

# Extension Education Methods

## Adoption of Pest, Nutrient, and Conservation Vegetation Management Using Financial Incentives Provided by a U.S. Department of Agriculture Conservation Program

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**ADDITIONAL INDEX WORDS.** EQIP, NRCS, integrated pest management, integrated crop management, resource conservation

**SUMMARY.** The Environmental Quality Incentives Program (EQIP) administered by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) was developed to encourage producer adoption of practices that promote resource conservation on lands in agricultural production. Reviewing the 2002 Farm Bill, EQIP rules, and local EQIP structure using Michigan as a case study, producers had ample opportunity to participate in EQIP. Yet past EQIP support of pest, nutrient, and conservation vegetation management was low among six states from 1997 to 2002, averaging 1.1% to 2.7% of total EQIP funds allocated. The past funding pattern and analysis of local resource concern priorities and incentive rates suggested that program modifications were warranted. The Michigan case study showed that participation in the NRCS advisory process, in partnership with commodity representatives and university specialists, was an effective avenue to recommend and obtain local EQIP modifications. After modifications were accepted in Michigan, increases were seen in producer participation in EQIP and in funds committed (about 15%) to adoption of a variety of techniques with pest, nutrient, and conservation vegetation value. This approach of analysis and engagement in the EQIP process is likely to work in other states, given common EQIP structure and governance, past funding patterns, and availability of supporting extension, research, and commodity partners.

Selected voluntary conservation programs, administered by the U.S. Department of Agriculture (USDA), NRCS, have been designed to provide financial incentives to pro-

ducers to address on-farm resource concerns. The general concept, authorizing history, and methods to deliver financial incentives to producers as a means to encourage conservation have

been reviewed by Casey et al. (1999). The 2002 Farm Bill (Farm Security and Rural Investment Act of 2002) further emphasized that environmental quality and farm health should be complementary goals of USDA, NRCS conservation programs (U.S. Congress, 2002a).

As first authorized in the 1996 Farm Bill (Federal Agricultural Improvement and Reform Act), EQIP was available to producers in U.S. geographic priority areas that were located across the country. The geographic areas were selected based on resource conservation concerns such as groundwater protection (Council for Agricultural Science and Technology, 2003; Ribaldo and Caswell, 1999). More recently, as reauthorized in the 2002 Farm Bill, EQIP became available throughout the U.S. to comprehensively address soil, water, air, plant, and animal conservation [U.S. Congress, 2002a, (Section 1240)].

Pest and nutrient management covers a broad range of monitoring and assessment protocols that guide the selection and use of farm technologies to manage pests and nutrients (Norris et al., 2003; Wild, 2003). We refer to manipulation of non-crop vegetation, such as groundcovers and field border plantings (e.g., Snapp et al., 2005), collectively as conservation vegetation management. There is a wide variety of NRCS-designed practices utilized in EQIP to address the resource concerns identified on-farm, including practices related to pest, nutrient, and conservation vegetation management (USDA, 2003a).

The 2002 Farm Bill, EQIP rules, and local EQIP structure were reviewed to evaluate the mechanism of delivering financial incentives through EQIP to assist producer adoption of pest, nutrient, and conservation vegetation management techniques. We measured patterns of past EQIP fund allocations to analyze the program's past success in this area. And a Michigan case study was conducted to assess how participation in local EQIP governance can lead to modifications of key program attributes that result in increased producer adoption of pest, nutrient, and conservation vegetation management techniques using EQIP financial incentives.

### Materials and methods

**THE FARM BILL AND EQIP GUIDANCE.** The 2002 Farm Bill (U.S.

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Congress, 2002a) and the corresponding conference report (U.S. Congress, 2002b) were reviewed to determine the intent of EQIP in implementing pest, nutrient, and conservation vegetation management techniques as a means to address resource concerns on the farm. The 2002 Final Rule for EQIP (USDA, 2002), program technical specifications (USDA, 2003a, 2003b), and local EQIP attributes using Michigan as an example (accessed through USDA, 2003b) were reviewed. Based on this review, an outline of the EQIP mechanisms relevant to producers interested in adopting pest, nutrient, and conservation vegetation management was developed.

**EQIP SUPPORT OF PEST, NUTRIENT, AND CONSERVATION VEGETATION MANAGEMENT.** EQIP fund allocations of nine NRCS-designed practices were considered because of their relationship to pest, nutrient, and conservation vegetation management. An additional three practices were chosen that address waste contamination concerns (USDA, 2003a). Full technical descriptions of each practice are available from the USDA (USDA, 2003a). The categories represent the goals common to these NRCS practices as listed in the technical descriptions under the heading "purpose." The pest, nutrient, and conservation vegetation management-related categories were soil management (specifically erosion and moisture control, which is commonly addressed by conservation vegetation management, a total of six practices); nutrient management, including soil organic matter and plant nutrient maintenance and use of plant by-products as a nutrient source (five practices); waste utilization including use of animal waste used for plant nutrition and plant by-products (two practices); weed management (three practices); and plant pest management (three practices). The waste containment-related categories were animal nutrient contamination control (two practices) and agrichemical contamination control (one practice).

We compared funds allocated to these categories among six states (California, Michigan, Minnesota, New York, North Carolina, and Oklahoma) that represented a wide range of crop production (USDA, 2004) and that were allocated EQIP funds exceeding \$20 million from 1997 to 2002. As used in NRCS reporting, allocated

funds were based on grower requests from successful applications submitted to EQIP. Fund allocations of the NRCS practices represented in each category were summed and reported as a percentage of total funds allocated in the program for each state. Percentage of funds allocated to these categories were also compared among the six states for 2002 (last year of the 1996 Farm Bill) and between Michigan and North Carolina, for which 2003 (first year of the 2002 Farm Bill) data were available. For each state, percent fund allocations among the seven categories were compared using the chi-square test of equality (Freund and Walpole, 1980), for the periods 1997–2002, 2002 (analyzed separately from the 1997–2002 period as noted above), and 2003. For each category, we also compared percent fund allocations across the states using the same chi-square test of equality.

**MODIFYING EQIP LOCAL GUIDELINES (MICHIGAN CASE STUDY).** In Michigan, we participated in the EQIP advisory process, in partnership with commodity representatives and university specialists, to encourage program modifications that were designed to increase producer adoption of pest, nutrient, and conservation vegetation management using EQIP financial incentives. One of us (M.J. Brewer, unpublished) served on the EQIP subgroup of the technical committee of Michigan, which is the principal state committee advising NRCS. Program proposals were offered and response was tracked through the advisory process. Producers volunteered information on their participation in EQIP after program modifications were implemented.

## Results

**THE FARM BILL AND EQIP GUIDANCE.** The 2002 Farm Bill provided clear language on the application of pest, nutrient, and conservation vegetation management techniques to resource conservation: "in determining the amount and rate of incentive payments, the Secretary may accord great significance to a practice that relates to pest management and pesticide use. Special significance also is placed on practices that promote residue management, nutrient management, invasive species management, and air quality management" [U.S. Congress, 2002a (Section 1240B, subsection

E #2)]. Also, the Farm Bill stated a purpose of EQIP was "to optimize environmental benefits by assisting producers in complying with local, state, and national regulatory requirements concerning soil, water, and air quality; wildlife habitat; and surface and ground water conservation; avoiding, to the maximum extent practicable, the need for resource and regulatory programs by assisting producers in protecting soil, water, air, and related natural resources" [U.S. Congress, 2002a (Section 1240)]. More specifically, national EQIP priorities include "reductions of nonpoint source pollution, such as nutrients, sediment, pesticides" (USDA, 2003b).

From a commodity viewpoint, EQIP was specified to provide support to animal production agriculture faced with environmental protection challenges. Percent allocation of program funds was established legislatively at 60% for this issue (USDA, 2003b), but the remaining 40% of program funds were broadly applicable to support plant commodities faced with environmental challenges. Specialty crop (fruit, vegetables, nursery crops, cut Christmas trees, and short rotation woody crops) producers face food, water, environmental, and human safety issues identified in the Food Quality Protection Act and other federal and state environmental protection programs (Johnson and Bailey, 1999; Ogg, 1999). Field crop producers also face similar issues such as wind-blown soils and leaching of fertilizers and pesticides (Norris et al., 2003; Wild, 2003).

Two locally set program attributes affect the likelihood of producer's EQIP applications being accepted and the amount of funds allocated to support the NRCS practices they wish to adopt. The NRCS State Conservationist establishes resource concern priorities and incentive rate schedules for NRCS practices, utilizing guidance from the NRCS advisory process as consistent with EQIP rules and national priorities [USDA, 2002 (Final Rule, Section 1466.4), 2003b]. Using Michigan as an example, special emphases were set by identifying the most important local resource concerns and by scoring the resource concerns in order to rank applications for funding. NRCS practices were selected to address each state resource concern (Table 1). Each practice was assigned an incentive rate, either as a cost share

**Table 1. Resource concerns identified as priorities in the Environmental Quality Incentives Program of Michigan, and applicable U.S. Department of Agriculture, National Resources Conservation Service (NRCS) practices to address the concerns in 2003 and 2004–05.**

Resource concern	Practices (NRCS no.) <sup>z</sup>	
	2003	2004–05
Threatened, endangered, or special concern species	F, C2	F, C2
Comprehensive nutrient management plan <sup>y</sup>		
Riparian corridor management	R1, C1, P, N	R1, C1, P, N
Groundwater resource protection	C1, C2, P, N, W1, A	C1, C2, P, N, W1, A
Air quality protection	R1, R2, C1, C2	R1, R2, C1, C2, P
Integrated conservation cropping	R1, R2, C1, C2, C3	R1, R2, C1, C2, C3, P, N
Animal production management	W1, W2, C4	W1, W2, C4
Integrated wildlife management	F	F
Forestry		
Invasive species control		I

Applications were further assessed by scores given to each resource concern.

<sup>z</sup>Code denotes the NRCS practice (practice number) designated to address the resource concern: R1 = residue management (329); R2 = seasonal residue management (344); C1 = cover crop (340); C2 = conservation cover (327); C3 = conservation crop rotation (328); P = pest management (595); N = nutrient management (590); F = field border (386); W1 = waste utilization (633); W2 = waste storage facility (313); A = agrichemical containment facility (702); C4 = composting facility (317); I = invasive species control (797).

<sup>y</sup>Funds were provided directly for this animal waste management planning activity. No practices were associated with it.

set as a designated percentage of actual costs or as an incentive set as an annual per acre payment (USDA, 2002; Table 2). For NRCS practices used annually, typically including those related to pest, nutrient, and conservation vegetation management, the intent was to provide producers yearly financial assistance to demonstrate the value of the practices for a designated contractual period, thereby encouraging their continued use. Payment limits also were set, as consistent with EQIP rules (USDA, 2003b). Other states had substantially similar program attributes, with the exception that the NRCS in Michigan sets statewide EQIP incentives and priorities, while other states may allow more localized guidelines developed from input of local working groups [see the EQIP page of NRCS state-based web sites (USDA, 2003b)].

**EQIP SUPPORT OF PEST, NUTRIENT, AND CONSERVATION VEGETATION**

**Table 2. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) practices related to five pest, nutrient, and conservation vegetation management categories (soil, nutrient, waste, weed, pest<sup>z</sup>) and two waste containment categories (pestchem, nutchem<sup>z</sup>), and their incentives rates used in the Environmental Quality Incentives Program in Michigan in 2004 and 2005.**

NRCS practice <sup>y</sup>	Soil	Nutrient	Waste	Weed	Pest	Pestchem	Nutchem	2004	2004	2005	2005
								rate <sup>x</sup>	time <sup>w</sup>	rate <sup>x</sup>	time <sup>w</sup>
								(\$ or %)	(years)	(\$ or %)	(years)
<i>Pest/nutrient/vegetation practices</i>											
Residue management	x	x									
No till/strip till (329a)								\$10	3	\$10	3
Mulch till (329b)								\$3	3	\$3	3
Ridge till (329c)								\$3	3	\$3	3
Seasonal residue management (344)	x	x						\$3	3	\$3	3
Cover crop (340)	x	x		x				\$15	3	\$15	3
Pest management (595)				x	x						
Vegetable crops								\$10	3	\$30	3
Fruit and nursery crops								\$20	3	\$60	3
Field crops								\$3	3	\$4	3
Nutrient management (590)		x	x								
Specialty crops								\$10	3	\$10	3
Field crops								\$4	3	\$4	3
Conservation cover (327)	x							\$50–225	1	\$50–225	1
Conservation crop rotation (328)	x	x		x	x			\$3	3	\$3	3
Waste utilization (633)			x					\$15	3	\$15	3
Field border (386)	x				x			50%	---	50%	---
<i>Containment practices</i>											
Waste storage facility (313)							x	75%	---	75%	---
Agrichemical containment facility (702)						x		75%	---	75%	---
Composting facility (317)							x	75%	---	75%	---

<sup>z</sup>Soil = erosion control and improvement of soil structure, Nutrient = nutrient management, including soil organic matter and plant nutrient maintenance and use of plant by-products use as a nutrient source, Waste = animal waste utilization on cropland, Weed = weed management and invasive species management of non-indigenous weedy species, Pest = plant pest management. Description of waste containment categories: Pestchem = agrichemical contamination control, Nutchem = animal nutrient contamination control.

<sup>y</sup>Name of the practice followed by its NRCS practice number. Full technical descriptions of each practice are available (USDA, 2003a). Vegetable crops include potato (*Solanum tuberosum*); fruit and nursery crops include Christmas trees and sod farms; specialty crops are high value crops requiring tissue analysis or nutrient additions through banding or split applications.

<sup>x</sup>Financial incentives for practices are paid on a dollars per acre basis or a percent cost share basis.

<sup>w</sup>Designated number of annual payments; not applicable for percent cost share.

MANAGEMENT. Wide variation in fund allocations among the six states for each of the seven categories was detected during the 1997–2002 period ( $\chi^2 > 1000$ ,  $df = 5$ ,  $P < 0.005$  in five tests) (Table 3). Also, considerable variation in fund allocations across categories for each state was detected ( $\chi^2 > 1000$ ,  $df = 6$ ,  $P < 0.005$  in six tests) (Table 3). The five pest, nutrient, and conservation vegetation management categories were skewed toward low fund allocations (1.1% to 2.7%). In comparison, funds supporting the animal nutrient contamination control category averaged about 6.5% across states.

Percentage of funds allocated to these categories increased substantially by 2002, but fund variation among states ( $\chi^2 > 1000$ ,  $df = 5$ ,  $P < 0.005$ ) and categories ( $\chi^2 > 1000$ ,  $df = 6$ ,  $P < 0.005$ ) remained high. The investments related to pest, nutrient, and conservation vegetation management averaged 2.7% to 8.3% among the

six states, and funds supporting the animal nutrient contamination control category was about 19%. Minnesota (17% to 26%) generally supported pest, nutrient, and conservation vegetation management categories more than the other states (0.2% to 17%). Michigan and North Carolina had very high allocations for the animal nutrient contamination control category (Table 4), with most funds supporting construction of animal waste storage facilities (data not shown).

During the first year of the new Farm Bill (2003), the same pattern of high variability in percent allocation was seen between Michigan and North Carolina for each category ( $\chi^2 > 1000$ ,  $df = 1$ ,  $P < 0.005$ ) and the seven categories for each state ( $\chi^2 > 1000$ ,  $df = 6$ ,  $P < 0.005$ ). Michigan focused nearly half of the budget on the animal nutrient contamination control category; whereas North Carolina provided a higher percentage of their

EQIP funds to support pest, nutrient, and conservation vegetation management categories (Table 5).

**MODIFYING EQIP LOCAL GUIDELINES (MICHIGAN CASE STUDY).** Working with commodity representatives and university specialists, one of us (M.J. Brewer, unpublished) offered two proposals to the EQIP subgroup of the technical committee of Michigan in 2003 and 2004. The subgroup considered expanded recognition of the NRCS nutrient and pest management practices to address the state's air quality and integrated conservation cropping resource concerns. These modifications were recommended by the subgroup and the technical committee. They were approved by the State Conservationist, beginning with the 2004 program (Table 1).

A second proposal offered incentive rate increases for the NRCS pest management practice (Table 2) to better encourage producer adop-

**Table 3. Funds allocated for five categories related to pest, nutrient, and conservation vegetation management and two categories related to agrichemical and animal nutrient containment in the Environmental Quality Incentives Program (EQIP).<sup>z</sup> Data were compared from six states with EQIP funds allocated exceeding \$20 million, 1997 through 2002.**

States	Funds (million \$)	Category (% of total funds provided to state) <sup>y</sup>							Mean ± SD
		Soil	Nutrient	Waste	Weed	Pest	Pestchem	Nutchem	
California	43.8	0.20	0.41	0.21	0.77	0.57	0.0042	1.67	0.54 ± 0.56
Michigan	23.9	1.43	1.42	3.91	1.71	1.57	6.30	10.57	3.84 ± 3.48
Minnesota	31.4	0.51	1.55	1.56	0.80	0.80	0.00	1.09	0.90 ± 0.56
New York	21.4	0.56	2.92	6.07	0.75	0.59	0.24	4.20	2.19 ± 2.26
North Carolina	24.8	5.34	8.21	3.69	2.27	2.53	0.42	17.91	5.77 ± 5.90
Oklahoma	27.5	0.13	0.53	0.50	1.20	1.20	0.00	3.31	0.98 ± 1.13
Mean ± SD		1.36 ± 2.00	2.51 ± 2.93	2.66 ± 2.29	1.25 ± 0.62	1.21 ± 0.75	1.16 ± 2.52	6.46 ± 6.55	

<sup>z</sup>Table 2 lists U.S. Department of Agriculture, National Resources Conservation Service (NRCS) practices applicable to each category. E. Brzostek (personal communications) provided data. Significant ( $P < 0.005$ , chi-square test of equality) variability was detected among states and categories.

<sup>y</sup>Soil = erosion control and improvement of soil structure, Nutrient = nutrient management, including soil organic matter and plant nutrient maintenance and use of plant by-products use as a nutrient source, Waste = animal waste utilization on cropland, Weed = weed management and invasive species management of non-indigenous weedy species, Pest = plant pest management. Description of waste containment categories: Pestchem = agrichemical contamination control, Nutchem = animal nutrient contamination control.

**Table 4. Funds allocated for five categories related to pest, nutrient, and conservation vegetation management and two categories related to agrichemical and animal nutrient containment in the Environmental Quality Incentives Program (EQIP).<sup>z</sup> Data were compared from six states with EQIP funds allocated exceeding \$5 million in 2002.**

States	Funds (million \$)	Category (% of total funds provided to state) <sup>y</sup>							Mean ± SD
		Soil	Nutrient	Waste	Weed	Pest	Pestchem	Nutchem	
California	16.0	0.08	0.09	0.0070	0.28	0.20	0.00	0.00	0.093 ± 0.11
Michigan	6.8	2.79	2.78	6.26	1.17	1.11	13.80	40.01	9.70 ± 14.11
Minnesota	9.4	23.73	25.94	17.27	20.36	19.90	0.00	1.85	15.58 ± 10.40
New York	5.6	1.53	8.02	16.53	1.99	1.21	0.00	26.77	8.01 ± 10.11
North Carolina	6.9	1.16	10.32	9.16	10.05	9.69	0.00	42.56	11.85 ± 14.23
Oklahoma	8.3	0.02	0.71	0.73	0.87	0.88	0.00	2.16	0.77 ± 0.72
Mean ± SD		4.89 ± 9.29	7.98 ± 9.70	8.33 ± 7.47	5.79 ± 8.01	5.50 ± 7.90	2.76 ± 6.17	18.89 ± 19.98	

<sup>z</sup>Table 2 lists U.S. Department of Agriculture, National Resources Conservation Service (NRCS) practices applicable to each category. E. Brzostek (personal communications) provided data. Significant ( $P < 0.005$ , chi-square test of equality) variability was detected among states and categories.

<sup>y</sup>Soil = erosion control and improvement of soil structure, Nutrient = nutrient management, including soil organic matter and plant nutrient maintenance and use of plant by-products use as a nutrient source, Waste = animal waste utilization on cropland, Weed = weed management and invasive species management of non-indigenous weedy species, Pest = plant pest management. Description of waste containment categories: Pestchem = agrichemical contamination control, Nutchem = animal nutrient contamination control.

**Table 5. Funds allocated for five categories related to pest, nutrient, and conservation vegetation management and two categories related to agrichemical and animal nutrient containment in the Environmental Quality Incentives Program (EQIP).<sup>z</sup> Data were compared from two states with EQIP funds allocated exceeding \$9 million in 2003.**

States	Funds (million \$)	Category (% of total funds provided to state) <sup>y</sup>							
		Soil	Nutrient	Waste	Weed	Pest	Pestchem	Nutchem	Mean ± SD
Michigan	9.7	1.38	2.41	12.77	1.20	1.14	10.11	47.98	11.00 ± 16.99
North Carolina	10.1	0.43	6.32	26.26	6.55	6.92	0.98	21.94	9.9 ± 10.12
Mean ± SE		0.90 ± 0.67	4.36 ± 2.76	19.51 ± 9.54	3.88 ± 3.78	4.03 ± 4.08	5.55 ± 6.46	34.96 ± 18.41	

<sup>z</sup>Table 2 lists U.S. Department of Agriculture, National Resources Conservation Service (NRCS) practices applicable to each category. Data was obtained from state NRCS offices by L. Elworth (communication) and M.J. Brewer (personal observation). Significant ( $P < 0.005$ , chi-square test of equality) variability was detected among states

<sup>y</sup>Soil = erosion control and improvement of soil structure, Nutrient = nutrient management, including soil organic matter and plant nutrient maintenance and use of plant by-products use as a nutrient source, Waste = animal waste utilization on cropland, Weed = weed management and invasive species management of non-indigenous weedy species, Pest = plant pest management. Description of waste containment categories: Pestchem = agrichemical contamination control, Nutchem = animal nutrient contamination control.

tion of a variety of integrated pest management techniques (e.g., use of reduced-risk pesticides, conversion to reduced-risk application methods, use of forecasting tools, and use of biologically based and cultural management methods) that vary in environmental benefit and cost of implementation (Norris et al., 2003). To support the proposal, a listing of integrated pest management techniques, their conservation value, and their costs applicable to fruit, vegetable, and nursery crop production in Michigan was compiled from existing university bulletins and advice from university specialists [Michigan State University Integrated Pest Management Program (MSU IPM Program), 2005]. In addition, Michigan commodity representatives provided support through letters and their participation on the technical committee. The EQIP subgroup and the technical committee recommended adjustments in incentives for commodity categories previously recognized. Substantial increases were approved for the vegetable category and the fruit and nursery category beginning in 2005 to support producer adoption of integrated pest management techniques (Table 2). In comparison, incentives for specific integrated pest management techniques on specific crops had been adopted in Washington, California, and Oklahoma [see the EQIP page of NRCS state-based web sites (USDA, 2003b)].

To evaluate the effect of these changes, producers, agricultural consultants, and NRCS local staff provided information from four counties in western Michigan, where there is a high concentration of fruit, vegetable, and nursery crops (Kleweno and Matthews, 2003). Previously in this region, producer awareness of EQIP had increased with the distribution of

educational materials (Brewer et al., 2004; MSU IPM Program, 2005). In this region, producer participation in EQIP increased at least two-fold, and about 15% of EQIP funds scheduled in producer contracts supported the adoption of an array of integrated pest management techniques, including several with nutrient and conservation vegetation management value (M.J. Brewer, personal observation; MSU IPM Program, 2005). In comparison, about 1.5% of EQIP funds in Michigan supported adoption of pest management from 1997 to 2002 (Table 3). Techniques scheduled to be adopted included conversion to reduced risk technologies (e.g., adding electronic canopy sensing technologies to orchard sprayers, use of flamer and steamer weed control technology, use of pesticides with low potential for ground and surface water contamination); removal of wild host plants that harbor pests; mulching of legume hay in young plantings for improved plant health and reduced use of herbicides with high leaching potential; establishment of sod centers in orchards with a legume and grass blend to provide plant nutrients, reduce erosion, and provide alternate hosts for beneficial insects; and planting allelopathic plants such as mustard species (e.g., *Brassica juncea*, *Sinapis alba*) and radish (e.g., *Raphanus sativus* var. *oleiferus*) (M.J. Brewer, personal observation). Many of these techniques have high crop and environmental health value (Norris et al., 2003).

## Discussion

We found that the 2002 Farm Bill, EQIP rules, and EQIP national priorities were supportive of a program effort to encourage adoption of pest, nutrient, and conservation vegetation management as a means to ensure farm

health and environmental quality. Using Michigan as a case study, producers interested in implementing pest, nutrient, and conservation vegetation management techniques had a good selection of applicable NRCS-designed practices (Table 2), and these practices were approved to address several local EQIP resource concern priorities (Table 1). These guidelines ensured a similar program nationally, but local EQIP governance allowed for substantial variation in selection of resource concern priorities, NRCS practices to address the priorities, and financial incentives for the practices. Analysis of EQIP guidelines and historical patterns of low EQIP support of pest, nutrient, and conservation vegetation management adoption suggested that modifications to these program attributes were warranted in Michigan and likely in other states.

The NRCS advisory process allows for local EQIP governance, providing an opportunity to propose local EQIP modifications. Information provided through the NRCS advisory process in Michigan justified expanded use of pest and nutrient management-related practices in addressing resource concerns (Table 1), and increased incentive rates for the NRCS pest management practice (Table 2). These modifications were designed to attract the interest of crop producers, with special emphasis on fruit, vegetable, and nursery crop producers who were faced with significant regulatory issues (Johnson and Bailey, 1999; Ogg, 1999). Corresponding to these changes, increases were seen in producer participation in EQIP, and in their EQIP commitments to adopt techniques with pest, nutrient, and conservation vegetation management value.

We found analysis of the EQIP process to deliver financial incentives,

use of the advisory process to make local program adjustments, and review of the historical pattern of program support for pest, nutrient, and conservation vegetation management to be highly valuable. The information gleaned allowed identification of key program attributes and approaches with the aim to address on-farm resource concerns by increasing producer adoption of pest, nutrient, and conservation vegetation management by using EQIP financial incentives. In Michigan, we focused on the state-wide selection of resource concern priorities, NRCS practices to address the priorities, and financial incentives for the practices. Active participation in the advisory process, in partnership with commodity representatives and university specialists, resulted in acceptance of modifications to these program attributes. This approach of analysis and engagement in the EQIP process is likely to work in other states, given common EQIP structure and governance, past funding patterns, and availability of supporting extension, research, and commodity partners.

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