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Crops, Dairy, Livestock, Equine News

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In This Issue...

2008 Farmer Research Meetings
April 1 Deerfield and April 3 Rutland

Through funding from Mass. Dept. of Agricultural Resources and the Agricultural Innovation Center Fund, Mass. Dept of Environmental Protection, Mass. Dept of Energy Resources, USDA's Sustainable Agriculture Research and Education programs, and the UMass Agricultural Experiment Station the Crops, Dairy, Livestock, Equine program is involved in several research and education activities to address the increased costs of feed, fertilizer, and indirectly fuel. Research was in progress in 2007 at the UMass farm and on several fields with cooperating farmers and will continue with farmers in 2008.

Two farmer meetings have been scheduled to share our research results and to seek farmer (your) input and involvement. The first meeting will be **Tuesday April 1 at the new field barn and workshop facility** at the UMass Crop and Animal Science Research Center, River Road in South Deerfield. The second meeting will be **Thursday April 3 at the Jordan Dairy Farm**, 51 Muschopauge Road in Rutland. Both meetings will begin at 10:45 a.m with refreshments and continue until 2 to 2:30 p.m with lunch provided.

Some of the diverse activities to be discussed include a graphical comparisons of early and late season hybrids for yields and grain contribution, the effect of planting date on yield, grain content and harvest date, and how these fit into a farm system for nitrogen management. If farmers are able to harvest corn by late August or early September then they have the opportunity to recover considerable amounts of residual nitrogen not used by the corn crop and from fall applied manure. Farm and University field experiments have shown early planted cover crops accumulated more than 100 lbs N/ac in the fall.

We have also examined the effect of raising chopping height on yield to increase the proportion grain in silage, and have results from planting summer annual crops, including corn planted at extremely high densities, in narrow (7 inch) rows, for grazing. Grain corn hybrids have also been evaluated.

Twenty eight pasture mixes or blends sold commercially were seeded last August at the UMass Farm as part of a regional project. Similar studies were seeded in Vermont and Pennsylvania, and a smaller number of blends on farms in other New England states. Other efforts are also being made to increase the productivity and utilization of pastures and we welcome farmer involvement.

We hope many farmers will be able to attend either of these meetings and participate in the discussions and field activities this year. If you wish to become involved in any activity on your farm, or have an idea but cannot attend a meeting then please give us a call (413-545-1843), or send an email to cdl@umext.umass.edu For more information contact any of CDLE team member at www.umass.edu/cdl/team.html

Looking forward to seeing you on Tuesday April 1 or Thursday April 3.

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Will Low Rates of Manure Supply Sufficient Nitrogen for Corn?

Soil and plant tests can provide valuable information for nitrogen management planning that minimizes adverse impact on environment and maintains the economic viability of corn production systems.

The pre-sidedress nitrate-N test (PSNT) is a late-spring nitrogen management tool for use in corn production systems. The PSNT was developed in Vermont and is now used successfully in humid regions of the Northeast to identify those fields where corn may or may not respond to additional nitrogen fertilization. It is especially appropriate for those systems where producers are utilizing animal manure from which availability of nitrogen may be uncertain. The PSNT determines the amount of NO_3-N in the top 12 inches of soil just prior to the time of side or topdressing. This is the time when plants are entering the stage of rapid growth and N uptake. The sampling time is usually late enough to reflect the effects of spring weather conditions and early enough to apply fertilizer if needed. Studies have shown that soil NO_3-N concentration in the range of 20 to 25 ppm indicates optimal N supplies for corn. Values obtained at PSNT have shown to be closely related to the yield of corn over a relatively wide range of soil types.

On-farm Research

An on-farm research demonstration was conducted in 2007 in a corn field located in Franklin County, Massachusetts on a site which had a history of manure application for the past several years. The soil type was a Podunk fine sandy loam classed as very deep, and moderately well drained soils on floodplains. The corn field received a basal application of approximately 10 tons of solid manure in spring and no starter fertilizer was used. The farmer used 5 pints per acre of Lumax for weed control.

Table 1: Nitrogen sidedress effect on silage yield, earcorn yield, plant moisture, soil NO_3-N at harvest, and cornstalk nitrate concentration.

N Rate lbs/acre	Silage[1] ton/a	Ear[2] ton/a	Ear ratio %	Moisture %	Soil N ppm	Stalk N ppm
0	24.7 b	4.0 b	40.2 ab	70.5 a	2 b	457 c
100	29.3 a	4.4 b	39.1 b	70.1 a	9 b	4804 b
150	29.9 a	5.0 a	42.7 a	71.6 a	31 a	6008 a

[1]Silage yield @ 70% moisture [2]Earcorn yield @ 25% moisture

Soil samples were taken at sidedress time (June 26) and again at harvest. Result revealed that the field's soil NO_3-N was 17 ppm which is normally considered inadequate. However, the farmer made it clear that he would not sidedress the crop due to the high cost of N fertilizer. We then decided to determine if application of recommended nitrogen (in this case 100 lbs N/acre) would produce a meaningful yield increase. We were also interested to find out if the crop responds differently to the source of nitrogen used for sidedressing. Nitrogen treatments consisted of three levels of N: a) no added fertilizer, b) PSNT recommended level (application of 100 lbs N/acre), and c) 50% higher than optimal level (application of 150 lbs N/acre). Urea and calcium ammonium nitrate (CAN) were used as nitrogen sources for sidedressing.

The study was a randomized complete block design with four replicates. Blue Seal 921Dp (92 days maturity) hybrid was planted on May 23 by the farmer and harvested manually on September 12 for yield determination.

Research Result

Our study indicated silage yield could have been increased by about 15% if the farmer had followed the current recommendation rate (100 lbs N/acre) for PSNT value of 17 (Table 1). Although fertilizer cost was high last year, the value of the increased yield would have outweighed the cost of the added fertilizer. However, The application of more nitrogen than recommended did not result in a significantly higher silage yield and would have caused needless increased cost and could to water quality concerns. Regardless of nitrogen rate, earcorn yield for this location was low. This at least in part, could be attributed to the cooler season and dry weather conditions in August. Dry conditions particularly during the month of August when tasseling and silking took place could have negatively affected the kernel set and ear development.

An alternative method to determine if N fertility program of a field was sufficient or appropriate is end-of-season cornstalk test. This test is based on the assumption that nitrate accumulates in the lower portion of mature cornstalks when excessive amounts of N are available in the soil. Research has shown that cornstalk NO_3-N concentrations greater than 750 ppm indicate that N supplies were sufficient for plant growth. The range of 700-2000 ppm is considered in many states to be the optimal range. Since the test is taken at the end of growing season it is a way to evaluate the N management used on the field.

The low conc. of NO_3-N in lower portion of corn stalk in non- fertilized corn at the end of the season, confirmed that plants could have benefitted from sidedress fertilizer (Table1). In contrast, the presence of a high concentration of NO_3-N in cornstalks in sidedressed treatments indicated that the highest yield could have been obtained with application of even less than 100 lbs N per acre.

Our study also showed that the CAN source of nitrogen for sidedressing gave slightly higher yields compared to urea but these were not statistically significant. A higher concentration of NO_3-N in the corn stalk at harvest with CAN suggested less volatilization nitrogen losses compared to urea.

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2007 Evaluation of Corn Hybrids in Massachusetts

In 2007 we grouped the corn hybrids submitted by contributing companies into three maturity groups; group I 90-97 days, group II 98-105 days, and group III > 106 days. Five years of field studies (2002 to 2006) at the University of Massachusetts Crops Research and Education Center Farm had shown that earlier maturing corn hybrids had a similar yield to later maturing hybrids. Further, in some of our studies the early maturing hybrids performed better in terms of the proportion of grain to stover than later maturing hybrids. If confirmed, this will demonstrate the benefit of planting earlier hybrids for integration with early planted cover crops for end-of-season N uptake. However, field studies on several farms across the Commonwealth are needed to confirm this finding.

All hybrids in this evaluation were planted on April 26, 2007 in the Connecticut River Valley at the University of Massachusetts Crops Research and Education Center Farm in South Deerfield. A cone type distributor mounted on a double disc opening corn planter was used in a conventionally prepared seed bed. Each plot was planted at the rate of 32,000 seeds per acre in 30 inch rows. Plots consisted of 3 rows with a length of 25 feet. Each hybrid was replicated 4 times. Weeds were controlled with a pre-emergence application of 2 quarts of Bicep II Magnum per acre, and fertilized with 650 lbs/ac of 15-8-12 fertilizer applied pre-plant, and a further 100 lb/acre of ammonium nitrate side dressed on July 9.

Corn hybrids were harvested by hand at different dates when their kernels reached 50% milk line. Harvested hybrids were evaluated for yield of silage and ear, percentage ears, and moisture content. Ten feet of the central row from each plot was taken for yield estimation. Silage yields were adjusted to 70% moisture and ear corn yields to 25% moisture. Moisture content is reported as percentage of corn harvested as silage.

Growing season conditions in 2007 for all maturity groups hybrids was significantly different compared to 2006 and the norm for this location. In 2007, crops experienced cooler and especially dryer conditions in their early growth stages compared to the previous season and the norm condition (Table 1). For example, during the first two months after planting, corn plants had 137, and 86 fewer growing degree days compared to 2006 and the norm condition, respectively. Moreover, during the early growth stages, noticeably in months of May and June, corn plants received significantly less rainfall (6.18 inch) than in 2006 (14.79 inch), and normal condition (8.44 inch) in this location.

Results obtained in 2007 indicated that silage yield of all three maturity group hybrids were not statistically different. However, the 2007 results in terms of grain to stover ratio were not consistent with our earlier findings. Hybrids in the late and medium maturity groups had 11% and 5% higher ear percentage than early maturity hybrids, respectively (Table 2). This in part, could be attributed to the cooler and dryer conditions existed during the early stages of the crop growth. Further research which includes a greater number of hybrids as well as evaluation at varied locations is required for more definite conclusions.

Results of these trials are made available to farmers, extension agents, seed distributors, seed salesmen and others upon request. Tables should not be reproduced if any portion is omitted or if order of data is changed.

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Table 1: Climate data for 2007, 2006 and norm in South Deerfield, Massachusetts.

	GDD[1]			Rainfall (inches)		
	2007	2006	Norm	2007	2006	Norm
Apr	7	-	-	0.83	-	-
May	284	291	282	2.76	6.37	3.89
Jun	448	585	533	2.59	8.42	3.75
Jul	628	773	697	5.50	2.08	3.91
Aug	711	550	638	1.12	1.42	4.10
Sep	195	323	381	1.62	1.83	3.79
Total	2273[2]	2522	2541	14.42[3]	20.12	20.24

[1] Growing Degree Days was calculated as: GDD = $E(T_{max} + T_{min})/2$ B 50
[2] Total GDD for maturity group III. Total for groups I & II were 2078 and 2173, respectively.
[3] Total rainfall for maturity group III. Total for I & II was 12.8 inches.

Table 2: Yield, moist%, and percent ear for all hybrids planted on April 26, 2007 harvested at 50% milk line.

BRAND	HYBRID	Maturity Group	silage[1] T/ac	moist %	earcorn[2] T/ac	emoist %	pctear %
DEKALB	DKC 45-82	I	28.9	64.9	7.0	46.7	60.7
DEKALB	DKC 46-60	I	28.6	66.1	6.7	48.9	59.5
Seedway	3000RRYG	I	28.9	65.7	6.3	46.3	55.0
Seedway	SW 3301L	I	29.6	67.2	6.8	47.4	57.4
Blue Seal	946L	I	30.0	64.8	6.7	49.2	55.6
Blue Seal	996L	I	27.7	64.1	6.2	48.4	57.1
Mean			**29.0**	**65.5**	**6.6**	**47.8**	**57.6**
DEKALB	DKC 50-48	II	28.1	62.9	6.2	46.5	61.8
DEKALB	DKC 55-12	II	32.6	64.5	7.9	45.8	60.7
DEKALB	DKC 54-46	II	27.7	62.1	6.6	41.4	59.3
DEKALB	DKC 48-46	II	30.8	65.0	7.9	45.6	63.7
DEKALB	DKC 52-63	II	30.6	65.0	7.6	47.2	62.0
Blue Seal	986GS	II	27.0	63.7	7.0	44.9	65.1
Blue Seal	1046L	II	35.1	65.5	7.6	45.4	53.8
Blue Seal	1051L	II	30.0	63.3	6.9	44.8	58.3
Mean			**30.2**	**64.0**	**7.2**	**45.2**	**60.6**
T.A. Seeds	TA 570-11	III	30.7	62.0	7.9	43.8	64.2
T.A. Seeds	TA 607-11	III	29.1	62.5	7.7	44.2	66.2
T.A. Seeds	TA 678-13	III	32.5	67.1	7.8	47.4	59.8
DEKALB	DKC 57-47	III	29.8	61.9	7.9	43.7	66.9
DEKALB	DKC 61-22	III	31.9	63.9	8.2	43.0	64.1
DEKALB	DKC 61-66	III	31.9	63.9	8.2	45.1	63.9
DEKALB	DKC 63-42	III	31.0	64.0	7.8	46.2	62.9
Mean			**30.8**	**63.6**	**7.9**	**44.8**	**64.0**
Overall Mean			30.2	64.2	7.3	45.8	60.7
CV (%)			12.0	4.2	12.3	7.0	6.1

[1]Silage @70% moisture [2]Earcorn @ 25% moisture

Guidelines for Evaluating Hay Quality

1. Whenever possible insist on a **hay analysis** from a certified forage lab to show the true nutrient content.
2. **Plant species present** - look for purity, weeds, toxins and poisonous plants. Legumes have higher quality than grasses, and in second or third cutting grasses will be mostly leaves since they do not go to seed.
3. **Maturity** - look for number and maturity of seedheads, blooms, and stiffness and fibrousness of stems. Good quality hay is harvested when legumes are in early bloom and before seed heads have formed in grasses.
4. **Leafiness** - with more leaves and less stem, the higher will be the quality. This is affected by species, maturity, and harvest handling. Legume leaves are easily lost if raked too dry. More mature plants have lower leaf to stem ratios.
5. **Texture** - feel to see if it is very soft, soft, slightly harsh, harsh or brittle. Hay that is brittle and stemmy indicates overmaturity and higher levels of fiber.
6. **Color** - green color helps hay sell but color alone is not a good indicator of quality. Open several bales and look inside. Slight discoloration on the outside does not indicate poor quality. Hay should have a bright green color and fresh smell. Brown or black hay indicated it may have been rained on or was wet after being baled.
7. **Odor** should be pleasant. Hay baled too wet can be moldy, musty, caramelized because of excessive heating.
8. **Dusty hay** result from soil contamination or indicate mold, or excessive legume leaf breakdown during baling.
9. Hay containing **foreign matter** including sticks, rocks, wire, clothing, animals, cow chips should be avoided.
10. Reject hay with significant amounts of **weeds**. Some weeds may be toxic, others indicate lower quality.

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Composting Manure for Horse and Other Small Livestock Operations

Why Compost?

Many horse owners and small livestock operations do not have access to sufficient land to make good use of manure by spreading. Composting provides another option for managing manure on the farm.

Microorganisms in the compost pile, including bacteria and fungi, breakdown the organic components of manure and bedding into smaller particles while releasing carbon dioxide, water and heat. The end product of composting is a dark, crumbly, earthy-smelling product similar to potting soil. Although manure can decompose on its own, composting speeds up this natural process. If done properly, composting decreases the volume of waste, kills parasitic eggs and larvae, destroys weed seeds, and transforms a potential liability into a marketable resource.

Recipe for Successful Composting

A manure pile does not constitute composting. Microorganisms responsible for composting need food, water, air and the proper temperature:

1) Moisture is necessary to permit biological activities and supporting chemical processes. Moisture content should be about 50-60%. When squeezing a handful of composted material, it should feel like a damp sponge; it will wet your hand with no free water drops. Moisture is continuously lost due to the high temperature. Therefore, regularly wet the materials without soaking. To increase the moisture content of compost from 25% to 55%, add about 20-30 gallons of water per 100 cu ft of compost. Wet each load as you fill the compost bin.

2) Air: Oxygen is needed for respiration of the microbes while breaking down the materials. Too much sawdust may compact so tightly that it will make the compost pile anaerobic. Thus, manure should be mixed with bulking materials, such as straw, lawn clippings (free of pesticides), leaves or hay. Inserting a perforated PVC pipes into the pile may also provide oxygen to microorganisms in the center of pile.

3) Appropriate C:N ratio: Microbes use carbon (C), which is the main element found in bedding material, as their source of energy. They also need nitrogen (N) for forming proteins. The challenge is to ensure the proportions of C and N in balance for successful composting. In general less bedding in the compost results in a faster process and a higher quality final product. If the bedding material is sawdust, it takes a longer time to compost. Lignin, an important component of wood, resists decomposition by many microbes. Only a few fungi are able to decompose lignin to CO_2 and water. Also the end product's quality is low (high C:N ratio). Adding higher N content materials such as grass clippings or N fertilizer to the pile (e.g. 1 lb of urea per cubic yard of collected waste) speeds up the process and improves its quality.

4) Temperature: During decomposition heat is given off creating an ideal environment for the microorganisms. They operate best in temperatures between 130–150 °F. At 140 °F or higher, pathogens, weed seeds and fly larvae in the composting materials are destroyed. However, at temperatures above 160 °F the microorganisms will also die. Therefore, it is essential to regulate the oxygen and temperature levels by regularly turning or inverting the compost pile (about once a week). Monitor the temperature using a long stemmed thermometer. Typically, fresh materials will heat up within 24 hours and within 2-3 days internal temperature may reach 155 ° F. At a point perhaps 2 ft. down from the top of your pile or bin, carefully insert the thermometer halfway into the side of the composting mass. Take temperatures at several locations to obtain an average. At the start, measure temperature at least daily for the first week. When the temperatures reach between 130- 160, the time between measurements may be decreased to twice-weekly intervals. Declining temperatures early in the composting, indicate declining oxygen levels, but it may also be due to less than optimal moisture or inadequate available N for the microbes. After turning, the temperature may drop to air temperature, but should rebound within 48 hours. The thermophilic cycles may last 2-6 weeks depending on the starting C:N ratio.

Choosing a Composting System: You can tailor your composting system to meet your needs depending on how many animals you have, the space and equipment available and how intensively you plan to manage the compost pile.

Compost Piles: Making compost does not necessarily require a special structure to store the materials. A simple, free standing pile can turned into an effective composting system and works well for example for one or two horse operations. The pile grows as composting materials are continually added to the top or sides of the mass. When the pile gets too big, additional piles can easily be created. Covering the pile with a tarp to prevent from soaking due to rainfall and frequent turning of the pile speeds up the process. Free-standing piles will require more space and careful consideration of location to prevent runoff and leaching of nutrients.

Multiple bin composting system: In this system decomposition takes place faster and less area is used. A three bin system is recommended for small operations. The first bin is allocated to fresh collected waste until it is full. The material is then shifted into bin two for composting. Meanwhile, bin one can be refilled. When bin one is full again, materials in bin two are shifted to bin three, and materials in bin one are shifted into bin two. Shifting material from one bin to the next serves as part of the turning process. Ideally, by the time bin one is full again, materials in bin three will be completely composted. We are experimenting with using 7 shipping pallets stood on edge to make a simple 3 bin system. We have such a system setup for composting at the UMass Equine Center Farm in Hadley.

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2008 Massachusetts Pasture Walks

NOFA/Mass, USDA Natural Resources Conservation Service (NRCS) and the University of Massachusetts Extension have organized these Grazing Workshops as a continuing education resource for Massachusetts farmers. Topics at each event will vary, but will include pasture management, organic transition and herd health, forage species, soil fertility, fencing and water systems, and summer and winter grazing. All pasture walks will take place from 10:00 - 1:00 (unless otherwise noted). Please bring your own lunch. For more information on any of these sessions, contact Winton Pitcoff, NOFA/Mass, at winton@nofamass.org or 413-634-5728; Stephen Herbert, UMass Extension, at 413-545-2250 or sherbert@pssci.umass.edu; or Tom Akin, NRCS, at 413-253-4365 or thomas.akin@ma.usda.gov

More details about each of these sessions, including directions to the farms, can be found at www.nofamass.org/programs/organicdairy/index.php or www.massgrass.org.

Transitioning a Dairy Herd from Winter to Summer Feed Tuesday, May 6, 10:00 a.m. – 1:00 p.m.
Rocky Acres Farm, 690 Coy Hill Road, Warren, MA

Small Ruminant Management
Wednesday, June 4, 10:00 a.m. – 1:00 p.m.
Crystal Brook Farm, 192 Tuttle Road, Sterling, MA

Transitioning to Organic Dairy / NRCS Resources
Saturday, June 21, 11:00 a.m. – 2:00 p.m.
Robinson Farm, 42 Jackson Road, Hardwick, MA

Organic Dairy Transition
Thursday, July 10, 10:00 a.m. – 1:00 p.m.
Colrain Dairy Farm, 270 Greenfield Road, Colrain, MA

Raising and Marketing Grass-Fed Meat
Thursday, July 24, 10:00 p.m. – 1:00 p.m.
Wheel-View Farm, 212 Reynolds Road, Shelburne, MA

Small Scale Dairies and Alternative Forages
August 18, 10:00 a.m. – 1:00 p.m.
Bostrom Farm, 95 Green River Road, Greenfield, MA

Infrastructure on Mixed-Livestock Farms
Tuesday, September 9, 10:00 a.m. – 1:00 p.m.
Tufts University Farm, North Grafton, MA

Pasture Management Research at UMass
Wednesday, September 17, 10:00 a.m. – 1:00 p.m.
Research and Education Center Farm, Deerfield