

Cornell Cooperative Extension

Eastern NY Commercial Horticulture Program

Irrigation Considerations Using Drip During This Dry, Hot Weather Crystal Stewart-Courtens, CCE Eastern NY Commercial Horticulture

The most common question coming my way during this dry weather is about how to best keep everything watered. How long should the drip be running, and how often? The answer depends on a number of factors from your type of drip tape to your soil type and plant needs. Here are the key considerations for making a decision:

1. Understand how much water your drip is delivering

The most common drip sold is high-flow (0.45 gallons of water per 100 feet per minute) with 12" spacing between emitters. Next most common is low flow (0.22 gallons per minute per 100 feet) with 12" spacing. There are other configurations as well; if you have something different, you can use this <u>Drip Line Rate Calculator</u> to figure out how much water you are delivering. NOTE: This tool is made for irrigating in the west, and does not take into account the ground between plasticulture. You should take that space out of the equation if using this to calculate application rates. For example, an acre of plasticulture is actually a maximum half acre of irrigated land. It also gives inches/hour rather than gallons! But it's a nice tool to give you an idea of your application rate.

2. Determine how much water you need to deliver per week (and make sure your system can do that)

As a rule of thumb, we want to deliver an inch of water per week, though this number can be higher when it is very hot and windy. A mature crop can lose up to .35 inches of water a DAY through evapotranspiration (crop water use for growth and cooling). An inch of water delivered over an entire acre is 27,154 gallons. Remember, in plasticulture systems we are only delivering to the ground under plastic, so you need to determine the actual amount of acreage you are delivering water to rather than including space between beds. Let's assume that half the acre is covered with plastic, so we need 13,577 gallons of water a week (or more, if you determine evapotranspiration is high). Here is what delivery to an acre of plasticulture might look like:

Таре	Bed Ft	GPM	Water Delivered in 3 hours	Times to Irrigate per Week
0.45	7210	32	5760	2.4 (run every 3 days)
0.22	7210	16	2880	5 (runwhen you can?)

Table of Contents

DEDA

June 24, 2020

- 1 Irrigation Considerations Using Drip During This Dry, Hot Weather
- 2 High Tunnel Tomato Nutrient Management
- 4 Onion Fungicides for Managing Stemphylium Leaf Blight
- 6 What is NourishNY?
- 7 Leafhoppers—Check Your Potatoes and Beans!
- 8 Corn Trap Counts

Header photo: Crops at different growth stages and in different condition may need different amounts of water! Also, routinely check drip lines to make sure they function properly. Photo: C. Stewart-Courtens

(Continued on page 2)

(Continued from page 1)

To water an acre of plasticulture, you have to be able to pull 32 gallons of water per minute and pull almost 8,000 gallons in 4 hours for the high-flow drip. And to deliver the acre an inch of water weekly, you'd run the system every other day. To do the same with low-flow, you'd run it every day. Of course, you have to adjust these numbers if using double lines of drip tape, as you might with 3 rows of crops or heavy users like tomatoes in tunnels!

Here is a caveat: Recently, researchers have found that maintaining soil moisture levels in a narrow range and irrigating when 30% of available soil moisture is used maximizes crop response. This may mean that more frequent application of smaller amounts of water is better than delaying irrigations until the soil moisture reaches a lower level — 40-50% soil moisture — and then applying a large amount of water. If you want to irrigate more frequently, say every day with the .22 and every other with the .45, here is the timing:

Таре	Bed Ft	GPM	Waterings per week	Hours to irrigate each time
0.45	7210	32	4	1 hour 45 mins
0.22	7210	16	7	2

3. Consider your soil type in making timing decisions

Water behaves differently in different soil types, and therefore you should water differently on different soil types. For example, delivering 4 hours of high flow drip on sand might just serve to push nutrients past the root zone along with much of the water, whereas watering daily with lower-flow might send water half as deep and keep nutrients where you need them. Here is an illustration of this idea, also from the Brookdale Fruit Farm presentation this winter:



Image: Brookdale Fruit Farm

Here is a quick reference to possible lateral movement through soil

Soil Type	Lateral movement
Coarse Sand	0.5 to 1.5 feet
Fine Sand	1 to 3 feet
Loam	3 to 4.5 feet
Clay	4 to 6 feet

Sometimes, double drip is required to span just one bed in very coarse soils.

Conclusions:

types:

Watering well is essential this year in particular. Besides knowing the correct rates for maintaining good plant health, you should also do routine maintenance to ensure that drip is not plugged or damaged in any way. Monitor soil moisture under the plastic to ensure that what you think you are doing is actually what is happening. And finally, if you do end up in a deficit situation and the ground becomes dry under the plastic, remember that it can take more water than you think to recharge the deeper soil moisture, which is essential to keeping even moisture above, particularly in our loamier vegetable lands.

Sources: Winter irrigation intensive with Brookdale Fruit Farm; Powerpoint. UMass irrigation factsheet: <u>https://aq.umass.edu/</u> <u>vegetable/fact-sheets/irrigating-vegetable-crops</u>

High Tunnel Tomato Nutrient Management Teresa Rusinek, CCE Eastern NY Commercial Horticulture

For those of you with tomatoes in tunnels, you may be seeing some nutrient deficiencies showing up at this time. Tunnel grown tomatoes push out vigorous growth and can become deficient more quickly than field grown tomatoes. To avoid deficiencies and nutrient imbalances it's really helpful to send in soil samples preplant, before amendments are added to the soil. After planting, growers have had good results managing fertility with foliar nutrient testing every 2-3 weeks over the course of the growing season. Tests range between \$20- \$ 30, but are worth the investment to avoid yield and quality reducing deficiencies and/or unnecessary nutrient applications. Any of the ENYCHP vegetable specialist can help you develop a nutrient monitoring program. Below are deficiencies we often see in HT tomato production.

Magnesium (Mg) deficiency symptoms are easily identified by the interveinal chlorotic mottling common on lowest leaves of high

tunnel tomatoes when the first fruit clusters begin sizing up. The chlorotic interveinal yellow patches usually occur toward the center of leaves with the margins being the last to turn yellow.



Sometimes, the interveinal yellow patches are followed

Mg deficiency—Interveinal chlorotic mottling common on lowest tomato leaves. Photo: A. Ivy

by orange to red coloring. As the deficiency increases in severity, necrotic spots and marginal scorching develops on leaves. On plants with mature fruit, symptoms may start on leaves toward the middle of the plant. Generally, Mg deficiency is not a major concern as long as the symptoms are limited to older growth and basic nutrient

(Continued on page 3)

(Continued from page 2)

needs are being met. Epsom salts and sul-po-mag are some sources of supplemental magnesium. Often, growers will use Epsom Salts (magnesium sulfate) at a rate of ½ teaspoon/gal water) as a mist foliar application. Typically, it takes about 4 gallons to cover a full high tunnel. Foliar applications can be used to correct small deficiencies in a single season, but soil applications are more appropriate for longer-term correction, but be careful as adding higher amounts of Mg than needed may trigger potassium deficiencies.



Mn deficiency causes interveinal chlorosis in mature leaves. Photo: T. Rusinek



K deficiency Mature, lower leaves show marginal necrotic spots or scorching. Photo: T. Rusinek



Yellow shoulders and uneven ripening are often caused by or exacerbated by low K levels. Photo: A. Ivy

Manganese (Mn) deficiency causes interveinal chlorosis in mature leaves. As the stress increases, the leaves take on a gray metallic sheen and develop dark freckled and necrotic areas along the veins. A purplish luster may also develop on the upper surface of the leaves. These symptoms along with blossom drop usually occur around the four-foot level of plants. If your irrigation water has elevated alkalinity (over 100 PPM CaCo3) and a pH over 7.0, acidifying it can help (sulfuric acid for conventional growers, citric acid for organic growers). Adding elemental sulfur to the soil between crops will bring soil pH down to optimal level over time. Excessively high soil levels of soil Phosphorous, Calcium, and/or Mg can inhibit Mn uptake as well.

Potassium (K) deficiency will cause mature, lower leaves to show marginal necrotic spots or scorching that progresses inward and also upward toward younger leaves as deficiency is generally characterized by a marginal chlorosis, progressing into a dry leathery tan scorch on recently matured leaves. This is followed by increasing interveinal scorching and/or necrosis progressing from the leaf edge to the midrib as the stress increases. As the deficiency progresses, most of the interveinal area becomes necrotic, the veins remain green, and the leaves tend to curl and crinkle. Growers need to keep providing K as the crop load increases in mid-summer; many do this through periodic fertigation with sulfate of potash or sul-po-mag. Other growers will switch to a fertilizer blend with a higher K:N ratio such as a 9-15-30 to supply the plants increased demand for K. Also, be aware that high soil levels of Ca and Mg can impede K uptake.

Phosphorus (P) deficiency often shows up as drooping leaflets with an outward curl and a purple tint around the margins and underside of the leaf. Overall plant growth is slowed giving a dwarfed look with poor fruit production. P deficiency may be seen earlier in the season if tomatoes are planted into cold soils. If P levels are sufficient in the soil, the deficiency will resolve itself once soil temperatures increase. If P is deficient in soil, phosphate can be applied through drip lines

(fertigation). Zinc can become unavailable in high pH or high P situations.

Calcium (Ca) deficiency often results in blossom end rot. In severe cases you may see die back of growing tips. Calcium deficiency can result after a period of dry soil conditions. In order for calcium to move into the plant, it's got to be dissolved in the soil solution, and then it can be taken up by the plant. It does not necessarily mean that your



Phosphorus (P) deficiency often shows up as drooping leaflets with an outward curl and a purple tint around the margins and underside of the leaf. Photo: T. Rusinek



Blossom End Rot on unripe tomato. Photo: A. Ivy

to show marginal necroticsoil is low in calcium, but that your soil might be too dry for thespots or scorching thatcalcium to be dissolved and for the plant to get at it. Maintainprogresses inward and alsoadequate soil moisture and calcium levels. Excessive N in the form ofupward toward youngerammonium as well as K and Mg in the soil impedes Ca uptake.leaves as deficiency isCalcium nitrate can be applied through irrigation system (fertigation).generally characterized by aFoliar sprays are not effective.

Onion Fungicides for Managing Stemphylium Leaf Blight *Ethan Grundberg, CCE Eastern NY Commercial Horticulture*

As was discussed in last week's podcast (beginning at minute 3:54 at <u>https://soundcloud.com/easternnewyorkvegnews/2020-biweekly-vegetable-news-podcast-episode-5-61720</u>), the task of crafting season-long fungicide programs targeting Stemphylium leaf blight (SLB) in onions has become a nearly impossible task. SLB will often be seen colonizing dry leaf tips on onions suffering from tip burn and often appears on leaves with excessive herbicide injury. The spread of SLB is favored by warm weather and long periods of leaf wetness and/or high relative humidity. While SLB typically isn't of concern until July, it has already been observed in fields of early transplants with extreme Buctril herbicide injury. If left unmanaged, SLB can caused onions to die "standing up" before lodging and increase susceptibility to bacterial bulb rots.

Thanks to the Stemphylium isolate fungicide sensitivity assays conducted by Cornell Plant Pathologist Dr. Frank Hay and the annual fungicide field trials led by state onion extension specialist Christy Hoepting, onion growers in New York have excellent access to up-to-date information regarding the development of fungicide resistance in Stemphylium populations. Unfortunately, Dr. Hay and Christy's work have demonstrated that SLB populations in the state are now resistant to varying degrees to fungicides in FRAC groups 2, 7,9, and 11. The only remaining FRAC group with good activity on SLB are the group 3 products like propiconazole (Tilt, OLF), difenaconazole (found in the premix products Inspire Super and Quadris Top), and tebuconazole (found in the pre-mix product Viathon).

To follow best practices to reduce the rate at which SLB is developing resistance to fungicides, however, a season-long program must include no more than two sequential applications of FRAC 3 products. Given the scarcity of other effective options, Christy Hoepting has developed several different example programs that use other fungicides with at least limited efficacy reducing SLB severity, like Bravo (FRAC M5), Gavel (FRAC 22+ M3), and biologicals like LifeGard (FRAC P06) during periods when SLB pressure might be lower or when insecticides are not being tank mixed. Christy summarized her main rules for SLB programs in 2020 recently:

The Rules for Fungicide Resistance Management for SLB in Onion, 2020

- •Start SLB fungicide program before disease symptoms start.
- •Use two FRAC groups with activity on SLB in every spray.
- •No more than two apps per FRAC before rotating to another FRAC group.
- •Rotate active ingredients (a, b, c...) and sub-classes (1, 2, 3...) within each FRAC group.
- Ideally, only 1-2 apps per fungicide
- •No more than <u>three</u> apps per FRAC per season.
- •Use high rates of FRAC 3. Use a minimum of Luna Tranquility <u>16 fl oz</u>.
- •Do not skip a week or extend the spray interval beyond 7 days. This could allow SLB population to rebound. During periods of low risk for SLB, use fungicides that work under low pressure, such as Bravo.

Following are two of Christy's example programs for consideration:

Week No.	Insecticide	BLB	SLB	DM	FRAC Group
1-2	none	Bravo 3 pt		No ⁴	M5 ¹
3	Movento	Inspire Super 20 fl oz		No	3b/9b ²
4	Movento	Tilt 8 fl oz Omega 16 fl oz		No	<mark>3a</mark> 29
5		Bravo 3 pt		No	M5
C C		Bravo 3 pt			M5
6			Gavel 2 lb		<mark>22</mark> /(M3)
7	Yes	Luna Tranqui	lity 16-20 fl oz	No	7(1) ³ /9a
8	Yes		Quadris Top 14 fl oz		<mark>3b/</mark> (11)
		Tilt 8 fl oz			За
			Gave	l 2 lb	22/ (M3)

Week No.	BLB	SLB	DM	FRAC Group	
1	Bravo 3 pt		No	M5	
2	Bravo 3 pt		No	M5	
2	Miravis Prime 11.4 fl oz			7(4)/ 12	
3	Gavel 2 lb			<mark>22</mark> /(M3)	
4	Inspire Super 20 fl oz			<mark>3</mark> b/9b	
5	Bravo 3 pt		Mancozeb 3 lb	M5 (M3)	
C	Bravo	o 3 pt		M5	
6		Gavel 2 lb			
7	Tilt 8	fl oz*	Managarah 2 lh	<mark>3a</mark> /(M3)	
7	Omega	16 fl oz	Mancozeb 3 lb	29	
8	Luna Tranquility 16-20 fl oz		Mancozeb 3 lb	7(1)/ 9a (M3)	
	Quadris Top 14 fl oz			3 b/(11)	
9	Tilt 8 fl oz			3a	
		Gave	<mark>22</mark> /(M3)		

Abbreviations:

BLB = Botrytis Leaf Blight

SLB = Stemphylium Leaf Blight

DM = Downey Mildew

FRAC = Fungicide Resistance Action Committee

Given the increasing complexity of developing onion fungicide programs, please do not hesitate to reach out to me to discuss the specific circumstances of your situation in more detail; I can be reached at eg572@cornell.edu or by phone at 617-455-1893.

Onion leaf exhibiting excessive premature dieback and sporulation from Stemphylium leaf blight. Photo: E. Grundberg

What is NourishNY?

Maire Ullrich, CCE Eastern NY Commercial Horticulture

New York State set aside a special allocation of dollars (\$25M) for emergency food agencies such as food banks, pantries, and soup kitchens to be able to buy food beyond their usual means. The dollars were distributed by region and agencies who have contracts with the Department of Health under the Hunger Prevention and Nutrition Assistance Program (HPNAP) and were given a budget to work with. Yes, NYS traditionally supports the purchase of food by these agencies but this program is different in that:

- 1. 85% of the food needs to be from NY. It can be processed elsewhere but it must be produced in the state to qualify for the funds.
- 2. There are no limitations on the kinds of foods purchased. HPNAP, the traditional stream of funds, has limitations on buying products such as whole milk and others that don't meet certain dietary requirements.
- 3. This program is focused on dairy to help relieve the excess that developed over the shift in product types and package sizes that occurred when restaurants and schools closed because of COVID-19.



The focus on dairy does not mean that produce will not be purchased as the agencies have autonomy under that 85% to buy what they need. Many emergency feeding agencies will be looking for fresh produce as well. In fact, they will likely be looking for products that are not normally in the donation stream that are not usually available. And that could be items like melons, or berries but maybe even something more common like peppers or tomatoes if donations are low this year.

If you have excess product, add yourself to the NourishNY list the NYS Department of Ag & Markets has developed. It is sort of a matchmaking site for buyers and sellers in the program. Enter your profile and the products you have available, as well as transportation details, and agencies in your area can find you. <u>https://agriculture.ny.gov/NourishNY</u>

As a seller, remember some of the agencies might be small and have limited refrigeration or storage space so make sure to clarify delivery details. Also know that since they will be paying a current wholesale price for Grade A product, they should receive Grade A product. Sometimes the inclination is to supply lower grades since it's for emergency feeding. Those unsalable but edible crops are still welcome as donations but if there is a price similar to what would be reported on the AMS (USDA Agricultural Marketing Service) website for a particular grade, that is the grade that should be received.

Funds need to be expended by October so NY farmers, this season, will definitely see the results of this buying. If you have any questions about the program or how to be in the suppliers list, please call Maire at 845-344-1234 x256 or e-mail at mru2@cornell.edu.

Food Safety News

Elisabeth Hodgdon, CCE Eastern NY Commercial Horticulture

New Handwashing Station Plans Available

Improving accessibility to handwashing stations with running water around the farm can go a long way toward improving food safety and minimizing COVID transmission. Now that summer is here, farm stands, farmers markets, and pick-your-own operations are getting busier. Consider building your own station for customers to use as they enter your retail area or fields. Post signage near the station so that visitors know your handwashing policy, and the proper protocol for washing their hands.

Chris Callahan and Andy Chamberlain of the University of Vermont Extension Ag Engineering group released two handwashing station design plans earlier this month and tested them out at a farmers market. Their designs feature a foot pedal-operated spigot to minimize hand contamination between customers, hands-free paper towel and soap dispensers, and gray water collection with an easy to maintain design.

Check out their designs on the UVM Extension Ag Engineering blog: http://go.uvm.edu/handwashingstation



Handwashing station at farmers market. Photo: UVM Extension Ag Engineering

Printable signs demonstrating handwashing protocols:

https://foodsafety.ces.ncsu.edu/wp-content/uploads/2020/03/Handwashing COVID-19 Flyer 031220-1.pdf?fwd=no

https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseasesconditions/coronavirus/covid-19-handwashing/covid-19-handwashing-eng.pdf

Online Produce Safety Alliance Grower Training Course Discount Available to NY Growers

At least one person from farms covered by the Food Safety Modernization Act's Produce Safety Rule must attend the PSA Grower Training Course. During the pandemic, in-person PSA Grower Training Courses normally held around the region are now held remotely. A temporary policy from the Produce Safety Alliance allows courses to be held remotely by Zoom or other online platforms. Prior to the pandemic, an online course was developed to take the place of in-person courses. The course is offered over three weeks, and participants can complete the course modules at their leisure. The online course differs from the temporary remote-delivered courses in that the participants do not need to all be present at the same time, and requires a longer

time commitment (15-30 hours) and completion of assignments. The online course is ideal for

growers who cannot dedicate longer periods of time during the day to complete a remote course, and want to work on the course material during off-hours and for shorter periods of time.

A discount is being offered right now for the online course, which normally costs \$150 during the pandemic. New York State growers (only) are now eligible to register for the course for only \$60 using discount code NYGROWER20. Note that out-of-state growers and government employees are not eligible. The discount code expires Sept. 30, 2020.

To register for the online course and to read more about the format and content: https://producesafetyalliance.cornell.edu/training/grower -training-courses/online-psa-grower-training-course/

Leafhoppers—Check Your Potatoes and Beans! Chuck Bornt, CCE Eastern NY Commercial Horticulture

We have been getting some reports of potato leafhoppers (PLH) throughout the region and with this hot and dry weather, they are really hitting their stride and starting to cause some significant damage in some early potatoes and beans. I cannot stress enough that getting on them early will help save some yield later on. Hay and straw cutting has occurred in most of the region, which tends to make the problem worse in our vegetable crops. I've even seen some years where PLH will also go after strawberries and eggplant. Concentrate scouting on early potato varieties (Norland, Red Gold, Yukon Gold etc.) as they seem to be the most susceptible and impacted by PLH, but also don't forget that snap beans are just as susceptible if not more especially when they are small.

Usually the first sign in potatoes is what we call hopper burn where leaf tips and margins tend to turn brown and get "crispy" looking or you may also notice a purpling on the tips of leaves (Figure 1) – if you are seeing this kind of damage, you have already started to lose some of the yield potential. Adult leafhoppers are wedge-shaped, iridescent green in color, and 1/8 inch long (Figure 2). The body is widest at the head. They are very active usually running sideways or flying up in the air only to land quickly. The newly

emerged nymph is nearly colorless with red spots that quickly fade. From there they will develop a yellow color and then change to pale green in the third instar. The nymphs do not fly but are very active on the undersides of the leaves. PLH damage in snap beans tends to distort the leaf and plants become stunted and malformed looking. In some ways it can appear to be herbicide damage.

Scouting/thresholds: Generally anytime you enter the field and disturb the plants and PLH is present, you will see the adults fly up and land again very quickly – if you're lucky enough you might even get one to fly up our nose - that's when you know they are there! You can also examine tractor radiator and air intake screens for adult leafhoppers while doing any kind of field work such as cultivation or hilling operations.

You can also use a sweep net or place yellow sticky traps near the field edges. Nymphs are best



Figure 1: Hopper burn turns leaf margins and tips purple and then brown. Photo: ADI



Figure 2: Potato leafhopper nymph and adult. Photo: Univ. of Minnesota (Continued on page 8)

sampled by visual examination of the undersides of leaves on the lower half of the plant. **Threshold: treat when more than one adult is found per sweep or more than 15 nymphs are found on 50 leaves.** (Source: CU IPM Guidelines for Vegetables)

Control: For conventional growers Dimethoate 400 (dimethoate) has been the go to material but many products are effective including many of the pyrethroids (Warrior II, Baythroid, Tombstone, Pounce etc.). Lannate is also another effective material. Keep in mind that usually multiple applications of these materials will be required for control. Besiege (Coragen plus Warrior) at 5-8 ounces per acre would give you a quick knockdown and 5 days or so of residual control, but there is a 14 day PHI so if you have beans or potatoes you plan on harvesting soon after application, you should choose a different material. To make your decision even more difficult, you need to consider the population of Colorado potato beetles present and what materials you might have already used.

- If there are Colorado potato beetles and you did not use a neonicotinoid (IRAC group 4) at planting as either a seed piece treatment or in-furrow spray (Admire Pro, Advise, Platinum, Crusier, Crusier Max, Verimark etc.) or as a foliar application this spring to control CPB, than Assail or Leverage would be good choices for both PLH and CPB.
- If any of these materials mentioned above or another IRAC group 4 were used at planting or foliar for potato beetles, use Dimethoate 400, Warrior II, Baythroid, Tombstone, Pounce, Lannate, Besiege or other materials labeled for PLH. To control CPB, review the Colorado potato beetle management article found in the June 10 Vegetable News.

For organic growers, timing and coverage of the plant is essential. Pyganic plus a sticker like NuFilm P or better yet M-Pede (an insecticidal soap with some activity by itself and also helps as a sticker), applied late in the evening will work for a quick knockdown but should be followed up within a couple days with another application. If you have a high pH water, buffering with something like citric acid to a pH 6.5-6.0 will also improve Pyganic efficacy. Other materials include azadirachtin containing products (Ecozin Plus, Aza-Direct, AzaMax etc.), but only provide suppression of nymphs. In addition, Surround, a type of kaolin clay, can also be used as a deterrent (will not kill them), but needs to be applied often to keep new growth covered or to replace what's been washed off by rain or overhead irrigation. However, you need to have good agitation in your sprayer as it can be difficult to spray out and repeated use of Surround can wear out nozzles so make sure you calibrate after every couple of uses.

Remember that it does not matter if you are using conventional or organic insecticides – in order to minimize exposure to bees, make sure to apply foliar insecticides late in the afternoon, evening, or at night.

Corn Trap Counts								
County	ECB-E	ECB-Z	FAW	WBC	CEW			
Albany	1	0	0	0	N/A			
Clinton 1	0	0	0	0	0			
Clinton 2	0	0	0	0	0			
Columbia	0	3	0	0	N/A			
Dutchess	0	0	N/A	N/A	2			
Essex	0	0	0	0	0			
Orange	0	1	N/A	N/A	5			
Ulster 1	0	0	N/A	N/A	7			
Ulster 2	4	6	0	0	3			
Ulster 3	0	0	N/A	N/A	N/A			
Washington	0	0	0	0	N/A			

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