By now you may have a good idea of the name of our recipient. He has received numerous awards and honors for his research and extension work and has freely given much to the International Plant Propagators' Society over many years. Our recipient is a Past President of the Eastern Region, as well as being the incoming IPPS International Board President.

May I present the 1989 Award of Merit to Elton M. Smith.

The Friday morning session convened at 8:00 a.m. with Ralph Shugert serving as Moderator.

COINCIDE: PHENOLOGICAL APPROACH TO PEST MANAGEMENT

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I joined the staff of the Morton Arboretum in 1980 after completing my Ph. D. degree in Plant Pathology at Iowa State University in 1979. While at Iowa State I selected entomology as my major field, with emphasis on pest management as my minor. During the 1970's, Integrated Pest Management (IPM) was a BUZZ word. I translated BUZZ word to mean something that the Federal Government would fund for research. Some faculty positions were established at Iowa State University and elsewhere relating to IPM.

Congress translated IPM as the replacement of chemical pesticides with biological and other means of pest control. Yet, I learned that IPM was only one component of an economic management program for crop production, or forest management, or golf course management, or arboretum management, or whatever.

Ladybugs may be an excellent control for green bugs on a vegetable crop. But where do you get 10 million; how do you disperse them; how do you get them to eat the pest; and how do you prevent them from flying away? What is important is the cost. The cost for control cannot exceed production costs. It is easy to see that economics would call for the most efficient pesticide at the least cost. We are talking about chemical control. At the present time we still rely on MORE chemical pesticides that are toxic to a wide range of animal species than on those directed to a few.

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Fortunately, we are moving in the right direction by removing the most persistent pesticides and those showing an ability to cause cancer or birth defects. But we have a long way to go before we have a *Bacillus thuringensis* that is specific to each of our insect pests. Research on botanical anti-insect compounds, soaps, oils, repellents, and other chemicals shows great promise. The use of biotechnology for the selection of pest-resistant plants and for the infusion of pest-resistant genes into plants also shows great promise. However, replacement is still years away for our standby insecticides of the 80's such as Diazinon, Sevin, Dursban, Malathion, and Orthene, to name a few.

What all this boils down to is that in 1990 we still have to recommend Cygon, Dursban, or Lindane (depending on what state you live in) to "control," actually prevent, the bronze birch borer. Our low-toxicity alternatives are few and far between.

If the situation indicates that a pest population has reached the threshold level for economic damage and chemical control becomes warranted:

1) We must choose the most effective pesticide that has the least toxicity to non-target plants and animals.
2) We must spray when the pest is vulnerable.
3) We must spray only the pest.
4) We must monitor to determine whether the pest is controlled.
5) We must determine the economic gain (or loss).

Our agricultural lands are now paying the price of pesticide abuse. Well water is contaminated with pesticides. Levels of cancer in farmers are increasing. Overuse is based upon an indoctrination that assumes that chemicals will solve our problems, and if 1X is good, 2X is twice as good. This attitude has carried over to urban areas. Many people believe that the best way to control weeds, insects, and diseases is with chemical sprays. The people opposed to pesticide use may be very vocal, but they are in the minority.

SAS: Spray and See. There are still many people in business that apply 3 to 4 cover sprays each year to control insect pests. Many homeowners still think that this is the correct way to take care of their landscape plants. I seriously doubt that one can legally spray all of the landscape plants on the average urban landscape with a single insecticide that will control all the pests. I have seen several properties where 3 or 4 cover sprays are used each year and have still seen birches dying because of bronze birch borers or spruces with heavy mite infestations. Most of the landscapes that I have seen require pest control on only one or two plants, not all the plants. Think of the loss of beneficial and neutral insects. Think of the exposure of the environment to unnecessary chemicals when cover sprays are used. This system should be replaced. We have a

difficult job ahead educating that cover sprays may create more problems than they solve.

SAS: See and Spray. This system is only slightly better than Spray and See. This is based on the observation of insects that is followed by a spray. We are back to 3 to 4 cover sprays, just to make sure the critters do not return. What is often not determined is:

1) whether or not there is an insect pest at all;
2) whether or not the pest is at an economic or aesthetic threshold level

IPM: Integrated Pest Management. There have been numerous studies that clearly demonstrate that IPM programs efficiently and effectively control pests with minimal use of toxic chemicals.

One area of IPM that needs more information is finding the precise time of the vulnerable stage of the insect pest. For example, cottony maple scale can be effectively controlled in the spring with a dormant application of oil. The pest is rarely noticed until after the leaves emerge and the ground, patio, picnic table, car, etc. are covered with sap and sooty mold. By this time the females begin laying eggs in cottony masses that are protected from most insecticides. Also at this time the twice-stabbed lady bug is busy eating the scale eggs. When do people spray? When they see the enlarging cottony masses. They may also see the white fuzzy ladybug larvae and mistake them for scales. The scales are most vulnerable when they hatch. When do they hatch? That depends on where you live. In northern Illinois it is usually early July. According to the Illinois Cooperative Extension recommendations for 1989, to control cottony maple scale: ''Spray acephate, malathion, or diazinon in July after crawlers have hatched; repeat 10 days later. Footnote: Treatment dates are listed for central Illinois (Urbana). In southern Illinois apply 2 weeks earlier and in northern Illinois 2 weeks later''. That is not what I call precision.

Let me give another example: Fletcher scale. Eggs hatch in early summer and the young nymphs are vulnerable to chemical sprays. Over wintering females are also vulnerable during the first warm weather of spring. However, the eggs, which are covered by the female's shell, are not vulnerable to most insecticides. Spraying before egg hatch is worthless and may be harmful to innocent insects. The Extension Service recommendation: ''Apply malathion in early April and repeat in early June. Footnote: Treatment dates the same as for cottony maple scale.

Even if you have a scout-monitoring IPM program it is difficult to know when the crawlers have hatched at every location. Some sites may be near the Lake (Michigan) which has a warmer winter and cooler spring than outlying areas. Again, there is a lack of precision.

Now there is a system that offers precision concerning the timing of the vulnerable stage of an insect pest. This system is also simple, accurate, and ingenious. I refer to **COINCIDE.** **COINCIDE** is based on the phenology of indicator plants and the life cycle of an insect pest. This is not a new concept.

New England farmers learned that it was time to plant corn when the white oak leaf was the size of a squirrel's ear. Morel hunters in the Midwest know it is time to look when the lilacs begin to bloom The shadbush derived its common name because it bloomed when shad (fish) moved upstream.

Synchronous Phenological Indicator (SPI). To my knowledge no one has ever given this phenomenon a name. I refer to it as synchronous phenological indicator or SPI for short.

The life cycle of the insect is closely associated with degree-days or day-degrees (DD). If we know the DD of the egg hatching of cottony maple scale or Fletcher scale, we know when to control. The degree-day value is constant whether you are in Madison, Wisconsin, or Lexington, Kentucky. However, the calendar dates are different.

With an IPM program how do you arrive at the DD at each location? Weather conditions, proximity to the lake, location on the shady side of a building, all will cause it to vary. This can be resolved by linking some indicator plant with the timing of the insect life cycle.

Don Orton, nursery inspector for the Illinois Department of Agriculture, has been inspecting nursery plants in the State of Illinois for over 20 years. He has compiled extensive notes on insect pests of ornamental plants, their vulnerable stage, and some indicator plant that **COINCIDES** with that stage. An indicator plant should:

1) Be common to a wide geographic area (e.g. red maple).
2) Be hardy and easy to grow (e.g. Norway maple).
3) Have a short and well defined indicator, usually its bloom period (e.g. apple serviceberry).
4) Be recognizable from a distance (e.g. saucer magnolia).
5) Be easy to identify and not confused with similar species (e.g. catalpa; crabapples have too many cultivars with too long a bloom period to be good indicators).

Orton uses 54 indicator plants in **COINCIDE.** **COINCIDE** works for cottony maple scale in the following manner. Its crawlers hatch when:

Primary indicator:

hills-of-snow hydrangea (*Hydrangea arborescens* 'Grandiflora') is in full bloom.

Alternative Indicators:
Canada thistle (*Circum arvense*) blooms.
chicory (*Chicorium intybus*) blooms.
wild carrot (*Daucus carota*) blooms.
botlebrush buckeye (*Aesculus parviflora*) blooms.
elderberry (*Sambucus canadensis*) blooms.
yucca (*Yucca filamentosa*) blooms.

Now it is nearly July and you know the location of one of the indicator plants. As *Hydrangea arborescens* 'Grandiflora' begins to bloom the scouts can look for crawlers.

The **SPI** for Fletcher scale is the following. The first spray can be applied when:
Primary indicators:
saucer magnolia (*Magnolia* × *soulangeana*) blooms.
apple serviceberry (*Amelanchier* × *grandiflora*) blooms.
Alternative indicators:
redbud (*Cercis canadensis*) showing color to beginning bloom.
spicebush (*Viburnum carlesii*) beginning bloom.
flowering quince (*Chaenomeles speciosa*) beginning bloom.
white spruce (*Picea glauca*) winter bud caps splitting.
Its nonvulnerable stage occurs when:
horsechestnut (*Aesculus hippocastanum*) is blooming.
prairie crabapple (*Malus ioensis*) is blooming.
Zabel honeysuckle (*Lonicera korolkowii*) is blooming.
Summer crawler stage spray occurs when:
Primary Indicator:
hills-of-snow hydrangea (*Hydrangea arborescens* 'Grandiflora') is in full bloom
Alternative Indicators: Same as above for cottony maple scale.

In case the primary indicator plant is not hardy in one's area, alternative indicators are provided. For ornamental plants **COINCIDE** offers the most complete information on the time of the vulnerable stages of serious insect pests. Those involved in IPM for urban landscapes can increase their efficiency by watching the indicator plants or even planting gardens with indicator plants that coincide with vulnerable stages of insect pests. We have insecticides, we have pesticides, we have miticides, now we have **COINCIDE**.