



PENNSYLVANIA VEGETABLE MARKETING & RESEARCH PROGRAM

2301 N. Cameron St., Harrisburg, PA 17110 | 717-694-3596 | pvmrp@embarqmail.com | PAVeggies.org

Pennsylvania Vegetable IPM Weekly Update

August 12, 2020

These are cooperative projects involving Penn State University researchers, Penn State Cooperative Extension educators, growers, the Pennsylvania Department of Agriculture, the Pennsylvania Vegetable Marketing and Research Program and the Pennsylvania Vegetable Growers Association.

Current Vegetable and Berry Issues

Beth Gugino, Shelby Fleischer, Kathy Demchak, Penn State Extension specialists, in consultation with Penn State Extension educators from across the state.

General conditions and observations: While parts of the state have remained very dry with growers having to prioritize what crops to irrigate, other parts of the state received over 10 inches of rain in two consecutive days last week causing significant losses due to flooding and from the spread of diseases such as Phytophthora blight. It is very important to keep in mind that FSMA and GAP regulations prohibit the entry of produce that came in contact with flood waters from entering the food system due to concerns about foodborne pathogens. Once the flood waters have dissipated, even if the fruit appear healthy, plant and human pathogens could have infected the fruit and can cause post-harvest fruit rots or even worse human illness. Chlorinated wash water will not remove human pathogens from the produce. More information can be found in the Produce Safety Alliance fact sheet titled [Farm Safety for Flooded Farms](#).

FIELD PRODUCTION UPDATE

There have been no new reports of **cucurbit downy mildew** this past week so to-date it has only been confirmed on cucumber in Blair, Lancaster, and Chester Counties in PA. The closest reports on jack-o-lantern pumpkin and butternut squash are in central Tennessee. All reports in the mid-Atlantic and Great Lakes region have predominately been on cucumber with a report on cantaloupe in Massachusetts. Regular scouting of fields is critical. Check the [CDM ipmPIPE website](#) for the latest reported outbreaks and disease forecasting information or call the 1-800-PENN-IPM hotline which is updated on Wednesdays each week. The use of downy mildew target fungicides on cucumber is highly recommended. If you have succession planting, be sure to destroy those you are no longer harvesting by either disking them under or burning them down with an herbicide.

Other diseases being observed in cucurbits include multiple reports of **Alternaria leaf blight** on cantaloupe and pumpkin, **gummy stem blight** in watermelon, **Plectosporium blight** on pumpkin and **Phytophthora blight** on many cucurbit crops. More on gummy stem blight and Phytophthora blight in the next Vegetable IPM Update.

Among all the cucurbit crops, **Alternaria leaf spot** is most common on cantaloupe. It is characterized by foliar lesions with concentric rings similar to Alternaria diseases caused by different species on other crops (Alternaria on cantaloupe will not cause disease on cole crops or tomato). Protectant fungicides such as chlorothalonil and mancozeb with help to manage the disease as well as some that are also used for managing powdery mildew including Pristine, Aprovia Top, and Inspire Super.



Alternaria leaf blight on cantaloupe. (Photo: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo,

Plectosporium blight is caused by a soilborne fungal pathogen that causes diamond shaped lesions on the petioles, handles and veins on the underside of the leaves. More importantly, it causes white russetting/speckling on the fruit which make it more susceptible to secondary fruit rots and well as render it unmarketable. Important management tools include crop rotation, avoiding over fertilization, and maximizing air movement in the field. Protectant fungicide programs used for powdery mildew will also help with *Plectosporium* however, coverage is critical. Fungicides that include a FRAC 11 active ingredient such as Pristine and Quadris Top can also help.



Symptoms of Plectosporium blight on pumpkin fruit and petioles. (Photos: Tom Maloney (left) and John Esslinger (right). Penn State Extension).

Insect problems are diverse and numerous. **Corn earworm** counts are spiking in the sweet corn monitoring network, but in some locations bees are collecting pollen from tassels. Pyrethroid resistance is a problem, and pyrethroids and methomyl (Lannate) is highly toxic to bees. The diamides (Coragen, among others) and spinosad (Blackhawk, among others) give worm control with reduced bee toxicity, but is not active on silk-feeding beetles (**Japanese beetle, western corn rootworm adults**), or **Brown Marmorated Stink Bug (BMSB)**, all of which have been occurring in sweet corn. Check fields for silk feeding, or BMSB, and if that's not a problem, avoiding pyrethroids will avoid the resistance issue. If that is a problem, alternating with a pyrethroid, or a premix of a diamide with a pyrethroid (Besiege) is an option. Using drop nozzles to keep sprays onto the silks and ear zone, and away from tassels, may help conserve bees if they are on the tassels, and drop nozzles tend to be the most effective option for earworm control.



Corn earworm larva feeding in sweet corn ear (left, Photo: H. Fescemyer) and bees collecting pollen from sweet corn tassels (right, Photo: Tom Ford).

Resistance is also causing problems with **Western flower thrips** in field tomatoes. In southeastern PA, Radiant, Entrust, and pyrethroids were not controlling WFT. Beleaf performed well in trials in tomatoes in North Carolina with very high WFT populations, and Beleaf now has a section 2(ee) label. Growers need to have a copy of the 2(ee) label when using it. Other products that were better than untreated controls include Harvanta, Torac, Grandevo WDG, and Venerate SC.

In cole crops, along with the commonly encountered **Imported Cabbage Worm** and **Cabbage Looper**, **Harlequin bug** caused significant damage to a kale crop, and **diamondback moth** is showing up.

In cucurbits, **mites** are a problem in multiple locations. Mites typically show up first on watermelons and other melons. This year we are also seeing them move into pumpkins and green beans. There are a variety of miticides labeled for mites. Along with mites on cucurbit foliage,



Two-spotted spider mites are in multiple crops (Photo: Frank Peairs, CSU, Bugwood.org)

in the flowers there are **Striped Cucumber Beetles, Spotted Cucumber Beetles, and Western Corn Rootworm (WCR)** adults. It is easy to mistake WCR and Striped cucumber beetles. The stripes on the Striped Cucumber Beetle are more distinct, and reach the tip of the abdomen; also, they have a black belly, but the WCR has a greenish/yellowish belly. Wild populations of important pollinators, the **squash bee** and **bumble bees**, are also in those flowers. **Squash vine borer** damage is occurring in multiple locations. **Squash bug** populations are also numerous. Usually these stay close to squash/pumpkin hosts, but they are also showing up in cucumbers this year.



Western flower thrips are a problem in tomatoes (Photo: Alton N. Sparks, Jr. UGA, Bugwood.org)

We are also seeing **virus problems in pumpkins**. These are aphid-vectored viruses, although it is also feasible that some may be seedborne. So far, viruses that have been identified include Watermelon mosaic 2 and squash mosaic. When a winged aphid (the life stage that immigrates into a field) lands on a plant, it first 'tastes' the plant. The tasting probe is quick and shallow. If the 'taste' is good, the aphid may stay and feed by sending the stylet (mouthpart) down to the phloem, and deposit live offspring, which leads to the wingless forms. But if the taste results in rejection, the winged aphid tries again with another plant. That tasting probe can move stylet-borne viruses quickly. There is also an interaction going on:



Adult western corn rootworm (left, Photo: Winston Beck, ISU, Bugwood.org) and Striped cucumber beetle (right, Photo: N. Sloff).



aphids may be attracted more to plants with virus symptoms, which helps the virus become acquired by the insect. Many species of winged forms may be passing through a field, and even if they are not colonizing there, they may be vectoring stylet-borne viruses. Management is challenging and should focus of selecting virus-resistant cultivars and managing weed population that could harbor the viruses. Because virus transmission by the aphids is rapid and the aphids that transmit the virus will pass through the field rapidly, insecticides are difficult to time and very often ineffective.

Aphid-vectored virus symptoms in pumpkin (Photo: MidAtlantic grower).

BERRY CROPS

Anthracnose on strawberries is of concern at this time of the year. All day-neutral strawberry varieties currently on the market are susceptible to anthracnose fruit, so fruit rot symptoms are likely to occur. As late summer plasticulture plantings of strawberries are being established, growers should watch for symptoms of anthracnose fruit or crown rot on the transplants. One characteristic symptom of anthracnose on the planting material is sunken dark brown lesions on leaf petioles or runners.



Early symptoms of anthracnose infection on strawberry leaf petiole (Photo: K. Demchak).

If plants of susceptible varieties such as 'Chandler' collapse this fall, plants should be checked for the presence of anthracnose crown rot. Updated background information on anthracnose management can be found at <https://extension.psu.edu/strawberry-anthracnose-better-understanding-and-management>.



Leaf curling and discoloration on leaves affected by powdery mildew (Photo: K. Demchak).

Powdery mildew is present in some strawberry plantings. One symptom of powdery mildew infection is that the leaves curl inward. This could be mistaken for drought stress where conditions are hot and dry. When powdery mildew is present, leaves will typically show some purple or dark red blotchiness.

Weather conditions vary greatly across the state, with some regions continuing to be hot and extremely dry while other areas have received too much rain all at once. Both situations stress the root systems of small fruit crops greatly. All berry crops are susceptible to **phytophthora root rot**, and this disease is a concern where too much moisture has been received, especially in areas of the field that do not drain well. In much of the state however, **drought stress** is a

major concern. The shallow root systems of strawberries and blueberries make them especially susceptible to drought stress. Recent tissue tests of blueberries are showing somewhat unusual results, presumably because of insufficient moisture possibly damaging root systems, or perhaps the plants are unable to take up nutrients as they normally would.

Spotted wing drosophila presence is relatively low where hot and dry; however, there are some reports of numbers increasing rapidly in areas of the Northeast where conditions are wet. Thus, growers should continue to be vigilant for this pest and apply treatments as needed.

Vegetable Disease Update

Beth Gugino, Extension Vegetable Pathologist, Penn State University

- There are **no reports of late blight** on tomato or potato in the mid-Atlantic region. If you suspect late blight on your farm please let me know either by email at bkgugino@psu.edu or by phone at 814-865-7328 or contact your local Extension Office.
- There have been several reports of gummy stem blight. **Gummy stem blight** is a fungal disease that affects cucumber, watermelon, cantaloupe, squash, and pumpkin causing foliar, vine and fruit rot symptoms. It is favored by high humidity, moisture, and warm temperatures. Stem lesions will often crack and develop a gummy brown exudate. Small black dots called pycnidia which you can see with a hand-lens can also develop within the lesions. The fruit will initially develop water-soaked spots that become larger brown spots that eventually turn black (black rot is another name for the fruit rot phase). The fungus survives season to season in crop debris so crop rotation is important as is managing for other diseases and pests such as powdery mildew and cucumber beetle that can further predispose the crop to gummy stem blight. In season fungicides to manage anthracnose will also help with gummy stem blight and include chlorothalonil alternated with FRAC 3 fungicides such as Proline and Rhyme or those pre-mixed with FRAC 7 or 9 including Luna Experience, Aprovia Top or Inspire Super. Additional product such as Merivon, Switch, and Miravis Prime are also recommended. Additional management recommendations can be found in the [2020-21 Mid-Atlantic Commercial Vegetable Production Recommendations](#).
- To-date, **cucurbit downy mildew** has been confirmed on cucumber in Blair, Lancaster, Chester Counties with no new reports this past week. The reports continue to remain primarily on cucumber. Regular scouting is critical. At this time targeted downy mildew specific fungicides should be used on cucumber and cantaloupe. Make sure to rotate FRAC codes to minimize potential development of fungicide resistance. Several growers continue to ask about downy mildew fungicide recommendations for pumpkins. Keep in mind the strain of downy mildew that causes disease on pumpkins and winter squash is different so downy mildew will not move from your cucumbers into your pumpkin crop. Currently, the use of targeted fungicides pumpkins is not need until there are more report of downy mildew in the region. Forecast maps are updated three days a week on Monday, Wednesday and Fridays at <http://cdm.ipmpipe.org>. Keep in mind that the color-coded regions are not only based on the forecasted weather conditions but also centered around confirmed reports of the disease. If you suspect that you may have downy mildew, please let me know by email at bkgugino@psu.edu or by phone at 814-865-7328 or contact your local Extension Office.



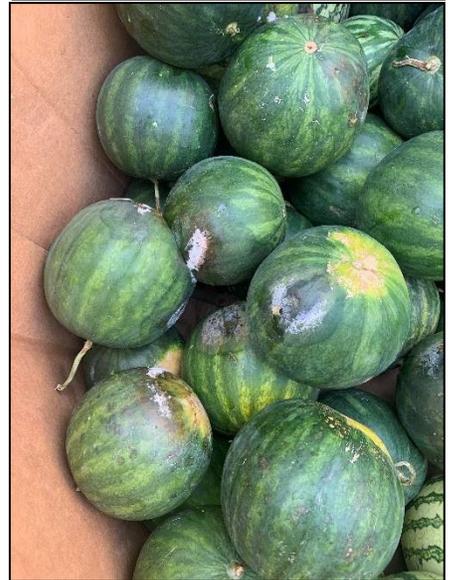
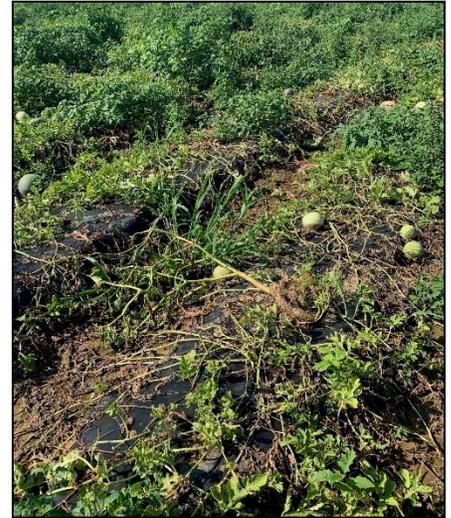
Gummy stem blight/black rot fruit symptoms on butternut. Eventually the lesions will turn black in color (Photo: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org).

PHYTOPHTHORA BLIGHT CAUSING SIGNIFICANT LOSSES IN CUCURBIT FIELDS

Phytophthora blight is a serious disease that can cause significant widespread losses in cucurbit as well as pepper, eggplant, tomato, lima and snap bean fields especially those that experience flooding or ponding. Initial symptoms of Phytophthora fruit rot are water soaked or depressed spots typically on the underside of the fruit where it is in contact with the soil. Symptoms can develop on the upper side of the fruit following rain or an irrigation event that splashes infested soil and spores up onto the fruit. Eventually the fruit will become covered with white sporangia and will rapidly collapse either in the field or shortly after harvest. The sporangia form when the soil is at field capacity and the infective zoospores that cause new infections are released when the soil is saturated which explains why the disease is most prevalent poorly drained soil and/or after significant rainfall. Young shoots and leaves will wilt and eventually collapse. The lower crown can turn tan to brown and develop a soft rot. It can survive in the soil in the absence of a host for several years.

Managing soil moisture by avoiding planting in poorly drained soils or low-lying areas, sub-soiling to break-up hard pans, planting on raised beds and avoiding excessive irrigation is recommended. If anticipating heavy rain, deep rip row middles to facilitate soil drainage and minimize movement of water between fields. Any cultural practices that help minimize standing water after rain or an irrigation event will help break-up the disease triangle. Do not irrigate from ponds or surface water sources that may contain water that drained from infested fields. Minimize splash dispersal of spores and surface water movement between rows or fields. Plant into cover crop mulches to minimize direct contact between the soil and fruit. In fields where Phytophthora is a problem minimize movement of people and equipment from infested to uninfested fields. Remove diseased plants and fruit from the field to reduce the spread of secondary inoculum. If sections of the field are very bad, consider disking these areas under to reduce pathogen inoculum and further spread in the field. Avoid culling infected fruit into production fields. Healthy fruit harvested from an infested field could develop symptoms post-harvest from infections that occurred in the field.

Under favorable conditions, fungicides will only suppress Phytophthora at best. In fields with a known history, pre-plant/at-planting/early-season applications of mefenoxam, Orondis Gold, Previcur Flex or Orondis Opti can help prevent early season crown and root rot. Mefenoxam resistance has been documented in some commercial fields which would reduce efficacy. In season recommended fungicides include Orondis Opti, Orondis Ultra, Ranman, Zampro, Elumin, Revus, Forum, Presidio, Omega, and Zing!. Many of these fungicides are also effective for managing downy mildew. Managing for resistance by rotating FRAC codes and tank mixing is essential. Additional management recommendations can be found in the [2020-21 Mid-Atlantic Commercial Vegetable Production Recommendations](#).



Vine collapse and Phytophthora fruit rot in the field (top) and post-harvest Phytophthora fruit rot symptoms on watermelon (Photos: Tanner Delvalle).

Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Extension is implied.

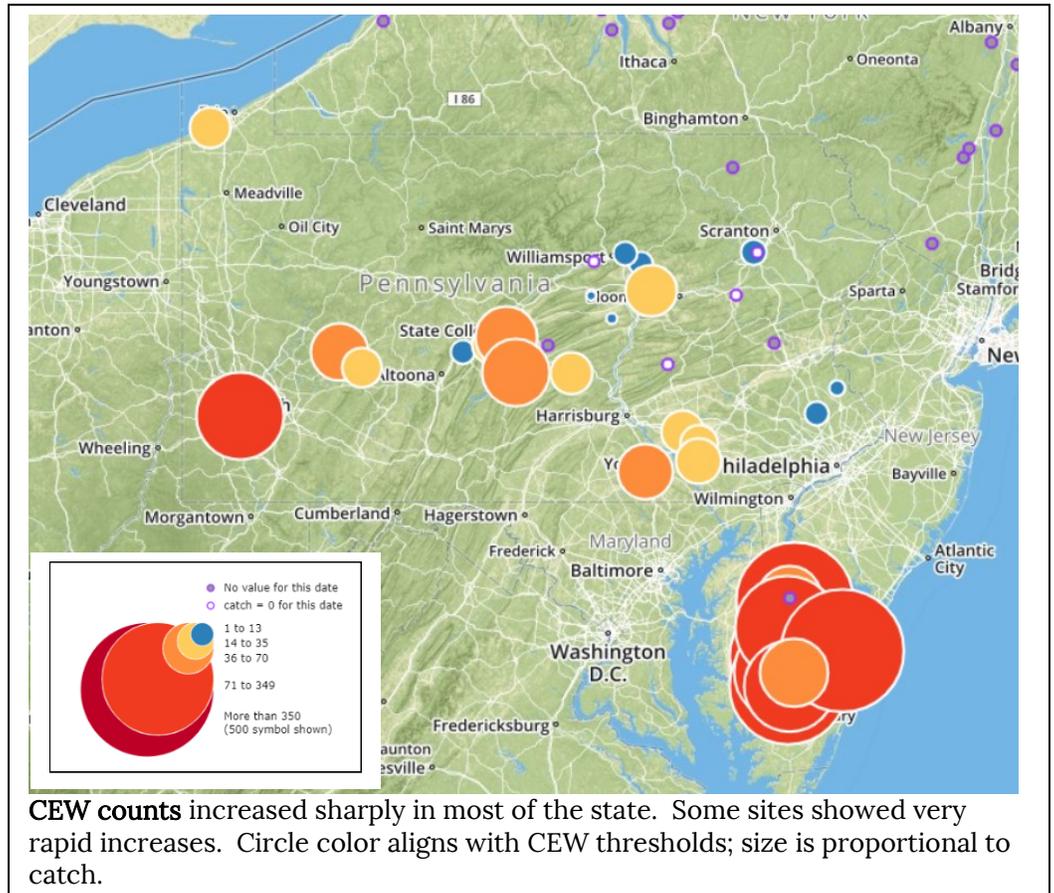
Sweet Corn Insect Pest Monitoring

Shelby Fleischer, Extension Vegetable Entomologist, Penn State University

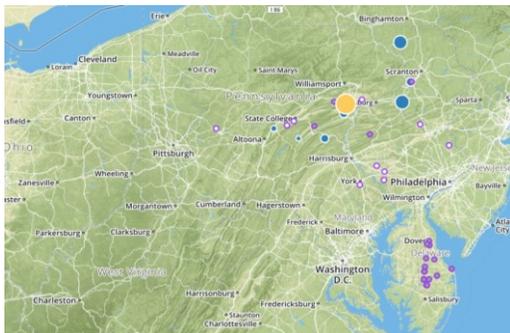
Interactive Maps with Google style view at <http://www.pestwatch.psu.edu/sweetcorn/tool/index.html>



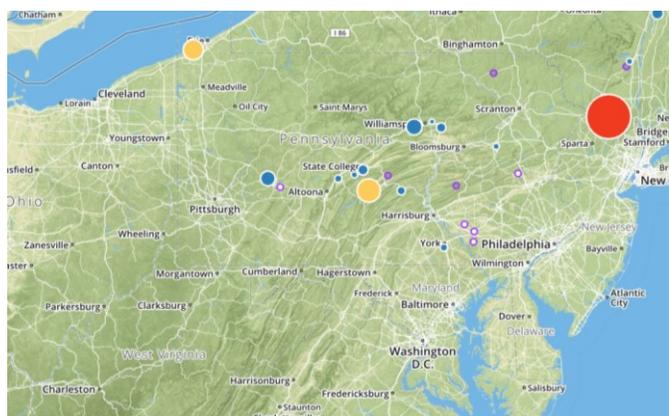
Corn earworm (CEW) are spiking. 20 of 28 sites (>70%) are above threshold, and 7 (25%) suggest tightening spray intervals.



CEW counts increased sharply in most of the state. Some sites showed very rapid increases. Circle color aligns with CEW thresholds; size is proportional to catch.



ECB counts are negligible.



FAW is showing up in isolated hot spots. FAW makes large, ragged feeding patterns.



Pyrethroid resistance can be a problem. Use materials with a low bee toxicity rating ('Bee TR' in the Veg Guide) when bees are working tassels. (Photo: Tom Ford)

TRAP COUNTS: 7-day moving average: catch/nights trapping, divided by the number of nights with data, times 7. Weeks where all the average-catch-per-night values are nulls are treated as if no data exist for that week. Gray = no trap for that site. Pink-to-yellow are sites above CEW threshold or hotspots for ECB or FAW. **Yellow suggest tighter spray intervals.**

County	Trap Name	CEW			ECB			FAW		
		29-Jul	5-Aug	12-Aug	29-Jul	5-Aug	12-Aug	29-Jul	5-Aug	12-Aug
Blair	Tyrone	10	7	11	7	4	2	2	10	2
Bucks	Bedminster	18	3	5	0	0	0			
Centre	State College	11	46	98	0	0	0	11	18	4
Centre	Rock Springs	6	18	68	0	0	0	2	5	1
Clinton	Loganton	11	1	---	---	---	---			
Erie	Fairview	12	12	32				1	7	3
Erie	Lake City	23	20	9				11	22	15
Indiana	Brush Valley	3	19	32				0	2	0
Indiana	Creekside	14	40	76	---	0	0	2	12	8
Juniata	Port Royal	11	23	64	17	5	3.5	2	4	2
Lackawanna	Ransom	0	0	---	2	3	---			
Lancaster	Landisville	6	22	31	4	0	0.5	0	0	1
Lancaster	Neffsville	5	17	41	1	0	0	0	0	0
Lancaster	New Danville	9	25	82	3	0	0	0	0	0
Lehigh	Germansville	3	---	17	0	---	0	0	---	0
Luzerne	Drums	3	0	106	3	5	11	0	0	1
Luzerne	Plains	0	8	20	0	2	4			
Lycoming	Linden	0	3	45				16	24	7
Lycoming	Montoursville	7	81	65				14	2	1
Lycoming	Muncy	7	38	87				0	6	3
Mifflin	Belleville	17	55	45	5	3	1	5	40	20
Montgomery	Souderton	13	7	20						
Montour	Washingtonville	5	32	31	5	3	0			
schuylkill	Tower City	12	0	---	7	1	---	0	0	---
Susquehanna	Montrose	---	---	4	---	---	10	---	---	---
Union	New Berlin	0	1	5	4	3	4			
Union	Lewisburg				0	0.7	22			
Washington	Venetia	48	92	200						
York	York	6	37	107	1	0	0	4	3	2

THRESHOLDS: Reproductive (tassel/silk) and late vegetative corn attracts moths. Shorten spray schedules when populations increase. If CEW is not a problem, then consider ECB.

	CEW			ECB	
	Catch/Week	Spray Frequency		Catch/Week	Spray Frequency
Very very low	1-13	7 - or no spray		<15	7 - or no spray
Very low	14-35	5-6		15-35	6
Low	36-70	4-5		36-70	5
Moderate	71-349	3-4		>70	4
High	>350	2-3			