Apofruit Italia: example from farmers’ association/cooperative from Emilia Romagna on integrated crop and pest management or other alternatives to chemical crop protection

Gianni Ceredi
A Cooperative with 3500 Grower-members
40 years history
Strong presence on the territories
Total fruit area: 9500 ha

- Pears: 670 ha
- Kiwifruit: 1812 ha
- Apples: 360 ha
- Others: 360 ha
- Peaches: 3900 ha
- Strawberries: 98 ha
- Plums: 580 ha
- Apricots: 760 ha
The Apofruit context

- 3500 growers
- Over 9500 ha of orchards
- At least 15 species grown
- Different areas of cultivation
- The need to guarantee quality and safety standards for consumers
- The necessity to reassure growers with efficient elements to solve health plant problems
In this context an adequate management in the use of agrochemicals is a priority.

In concrete terms, the synthetic active ingredients can be both a necessity and an opportunity, but they can also represent a risk.
There are several factors that make us overuse agrochemicals

- Diffusion of sensitive varieties to pathogens
- Diffusion of unhealthy nursery plants
- Repeated use of pesticides which can create resistance incidents
- Poor knowledge of insects and pathogens biology
- Poor knowledge of agrochemical action processes
- Tendency to force productivity levels through excessive and inappropriate use of agricultural practices
- Use of agrochemicals instead of alternative pest management techniques
- Poor use of techniques useful to chemical pest management
- Absence of a systematic and independent control network which keeps constantly monitored the presence of agrochemical residues on productions
The first important step towards the decrease of the use of the synthetic agrochemicals was the application of the concept of integrated production. For more than 20 years Apofruit has been able to give its products a particular Hallmark by a constant training and updating of growers from our agricultural experts team, which operates in close contact and collaboration with research and experimentation institutes in the region.

It may seem a banality but a more sensible and therefore limited use of agrochemicals is the consequence of awareness of problems and a careful use of alternative/complementary pest management techniques.
Just some typical elements of our way of doing integrated production:
The annual drafting of a operative technical lines and advices for our growers

Gli adulti compaiono dalla fine di Maggio e in corrispondenza dell’inaugurazione dei frutti depongono all’interno di questi le loro uova. Le larve scavano gallerie nei frutti rendendoli più suscettibili ai marciumi. È importante monitorare la comparsa degli adulti con trappole alimentari o cronometriche per intervenire prontamente. La mosca può rappresentare un problema serio per le varietà tardive.

La specie è molto diffusa. Le punte sulla lamina fogliare provocano accartocciamenti e disseccamenti con conseguenze sulla crescita dei germogli e sulla differenziazione delle gemme. Le colonie producono una copiosa melata sulla quale si sviluppa abbondante fumagine in grado di deprezzare i frutti. La difesa chimica può essere attuata in post fioritura, contro le prime colonie, o su eventuali reinfezioni.

Le infezioni possono interessare tanto gli organi florali che i frutti in maturazione. In entrambi i casi la difesa si rende necessaria con antimicratici sistematici e piovosi o in presenza di fattori che provocano lesioni sui frutti (attacchi di mosca o piogge battenti). Una buona difesa preventiva, si ottiene eliminando le mummie dei frutti dell’anno precedente.

Si consiglia di rimuovere le parti secche della pianta con l’evidenza dell’attacco dello sconfitto e di portare fuori dell’appoggiamento tutto il materiale per bruciarlo. Si raccomanda di non ascuatarla legno vicino agli impianti.
The growers must record all the agricultural practices on a specific form...
and Apofruit, in collaboration with “Agriok”, has computerized all the data from more than 300 farms on a specific database...
Application of appropriate agricultural practices: (green manure, ground cover, crops rotation, solarization)
Use of insects for the control of mites on strawberries

In 2006 we freed more than 2.3 m. of P. persimilis
Regular and common use of monitoring systems tools for many key insects and pathogenic agents
Use of forecasting models in the biological development of many insects and pathogenic agents

Codling moth eggs development forecasting model
S. Giovanni in Persiceto - 2002
Different weather conditions affecting *Codling moth* oviposition (S. Agostino (Fe) - 1993-2003)
The reduction of agrochemicals use for fungicidal purpose has shown to be less effective as it is more difficult to anticipate the pathogenic agents epidemiology through the forecasting models use.

Against fungal diseases we generally take action in advance often thinking of post harvest preservation.

However, also in this case, there are elements that can help us to reduce the use of chemicals:

Better knowledge of pathogenic agents and their epidemiology

Deeper knowledge of allowed active ingredients especially on their persistence and their mechanism of action

The right overlap of these two factors usually lead to a more correct and less frequent use of synthetic agrochemicals
A research for an integrated approach to solve the health plant problems includes the use of alternative means to chemicals like **mating disruption** for some Lepidoptera.
Concerning this we reproduce a research done by Apofruit in collaboration with ARPA (Environmental and prevention agency of Emilia Romagna) in the years 2001/2002:

- At first we have monitored the presence of OFM and PTwB on our territory using pheromone monitoring traps.
Then we compared the use of pesticides against OFM and PTwB in peach orchards (400 farms, half of them using m.d.)

**Integrated farms:**

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Average amount of agrochemical products (kg/ha)</th>
<th>B. t.</th>
<th>Phosphates</th>
<th>I.G.R.</th>
<th>Etofenprox</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td></td>
<td>1.2</td>
<td>0.7</td>
<td>0.3</td>
<td>1.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
<td>1.2</td>
<td>3.0</td>
<td>0.6</td>
<td>1.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Interm./Late</td>
<td></td>
<td>1.2</td>
<td>4.0</td>
<td>0.6</td>
<td>2.4</td>
<td>7.0</td>
</tr>
<tr>
<td>Late</td>
<td></td>
<td>2.4</td>
<td>6.0</td>
<td>0.9</td>
<td>2.4</td>
<td>9.3</td>
</tr>
</tbody>
</table>

**Integrated farms with m.d.:**

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Variation in % of agrochemical products used and Average amount of agrochemical products (kg/ha)</th>
<th>B. t.</th>
<th>Phosphates</th>
<th>I.G.R.</th>
<th>Etofenprox</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>0.0% - 83% - 81% - 88%</td>
<td>0.0%</td>
<td>- 51%</td>
<td>- 81%</td>
<td>- 88%</td>
<td>0.32</td>
</tr>
<tr>
<td>Intermediate</td>
<td>+100% - 75% - 83% - 86%</td>
<td>+100%</td>
<td>- 75%</td>
<td>- 83%</td>
<td>- 86%</td>
<td>1.02</td>
</tr>
<tr>
<td>Interm./Late</td>
<td>+ 100% - 58% - 71% - 58%</td>
<td>+ 100%</td>
<td>- 58%</td>
<td>- 71%</td>
<td>- 58%</td>
<td>2.9</td>
</tr>
<tr>
<td>Late</td>
<td>+150% - 46% - 65% - 46%</td>
<td>+150%</td>
<td>- 46%</td>
<td>- 65%</td>
<td>- 46%</td>
<td>4.8</td>
</tr>
</tbody>
</table>
The need to guarantee our fruit and vegetables from the active ingredient residue problem at the harvest, lead us to closely and deeply examine the residue behaviour of the allowed chemical molecules.

Although accepted by the integrated production lines, when a new active ingredient is introduced in the national crop protection scene, always makes it necessary for our organisation to determine its real degradation trend.

An example: Fludioxonil Ciprodinil
Grey mould (strawberries)
Brown rot (peaches)
Ciprodinil Residues on strawberries

- l.m.r.: 2.0 ppm
- 0.66 ppm (30% l.m.r.)
Ciprodinil residues on peaches

1.m.r. : 0.5 ppm
0.17 ppm (30% 1.m.r.)
Moreover, through a systematic plan of sampling, we keep constantly monitored the presence of agrochemicals residues in our productions.

Taking peaches for example, over the last 6 years we have carried out over 4000 multiresidue analyses, performed on samples taken at harvest.

The results of this permanent commitment is highlighted by the percentage of negative results…
Species: Peach
Period: 2000-2005
N. Multiresidue analyses: 4000

- Phosforates
- Triazole
- Etofenprox
- IGR

- No residue
- 0-30 % LMR
- 30-100 % LMR
- > 100 % LMR
Conclusion:

With my short presentation I tried to show you some aspects of our philosophy that lead to a correct management of pesticide use. Nevertheless, I would like to highlight that our choice needs a strong and constant effort from an economical, organizational and cognitive point of view.

This big effort creates an environmental and health benefit that affects both producers and consumers.
Still, the absence of a real _awareness_ of this penalized in some way our experiences

In our country the production of fresh fruit and vegetables is _fragmentary_ and the association producers have limited possibilities to force and influence the choices

At the same time, these associations do not _collaborate_ enough with each other but they tend to compete
It would be good to create and consolidate a real effective network on these issues among producers, associations of producers, research centres, O.G.D. institutions of control both public and independent.

This kind of network would allow us to use all the available resources and organizations like ours could concentrate mainly on the production of quality fruit and vegetables.

At the same time it would be hoped a strong spreading action on “quality” from regional and national institutions.
In this context organisations like ours continue their commitment on quality productions but are continuously subjected to a strong pressure from different sectors that are not sensible to these issues and they only have speculative interests.