

Application and Development of pheromones in modern IPM



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Modern IPM

In agriculture, IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides. Effective, less risky pest controls are chosen first, including biopesticides such as pheromones to disrupt pest mating...

In practicing IPM, growers follow this four-tiered approach:

Set Action Threshold:...Before taking any pest control action, an IPM program first develops an action threshold...

Monitor and Identify Pests:...Not all insects, weeds, and other living organisms require control...

Prevention:...As a first line of defense, IPM programs prevent pests from becoming a threat.

Control: Once monitoring, identification, and action thresholds indicate that pest control is necessary and preventive methods are no longer effective or available, the next step is to determine which control method maximizes effectiveness and minimizes risk.

Broadcast spraying of a nonspecific pesticide is a last resort.



Can we replace pesticides with pheromones MD?

“....We have evidence that grape moths can be controlled by the application of enough quantities of sex attractants.”..

“...the problem of replacing arsenic ...would be solved in an elegant way.”



Götz B. (1940). Sexualduftstoffe als Lockmittel in der Schädlingsbekämpfung. Umschau 44: 794-796



Are Pheromones still a ?

"... During the 1970s and early 1980s, great expectations were voiced as to the potential of pheromones and other semiochemicals for use as effective and environmentally benign methods of insect control....

These expectations were not realized in the short term, and significant credibility problems concerning the practical application of pheromones began to develop.

Despite considerable evidence that pheromones were or could be of substantial practical use, there seemed to be some feeling that pheromones would ultimately be regarded as interesting subjects for scientific investigations, with little real value."

Ridgway et al., 1990.



Pheromones MD experiences

When key factors meet:

Low population density

Reliable dispenser system

Area-wide approach



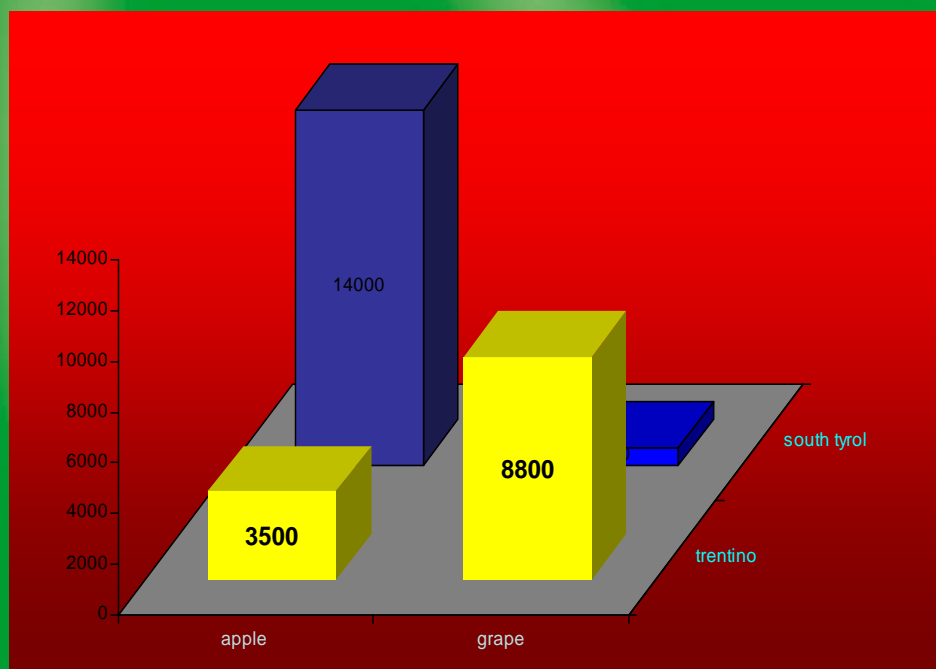
MD becomes
a potential
replacement
of insecticides



AREA-WIDE IPM

Trentino - South Tyrol Italy

46,000 ha of apple and grapevine
27,000 ha apply MD in 2007

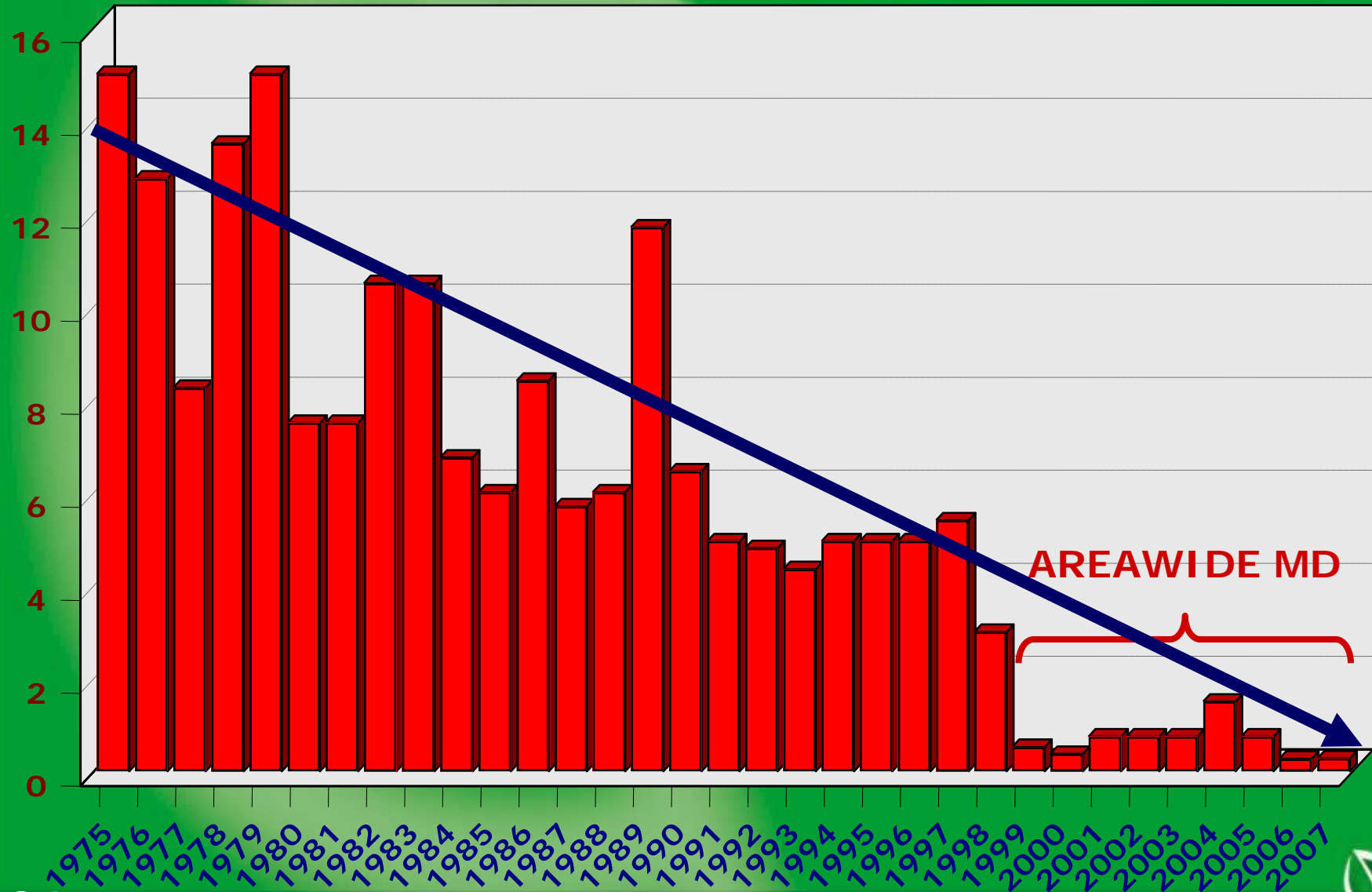


source S. Michele all'Adige Institute



ISECTICIDES KG/HA PER YEAR

MEZZOCORONA VINEYARDS TRENTINO

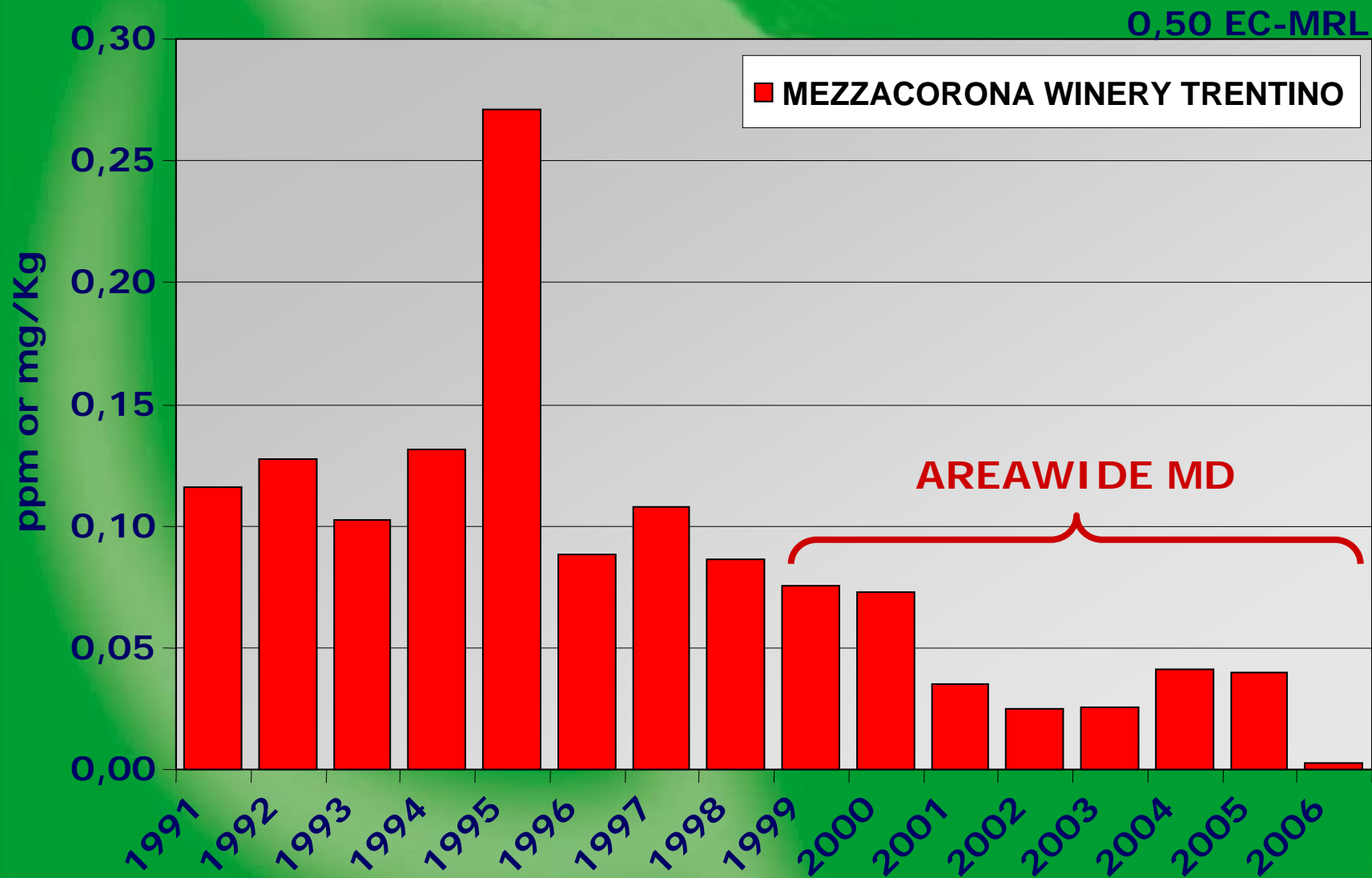


source Mezzacorona Winery



TOTAL INSECTICIDES RESIDUES

GRAPE PROTOCOL – AVERAGE SAMPLES



source Mezzacorona Winery



Codling Moth MD Apple IPM

Meran South Tyrol

year	checked orchards	average harvest damage%	% orchard < 1% damage	average additional spray
1994	421	0,5	86,7	1,5
1995	631	0,8	80,0	0,5
1996	91	0,5	92,3	0,6
1997	66	0,4	89,4	0,3
1998	156	0,9	76,9	0,5
1999	279	0,6	81,7	1,6
2000	187	0,3	92,0	0,7
2001	154	0,3	94,8	0,4
2002	184	0,7	85,8	0,6
2003	223	1,1	77,6	0,9
2004	252	0,8	85,0	0,6
2005	224	0,5	87,0	0,3
2006	155	0,4	85,0	0,3

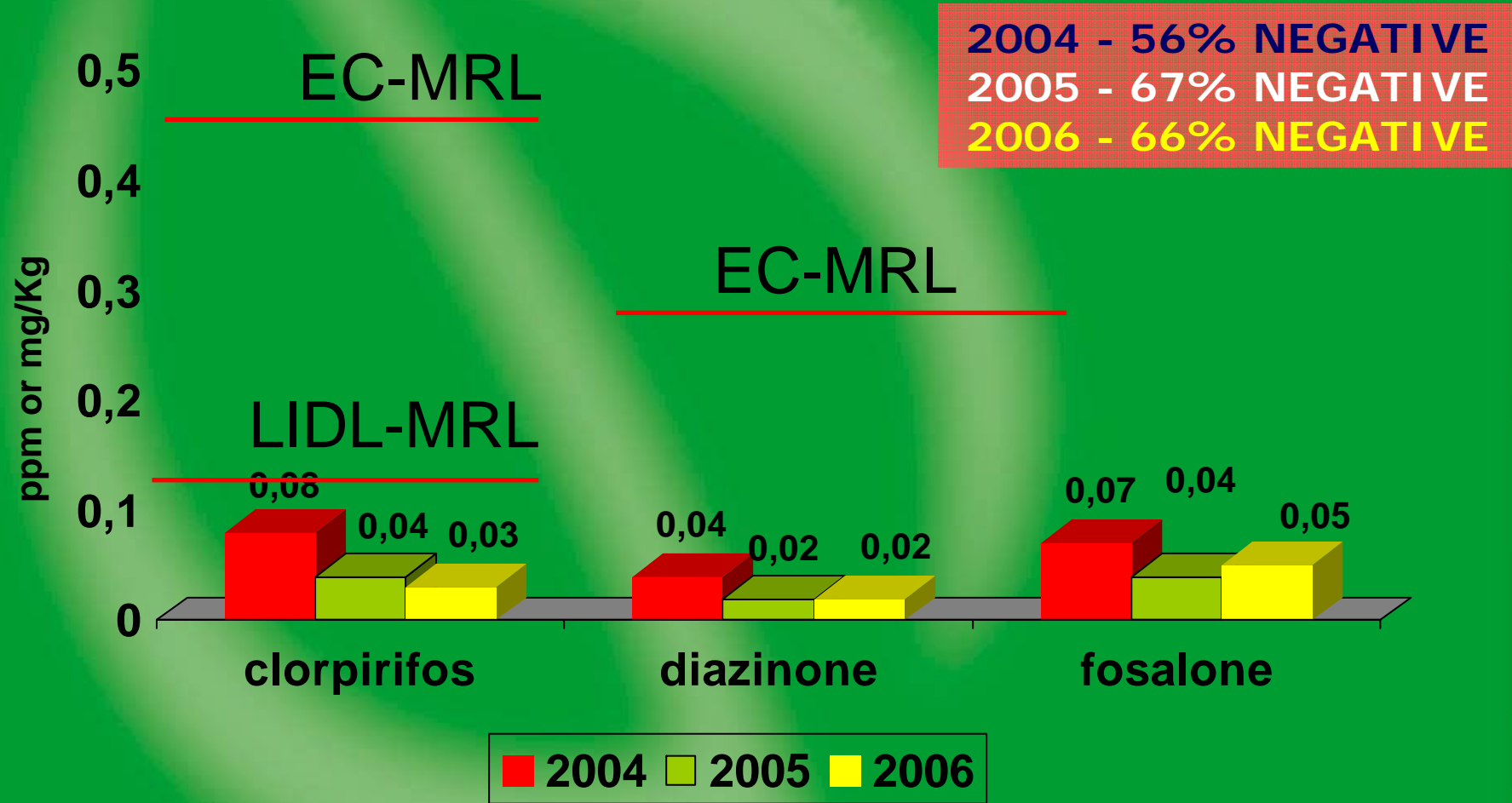


source S. B. O. W.



Insecticides Residues

in positive samples analysis



source Südtiroler Apfelkonsortium



Successful USE in IPM

MONITORING

The routine method for checking numerous pest species. Semiochemicals are simple and highly effective tools for detecting and monitoring insect populations. This will continue.

INSECT CONTROL

Oriental fruit moth, Codling moth, Grape moths, Clearwing moths, Tomato pinworm, Peachtree borer, Lesser peachtree borer, Leafrollers, Smaller tea tortrix, Pink boll worm, Leopard moth, etc. Large tropical weevils..



DO THE NUMBERS ADD UP ?

Insect pheromones identified:
several thousands

Insect pheromones used for monitoring:
several hundreds (?)

Insect pheromones used for insect control:
Less than hundred

How is it that we appear to have this amazing power to manipulate insect behavior, and yet we have only been able to capitalize on it in relatively few cases?



Pheromone Development projects in 21st century

Driving forces

- ✓ Economic status of the pest insect
- ✓ Insect biology and life history
 - Is it likely to be controlled by pheromones?
- ✓ Crop characteristics
- ✓ Pheromone chemistry
- ✓ Ease and cost of synthesis
- ✓ Stability, longevity and formulation in active form
- ✓ Economics of production and use
- ✓ Economics of Authorizations and marketing



Economics of pheromone use

✓ **Market analysis**

is the market large enough to warrant R&D, and ongoing sales?

✓ **Synthesis**

Can the pheromone(s) be made cheaply, in large quantity and good chemical purity

✓ **Formulation**

stability: shelf and field life, longevity

✓ **Deployment**

dispensers/Ha, number of applications per season

✓ **Registration**

simplified and relatively inexpensive

✓ **Indirect costs**

monitoring, treatment in cases where control breaks down



How can we be most effective in the 21st century?

Work smarter....

- ✓ **Recognition of limitations**

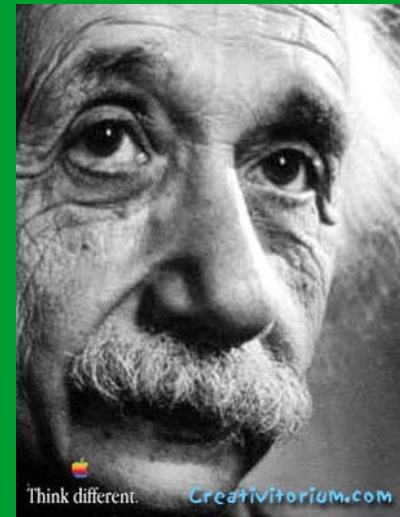
IPM area-wide,
not just stand-alone strategies

- ✓ **Careful choice of target species**

Crop, biology, economics, etc.

- ✓ **Make better use of our collective experiences
and mistakes by sharing a worldwide
knowledge of more than 30 years**

*Definition of insanity: doing the same thing over and over and
expecting different results. Albert Einstein*





Thank you for the attention

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ShinEtsu
PHEROMONES

