

DEVELOPMENT OF IPM ELEMENTS FOR KEY CROPS IN NEW YORK STATE

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Abstract

Integrated Pest Management (IPM) methods balance economic, environmental, and human health issues in pest management decision-making. This balance is achieved by careful consideration and implementation of all appropriate pest management options. IPM methods are developed to insure the delivery of high-quality agricultural products, maximize the effectiveness of all pest-control techniques and minimize adverse environmental effects.

Since managing pests is a dynamic process influenced by weather, markets, new knowledge, and other information, the best way to define it appears to be through a set of elements. The NYS IPM Program has developed IPM Elements for a number of vegetable and fruit crops in response to stakeholders. [These have been posted to the NYS IPM Website at: \(www.nysipm.cornell.edu/elements/index.html\)](http://www.nysipm.cornell.edu/elements/index.html). Elements are typically derived through a partnership process of appropriate stakeholders such as agricultural producers, food processing companies, supermarkets and Cornell University research and extension staff. Once developed IPM elements for a given crop may change over time as new knowledge and new perspectives become available.

The current project describes the development of new and revised* IPM Elements for: 10 NYS crops including: Apple*, Grapes-Juice*, Alfalfa (New Stands and Established Stands), Field Corn, Dairy Cattle (Summer-Confined and Summer-Pasture), Wheat (Winter), Soybean, Greenhouse, Onions*, and Potatoes*.

I. PROJECT DESCRIPTION

A. The Problem, Background and Justification

A variety of arthropod, disease, weed, and vertebrate pests impact yield and economic value of crops important to the sustainability of agriculture in the northeast. Pest control decisions have inherent costs and can pose potential risks to users and the environment. Effective pest management requires a working knowledge of pest biology and the skillful choice and integration of management alternatives that minimize or help avoid pest impacts. This management approach benefits producers through enhanced environmental protection and

improvements to net economic profitability. The practice of integrated pest management (IPM) is recognized as the preferred best management approach to pest control by such diverse groups as the US Forest Service, USEPA, USGAO, NYS DEC, and community agencies (name or 2?), the American Farmland Trust, Red Tomato, Mothers and Others, Sysco Foods, Birdseye Foods, Campbell Soup, Audubon Society, World Wildlife Fund, Sierra Club, and many others.

Integrated Pest Management (IPM) incorporates crop- and region-specific methodologies designed to minimize losses associated with arthropod, disease, weed, and vertebrate pests, maximize the efficacy and economy of agricultural pesticide use that minimizes risk to the environment while preventing crop loss. IPM advocates the use of multiple, compatible, cultural, physical, biological and chemical tactics to keep pest populations below levels injurious to crop production. When risk of significant pest injury is imminent judicious pesticide use can be a recommended tactic.

Integrated Pest Management (IPM) methods balance economic, environmental, and human health issues in pest management decision-making. This balance is achieved by careful consideration and implementation of all appropriate pest management options. IPM methods are developed to insure the delivery of high-quality agricultural products, maximize the effectiveness of all pest-control techniques and minimize adverse environmental effects.

The principles of IPM have been successfully applied to managing pests in a variety of settings including agriculture, landscapes, livestock, structures, and beyond. Since managing pests is a dynamic process influenced by weather, markets, new knowledge, and other information, the best way to define IPM appears to be through a set of “elements”. Elements are sets of appropriate, effective, efficient, economically viable and environmentally sound practices one would use to mitigate or avoid pest problems. IPM Elements serve to help producers self evaluate the strength of their IPM programs and identify areas where and how they can improve pest management for the crops they grow. A number of states, organizations and others are developing and promoting the use of IPM Elements. IPM Elements have also been successfully used by growers, food processors, supermarkets, and others to help identify and document IPM use relative to managing key pests of crops. In NY, IPM Elements have been developed for a many vegetable and fruit crops at the request of representatives of these commodity industries. IPM Elements developed for use in NY can be found at the NYS IPM Program website: (www.nysipm.cornell.edu/elements/index.html).

How are IPM Elements developed?

In NY, IPM elements have been developed in response to requests from grower groups and food industry stakeholders. Recently, the National Resources Conservation Service (NRCS) has requested IPM elements for crops approved for various federal government cost-sharing programs.

In NY, the typical set of IPM elements is developed through a partnership process involving a commodity appropriate collection of stakeholders which may involve agricultural producers,

food processing companies, supermarkets and Cornell University research and extension faculty and staff. Drafts of IPM elements are generated by IPM personnel drawing from crop specific production and pest management resources, existing manuals, fact sheets, Cornell Pest Management Guidelines, and other available resources with assistance from faculty, extension staff, and interested stakeholders. A technical support person with appropriate background and experience works with the principal subject matter investigator to draft IPM elements for the crops proposed. These rough drafts of these documents are then shared with some stakeholders for initial reviews and comments. These drafts are then revised and the subsequent draft is made available to a larger set of stakeholders for comments. Revised draft of the elements are then sent to stakeholder groups for comment either via mail or electronic media or via meetings to gain broader input and refine the documents. Once general consensus has been reached on the final draft of the IPM elements, end users have the option of adding metrics to help in evaluation. These metrics have included a point system or priority level to allow measurement of the IPM practices. Finalized versions of the IPM elements were then placed on the NYS IPM website. IPM elements, by virtue of the science they represent, are *living documents* that are subject to periodic review and enhancement as new information becomes available.

New IPM elements have been requested for: alfalfa, field corn, wheat, soybean, oats, forage legume & grass mixtures, apple, peach & nectarine, tart cherry, grapes, potatoes, onions, Christmas trees, trees & shrubs in containers, in-ground trees & shrubs, perennials, and dairy cattle. The NYS acreage and crop value statistics for these proposed crops is given in Table 1 for the 2001/2002 growing seasons.

Table 1. Agricultural production statistics for selected crops in New York State.

Crop	Acres		Yield/Acre	\$/Acre	Value \$(K)
	Planted (K)	Harvested (K)			
Wheat	125	120	53 bu	2.45	15,582
Oats	95	80	69 bu	1.4	7,728
Rye	35	7	27 bu	2	378
Barley	15	12	51 bu	1.6	979
Soybeans	160	158	33 bu	4.35	22,681
Corn-Grain	1,030	540	105 bu	2.3	130,410
Corn-Silage		485	16 Tons	26.4	204,864
Alfalfa		560	2.8 Tons	118	185,024
Other Hay		1,100	1.8 Tons	80.5	159,390
Potatoes	235	233	255 cwt		58,826
Onion	132	127	320 cwt		38,263
Crop	Farms	Number Trees	Acres (K)	Utilized Yield	Value \$(K)
Apple	695	7,544,740	41	610 million lbs	99,955
Peach	255	239,758	1.7	10 million lbs	2,375
Tart Cherry	126	264,435	2	13 million lbs	6,420
Grapes	962		31	155,000 tons	43,336
Crop	Producers \$100,000+	Number Sold 2001 (K)	Sales 2001 \$(K)	Number in inventory (K)	Value of inventory\$(K)
Christmas trees	13	54	1,086	663	7,110
Broadleaf evergreens	42	893	9,247	2,235	14,800
Coniferous shade trees	52	595	9,431	2,586	16,192
Deciduous shrubs, other	54	187	9,605	2,948	23,702
Flowering trees	51	187	4,868	841	15,495

Deciduous shade trees	57	257	11,646	1,419	34,766
	Dairy Farms	Dairy Cows	\$/cwt Milk	Lbs Milk (M)	Value \$ (M)
Dairy Cows	7,200	670,000	15.80	11,641	1,860.9

Sources: New York Agricultural Statistics 2001-2002, <http://www.nass.usda.gov/ny>

B. Objectives

- 1) To identify and delineate common IPM practices for crops in New York State to provide a framework for NRCS and stakeholders to assess their use of IPM practices for environmental protection and conservation. Specifically, the goal of this project is to develop IPM elements for the crops listed above.
- 2) Placement of IPM elements produced will be placed on NYS IPM website for availability to stakeholders.

C. Approach and Procedures

Initial draft IPM elements will be developed from existing manuals, fact sheets, Cornell Pest Management Guidelines, and from other available resources with assistance from faculty, extension staff, and interested stakeholders. A technical support person with appropriate background and experience will be hired to work with the principal investigators to draft IPM elements for the crops proposed. Draft IPM elements will then be sent to stakeholder groups for comment either via mail or electronic media or via meetings to gain broader input into the IPM elements documents. IPM Coordinators will consult and meet with stakeholders (growers, crop consultants, agri-business personnel, faculty, extension staff, federal & state agencies, etc.) in a series of focus groups for consensus building. Once consensus has been established, the IPM elements will be finalized and posted on the web. The template for new IPM Elements is shown in Appendix 1. In addition to developing a set of new crop elements, previously developed IPM elements for apples, grapes-juice, onions and potatoes will be reviewed and revised as appropriate.

Progress to Date (January 24, 2005):

Significant progress has been made to develop or revise* Elements of IPM for 10 NYS crops including: Apple*, Grapes-Juice*, Alfalfa (New Stands and Established Stands), Field Corn, Dairy Cattle (Summer-Confined and Summer-Pasture), Wheat (Winter), Soybean, Greenhouse, Onions*, and Potatoes*. See Table 2.

Of these, IPM Elements for Apples, Grape-Juice, Onions and Potatoes have been revised, reviewed by stakeholders, and are now available for use on the NYS IPM website (<http://nysipm.cornell.edu/elements/index.html>). Elements for the remaining crops have been drafted. Elements for alfalfa, field corn, wheat and greenhouses have begun the stakeholder review process.

A no cost project extension request has been made to allow time for the stakeholder review process, to complete any subsequent revisions as necessary, and to post revised elements to the NYS IPM program Elements website.

Table 2. IPM Crop elements in development as of December 20, 2004.

Crop	Commodity	Status
Apple	Fruit	On Line
Grape - Juice	Fruit	On Line
Peach & Nectarine	Fruit	
Tart cherry	Fruit	
Alfalfa	LivestkFCrops	Draft
Dairy Cattle	LivestkFCrops	Draft
Field Corn	LivestkFCrops	Draft
Forage legume & grass mixes	LivestkFCrops	
Oats	LivestkFCrops	
Poultry	LivestkFCrops	Draft
Soybean	LivestkFCrops	Draft
Spelt	LivestkFCrops	
Wheat	LivestkFCrops	Draft
Christmas trees	Ornamentals	
Greenhouse	Ornamentals	Draft
Perennials	Ornamentals	
Trees & shrubs in containers	Ornamentals	
Trees & shrubs in ground	Ornamentals	
Onions	Vegetables	On Line
Potatoes	Vegetables	On Line

This project funded by a grant from USDA CSREES

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Appendix:

Elements of Crop IPM in New York State

MAJOR PESTS

Insects	Risk	Diseases	Risk	Weeds	Risk	Vertebrates	Risk
	+++		+++		+++		+++
	++		++		++		++
	+		+		+		+

List of common pests expected to affect the crop in New York. +++ = generally expected (high risk), a priority for management; ++ = potentially expected, (medium risk); + = occasional pest, (low risk).

EDUCATIONAL IPM CONSIDERATIONS

Education	Activity	Points
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List of recommendations for activities that provide information to enhance IPM knowledge and skills. Example activities may include: participation in meetings, accessing information from IPM website, use of Cornell production and pest management guides.

PRE-PLANT IPM CONSIDERATIONS

Management	Activity	Points
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List of pre-plant activities/practices that enhance pest management impacts. Management topics may include: Site Selection, Site Preparation, Insect & Disease, Weed, Records, Crop Rotation, Soil Test, and Nutrient Management, and more.

AT PLANTING IPM CONSIDERATIONS

Management	Activity	Points
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List of planting time activities/practices that enhance pest management impacts. Management topics may include: Hybrid Selection, Nutrient Management, Seedbed Preparation, Planting Dates, Seed Treatment, Equipment, Planting Guidelines, Fertilization, Disease, Insect, Weed, and more.

IN SEASON IPM CONSIDERATIONS

Management	Activity	Points
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List of in season activities/practices that enhance pest management impacts. Management topics may include: Equipment, Population Assessment, Nutrient (or Fertilization), Weed, Scout, Pest, Diseases, Action Thresholds, Chemical Controls, Records keeping, and more..

PRE-HARVEST AND HARVEST IPM CONSIDERATIONS

Management	Activity	Points
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List of pre-harvest/harvest activities/practices that enhance pest management impacts. Management topics may include: Disease, Equipment, Harvest, Insect, Storage, and more.

POST HARVEST IPM CONSIDERATIONS

Management	Activity	Points
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List of post-harvest activities/practices that enhance pest management impacts. Management topics may include: Weed, Soil, Insect, Records, Storage, and more.

Total Points Available ____
Total Point Earned ____
Percent of Points Earned ____

IPM OPTIONS FOR MANAGING CROP SPECIFIC PESTS

The management techniques listed below offer varying degrees of control for pest listed. For more information, consult the [Cornell Guide for Integrated Field Crop Management](#) or the [Cornell Field Crops and Soils Handbook](#) .

Crop X Pests	Planting Date	Resistant Varieties	Seed Pesticides	Pesticide	Field Sanitation	Crop Rotation	Biological Control
Weeds							
Insects							
Disease							

A table summarizing common management practices to employ to minimize risk of pest impacts/problems. More detailed information would be available through the Cornell guide series and other extension IPM resources.

TO LEARN MORE...

References listed below.

A list of suggested key, crop-specific, NY appropriate IPM resources that provide more detailed information regarding application and use of IPM elements. (Such as the Cornell Guide for Integrated Crop Management, Recommendations for pertinent resources, factsheets, etc.