LINAP Fertilizer Management Workgroup Questionnaire Response Summary

Fertilizer Formulations and Application

The intent of this topic is to discuss the types of fertilizer currently used in agriculture, golf courses and lawn and garden care and identify opportunities to improve fertilizer formulations and application rates to further minimize nutrient losses.

Summary of Findings

- The vast majority of respondents believe there are opportunities to improve or change fertilizer formulations to mitigate nitrogen pollution.

- Opportunities identified to improve/change fertilizer formulations to mitigate nitrogen pollution ranked in order of most commonly identified to least identified by respondents:
    - Public education
    - Increase the use of controlled release formulations
    - More research is needed
    - Regulate content
    - Reduce nitrogen content
    - Test and improve soil
    - Increase residential compliance
    - More best management practice (BMP) adoption
    - Increase use of organic fertilizer
    - Increase regulatory compliance
    - Smaller particle size should be made available
    - Yield and crop performance must be maintained

- The vast majority of respondents believe there are opportunities to improve/change fertilizer recommended applications rates to mitigate nitrogen pollution.

- Opportunities identified to improve or change fertilizer application rates to mitigate nitrogen pollution:
    - Public education
    - Reassess requirements
    - Reduce pounds of nitrogen applied per square foot per year
    - Rates should be determined based on the crop
    - New technologies need to be developed
    - Regulate rate
    - Incentivize industry
    - Increase use of organics and waste
    - Rate should be proportional to the type of fertilizer (soluble versus insoluble)
    - Yield guarantees for farmers that apply nitrogen at recommended rates
    - Test and improve soil
    - Measure well nitrogen

- Who should fund research into improving fertilizer formulas to minimize nitrogen losses? Listed in order of most identified to least identified:
    - Manufacturer
    - State
    - Local
    - Federal
    - Academia
    - End-user
    - Cooperative Extension
    - NGO

- Who should be responsible for funding research into improving fertilizer applications to minimize nitrogen losses? Listed in order of most identified to least identified:
    - State
    - Manufacturer
    - Local
    - Federal
    - Academia
    - End-user
    - NGO
    - CCE

- What should be the role of government in regulating fertilizer use and application? Listed in order of most identified to least identified:
    - Regulate the use of fertilizer
    - Educate end-users
    - Research and innovation
    - Create incentives and disincentives
    - Encourage BMPs
    - Consider industry impact'
    - Monitoring

    - Measure effectiveness

- The following sectors were ranked in order of ‘perceived’ responsible fertilizer application and use with 1 being the most responsible and 4 the least:
    1. Golf courses
    2. Agriculture
    3. Lawn services
    4. Homeowner

- The vast majority of the group would consider utilizing fertilizer manufactured from wastewater, urine or bioharvested materials.

- The group was split on whether they felt that changing the source of raw materials to something from wastewater or bioharvested materials could have a significant impact on nutrient pollution.

Formulations and Applications Questionnaire Answers & Analysis

Questions 1 - 4: Opportunities to improve

Affiliation	**Q1** (Do you think there are opportunities to improve/change fertilizer formulations to mitigate nitrogen pollution?)	**Q2** (If you believe there are opportunities to improve/change fertilizer formulations to mitigate nitrogen pollution what do you think they are?)	**Q3** (Do you think there are opportunities to improve/change fertilizer recommended application rates to mitigate nitrogen pollution?)	**Q4** (If you believe there are opportunities to improve/change fertilizer application rates to mitigate nitrogen pollution what do you think they are?)
Advisor 1	Yes	Encouraging use of controlled release fertilizer and other alternative mixtures as well as ways to decrease the price of these products be on par with traditional fertilizers. Continuing research into controlled release fertilizers to improve the consistency of their effectiveness. Also increasing the adoption of BMPs outline by CCE in conjunction with groundwater monitoring.	Yes	Yes and this is extremely dependent on the product used and the crop one is trying to grow.
Advisor 2	Yes	There is opportunity for some crops, & some situations. There is limited benefit in crops that use small amounts of N (i.e wine grapes). In crops that need more N, integrating controlled release technology w/ conventional soluble fertilizers formulations could be an opportunity. But, yield & crop performance must be maintained, & cost effectiveness needs to be considered. In many cases, research needs to be conducted to determine BMPs for the use of these 'new' fertilizer types. Appropriate controlled-release fertilizers are not available for all crops & may not be appropriate for all crops. For home turf, formulations are poorly understood; changing formulations without education may not reduce N application. Slow release products are available, but can be difficult to navigate choices for some. For commercial, applications are based on lb N and not formulation.	Yes	Crop production: Each crop needs a certain amount of N for optimal yields; applying below recommended rates is not advised in order to maintain farm viability and sustainability. Additionally, certain growing conditions (out of control of the grower) can result in loss of N and it is necessary for growers to supplement N in order to retain appropriate yields. For home landscapes, N rates tend to be poorly understood by the general public and there is the persistent conception that more is "better" and "greener" is "better". Research has indicated what the appropriate rates are for healthy turf, but education on appropriate rates, how different formulations should be used may help. Easier to understand/read fertilizer bags might help also

Affiliation	**Q1 cont'd** (improve formulations)	**Q2 cont'd** (if yes, what)	**Q3 cont'd** (improve app. rates)	**Q4 cont'd** (if yes, what)
Advisor 3	Yes	We have worked closely with partners at Cornell Cooperative Extension to give farmers direct experience with use of controlled release nitrogen fertilizer - which often facilitates a 20% reduction in nitrogen applications. These on-farm demonstrations have proven very successful with sweet corn growers and successful with potato farmers. There is a need for both more research about formulations for other crops and on-farm demonstrations to help farmers get real world experience in using them and understanding the financial impact of their use. In many cases, the controlled release fertilizer costs more per unit, but saves money overall due to the reduced application rate - but this takes time to document and share.	Yes	Fertilizer is commonly used by residents who have no clue on application rates or why they use fertilizer in the first place. People need to realize that they are trying to grow a species of turf grass that is not adapted for LI.
Advisor 4	Yes	Targeted education exemplifying the fiscal benefits to the possibility of a reduction in fertilizer use. Caution against prescription farming.	Yes	See - http://healthylawns.suffolkcountyny.gov/lawn/fertilizing/howmuch.htm BMPs for Turfgrass were recommended in the Nitrogen Fertilizer Management of Turfgrass in Suffolk County Prepared by R. Portmess and A.M Petrovic, Cornell University, Ithaca, New York. 2010. See also BEST MANAGEMENT PRACTICES FOR FERTILIZING LONG ISLAND LAWNS Prepared by Tamson Yeh, CCE – Suffolk County, 11/2008. (available upon request). For golf courses see SUFFOLK COUNTY NITROGEN MANAGEMENT SUMMARY REPORT, January 19, 2011. Prepared by: Robert Portmess and A. Martin Petrovic, Cornell University. Additional BMPs have been developed LONG ISLAND SPORTS FIELD FERTILIZATION (DRAFT - available upon request). Consumer education efforts should emphasize the cost-savings to the residential applicator. For landscapers, we must find market incentives that minimize applications. When landscapers can pass along fertilizer costs to customers, they can be incentivized to maximize applications.

Affiliation	Q1 cont'd (improve formulations)	Q2 cont'd (if yes, what)	Q3 cont'd (improve app. rates)	Q4 cont'd (if yes, what)
Advisor 5	yes	Other states like NJ and FL require a certain amount of controlled release fertilizer (CRN) in their formulations. We should explore the requirement in NY to use up to 50% of controlled released nitrogen (CRN) in formulations for residential/landscape applications. From a regulatory perspective, formulations are the simplest to enforce. Other standards, such as application timing, locations, and frequencies are much more difficult to enforce.	Yes	Offer public lectures/handouts/public exposure through radio/media
Advisor 6	Yes	Educate the public further as to the dangers of excessive nitrogen applications to their landscape	Yes	New technologies, like Adapt N, yield guarantees for farmers that apply N at recommended rates and other approaches can help reduce nitrogen losses from farmland.
Environ. 1	Yes	Encouraging (or requiring) use of slow-release formulations would reduce leaching to groundwater & allow more efficient uptake by plants. I DO NOT believe that regulating the amount of "organic" N in fertilizer is necessarily the solution here. Often synthetic products are more effectively used by plants and can be tailored to local conditions.	Yes	Many products instructions comply with other states' local laws, but Suffolk county does not regulate application. Regulations should limit the lbs N applied per sq foot per year, not any other application rate parameter such as frequency, concentration, of % of N in the product. We should regulate the parameter of concern: total load of N.
Environ. 2	Yes	Continue to improve upon slow release fertilizers. Education on how to use fertilizer would help, also simple things like adjusting PH in the soil plays a large roll in nitrogen availability to plants.	Yes	Soil health. Teach people more about soil health. The healthier the soil is the better it is able to retain water and other nutrients including nitrogen.
Environ. 3	Yes	Lower the quick release content by regulation so that all products are available with a level playing field, make all products primarily slow release... more so than is the case today. And the release rate should be correlated to the ability of the plant to take up the N with the least amount of root bypass as close to zero as possible.	Yes	We need an agreement on what we are "managing for"/"trying to sell", depending on point of view, business interest or public interest. This is a hard question to answer & likely require a long conversation. What a lawn needs according to one Cornell reference is just mulching grass if a lawn is est'd- thus needing "no fertilizer". Accounting for atmospheric deposition of N combined with N released by mulching grass the N applied naturally seems to be enough for an established lawn. Then there are other conflicting industry related recommended rates of 1lb/1000 SQ feet three times/year? This is obviously for a person desiring a picture perfect lawn, largely for ornamental value. But these are likely the aggregated worst polluting offenders. For what legitimate public policy purpose is this pollution to be allowed?

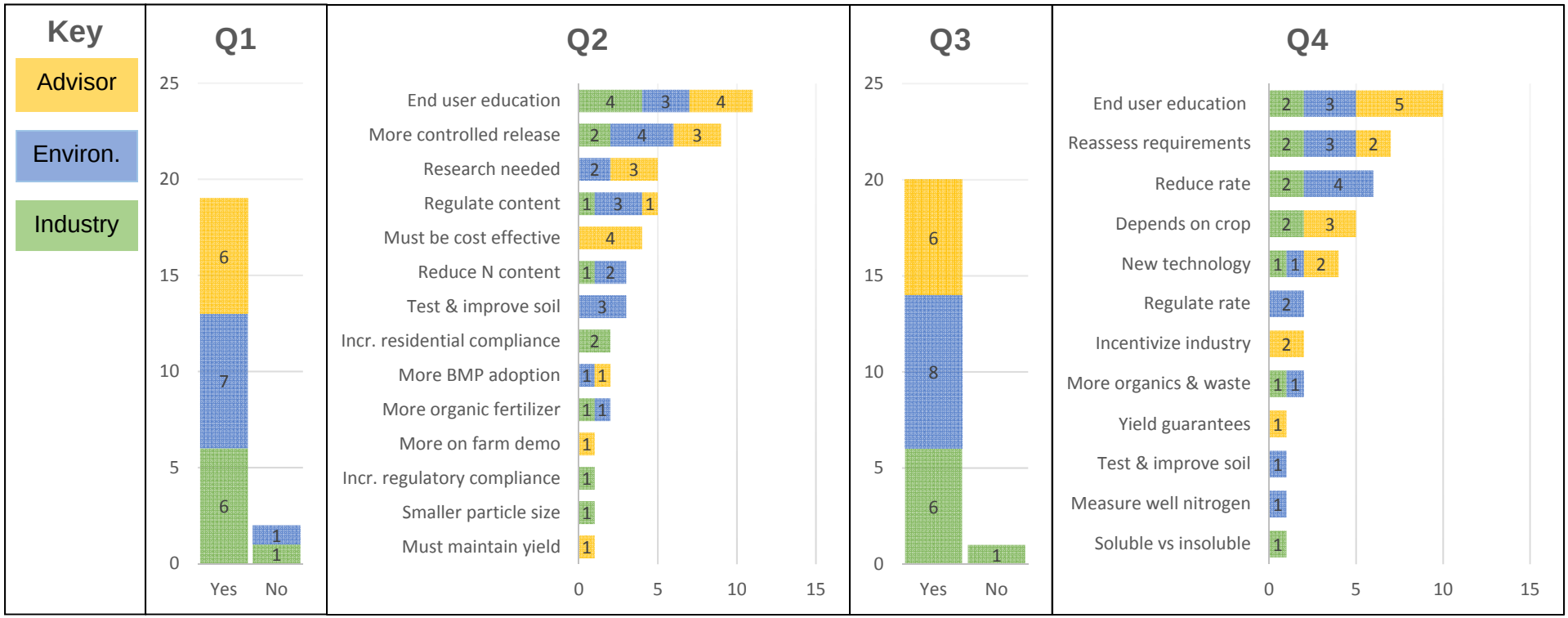
Affiliation	**Q1 cont'd** (improve formulations)	**Q2 cont'd** (if yes, what)	**Q3 cont'd** (improve app. rates)	**Q4 cont'd** (if yes, what)
Environ. 4	Yes	Lower concentrations of nitrogen for most residential applications are probably acceptable as most lawns probably need very little. Slow release may also reduce loss to runoff and promote better utilization by plants. Investigate whether pH adjusting or other additives/micronutrients to fertilizers would improve the health/appearance of lawns, thus allowing lower N concentrations (Florida formulation). See https://extension.unh.edu/resources/files/Resource002468_Rep3617.pdf, New England Regional Nitrogen and Phosphorus Fertilizer and Associated Management Practice Recommendations For Lawns Based on Water Quality Considerations Consider existing/other N sources such as grass clippings, Air Dep., corn gluten, compost, in recommending application rates.	Yes	Using a combination of resources in both collect & disseminating data. SC & NC DHS Water Quality Monitoring Program have established sampling wells that are regularly tested for pesticide detections. I'm assuming the well samples include being tested for nutrient overloads. The data collected can show trends in nutrient use as specifically as the pesticide trends are able to be demonstrated & graphed. This data needs to be included in outreach by different audiences available to the DEC, Cornell, industry, government. It has been my experience that showing the data via graphs, demographics makes the audience take ownership. Social media, point of sale, PSA's are effective tools. Consumer drives the market. If end users believe & understand the data, they'll want to shift to environmentally wise, affordable & effective products. In order to keep up with consumer demands, fertilizer manufacturers will smart market their products and tailor for demographics.
Environ. 5	Yes	Research and implement of Best Management Practices for fertilizer applications addressing all sectors of consumers: agricultural, universities, agencies, cemeteries, recreation fields, homeowners. All factors need to be researched and plotted: Soil type, commodity grown, hydrology, temperature - locality, available buffer and riparian zones, threshold of land use. Fine tune fertilizer formulations and provide the tools to assist the end user into selecting the appropriate choice. Almost like a prescriptive.	Yes	Reduce nitrogen applications to 1 lb/1,000 ft. per year where economic hardships do not apply (e.g. this would not include agriculture, but would include public/private lawns/landscapes).
Environ. 6	No		Yes	The advice on rates and timing are probably fine. The trick is getting people to use them. Even professionals can't follow the recommendations all the time for unforeseen conditions

Affiliation	**Q1 cont'd** (improve formulations)	**Q2 cont'd** (if yes, what)	**Q3 cont'd** (improve app. rates)	**Q4 cont'd** (if yes, what)
Environ. 7	Yes	Yes- reduce amount of inorganic nitrogen in formula (i.e. nitrogen sources that must be broken down by soil biology before becoming available to the plant)/removing water-soluble nitrogen from formulas.	Yes	
Environ. 8	Yes		Yes	LINAP should review recommendations from Cornell and others and assess recommendations from other areas that are addressing nitrogen. Does Cape Cod have any applicable recommendations? Consider existing/other sources such as grass clippings, Air Dep., corn gluten, compost. Increase ease of home soil tests. Consider aerial imagery and sensing to assess nitrogen status in turf and crops. This could be used for educational purposes as well as to develop guidelines/regulations for timing or application rates. http://horttech.ashspublications.org/content/21/3/287.full Consider use of a homeowner budget/footprint for nitrogen based on outcomes of Sub-watersheds Wastewater Plan. Back calculate reductions in residential fertilizer use required to reduce N load to sub-watershed where they live so that homeowners are aware that their individual actions are directly related to water quality improvements.
Industry 1	No		No	
Industry 2	Yes	Increased use of: -slow/extended release formulations (i.e. 8-12 weeks) that release at 1/3 to 1/2 lb N per 1000 s.f. per every 4 week period -organic and biosolid formulations -quick release formulations to be labeled to a 1/4 to 1/2 lb N per 1000 s.f. application rate with appropriate spreader settings on the packaging	Yes	A large part of the improvement would come from Home owner compliance and buy-in.

Affiliation	**Q1 cont'd** (improve formulations)	**Q2 cont'd** (if yes, what)	**Q3 cont'd** (improve app. rates)	**Q4 cont'd** (if yes, what)
Industry 3	Yes	In the last 20 years I have seen steady and productive changes made to formulations. Had the population density not outpaced those advances we would have realized a reduction in nutrient loss and positive impacts on water quality. I am sure there are further advances to be made, but non-compliance of application methods and rates by home owners and non-professionals may un-do any gains.	Yes	I answered that in questions 2
Industry 4	Yes	Fertilizer formulations and makeups are continually changing for the better. How, I will leave that up to the scientists and manufacturers	Yes	Yes studies are always being done by Cornell and other scientific groups to help farmers and growers alike to use the ideal rates on a per crop basis. All farmers and growers want the optimum crop with minimal inputs, use this data to minimize fertilizer use to necessary levels of use, and save money too
Industry 5	Yes	Discussed as a group at our board meeting we believe that fertilizer sold to the general public should be formulated in a way that minimizes N/lb so large bags spread over yards are not an over application. Also advertising 5 step programs etc. to the unassuming public allows people to think they need more and more. Nobody wants to pollute the water, but what if they had no idea that's what applying fertilizers inaccurately does.	Yes	Make the rate of application proportional to the type of fertilizer. IE- water soluble vs. water insoluble
Industry 6	Yes	Smaller particle sizes which will better distribute the granule resulting in better coverage and the possibility of less nitrogen needed in an application as a result.	Yes	By using more Enhanced Efficiency Fertilizers (EEF's), applicators can increase plant uptake and reduce losses such as volatilization and leaching in the environment. Proper rates of EEF's and fewer applications could also, in a macro perspective, help the Carbon footprint by reducing fossil fuel used in shipping and applying extra applications. Product information and instructions highlight this and public and professional education efforts could elevate this information.

Affiliation	Q1 cont'd (improve formulations)	Q2 cont'd (if yes, what)	Q3 cont'd (improve app. rates)	Q4 cont'd (if yes, what)
Industry 7	Yes	If Nitrogen is applied properly, potential pollution is greatly limited or avoided. There are innovative products on the marketplace now that help improve efficiency. Apply fertilizers based on the principals of the 4-R Nutrient Management guidelines: the right product, at the right time, in the right place, at the right rate. You can greatly reduce the risk for N pollution with more Enhanced Efficiency Fertilizer (EEF) technology in the bag versus more soluble sources. Using better longer lasting, or time release nitrogen technologies.	Yes	-Limit application rates of extended release fertilizer to release at a maximum of 1/2 lb per N per 1000 s.f. per 4 week period -Limit organics/biosolids and combination fertilizers (of quick and slow release N) to a maximum of .9lb of N per application -At no time should there ever be an application of quick release N that is greater than 1/2 lb N per 1000 s.f.

Questions 1-4: Analysis



Questions 5-7: Funding research and government role

Affiliation	**Q5** (Who should be responsible for funding research into improving fertilizer formulas to minimize nitrogen losses?)	**Q6** (Who should be responsible for funding research into improving fertilizer applications to minimize nitrogen losses?)	**Q7** (What should be the role of government in regulating fertilizer use and application?)
Advisor 1	Federal, state and local government sources. Also private sources such as Peconic Land Trust, Northeast Sustainable Ag Research and Education and NY Farm Viability Institute	Federal, state and local government sources. Also private sources such as Peconic Land Trust, Northeast Sustainable Ag Research and Education and NY Farm Viability Institute	The technologies surround fertilizer use are rapidly evolving and any regulations must reflect this. The business community needs the flexibility to change environmental management strategies as new recommendations from scientific experts arises. Government should focus efforts on monitoring and effectiveness of current regulations.
Advisor 2	Any interested parties. Local, state, federal government, industry sources.	Any interested parties. Local, state, federal government, industry sources.	Sound science must always be at the forefront. Regulation, if it is to be considered, should not be directed by those with an incomplete understanding of the subject matter nor those with an agenda. Those involved must work with the latest university research and have an understanding of how proposed legislation will affect growers, service providers, and if it will have practical value in the reduction of N. It is important to maintain the viability and sustainability of agricultural and horticultural operations. Any regulation needs to ensure that suggested practices are attainable and economical.
Advisor 3	Scotts. They are the ones profiting from the sale of the pollutants, they should also be willing to develop a product that is specific to our needs on LI. There should be no push back if they market the product well, there is more profit margin to be made.	Scotts. They are the ones profiting from the sale of the pollutants, they should also be willing to develop a product that is specific to our needs on LI. There should be no push back if they market the product well, there is more profit margin to be made.	Govt. needs to be the authority on the use of fertilizers as it pertains to publically owned resources, but should not mandate or outlaw its use on private property. For private property, education is the only real way to enact a voluntary change from consumers.
Advisor 4	Manufacturers - need market incentives to motivate fertilizer manufacturers to change formulations. Instead of regulations, we could tax the use of N fertilizers (or the use of non-CRN fertilizers) & earmark those revenues for WQ protection. Education is important but not sufficient. Ultimately, most residents are still demanding green lawns from their fertilizer products & landscape professionals. Additional sources - NY State/County/Towns	Same as above...	Create market incentives (subsidies/taxes) to encourage best management practices that protect ground and surface waters.Require Controlled Release Nitrogen (CRN) up to 50%. Education Campaign. Signage requirements.

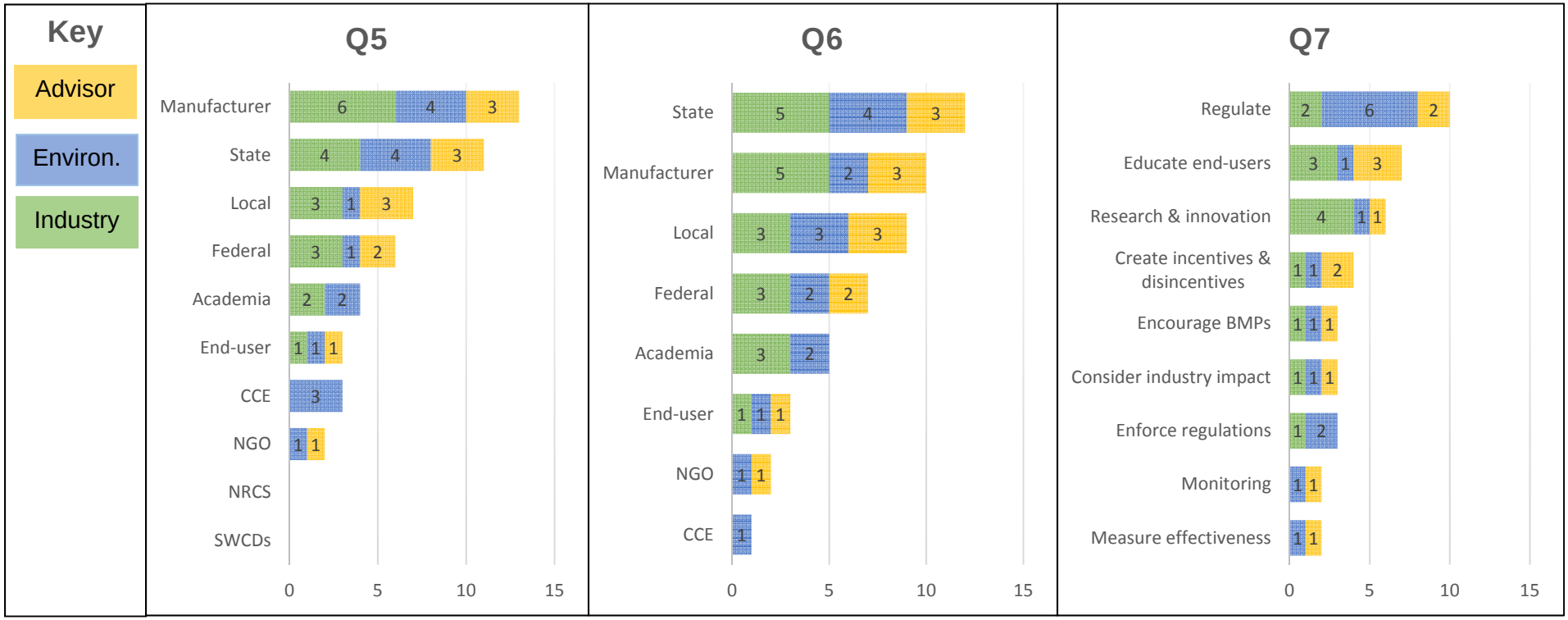
Affiliation	**Q5 cont'd** (funding formula research)	**Q6 cont'd** (funding application research)	**Q7 cont'd** (government role)
Advisor 5	the area governmental regulatory appropriate to each location	same as above	financing and education
Advisor 6			
Environ. 1	R&D is primarily being done by fertilizer companies and is already paid for by the industry. Also, cooperative extension agencies are doing a great deal of research and should be well-funded to do so. The State could assist in transfer of ag-focused research finding to improve residential/turf fertilizer formulations.	NRCS, SWCDs	The government must regulate the use of fertilizer. It does not make sense to spend tremendous amounts of money to upgrade wastewater treatment and then spend zero to reduce a much simpler source. One that, in the case of residential fertilizer, is not even essential to our livelihoods like food and waste treatment are.
Environ. 2	That's probably a state responsibility.	The State	
Environ. 3	Non industry related or "captured" entities if the industry can't or won't do this on its own. I see this as a real opportunity for innovation, but often this requires the industry to accept the reality that what we are doing is not working anymore and change needs to occur -- before one can be liberated to look at other opportunities to make the sale of products that harm the environment a lot less.	The Industry should have a surcharge imposed on the sale of its products that pays to improve the performance of and lessens the impacts of the use of its products. After all, the industry wants to be good corporate citizens, I'm sure ---and have the best use of its products with the lowest impacts possible to a resource as essential to life as water.	Government should set the rules -- impose incentives and disincentives a needed-- the Industry should be allowed to try to innovatively meet them. Secondly gov't should induce innovation with industry challenges by partnering with academic institutions. Government also needs to raise the bar by challenging of the industry, its supporting extension and advising entities to literally reinvent itself (which are often "captive" of the end users-- landscapers, farmers, homeowners) Government likely needs rules for different uses of fertilizers-- ornamental products have the least justification to harm a public resource like groundwater and surface water. The other users have to do better also. but maybe the application windows for ornamental need to be only allowed for new plantings -- once established a much tighter allowable application window maybe needs to be considered by law-- May and June applications only that are slow release for 90 days or something like this.

Affiliation	**Q5 cont'd** (funding formula research)	**Q6 cont'd** (funding application research)	**Q7 cont'd** (government role)
Environ. 4	A combination. Chemical producers conduct research & smart market according to consumer demand through their own resources. Producers should provide funding to universities to do local research. Univ professors & extension should research opportunities for soft funding from industry/private sources (seed money). Environ orgs & agencies can provide funding through grants & matching resources. State, local & federal govts provide funding through pollution prevention grants & preventative health.	All of the above. The same philosophy should be applied to both the application and formula of nitrogen. The label dictates the usage and based upon the fertilizer analysis.	If within a given a time period (say 5 years) new chemistry, public outreach, water quality data, etc., show no real value to protecting the environment then the government should be called upon to regulate fertilizer use. Or if medical data shows human health is being negatively affected either directly or ancillary, then the call to regulate should be immediate.
Environ. 5	Cornell University/Cooperative Extensions should be responsible for conducting research, but should not be responsible for covering entirety of finances. While demand for sustainable practices is still developing, the need for improved fertilizer formulas with reduced leaching capacity has not; we cannot depend on private sector to invest in the research/ development of these formulas.	See above.	Govt should negotiate compromise between environ necessities (on LI are also economic re protection of waterways/quality of life) & respecting needs of farmers & other industries to conduct business. Policies need to be in place to reduce use of fertilizers for non-essential purposes (e.g. lawns). Implementation & enforcement of policies will take time/trial & error, but legislation to reduce N pollution is necessary to create change around attitudes & behavior re use of N fertilizers especially in landscaping industry/private residences.
Environ. 6	Don't know	County & the State	Regulations are probably fine, but it seems that enforcement is nonexistent
Environ. 7			
Environ. 8	State and industry cooperative effort.	State and industry cooperative effort. Where should the funds come from?	1st role for govt is to quantify fertilizer use & application & determine impact on environment. After considering all sources, determine how load from source should be reduced. Commercial applicators likely easier to regulate than homeowners. Can regulate industry on formulation, very difficult to regulate homeowners. Can tell public the right thing to do. Consider homeowner budget/footprint for N based on Subwatersheds Wastewater Plan. Back calculate reductions in residential fertilizer use needed to reduce N load to subwatershed where they live so homeowners aware their individual actions directly relate to WQ improvements.

Affiliation	**Q5 cont'd** (funding formula research)	**Q6 cont'd** (funding application research)	**Q7 cont'd** (government role)
Industry 1	Business, academia, government	Business, academia, government	Government should encourage the use of best management practices. Plants require varying amounts of fertilizer depending on the plant and the situation. Setting rigid standards can impact efficacy and loss both positively and negatively.
Industry 2	State and Federal grant money.	State and Federal grant money.	Incentivize home owner compliance by creating a climate where they take ownership of change and local government responds w/ encouragement, hard numbers and success stories. Look at Recycling and reusable grocery bags.
Industry 3	the fertilizer manufacturers	same as 5	we have enough government regulations
Industry 4	Companies that sell fertilizer and formulate fertilizers who want to sell a premium product to the end users should be using best practice to produce product that minimizes nitrogen losses. It is a good business model and a moral obligation to present the best possible product to the market.	The research needs to be based on sound science	Scientific study of best use practices and education
Industry 5	Fertilizer companies	Fertilizer companies and New York State	If the government so chooses to regulate use and application it should be founded upon sound scientific research and facts.
Industry 6	In general, fertilizer companies regularly fund research projects that advocate better products for the environment and create value for customers and consumers. However, the initiating group seeking to review or impose more regulation should work with these companies and universities to fund research to create more science based decisions when it comes to fertility on Long Island.	Similar to the above question. However, high quality, slow release nitrogen and fertilizer technologies are currently available.	Generally, they should take a more supplementary approach to educating their constituents about products and use. Products are made, and labels and instructions are developed to ensure both human and environmental health and safety. Government should ensure policies are based on sound science and create a level playing field for all participants; not picking winners and losers, such as exempting certain fertilizer sources from regulation. The government's role should be based on their own capabilities as well. A focus on educating public and professional users.

Affiliation	**Q5 cont'd** (funding formula research)	**Q6 cont'd** (funding application research)	**Q7 cont'd** (government role)
Industry 7	Funding for research should be a combination of manufacturer, government and to a small degree end user. For end user, I'm thinking something like a $0.25 per package surcharge.	Same as number 5.	To aid in the development of realistic fertilizer use guidelines and ensure easy to understand application rates are developed and enforced.

Questions 5-7: Analysis



Questions 8-10: Responsibility and alternative materials

Affiliation	**Q8** (Rank [1-4 most to least] the following sectors with respect to perceived responsible fertilizer application and use)				**Q9** (Would you consider utilizing fertilizer manufactured from wastewater, urine or bioharvested materials?)	**Q10** (Do you think changing the source of raw materials to something from wastewater or bioharvested materials could have a significant impact on nutrient pollution?)
	A. Golf courses	*B. Agriculture*	*C. Commercial lawn care services*	*D. Private homeowner*		
Advisor 1	2	1	3	4	Yes	Yes
Advisor 2	2	1	3	4	Yes	No
Advisor 3	2	4	3	1	Yes	Yes
Advisor 4	1	2	3	4	Yes	Yes
Advisor 5	1	2	1	2	Yes	Yes
Advisor 6	2	1	3	4		
Environ. 1	1	2	3	4	Yes	No
Environ. 2	3	1	2	4	Yes	Yes
Environ. 3	1	4	3	2	Yes	Yes
Environ. 4	3	4	1	2	Yes	Yes
Environ. 5	2	1	3	4	Yes	
Environ. 6		2	3	4	Yes	No
Environ. 7	2	1	3	4	Yes	Yes
Environ. 8	2	1	4	3	Yes	Yes
Industry 1	2	2	2	2	Yes	No

Affiliation	**Q8a cont'd** (golf courses)	**Q8b cont'd** (agriculture)	**Q8c cont'd** (lawn services)	**Q8d cont'd** (homeowner)	**Q9 cont'd** (consider other materials)	**Q10 cont'd** (impact of other materials)
Industry 2	2	4	3	1		No
Industry 3	3	2	4	1	Yes	No
Industry 4	2	1	3	4	No	No
Industry 5	1	3	2	4	Yes	No
Industry 6	1	3	2	4	No	No
Industry 7	1	1	2	4	Yes	Yes

Questions 8-10: Analysis