What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 2, NUMBER 6, 1992

FARMING A DIRT HIGHWAY 1: Soil Profile Turned Upside Down

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It's no joke

Would you enjoy plowing and planting on a dirt highway? ***What?*** For openers let's say it's sixty to eighty feet wide and cuts through well managed, glacial till soils that never had a highway carved across them before. Now, let's add an extremely dense, brick-like subsurface, due to the steady convoys of heavy traffic which traveled over it for several months...wet weather and dry weather alike. ***Is that it? Can I try to plow and plant it now?*** No; not yet...just a few more features to describe about this "highway" across your land. The surface is rough and rutted. It has a phenomenal wealth of infertile clay and cobble rocks (which used to be naturally and separately layered from two to eight feet beneath the surface), all mixed and mashed together, on top of what used to be your seven inches of topsoil.

This dirt highway is aligned straight -- up and down the hills and across flat fields. Where it changes grade, at the bottom of the rolling hayland, and begins over your most workable cropfield, an exciting new discovery awaits you! ***What discovery?*** A tractor and fully-loaded manure spreader are sunk, axle deep, in a new wet area you've never seen before! New spring-seeps or "water-boils" are popping out of the ground at the toe-of-slope, saturating the "dirt highway" and adjacent ground. Or maybe the wet area is discovered by the operator of the commercial lime spreader (the same driver who has limed your fields over the last fifteen years and knows every turnaround, every swale and ditch) as he climbs down from the cab and looks in bewilderment at the rear wheels, sunk to the top of their hubs in some weird looking grayish, stoney and muddy mess.

So what's the punch line to this joke? It's no joke. Through many Northeast farms, that "dirt highway" carved through the rotation pastures, the haylands and the heavily worked cropfields is a transmission pipeline right-of-way...the aftermath. ***The "aftermath"?*** The aftermath. It's the unnatural, topsy-turvy condition in which the soil material and your farmland are left, after the trench was excavated or blasted, drainage of soil-water was altered, spoil material was bulldozed over and through the topsoil, the pipe was lowered in the trench and padded over with swipes of topsoil, and excavated rocks are littered across the right-of-way. It's the soil profile turned upside down.

Now, go ahead. Try to farm it.

The past and not so past

The construction of large size pipelines trenched through towns, across counties and states is handled primarily by big contractors who bid for jobs anywhere and everywhere across the country. ***Anywhere and everywhere?*** Yes, anywhere and everywhere. Here in the humid Northeast, through your glacial till and outwash soils and their wide variety of terrain; across the Midwest through the deep loam soils on gentle slopes; up on the broad, flat, semi-arid Great Plains; or, out in the dry land of the Southwest.

For the most part -- regardless of their present locations -- big transmission pipeline contractors and equipment operators were reared on one set of working conditions... drier, easier ground. In the dry or semi-arid regions, with landscapes which are relatively flat and where soil-structure damage and soil-horizon mixing from pipeline construction are lower, the "aftermath" has been more tolerable. But back here in the humid Northeast with its hundreds of varieties of soils, plus its diversity of landscapes to gouge across, the "soil-and-spoil" techniques which many pipeliners were trained on just don't work; not on Northeast farm soils...unless you want a dirt highway to farm.

(Continued on Page 2)

SOIL MANAGEMENT

"Dirt highway" planning; but by who?

A right-of-way agent representing the pipeline brought me a set of papers to sign...and said they're for a right-of-way easement; and they can build across my land even if I won't sign. And did you also hear a lot of talk as to how good everything will be cleaned up -- just as you want it? ***Oh, yeah; I heard a lot of things like that.*** Were those details included in writing, directly in the document? ***Well, no; but I read a lot of words like: "grantee" and "grantor"; and "ingress and egress" and "witnesseth".... Then we talked about negotiating a price so they could cross through my farm.*** But did the draft document contain specific details as to how your soil resource would actually be protected and totally restored, so that you can farm it again? ***No. I guess not.*** Did the pipeline company send a qualified agricultural specialist to work with you in the field and help plan specific soil protection and restoration measures tailored to your soils and farm? ***No. I guess not. I had a couple of ideas but the right-of-way agent didn't really think I needed to be concerned.***

Planning a "dirt highway" and then actually farming it is a risky situation. Sometimes, depending on jurisdiction (if any), a transmission pipeline proposal might include proper soil protection and farmland restoration methods, up front, in an application for state or federal certification.Other times, when details on restoration methods are lacking, the state or federal government may include them as requisites prior to approving the application. But watch out for major stunts! ***Major stunts?*** Yes; major stunts. Some project field representatives are "dirt highway planners" of the old method. ***You mean, "the soil profile turned upside down"?*** Yes. Those pipeline right-of-way staff or contractor representatives try to convince Northeast farmland owners along a pipe route that the old techniques used in arid or semi-arid soils are good enough for your soils. ***How do they detour around government requisites for proper construction and restoration on Northeast farm soils if they were included in the certification?*** Too often, the certifications have been worded broadly enough to give the pipeliners the choice of right-of-way construction and restoration methods -- but without differentiating the Western dry climate plains apart from the Northeastern humid glacial till/outwash.Then, the right-of-way agents or the pipeline contractors will go door-knocking and meet with farm operators, to convince them that the way they've built the pipelines "two, three and four years ago" (i.e. one to two-thousand miles southwest of your place) will use a narrow seventy-five feet wide right-of-way and cause far less overall disturbance of the land.

Well, that sounds really good....Doesn't it? Their narration "sounds" good; but it doesn't "farm" good when it's applied here in the Northeast. ***Why not?*** Excessive soil moisture for most of the year and a thin topsoil. To the big pipeliners, there is no such thing as a "work shutdown" due to wet soil. Although pipeline right-of-way work will stop for the actual rainstorm, the crews are back running the big equipment and excavating as soon as the rain has quit; and your four to nine inches of topsoil can't cope with six months of pounding and grinding from the heavy equipment, trenching and rutting the right-of-way (dirt highway).

So how will their Western plan work, here, on my soils? Put your two limiting factors of Northeast soils together -- excessive soil moisture plus thin topsoil -- then, leaving the topsoil in place on the travel zone, have the pipeline construction operation cut loose on the right-of-way, for six months, across your fields:cutting-and-filling a dirt highway; excavating or blasting a trench four to eight feet wide and six to ten feet deep (depending on pipe diameter); hauling truckloads of pipe; continuing all work regardless of soil moisture (topsoil and subsoil) and you're in for farming a right-of-way with the loam, clay, gravel and rocks turned upside down....That's how it works. Nice plan?Maybe for them; but not for your Northeast farm soils.

In this issue, the pitfalls of transmission pipeline right-of-way methods not suited to Northeast soils have been presented. In the next issue:How to Keep a Temporary "Dirt Highway" Permanently Farmable. If you wish to obtain more information, you can contact John Lacey at (607)255-1756.

The 1992 Growing Season Weather in New York State

AGRICULTURAL METEOROLOGY

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Cold and wet weather conditions are not conducive to a good growing season in New York State, but, nevertheless, were the types of weather that most New Yorkers had to endure during the 1992 growing season. September marked the seventh consecutive month that temperatures for New York State (area-weighted) were below normal. The five months of May through September averaged nearly 2 degrees colder than normal. This made it second only to 1924 as the coldest such period on record. It was also in sharp contrast to the 1991 growing season which averaged about 2 degrees warmer than normal. Precipitation was more variable across the state, with eastern and northern portions noticeably drier than their central and western counterparts. Overall, however, the state was wetter than normal in four out of the five months comprising the growing season. These cold and wet conditions lead to slowed crop growth and delayed harvests.

May ... May averaged just two-tenths of a degree colder than normal. Although a small departure, it was 6 degrees cooler than May 1991 and cooler than 7 out of the last 10 Mays. Precipitation was quite close to normal, averaging 107% of normal for the state. The Mohawk Valley was the wettest part of the state during May, while the Champlain Valley was the driest with respect to normal.

June ... June was 2.6 degrees colder than normal. This was over 4 degrees cooler than the corresponding month in 1991 and cooler than 8 out of the last 10 Junes. Some of the cooler locations in the state reported near or below freezing temperatures on a couple of nights during the second half of the month. June was the only month of the growing season that had below normal precipitation. Although the state received only 81% of the normal precipitation, this was 1.3 inches more than June of a year ago. The coastal portion of the state was wetter than normal and the Mohawk Valley was the driest location. July ... The cold and wet weather that reigned during July was never more extreme. It was both the coldest and wettest July on record since such records began in 1895. The state averaged 3.5 degrees below normal. New York weather stations on the average measured six and a half inches of rain this month. It was the wettest July on record for the Western Plateau, Great Lakes and Central Lakes, as well as, for the state as a whole. The previous wettest July was 1902 with 6.23 inches of precipitation. Some locations in western and central New York received 10 to 12 inches of rain. The cold, wet weather resulted in considerable delays in grain harvesting.

August ... The state average temperature was 2.5 degrees below normal, which was 4.3 degrees colder than last August and the coldest August since 1986. This put the finishing touches on the coldest summer (June through August) on record for many locations, and the third coldest for New York overall. The state received 115% of the normal precipitation during August. The Great Lakes and coastal areas received over 5 inches of rain - 142% of normal. September ... Temperatures around the state were closer to normal, averaging only 0.7 degrees cooler than the thirty-year mean. Despite these rather cool temperatures, it was the warmest September since 1985. Precipitation was also very near the long-term normal. The state overall averaged 108% of normal, with 134% of normal for the Western Plateau and Central Lakes and 86% for the Eastern Plateau and Hudson Valley.

Monthly 1992 Temperature Departures from Normal

Month	Albany	Canton	Cooperstown	Geneva	State
May	1.0	0.0	-0.2	-0.7	-0.2
June	-1.5	-2.6	-2.8	-2.9	-2.6
July	-3.8	-5.0	-3.3	-4.7	-3.5
August	-1.8	-2.2	-2.6	-3.9	-2.5
September	0.2	-0.6	-1.0	-1.6	-0.7
Average	-1.2	-2.1	-2.0	-2.8	-1.9

Monthly 1992 Precipitation Departures from Normal

Month	Albany	Canton	Cooperstown	Geneva	State
May	0.30	-0.55	0.61	-0.06	0.23
June	-1.33	-1.35	-1.43	-1.12	-0.69
July	1.26	0.90	4.04	7.47	3.10
August	-1.29	-0.43	2.03	0.90	0.47
September	-0.80	-0.49	-0.08	1.18	0.28
Average	-0.37	-0.38	1.03	1.67	0.68

PEST MANAGEMENT

Choosing a Management Strategy for Corn rootworm

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Populations of western corn rootworm have stabilized throughout western and central NY. Fields scouted for corn rootworm adults during 1992 throughout western and central NY have indicated that approximately 60-70% of the continuous corn fields will be in the high risk category for damage next year if those fields are planted to corn in 1993. Scouting results have also indicated that the risk of corn rootworm damage is increasing in continuous corn fields located in eastern NY.

Corn Rootworm Biology and Management: Two different species of corn rootworm (CRW) can cause economic loss in our commercial field corn fields. Northern corn rootworm adult beetles are bright lime green and have been inhabitants of our corn fields for many years. The western corn rootworm which is yellowish with dark stripes has invaded New York only in the past few years and currently is most numerous in western and central New York. Field populations of CRW can occur as a mixed population, hybrids or as only a single species. Both species of CRW have similar life cycles and can be discussed together. Adult CRW beetles are found in corn fields from pollination until the first killing frost (late July - September). During this time the adult females are laying eggs in the soil cracks around the bases of corn plants and will overwinter and hatch in late May (next spring). Newly hatched larvae locate the young corn plants and begin feeding on the developing roots. Larval development and root feeding damage is completed by mid July. Larvae pupate and emerge as adult beetles during late July and early August to begin laying eggs to complete their life cycle.

CRW larvae damage corn by feeding on the root system and if present in sufficient numbers, will reduce corn yields by inhibiting the ability of the corn plant to uptake water and nutrients. Additional yield loss occurs as the CRW feeding destroys the plant's brace roots resulting in harvest loss due to lodging.

Fields at Risk: Fields planted to continuous corn are at greater risk to economic CRW infestations than first year corn since CRW eggs are laid the previous fall in existing corn fields. Fields in continuous corn production increase in likelihood of developing economic CRW infestations, the longer corn is planted to the field on a continuing basis. Continuous corn planted after late planted corn the previous year is at high risk due to the attractivene ss of the late pollinating corn to the adult CRW resulting in heavier than normal egg laying in the field.

Management: Potentially damaging populations of CRW are managed by rotating the field to a non-host crop or by the use of soil insecticides incorporated in the seed bed at planting or cultivation. The need to rotate the field or use a soil insecticide next year to manage CRW can be determined by counting the number of adult CRW beetles per 55 corn plants (5 plants in 11 different field locations within a field) in each corn field during and shortly after pollination. If these beetle counts exceed 1 beetle per plant as a field average, the field is at high risk for CRW damage providing the field is planted to corn in 1993. If the field cannot be rotated and must be planted to corn in 1993, then a registered soil insecticide * is recommended at planting or during cultivation next spring. The 1992 field performance of the current NY registered soil insecticides are listed in Table 1.

Table 1. Root ratings from the corn rootwork trials located at the Agway Farm, Tully NY and the Cornell Experimental Farm, Aurora NY. Corn varieties used at Tully and Aurora were Agway AG 295 (85 day) and Pioneer 3429 (108 day), respectively. Seeding rates were 28,000/acre at both locations.

Compound	Rate/1000 Row Ft	Placement	Tully-root rating	Aurora-root rating
Counter 20 CR	6 oz	IF	3.3** de	2.2 a
Counter 20 CR	6 oz	T-Band	3.2 cde	2.2 a
Counter 15 G	8 oz	IF	3.1 bcd	2.6 b
Counter 15 G	8 oz	T-Band	2.8 bc	2.2 a
Dyfonate 20 G	6 oz	T-Band	1.9 a	2.5 b
Dyfonate 4 E	2.5 fl oz	T-Band	*	2.2 a
Furadan 4 F	2.5 fl oz	IF	4.2 f	*
Lorsban 15 G	8 oz	IF	4.3 f	*
Lorsban 15 G	8 oz	T-Band	3.1 bcd	2.6 b
Thimet 20 G	6 oz	T-Band	4.3 f	3.5 c
Untreated Check			4.9 g	4.1 d

* Please refer to the *1993 Cornell Recommends for Field Crops* for the current insecticide recommendations and read the insecticide label before mixing and applying any insecticide.

** Root ratings of 3.0 and greater are considered to be economic. Numbers followed by the same letter within a column are not significantly different.
IF= In furrow application on top of the bare seed.
T-Band= Banded in a 7-inch band in front of the press wheel.

Corn Silage Plant Populations

CROP MANAGEMENT

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Based on studies from 1988 through 1991, we once again revised upward corn silage plant population recommendations in the 1993 Cornell Recommends for Integrated Field Crop Management. Table 1 shows the recommended planting rate (assuming 90% emergence) to obtain recommended harvest silage populations on major corn-producing soils in New York. We again conducted studies at Aurora and Mt. Pleasant in 1992 to evaluate the revised plant population recommendations. At Aurora, we evaluated seven hybrids (100-110 day) at nine harvest plant populations ranging from 12000 to 36000 plants/acre. At Mt. Pleasant, we evaluated three hybrids (90 to 95 day) at the same plant densities. All hybrids at Aurora attained the 1/2 milk line stage at the time of harvest. At Mt. Pleasant, however, all three hybrids were at the early to late dent stages at the time of killing frost because of exceptionally cool conditions (>300 GDD below normal).

Maximum economic yield (assuming $20/ton for silage and $70/bag of seed) at Aurora occurred at a harvest population of 33000 plants/acre when averaged across hybrids (Table 2). An interaction, however, was observed between hybrids and plant densities with some hybrids (Pioneer 3733, 3527, and Hytest 424) performing best at 27000 to 30000 plants/acre and other hybrids (Pioneer 3592, 3429, Hytest 474, and Funks 4385) performing best at 33000 to 36000 plants/acre. We also sampled five plants from each plot to determine moisture and grain percent of the silage. As in previous years, grain percent remained constant (~ 50% in 1992) across the nine populations, suggesting that silage quality also remained fairly constant. Previous studies from 1988 to 1990 indicated that silage quality did not differ much between harvest populations of 20000 and 32000 plants/acre.

Averaged across three hybrids at Mt. Pleasant, 27000 plants/acre produced maximum economic silage yields with no interaction between hybrids and plant populations. In previous years, hybrids grown at Mt. Pleasant compared to Aurora required somewhat higher populations to achieve maximum silage yields. It is not clear whether the immaturity of the corn at Mt. Pleasant limited the response in 1992.

We have evaluated the corn silage response of about 25 commercial hybrids to plant populations over the last 5 years. Almost all hybrids have required a minimum harvest plant population of 26000 plants/acre for maximum economic silage yields. We recommend that you follow the harvest plant population guide in Table 1 and fine-tune the recommendation according to the specific hybrid. For example, if a seed company recommends that a hybrid responds well to high populations, aim for the higher end of the harvest population range (i.e. 30000 plants/acre at harvest on deep well-drained soils). If the seed company recommends that a hybrid does not respond to plant populations, aim for the lower end of the range (i.e. 28000 plants/acre at harvest on deep well-drained soils). Remember, modern corn hybrids compared to older hybrids require higher plant populations for maximum economic silage yields.

(See SILAGE, page 7)

Table 1. Guide to corn silage populations for New York.

Soil Conditions	Planting Rate (90% emergence)	Harvest Population
	---plants/acre---	
Deep well-drained soils with high water-holding capacity	32222	28000-30000
Well to moderately well drained loams to clay loams	30000	26000-28000
Sandy loams or somewhat poorly drained loams to clay loams	27778	24000-26000
Gravelly or shallow loams to clay loams	25556	22000-24000

FORAGE MANAGEMENT

Timing Alfalfa Cutting Using Weather Forecasts

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Ronald E. Pitt, Agricultural and B iological Engineering

It is noon, and the sun is shining. The alfalfa is at 10% bloom, and you need to start cutting to keep on schedule for later harvests. But the weather forecast for tonight and tomorrow gives a 50% chance of rain. Should you start mowing? Does the chance that the crop will be rain-damaged outweigh the need to harvest? What do you do?

In our research, we have been trying to obtain some guidance for the cutting decisions farmers face every growing season. We have been using a technique called decision analysis to calculate the best balance between crop and weather factors in harvesting alfalfa.

In our model, the best cutting decision is one which gives the highest economic return from all cuttings in a year. The decisions are based on (1) the maturity, quality, and yield of alfalfa as dependent on the growing-degree days since the previous cutting, (2) the dollar value of the forage according to its protein, fiber, and energy contents, (3) the cutting number, (4) the extent to which later cuttings may be shifted, (5) the probability of rain, (6) drying rate in the field, (7) the decrease in forage value associated with weather-related harvest losses, and (8) the potential damage to stand life due to Fall cuttings.

There are important factors we cannot yet consider. For example, we do not base the decisions on labor or equipment availability, on the time it takes to mow and harvest the fields, or on other fields or tasks the farmer may have to deal with. Thus, our results can be viewed only as suggestions, not specific recommendations.

First cutting

On the graph are the results of the calculations for first harvest. In this graph the recommended cutting decision is plotted versus time in the season, depending on crop maturity and chance of rain. On the vertical axis is the growing-degree days (GDD) since April 1. GDD is in degrees Celsius relative to 5°C. The patterned regions show the recommendations dependent on the forecast chance of rain. Here we use a combination of the forecasts for the next two 12-hour periods.

For example, on June 1, the model says that if the GDD is less than 350 (bottom line), the forage is too immature to cut. If the GDD is between 350 and 400 (light dots), the forage should be cut as long as the chance of rain is less than 10%.

For more mature forage, the model suggests that a higher risk of rain is acceptable for cutting, because the crop may be exceeding its optimum maturity. If on June 1 the GDD is more than 400, then the model recommends cutting if the chance of rain is less than 30% (heavy dots). The model does not recommend cutting on June 1 if the chance of rain is more than 30%.

The lines separating different rainfall probabilities slope downward with time. The model is trying to avoid delaying later cuttings and therefore is increasingly willing to risk rain damage and accept lower yields.

General trends

We wanted to see how the model's recommendations would work for alfalfa silage harvest in the Central New York area. We took weather data from this region (including the GDD and daily rainfall) for many years and used the computer to simulate the model's recommendations for cutting management. We followed the GDD through each year, plotted the crop growth and quality, and harvested each cutting dependent on the chance of rain for each day, using the model's best decisions. We assumed all cuttings were for silage.

What we found was a little surprising. The model suggested making four harvests of alfalfa in most years, with the interval between harvests being fairly short. The median dates for the four cuttings were June 1, July 8, August 9, and October 8.

Year-to-year variation in the date of first cutting is shown by the horizontal bars at the bottom of the graph. In the simulation, first cutting occurred between May 23 and June 10 in 90% of the years, and between May 29 and June 5 in 50% of the years.

(See WEATHER, page 7)

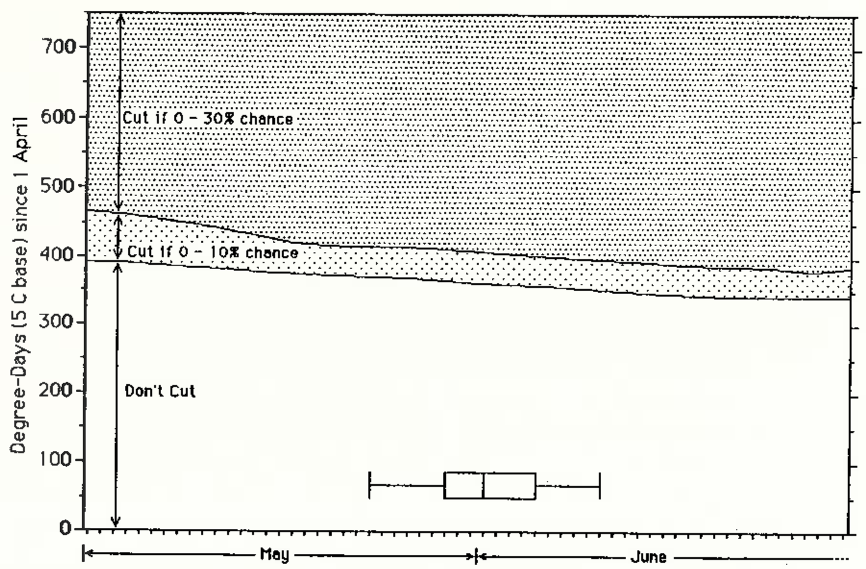
SILAGE, from page 5

Table 2. Corn silage yields of ten hybrids at nine harvest plant populations at Aurora and Mt. Pleasant in 1992.										
	Harvest Plant Density (plants/acre)									
Hybrid	12000	15000	18000	21000	24000	27000	30000	33000	36000	Optimum
	Tons/acre (65% moisture)									
	AURORA									
Pioneer 3733	17.4	18.8	21.1	22.5	23.3	24.8	24.2	25.0	25.4	~27000
Pioneer 3592	17.5	19.3	21.8	22.5	23.9	22.7	24.8	24.7	27.5	~36000
Pioneer 3527	19.9	21.8	22.6	23.8	25.8	27.4	28.1	28.3	26.6	~30000
Pioneer 3429	18.3	20.7	21.7	23.1	25.7	25.2	25.6	28.2	26.0	~33000
Hytest 424	18.2	20.1	21.4	23.5	22.2	24.0	27.0	27.0	27.8	~30000
Hytest 474	17.5	18.8	20.6	23.7	23.7	24.8	25.5	26.0	27.4	~36000
Funks 4385	15.7	18.4	20.0	21.0	21.8	24.2	23.1	25.7	24.9	~33000
Mean	17.8	19.7	21.3	22.9	23.8	24.7	25.5	26.4	26.5	~33000
	MT. PLEASANT									
Pioneer 3861	9.2	10.2	10.7	12.4	12.6	14.2	13.7	14.2	14.9	~27000
Pioneer 3845	9.8	11.0	12.6	12.8	13.9	15.2	15.5	15.4	16.0	~30000
Pioneer 3751	9.6	10.1	11.6	13.2	12.5	14.0	14.0	14.3	13.1	~27000
Mean	9.5	10.4	11.6	12.8	13.0	14.5	14.4	14.8	14.7	~27000

WEATHER, from page 6

The 4 to 5 week regrowth periods during summer recommended by the model mean that the model was cutting at high quality, with somewhat smaller yields. The early third cutting meant that a substantial portion of the year's harvest came from fourth cutting, even with the poor harvest weather in October.

Specific recommendations cannot be obtained from the model. But in general, the model suggests cutting alfalfa for quality at the expense of stand persistence.



Calendar of Events

Jan. 4-7	Northeast Weed Science Society Meeting, Baltimore, MD.
Jan. 12-13	Empire State Soil Fertility Assoc. Meeting, Auburn Holiday Inn.
Jan. 20	Finger Lakes Corn Congress (9-3), Waterloo Holiday Inn.
Jan. 20	New York Corn Growers Assoc. Meeting (4-10), Waterloo Holiday Inn
Jan. 21	Western New York Corn Congress, Sheraton Inn, Batavia, NY.
Feb. 23-25	National Conference on Silage Production, Syracuse Sheraton Inn.
Feb. 25-27	New York Farm Show, NYS Fairgrounds, Syracuse

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