Integrated Fruit Production (IFP) in Europe—Report of the IDFTA 2001 European Tour

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The IDFTA international study tours are great opportunities to see how apple industries are doing in other parts of the world and to get to travel with and learn from fruit growers in other parts of the U.S. and Canada. I took this tour with a goal of learning about Integrated Fruit Production (IFP) in Europe. This is my interpretation of what I heard.

Figure 1 is a view overlooking the Etsch Valley, South Tyrol, Italy, where 40,000 acres of apples are planted, hay and pasture on the higher elevations and slopes, and grapes on the hillsides. Clouds are covering the mountains in the distance with the early morning rain. It is impressive to see such a concentrated and historical agricultural region.

The concept of IFP began in Europe in the 1970s. There is a set of standards that has been created by the International Organization of Biological Control of Noxious Animals and Plants (IOBC) and International Society of Horticultural Science (ISHS) and updated in 1999. In these standards, IFP is defined as "the economical production of high quality fruit, giving priority to ecologically safer methods, minimizing the undesirable side effects and use of agrochemicals, to enhance the safeguards to the environment and human health." IFP is driven by social concerns for overproduction, endangerment of wild species and pollution of ground and surface water identified with intensive farming.

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IOBC is a certification organization with a given set of guidelines and requirements for certification, but not all IFP standards set for each country or cooperative conform to these standards. IFP is a set of "good agriculture practices." Within the IFP standard, Integrated Pest Management (IPM) elements are identified usually on a regional or national scope listing available pesticides for use under three categories—permitted ("green list"), permitted with restrictions ("yellow list"), not permitted ("red list"). These categories are based on toxicity to man, toxicity to key natural enemies, toxicity to other natural organisms, pollution of ground and surface water, ability to stimulate pests, selectivity, persistence, incomplete information and necessity of use.

IFP is intended to be a holistic approach that extends over the entire farm to sustain agriculture and its relationship with society. Sustaining the multiple functions of agriculture in society is included in the many goals of IFP. Agriculture has to meet the needs of the entire society including the production of food and fiber, diversified landscapes, wildlife conservation and maintenance of local cultural traditions. These are some of the non-agricultural environmental and recreational values provided by operational farms. The guidelines are intended to cover every aspect of production and continue through harvest, storage and packing of the produce. The goal is to have "traceability" of fruit from orchard block to the consumer.

The IFP standards include requirements for:

- Variety/rootstock selection—usually dependent on regional recommendations but do not go as far as requiring disease resistance.
- Soil fertility—encourage inputs and proper tillage techniques to maintain soil structure.
- Nutrient management—apply fertilizers based on a soil and foliar analysis done at least every 3 years.
- Biodiversity in flora and fauna—there are several ways to comply with this requirement but it encourages a mixture of animal and plant species that may serve as predators or sources of predators to manage pest pressure.
- IPM with "sacred cows"—standards are more specific on a regional basis, but standards require the protection of 2 species within the orchard that can provide benefits in pest management.
- Irrigation—application of water should depend on evapotranspiration rate for an area or information regarding specific water needs for a crop.
- Spray equipment care—spray equipment is to be calibrated annually and well maintained.

FIGURE 1

Overlooking the Etsch Valley, South Tyrol, Italy.

- Pre-harvest quality measurements—fruit quality measurements such as pressure and brix at harvest are to be recorded for each variety in each block harvested.
- Postharvest management—must follow restrictions on any applications for postharvest treatments, ensure traceability of fruit from specific orchard block to the customer.
- Animal production—relates to integrating animal production into the whole farm system, manure management, etc.
- Sanitation and hygiene—include requirements for personal hygiene protocols for workers on farm and how to manage the produce at harvest to avoid contamination.

This is not a comprehensive list. Examples of some of the standards follow.

The major disease and insect problems noted in all four countries visited include apple scab, powdery mildew, fire blight, woolly apple aphid and codling moth. In France a grower reported that borers (in burrknots) are becoming an increasing problem.

Fruit thinning methods vary from one region to another. Carbaryl which is mostly used for thinning can be applied only early in the season for thinning and, in many countries, carbaryl will not even be allowed for thinning in the near future. In France thinning is done with NAA and carbaryl; but in South Tyrol, Italy, there is not enough heat for the use of NAA, so they rely more on NAD. Hand thinning is the preferred method of thinning in IFP. Many European countries are reluctant to approve plant growth regulators, especially Germany.

For apple scab control, they will use a program of contact fungicides when they can and DMIs (we recognize as Rubigan or Nova) mixed with contact fungicides or strobilurins. There are restrictions on the number of applications of mancozeb due to its impact on predator mites. Mancozeb can be applied only 4 times per season but only 2 applications in succession to minimize the impact on the predator mite population. The standards for specific areas can include cultural practices to help reduce overwintering inoculum such as urea applications to the dropped leaves or chopping the leaves to increase the rate of decomposition. They are also planting some disease-resistant varieties such as Topaz.

Fire blight was a concern everywhere we went, although we did not see any infections. In general, they focus on eradication programs for infected trees as well as alternate hosts that are susceptible to the disease in the wild or cultivated gardens. The biggest concern is that, in most countries throughout Europe, streptomycin is not allowed for agricultural use. And nothing works as well as streptomycin in controlling blossom blight. According to Kurt Werth, our guide for South Tyrol, fire blight was found in the Bolzano area in a pear orchard, which was destroyed. None has been seen since. Fire blight may not be a problem in that area since they tend to have cool bloom periods, and their industry is based on the quality Golden Delicious they are known for. But their industry is switching to produce more Gala (25%), Braeburn (10%), and Pink Lady (10%), all fire blight susceptible varieties.

Codling moth is a primary pest, which in most areas was first controlled using mating disruption and eliminating broad-spectrum insecticides in the IFP programs. But then Tortrix moth became a problem and the damage by codling moth was exceeding the threshold of 5 to 10% required for the use of mating disruption. Where mating disruption was used, the pheromone was hung in all fruit crops in the area. The next step for control was to include the use of insect growth regulators (IGRs) such as phenoxycarb (Insegar) or tebufenozide (Mimic a.k.a. Confirm). These IGRs also control Tortrix moth. They have also incorporated the application of granulosis virus, which infects codling moth, applied during a 2 week egg-laying period; each spray is effective for a week. When they use mating disruption, the pheromones are applied to all apple orchards and surrounding fruit plantings that are not apples.

Woolly apple aphid appears to be a problem although Europeans do not do anything to try to control it. To keep it in check, they rely on biological control using a parasitic wasp that was imported with the aphid from North America.

Mites are managed by establishing a predator mite population of *Typhlodromus pyri*. The source of this predator mite is woody grapevines pruned from vineyards where *T. pyri* are established (Fig. 2). They cut pieces of the canes where predator mites overwinter and transfer them to the orchards to establish a predator population. Then a pre-bloom oil application is made to kill the overwintering red mite eggs. They let *T. pyri* do the rest. This is considered one of the "sacred cows" in the system. The pesticides toxic to *T. pyri* are restricted or not permitted under IFP standards. Mancozeb is restricted to 2 applications in succession (maximum of 4 per season) to minimize the impact on *T. pyri* populations.

Enhancing biodiversity is an important concept incorporated into the guidelines. The predator mite preservation contributes to the requirement for enhancing biodiversity. Another way to increase biodiversity is to encourage birds to nest and perch in orchards, especially hawks and other birds which will keep rodent populations in check and feed on insects in the orchard. In Switzerland old apple trees are cared for as "historical" trees to preserve the look of the countryside. Owners are paid 30 Swiss Francs ($US 17.70) per year per tree to care for the trees.

At FIBL, the Research Institute for Organic Farming in Frick, Switzerland, we saw another way to encourage wild bees to nest around orchard areas by building a mud wall or using old fire wood (Fig. 3). We also learned about "ecological compensation land" to enhance biodiversity. In organic standards, 7% of land must be designated as ecological compensation land, unmanaged, no herbicide, insecticide, fungicide, and left unmowed part of the year to encourage diversity in animal life. Examples include the ditches, headlands of an orchard, or rock piles. IFP standards require about 3% of the land under this program and subsidize for this practice.

Ground cover was similar across the tour. There were fairly clean, narrow herbicide strips under the trees but all seemed to have dead plant residue, not barren, cracked ground. They used systemic post-emergence herbicides such as Roundup or Basta (Rely), the residual type herbicide looked like it was limited to diuron but must be tank mixed with a post-emergence herbicide. One grower we visited used a rotary hoe cultivator and followed up with tree bark mulch in his organic block.

We saw two methods for bird control. Some orchards used bird netting with a complete enclosure and the other sites used the recordings of bird distress calls or raptors.

All through Europe, especially in Germany and northern Italy, we saw very tidy operations. Equipment was well maintained and clean. Sprayer calibration is required by IFP annually and records must be kept of all applications made in each block. The sprayers were clean

FIGURE 2

The source of this predator mite is woody grapevines pruned from vineyards where *T. pyri* are established.

and posed little hazard of pesticide exposure. A grower in South Tyrol stored each implement on its own cart for easy storage and access.

The storages we visited were built of insulated panels with a finish coat on inside and out. The whole room could be pressure washed for cleaning. Sanitation is an important IFP requirement in the storages and packing houses. In France we were told that they are phasing out wooden bins and would be using only plastic bins in 10 years because they are more easily cleaned. Some of these costs could be subsidized by the European Union Quality Program.

IFP requires professionally trained as well as environmentally and safety-conscious growers. In Germany and France, there is no Extension system that is government supported. A consultant from Germany explained how they work in the system. They are usually employees of either the IFP certifying organization or the grower coop. They run prediction models for diseases and insects for sites in their region. They teach growers how to scout for pests. They disseminate the information by fax, phone and newsletters. Growers are required to attend a twilight meeting every month. In Germany there is still federally supported research going on, but in France much of the research is supported by grower coops.

IFP certifying organizations, often packinghouse coops, often use a "points for practices" system to evaluate individual farms for certification. It is not necessary to implement all of the elements in the IFP guidelines to achieve certification. Points are deducted from the maximum total possible for each case where the recommended practice is not followed. A minimum score must be attained for a grower to be certified. Different types of point systems are used depending on the organization. Some IFP programs or certifiers do not use a point system.

There are several controls built into the system to ensure growers adhere to the standards. The first resource used for accountability is the record keeping done by the grower to record all activities on the farm. It is not enough to follow the standards, it all has to be written down. Records must include fertilizer applications and soil and foliar analysis results, calibration records, spray records and scouting records that justify any spray applications. Some insecticide applications that are "restricted" require a prescription by a consultant. These records are important to document any activities that cannot be measured during an inspection. These records are submitted annually to the certifying organization. A surprise visit is arranged for another grower from the coop to visit and oversee activities on the farm. During the season, the cooperative can collect leaf samples and fruit samples for residue analysis to confirm pesticide restrictions are being followed. And finally, the government can send a representative to collect leaf and fruit samples for residue analysis and sample spray tank mixtures. So there are many steps taken to ensure IFP standards are followed.

What are the benefits of IFP besides all the perceived environmental benefits? The benefit is not in dollars returned to the growers, but it does provide access to the market. And the elements of IFP can be sources of government paychecks. The EU Quality Program will pay 50% of the cost of an activity that will improve quality or address market needs up to a maximum of 4% of gross of the product on the farm. Some countries such as France invest their quality program funds into hail netting and plastic bins. Other countries use those funds for pest management programs on the farm and to help pay the consultant fee. And finally, other federal, state and local subsidies are paid for many other perceived environmental improvements in agriculture.

This was a quick overview of some of the highlights of the IDFTA study tour. It is not a detailed scientific study of IFP in Europe. It was an opportunity to understand how the Europeans are accomplishing their goals in IFP to help us understand why our European buyers are encouraging us to join them.

FIGURE 3

At FIBL, the Research Institute for Organic Farming in Frick, Switzerland, we saw another way to encourage wild bees to nest around orchard areas by building a mud wall or using old fire wood.