2001 IDFTA European Tour: Integrated Fruit Production in Europe

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Integrated Fruit Production in Europe 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." This article highlights common IFP practices in Europe from the 2001 IDFTA European summer tour.

The IDFTA summer 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 fellow fruit growers from other parts of the U.S. and Canada. My goal of the 2001 IDFTA Tour was to learn first-hand about Integrated Fruit Production (IFP) in Europe.

We traveled to Angers, France, Switzerland, Bodensee region of Germany and South Tyrol, Italy. South Tyrol has approximately 40,000 acres of apples and pears planted in the valley, with hay and pasture on the higher elevations and slopes, and grapes on the hillsides. It is impressive to see such a concentrated, historic agricultural region (Fig. 1).

The concept of Integrated Fruit Production (IFP) began in Europe in the 1970s. The standards that were created by the International Organization of Biological Control of Noxious Animals and Plants (IOBC) and International Society of Horticultural Science (ISHS) were updated again in 1999. These standards define IFP 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.

The 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 organ-isms, pollution of ground and surface water, ability to stimulate pests, selectivity, persis-tence, incomplete information, and nec-essity of use.

Figure 1. The picturesque South Tyrol where 40,000 acres of fruit are grown. Many of these acres are grown using IFP practices.

IFP is intended to be a holistic approach extending over the entire farm, sustain-ing 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 fibre, 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 the production through harvest, storage, and packing of the produce. The goal is to have "traceability" of fruit from orchard block to the consumer.

IFP Standards

The IFP standards include requirements for:

- Variety/rootstock selection – usually dependent on regional recom-mendations 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 once 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 two species within the orchard that can provide benefits in pest management.
- Irrigation – application of water should depend on evapo-transpiration 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.
- 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.
- Post-harvest management – must follow restrictions on any applications for post-harvest 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. Some 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, wooly apple aphid, and codling moth. In France, a grower reported that borers (in burrknots) are becoming an increasing problem.

For apple scab control, growers use a program of contact fungicides when possible and DMI's (similar to Rubigan or Nova in the USA) mixed with contact fungicides or they use strobylurines if they are registered. There are restrictions on the number of applications of mancozeb due to its impact on predator mites. Mancozeb can only be applied four times per season but only two applications can be applied in succession to minimize the impact on the predator mite population. 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 developing markets for disease resistant varieties such as Topaz.

Fire blight was a concern everywhere we went, although we did not see any infections. In general, Europeans are concentrating on eradication programs for infected trees and susceptible alternate hosts in the wild and cultivated gardens. Most European countries do not allow streptomycin for agricultural use. And nothing works as well as streptomycin in controlling blossom blight. According to Kurt Werth, our guide for S. Tyrol, fire blight was found in the Bolsano area in a pear orchard. This orchard was eradicated and none has been seen since. Fire blight may be less of a problem in that area since they tend to have cool bloom periods, and their industry is based on the less susceptible Golden Delicious they are known for. Their apple industry is now switching to produce more Gala (25%), Braeburn (10%), and Pink Lady (10%)—all fire blight susceptible varieties.

Codling moth is the primary insect pest in Europe. It was first controlled in most areas with mating disruption and the elimination of broad-spectrum insecticides in the IFP programs. Subsequently, the Tortrix moth became a problem and damage by codling moth exceeded the threshold of 5-10% 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 (IGR's) such as phenoxycarb (Insegar) or tebufenozide (Mimic a.k.a. Confirm). These IGR's also controlled Tortrix moth. They have also incorporated the use of Granulosis virus, which infects codling moth. Applied during a two week egg-laying period, each spray is effective for a week. When growers use mating disruption, the pheromones are applied to all apple orchards and surrounding fruit plantings that are not apples.

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

Mites are managed by establishing a predator mite population of *Typhlodromus pyri*. Vineyards are the source of this predator mite; woody grapevines are pruned from vineyards where *T. pyri* are established They cut pieces of the canes (Fig. 2)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 two applications in succession (maximum of 4 per season) to minimize the impact on *T. pyri* populations.

Fruit thinning methods vary from one region to another. Carbaryl currently can only be applied early in the season for thinning, and in many countries, even this use will not be allowed in the near future. In France, thinning is done with NAA and carbaryl; but in S. Tyrol, Italy, it is not warm enough during thinning to use NAA, so more growers rely on NAD. Handthinning is the preferred method for thinning in IFP programs. Many European countries are reluctant to approve plant growth regulators, especially Germany.

Enhancing Biodiversity

Enhancing biodiversity is an important concept incorporated into IFP guidelines. Predator mite preservation contributes to the requirement for enhancing biodiversity. Another way to increase biodiversity is to encourage birds (especially hawks) to nest and perch in orchards (Fig. 3). These and other birds are intended to 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 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. "

We also learned about "ecological compensation land" to enhance

Figure 2. Grapevine cane pieces are cut and hung in orchards to transfer the predatory mite *Typhodromus pyri*. This is the same predator as in Western New York.

biodiversity. In organic standards, 7% of the 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, or headlands of an orchard, or rock piles. IFP standards require about 3% of the land under this program and growers are subsidized for this practice.

Ground cover management was similar across the tour stops. All tree rows were fairly clean, with narrow herbicide strips under the trees. All seemed to have dead plant residue, not completely bare ground. They used systemic post-emergence herbicides such as Roundup or Basta (Rely), the one residual type herbicide more commonly used is diuron which 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 (Fig. 4).

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.

Throughout Europe, especially in Germany and northern Italy, we saw very tidy operations. Equipment was well maintained, and clean and posed little hazard of pesticide exposure. Sprayer calibration is required by IFP annually and records must be kept of all applications made in each block. One grower in S. Tyrol stored each implement on its own cart for easy storage and access.

The cold storage facilities we visited were built of insulated panels with a finish coat on both the inside and out. The whole room could be pressure washed for cleaning. Sanitation is an important IFP requirement in the storage and packing houses. In France, we were told that they are phasing out wooden bins and would only be using 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, and environmental and safety conscious growers. In Germany and France, there is no government supported Extension Service. Former Extension personnel have become 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 at least one twilight meeting every month. In Germany, there is still federally supported research, but, in France, much of the research is supported by grower coops.

IFP certifying organizations, often packinghouse coops, frequent-ly use a "points for practices" system to evaluate individual farms for certification. It is not necessary to use all 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. There are different types of point systems used depending on the organization. Some IFP programs or certifiers do not use a point system.

Tracking Accountability

There are several controls built into the system to ensure that growers adhere to the standards. The first accountability tool 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 soil and foliar analysis results, fertilizer applications calibration records, spray records, and scouting record that justify any spray applications. Some "restricted" insecticide applications require a written prescription by a consultant. These records are important to document any activities that cannot be measured during an inspection.The 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 and fruit samples for residue analysis to confirm that 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 IP standards are followed.

Figure 3. Birdhouses are installed in orchards to encourage bird predation of rodents and insects.

Figure 4. Mulch to control weeds is increasingly being used as part of an IFP program.

In addition to all the perceived environmental benefits, what are the other benefits of IFP? The benefits are not measured in dollars returned to the growers, but IFP does provide access to markets. And the elements of IFP can be a source of pay checks from the government. 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 the gross of that product on the farm. France invests 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 fees. Finally, many other federal, state and local subsidies are paid for because of perceived environmental improvements in agriculture.

This quick overview of some of the highlights of the 2001 IDFTA European tour is not a detailed scientific study of IFP in Europe. It is another opportunity for us to better understand how the Europeans are accomplishing their goals in IFP. This information should help us understand what might be required to continue to market our fruit in Europe.

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