needle retention study on Canaan fir (what would improve the trees needle retention?)</li> </ul>	<ul style="list-style-type: none"> <li>• Genetic research to find trees that can grow in PA</li> </ul>
<ul style="list-style-type: none"> <li>• The Phytophthora Root rot problem</li> </ul>	<ul style="list-style-type: none"> <li>• Research to improve control of insects and diseases in trees</li> </ul>	<ul style="list-style-type: none"> <li>• Insect Control e.g. elongated hemlock scale</li> </ul>
		<ul style="list-style-type: none"> <li>• Research to develop a natural non toxic insect repellent</li> </ul>

		<ul style="list-style-type: none"> <li>• Insect Control e.g. elongated hemlock scale</li> </ul>
		<ul style="list-style-type: none"> <li>• Insect Control e.g. elongated hemlock scale</li> </ul>

Two main indices of diversity can be observed in Table 33. The first is that there is minimal overlap within each group. Harrisburg shows no duplicates among top tier problems. Indiana also shows no duplicate for top tier problems, while Bloomsburg shows overlap of two research problems within the group.

A second measure of diversity is to compare top tier problems across all the groups. A total of 21 problems were ranked top tier with very limited overlap among them.

**Leading Research Problems  
& Priorities  
In  
Pennsylvania's  
Christmas tree Industry**

**Volume II Appendix  
Tables and Figures**

**Produced For  
PCTGA**



# **APPENDICES**

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## Appendix A

### A-1 -Harrisburg Data Listing of Problems

**Table A1**

List of Problems cited.	Type of Problem
1. Research to eradicate bad insects, e.g. White pine weevil	Type I (PR/SO)
2. Exotic firs that tolerate various soil conditions	Type I (PR/SO)
3. Research of growth regulators for Douglas Fir (to make a better tree)	Type I (PR/SO)
4. Selection of business management software optimum for industry	Type IV (SR/BO)
5. Research into general problem of chemicals being taken off the market (broad spectrum's) by EPA Need newer chemicals to replace them	Type III (SR/SO)
6. Phytophthera Root rot problem	Type I (PR/SO)
7. Insurance industry practices : determine insurance coverage for cut trees—implications for the industry	Type IV (SR/BO)
8. Research needle retention in exotic firs	Type I (PR/SO)
9. Consumer research examining why there is a decline in purchasing real trees	Type IV (SR/BO)
10. Advertising : need to document best advertising practices in the industry	Type IV (SR/BO)
11. Research of the Douglas Fir needle midge ( only host for midge is the Douglas Fir	Type I (PR/SO)
12. Rhadocline ( Douglas Fir)	Type I (PR/SO)

13. Research into elements of business profitability what works? How to do it?	Type II (PR/BO)
14. Research into causes of the dieback leader problem on the Douglas fir( Douglas Fir Leader dieback)	Type I (PR/SO)
(15)Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field	Type II (PR/BO)
(16) Research into methods for improving profitability of farm and equipment e.g. to sell firewood, sell mulch, sell topsoil, landscaping, etc.	Type III (SR/SO)
(17 ) Research of the elongate hemlock scale (specific pest)	Type I (PR/SO)
(18 )Research into spruce needle rust control	Type I (PR/SO)
(19 )Continue research into weed control (Kuhn's research)	Type I (PR/SO)
(20)tissue culture research of the rocky mountain strain of the Douglas Fir	Type I (PR/SO)
(21) Research of the adaptability of various species to PA climate (compare tree in indigenous settings )	Type II (PR/BO)
(22) Research tracking best genetic seed source in the industry	Type I (PR/SO)
(23) Research best opportunities for growers to pool resources, to leverage discounts from suppliers (e.g. buying fertilizers)	Type IV (SR/BO)
(24) Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.	Type III (SR/SO)

**A-2**  
**-Harrisburg Data Categorized by Problem Type**

1. Type I Research: Primary Research, Science Oriented (PR/SO)
2. Type II Research: Primary Research, Business Oriented (PR/BO)
3. Type III Research: Secondary Research Science oriented (SR/SO)
4. Type IV Research: Secondary Research, Business oriented (SR/BO)

**Table A2-**  
**Number of Mentions**

Problem Type	Number of Mentions
Type I Research: Primary Research, Science Oriented (PR/SO)	14
Type II Research: Primary Research , Business Oriented (PR/BO)	3
Type III Research: Secondary Research Science oriented (SR/SO)	3
Type IV Research: Secondary Research ,Business Oriented (SR/BO)	4

**A-3**  
**Harrisburg Data Categorized by Priority Problems**

**Table A3**

Priority Problems		
1	2	3
Most Important Problem	Second Most Important Problem	Third most important problem
Consumer research examining why there is a decline in purchasing real trees	The Phytophthora Root rot problem	Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field
Research to eradicate bad insects, e.g. White pine weevil	Research into elements of business profitability what works? How to do it?	Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.
Selection of business management software optimum for industry	Research into elements of business profitability what works? How to do it?	Advertising : need to document best advertising practices in the industry
Research into causes of the dieback leader problem on the Douglas fir Douglas Fir Leader dieback	Exotic firs that tolerate various soil conditions	Consumer research examining why there is a decline in purchasing real trees
Research of the adaptability of various species to PA climate (compare tree in indigenous settings)	Research into general problem of chemicals being taken off the market ( broad spectrum's) by EPA Need newer chemicals to replace them	Research of growth regulators for Douglas Fir ( to make a better tree)
The Phytophthon Root rot problem	Rhodocline ( Douglas Fir)	Research into spruce needle rust control

)

## Appendix B

### B-1 Indiana Data Listing of Problems

**Table B1**

<u>List of Problems cited.</u>	<u>Type of Problem</u>
1. Research to improve control of insects and diseases in trees	Type I (PR/SO)
2. Marketing/ consumer research to promote “real trees’ to younger generation (5 – 18 year olds)	Type II (PR/BO)
3. Research the chemical labeling problem – losing available chemicals to government regulations without replacements.	Type III (SR/SO)
4. Research to develop a scouting system (guidelines and procedures) to identify pest problems	Type III (SR/SO)
5. Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	Type III (SR/SO)
6. Consumer research to increase sales in PA	Type II (PR/BO)
7. Research to develop a flame retardant spray that doesn’t dry out cut trees	Type II (PR/BO)
8. Needle retention study on Canaan fir (what would improve the trees needle retention?)	Type I (PR/SO)
9. Consumer research of the public image of the Christmas tree industry	Type II (PR/BO)
10. Genetic research to find Nordman and Noble fir that will grow well in PA	Type I (PR/SO)
11. Product Development of a tree species that will grow in PA ( find the next Fraser Fir)	Type II (PR/BO)

12. More reliable and consistent research on the problem of the White Pine weevil	Type I (PR/SO)
13. Research that documents optimum fertilization practices for popular trees grow in PA )	Type III (SR/SO)
14. ----Research data base on Christmas trees ( How to )	Type IV (SR/BO)
15. Consumer research on internet/web marketing of product ( best practices)	Type IV (SR/BO)
16. Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy	Type II (PR/BO)
17. Study of the long term ( 8-10 years) supply and demand characteristics of the industry ( impact on future sales)	Type IV (SR/BO)
18. The labor shortage: why and what to do about it	Type II (PR/BO)
19. Research turning unsold trees into bio-energy	Type II (PR/BO)
20. Research of greater productivity in industry ( to make labor, equipment, more profitable)	Type II (PR/BO)
21. Research to develop best procedures/ practices for shearing Fraser fir throughout life cycle	Type IV (SR/BO)
22. Research to develop a non toxic systemic chemical that will kill B.T.A.	Type I (PR/SO)

**B-2**  
**Indiana Data Categorized by Problem Type**

1. Type I Research: Primary Research, Science Oriented (PR/SO)
2. Type II Research: Primary Research, Business Oriented (PR/BO)
3. Type III Research: Secondary Research Science Oriented (SR/SO)
4. Type IV Research: Secondary Research, Business Oriented (SR/BO)

**Table B2**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	5
Type II Research: Primary Research , Business Oriented (PR/BO)	9
Type III Research: Secondary Research Science oriented (SR/SO)	4
Type IV Research: Secondary Research ,Business Science Oriented (SR/BO)	4

**B-3**  
**Indiana Data Categorized by Priority Problems**

**Table B3**

Priority Problems		
1	2	3
Most Important Problem	Second Most Important Problem	Third most important problem
Research the chemical labeling problem – losing available chemicals to government regulations without replacements.	Needle retention study on Canaan fir (what would improve the trees needle retention?)	Research data base on Christmas trees ( How to )
Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	Study of the long term ( 8-10 years) supply and demand characteristics of the industry ( impact on future sales)	Consumer research on internet/web marketing of product ( best practices)
Consumer research to increase sales in PA	Needle retention study on Canaan fir (what would improve the trees needle retention?)	Product Development of a tree species that will grow in PA ( find the next Fraser Fir)
Genetic research to find Nordman and Noble fir that will grow well in PA	Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio—energy
Needle retention study on Canaan fir (what would improve the trees needle retention?)	Research to develop a flame retardant spray that doesn't dry out cut trees	The labor shortage: why and what to do about it
Research to improve control of insects and diseases in trees	Needle retention study on Canaan fir (what would improve the trees needle retention?)	Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy

## **Appendix C**

### **State College**

**(Based on Interview with Professor Rick Bates)**

#### **C1-- Major Categories of Research in the Industry**

**In terms of research in this field, there are three areas that need to be addressed in an ongoing fashion. Generally they fall into the broad areas of**

- 1. Business Management**
- 2. Pest Management**
- 3. Cultural Management**

##### **1. Business Management**

- **Risk Management**
- **Risk reduction**
- **Marketing**
- **Financial Management**

**A lot of the business management issues (and the other two areas) would benefit from some kind of umbrella business management system. A lot of the information being worked on needs disseminated to reach people who will actually use it.**

##### **2. Pest Management --**

**Pests themselves organize the priorities**

- **weeds**
- **insects**
- **diseases**

**For each of these in terms of research there needs to be someone doing what could be called “first responders.” If there is a new insect pest in the state, someone needs to put out an alert, someone needs to start**

**doing scouting, and someone needs to start testing products, monitoring new chemicals. For block buster crops like corn there are many people working on it, but a specialty crop like Christmas trees it is harder to put a research team together. The problem is not having qualified people available to address specific pest issues related to Christmas trees (e.g. at PSU no plant pathologist that works with Christmas Trees).**

**3. Cultural Management --**

**Related to things like how you grow Christmas trees, fertility of soils, shearing, pruning, post harvest issues, growth regulators, -- problems of a biological nature. Cultural management includes everything from propagation, planting stock to planting procedures, genetic improvement, and post harvesting handling.**

- **Getting to the Priorities**

**With pest mgt, the pests themselves organize the priorities – the severity and economic loss related to the pest dictates whether it is a priority or not –e.g. plum pox in apples. Among the three categories there is no good way to establish a hierarchy of priorities, i.e. pest care not necessarily more important than business management issues.**

**Table C-1**

<b>Major Categories of Research in the Industry</b>	
<b>Category of Research</b>	<b>Examples</b>
<b>Business Management</b>	<ul style="list-style-type: none"> <li>• <b>Risk Management</b></li> <li>• <b>Risk reduction</b></li> <li>• <b>Marketing</b></li> <li>• <b>Financial Management</b></li> </ul>
<b>Pest Management</b>	<ul style="list-style-type: none"> <li>• <b>weeds</b></li> <li>• <b>insects</b></li> <li>• <b>diseases</b></li> </ul>
<b>Cultural Management</b>	<ul style="list-style-type: none"> <li>• <b>how you grow trees</b></li> <li>• <b>fertility of soils</b></li> <li>• <b>shearing, pruning</b></li> <li>• <b>post harvest issues</b></li> <li>• <b>growth regulators</b></li> </ul>

**C2—Problem priorities from the academic perspective  
(Rick Bates)**

**1. Information Management**

**There needs to be some kind of ongoing efforts related to information management. Under information management would be the discussion forum. More information management needs to be done. Some things are now available –PSU has a Christmas tree web page, PCTGA has a web page and the national has one.**

**(Relationship between national and state) (NCTA) There are also umbrella liaisons and committees ( fee based source of funds).**

**Categories of Information Management**

- **Web based information sharing**
- **Growers forums**
- **National's research clearing house**

**2. Cultural Management**

**The Christmas tree industry is a business that needs a new product or two to roll out and develop**

- **New trees**
- **New uses for existing trees**
- **Improvement on existing species**
- **Testing of potential species**
- **New ways to use the product**

**3. Need to regionalize our research efforts in the northeast – regional rather than the state. Coordination among state services and academic entities. Creating a loose association of individuals involved with the industry research that maintain communication, share results, collaboration on projects.**

### **C3— Dissemination of Secondary research**

**The national Christmas tree grower association is developing a clearing house for published results relating to the Christmas tree industry – probably start with refereed journals –and may be expanded**

- **A related thing that would really be useful is a forum or discussion board, statewide regional or even national (interactive) to address the kinds of business and other practical topics members may have (maybe different rooms within a larger forum. It would require a broad base of users on the forum to make it useful. Issues to work out now unknown: the cost of hardware, costs of hardware, logistics, etc. One way to do it is set up a subscription basis.**
- **Beyond a listing of research topics, a subsequent step is necessary to determine A. what secondary research may have already been done and B. what research is feasible of research that is desirable (can something be done?). And then an additional step would be to prioritize those researchable topics that remain. So this is a first step.**

**Table C-2**

Priority Problems		
1	2	3
Most Important Problem	Description of Problem	Example of Problem/Solution
<b>Information Management Type IV (SR/BO)</b>	<b>Ongoing efforts related to information management</b>	<b>Growers forums</b>
<b>Cultural Management Type II PR/BO)</b>	<b>A new product or two to roll out and develop</b>	<b>New ways to use the product</b>
<b>Need to regionalize our research efforts in the northeast – Type IV (SR/BO)</b>	<b>Regional rather than the state. Coordination among state services and academic entities.</b>	<b>Creating a loose association of individuals involved with the industry research</b>
<b>Dissemination of Secondary research Type IV (SR/BO)</b>	<b>Clearing house for published results relating to Christmas tree industry</b>	<b>Forum or discussion board, statewide regional or even national</b>

## Appendix D

### D1 Bloomsburg Data Listing of Problems

**Table D-1**

<u>List of Problems cited.</u>	<u>Type of Problem</u>
1. Insect Control e.g. elongated hemlock scale	Type I (PR/SO)
2. Eliminate drop cones on Fraser Firs	Type I (PR/SO)
3. Research to develop a natural non toxic insect repellent	Type I (PR/SO)
4. Consumer Research into the question of why we are losing market share/declining purchase of live trees.	Type II (PR/BO)
5. Research into question of whether there should be a standard for cut trees( regulated by state)	Type II (PR/BO)
6. Develop better needle retention for Canaan firs	Type I (PR/SO)
7. Develop a better variety of trees for PA (e.g. Norman Fir)	Type I (PR/SO)
8. Research to provide members with full and timely information on new chemicals, fungicides, and herbicides	Type III (SR/SO)
9. Research into methods of chemical or mechanical shearing of Fraser Firs	Type III (SR/SO)
10. Encouraging Plant Pathology at PSU to get back involved in doing research(last was Scotch Pine)	Type I (PR/SO)
11. Genetic research to find new (varieties)trees that can grow in PA	Type I (PR/SO)

12. Research with recommendations about nutrients and fertilizers –their use, efficacy and timing (what works best?)	Type III (SR/SO)
13. Research that addresses product promotion, advertising and marketing issues (how to sell it?)	Type II (PR/BO)
14. Disease Control research.	Type I (PR/SO)
15. Causes and cures for Phytophthora Root rot ( soil borne )	Type I (PR/SO)
16. Research re the chemical residue left on cut trees (Baseline: how much now is actually left; what should standard be?)	Type III (SR/SO)
17. Research to identify why industry is not more influential in Harrisburg ( e.g. in . legislation)	Type IV (SR/BO)
18. Research re use of chemical mowing ( to spray herbicide between rows to stunt grass)	Type III (SR/SO)
19. Research to develop a state seed forest ( to develop more varieties)	Type I (PR/SO)
20. Research into labor shortage – (migrant laborers) in industry (why does it exist and what to do about it?)	Type IV (SR/BO)
21. Document the costs of raising a tree from start to finish	Type II (PR/BO)

**D-2**  
**Bloomsburg Data Categorized by Problem Type**

1. Type I Research: Primary Research, Science Oriented (PR/SO)
2. Type II Research: Primary Research, Business Oriented (PR/BO)
3. Type III Research: Secondary Research Science Oriented (SR/SO)
4. Type IV Research: Secondary Research, Business Oriented (SR/BO)

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	10
Type II Research: Primary Research , Business Oriented (PR/BO)	4
Type III Research: Secondary Research Science oriented (SR/SO)	5
Type IV Research: Secondary Research , Business Oriented (SR/BO)	2

**D3**  
**Bloomsburg Data Categorized by Priority Problems**

**Table D-3**

1	2	3
Most Important Problem	Second Most Important Problem	Third most important problem
Genetic research to find trees that can grow in PA	Consumer Research into question of why we are losing market share (declining purchase of live trees).	Document the costs of raising a tree from start to finish
Eliminate drop cones on Fraser Firs	Research to develop a natural non toxic insect repellent	Research into labor shortage in industry (why is it happening and what to do about it?)
Research with recommendations about use, efficacy and timing of fertilizers	Research into question of whether there should be a standard for cut trees( regulated by state)	Research into methods of chemical or mechanical shearing of Fraser Firs
)Consumer Research into question of why we are losing market share (declining purchase of live trees).	Research re the chemical residue left on cut trees (how much is actually left; what should standard be?	Genetic research to find trees that can grow in PA
Genetic research to find trees that can grow in PA	Encouraging Plant Pathology at PSU to get back involved in doing research	Insect Control e.g. elongated hemlock scale
Insect Control e.g. elongated hemlock scale	Eliminate drop cones on Fraser Firs	)Consumer Research into question of why we are losing market share (declining purchase of live trees).
Research to develop a natural non toxic insect repellent	Consumer Research into question of why we are losing market share (declining purchase of live trees).	Encouraging Plant Pathology at PSU to get back involved in doing research
Insect Control e.g. elongated hemlock scale	Research to develop a natural non toxic insect repellent	Encouraging Plant Pathology at PSU to get back involved in doing research
Insect Control e.g. elongated hemlock scale	Document the costs of raising a tree from start to finish	Consumer Research into question of why we are losing market share (declining purchase of live trees).

## Appendix E

**Table E-1**

Type I Research:	
Primary Research, Science Oriented	
(PR/SO)	
Listed Problem	Source of Problem Listing
Research to eradicate bad insects, e.g. White pine weevil	<i>Harrisburg</i>
Exotic firs that tolerate various soil conditions	<i>Harrisburg</i>
Research of growth regulators for Douglas Fir ( to make a better tree)	<i>Harrisburg</i>
Phytophthora Root rot problem	<i>Harrisburg</i>
Research needle retention in exotic firs	<i>Harrisburg</i>
Research of the Douglas Fir needle midge ( only host for midge is the Douglas Fir	<i>Harrisburg</i>
Rhadoocone ( Douglas Fir)	<i>Harrisburg</i>
Research into causes of the dieback leader problem on the Douglas fir( Douglas Fir Leader dieback)	<i>Harrisburg</i>
research of the elongate hemlock scale ( a specific pest)	<i>Harrisburg</i>
Research into spruce needle rust control	<i>Harrisburg</i>
Continue research into weed control ( Kuhn's research)	<i>Harrisburg</i>
tissue culture research of the rocky mountain strain of the Douglas Fir	<i>Harrisburg</i>
Research tracking best genetic seed source in the industry	<i>Harrisburg</i>
Research to improve control of insects and diseases in trees	<i>Indiana</i>
Needle retention study on Canaan fir (what would improve the trees needle retention?)	<i>Indiana</i>
Genetic research to find Nordman and Noble fir that will grow well in PA	<i>Indiana</i>
More reliable and consistent research on the problem of the White Pine weevil	<i>Indiana</i>
Research to develop a non toxic systemic chemical that will kill B.T.A.	<i>Indiana</i>
Insect Control e.g. elongated hemlock scale	<i>Bloomsburg</i>
Eliminate drop cones on Fraser Firs	<i>Bloomsburg</i>

Research to develop a natural non toxic insect repellent	<i>Bloomsburg</i>
Develop better needle retention for Canaan firs	<i>Bloomsburg</i>
Develop a better variety of trees for PA (e.g. Norman Fir)	<i>Bloomsburg</i>
Encouraging Plant Pathology at PSU to get back involved in doing research(last was Scotch Pine)	<i>Bloomsburg</i>
Genetic research to find new (varieties)trees that can grow in PA	<i>Bloomsburg</i>
Disease Control research	<i>Bloomsburg</i>
Causes and cures for Phytophthera Root ( soil borne)	<i>Bloomsburg</i>
Research to develop a state seed forest ( to develop more varieties)	<i>Bloomsburg</i>

## Appendix F

### Table F-1

Type II Research:	
Primary Research, Business Oriented	
(PR/BO)	
Listed Problem	Source of Problem Listing
Research into elements of business profitability What works? How to do it?	<i>Harrisburg</i>
Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field	<i>Harrisburg</i>
Research of the adaptability of various species to PA climate (compare tree in indigenous settings )	<i>Harrisburg</i>
Marketing/ consumer research to promote “real trees’ to younger generation (5 – 18 year olds)	<i>Indiana</i>
Research to develop a flame retardant spray that doesn’t dry out cut trees	<i>Indiana</i>
Consumer research of the public image of the Christmas tree industry	<i>Indiana</i>
Consumer research to increase sales in PA	<i>Indiana</i>
	<i>Indiana</i>
Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy	<i>Indiana</i>
The labor shortage: why and what to do about it	<i>Indiana</i>
Research turning unsold trees into bio-energy	<i>Indiana</i>
Research of greater productivity in industry ( to make labor, equipment, more profitable)	<i>Indiana</i>
A new product or two to roll out and develop New ways to use the product	<i>State College</i>
Information Management such as growers forums	<i>State College</i>
Consumer Research into the question of why we are losing market share/declining purchase of live trees.	<i>Bloomsburg</i>
Research into question of whether there should be a standard for cut trees( regulated by state)	<i>Bloomsburg</i>
Research that addresses product promotion, advertising and marketing issues (how to sell it?)	<i>Bloomsburg</i>
Document the costs of raising a tree from start to finish	<i>Bloomsburg</i>
Need to regionalize our research efforts in the northeast – Coordination among state services and academic entities.	<i>State College</i>
Dissemination of Secondary research / clearing house for published results relating to Christmas tree industry	<i>State College</i>

## Appendix G

### Table G-1

Type III Research: Secondary Research Science Oriented (SR/SO)	
Listed Problem	Source of Problem Listing
Research into general problem of chemicals being taken off the market ( broad spectrum's) by EPA Need newer chemicals to replace them	<i>Harrisburg</i>
Research into methods for improving profitability of farm and equipment e.g. to sell firewood, sell mulch, sell topsoil, landscaping, etc	<i>Harrisburg</i>
Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry	<i>Harrisburg</i>
Research the chemical labeling problem – losing available chemicals to government regulations without replacements.	<i>Indiana</i>
Research to develop a scouting system (guidelines and procedures) to identify pest problems	<i>Indiana</i>
Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	<i>Indiana</i>
Research that documents optimum fertilization practices for popular trees grown in PA	<i>Indiana</i>
Research with recommendations about nutrients and fertilizers –their use, efficacy and timing (what works best?)	<i>Bloomsburg</i>
Research re the chemical residue left on cut trees (Baseline: how much now is actually left; what should standard be?)	<i>Bloomsburg</i>
Research re use of chemical mowing ( to spray herbicide between rows to stunt grass)	<i>Bloomsburg</i>
Research to provide members with full and timely information on new chemicals, fungicides, and herbicides	<i>Bloomsburg</i>
Research into methods of chemical or mechanical shearing of Fraser Firs	<i>Bloomsburg</i>

## Appendix H

**Table H-1**

**Type IV Research:  
Secondary Research, Business Oriented  
(SR/BO)**

Listed Problem	Source of Problem Listing
Selection of business management software optimum for industry	<i>Harrisburg</i>
Insurance industry practices : determine insurance coverage for cut trees—implications for the industry	<i>Harrisburg</i>
Consumer research examining why there is a decline in purchasing real trees	<i>Harrisburg</i>
Research best opportunities for growers to pool resources, to leverage discounts from suppliers (e.g.) buying	<i>Harrisburg</i>
Research data base on Christmas trees ( How to )	<i>Indiana</i>
Consumer research on internet/web marketing of product ( best practices)	<i>Indiana</i>
Study of the long term ( 8-10 years) supply and demand characteristics of the industry ( impact on future sales)	<i>Indiana</i>
Research to develop best procedures/ practices for shearing Fraser fir throughout life cycle	<i>Indiana</i>
Information Management such as growers forums	<i>State College</i>
Need to regionalize our research efforts in the northeast – Coordination among state services and academic entities.	<i>State College</i>
Dissemination of Secondary research / clearing house for published results relating to Christmas tree industry	<i>State College</i>
Research to identify why industry is not more influential in Harrisburg ( e.g. in legislation)	<i>Bloomsburg</i>
Research into labor shortage – (migrant laborers) in industry (why does it exist and what to do about it?)	<i>Bloomsburg</i>

## Appendix I

### All Groups Data Categorized by Problem Type

1. Type I Research: Primary Research, Science Oriented (PR/SO)
2. Type II Research: Primary Research, Business Oriented (PR/BO)
3. Type III Research: Secondary Research Science Oriented (SR/SO)
4. Type IV Research: Secondary Research, Business Oriented (SR/BO)

**Table I-1**

<b>Problem Type</b>	<b>Number of Mentions</b>
Type I Research: Primary Research, Science Oriented (PR/SO)	Total Type I = <b>29 Problems</b>
Type II Research: Primary Research , Business Oriented (PR/BO)	Total Type II = <b>17 Problems</b>
Type III Research: Secondary Research Science oriented (SR/SO)	Total Type III = <b>12 Problems</b>
Type IV Research Secondary Research , Business Oriented (SR/BO)	Total Type IV = <b>13 Problems</b>

**Problem Types Compared for individual groups**  
HARRISBURG --- INDIANA --- STATE COLLEGE --- BLOOMSBURG  
**Table I-2**

Problem Type	Number of Mentions			
	HAR	IND	STCOL	BLOOMS
Type I Research: Primary Research, Science Oriented (PR/SO)	14	5	0	10
Type II Research: Primary Research , Business Oriented (PR/BO)	3	9	1	4
Type III Research: Secondary Research Science oriented (SR/SO)	3	4	0	5
Type IV Research Secondary Research , Business Oriented (SR/BO)	4	4	3	2

**Appendix J**

**Comprehensive listing of Most Important Priority Problems  
From all Groups Categorized by  
1st  
2nd  
3rd**

**Table J1**

Priority Problems		
1	2	3
Most Important Problem	Second Most Important Problem	Third most important problem
Consumer research examining why there is a decline in purchasing real trees	The Phytophthera Root rot problem	Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field
Research to eradicate bad insects, e.g. White pine weevil	Research into elements of business profitability what works? How to do it?	Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.
Selection of business management software optimum for industry	Research into elements of business profitability what works? How to do it?	Advertising : need to document best advertising practices in the industry
Research into causes of the dieback leader problem on the Douglas fir( Douglas Fir Leader dieback)	Exotic firs that tolerate various soil conditions	Consumer research examining why there is a decline in purchasing real trees
Research of the adaptability of various species to PA climate (compare tree in indigenous settings)	Research into general problem of chemicals being taken off the market ( broad spectrum's) by EPA Need newer chemicals to replace them	Research of growth regulators for Douglas Fir ( to make a better tree)
The Phytophthera Root rot problem	Rhodocline ( Douglas Fir)	Research into spruce needle rust control
Research the chemical labeling problem – losing available chemicals to government regulations without replacements.	Needle retention study on Canaan fir (what would improve the trees needle retention?)	Research data base on Christmas trees ( How to )
Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	Study of the long term ( 8-10 years) supply and demand characteristics of the industry ( impact on future sales)	Consumer research on internet/web marketing of product ( best practices)
Consumer research to increase sales in PA	Needle retention study on Canaan fir (what would improve the trees needle retention?)	Product Development of a tree species that will grow in PA ( find the next Fraser Fir)

Genetic research to find Nordman and Noble fir that will grow well in PA	Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.	Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio—energy
Needle retention study on Canaan fir (what would improve the trees needle retention?)	Research to develop a flame retardant spray that doesn't dry out cut trees	The labor shortage: why and what to do about it
Research to improve control of insects and diseases in trees	Needle retention study on Canaan fir (what would improve the trees needle retention?)	Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio-- energy
Information Management	-----	-----
Cultural Management	-----	-----
Need to regionalize our research efforts in the northeast –	-----	-----
Dissemination of Secondary research	-----	-----

Genetic research to find trees that can grow in PA	Consumer Research into question of why we are losing market share (declining purchase of live trees).	Document the costs of raising a tree from start to finish
Eliminate drop cones on Fraser Firs	Research to develop a natural non toxic insect repellent	Research into labor shortage in industry (why is it happening and what to do about it?)
Research with recommendations about use, efficacy, and timing of fertilizers	Research into question of whether there should be a standard for cut trees( regulated by state)	Research into methods of chemical or mechanical shearing of Fraser Firs
Consumer Research into question of why we are losing market share (declining purchase of live trees)	Research re the chemical residue left on cut trees (how much is actually left; what should standard be?)	Genetic research to find trees that can grow in PA
Genetic research to find trees that can grow in PA	Encouraging Plant Pathology at PSU to get back involved in doing research	Insect Control e.g. elongated hemlock scale
Insect Control e.g. elongated hemlock scale	Eliminate drop cones on Fraser Firs	Consumer Research into question of why we are losing market share (declining purchase of live trees).
Research to develop a natural non toxic insect repellent	Consumer Research into question of why we are losing market share (declining purchase of live trees)	Encouraging Plant Pathology at PSU to get back involved in doing research
Insect Control e.g. elongated hemlock scale	Research to develop a natural non toxic insect repellent	Encouraging Plant Pathology at PSU to get back involved in doing research
Insect Control e.g. elongated hemlock scale	Document the costs of raising a tree from start to finish	Consumer Research into question of why we are losing market share (declining purchase of live trees).

<b>First Priority Problems By Problem Type</b>
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**Table J2**

	Type I (PR/SO)	Type II (PR/BO)	Type III (SR/SO)	Type IV (SR/BO)
Consumer research examining why there is a decline in purchasing real trees		<b>x</b>		
Research to eradicate bad insects, e.g. White pine weevil	<b>x</b>			
Selection of business management software optimum for industry				<b>x</b>
Research into causes of the dieback leader problem on the Douglas fir( Douglas Fir Leader dieback)	<b>x</b>			
Research of the adaptability of various species to PA climate (compare tree in indigenous settings)		<b>x</b>		
Phytophthora Root rot problem	<b>x</b>			
Genetic research to find trees that can grow in PA		<b>x</b>		
Eliminate drop cones on Fraser Firs		<b>x</b>		
Research with recommendations about use, efficacy and timing of fertilizers				<b>x</b>
Consumer Research into question of why we are losing market share (declining purchase of live trees).		<b>x</b>		
Genetic research to find trees that can grow in PA		<b>x</b>		

Insect Control e.g. elongated hemlock scale	<b>x</b>			
Research to develop a natural non toxic insect repellent		<b>x</b>		
Research the chemical labeling problem – losing available chemicals to government regulations without replacements.				<b>x</b>
Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.		<b>x</b>		
Consumer research to increase sales in PA		<b>x</b>		
Genetic research to find Nordman and Noble fir that will grow well in PA		<b>x</b>		
Needle retention study on Canaan fir (what would improve the trees needle retention?)		<b>x</b>		
Research to improve control of insects and diseases in trees	<b>x</b>			
Information Management				<b>x</b>
Cultural Management		<b>x</b>		
Need to regionalize our research efforts in the northeast				<b>x</b>
Dissemination of Secondary research				<b>x</b>

**Second Priority Problems  
By  
Problem Type**

**Table J3**

	<b>Type I (PR/SO)</b>	<b>Type II (PR/BO)</b>	<b>Type III (SR/SO)</b>	<b>Type IV (SR/BO)</b>
The Phytophthera Root rot problem	<b>x</b>			
Research into elements of business profitability what works? How to do it?				<b>x</b>
Exotic firs that tolerate various soil conditions	<b>x</b>			
Research into general problem of chemicals being taken off the market ( broad spectrum's) by EPA Need newer chemicals to replace them				<b>x</b>
Rhadocline ( Douglas Fir)		<b>x</b>		
Needle retention study on Canaan fir (what would improve the trees needle retention?)		<b>x</b>		
Study of the long term ( 8-10 years) supply and demand characteristics of the industry ( impact on future sales)		<b>x</b>		
Needle retention study on Canaan fir (what would improve the trees needle retention?)		<b>x</b>		
Research to document cost of planting Fraser Fir, Douglas fir, Canaan fir – from planting to harvest.		<b>x</b>		
Research to develop a flame retardant spray that doesn't dry out cut trees		<b>x</b>		

Consumer Research into question of why we are losing market share (declining purchase of live trees).		<b>x</b>		
Research to develop a natural non toxic insect repellent		<b>x</b>		
Research into question of whether there should be a standard for cut trees( regulated by state)				<b>x</b>
Research re the chemical residue left on cut trees (how much is actually left; what should standard be?		<b>x</b>		
Encouraging Plant Pathology at PSU to get back involved in doing research	<b>x</b>			
Eliminate drop cones on Fraser Firs		<b>x</b>		
Consumer Research into question of why we are losing market share (declining purchase of live trees).		<b>x</b>		
Document the costs of raising a tree from start to finish		<b>x</b>		

**Third Priority Problems  
By  
Problem Type**

**Table J4**

	<b>Type I (PR/SO)</b>	<b>Type II (PR/BO)</b>	<b>Type III (SR/SO)</b>	<b>Type IV (SR/BO)</b>
Research into best planting care techniques for survivability of trees from nurseryman to transplants in the field		<b>x</b>		
Research into opportunities and challenges of carrying on public education of young people re Christmas tree industry.				<b>x</b>
Advertising : need to document best advertising practices in the industry				<b>x</b>
Consumer research examining why there is a decline in purchasing real trees		<b>x</b>		
Research of growth regulators for Douglas Fir ( to make a better tree)		<b>x</b>		
Research into spruce needle rust control	<b>x</b>			
Research data base on Christmas trees ( How to )				<b>x</b>
Consumer research on internet/web marketing of product ( best practices				<b>x</b>
Product Development of a tree species that will grow in PA (find the next Fraser Fir)		<b>x</b>		

Research new product development / new uses for Christmas trees /expand market beyond trees, e.g. bio—energy		<b>x</b>		
The labor shortage: why and what to do about it				<b>x</b>
Document the costs of raising a tree from start to finish		<b>x</b>		
Research into labor shortage in industry (why is it happening and what to do about it?)				<b>x</b>
Research into methods of chemical or mechanical shearing of Fraser Firs				<b>x</b>
Genetic research to find trees that can grow in PA		<b>x</b>		
Insect Control e.g. elongated hemlock scale	<b>x</b>			
Consumer Research into question of why we are losing market share (declining purchase of live trees).		<b>x</b>		
Encouraging Plant Pathology at PSU to get back involved in doing research	<b>x</b>			