

The New York State Apple IFP, Our “Most Friendly Practices”

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The New York apple industry developed a comprehensive strategic plan in 2001 calling for NY state apple growers to become the premier suppliers of high quality apples to domestic and foreign customers and to do it in a manner that is in harmony with the environment. The plan calls for Cornell to develop a market oriented integrated fruit production (IFP) program for apples in NY. Cornell University faculty and Cooperative Extension personnel, in collaboration with the NY Apple Research and Development Program Board of Directors, recently completed a draft of an IFP protocol for apples. Integrated Fruit Production is defined as the economically successful production of high quality fruit with the best possible protection of the agro-ecosystem, human and domestic animal health, wildlife and the environment.

Fruit consumers and buyers are aware of, and are looking for environmental and food safety characteristics in the food they purchase (Hartman, 1996). They want to be assured that the fruit and fruit products they consume are produced in an environmentally friendly manner, using a minimum of plant production chemicals and leaving a minimum of residue on the fruit. They also want to be assured that the fruit is free from microbial contamination and safe for human consumption. These things can be achieved by adherence to Good Agricultural Practices (GAP) all along the food production chain: from the orchard, to the storage and packing plant, to the grocery store (Rangarajan et al. 2000).

The NY apple IFP protocol details eco-friendly insect, mite, disease, vertebrate and weed pest management, orchard establishment, tree training and pruning, fertilization, fruit thinning, harvest and post harvest practices. These provide a set of guiding principles for apple producers, buyers and consumers seeking NY apples that are grown in the safest and most environmentally sound manner possible using current technology. The availability of GAP guidelines, IPM guidelines (Agnello et al. 2004), (Agnello et al. 1999), and now an IFP protocol for apple, provides NY apple growers a wealth of informational resources that will allow them to produce apples in both an environmentally friendly and safe manner, and capture markets that seek “most friendly practices.”

What is the Scope of the NY IFP Protocol?

IFP combines orchard horticultural practices with integrated pest management to arrive at a holistic approach to growing apples from orchard establishment through post harvest. With IFP, some orchard management practices that are legal are not allowed due to the negative effects on the environment or food safety. For example, some crop protection chemicals, cannot be used because of their persistence in the environment. And another example, bins must be thoroughly cleaned after being emptied of fruit to reduce microbial contamination and pest inoculum. An overview of the main areas of the IFP is presented below.

Integrated Fruit Production (IFP) is a comprehensive production strategy that attempts to produce fruit with the best possible protection of the agro-ecosystem, human and domestic animal health, wildlife and the environment while still being profitable. A draft of a NY protocol for IFP has been produced by Cornell faculty and extension staff. We now seek the input of all the segments of the fruit industry on the draft protocol.

Horticultural Practices. IFP guidelines in this category are concerned with protecting the soil tilth, limiting erosion, preventing nutrient contamination of either groundwater or surface water resources and using varieties and rootstocks that resist pests. When new orchards are planted, site characteristics, variety / rootstock combinations, and planting systems are combined in a harmonious fashion that is both economically and environmentally sound. It is especially important that the planting system produce sufficient quantities of high quality fruit to be profitable. Properly maintaining the soil structure, organic matter levels, fertility, soil fauna and micro-flora will help maintain healthy, productive trees that more effectively resist pest problems. The use of resistant rootstocks and/or varieties will reduce the need for pest control measures over the life of the orchard. The goal of fertilization and irrigation programs in integrated production is to minimize offsite nutrient losses, maintain soil nutrients within the optimal range, and to do this as much as possible through natural cycles while promoting yields of high quality fruit. Trees should be trained and pruned to achieve a balance between vegetative growth and cropping. This should result in compact yet open canopies that

provide light and air penetration to the entire canopy for optimum fruit quality and reduced disease.

Integrated Pest Management (IPM).

The aim of IPM is to protect the tree and its fruit from weeds, insects & mites, diseases and animals using ecologically and economically sound management practices. This means that practices are chosen that will enhance safeguards to the environment and human health while minimizing the use of agrochemicals. Priority is given to cultural, biological, and genetic management practices. Under the IFP protocol, pests (weeds, insects, mites, diseases and vertebrates) and their negative effects must be monitored regularly and recorded. Scouting methods must be based on scientifically sound principles appropriate to the region or locality, and the decision to treat must be based on established thresholds or through the use of forecasting. IPM insect and mite monitoring activities along with thresholds and disease forecasting methods are used in the IFP protocol as described in the Cornell Pest Management Guidelines for Commercial Tree-Fruit Production and the Cornell Apple IPM manual (Agnello et al. 2004), (Agnello et al. 1999).

Weed management. Under the IFP protocol the goal of ground cover management is to limit weed competition to trees in a manner that maximizes production but minimizes soil erosion, nutrient runoff and the use of herbicides (avoiding residual herbicides completely). Secondly, the aim of groundcover management is to maintain ecological stability and species diversity. A weed suppression strip (less than, or equal to 1/3 the distance between row spacing) can be maintained along the tree row. Close mowing of the orchard drive lanes during summer and fall will help to limit reproduction of weeds.

Arthropod management. Populations of key natural enemies (e.g., phytoseiid mites) must be preserved. This should be done by using management practices that encourage their natural build-up or, when practical through artificial introductions, as in the case of predatory mites. Decisions to treat must be based on economic action thresholds and must use methods that have low environmental impact. Many action thresholds are based on degree days (DD) calculated from daily maximum and minimum temperatures. Insect and mite monitoring, sampling and action thresholds are crucial aspects of arthropod management in apples.



Use of the Good Agricultural Practices contained in the IFP protocol protects the farmer, his customers and the environment.

Disease Management. Cultural practices for disease management should be used where practical, and should include orchard sanitation to remove overwintering sources of inoculum, pruning and removal of cankered limbs to reduce inoculum pressure, and weed and canopy management to facilitate air circulation and promote rapid drying of plant tissues. Varieties and rootstocks that have some level of tolerance or resistance to diseases are preferred. Disease forecasting, spray timing and scouting are crucial aspects of disease management in apples.

Vertebrate Management. Close and regular mowing of orchard drive lanes and surrounding headlands to minimize available protective habitat and food sources during the growing season is essential to reduction of vole and rabbit populations. "Most friendly" IFP practices for vertebrate control include exclusion fencing, netting, wire trunk guards, visual scare devices, and habitat manipulation. Habitat manipulation and preservation can also be used to promote the presence of helpful predators such as fox and birds of prey.

Spray Technology. When pest or tree management requires the use of chemical sprays, environmentally safe spraying methods that improve deposition and reduce drift should be used. New sprayer designs greatly enhance application, are safer to use and easier to maintain. Where

ever possible tractors should be fitted with cabs and adequate filtration to protect the operator. The sprayer should also be regularly serviced to ensure correct application, including calibration, maintenance and mechanical adjustment. Care must be taken while filling sprayers to avoid operator contamination and environmental pollution, and the spraying operation should be done in a way that ensures good deposition, minimizes drift, and protects the operator while keeping in mind the safety of others. Spraying operations should be timed and materials should be chosen to minimize harm to honey bees and other pollinators, and application records should be kept for all types of pesticide applications. After use, the sprayer should be thoroughly cleaned and stored in a safe, secure building to ensure that it is in good working condition the following season. Pesticides should be stored in a secure, frost-free, ventilated storage building.

Harvest and Post Harvest. Post harvest management must be done in a manner that maintains high fruit quality and ensures food safety. Bins of harvested fruit should never left in the orchard overnight; this reduces the possibility that rodents will find their way into bins before they are moved to storage. Should soil become wedged into bin runners, the soil must be thoroughly removed before the bin is stacked on top of another. A sanitation

system should be used in the packing plant to kill bacteria, yeasts, and fungal spores in water flumes. Empty bins should be removed from the packing area, as soon as possible to be cleaned and to prevent contamination with airborne spores. Decayed and culled fruit should be removed from the packing area at the end of each day, and the floors of the packing area cleaned. Calcium treatments should be applied as field sprays rather than as post-harvest treatments. Post-harvest drench treatments should be used only when such treatments are essential for controlling superficial scald or carbon dioxide injury. Drencher reservoir tanks should be fitted with appropriate agitation systems to keep post-harvest treatment chemicals in suspension. Solutions should be changed regularly and reservoir tanks cleaned before refilling.

Professionally Trained Growers. An essential key to the successful use of the NY-IFP protocol is to train and educate growers. Growers must continue educational efforts in order to be aware of the current best management practices in nutrition, tree training, pruning, crop load management, farm employee health and welfare regulations, food safety practices, and integrated pest management. Growers are required by the New York State Department of Environmental Conservation (DEC) to be Certified Pesticide Applicators and to attend DEC-approved training programs offering re-certification credits. Cornell Cooperative Extension offers yearly meetings in the three major apple-growing regions of NY state. In addition, there are meetings and programs offered by the New York Apple Association, the agrochemical industry, private consultants, crop advisors, and The New York Fruit and Vegetable Expo.

Crop Production Chemicals: Red, Yellow, or Green?

Under the NY-IFP protocol, agrochemicals are classified into green, yellow and red lists based on the optimal combination of the following characteristics: least toxicity to humans, least toxicity to natural enemies, least toxicity to other non-target organisms, potential for pollution of ground and surface water, tendency to stimulate pest increases, target pest selectivity, environmental persistence, environmental fate, necessity of use and excellent to good control of the target pest. Pesticides identified as having all or most of these characteristics are considered "green." Pesticides identified as having

areas of concern or restrictions are considered "yellow." All other products are not permitted and considered "red" because they have few, if any, of the above characteristics. The NY-IFP protocol includes only the green and yellow lists. When the use of an agrochemical is justified, products from the green list are preferred; however, when a suitable "green" product is not available, then products from the yellow list can be used with the restrictions noted in the IFP protocol. No products from the red list may be used with IFP.

Agrochemicals must be used in a manner that does not promote the development of resistance in the target organism. Some general anti-resistance strategies include: 1) using pesticides only when necessary to avoid economic loss or crop injury, 2) using fungicides in a protective rather than an after-infection mode, 3) using the highest labeled rate of a chemical when resistance is not prevalent; however, for arthropods, rates should not be inflated beyond those necessary for acceptable control, 4) using spray schedules that incorporate pesticides with different modes of action, 5) regularly calibrating the sprayer, 6) applying pesticides with enough water to ensure adequate coverage, and 7) adjusting sprayers to direct spray on to the target to minimize drift.

The use of reduced-risk or "green" pesticides is central to IFP, however, unless such materials are inexpensive enough to allow the farmer to sustain the practice of using them, their economic risk will outweigh the environmental risk. As growers and marketers sell fruit that is produced using "most friendly practices," they will need to ensure that the price on such fruit gives the farmers sufficient economic profitability to allow the continued use of IFP methods. This brings to the forefront one of the important underlying principals of IFP, and that is that it requires the interdisciplinary involvement of researchers, extension personnel, private consultants, growers, packers, shippers, buyers, retailers, policy makers, and consumers in order to be successful.

Implementing the NY Apple IFP Protocol

The development and implementation of apple IFP programs around the world have generally been market driven as growers or marketers have attempted to respond to market pressures to protect the environment, minimize the use of pes-

ticides and ensure food safety. In some cases the effort to develop IFP programs has been made to maintain market access as buyers have demanded IFP production methods. In other cases, IFP programs have been developed to build new markets or increase market share. In the case of the NY apple industry, leading growers and marketers have encouraged this effort to both maintain market access and to assure new buyers that NY apples are produced using sound IFP methods. The implementation of the protocol could provide a market advantage for growers, packers, shippers, and marketers.

The implementation of the NY IFP protocol could be done either informally by growers using the protocol as a guide or formally with a certification program administered by a compliance group. Since the IFP effort in NY was begun, the apple industry has begun implementing a market assurance program of Best Management Practices from Europe named EUREPGAP. This program requires certification by an independent third-party auditor, that the crop was produced using the BMP's that are proscribed by the EUREPGAP protocol. EUREPGAP requires growers to use the best pest and crop management practices but does not specify what they are. The NY apple IFP protocol differs from EUREPGAP in that it deals with specific apple IPM and horticultural BMPs, while the EUREPGAP scheme is written from a global, all-fruits-and-vegetables perspective. Does the NY apple industry want a certification program for IFP to differentiate IFP-fruit in the marketplace, or would it prefer to implement the protocol informally? The implementation of the NY IFP protocol is not an area in which Cornell University faculty and extension personnel typically become involved, except for those who assist with business plan development. It will be up to growers, growers' groups or industry groups to develop IFP certification and auditing programs to certify their fruit as IFP-grown. Canada has developed a national IFP for apples, with each Province developing their own set of detailed guidelines. The NY IFP was developed to ensure compatibility with both Ontario's and Quebec's IFP programs to preserve important export outlets for NY apples.

Beyond certification, what are the benefits of having an IFP protocol for NY apples? The principles underlying IFP can be implemented as educational tools and for grower self-assessments. The NY-IFP protocol can provide the NY apple industry with rallying points to promote

An IFP protocol must be a dynamic and flexible set of guiding principles (Anonymous 2003). Pest outbreaks and challenging production years will occur, bringing about the need to re-evaluate the IFP protocol and make needed adjustments to safeguard the apple crop and promote apples as a healthy and wholesome food. The NY apple IFP protocol is a dynamic and flexible document. The IFP protocol will be capable of integrating new strategies that are justifiable and reconcilable with the principles of integrated fruit production as it addresses pest man-

awareness and discussion of environmental and food safety impacts of production practices. The NY-IFP protocol can provide farmers and agencies with sources of information to uphold the need for cost share dollars and grant funds for transitioning to and adopting IFP practices (ex. NRCS and EQIP). Certainly, there is benefit in connecting environmental conservation, BMPs, IPM, and GAPs into whole farm production management that benefits environmental conservation and food safety.

The main principles of IFP are: to promote the production of safe foods, with minimal environmental impact and when needed the minimal use of reduced-risk pesticides through adoption of IPM. It is important to recognize that transitioning to IFP is a process influenced by economics, information, know-how and technology. It is also important to develop cross-disciplinary efforts to provide a foundation of knowledge and support and to provide for the industry's ability to conduct self-assessments and measure progress. To be successful, IFP must not only promote social and environmental goals, but economic sustainability at all levels of apple production and marketing as well.

agement, crop production, food safety, environmental conservation, and market preservation.

Much work went into developing the NY apple IFP protocol which has resulted in a sound and solid set of environmentally friendly production practices. The NY ARDP Board of Directors has discussed the most recent draft with us and has given us their suggestions. We are now seeking broader input from the NY apple industry. If you work with the NY apple industry and would like to review the New York Integrated Fruit Production (IFP) Protocol for Apples we would appreciate your comments and suggestions. For a copy of the NY IFP protocol contact either Juliet Carroll or Terence Robinson.

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