l'accroissement de population du puceron après l'établissement. Ces résultats peuvent être applicables aux insectes perceurs et suceurs qui se nourrissent des arbres et des arbustes.

Zusammenfassung: Das Düngen von *Tsuga canadensis* mit Stickstoff in einer Forstplantage in Connecticut hat das Populationswachstum von *Adelges tsugae* angeregt. Der Prozentzahl von den überlebenden Nymphen und Eiproduktion unter den Erwachsenen *A. tsugae* war zweimal so groß bei den gedüngten *T. canadensis* als bei den ungedüngten. Gedüngte *T. canadensis* hatten fünfmal so viel *A. tsugae*, unterlegene Färbung und 25 Prozent weniger Neuwachstum nach der ersten *A. tsugae* Generation im Vergleich mit den ungedüngten Bäumen. Es gab keinen Unterschied zwischen Bäumen, die seit 6 Monaten vor der Verseuchung mit *A. tsugae* gedüngt worden waren, und Bäumen, die zur gleichen Zeit gedüngt und verseucht worden waren. Das Stickstoffdüngen von *T. canadensis* hat weder Wirtsresistenz gegenüber *A. tsugae* erhöht, noch die *A. tsugae* Population nach der Gründung unterdrückt. Diese Resultate darf man insgesamt auf steckenden und saugenden Insekten, die sich an Bäume und Büsche nähren, beziehen.

THE FUTURE OF ISA RESEARCH[1]

by Hyland R. Johns

Abstract. Research in arboriculture is taking new directions under ISA leadership. As a three billion dollar industry, we need to do much more for research and education—and get the results out to the users. We must increase our commitment, because we're investing in our own future. This is a challenge for every member of ISA, and will increase our professionalism in the field. We must identify and prioritize research and education needs, then find the money to support those needs.

Prospects for the future of arboriculture research are exciting! Of course, no one knows the future; but then the future never really comes. The future is now, and we're facing urgent research and education needs.

Early beginnings. Formal support of research by the ISA began in 1975, when the Trust was organized with O.J. Anderson, John Duling, Gene Himelick, Hyland Johns and Jack Rogers as Trustees. Five grants of $500 each were made that first year.

In just 15 years, we've awarded 162 grants totalling nearly a quarter of a million dollars throughout the United States, Canada and other countries. That's a good beginning, but it's not enough for today, or the future.

We're a three billion dollar industry, and we need to do much more for research and education. That's why the ISA has begun a million dollar campaign for the Trust. While the all-industry

1. Presented at the annual conference of the International Society of Arboriculture in Toronto in August 1990.

average for research and development is 3.4% of revenues annually, arboriculture supports less than one half of 1.0% (Fig. 1). We should do seven times as much each year just to be average.

It's a tough, changing and challenging world out there, but we're "INVESTING IN OUR FUTURE". Innovation in arboriculture must be achieved through research and education; that's the challenge for all of us: researchers, educators and practicing arborists. "Challenge" because a recent survey of attitudes and beliefs was made for the ISA and NAA (National Arborists Association). Typical reactions from arborists showed little interest or concern for research. Perhaps we take trees for granted.

ISA Mission. The ISA Mission statement calls for worldwide awareness of professional tree care through research and education, and we have not kept pace. Like it or not, we in arboriculture have an identity problem. Another recent survey showed that 80% of the public goes to a local garden center for information on trees!

We have a big job to do, and we have to begin with ourselves. Research, education and demonstration will help achieve professionalism while fostering greater public awareness.

We must get the RESULTS of research out to the users. Research without education is of little value; "technology transfer" is the government term. But the goal of all of us, commercial, utility, consultant, municipal or academic must be closer cooperation.

Identify needs. We can work much more closely together in identifying research needs. We can strive for a working partnership with more of a marketing approach. Arborists are really the clients (customers) of researchers and educators, and developing that participative partnership can be a new paradigm for arboriculture. AREA researchers and educators can play an important part.

The ISA Trust hopes for a new leadership role by organizing a national research summit. This can bring representatives of green industry organizations together to identify and prioritize research needs. We've already begun with the ISA through a brainstorming session early this year, and a member survey conducted last summer.

ISA and the NAA have different research and education needs, and overlap in only a few areas such as Integrated Plant Management (IPM) efforts (Fig. 2)

Trees are the solution. National street tree surveys have shown how much needs to be done to fill the thousands of miles of streets without trees. Newspapers, magazines, radio and TV have given tremendous coverage of current problems of global warming, air pollution, heat islands in cities, etc. President Bush's tree planting program, America the Beautiful, along with Global Releaf and other efforts are leading the way. TREES ARE THE SOLUTION. But there is a crying need for more information as to proper

R & D SCOREBOARD

INDUSTRY	R & D
AUTO	3.2%
CHEMICALS	3.6%
CONSUMER PRODUCTS	1.6%
FOOD	0.7%
HEALTH CARE	8.2%
SERVICE INDUSTRIES	1.2%
ALL INDUSTRY	3.4%

Figure 1

INNOVATION IN ARBORICULTURE
THROUGH RESEARCH AND EDUCATION

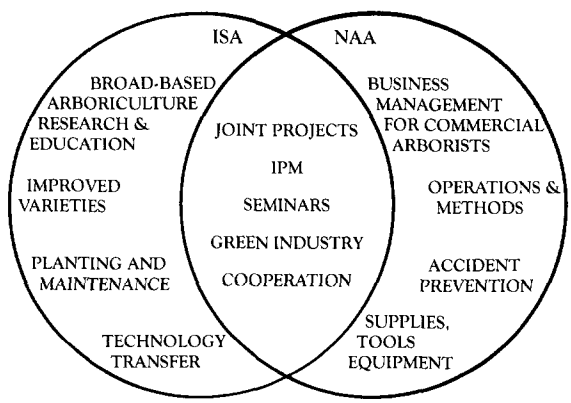

Figure 2

species, planting, and care—all to insure better survival for trees and for us.

Investing in our future. The ISA and its Research Trust is providing more leadership in identifying and funding critical needs for research, education, and demonstrations. Investing in our future" benefits all of us. Our million dollar campaign is a good beginning to carry this out.

Chapters and Special Interest Groups can help with their regional or specialized member groups; that's where much of the action is (Fig. 3). For example, our annual meeting draws 1000 to 1200 attendees, while Chapters draw a total of 5000 to 6000 people, a much larger audience.

All of us can pledge our time, our effort and money toward helping finance the million dollar campaign for this year. Every one of us individually can be a part of investing in our own future.

Planning for the future. With current constraints on our economy, families, corporations, government agencies and institutions are all tightening budgets. We should prioritize our needs and stretch our dollars for research and education. We will have to do more strategic planning and allocate our resources carefully. This approach is not only practical, but impresses and influences potential contributors; all of us want to see a good return on our investments.

We can "leverage" our investment too. In many cases, our $2000 grant attracts money from other sources, and may bring from $10,000 to $40,000 additional research money. That's really multiplying buying power!

Partenerships. We want to intensify our research and insure its usefulness to the customers of researchers. In other words, researchers must be "interpreters" for arboricultural research, and together with arborists, demonstrate innovative methods, equipment and new materials to the consuming public. We can accomplish this by forming closer partnerships between practicing arborists and researchers. This will bring us more involvement and more support.

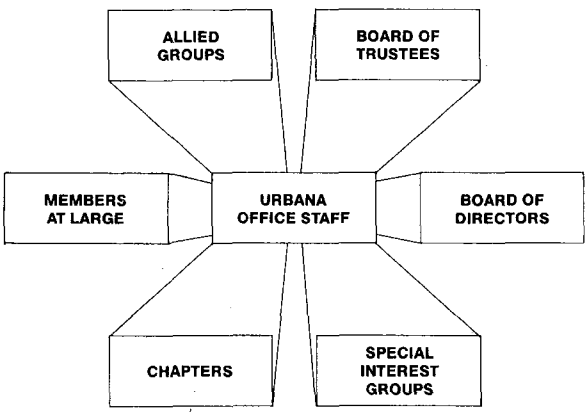

Figure 3

In conclusion then, the future of research in arboriculture can be summed up by our own personal commitment for:

1. Identifying and planning for priority needs
2. Education through demonstrations
3. Expanded funding for innovation
4. Emphasis on cost-effective outcomes
5. Higher levels of training—we're going hi-tech
6. More professionalism to meet encroaching regulatory pressures
7. Multi-disciplinary approach to IPM problems

New concepts and new solutions will come from new funding, implemented by these new partnerships. It's a vision for the future, investing in our own future. And we all can play an important part. We're not just benefiting trees—we're benefiting people now, and for the future—our future.

Chairman, ISA Research Trust
Asplundh Tree Expert Co.
708 Blair Mill Road
Willow Grove, PA 19090

Résumé. La recherche en arboriculture a pris de nouvelles orientations sous le leadership d'ISA. Étant une industrie de trois milliards de dollars, nous avons besoin de faire plus pour la recherche et l'éducation — et faire parvenir les résultats aux utilisateurs. Nous devons accroître notre engagement parce que nous investissons dans notre propre futur. Ceci est un défi pour chaque membre d'ISA et accroîtra notre professionnalisme sur le terrain. Nous devons identifier et accorder la priorité aux besoins en recherche et éducation et ensuite trouver les fonds pour subvenir à ces besoins.

Zusammenfassung: Unter der Führung der ISA nimmt die Forschung der Forstwirtschaft neue Orientierungen. Als eine 3 Milliarden Industrie müssen wir viel mehr für die Forschung und Ausbildung machen, und dann diese Ergebnisse an die Verbraucher liefern. Wir müssen unsere Verpflichtung steigern, weil wir in unserer eigenen Zukunft investieren. Das ist für jeden ISA Mitglied eine Herausforderung und unser professioneller Ruf wird in dem Gebiet wachsen. Wir müssen Forschung- und Ausbildungsbedürfnisse identifizieren und einordnen und danach die Finanzierung finden um diese Bedürfnisse zu unterstützen.