Insects 2021

Drought, temperature and some new worries

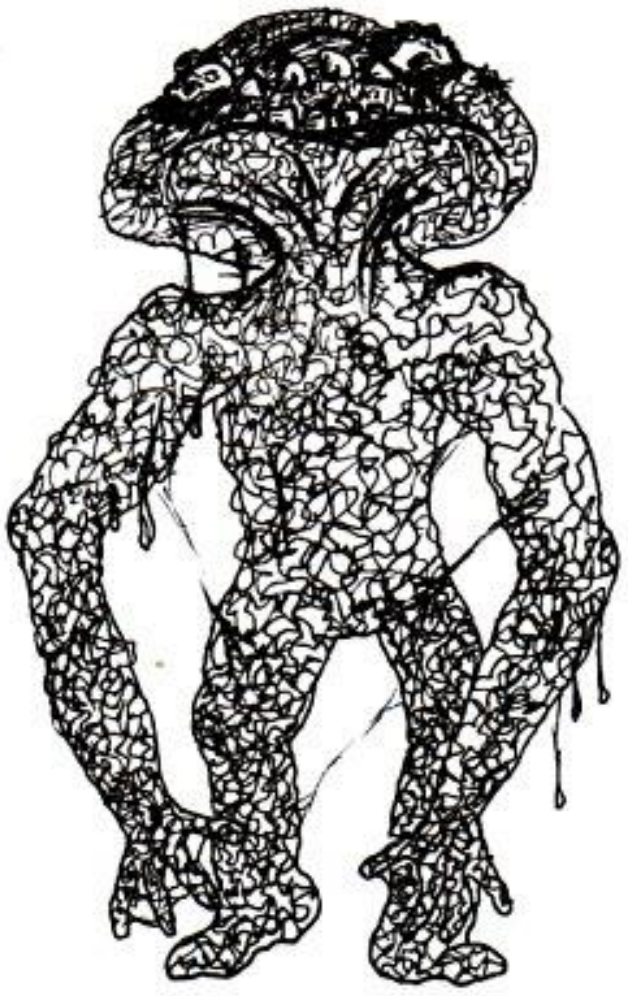
Ian MacRae
Dept of Entomology
University Of Minnesota

Research Update for Ag. Professionals
Crookston, Jan 13, 2022

University of Minnesota
Driven to Discover[SM]

The fungus among us

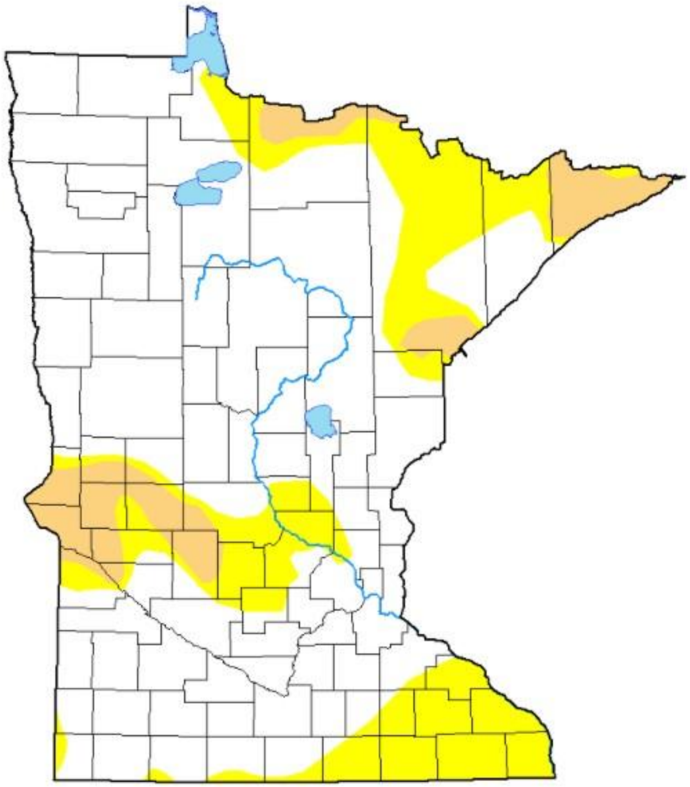
- Many insect populations in MN partly regulated by entomopathogenic fungi (infect and kill insects)
  - Younger insects most susceptible
- BUT fungi need right weather conditions (cool & wet)
  - Hot, dry springs/summers favor development of insect populations; no fungi, less early season control, better establishment and growth of insect populations
- Aphids, grasshoppers, several others
  - Without early mortality (mostly from entomopathogenic fungi) these species will expand



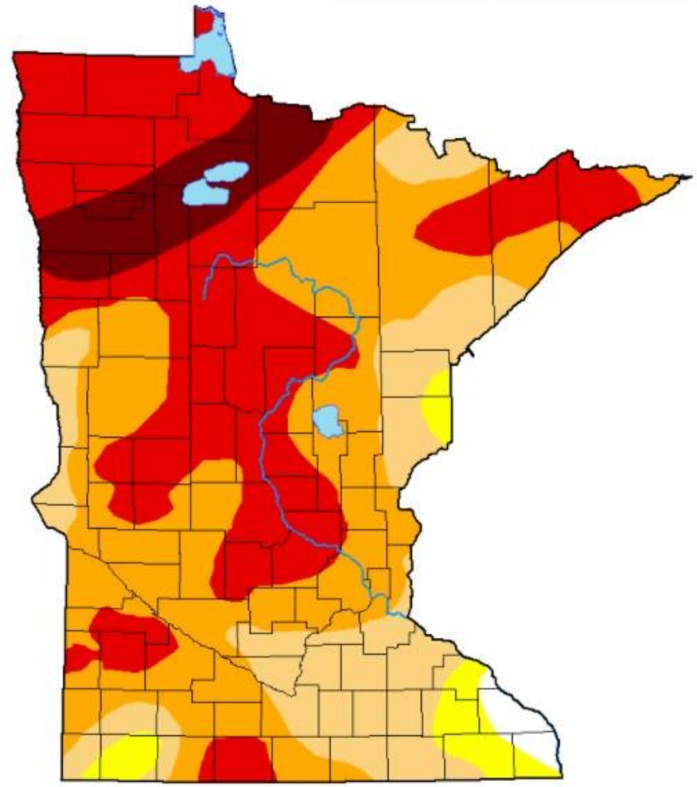
Drought Classification

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

June	Avg Temp	Avg Max Temp
2020	67.9	80.1
2021	69.3	90.1



2020



2021

Temp is in the driver seat

- Insects are cold-blooded, so all physiological processes dependent on ambient temp, so affects generation time & population growth in insects
  - Higher temp = faster digestion = more feeding = faster growth & maturity = earlier mating = more offspring through the same year

Regulation

- EPA is revoking all tolerances for chlorpyrifos
- This action stops the use of chlorpyrifos on all food and feed, taking effect Feb. 28, 2022
  - *Do not use chlorpyrifos containing products for crop pests*
- Non-agricultural uses are unaffected
- Disposal options: See MDA's Waste Pesticide Collection Program

Soybean aphid

Damage boundary

Plant Health Progress ♦ 2016 ♦ 17:263-269 http://dx.doi.org/10.1094/PHP-RV-16-0061

Plant Health Review

Biology and Economics of Recommendations for Insecticide-Based Management of Soybean Aphid

Robert L. Koch, Department of Entomology, University of Minnesota, Saint Paul 55108; **Bruce D. Potter,** Southwest Research and Outreach Center, University of Minnesota, Lamberton 56152; **Phillip A. Glogoza,** University of Minnesota Extension, Moorhead 56560; **Erin W. Hodgson,** Department of Entomology, Iowa State University, Ames 50011; **Christian H. Krupke,** Department of Entomology, Purdue University, West Lafayette, IN 47907; **John F. Tooker,** Department of Entomology, Penn State University, University Park 16802; **Christina D. DiFonzo,** Department of Entomology, Michigan State University, East Lansing 48824; **Andrew P. Michel** and **Kelley J. Tilmon,** Department of Entomology, The Ohio State University, Wooster 44691; **Travis J. Prochaska,** North Central Research Extension Center, North Dakota State University Extension, Minot 58701; **Janet J. Knodel,** Department of Plant Pathology, North Dakota State University, Fargo 58102; **Robert J. Wright,** Department of Entomology, University of Nebraska Lincoln 68583; **Thomas E. Hunt,** Department of Entomology, University of Nebraska-Lincoln, Concord 68728; **Bryan Jensen,** Integrated Pest Management, University of Wisconsin, Madison 53706; **Adam J. Varenhorst,** Agronomy, Horticulture, and Plant Science Department, South Dakota State University, Brookings 57006; **Brian P. McComack,** Department of Entomology, Kansas State University, Manhattan 66506; **Kelly A. Estes** and **Joseph L. Spencer,** Illinois Natural History Survey, University of Illinois, Champaign 61820

Accepted for publication 13 December 2016

ABSTRACT

Soybean aphid, *Aphis glycines* Matsumura, remains the key insect pest of soybean, *Glycine max* (L.) Merrill, in the north-central United States. Management of this pest has relied primarily on scouting and application of foliar insecticides based on an economic threshold (ET) of 250 aphids per plant. This review explains why this ET remains valid for soybean aphid management, despite changes in crop value and input costs. In particular, we review how soybean aphid impacts soybean yield, the role of biology and economics in recommendations for soybean aphid management, and the short- and long-term consequences of inappropriately timed insecticide applications.

INTRODUCTION

The soybean aphid, *Aphis glycines* Matsumura (Fig. 1), was first detected in the United States in 2000. Prior to the invasion by this pest, insecticide applications to soybean, *Glycine max* (L.) Merrill, in the north-central United States were rare (USDA-NASS 1999), but during the last region-wide outbreak in 2005, millions of acres were treated for soybean aphid (USDA-NASS 2005). Although outbreaks are less common in some states since the mid-2000s (Bahlai et al. 2015), soybean aphid is still the key insect pest of soybean in this region (Hurley and Mitchell 2014). In North America, a tremendous amount of research and observational data have been generated on soybean aphid since its initial detection, and tools and knowledge now exist for effective management of this pest (Hodgson et al. 2012; Ragsdale et al. 2004; Ragsdale et al. 2011; Tilmon et al. 2011).

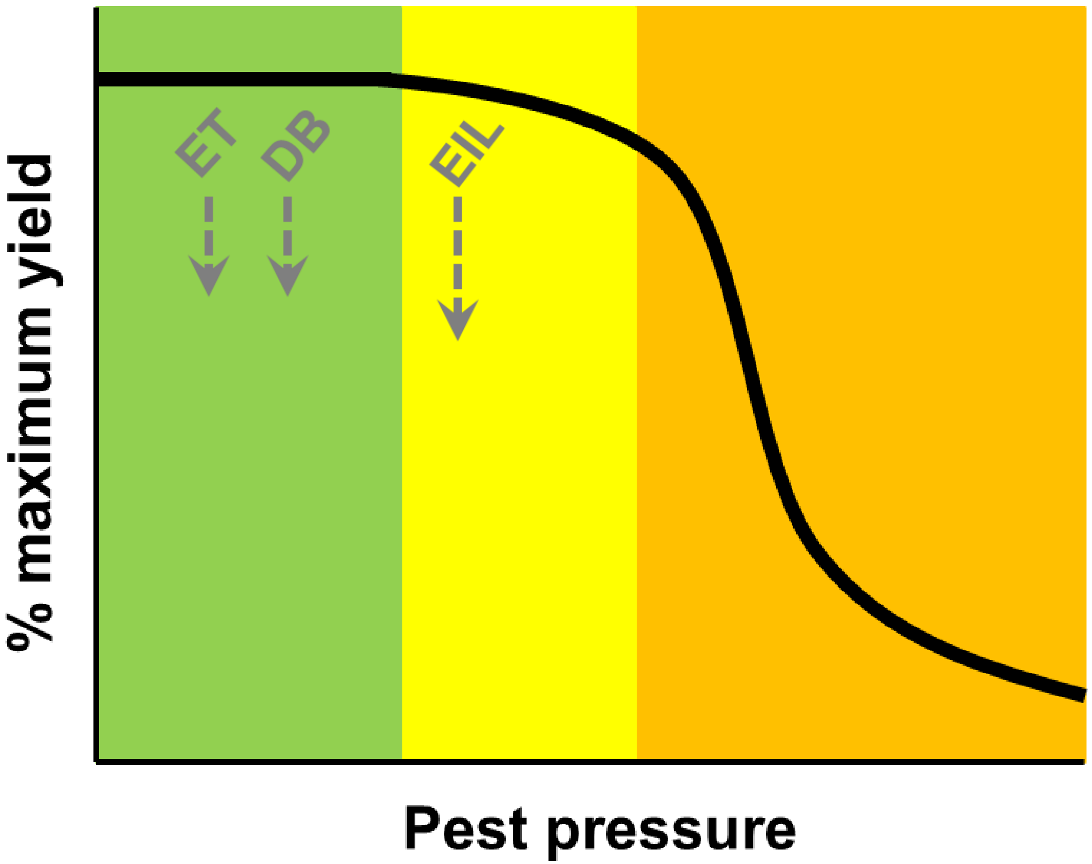
Soybean aphid management recommendations, including the economic threshold (Ragsdale et al. 2007), developed by land-grant universities are based on replicated research evaluated by other agricultural scientists (i.e., peer-reviewed) before publication and dissemination. These recommendations take into consideration pest biology as well as effectiveness and short- and long-term economic and environmental implications of management tactics. Economic conditions (e.g., crop and input prices) have changed since publication of soybean aphid management recommendations (Ragsdale et al. 2007; Tilmon et al. 2011). Here we present a research-based review updating what is known about soybean aphid, including the potential effects on yield and cost-effective management for this pest.

FIGURE 1

Soybean aphid colony on soybean (photo by A. Varenhorst).

Corresponding author: Robert L. Koch. Email: koch0125@umn.edu.

doi:10.1094/PHP-RV-16-0061



Deciding when to spray

Plant Health Progress ♦ 2016 ♦ 17:265-269

http://dx.doi.org/10.1094/PHP-RV-16-0061

Plant Health Review

Biology and Economics of Recommendations for Insecticide-Based Management of Soybean Aphid

Robert L. Koch, Department of Entomology, University of Minnesota, Saint Paul 55108; **Bruce D. Potter,** Southwest Research and Outreach Center, University of Minnesota, Lamberton 56152; **Phillip A. Glogoza,** University of Minnesota Extension, Moorhead 56560; **Erin W. Hodgson,** Department of Entomology, Iowa State University, Ames 50011; **Christian H. Krupke,** Department of Entomology, Purdue University, West Lafayette, IN 47907; **John F. Tooker,** Department of Entomology, Penn State University, University Park 16802; **Christina D. DiFonzo,** Department of Entomology, Michigan State University, East Lansing 48824; **Andrew P. Michel** and **Kelley J. Tilmon,** Department of Entomology, The Ohio State University, Wooster 44691; **Travis J. Prochaska,** North Central Research Extension Center, North Dakota State University Extension, Minot 58701; **Janet J. Knodel,** Department of Plant Pathology, North Dakota State University, Fargo 58102; **Robert J. Wright,** Department of Entomology, University of Nebraska-Lincoln 68583; **Thomas E. Hunt,** Department of Entomology, University of Nebraska-Lincoln, Concord 68728; **Bryan Jensen,** Integrated Pest Management, University of Wisconsin, Madison 53706; **Adam J. Varenhorst,** Agronomy, Horticulture, and Plant Science Department, South Dakota State University, Brookings 57006; **Brian P. McCornack,** Department of Entomology, Kansas State University, Manhattan 66506; **Kelly A. Estes** and **Joseph L. Spencer,** Illinois Natural History Survey, University of Illinois, Champaign 61820

Accepted for publication 13 December 2016

ABSTRACT

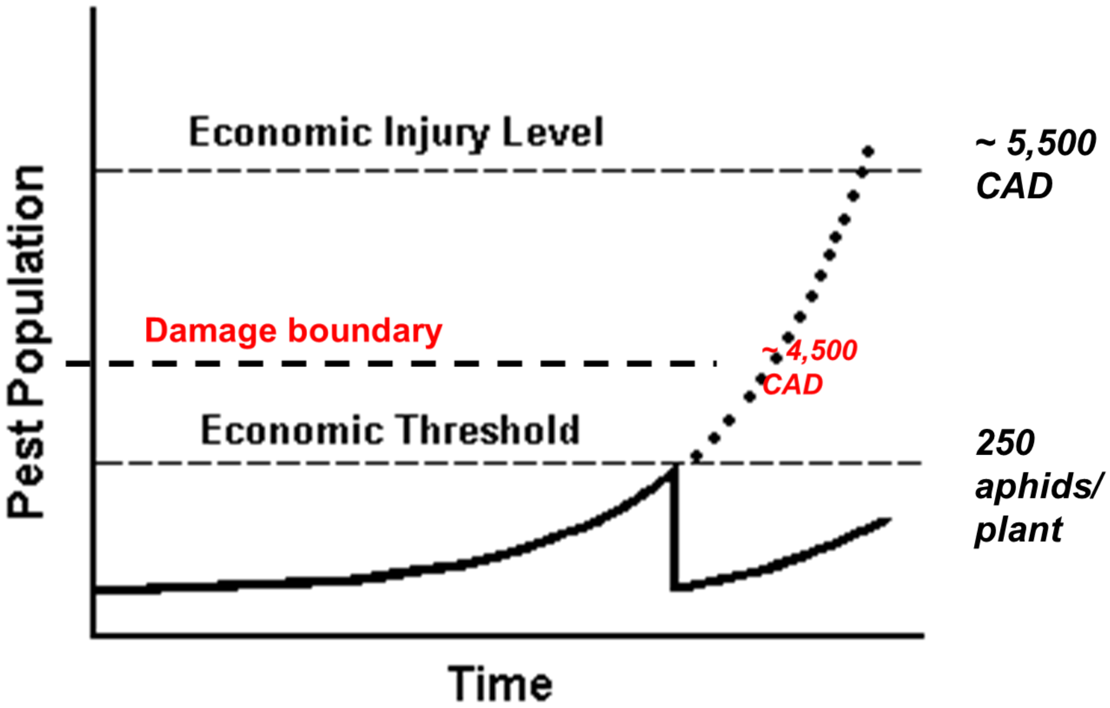
Soybean aphid, *Aphis glycines* Matsumura, remains the key insect pest of soybean, *Glycine max* (L.) Merrill, in the north-central United States. Management of this pest has relied primarily on scouting and application of foliar insecticides based on an economic threshold (ET) of 250 aphids per plant. This review explains why this ET remains valid for soybean aphid management, despite changes in crop value and input costs. In particular, we review how soybean aphid impacts soybean yield, the role of biology and economics in recommendations for soybean aphid management, and the short- and long-term consequences of inappropriately timed insecticide applications.

INTRODUCTION

The soybean aphid, *Aphis glycines* Matsumura (Fig. 1), was first detected in the United States in 2000. Prior to the invasion by this pest, insecticide applications to soybean, *Glycine max* (L.) Merrill, in the north-central United States were rare (USDA-NASS 1999), ...

... present a research-based review updating what is known about soybean aphid, including the potential effects on yield and cost-effective management for this pest.

FIGURE 1
Soybean aphid colony on soybean (photo by A. Varenhorst).



Foliar insecticides for soybean aphid

Group 1 **AChE inhibitors**		**Group 3** **Na channel modulators**		**Group 4** **nAChR modulator**	
1A	methomyl	3A	alpha-cypermethrin	4A	acetamiprid
			beta-cyflufthrin		chlothianadin
1B	acephate		bifenthrin		imidacloprid
	~~chlorpyrifos~~		cyfluthrin		thiamethoxam
	dimethoate		deltamethrin	4C	sulfoxaflor
			esfenvalerate	4D	flupyradifurone
			gamma-cyhalothrin		
			lambda-cyhalothrin	**Group 9** **Chordotonal organ modulator**	
			permethrin		
			zeta-cypermethrin	9D	afidopyropen

Transform

Sivanto

Sefina, Versys
Inscalis

Caterpillars

- Defoliators
  - Thistle Caterpillar
  - Green Cloverworm
  - Soybean looper

Management of defoliators

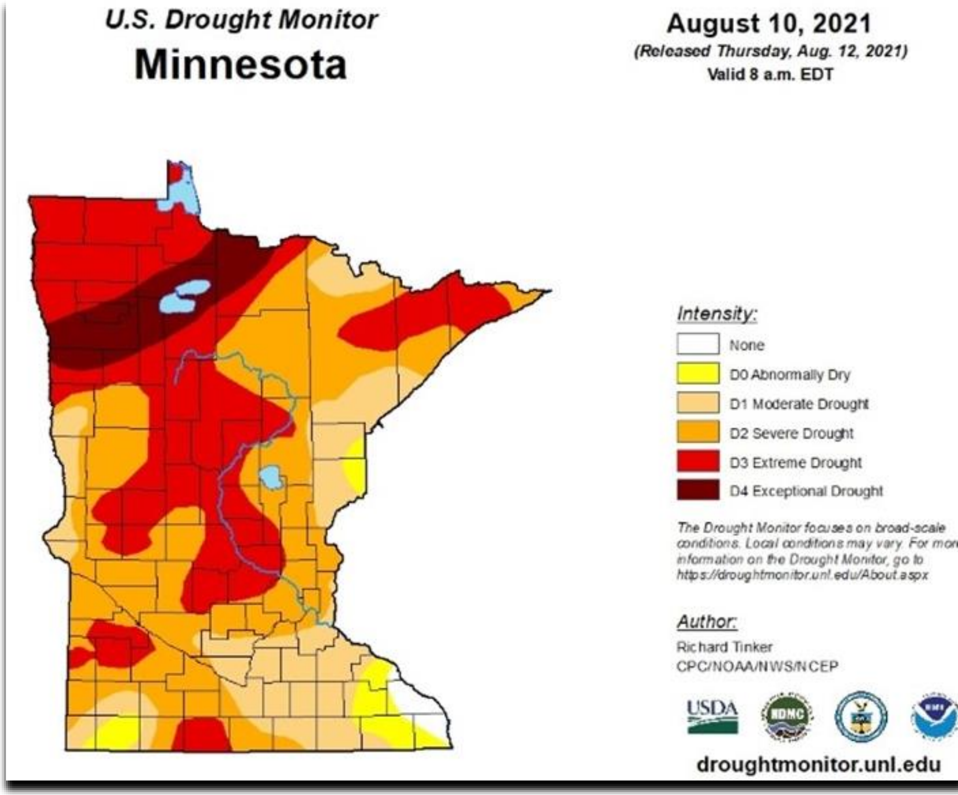
- Consider all defoliators
- Estimate % defoliation over entire canopy
  - Multiple locations in field
  - Top, middle & bottom leaves
- Threshold
  - 30% pre-bloom
  - 20% bloom to pod fill
  - Pest/s still present

Twospotted spider mites




Outbreaks associated with drought

- Accelerates movement to soybean from perennial vegetation
- Improves food quality of soybean (for mites)
- Increases mite reproduction
- Suppresses a fungus that attacks mites



Miticides for soybean

Group	Active	Product	Stages
~~1B~~	~~Chlorpyrifos~~	~~Lorsban, etc.~~	~~Adults & Immatures~~
1B	Dimethoate	Dimethoate, etc.	Adults & Immatures
3A	Bifenthrin	Bifenture, Brigade, Tundra, etc.	Adults & Immatures
6	Abamectin	Agri-Mek	Eggs
10B	Etoxazol	Zeal	Eggs & Immatures

Aphids in small grains

- Generally, aphid thresholds in wheat are ~12-15 aphids/head until after heading (prior to heading, yield loss occurs ~300 CAD)
- As the grain matures, the plant becomes less suitable as a host and less susceptible to damage, nutrients are shuttled from stems and leaves to the heads, and the number of CAD required to cause yield los increases significantly

Aphids in small grains

- High temperatures have been shown to impact yield in small grains
  - Increase in maturation rate, decrease grain size
  - Can decrease natural enemies but increase pest numbers
- In 2021 late season English grain aphid
  - EGA reproduction increases on ear with grain stage until late milk when reproduction drops and mortality increases

Aphid thresholds in small grains

Greatest risk of loss is from vegetative through heading, economic loss can occur up to early dough, but after this, loss is unlikely. Yield loss in small grains occurs @ 300 CAD.

Stage	Threshold
Vegetative thru head emergence	4 / stem
Complete heading thru end of anthesis	4-7 aphids / stem
End of anthesis thru medium milk	8-12 aphids / stem
Medium milk thru early dough	>12 aphids / stem

From recent work from Dr. Jan Knodel's work @ NDSU – expands on original threshold and provides more detail through the plant's developmental cycle

Foliar insecticides for wheat

Group	Active	Product (examples)*	Insects
1B - Organochlorines	Dimethoate	Dimethoate, etc.	Aphids, grasshoppers
Group 2A – Organophosphates	Malathion	Malathion5, Chminova 57EC, Fyfanon ULV AG	Aphids, armyworms, cereal leaf beetle, grasshoppers, Hessian fly, wheat midge
3A – Synthetic Pyrethroids	Alpha (& Zeta)-Cypermethrin, Beta-Cyfluthrin, Bifenthrin,	Fastac, Mustamg Maxx, Baythjroid, Brigade,	Aphids, armyworms, cereal leaf beetles, cutworms, grasshoppers, Hessian fly, wheat midge, wheat stem maggot
Group 4C - Sulfoxamines	Sulfoxaflor	Transform	Aphids
Group 4D - Butenolides	flupyradifurone	Sivanto	Aphids
Group 5 - Spinosyns	Spinetoram, Spinosad	Radiant, Blackhawk, Entrust	
Group 28 – Anthranilic Diamides	Chloantraniliprole	Prevathon	Armyworms, grasshoppers

**** Examples only, not a specific recommendation over other products with the same active ingredient***

University of Minnesota
Driven to Discover℠

Grasshoppers: the classic drought insect

Twostriped grasshopper
***Melanoplus bivitattus* (Say)**

- Adults large size (1 1/4 to 2-inch-long)
- Tall and lush grasses and forbs
- Mixed diet with grasses and cereals but forbs improve nymph nutrition
- Eggs concentrated in roadsides and crop borders
- Can migrate
- Early hatching species (warm rains)

Migratory grasshopper
Melanoplus sanguinipes (Fabricus)

- Adults medium sized (~ 1 inch long)
- Grasslands, small grains, alfalfa
- Mixed diet with preference or forbs
- Capable of very rapid population increases
- Adults (sometimes nymphs) can migrate
- Can be one of the first species to increase during outbreak

Clearwinged grasshopper
Camnula pellucida (Scudder)

- Adults are medium sized (~ ¾ inch long)
- Grasslands
- Diet is mainly grasses
- Can migrate
- Adults aggregate on egg beds

Redlegged grasshopper
Melanoplus femurrubrum (*DeGeer*)

- Adults are medium sized (3/4 to 1 inch long)
- Tall vegetation, moist weedy areas
- Forbs and some grasses
- Strong fliers ~40 feet but short distance dispersal
- Very widely distributed
- Will lay eggs in alfalfa

Differential grasshopper
***Melanoplus differentialis* (Thomas)**

- Adults are large sized (1 ½ to 2 inch long)
- Tall herbaceous vegetation in wet areas -> roadsides and crop borders
- Mixed diet of mainly forbs for nymphs
- Short distance dispersal toward food
- Adults often found in corn
- Eggs laid beneath sod or dense vegetation (often in soybean)
- A late hatching species

Scouting and thresholds

Action thresholds for grasshoppers

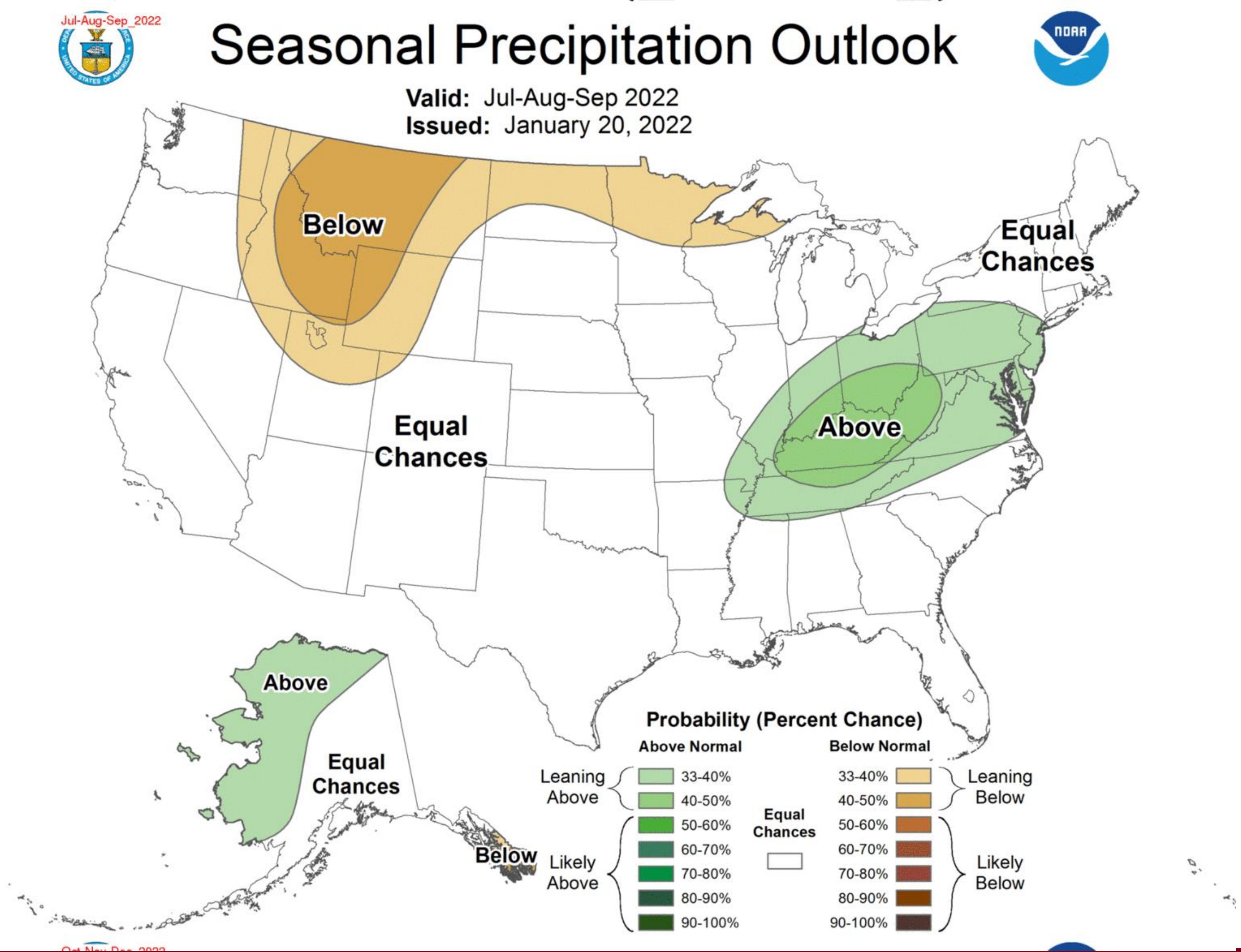
	Nymphs/yd^2		Adults/yd^2	
Rating	**Margin**	**Field**	**Margin**	**Field**
Light	25-35	15-25	10-20	3-7
Threatening	50-75	30-45	21-40	8-14
Severe	100-150	60-90	41-80	15-28
Very Severe	200+	120+	80+	29+

- Grasshopper populations and thresholds based on numbers per square yard
- Estimate numbers emerging in 20 x 1 sq. ft. areas
- Calculate average and multiply by 9 to obtain number/square yard
- *Alternative:* Four 180-degree sweeps with a 15-inch sweep net ~ 1 yd^2
- Treat at threatening level

Management tips

- Treat crop borders and "grasshopper production" areas if nymph numbers high early.
- As nymphs are larger enlarge treatment areas within cropping systems
- When nymph numbers are severe treat to prevent them from entering crops.

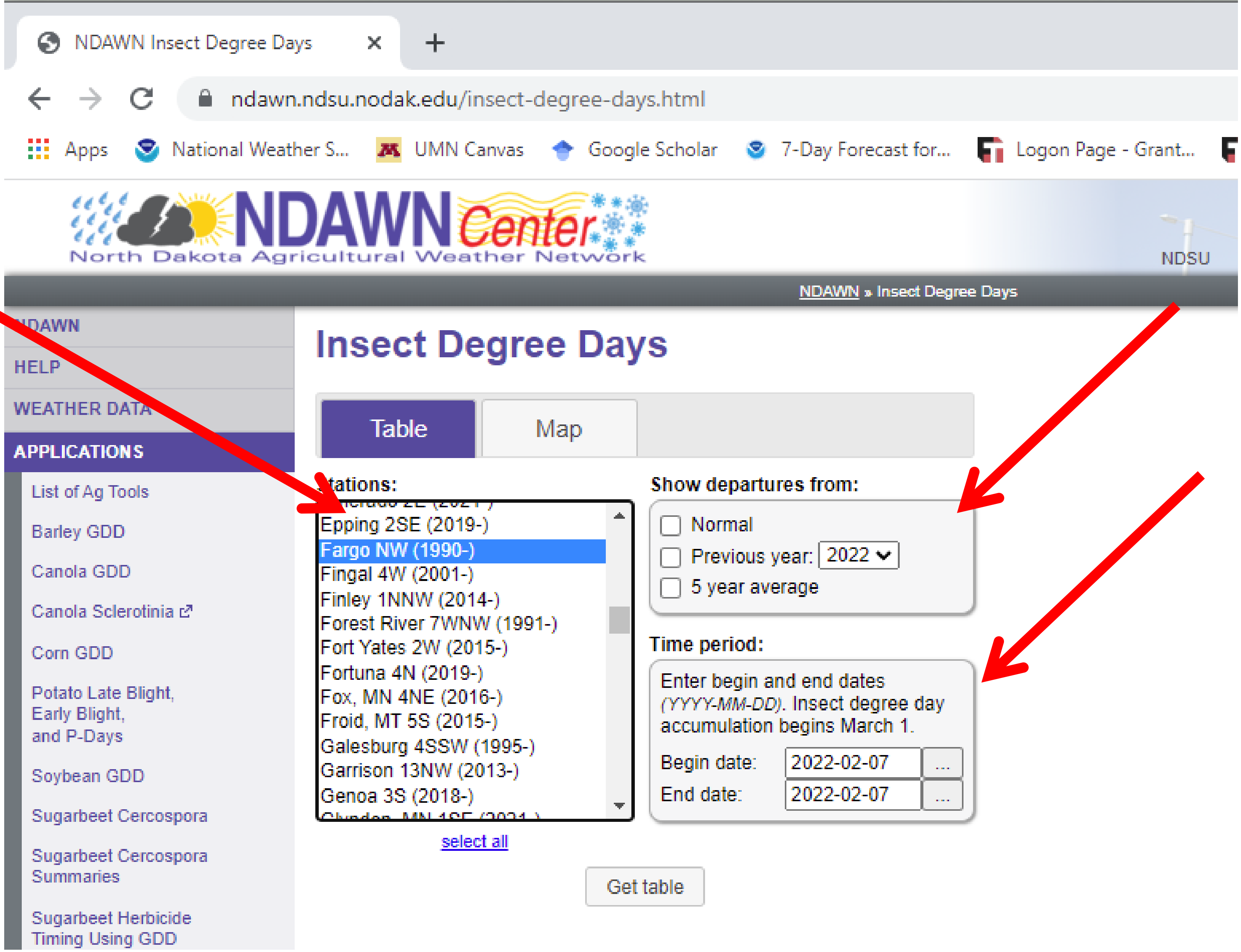
Seasonal Precipitation Outlook



University of Minnesota
Driven to Discover℠

Prediction tools – it's all about the heat

- DAWN Insect Degree Day Calculator
  - https://ndawn.ndsu.nodak.edu/insect-degree-days.html
- VegEdge Insect Growing Degree Day maps
  - Brown Maramorated Stink Bug, Cabbage Maggot, European CornBorer (Bivoltine & Univoltine), Japanese Beetle, Seed Corn Maggot


NDAWN Insect Degree Days
ndawn.ndsu.nodak.edu/insect-degree-days.html
Apps
National Weather S...
UMN Canvas
Google Scholar
7-Day Forecast for...
Logon Page - Grant...
NDAWN Center
North Dakota Agricultural Weather Network
NDSU
NDAWN » Insect Degree Days
HELP
WEATHER DATA
APPLICATIONS
List of Ag Tools
Barley GDD
Canola GDD
Canola Sclerotinia
Corn GDD
Potato Late Blight, Early Blight, and P-Days
Soybean GDD
Sugarbeet Cercospora
Sugarbeet Cercospora Summaries
Sugarbeet Herbicide Timing Using GDD
Insect Degree Days
Table
Map
Epping 2SE (2019-)
Fargo NW (1990-)
Fingal 4W (2001-)
Finley 1NNW (2014-)
Forest River 7WNW (1991-)
Fort Yates 2W (2015-)
Fortuna 4N (2019-)
Fox, MN 4NE (2016-)
Froid, MT 5S (2015-)
Galesburg 4SSW (1995-)
Garrison 13NW (2013-)
Genoa 3S (2018-)
select all
Show departures from:
Normal
Previous year: 2022
5 year average
Time period:
Enter begin and end dates (YYYY-MM-DD). Insect degree day accumulation begins March 1.
Begin date: 2022-02-07
End date: 2022-02-07
Get table

Date	Fargo									
	Total Rain fall (inch)	Max Air Temp (°F)	Min Air Temp (°F)	Base 40 (°F)	Base 45 (°F)	Base 48 (°F)	Base 50 (°F)	Base 55 (°F)	Base 60 (°F)	Base 65 (°F)
2021-06-21	0.00	65	45	1645	1301	1107	989	736	546	391
2021-06-22	0.00	79	49	1669	1320	1123	1003	748	555	398
2021-06-23	0.00	92	58	1704	1350	1150	1028	768	571	412
2021-06-24	0.00	84	58	1735	1376	1173	1049	784	583	421
2021-06-25	0.00	81	63	1767	1403	1197	1071	801	595	429
2021-06-26	0.10	78	62	1797	1428	1219	1091	816	605	436
2021-06-27	0.05	84	56	1827	1453	1241	1111	831	617	445
2021-06-28	0.08	78	62	1857	1478	1263	1131	846	627	452
2021-06-29	0.00	83	57	1887	1503	1285	1151	861	638	461
2021-06-30	0.00	88	61	1922	1533	1312	1176	881	653	472
Averages:		64	40							
Totals:	31M 5.47			1922	1533	1312	1176	881	653	472
Max:	31M 1.28	102	76							
Min:	31M 0.00	20	-5							
Std. Dev.:		18	15							

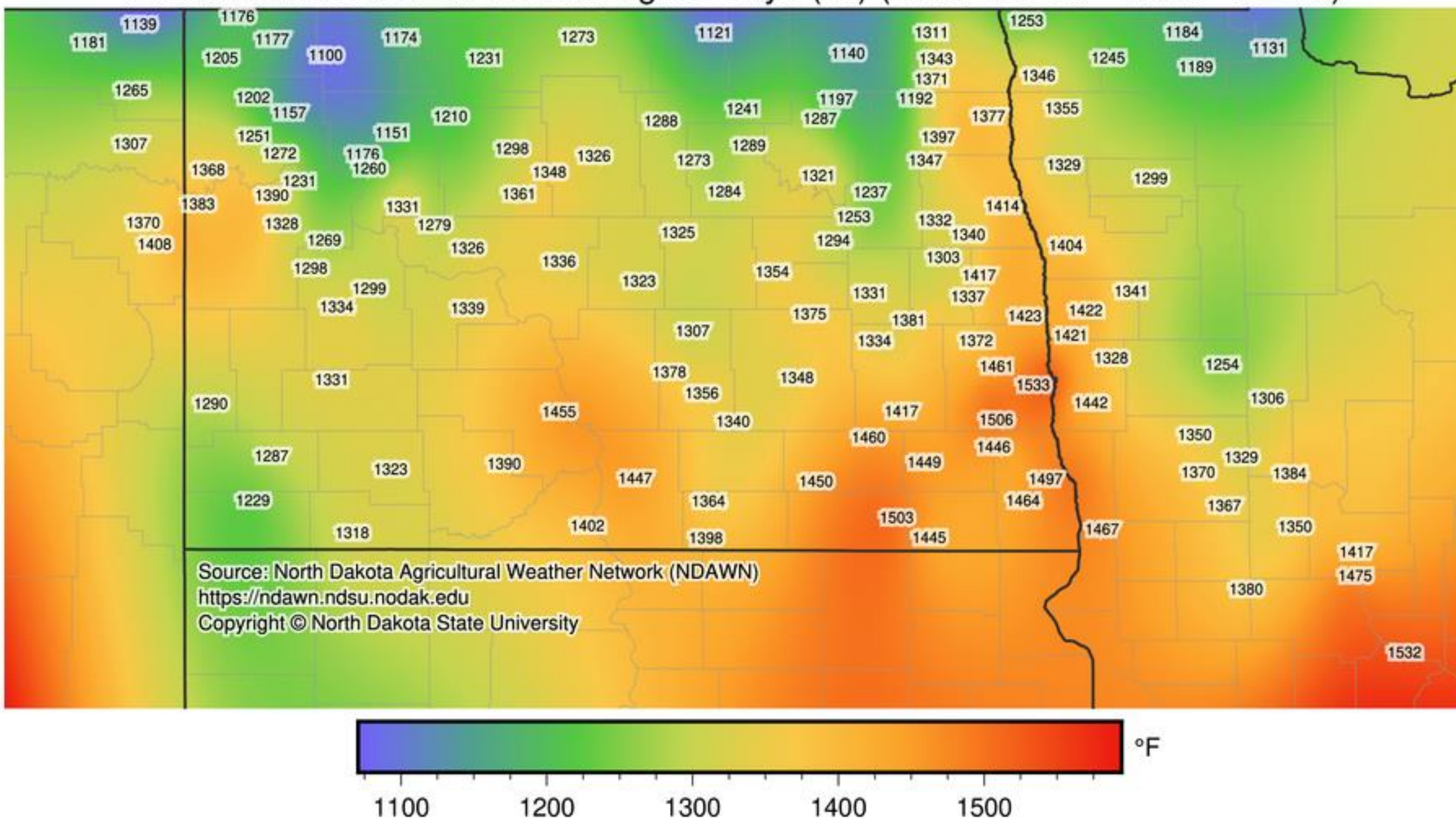
NDAWN Center
North Dakota Agricultural Weather Network

NDSU NDSU Agriculture NDSU School of Natural Resource Sciences

NDAWN » Insect Degree Days » Map

WN
P
ATHER DATA
LICATIONS
st of Ag Tools
arley GDD
anola GDD
anola Sclerotinia
orn GDD
otato Late Blight, arly Blight, d P-Days
oybean GDD
ugarbeet Cercospora
ugarbeet Cercospora immaries
ugarbeet Herbicide ming Using GDD
ugarbeet Root Maggot
ugarbeet GDD
ugarbeet GDD Multiple anting Dates
unflower GDD
heat GDD/Midge DD
heat GDD Multiple anting Dates
heat & Small Grains sease Forecaster

Accumulated Base 45 Insect Degree Days (°F) (2021–03–01 – 2021–06–30)



Adjust end date: Previous day (2021-06-29) Next day (2021-07-01)

Station details: --- Select a station --- (Also available by clicking on station on map)

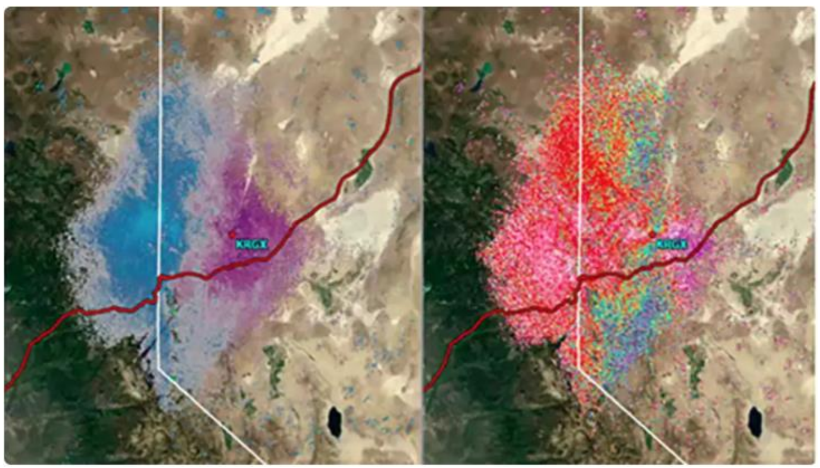
Prediction tools – this subject blows!

- HYSPLIT (**HY**brid **S**ingle **P**article **L**angrangian **I**ntegrated **T**rajectory model)
  - Wind model from NOAA & Australian Atmospheric Association
    - Developed to track particle being moved by wind
    - At any wind > flight speed of an insect, the insect stops being a pilot and becomes a passenger (basically, an airborne particle)
- https://www.ready.noaa.gov/HYSPLIT.php

NWS radar detects insect flight

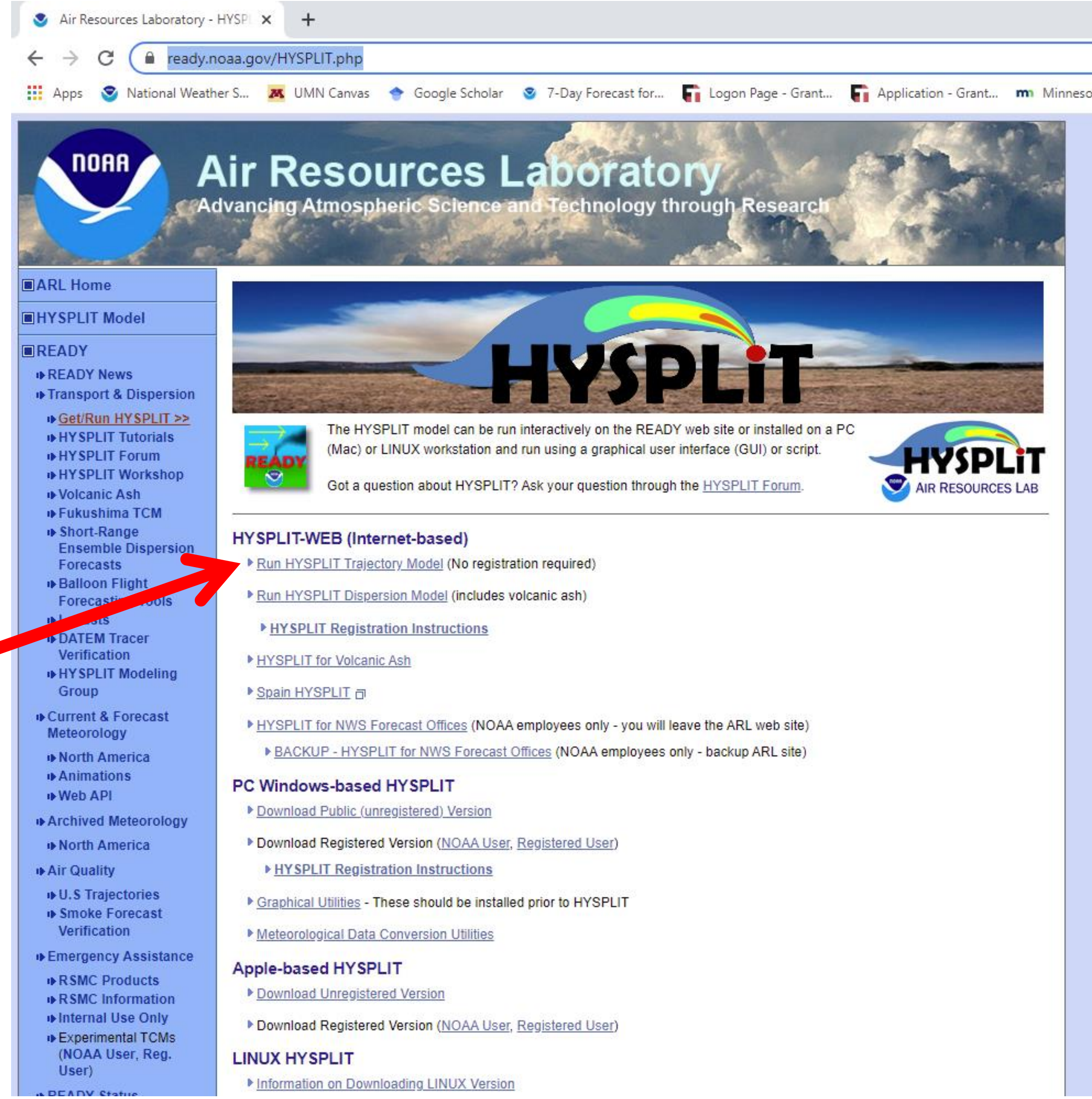
NWS weather radar (any color Doppler radar) picks up insect flight. Technique has been used to monitor flights of cutworms, etc..

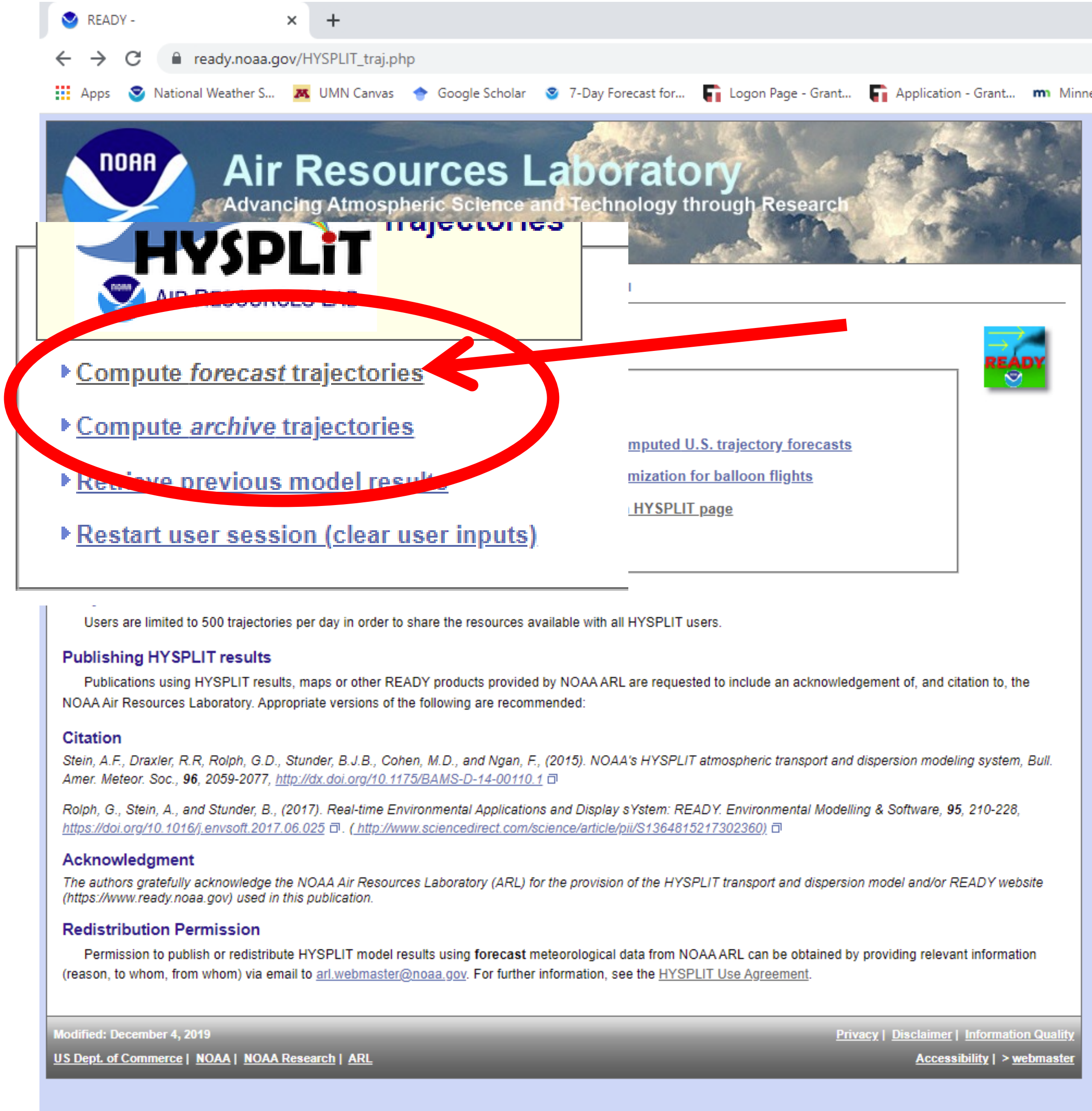
Monarch butterfly migration



Grasshoppers & beetles

HYSPLIT on the web




READY -
ready.noaa.gov/HYSPLIT_traj.php
Apps National Weather S... UMN Canvas Google Scholar 7-Day Forecast for... Logon Page - Grant... Application - Grant... Minne
NOAA
Air Resources Laboratory
Advancing Atmospheric Science and Technology through Research
HYSPLIT
Compute forecast trajectories
Compute archive trajectories
Retrieve previous model results
Restart user session (clear user inputs)
mputed U.S. trajectory forecasts
mization for balloon flights
HYSPLIT page
READY
Users are limited to 500 trajectories per day in order to share the resources available with all HYSPLIT users.
Publishing HYSPLIT results
Publications using HYSPLIT results, maps or other READY products provided by NOAA ARL are requested to include an acknowledgement of, and citation to, the NOAA Air Resources Laboratory. Appropriate versions of the following are recommended:
Citation
Stein, A.F., Draxler, R.R, Rolph, G.D., Stunder, B.J.B., Cohen, M.D., and Ngan, F., (2015). NOAA's HYSPLIT atmospheric transport and dispersion modeling system, Bull. Amer. Meteor. Soc., 96, 2059-2077, http://dx.doi.org/10.1175/BAMS-D-14-00110.1
Rolph, G., Stein, A., and Stunder, B., (2017). Real-time Environmental Applications and Display sYstem: READY. Environmental Modelling & Software, 95, 210-228, https://doi.org/10.1016/j.envsoft.2017.06.025. (http://www.sciencedirect.com/science/article/pii/S1364815217302360)
Acknowledgment
The authors gratefully acknowledge the NOAA Air Resources Laboratory (ARL) for the provision of the HYSPLIT transport and dispersion model and/or READY website (https://www.ready.noaa.gov) used in this publication.
Redistribution Permission
Permission to publish or redistribute HYSPLIT model results using forecast meteorological data from NOAA ARL can be obtained by providing relevant information (reason, to whom, from whom) via email to arl.webmaster@noaa.gov. For further information, see the HYSPLIT Use Agreement.
Modified: December 4, 2019
Privacy | Disclaimer | Information Quality
US Dept. of Commerce | NOAA | NOAA Research | ARL
Accessibility | > webmaster

Air Resources Laboratory

Advancing Atmospheric Science and Technology through Research

ARL Home > READY > Transport & Dispersion Modeling > HYSPLIT > HYSPLIT Trajectory Model

READY users produced 3496 un-registered HYSPLIT simulations since 00 UTC today!

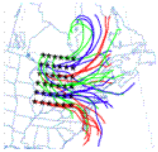
Type of Trajectory(ies)

Number of Tra… Starting Locations	◉ 1 ○ 2 ○ 3 — Note: By choosing just one source location, more options for selecting the location will be presented on the next page, such as choosing by latitude/longitude, by WMO ID, or by plant location. Multiple source locations limit the input to just latitude/longitude positions. This option is ignored for trajectory ensemble and frequency.
Type of Trajectory	◉ Normal ○ Matrix ○ Ensemble ○ Frequency

Next>>

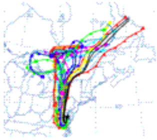
Details

Trajectory Matrix



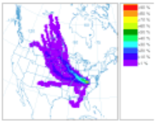
The trajectory matrix option will run a grid of trajectories bounded by the first 2 source locations (trajectory 1 is the lower left grid point and trajectory 2 is the upper right grid point) and evenly spaced with a grid increment given by the distance between the lower left grid point (trajectory 2) and trajectory 3. Only one height is allowed.

Trajectory Ensemble



The trajectory ensemble option will start multiple trajectories from the first selected starting location. Each member of the trajectory ensemble is calculated by offsetting the meteorological data by a fixed grid factor (one grid meteorological grid point in the horizontal and 0.01 sigma units in the vertical). This results in 27 members for all-possible offsets in X,Y, and Z. Note: the starting height should be greater than 250 m for optimal configuration of the ensemble.

Trajectory Frequency



The trajectory frequency option will start a trajectory from a single location and height every 6 hours and then sum the frequency that the trajectory passed over a grid cell and then normalize by either the total number of trajectories or endpoints. A trajectory may intersect a grid cell once or multiple times (with residence time options 1, 2 or 3).

NOAA

Air Resources Laboratory

Advancing Atmospheric Science and Technology through Research

ARL Home > READY > Transport & Dispersion Modeling > HYSPLIT > HYSPLIT Trajectory Model

READY

Meteorology & Starting Location(s)

Trajectory Calculation

Meteorology: HRRR (18h fcst, 3 km, 1 hrly, CONUS, sigma) More info

View Current NAM Fire Weather Domains

Source Location (enter using **one** of the following methods):

Click a location on the map or select from below:

Decimal Degrees Latitude: N Longitude: W

DDD/MM/SS Latitude: N Longitude: W

Air Resources Laboratory

Advancing Atmospheric Science and Technology through Research

ARL Home > READY > Transport & Dispersion Modeling > HYSPLIT > HYSPLIT Trajectory Model

READY

Model Run Details

Request trajectory

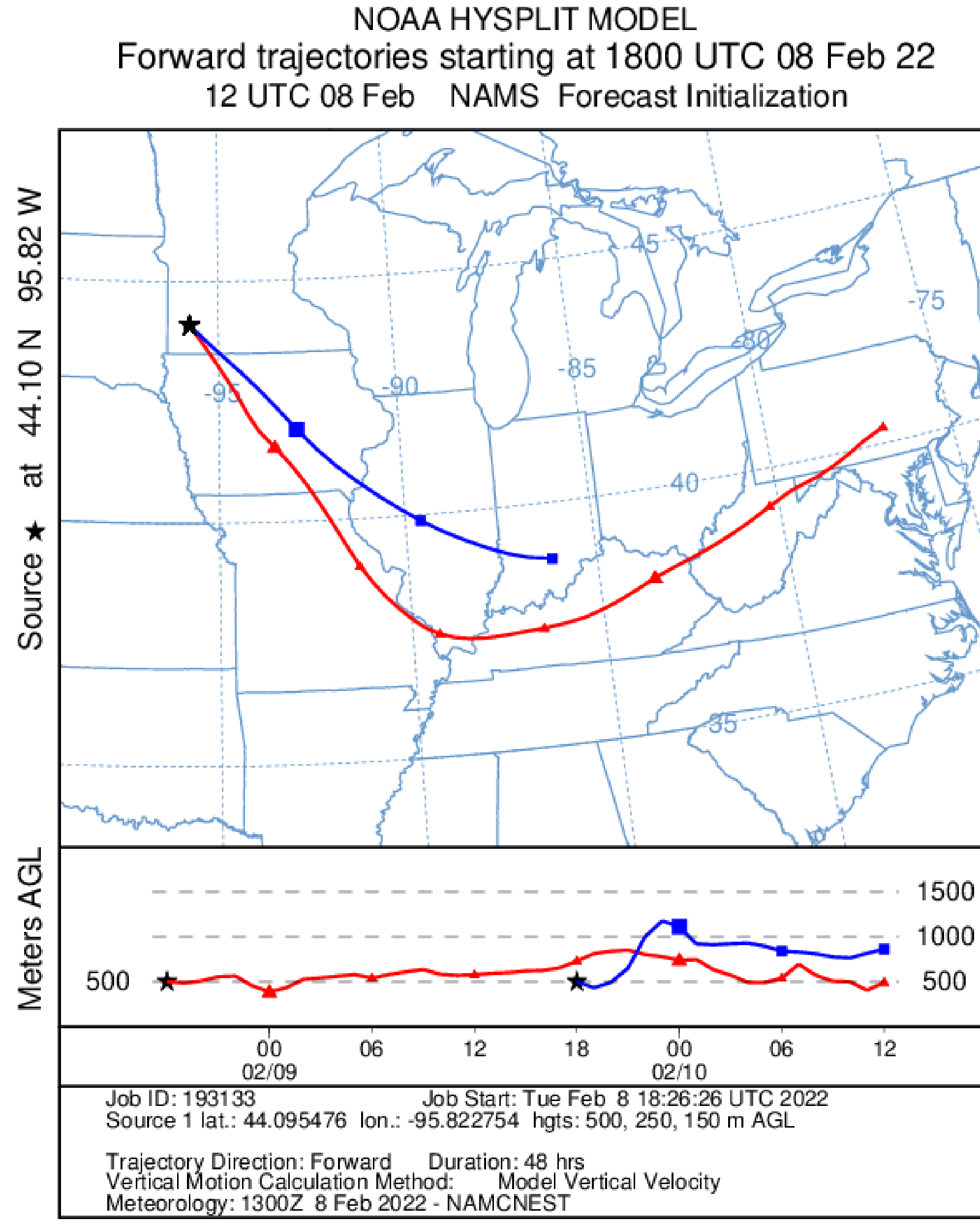
The current NAMCNEST model has 48 hours of forecast data beginning at 02/ 8/22 1300 UTC.

Model Parameters

Trajectory direction:	◉ Forward ○ Backward (Change the default start time!)				More info
Vertical Motion:	◉ Model vertical velocity ○ Isobaric ○ Isentropic				More info
Start time (UTC): Current time: 18:20	year: 22	month: 02	day: 08	hour: 18	More info
Total run time (hours):	48				More info
Start a new trajectory every:	12 hrs	Maximum number of trajectories:	24		More info
Start 1 latitude (degrees):	44.036270				More info
Start 1 longitude (degrees):	-95.690918				More info
Start 2 latitude (degrees):					
Start 2 longitude (degrees):					
Start 3 latitude (degrees):					
Start 3 longitude (degrees):					
Automatic mid-boundary layer height? Will override selections below.	○ Yes	◉ No			More info
Level 1 height:	500	◉ meters AGL	○ meters AMSL		More info
Level 2 height:	250				
Level 3 height:	150				

Winds from the west – obviously not bringing anything here.

Note lower level winds stop early (ground termination). Those winds, or anything terminating in a rain storm, can bring insects int oan area.



Questions??

He’s got a question!