

Practice: 590 - Nutrient Management

Scenario: #1 - Basic

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on > = 40 acres of cropland where there is no manure application. The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients. Payment for implementation is to defray the costs of soil testing, analysis, consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Records demonstrating implementation of the 4 R's of the NM criteria (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) will be required.

Before Situation:

In this geographic area, a fertility program is either non-existent or does not meet the 590 nutrient management standard. Soil testing is not completed on a regular basis and applications of fertilizers are not based on land grant university recommendations or a nutrient budget. An environmental evaluation or risk assessment is not completed. Nutrients are transported to surface waters through runoff or soil erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Situation:

A nutrient management system will be developed to meet the NRCS 590 standard. The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation. A nutrient budget will be developed for each field(s) based on soil test analysis and land grant university recommendations or crop removal rates. On planning units, typically 40 acres or larger, soil testing is completed according to LGU recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget. The use post-harvest soil and/or tissue tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs and potentially reducing off-site impacts. Records will be provided annually of the current soil test, analysis, amount of application, forms and rates of nutrients for each field, including post-harvest analysis. Nutrient applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: \$195.03

Scenario Cost/Unit: \$4.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$92.63	2	\$185.26
Materials						
Test, Soil Test, Standard	299	Includes materials, shipping, labor, and equipment costs.	Each	\$9.77	1	\$9.77

Practice: 590 - Nutrient Management

Scenario: #2 - Basic Organic, manure

Scenario Description:

The planned Nutrient Management (NM) system for organic production will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients. Payment for implementation is to defray the costs of soil testing, manure and/or compost analysis, consultant services that provide nutrient recommendations. Records demonstrating implementation of the 4 R's of the NM standard (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) will be required. This scenario is designed to encourage organic producers to effectively utilize organic fertilizers, manure, and/or compost appropriately improving soil quality and minimizing runoff of nutrients from fields to surface waters. The basis for nutrient applications will be recommendations based on soil and manure analyses.

Before Situation:

In this geographic area, an organic fertility program does not meet the 590 nutrient management standard. Soil testing is not completed on a regular basis and applications of organic fertilizers and amendments are not based on a nutrient budget. Nutrients are transported to surface waters through runoff or erosion and to ground waters through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Situation:

A nutrient management system will be developed to meet the NRCS 590 standard and NOP regulations. A nutrient management budget will be developed annually for each field(s) based on soil test analysis and crop needs. Soil testing is completed according to LGU (or comparable) instructions. Application of nutrients will be completed at the proper rate, timing, and methods, and sources. Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations. Application of nutrients via manures, cover crops, or approved commercial forms, are applied in a manner that minimizes nutrient runoff and leaching. Records will be provided annually of the current soil test analysis, amount of application, forms and rates of nutrients for each field.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: \$518.41

Scenario Cost/Unit: \$12.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$92.63	5	\$463.15
Materials						
Test, Soil Test, Standard	299	Includes materials, shipping, labor, and equipment costs.	Each	\$9.77	1	\$9.77
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	\$45.49	1	\$45.49

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Scenario: #3 - Basic Organic, compost

Scenario Description:

The planned Nutrient Management (NM) system for organic production will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients. Payment for implementation is to defray the costs of soil testing, manure and/or compost analysis, consultant services that provide nutrient recommendations. Records demonstrating implementation of the 4 R's of the NM standard (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) will be required. This scenario is designed to encourage organic producers to effectively utilize organic fertilizers, manure, and/or compost appropriately improving soil quality and minimizing runoff of nutrients from fields to surface waters. The basis for nutrient applications will be recommendations based on soil and manure analyses.

Before Situation:

In this geographic area, an organic fertility program does not meet the 590 nutrient management standard. Soil testing is not completed on a regular basis and applications of organic fertilizers and amendments are not based on a nutrient budget. Nutrients are transported to surface waters through runoff or erosion and to ground waters through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Situation:

A nutrient management system will be developed to meet the NRCS 590 standard and NOP regulations. A nutrient management budget will be developed annually for each field(s) based on soil test analysis and crop needs. Soil testing is completed according to LGU (or comparable) instructions. Application of nutrients will be completed at the proper rate, timing, and methods, and sources. Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations. Application of nutrients via manures, cover crops, or approved commercial forms, are applied in a manner that minimizes nutrient runoff and leaching. Records will be provided annually of the current soil test analysis, amount of application, forms and rates of nutrients for each field.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: \$518.34

Scenario Cost/Unit: \$12.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$92.63	5	\$463.15
Materials						
Test, Soil Test, Standard	299	Includes materials, shipping, labor, and equipment costs.	Each	\$9.77	1	\$9.77
Test, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	\$45.42	1	\$45.42

Practice: 590 - Nutrient Management

Scenario: #4 - Basic with Manure

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on planning units 40 ac or larger of cropland where there is manure or compost application in addition to commercial fertilizer applications. The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients while minimizing off-site degradation or the excessive build up of N and P. Payment for implementation is to defray the costs of soil testing, manure testing, proper implementation, consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Risk assessments including the PI (phosphorus index) and NI (nitrogen index) will be completed with applications of manure completed based on risk results. Records demonstrating implementation of the 4 R's of the NM plan (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) will be required along with copies of risk assessments.

Before Situation:

In this geographic area, a fertility program is either non-existent or does not meet the 590 nutrient management standard. Soil testing and manure testing is not completed on a regular basis and applications of nutrients are not based on land grant university recommendations or a nutrient budget. Nutrients and manure solids are transported to surface waters through runoff or erosion or to groundwater through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Situation:

A nutrient management system that includes manure as a source will be developed to meet the NRCS 590 standard. The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation. A nutrient management budget will be developed for each field(s) based on soil tests and manure test analysis along with land grant university recommendations or crop removal rates. On a planning unit soil testing is completed according to LGU recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget. Applications of manure are based on risk assessments (PI - phosphorus index and NI - Nitrogen Index). The use of post-harvest soil and/or tissue tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N. The use of a Pre-Side-Dress Soil Nitrogen Test (PSNT) or a Pre-Top-Dress Tissue Test (PTDTT) prior to the rapid biomass growth of the plant will assist the producer in evaluating the mineralization of Nitrogen from manures / cover crops in providing adequate nitrogen to meet the crop requirements, thus reducing the potential for off-site impacts. Records will be provided annually documenting current soil and manure test analyses, amount of application, forms and rates of nutrients for each field, including post-harvest analysis. Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure: Acre of Applied Material

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: \$518.41

Scenario Cost/Unit: \$12.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$92.63	5	\$463.15
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	\$45.49	1	\$45.49
Test, Soil Test, Standard	299	Includes materials, shipping, labor, and equipment costs.	Each	\$9.77	1	\$9.77

Practice: 590 - Nutrient Management

Scenario: #5 - Basic, combined manure-fertilizer

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on > = 40 acres of cropland for 3 years where commercial fertilizers are used 2 years and manure is applied for 1. The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients. Payment for implementation is to defray the costs of soil testing, manure testing when applied (assumes manure will be applied no more than once every 3-years), consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Risk assessments including the PI (phosphorus index) and NI (nitrogen index) will be completed with applications of manure completed based on risk results. Records demonstrating implementation of the 4 R's of the NM criteria (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) will be required along with risk assessments. Implementation will result in the proper rate, source, method of placement, and timing of nutrients while minimizing off-site degradation or the excessive build up of N and P.

Before Situation:

In this geographic area, a fertility program is either non-existent or does not meet the 590 nutrient management standard. Soil and manure testing is not completed on a regular basis and applications of fertilizers and manure are not based on land grant university recommendations or a nutrient budget. An environmental evaluation or risk assessment is not completed. Nutrients and manure solids are transported to surface waters through runoff or soil erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields have little or no erosion protection often times resulting in wind, sheet, rill, and ephemeral erosion.

After Situation:

A nutrient management system that includes commercial fertilizers and manure will be developed to meet the NRCS 590 standard. The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation. A nutrient budget will be developed for each field(s) based on soil and manure test analysis and land grant university recommendations or crop removal rates. On planning units, typically 40 acres or larger, soil testing is completed according to LGU recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget. The use of post-harvest soil and/or tissue tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs and potentially reducing off-site impacts. Applications of manure are based on risk assessments (PI - phosphorus index and NI - Nitrogen Index). The use of post-harvest soil and/or tissue tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N. The use of a Pre-Side-Dress Soil Nitrogen Test (PSNT) or a Pre-Top-Dress Tissue Test (PTDTT) prior to the rapid biomass growth of the plant will assist the producer in evaluating the mineralization of Nitrogen from manures / cover crops in providing adequate nitrogen to meet the crop requirements, thus reducing the potential for off-site impacts. Records will be provided annually documenting current soil and manure (when applied) test analyses, amount of application, forms and rates of nutrients for each field, including post-harvest analysis. Nutrient applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: \$302.67

Scenario Cost/Unit: \$7.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$92.63	3	\$277.89
Materials						
Test, Soil Test, Standard	299	Includes materials, shipping, labor, and equipment costs.	Each	\$9.77	1	\$9.77
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	\$45.49	0.33	\$15.01

Practice: 590 - Nutrient Management

Scenario: #6 - Enhanced-Precision

Scenario Description:

This scenario describes the implementation of a precision nutrient management (NM) system on a conventional cropping system where either no, or only basic NM practices, are being applied. The planned NM system will meet the current 590 standard. Payment for implementation is to defray the costs of soil testing, analysis, consultant services, skilled labor and specialized nutrient application that provide proper nutrient recommendations based on LGU (Land Grant University) recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on a precision level that includes split applications, NDVI (Normalized Difference Vegetation Index) sensing, and aerial imaging. Records demonstrating implementation of the 4 R's of the NM plan (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) will be required. This scenario goes beyond the basic precision system by using technologies that improve efficiency and effectiveness of nutrient management by utilizing specialized precision techniques and tools (variable rate applicators, NDVI, aerial photography, yield monitoring). An enhanced nutrient management system includes split applications and multiple nutrient concentration tests (other than only soil tests) and methods that more concisely enable scheduling of appropriate fertilizer applications. Precision nutrient management techniques ensure that the right rate, proper timing, and proper placement of nutrients minimize non-point source pollution and provide proper amounts of nutrients to the crop where it is needed, and not applying where it is not needed.

Before Situation:

In this geographic area, a fertility program is already in place; however, application of nutrients across large acreages is based on a lack of representative soil samples or analyses. The current NM system may or may not meet 590 standards, however, could be improved by reducing energy inputs and utilizing precise mapping and diagnostic equipment. Because whole fields are often fertilized with the same rate, excess nutrients may be applied in some areas while inadequate amounts of nutrients are applied in other areas. Excess nutrients are transported to surface waters through runoff or erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fertilizer applications are made in their entirety more than 30 days prior to planting. Applications do not consider the detrimental effects of improper timing or improper rates. Whole fields with like crops and rotation are fertilized the same. Inefficient energy utilization occurs due to traditional methods and forms of fertilizer applications.

After Situation:

The development and implementation of a Nutrient Management Plan (NMP) will benefit plant productivity and reduce off-site movement of nutrients. The use of pre-plant soil tests will assist with the development of the annual nutrient budget in accordance with Land Grant University fertilizer guides and conducted in a way that provides a representative assessment of nutrient concentrations in each field or planning unit including zone directed sampling, real time NDVI (normalized differenced vegetative index) sensing, EC Index type sampling, or via high definition aerial photography that allows for the identification of numerous variations (zones) in a planning unit. Additional nutrient tests including PSNT (pre-sidedress nitrogen test), CSNT (corn stalk nitrate test), chlorophyll meters, spectral analysis, etc., may be used to further refine nutrient applications. Use of a post-harvest soil test or tissue tests (interpreted by a crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts. Soil testing is completed annually for N and at least once every three years for P-K. Further minimization of risk is accomplished by identifying the variability across the field(s) by using soil survey maps or other simple techniques to establish zones, along with zonal soil testing. Nutrients are applied at rates based on soil test zone analyses. Zone maps are created and a nutrient budget developed for each zone. An application rate (prescription) is developed for each zone based on representative soil analysis and a zone nutrient budget. Soil testing is completed annually for N and at least once every three years for P-K. A nutrient budget is developed for each field annually. Application of nutrients is completed so that non-point source (nutrient runoff, leaching) pollution is minimized. These include practices such as use of split applications, slow release nutrients, nitrogen inhibitors, proper timing of application, more appropriate formulations, banding, etc. Nutrients are applied based on realistic yield expectations. The average field size is >=40acres. Applications of nutrients are completed using a GPS guided variable rate fertilizer applicator. Application rates of all sources of nutrients are based upon soil tests (soil testing is completed according to LGU (or comparable) recommendations) and either LGU recommendations, crop removal rates, or industry standard. Applications of nutrients will be completed in split applications where a majority of the N needs are applied based on the needs of the crop, based on growing season requirements. Advanced training may be needed to effectively implement the practice. Producer will use specialized labor where needed in the annual maintenance of the NM plan. Record keeping will include all soil tests, analysis, zone maps, nutrient prescriptions and budgets, and as-applied applications. Yield monitoring maps will be collected and utilized (where technology allows) to develop the following year nutrient applications. Record keeping will document application of nutrients based on the 4 R's (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application).

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: \$2,111.13

Scenario Cost/Unit: \$52.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Equipment/Installation</i>						

Equipment/Installation

Fertilizer, precision application	952	Fertilizer application performed by light bar/GPS navigation system. Includes equipment, power unit and labor costs.	Acre	\$11.31	40	\$452.40
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Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$92.63	5	\$463.15
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$29.26	4	\$117.04

Materials

Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	\$12.76	40	\$510.40
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	\$13.55	40	\$542.00
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	\$26.14	1	\$26.14