INVITED PAPERS AND ABSTRACTS OF CONTRIBUTED PAPERS

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CONTENTS

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AUTHOR INDEX

Graduate Student Competition Papers

Calibration of a Commercially Available Rising Plate Meter for Yield Estimation in Intensively Managed New York Pastures.
D.C. Demaine* and G.W. Fick, Cornell Univ.

The number of dairy producers in New York State that have adopted Management Intensive Grazing (MIG) in the past 10-15 years has increased dramatically. These farmers require objective tools to aid their decision making in order to maximize both pasture yield and animal production. Rising plate meters calibrated for local conditions have proven to be among the most accurate tools for estimating pre-grazed yield of pasture herbage. A commercially available rising plate meter was calibrated on several New York dairy farms in 2000 and 2001. The farms chosen represented a range of pasture types found commonly in New York including orchardgrass (*Dactylis glomerata* L.) and white clover (*Trifolium repens* L.), Kentucky bluegrass (*Poa pratensis* L.) and white clover, and perennial ryegrass (*Lolium perenne* L.) and white clover. Multiple linear regression was used to determine the best calibration equations for different pasture types and different times of the growing season. Details of this regression methodology will be discussed.

Performance of Bt Corn Hybrids, their Near Isolines, and Leading Corn Hybrids in Pennsylvania and Maryland. B.L. DILLEHAY*, G.W. ROTH, D.D. CALVIN, G.A. KULDAU, J.A. HYDE, and R. KRATOCHVIL, Penn State Univ. and Univ. of Maryland.

The European corn borer (*Ostrinia nubilalis*) is one of the most important corn insect pests in the northeast United States. This study was conducted to evaluate Bt modified hybrids, their nearest isolines, and regional leading hybrids with respect to grain yield, moisture, and test weight subjected to natural infestations of European corn borer (ECB). Corn hybrids were grown in 2000 and 2001 at four locations in Pennsylvania and three locations in Maryland. Over both years and over all locations, the Bt, isoline, and lead hybrids yielded 167, 159, and 156 bu/ac respectively. Moisture content at harvest was 22.2, 21.3, and 21.2 percent for the Bt, isoline and lead hybrids respectively. Test weight of the grain was 55.4, 55.8, and 55.7 lbs/bu respectively for the Bt, isoline and lead hybrids. Overall, the Bt yielded significantly higher than the isoline and lead hybrids, the Bt had a significantly higher moisture content at harvest as compared to the others, and the Bt had a significantly lower test weight as compared to the isoline and lead hybrids. However, only a few locations reflected this overall significance due to the interaction between climate, ECB infestation, and timing of ECB feeding.

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Quantity and Composition of Amorphous Materials in Natural Coal Refuse from North-Central West Virginia.
G. M. ETTER* and L. McDONALD, West Virginia Univ.

Coal refuse is a waste material produced during the coal separation process and is notorious for releasing high metal-loads into watersheds. No study has investigated the amorphous fraction of these materials and how they vary spatially and chemically within a single coal refuse pile and between piles. Two inactive coal refuse piles in north-central West Virginia were sampled at three depths (0, 2, and 4 feet) at the top and bottom of each pile, and the amorphous content was determined using the acid ammonium acetate in the dark test (AOD). The amorphous content of coal refuse piles appeared to increase with depth and decrease with elevation, with an overall average amorphous percent of 3.4%. This amorphous fraction can vary considerably between different piles. AOD solutions were analyzed for Si, Al, and Fe to gain insight into the chemical composition of the amorphous materials.

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Effects of Nitrogen Fertilizer and Red Clover (Trifolium pratense L.) Component on Yield of Grass-Legume Mixed Swards. C.S. KANDAPOLA* and W.B. BRYAN, West Virginia University.

The effects of two levels of red clover (low and high) and three levels of N fertilizer (0,28,56 N kg/ha) on yield and quality of grass-legume mixed swards were studied. Total herbage accumulation of the mixtures with high legume percentage was significantly higher than those with low legume percentage. Swards with high legume stand also yielded more crude protein compared to low legume stand. Although the effect of N on herbage accumulation was not significant, an increase was observed for crude protein yield at the higher N levels. However, a reduction in legume composition and an increase in grass composition was observed with increasing levels of N. It was concluded that presence of 25-35% red clover increases total herbage accumulation. It was also concluded that application of N fertilizer discourages the survival of the clover fraction in mixed swards.

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Sheep Production under USDA Organic Rules. B.J. O'DOHERTY* and W.B. BRYAN, West Virginia University

Sheep are used as the animal component of the farming systems research being conducted on the Organic Farm of West Virginia University. The research compares two systems, one using off-farm compost and the other using cover crops exclusively, in three replicates. The research also examines the difference between systems with animals and without. The sheep component consists of 18 ewes and their lambs divided into 6 flocks; 4 flocks of 3 ewes and 2 flocks of 2 ewes. Regular use of synthetic anthelmintics is not permitted under USDA Organic Rules. The literature indicates a minimum of 3 days is required for incubation of barber pole worm (Haemonchus contortus) eggs. The literature indicates that the amount of infective H. contortus larvae diminish after 5 weeks. On this basis, sheep graze for 3 days and are not returned for 5 weeks. Pasture production is estimated from forage height measurements taken pre-grazing and post-grazing. Data will be presented on fecal egg counts.

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Possible Predictors of Linoleic and Linolenic Acid Content in Cool Season Pasture Plants. E. M. SECONI* and H.D. KARSTEN.
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Conjugated linoleic acid (CLA) and omega-3 fatty acids are healthy fats that are elevated in the milk and meat of ruminant animals that have grazed fresh pasture. Photosynthetic tissue of fresh pasture plants are a source of linoleic and linolenic acids, which are key ingredients in the production of CLA and omega-3 fats in ruminant animals. We examined how leaf-to-total plant ratio and plant developmental stage effect linoleic and linolenic acid content in several cool- season pasture species. Alfalfa, white clover, red clover, orchard grass, Kentucky bluegrass, smooth bromegrass, quackgrass, and tall fescue were collected on several dates over the spring, summer, and fall of 2001 from pastures on the beef and dairy research farms at Penn State University. At each site, two samples were collected from several plants of each species. One samples was cut at ground level for mean stage count and calculation of leaf to stem ratio, and the other at grazing height for fatty acid analysis. Half of the total plant fatty acid sample was frozen in liquid N immediately. The other half was separated into leaf, stem, and reproductive structures that were frozen separately in liquid N. Fatty acid samples were then freeze dried, finely ground, and stored at –80°C until they could be extracted, methylated, and analyzed with gas chromatography. Analysis of variance and multiple regression were used to determine whether plant species, stage of development, and leafiness differ and can predict plant fatty acid content.

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Soil Development on a Mountaintop Removal Coal Mine. K.A. THOMAS*, J.C. SENCINDIVER, J.G. SKOUSEN, and J.M. GORMAN, West Virginia University

Mountaintop surface mining for coal has been practiced in West Virginia for over three decades, but its environmental impacts have become increasingly scritinized in recent years. Therefore, this study evaluated soil development on different aged mined lands. Four different ages (2,7,11, and 23 years) and two different slope classes (nearly level to gently sloping and steep to very steep) of minesoils on a reclaimed mountaintop removal mine in Logan County, WV were described and sampled. Three contiguous native soils were included for comparison. Standard laboratory analyses of physical and chemical properties were conducted in order to classify these soils. Morphological and physical characterization revealed that minesoils are developing with age, indicated by increasing A horizon thickness, increasing solum thickness and increasing aggregate stability with time. Chemical analyses showed higher N with minesoil age. Minesoils had higher pH, basic cation concentrations, and base saturation than native soils, but native soils had higher concentrations of carbon, nitrogen, aluminum, and manganese.

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Poster Papers

Hydropedology: Bridging Disciplines, Scales, and Data. H. LIN*, The Pennsylvania State University

There is a growing recognition that synergy could be generated by bridging traditional pedology with soil physics/hydrology to enhance integrative studies of soil-water relationships across spatial and temporal scales. Hydropedology is suggested as such a bridge that embraces interdisciplinary and multiscale approaches for the study of interactive pedologic and hydrologic processes and properties in the earth's surface and subsurface environment. Emphasized here are potential bridges to address (1) knowledge gaps between traditional pedology and soil physics/hydrology, (2) scale differences in microscopic, mesoscopic, and macroscopic studies of soil-water relationships, and (3) data translation from soil survey databases into soil hydraulic properties. Such bridges signify the potentially unique contributions hydropedology can make to integrative soil and water sciences.

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Rearing Root-Knot Nematode Populations for Research: Utilization of an Innovative Approach. T. MALLOZZI, S. SARDANELLI and R. KRATOCHVIL*. Univ. of Maryland.

Agricultural research with plant-parasitic nematodes often requires an abundant population of a nematode species. The ease that a desired species can be initiated and proliferated can reduce time and labor expenses. A unique approach to the propagation of root-knot nematodes, Meloidogyne spp., utilizes a moisture replacement system (MRS) (Sardanelli and Kenworthy, 1997)that is composed of a contained reservoir that delivers a continuous supply of water via a wicking system. Inoculations of Meloidogyne incognita into each bioassay unit of the MRS yielded average nematode populations that were 10 times greater than initial inoculum levels when measured at 6 weeks post-inoculation. Utilization of this system in nematode research serves as a highly effective method for population proliferation of the root-knot nematode.

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Soil Nitrate Testing as a Guide to Nitrogen Management for Annual Crops. J.R. HECKMAN, Rutgers, The State University of New Jersey.

Soil nitrate testing is most useful when there is reason to believe, based on field history, that N availability may be adequate. These reasons may include soil organic matter content, applied manure, compost, legumes in the rotation, or residual N fertilizer. Soil nitrate testing is not helpful when crops are grown on sandy, low organic matter content soils that are known from experience to be N deficient. Soil nitrate testing is useful for annual crops such as vegetables or corn for which supplemental N fertilization is a concern. Soil nitrate tests must be performed at critical crop growth stages, and the results must be obtained rapidly to make important decisions about the need for N fertilization. Soil NO_3-N concentations in the range of 25 to 30 mg/kg (ppm) indicate sufficiency for most crops, but N fertilizer practice should be adjusted based on local Extension recommendations.

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Leaf Appearance and Dry Matter Accumulation in Spring Grains as Affected Planting Date. G. ARMAH-AGYEMAN*, R. KAROW and E. MARX, Oregon State University.

Predicting the rate of leaf appearance (RLA) is essential in understanding spring cereal development and growth. This study was conducted to determine planting date (PD) and genetic effects on RLA and dry matter (DM) accumulation rates. Eight genetically diverse spring grain cultivars were planted over four dates in Corvallis, OR in 1997 and 1998. RLA and DM rates were determined. Significant differences in RLA were observed among cultivars, however as a group, the RLA of wheat cultivars did not differ significantly from either the barley or oat. Similarly, RLA in barley did not differ significantly from oat. RLA was constant for a particular PD but differed among planting dates. However, in the presence of unfavorable environmental conditions, e.g. heat stress accompanied by moisture limitations, deviations from linearity occurred. DM followed non-linear trends in both years. Data showed that environmental effects override all genetic effects in determining DM accumulation rates.

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Yield, Kernel and Test Weights in Spring Grains as Affected Planting Date. G. ARMAH-AGYEMAN*, R. KAROW and E. MARX, Oregon State University.

Increased interest in spring grain cereals in Oregon requires field data on the growth and development of these cereals. This study was conducted to determine the effect of planting date on the yield, kernel and test weights (TW) of five spring cereals. Cultivars were planted over four dates in 1997 and 1998. Very different environmental conditions characterized each year, with temperature, precipitation and soil management effects having great influence on grain yields. Delaying planting from the earliest (26March) to the latest date (16 May) reduced yields by an average of 21% in 1997 and 84% in 1998. Reductions in kernel weight with late delayed plantings accounted for the differences observed. Overall, grain yields averaged 4735kg ha^{-1} in 1997 and 2027 kg ha^{-1} in 1998. Differences in TW were significant, with cultivars having greater influence than planting date. Though early planting is recommended, late planting can be successful in some years.

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Brown Mid Rib Sorghum Sudangrass in New York. T. KILCER, Cornell Cooperative Extension, Q.M. KETTERINGS*, Cornell Univ., and P. CEROSALETTI, Cornell Cooperative Extension.

Growing corn silage under New York growing conditions an be a challenge. Research in Columbia County, NY, has shown that under optimum management, Brown Mid Rib sorghum sudangrass (BMR) can be of high feed quality and produce the same or more milk per acre than a corn silage crop. BMR does not appear to suffer the yield penalty associated with late planted corn, nor the challenges of harvesting a high quality feed in fall weather as harvest is complete by early September. This crop also has environmental benefits: it allows for manure applications during the summer when the risk of runoff is considerably reduced. Splitting nitrogen applications throughout the summer may also reduce nitrogen losses. Research is being conducted to better define optimum management. Results of past studies (seeding rates, optimum timing of harvest, nitrogen requirements) as well as ongoing work in New York will be presented.

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Pasture Management Practices of New Jersey Equine Owners. D. KLUCHINSKI*, Rutgers U., J. W. SINGER, USDA-ARS National Soil Tilth Lab., W. J. BAMKA, Rutgers U.

Equine property owners represent a growing audience in New Jersey that requests information on pasture management. A 29 multi-choice question survey was mailed in January 2000 to assess current pasture management practices. A response rate of 72% (n = 449) was achieved. Sixty-nine percent of respondents have less than 21 horses, 15% owned 21 to 35 horses, and 16% had greater than 35. Nearly 72% have less than 21 acres of pasture. Nineteen percent indicated Cooperative Extension is one source they use for pasture management information, while only 18% stated it is their primary source. Soil testing is used by 64%, and 95% apply limestone and 94% apply fertilizer, but only 28% are basing these application rates on soil test recommendations. Approximately 89% mow and 64% drag their pastures, and 54% report practicing some form of rotational grazing. One-third use manure on their farm but only 3% use manure testing to determine nutrient content. Sixteen percent stockpile manure, 13% compost it, and 33% sell, give away or dispose of manure through trash removal. Most of the survey respondents do not have access to or own the equipment needed for good pasture maintenance and management.

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Forage Suitability Group Report Construction. J.B. CROPPER* and G. L. PEACOCK, USDA-NRCS.

Forage suitability groups (FSG's) are interpretative reports that use soil properties and climatic data to develop forage selection and management recommendations and yield potentials for soils grouped with like agronomic characteristics. FSG's replace pasture and hayland soil suitability management groups (PHSG's) used by USDA-NRCS as planning tools in the past in states where they were developed. In the Northeast (East) Region, only West Virginia developed PHSG's. FSG's are based on more rigorous soil property criteria using the National Soil Information System of USDA-NRCS and other pertinent soil databases than those used to develop PHSG's. FSG's also acknowledge that climate affects yield and forage selection and management recommendations and incorporate that information into the report. Microsoft Access is the database used to store the information and generate a report for each FSG. FSG's are being compiled for each Major Land Resource Area in the US that has significant forage production occurring in it. The Northern Plains Region is furthest along in the work.

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Population Responses of a Leafy and Conventional Corn Hybrid for Silage in Southeastern Pennsylvania. S. H. TORREY*, G.W. ROTH, and D.D. ARCHIBALD, Penn State Univ.

Previous work has indicated the optimum plant population for corn grown for silage ranges between 74,000 and 84,000 plants per acre. We were interested in whether this recommendation applies to long season areas of Pennsylvania and how a leafy hybrid responds to higher plant populations. We evaluated a conventional hybrid (Mycogen 2799IMI) and a leafy hybrid (Mycogen TMF 114) at the Penn State farm in Landisville, Pennsylvania during 2000 and 2001. Each hybrid was planted at 59, 74, 89 and 104 thousand plants/ha. After harvest, the whole plant corn forage was analyzed to determine NDF, NDF digestibility, crude protein and starch. Yield and forage quality results were input into the University of Wisconsin MILK2000 equation. Yields of the leafy hybrid were less responsive to population than those of the conventional hybrid. Milk/ton responses to increased population were similar for both hybrids but varied each year, with milk/ton declining in 2000 and increasing slightly in 2001. Hybrids varied significantly in milk/ton. Milk/ha was maximized at 89000 plants per hectare for the conventional hybrid and 74000 plants per hectare for the leafy hybrid. This suggests previous studies apply to this region and that leafy hybrids may have lower optimum plant densities.

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Modeling Phosphorus Sorption in West Virginia Benchmark Soils. B.S. SEKHON*, D.K. BHUMBLA, J.C. SENCINDIVER, and S.G. CARPENTER, West Virginia University

Soils vary in their capacity to attenuate P, however, site-specific data for phosphorus sorption capacity (PSC) of soils is lacking. Soil characterization data that are collected for soil survey and classification can potentially be used to predict PSC of soils. No investigations are known to us where these data have been used to predict PSC of soils. We attempt to fill these knowledge gaps by investigating P retention characteristics of 4 WV benchmark soils. Soil samples from ninety eight soil horizons of sixteen soil profiles representing 4 soil series were analyzed for exchangeable Al and Ca, clay content, pH, organic carbon, oxides of Fe and Al, and PSC. Soils varied in their P retention and release characteristics. Surface soil horizons had lower PSC and higher P release than that observed for subsurface horizons. Statistical modeling techniques were used to model P sorption capacity based on the soil characterization data. Suitability of this modeling technique for predicting P sorption capacity of soils will be discussed.

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Some Effects of Companion Planting with Tomato, Basil and Brussels Sprout. M.K. BOMFORD* and L. BUTLER, West Virginia Univ.

Companion planting is the practice of growing two or more crops together to increase yields, reduce pest levels, or derive other benefits. Ongoing studies compare the yield and pest abundance of tomato, basil, and Brussels sprout grown in monoculture or companion pairs. In a preliminary study, Land Equivilency Ratios (LER) showed a yield advantage to growing tomatoes with companion crops, but no advantage to other combinations. In the first year of an ongoing French Intensive system study, companion planting altered yields per plant, but did not increase LER. Measurements of canopy light penetration and soil moisture content showed a strong correlation between competition for water and light between treatments. Several insect pests, including the cross-striped cabbageworm, *Evergestis rimosalis* Guenee, and imported cabbageworm, *Pieris rapae* L., responded to companion planting in the preliminary study, but not in the French Intensive study.

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Soil and Water Quality Papers

Water Quality Changes in an Acid Mine Drainage Stream Over a 25-Yr Period. J. STEWART and J. SKOUSEN, WVU.

The Deckers Creek watershed in northern West Virginia has a long history of industrial development and environmental abuses. The water in Deckers Creek was sampled in 1974 and re-sampled in 1999 to determine water quality changes over 25 years. Twenty-nine sampling points were located along the creek and water samples were analyzed for pH, acidity, alkalinity, iron and calcium at both times. Aluminum, manganese and fecal coliform (FC) densities were measured only in 1999. Water at all sampling points showed lower acidity and metal contents in 1999 compared to 1974. Water pH increased at the mouth from 4.8 in 1974 to 6.3 in 1999. Acidity was reduced an average of 62% across all sites and iron concentrations were decreased 53%. One major untreated point source of water from an abandoned underground mine continues to degrade the quality of the creek. The water quality in Deckers Creek has generally improved due to decreased coal mining activities, reclamation, and healing over time due to natural processes. More time and additional reclamation projects will continue to enhance the water quality in the creek.

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Phosphorus Leaching from Undisturbed Soil Columns Amended With Normal and Alum-Treated Poultry Litter. L.BOYER*, R.O. MAGUIRE, and J.T. SIMS, Univ. of Delaware.

The environmentally sound management of animal manures is a major problem facing U.S. agriculture today. An area of particular concern on the Delmarva Peninsula is the impact of phosphorus (P) leaching from "high P" soils on ground and surface water quality. Phosphorus leaching can occur in deep sandy soils, in high organic matter soils, and in soils where over-fertilization and/or excessive use of organic wastes, such as poultry litter, has increased soil P to values above those needed for economically optimum crop yields. One best

management practice to reduce the environmental impacts of animal manures that is of particular interest to the poultry industry is the use of "alum" [$Al_2(SO_4)_3$] as a poultry litter amendment ("litter" is a mixture of bedding material, usually sawdust, and poultry manure). Our objective was to compare the effects of normal and alum-treated poultry litter on the leaching of P and aluminum from undisturbed soil columns varying in soil test P.

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Water Treatment Residuals as Soil Amendments for Agricultural Buffers: Effects on Plant Growth, Soil Phosphorus, and Phosphorus Leaching. R. A. EATON AND J. T. SIMS*, Univ. of Delaware.

Recent research has shown that saturation of soils with P can not only enhance soluble P losses in runoff but also by leaching into shallow ground waters. Consequently, there is a need to develop and evaluate innovative soil conservation practices that will reduce subsurface P losses. We evaluated the use of water treatment residuals (WTRs) as soil amendments for buffer strips using laboratory and greenhouse studies. Results from lab studies clearly showed that WTRs could stabilize soil P in less soluble forms and also increase the P sorption capacity of high P soils varying in chemical and physical properties. Greenhouse studies showed that a municipal alum WTR and an industrial Fe WTR could reduce P solubility and leaching without negatively affecting the growth of either agronomic crops or plants typically grown in buffer strips. Implications of these results for long-term management strategies needed to achieve the reductions in P loading required by state nutrient management laws and USEPA Total Maximum Daily Load (TMDL) agreements will be discussed.

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Nutrient and trace element flux following surface mine reclamation with biosolids. R.C. STEHOUWER and K.E. MACNEAL, Penn State Univ.

Large, one time biosolids application rates of 134 Mg ha^{-1} (dry weight) are routinely permitted for mine reclamation in Pennsylvania. Depending on the biosolids composition, approximately 5000 kg total N ha^{-1} and 1000 kg ha^{-1} first year available N are also added. This study was conducted to assess the fate of biosolids N following mine application. An abandoned mined land site was instrumented to collect surface runoff, vadose zone percolate water, and ground water. Water samples were analyzed for pH, acidity, total N, NH_4^+, NO_3^-, total P, ortho-P, Al, Fe, and several trace elements. Prior to biosolids application, NO_3^- levels in all water sources were very low (<1 mg NO_3^--N L^{-1}). Following biosolids application, NO_3^- concentrations have remained unchanged in groundwater, but have increased to the range 10 – 20 mg NO_3^--N L^{-1} in surface runoff, and to the range 160 – 260 mg NO_3^--N L^{-1} in percolate water. Percolate water also showed increased concentrations of Al, Mn, and Cu following biosolids application, but Fe appeared to decrease. These results indicate a need to reassess permitted application rates due to the potential for significant NO_3^--N loss.

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The Effect of Different Ammoniacal Nitrogen Sources on Soil Acidification. S.H. CHIEN, *IFDC*; M.M. GEARHART and D.J. COLLAMER*, *Honeywell International.*

Ammonium sources of fertilizer cause soil acidification as the ammonium form is converted to nitrate through the microbial processes of nitrification. The adopted figures by the Association of Official Analytical Chemists (AOAC), which have been widely cited and accepted, state that ammonium sulfate (AS) is three times more acid forming than urea and ammonium nitrate (AN). These values are based on theoretical considerations by Pierre in 1934, with no empirical validation. The purpose of this study was to determine the acidulation potential of AS with respect to AN and urea, in greenhouse and laboratory studies. Soils varying widely in texture were used to represent the range for most agricultural soils. It was concluded that AS generated about 1.5 to 2.0 more acidity than AN and urea in the soils tested. These results therefore refute the widely adopted AOAC value which implies that 3 times more lime is required for AS than AN and urea to neutralize soil acidity induced by nitrification.

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Runoff and Soil Test Phosphorus from Crop Fields in Vermont. W.E. JOKELA, J. TILLEY, F. MAGDOFF, E. STEWART. Univ. of Vermont.

Phosphorus runoff from cropland contributes to eutrophication and water quality degradation in lakes and streams. A Phosphorus Index has been developed to prioritize fields for P runoff potential, but it requires sound research data to relate P runoff to variables such as erosion, manure application, and soil test P (STP). We initiated research to determine P concentrations in runoff as a function of STP levels. We generated runoff with a rainfall simulator on clay and silt loam soils in field plots and runoff boxes and measured P and sediment losses. Soluble runoff P generally increased linearly with STP, but preliminary results suggest differences between soil types. Some unexpected results may have been due to unusual antecedent soil moisture conditions and other soil and vegetation effects.

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Soil and Crop Management Papers

Alternative Approaches to Managing Rootknot Nematode Infestations. R.J. Kratochvil*, K.L. Everts, S. Sardanelli, and B. Gallagher.

Rootknot nematodes (RKN) (*Meloidogyne* spp.) affect more than 2,000 species of plants including vegetables, field crops, forage crops, small grains, fruits, nursery crops, and turf grasses. They are endemic to all agricultural soils. Potato farmers on the Eastern Shore of Maryland have noticed that succeeding vegetable or field crops have performed very poorly. Soil samples that have been collected from suspect fields and subsequently examined by the University of Maryland Nematology Laboratory have identified highly elevated populations of RKN. Farmers have been managing their RKN populations with chemical nematicides such as methyl bromide and Telone II. The cost associated with these products and the imminent removal of methyl bromide from the market has generated interest in alternative management techniques. A three-year on-farm study evaluated the effect of a number of non-host crop species upon the RKN populations when they were used in rotation with vegetable and agronomic crops. Results of this on-farm research project will be discussed.

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FORAGE PRODUCTION AND RISK IN THE NORTHEAST. E.B. RAYBURN, WEST VIRGINIA UNIVERSTIY

Livestock producers manage production and risk within a multiple dimensional system of ecology, technology, and markets. Forage species affect risk through yield and yield variability. Regional variety trials were used to determine the mean and variability of yield for orchardgrass (*Dactylis glomerata*, L.), tall fescue (*Festuca arundinacea* Schreb.) and perennial ryegrass (*Lolium perenne* L.). Monte Carlo risk assessment was conducted of predicted steer performance using the NRC beef gain equations, production costs and returns typical to the region, identified species yield and variability, and the add-in software @Risk in an Excel model. Forage species differ in yield and yield variability. High average yield increases optimum stocking rate and net income. Orchardgrass and tall fescue (E-) were more productive and lower risk than perennial ryegrass based on the regional data. Locations differ in yield and variability due to climate and soil. Variety trials across environments can be used to identify these effects on production economics and risk.

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Cross-pollination of Roundup Ready Corn Pollen into Conventional Corn. J.M. Jemison, Jr. and M. Vayda, University of Maine
Transport of genetically engineered (GE) corn pollen drift continues to be a concern to production agriculture. A three-year study was initiated in 1999 to evaluate the likelihood of cross-pollination of GE corn with conventional corn planted within 50 m of the GE corn source. In 2000, we found a small amount of GE seed (0.016%) in the conventional hybrid, which in effect negated our ability to determine source of GE pollen for that year. In each year, both GE and conventional corn experiments were planted within two days and corn ears were harvested, air-dried, and shelled. Corn was planted in the greenhouse, and sprayed with glyphosate at 1.12 kg ai/ha. Plant survival was scored. In 1999, we found 1.4% cross-pollination in conventional corn planted 30m-E, 0.7% at 35m-E, and 0.03% at 40m-E of the GE source. In 2001, we found very similar results with 1.1% survival at 25m-E, 0.9% survival at 30m-E, and 0.04% at 35m-E. This work indicates that while cross-pollination of GE and conventional corn is possible, the amount is limited even when the two corn hybrid types are planted at close distances.

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Detection of Genetically Modified Traits in Maize. B. L. MA, Agriculture and Agri-Food Canada.

There is an urgent need to determine the transfer and detection of genetically modified (GM) traits in maize for identity preservation and regulations for marketing. Samples with known fractions of GM content (Bt, LL and stacked genes) made from our field study, and from seed companies were tested by lateral flow test kits and by ELISA-based test strips from different companies. Selected samples were also tested in a commercial lab. Our data suggested that a qualitative quick test can detect samples containing 1% or higher Bt and 2% or higher LL events. Pollen samples (non-GM kernels pollinated by neighbouring GM pollen) usually contained less GM content and thus a higher concentration is needed than maternal, i.e. seed, samples. Both ELISA-based and commercial DNA-based PRC tests distinguished samples with GM content from 0.1 to 0.5%, but the precision of quantification at this range was very low. This sets the reliable detection limi

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Evaluation of Starter Fertilizers for Corn on Soils Testing High for P in Pennsylvania. S. M. HEINBAUGH*, G.W. ROTH, D.B. BEEGLE, and M.E. ANTLE, Penn State Univ.
Use of starter fertilizers for corn on soils testing high for P is common. Eliminating or replacing typical 1-3-1 (N-P_2O5-K_2O) starter fertilizer blends with N only starters may be more economical and lead to less P accumulation in the soil. In 2000 and 2001 we conducted numerous on farm tests to evaluate the yield and early growth response of corn to 10-30-10 and ammonium sulfate as a starter fertilizer. In 2000, averaged over 9 sites there was no yield difference between the check and the conventional starter, but yields from the ammonium sulfate treatment were 5% higher. Averaged over all 22 sites in 2001, both starters had a significant effect on early growth that increased 23% over the check for the 10-30-10 and 17% for the ammonium sulfate. In 2001, averaged over all sites, the yields of the 10-30-10 starter fertilizer treatment and the ammonium sulfate were similar and averaged 3.7% higher than the check. Averaged overall sites, use of the 10-30-10 was not profitable. The use of the ammonium sulfate as a starter could be profitable if the starter could be used to offset some of the crop N requirement.

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