How to Take Advantage of NEWA Weather and Pest Models



Juliet Carroll NYS IPM Program Cornell University

newa.cornell.edu



NEWA is a knowledge network

- Farmers share weather information through the network, providing feedback and guidance
- Data is collected every 15 minutes and tabulated in hourly and daily summaries
- Precip, temp, RH, leaf wetness, solar radiation, wind
- Land grant universities, grower organizations
- Research & extension faculty support development
- 291 weather stations in 7 states



NEWA weather stations

NEWA stations
Cornell University
Airport stations



PA-NEWA

- 23 weather stations
 - 9 farms
 - 1 high school
 - 13 airports



NEWA access

Via the Home Page Via the Station Page Apple Home Page information Blue Menu





NEWA's Home Page

- Save the map location
- NWS query your forecast
- Blue menu on all NEWA pages
 - Weather Data
 - Pest Forecasts
 - Station Pages
 - Crop Management
 - Crop Pages
 - About Weather Stations
- Blue menu: interactive tools



NEWA's Station Pages

- Quick links to tools
- Current results
 - Default biofix dates
- Location-specific information





Welcome to the NEWA Apple Home Page

Apple Scab Disease Risk and Forecasting

Apple Scatt Infection Events and Ascasacce Maturity Seasonal Apple Lina Withman Log (per station)

Fire Blight Disease Risk and Forecasting

Fire Blight Model information about Cougar Blight (Washington State Univ.)

Sooty Blotch and Flyspect Risk and Forecasting

Soory Blotch and Flyspeck Model Semicinal Apple Level Weltherns Log (per station)

Apple Insects

Apple West Frencesy Models and FM Powcasts Degree Day Accomutations Table (Historical dates and degree day periods for see that pestiphenology events)

the following pest phenological models are covered:							
insect	Base T						
Coding Math	50 F						
Oriental Fruit Moth	45 F						
Obliquesanced Leafrolier	43 F						
Plum Curtuiki	50 F						
Spotlied Textiform Lawfrener	43.5						
Apple Mappor	50 F						

Apple Biofix Table

Fest	Base T	Riofiz
Apple Bcab	32 F	00% Green Tap stac's
Fine Dilght	45 F	First Biosiom Open
Sonly Blotch & Physipeck	NA.	Estimate based on OD accumulations consident with Instancel observations
Coding Moth	00 P	First Busished Trap Calch
Oriental Proit Moth	45.F.	Pine Sustained Frap Calch
Conquebanced Leafoner tal summer generation	45.7	Pinst Buildened Trap Cetch
Fism Carcula	10 F.	Peta Fak
Sen Jose Scale	50.7	March Y
Spotled Textilion: Leathney 2nd periestics	43.7	Prist Sustained Trep Catch
Apple Magazz	150 #	Lianuary 1

*Not Approxime

• Explains apple biofix for the **NEWA** tools

NEWA's Apple Page

On-line Resources to Support Monitoring

Sampling Forms and Decision Support for Scouting and Monitoring Arthropod Pest

There are Same are also available in the Corneli Pesi Nanagement Gaidelines for Commercial Tree Find Production to assail with scouting and monitoring for articiped pests. They are more there from the Find IPM web site.

Conversal

Spotted Tentiform Leafminer (STLM)

First bud or early bloom stage scouling for http://www.unit. Petal fail slage accounty for BTLM sap feeting minus (pet/) (further scouring for second generalises (ETLE) perio

Obliquebanded Leafroller (OBLR)

Degits CBLR scouling on July 5 in WMY (5-7 days earlier in E NY or Long Islands or begin approximately 600 degree days Base 43 F after the first moth fight begins, fruit sustaineer moth catches in precommendation. 3% ODLE intestation triminal units

Mites

2.5 miles had breaked working in June (add) Lindes leaf threshold scouling in July (pdf) 7.6 minute load Exceptional eccenting August 1 to 10 (pdf)

Appre MaggoLiAMJ konverg form (peth)

Bourns and Monitoria Summary Flore (pdf)

For Further Information:

Pixel IPSI Part Sheets Information on many meant pests, when, and diseases of loss first

Stat Management Galilebras to Commercial Tree First Production conterns the current year's tree trail management information complexiting Comet University extension faculty, including useful apple scalt and fee bight information and scouling and monitoring forms for anteropoli peals

Scatters. Prod Journal Weekle extension newsetter produced by Art Agnetic. Entomology Dept. Comell University, Geneva, during the growing season. Contact Act Agagito for subscription information.

For more information on tree buil pest management. Foul IPM Resources

Comet Fluit Resources. Intel Ind. Ftd.



Accuracy of the weather data is the tecenoratedly of the cantody of the weather cluber addresseds. HENCK is and recomposition for excention of the result or data callected by motometric in the reduced. If you ration extension or relating weather data, cardial billing and we will cardial the owner of the technicered.

ACIS

Next NEWS 1 Collect Corport Research 1 Collect Weather Direct 1 Advanced at Longh 210000 Frage

81 2000 MYE IPM Program Connet Drawmark 1 Prevented to 102 1 If you makes any problems with our evaluate particular to 102 103



NEWA tools:

IPM forecast models

Plant diseases

Insects

Crop management models



Pest Forecasts

Sta

Apple Diseases Apple Insects Apple Leaf Wetness Events Grape Forecast Models Onion Disease Forecast Onion Disease Log Onion Modified Blight Alert Onion Blight Alert Onion Maggot Potato Late Blight 1st Spray Potato Late Blight Later Sprays Potato Early Blight Late Blight DSS Tomato Diseases, Tomcast Tomato Late Blight Sw Corn Stewart's Wilt Text Sw Corn Stewart's Wilt Map Cabbage Maggot Cucurbit Downy Mildew Alfalfa Weevil Soybean Rust PA PIPE Weed Map Turfgrass Diseases

Pest Forecast menu items for apples

- Apple diseases
 - apple scab
 - fire blight
 - sooty blotch / flyspeck
- Apple insects
 - spotted tentiform leafminer
 - oriental fruit moth
 - codling moth
 - plum curculio
 - obliquebanded leafroller
 - apple maggot
- Apple leaf wetness events



Apple disease tools

Interactive – enter your green tip & bloom dates 5-day future forecasts

- <u>Apple scab</u>
 - ascospore maturity
 - infection events & risk
 - leaf wetness events log
- Sooty blotch & flyspeck
 - infection risk
- <u>Fire blight</u>
 - Cougarblight & **EIP** infection risk
 - streptomycin spray resets risk
 - shoot blight symptoms & infection

Apple Scab Summary for Wading River												
	Past	Past	Current	5	Day Fore	ast Fore	cast Detail	5				
	May 8	May 9	May 10	May 11	May 12	May 13	May 14	May 15				
Ascospore Maturity	35%		08%	75%	\$0%	82%	84%	87%				
Infection Events	No		No									
Days to Symptoms	NA		NA									

	Past	Past	Current	5	Day Foreca	est Fore	icașt Detai	łs
Date	Jun 29	Jun 30	Jul 1	Jul 2	Jul 3	Jul 4	Jul 5	Jul 6
Days since petal fall	38	39	40	41	42	-10	-	-45
Accumulated Leaf Wetness Hours - ALWH	324	343	367	391	410			
Risk Level	Moderate	Moderate	Moderate	Moderate	Moderate			

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Orchard blight history choices

- No fire blight in your neighborhood last year
- Fire blight occurred in your neighborhood last year
- Fire blight is now active in your neighborhood



<u>Fire blight</u>

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Disease risk levels

File Edit View Favorites Tools Help

Disease management information

	Past	Past	Current	Blossom I	Blight 5-D	ay Forecast	t Foreca	st Details
Date	May 26	May 27	May 28	May 29	May 30	May 31	Jun 1	Jun 2
4-day DH	65	54	42	76	286	464	672	787
Risk Level	Low	Low	Low	Low	Caution	High	Extreme	Extreme
Wetness Events								
Rain Amount	0.00	0.00	0.29	0.35	0.05	0.00	0.00	0.15
Rain Prob (%) Night Day			-1-	- -	- -	-1-	-1-	- 12
Dew <table-cell></table-cell>	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Leaf Wetness (hours)	1	6	16					

Scan 4-day degree hour (DH) totals, risk levels, rain, dew, leaf wetness, and note the infection risk level.

Pest Management for Cougarblight Risk Level:

- Low bactericides probably unnecessary, check the 5-day forecast for warm weather (60°F or higher) and wetting events.
- Caution check the 5-day forecast, expect infection if warm weather continues (60°F or higher) and a wetting event occurs.
- High expect infection if there is a wetting event, even a heavy dew.
- Extreme the blossoms should be protected with streptomycin.

Streptomycin Applications: Enough heat units may accumulate to put the newly open flowers at risk for infection if rain or heavy dew then occurs. If you applied streptomycin before all flowers were open, enter the date of the streptomycin application to recalculate fire blight risk predictions.



Streptomycin Applications: Enough heat units may accumulate to put the newly open flowers at risk for infection if rain or heavy dew then occurs. If you applied streptomycin before all flowers were open, enter the date of the streptomycin application to recalculate fire blight risk predictions.

Streptomycin Spray Date: Click to enter date

Streptomycin Applications: Enough heat units may accumulate to put the newly open flowers at risk for infection if rain or heavy dew then occurs. If you applied streptomycin before all flowers were open, enter the date of the streptomycin application to recalculate fire blight risk predictions.

Streptomycin Spray Date: 5/28/2013

Blossom Blight Summary Cougarblight										
	Past	Past	Cur	Current Blossom Blight 5-Day Forecast Norecast Det						
Date	May 26	May 27	May	y 218	May 29	May 30	May 31	Jun 1	Jun 2	
4-day DH	65	54		·	34*	247*	457*	672	787	
Risk Level	Low	Low		- \	Low*	Caution*	High*	Extreme	Extreme	
Wetness Events										
Rain Amount	0.00	0.00	0.:	29	0.35	0.05	0.00	0.00	0.15	
Rain Prob (%) Night Day			-	-	- -	- -	- -	- -	- -	
Dew 김	No	Yes	Y	es	No	Yes	Yes	Yes	Yes	
Leaf Wetness (hours)	1	6	1	б						
NA - data not available	Cou	garblight C	harts	Download	Time: 5/28	/2013 23:00				

* Indicates incomplete accumulation of the 4-day DH total. The DH value may reach "Caution", "High" or "Extreme" levels before spanning the 4-day accumulation cut-off time of Cougarblight. In such cases, you should use the best judgment of actual bloom stages, fire blight orchard history, prior spray

applications, and forecasted weather to make a decision whether to apply a bactericide to protect from blossom infections. For blossom blight protection, the bactericide must be applied to the open flowers. Scan 4-day degree hour (DH) totals, risk levels, rain, dew, leaf wetness, and note the infection risk level.

Pest Management for Cougarblight Risk Level:

- Low bactericides probably unnecessary, check the 5-day forecast for warm weather (60°F or higher) and wetting events.
- Caution check the 5-day forecast, expect infection if warm weather continues (60°F or higher) and a wetting event occurs.
- High expect infection if there is a wetting event, even a heavy dew.
- Extreme the blossoms should be protected with streptomycin.

<u>Fire blight</u>

-Streptomycin spray date Risk re-calculates



Monitoring for Shoot Blight Symptoms: To effectively limit shoot blight damage, strikes should be pruned throughout the terminal growth period. If you have a trauma event such as windy thunderstorm during bloom or a summer hailstorm, begin checking for symptoms 90-100 degree day base 55°F after the event. Enter the date of the infection/weather event: Infection Event Date: 06/02/2013 <u>Fire blight</u> If you are seeing fire blight symptoms and want to determine approximately when the infection event occurred, enter the date of symptoms: -Shoot blight monitoring Symptom Occurrence Date: Click to enter date -Shoot blight event Shoot Blight Infection for Water Mill (North) Fire blight symptoms on infected shoots show up when about 90 to 100 degree days base 55F have accumulated after an infection event. Infection event: Monitoring for Shoot Blight Symptoms: To effectively limit shoot blight damage, strikes should be June 2 pruned throughout the terminal growth period. If you have a trauma event such as windy thunderstorm during bloom or a summer hailstorm, begin checking for symptoms 90-100 degree day base 55°F after the Degree Days (base 55 BE) 6/2 through 6/12: event. Enter the date of the infection/weather event: 97 Infection Event Date: Check for symptoms starting on June 12 If you are seeing fire blight symptoms and want to determine approximately when the infection event occurred, enter the date of symptoms: Symptom Occurrence Date: 06/17/2013 Error processing form; enter Infection Event Date Shoot Blight Infection for Water Mill (North) Fire blight symptoms on infected shoots show up when about 90 to 100 degree days base 55F have accumulated after an infection event Symptom Occurrence Date: June 17 **Approximate Infection Date:** June 9 Degree Days (base 55 BE) 6/9 through 6/17: 92



Apple insect tools

Interactive - enter your petal fall & trap catch dates. Spray windows are predicted for:

- <u>Codling moth</u>
- <u>Oriental fruit moth</u>
- <u>Obliquebanded leafroller</u>
- Spotted tentiform leafminer

When to end sprays is predicted for

<u>Plum curculio</u>

When to hang traps is predicted for

<u>Apple maggot</u>





Apple insects			Codling moth							
			Pest management							
NEWA Apple Insect N	Aodels		Pest status							
Select a pest: Codling Moth	Map Results More info		-Pest phenology							
Weather Station:	Codling Moth R	esults for Biglerville (Holla	-Pest stage							
Biglerville (Hollabaugh), PA	First Trap									
Accumulation End Date: 05/22/2014	First Trap Catch date above is estimated ba for blocks of interest and the model will c	sed on degree day accumulations or alculate the protection period after firs	user input. Enter the actual date st trap catch more accurately.							
Calculate	Accumulated degree days (base 50°F) first trap catch through 5/22/2014: 125 (0 days missing)									
	Pest stage: Moths flying & first eggs laid									
	The pest stag	e above is estimated. Select the actua	al							
	stage and the n									
	Pest Status	Pest Mana	gement							
	First eggs are laid at about 50 DD and	Apply insecticides that need to b	e present before egg laying							
	the first eggs usually hatch after about 220 DD.	at about 50-75 DD. Apply insect laying period at 100-200 DD. Pe	sticide information							
	Disclaimer: These are theoretical pre development or disease risk use the location. These results should not be presence, and disease occurrence dete	dictions and forecasts. The theoreti weather data collected (or forecasted substituted for actual observations of rmined through scouting or insect phe	ical models predicting pest d) from the weather station of plant growth stage, pest eromone traps.							
	NEWA	Northeast Regional Climate Center								
		<u>newa.co</u>								

Select a pest: Oriental Fruit Moth	Map Results More info										
Weather Station:	Oriental Fruit Moth Results for Biglerville (Hollabaugh)										
Biglerville (Hollabaugh), PA	oriental Franchista Results for Digits (inc (itomasaugh)										
	First Trap Catch: 5/6/2014										
Accumulation End Date:	First Trap Catch date above is estimated b	ased on degree day accumulations or user input. Enter the actual date									
05/22/2014	for blocks of interest and the model will calculate the protection period after first trap catch more accurately. Accumulated degree days (base 45°F) first trap catch through 5/22/2014: 308 (0 days missing) Pest stage: Moths flying & 50% of eggs have hatched										
Calculate											
	The pest stage above is estimated. Select the actual										
	stage and the	model will recalculate recommendations.									
	Pest Status	Pest Management									
	Moths are still flying and usually about 50-60% of OFM eggs from the first generation have hatched.	Check the time elapsed after petal fall to determine the exact timing of this second spray. This second spray should be applied at about 10-14 days after petal fall. This second spray against the first generation of OFM is particularly important in high-pressure orchards (past history of OFM fruit damage or high pheromone traps catches, (>10/ trap/ week) to control the remainder of hatching larvae. If this spray is applied at									
Driental fruit moth		the normal time of a first cover spray (10-14 days after petal fall) it will also control early hatching CM larvae from the									
Dest management		first flight of adults. Also, Plum curculio may still be active									
est management		at this interval after PF in cool, rainy seasons. Pesticide									
'est status		information									
Pest phenology	Disclaimer: These are theoretical p	edictions and forecasts. The theoretical models predicting pest									
Doct stage		~									

Crop management tools

Crop Management

Apple Irrigation Apple Carbohydrate Thinning Activity Planner Growing Degree Days Degree Day Forecasts - NY Degree Day Forecasts - MA Drought Forecast Evapotranspiration Map Apple Evapotranspiration US Drought Monitor Drought Index Critical Temperatures NY Crop Weather Daily Weather

Crop Management menu items for apple

- Apple irrigation
- Apple evapotranspiration
- Apple carbohydrate thinning







Weather tools

Climate and weather data Hourly readings Daily summaries Degree days



Using weather knowledge

- Daily max & min temperature
- Growing degree days
- Track winter temperature
 - daily summaries
 - hourly data
- Amount of rain
- Hours of leaf wetness

NEWA collects precipitation temperature leaf wetness relative humidity solar radiation wind speed wind direction

Optional sensors soil temperature soil moisture



Weather products

- 11 degree day calculations select Degree Days
 - 4C, 32, 40, 43, 45, 48, 50, 86/50, 55, 47.14, 14.3C
 - From January 1, March 1, April 1, and May 1
- Hourly observations tabulated select Hourly Data
- Daily observations tabulated select Daily Summary
 - average, max & min temperature (F)
 - leaf wetness (number of hours wet)
 - total rain (accumulated inches)
 - hours above 90% relative humidity
 - average wind speed (mph)
 - solar radiation (langleys)



Degree day tool

Degree Days

NEWA Degree Day Data Page





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Weather Data



Pest

Daily Summary

	Date	Date Avg Temp (F)		Min Temp (F)	LW Hours	To Rain
				Piney Mour	ntain - D	aily D
	1/1/2015	29.3	38.5	18.3	0	0.
	1/2/2015	32.2	39.8	26.1	0	0.
	1/3/2015	29.8	33.3	24.4	15	0.4
	1/4/2015	40.8	52.5	32.7	18	0.4
	1/5/2015	27.3	38.8	16.8	0	0.
	1/6/2015	16.9	22.5	13.4	0	0.0
	1/7/2015	13.7	18.0	5.7	0	0.0
	1/8/2015	8.3	13.7	1.6	0	0.
	1/9/2015	20.4	27.4	13.4	0	0.0
	1/10/2015	10.4	16.5	4.4	0	0.
	1/11/2015	20.8	31.4	5.5	2	0.
	1/12/2015	33.2	39.3	29.3	21	0.0
8						222222

Piney Mountain, PA Hourly and daily data showing the cold snap on January 8th.

Hourly Data

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All Weather Data

NEWA Weather Data Page

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	Date/Time	Temp (F)	LW (minutes)	Rain (inches)	RH %	Dewpoint (F)	Wind Spd (mph)	Wind Dir (degrees)	Solar Rad (langley)	Est LW (minutes)	^
1	01/08/2015 13:00	11.5	0	0.00	54	-2	4.4	183	20	0	
	01/08/2015 12:00	10.8	0	0.00	56	-2	3.6	184	25	0	
	01/08/2015 11:00	9.1	0	0.00	55	-4	4.3	200	35	0	
	01/08/2015 10:00	1.4	0	0.00	57	-5	4.5	200	25	0	
	01/08/2015 09:00	5.7	0	0.00	60	-5	2.2	176	13	0	
	01/08/2015 08:00	1.9	0	0.00	67	-6	1.3	173	1	0	
	01/08/2015 07:00	1.6	0	0.00	67	-7	1.4	183	0	0	
	01/08/2015 06:00	2.7	0	0.00	65	-6	2.7	179	0	0	
	01/08/2015 05:00	3.5	0	0.00	66	-5	2.6	177	0	0	
	01/08/2015 04:00	3.7	0	0.00	65	-5	2.9	173	0	0	
	01/08/2015 03:00	3.9	0	0.00	64	-6	2.7	183	0	0	
	01/08/2015 02:00	4.0	0	0.00	66	-5	2.9	204	0	0	
	01/08/2015 01:00	4.5	0	0.00	68	-4	3.3	208	0	0	
	01/08/2015 00:00	5.6	0	0.00	67	-3	4.2	218	0	0	
	01/07/2015 23:00	5.7	0	0.00	56	-7	6.2	245	0	0	
	01/07/2015 22:00	6.5	0	0.00	50	-8	9.0	251	0	0	
	01/07/2015 21:00	7.4	0	0.00	60	-4	8.6	245	0	0	
	01/07/2015 20:00	8.6	0	0.00	81	4	5.3	238	0	0	
	01/07/2015 19:00	9.4	0	0.00	82	5	4.4	246	0	0	
	01/07/2015 18:00	9.9	0	0.00	82	6	4.8	243	0	0	
	01/07/2015 17:00	11.2	0	0.00	75	5	6.9	248	1	0	
	01/07/2015 16:00	13.7	0	0.00	5 9	2	6.4	236	11	0	Ŧ
	•	_			_	111				•	

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Linkage

PA PIPE weed map Pesticide selection tools from the Pesticide Management Education Program (PMEP) Tree Fruit Decision Support System Late Blight Decision Support System Stewart's wilt of sweet corn cucurbit downy mildew ipmPIPE soybean rust Forecast Center Fore Cast for the Turf Industry



Future

Mobile website app's Cloud technology – user inputs, myNEWA, eNEWA Google analytics User surveys New tools – chilling hours, degree day calculators, alarms New audiences – green industry, field crops, animal agriculture Virtual weather stations



Anecdotes and outcomes

- In a 2007 survey, NEWA users reported they can save, on average, \$19,500 per year in spray costs and prevent, on average, \$264,000 per year in crop loss as a direct result of using NEWA pest forecast models.
- the orchard largely "scab-free" for the first time in several years, the manager depended heavily on NEWA and could see significant differences between their onsite station and the one they had been using.
- use the NEWA site almost every day early in the season.



Get a NEWA Weather Station

RainWise Inc. 🖄

Professional Weather Instruments

Want a NEWA weather station?

Connect to NEWA in NY, MA, VT, PA, and CT with a RainWise AgroMET & IP100 Weather Station package for \$1.890

NEWA covers New York, Massachusetts, Vermont, Pennsylvania, and Connecticut. NEWA makes it possible for farmers, consultants, processors, educators and faculty to share resources for weather data collection, analysis, distribution, and archiving,

NEWA RainWise MKIII stations measure:

- Temperature Dew Point Temperature Relative Humidity Rainfall
- Leaf Wetness
- Solar Radiation
- Wind Speed Wind Direction



The weather station price includes

- 2-year warranty
- Software
- Cables
- Solar panel
- Ethernet interface requires high speed internet (DSL, cable, etc.)
- Non-volatile RAM prevents data loss during power outage
- 8 integrated sensors temperature, dew point temperature (relative humidity), tipping bucket rain gauge, leaf wetness, solar radiation, anemometer (wind speed), wind direction, and barometric pressure.

Get the AgroMET (MKIII SP1-LR) with IP-100 Ethernet interface, cost \$1,890. 2.4 GHz and up to 1 mile (line of sight) transmission. The Ethernet IP-100 interface requires high speed internet. Weather data is sent to RainwiseNet and immediately transferred to NEWA's server. Prices are based on shipping and billing within the contiguous United States. Current delivery is 4-6 weeks.

Note: Order the monomount, mounting bracket, separately, approximately \$50.

Before placing your order, contact your state's NEWA manager:

In Connecticut

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About Weather Stations

Get a Weather Station Placement Guidelines Maintenance Guidelines Troubleshooting Guide



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Land grant universities

- Cornell University NY
- University of Vermont VT
- University of Massachusetts MA
- Rutgers, The State University NJ
- Pennsylvania State University PA
- University of Connecticut CT















Thank you!

<u>Funding partners</u> – USDA, EIPM, CAR, CSREES, NIFA, LISA, Hatch, Smith Lever, NYWGF, NYFVI, LE Grape Processors, VT Tree Fruit Growers, PA Tree Fruit Growers, NY Apple Research & Development Program, NE IPM, NE SARE, NECRME, NRCS, NYS IPM Program.



Try NEWA, it's free! Visit <u>newa.cornell.edu</u> anytime.

Contact NEWA in Pennsylvania

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Questions? Suggestions?

contact me:

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