



# Berry Notes

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Prepared by the University of Massachusetts Fruit Team

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## CROP CONDITIONS

**Strawberry** harvest has begun. Continue checking for two-spotted spider mites through harvest. Tarnished plant bug can still cause damage to late fruit. Also, check soil in fields with failing plants for white grubs or root weevil larvae. Root weevils, especially Black Vine Weevils, appear to be a growing problem throughout New England. Remember to pick blossoms on new plantings. Also, check new plantings for infestations of potato leafhopper. **Blueberry** fruit are developing. Some growers have noticed high levels of Japanese beetle grubs in the soil around blueberry plantings. We are still awaiting word from USEPA on our petition for a Section 18 Emergency Label for the use of Admire® insecticide on both strawberries and blueberries for controlling Oriental Beetle larvae feeding on roots. Cranberry fruitworm moths are here. Blueberry maggot fly will be coming soon. Keep an eye out for aphids on new shoots. These insects can vector Blueberry Scorch Virus. **Summer raspberries** are beginning to bloom. Gray mold protection is key during bloom. Cane diseases may be starting to show up on primocanes. Keep up the monitoring for tarnished plant bug and mites (two-spotted spider mites and European red mites). Watch for potato leafhopper on **fall-bearing raspberries**. They can cause significant stunting and leaf-curl at this time of year. **Black raspberry** primocanes should be tipped back to about 2.5 or 3 feet. This will encourage sturdy canes with lateral branching. Avoid tipping in wet weather. **Blackberries** are in full bloom. **Grapes** are progressing toward bloom. Disease management will remain a high priority. Continue to monitor for grape berry moth. Potato leaf hopper have been found on Long Island vineyards and are likely to be here, too. Japanese beetle will be emerging from the soil in the next 7 – 14 days.

## ENVIRONMENTAL DATA

This information is intended to be used as a guide for monitoring the developmental stages and planning management strategies of pests in your location. Growing degree day (GDD) and precipitation data was collected for the one-week period, May 30 through June 5, 2002. Soil temperature and phenological indicators were observed on June 5, 2002.

Region/Location	Growing Degree Days		Soil Temp (4" depth)	Accum. Precip
	1 Month Gain	Total		
<b>Cape Cod:</b> Barnstable	103	394	62° F	0.60"
<b>Eastern:</b> Hanson	105	456	65° F	0.65"
Waltham	119	585	62° F	1.34"
<b>Central:</b> Boylston	103	377	55° F	0.40"
<b>Western:</b> Amherst	114	474	55° F	0.25"
Great Barrington	101	467	59° F	0.61"

(Source: UMass Extension Landscape Message #14, June 7, 2002)

# STATE WEATHER SUMMARY For the Week Ending Sunday, June 9, 2002

Prepared by AWIS, Inc. (available at <http://www.nass.usda.gov/weather/cpcurr/new-eng-crop-weather>)

STATE	AIR TEMPERATURES				PRECIPITATION	
	LO	HI	AVG	DFN	LO	HI
ME	27	76	53	-7	0.00	1.67
NH	16	80	55	-6	0.24	2.71
VT	27	85	56	-5	0.30	3.06
MA	34	79	59	-5	1.34	3.16
RI	38	78	60	-4	1.70	2.64
CT	38	82	61	-4	1.84	3.35

(Source: New England Ag. Statistics Service, Weekly Crop Weather Report, Volume 23, No. 7, June 10, 2002:)

## Strawberries

### Disease Management Update in Strawberries

Sonia Schloemann, UMass Extension

Prolonged wet weather always raises concerns about disease problems. Gray mold caused by *Bortyris cinerea* is the disease most often discussed in this context. But, other diseases can also cause significant damage and yield losses. Among these are **angular leaf spot** caused by bacteria and the 'water molds', **red stele and leather rot** caused by fungi.

#### Angular Leaf Spot

Angular leaf spot is a bacterial disease caused by *Xanthomonas fragariae*. This bacterium infects only strawberries. It is sporadic in New England, but it can be important when it strikes. This disease causes leaf, petiole and calyx spots in New England, but has been reported occasionally to kill plants in California. It is favored by wet, cool (65• F in day, 35• F at night) weather.

*Symptoms* - Tiny water soaked spots appear on the lower surface of the leaves, which are angular in shape because they are bordered by veins. When the leaves are held up to the light, the spots are translucent. When viewed normally, they are dark green. Later, the spots will grow together to form larger, reddish-brown irregularly shaped spots, which may become surrounded by a yellow ring. These larger spots often follow veins. The leaf will have a ragged appearance. Spots can also appear on the petioles and on the calyx of the fruit, darkening them and making the fruit less attractive. In wet weather, a thick fluid can appear on the undersides of the infected leaves, which will dry to a shiny brown varnish-like film. This fluid and film is diagnostic for this disease.

*Control* - If this disease has been a significant problem, rotate the affected field away from strawberries for at least one year. When replanting, space plants widely in the row and plant narrow rows to maximize air circulation within the row. If the field is to be kept over, remove as much leaf debris from fields as possible at the

time of renovation. Avoid working in the fields when the plants are wet.

Scouting should begin in fields that have a history of the disease as soon as buds extend from the crown, and should continue until bloom. If symptoms are seen, discontinue irrigation unless needed for frost protection or if weather is very dry. If irrigation is needed, time it so that plant dry off from morning dew for 1-2 hours before irrigation is turned on and/or so that plants dry for 1-2 hours before dew settles on to the plants in the evening. Some guides recommend the use of copper containing fungicides for control of angular leaf spot. However, the general opinion is that copper is not very effective and may cause phytotoxicity if used improperly. Cultural practices that minimize wetness and maximize drying are the best options for controlling this disease. Cultivar selection can also help. Cavendish, Annapolis, Allstar, Honeoye and Kent are very susceptible to angular leaf spot.

#### Leather Rot

Leather rot is caused by the fungus *Phytophthora cactorum*. It can infect the crowns, runners, and fruit of strawberry, and many other plants as well. This disease is more common in southern and midwestern states than in the Northeast. When it does affect this area, losses can be quite high. This disease is favored by wet weather, and temperatures of approximately 60• to 80•F. It can progress quickly when conditions are favorable, causing huge losses in just a few days.

*Symptoms* - On immature fruit, brown to dark brown spots that remain firm appear. The spots expand quickly until they cover the entire fruit. The fruit appears dark and leathery in texture, inside and out. Mature fruit may become soft and be dull pink to lilac, or may remain a normal color. When the fruit is split open, it usually has a sharp, pungent smell. The fruit tastes quite bitter. A white fuzzy growth may appear on the fruit if conditions are moist or if it is placed in a plastic bag with a moist paper towel for a few days.

*Control* - The fungus, *Phytophthora cactorum*, is in the soil, and can infect fruit after being splashed onto it by rain or by the fruit being in direct contact with the soil. A thick layer of straw mulch is important to keep the fruit off the ground and to prevent the soil from splashing onto the fruit. Mulching with straw rather than plastic prevents the berries from sitting in water. This disease is worse in wet situations, so plant in well-drained soil and avoid compacting the soil around the plants. Plant narrow rows and space plants widely within the row to keep the canopy dry. Plant in an area with good air circulation and control weeds to improve air circulation. Irrigate in the morning so that plants dry quickly.

There are systemic fungicides that will help manage infections by *P. cactorum*. Ridomil Gold 4EC (mefanoxam) and Aliette (fosetyl-Al) are registered for control of leather rot and can provide significant control especially when combined with the use of the cultural practices mentioned above.

### **Red Stele**

This disease is caused by the soil-borne fungus *Phytophthora fragariae*. Many commercial strawberry cultivars are susceptible to the red stele fungus while many are resistant to one or more strains. This root rot disease has become a serious problem facing strawberry production in the northern United States. The disease is most destructive in heavy clay soils that are saturated with water during cool weather. Once it becomes established in the field, the red stele fungus can survive in soil up to 13 years, even if no strawberries are grown during that time.

Normally, the disease is prevalent only in the lower or poorly drained areas of the planting; however, it may become fairly well distributed over the entire field, especially during a cool, wet spring. The red stele fungus may become active at 40• F. However, the optimum temperature for growth and disease development is between 55-60•F. Under favorable conditions of high soil moisture and cool temperature, plants will show typical disease symptoms within 10 days after infection.

*Symptoms* - When plants start wilting and dying in the more poorly-drained portions of the strawberry field, the cause is very likely red stele disease. Infected plants are stunted, lose their shiny green luster, and produce few runners. Younger leaves often have a metallic bluish-green cast. Older leaves turn prematurely yellow or red. With the first hot, dry weather of early summer, diseased plants wilt rapidly and die. Diseased plants have very few new roots compared to healthy plants that have thick, bushy white roots with many secondary feeder

roots. Infected strawberry roots usually appear gray, while the new roots of a healthy plant are yellowish-white.

The spores of *P. fragariae*, which reside in infected soils, are attracted to developing strawberry rootlets. After infection, the roots begin to rot from the root tip upwards toward the crown causing a characteristic reddening of the inner portion (stele) of the root; thus, the name "red stele". The best way to identify the disease is to carefully dig up a wilted plant and peel off the outside portion of several roots. If the stele is pink to brick red or brownish red, the plant has the red stele disease. The red color may show only near the dead tip of the root or it may extend the length of the root. The red stele is best seen in the spring up to the time of fruiting. No other disease of strawberry produces this symptom.

*Control* - Red stele development is favored by cool, wet soil. As a result, proper site selection and preparation are both important management tools for this disease. Soil drainage (both surface and internal) should be good because red stele requires free water (saturated soil) in order to develop. Avoid low-lying areas which tend to have poor water drainage. If the site selected does not have good soil drainage, the strawberry planting should be established on raised beds of 10 inches or more. The raised beds will allow excess soil water to drain away from the strawberry root system, creating an environment less favorable to the disease causing fungi. In addition, less soil compaction will occur near the root system. Be sure to clean cultivators or equipment used to build raised beds to insure that soil is not being carried from red stele infected fields.

If a high-risk site is being planted to strawberries, select varieties with resistance to the red-stele disease. These include: Allstar, Darrow, Delite, Earliglow, Guardian, Lateglow, Lester, Midway, Redchief, Redglow, Sparkle, Sunrise and Surecrop. (Note: The varieties classified as "resistant" are not resistant to all strains of *P. fragariae*. Therefore, it is possible that a new planting may again succumb to the disease if the site has poor drainage or if the site is improperly prepared.) Also, inspect transplants carefully before putting them in the soil to be sure they are not already infected with red stele.

There are systemic fungicides that will help manage infections by *P. fragariae*. Ridomil Gold 4EC (mefanoxam) and Aliette (fosetyl-Al) are registered for control of red stele. If red stele develops in an established planting, these fungicides should help control the disease especially if used in combination with good cultural practices. However, fungicides should not be used on a routine or preventative basis. Such use would be uneconomical and might result in the development of resistance by the fungus to these materials.

## **One More Time About Quadris Fungicide .....**

We have mentioned this a couple of times, but since the consequences are so severe, we should mention it again. In last week's message, Mike Ellis' excellent article about disease management in strawberries, Quadris®

fungicide was mentioned for managing anthracnose infections. It is important to remember that Quadris® and Abound® fungicides contain the same active ingredient which is highly phytotoxic to several apple cultivars. DO

NOT spray either of these compounds in the vicinity of apples where any drift might occur. Furthermore, DO NOT use the same spray equipment on apples that has

been used to apply either Quadris® or Abound® on other crops. Even when thoroughly rinsed, enough residue may remain to KILL apple trees!

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## Brambles

### Black, Purple Raspberries, and Blackberries: Summer Heading (Tipping)

*Richard Funt, Ohio State University*

If shoots of these plants are allowed to grow unchecked, they get long and are very difficult to manage without support of some kind. To prevent this, the tips of new canes should be pinched off (headed) when the canes have reached a certain height. This induces growth of side branches and results in plants that are stocky and self-supporting and have a large amount of bearing wood.

Black raspberry shoots should be tipped when canes reach about 28 to 30 inches. Brandywine purple raspberries are usually tipped about 36 inches. Erect blackberries are permitted to grow to a height of about three feet before tipping. Generally, plant height will be less than two feet for the planting year. Therefore, heading is done every year from the second season. Royalty purple raspberries do not require heading, because their growth is similar to red raspberries.

In heading, the usual practice is to remove four inches of the top. It is necessary to go over the planting several times, because all shoots do not reach the same height at the same time. If shoots are permitted to grow much above the desired height and then headed, the extra shoot growth is wasted, and the side branches will not be as strong as if heading had been done at the proper time. The laterals should not be shortened until the following spring.

In most cases, the laterals mature sufficiently well and are not winter-killed to an extent that yields are lowered. Canes that do not reach the height for tipping by the time harvesting is started are usually not tipped. These weak canes will not grow much higher, and late tipping results in weak, immature laterals. (*Source: Ohio State University Bulletin 782-99 Brambles - Production Management and Marketing*)

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## Blueberries

### Insect Update

*Sridhar Polavarapu and Dean Polk, Rutgers Univ.*

**Blueberry Maggot (BBM):** Adult flies are active for the past 10 days. Trap counts should increase over the next several weeks, and be over on most farms by late August. This will be the primary insect pest target through late June and July. Female blueberry maggot flies emerge a few days before the males. Females seek at will hatch in 4-6 days. Therefore, the target for all insecticide applications for managing blueberry maggot populations is the adult stage.

**Oriental Beetle:** Adult beetles are emerging for the past 10 days. Egg laying will begin in the next few days and will continue for the next 3-4 weeks. These eggs will begin hatching usually towards the end of June. Admire 2F (imidacloprid) applied targeting the newly hatched grubs is most effective in suppressing oriental beetle grub population [*Ed. Note: Admire has not yet been*

protein (usually from bird droppings) as they emerge and require 7-10 days for egg maturation. Following this maturation period, females lay eggs just beneath the ripe or ripening blueberries. Once an egg is inserted into a berry, insecticides will not be able to kill the egg or the maggot th

*approved for use in Massachusetts*]. Please note that the PHI of Admire is changed to 7 days this year. My recommendation is to apply Admire after harvest in Duke and other early maturing varieties and apply now on Bluecrop and later maturing varieties.

Pheromone traps are highly effective in trapping adult male oriental beetles. Trap catches in blueberry blocks that are heavily infested with oriental beetle grubs are usually in excess of 1000 beetles per trap per week at this time. (*Source: Blueberry Bulletin, Vol. 18, No. 9, June 13, 2002*)

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## Grapes

### Shoot Positioning in Grapes

*Bruce Bordelon, Purdue University*

Shoot positioning in grapes is done to reduce shading of the renewal zone for improved fruitfulness next year and to improve sunlight exposure of fruit clusters. Varieties

differ in their need for shoot position due to their growth habit and vigor. Some varieties such as Vignoles and Chancellor tend to have relatively short shoots that stand up well on their own,

so shoot positioning is seldom needed. Other varieties such as Traminette, Foch and all the American varieties produce horizontally growing shoots that tend to run along the top of the trellis and cause significant shading of the fruit and renewal zone. Shoot positioning is very important with these varieties. Other varieties vary depending on vigor of the particular site. For high cordon systems, shoots are positioned downward on both sides of the row to improve sunlight exposure to the fruit and renewal zone. The first positioning can usually be done a week or two before bloom. Wait a week if significant shoot breakage occurs. Repeat the positioning about 2 weeks after the first round. If you wait too long, the tendrils will begin to attach, and significant shoot breakage can occur. Timing is very important to reduce shoot breakage and accomplish reduced shading in the renewal zone in time to improve fruitfulness. Fruit bud development begins about bloom so shading during this time can reduce fruitfulness for next year. With vertically shoot-positioned (VSP) training, the shoots are vertically

trained upright above the cordon (or cane). Catch wires are used to support the shoots, which are manual tucked into position. Shoot positioning on VSP is done as shoot length warrants. The first set of catch wires is typically at 8 to 12% above the cordon. When the majority of shoots are at or above this point, the first round of positioning is done. If positioning is delayed too long the cordon (or cane) may rotate and shoots will be pointing down or to the side. It is difficult to turn shoots back up to a vertical plane once they've fallen. The same problem can occur if the first set of catch wires is placed too high above the cordon. Some growers use movable catch wires to help position shoots. The wires are released from their holders and kept beneath the cordon during the winter. Pairs of wires, one on each side of trellis posts, are brought up to a fixed position above the cordon, bringing the shoots into a vertical plane in the process. Various shoot „taping% or tying systems are commercially available to attach shoots to the trellis wires if necessary. (*Source: Facts for Fancy Fruits, 2002-07 June 7, 2002*)

## General

### Water Safety Issues on the Farm

*Craig Hollingsworth, UMass Extension*

On your farm, you may use water for irrigation, applying pesticides and fertilizers, cooling and/or frost control. In packing operations, water is used to cool and wash produce, to clean and sanitize your plant, and to wash your hands. If the water you use is contaminated with pathogens, you run the risk of contaminating the food you grow and sell.

Water can be the source of a variety of pathogens including *E. coli* O157:H7, *Salmonella spp.*, *Shigella spp.*, *Cryptosporidium parvum*, *Giardia lamblia*, *Cyclospora cayetanensis*, and the Norwalk and hepatitis A viruses. Contaminated water used for irrigation and washing produce has been linked to outbreaks of *Salmonella*, *Giardia* and *Cyclospora*.

Municipal or public water systems are the best source of water for any on-farm use and present the lowest risk of contamination. Public water supplies are monitored and treated for contaminants. Private wells that are tested annually and found to be safe are also unlikely to contaminate produce. Ground water is less likely to have microbial contaminants than surface water. Surface water (ponds and streams) is most likely to be affected by watershed activities and season and, therefore, present the greatest risk of contamination from harmful pathogens.

#### What can you do?

**Recognize the risks associated with your water source.**

The risk for contamination of your produce with water depends on a number of variables including:

- what you are growing (cantaloupe or lettuce may be more risky because they are grown close to the ground and may be difficult to clean)
- whether your crops are grown near the ground or on bushes, canes, or trees
- your source of irrigation water
- the condition of your water supply system--well or public

Take a look at the source of your water; consider possible sources of contamination, including animal pastures, manure storage facilities, feed lots, faulty septic systems and high concentrations of wildlife. Was your land always used for agriculture? What potential sources of contamination are in the watershed area--sewage treatment plants, chemical plants, livestock operations?

#### **Test your water**

Water testing can be useful tool, providing you with information about the quality and safety of your water supply. Contact your local or state health department for the names of laboratories licensed to test water.

Standard/conventional water tests will tell you if your water supply contains “fecal coliforms” or “generic” *E.coli*, but does not tell you about the presence of pathogens (bacteria, viruses or parasites that can make you sick) like *E. coli* O157:H7. If you are concerned about possible contamination by specific bacteria or other pathogens, you should request that your water sample be tested for these.

*If you use municipal water--*

- request records regarding their testing programs for your files, annually.

*If you use well water--*

- it is recommended that you test the well water 1-2 times per year.
- to process your produce, you will need to test well water at least once per year to comply with processing regulations.

Note changes in your water quality, such as cloudiness after a storm may indicate that surface water is contaminating your well. Check your well construction and pump. Divert any surface water that pools away from the well head. Test the water again soon after a storm.

*If using surface water for irrigation--*

- testing can be useful tool in determining your risk for contamination. Test surface water three times per year--at planting, at peak use and at or near harvest. A single test may not indicate the potential for water to be contaminated. If pathogens are present in low numbers, they may not show up in your test.

**☑ Keep records for all water tests**

Record test results, review them regularly and note changes in water quality over time. In addition to water analysis test results, you should keep records of well construction details and dates, and maintenance records for the well and pump.

*[Adapted from the New England Extension Food Safety Consortium]*

## Food Safety During Harvest

*Craig Hollingsworth, UMass Extension*

Good sanitation practices during harvesting can help to reduce the risk of microbial contamination of fresh produce. Soil, fertilizers, harvesting equipment, water, workers, pets and pests can all be sources of harmful microorganisms that can cause foodborne illness. Therefore it is important that grower's set up measures to help prevent these sources of microorganisms from contaminating produce.

Good sanitation practices include cleaning and sanitizing all food contact surfaces, encouraging worker hygiene and training and keeping animals out of fields, orchards and packing house.

### **What do we mean by "food contact surface", "cleaning" and "sanitizing"?**

A **food contact surface** is a surface that comes into contact with the fresh produce any time during harvesting, packing or transporting.

**Cleaning** means to remove soil and residues from food contact surfaces by washing and scrubbing with soap or detergent, then rinsing with clean potable water.

**Sanitizing** means to treat a food contact surface with a sanitizing solution that will kill most microorganisms. Surfaces must be cleaned first before they can be sanitized. Soil and soap residues can inactivate the sanitizing solution.

A **sanitizing solution** is made by mixing a small measured amount of a sanitizer with potable water according to the directions given by the manufacturer.

A **sanitizer** is a chemical compound designed to kill microorganisms. The most commonly used are chlorine bleach and quaternary ammonium compounds.

### **Take a walk through your harvesting operation and check for these signs of potential food safety hazards:**

- ☑ Pets, livestock, poultry or wildlife in fields
- ☑ Human or animal waste in fields and orchards
- ☑ Sick or unclean workers
- ☑ Dirty harvest containers
- ☑ Produce laden with dirt or manure
- ☑ Broken and dirty harvest equipment

### **What can you do?**

- ☑ Wash, rinse and sanitize, when possible and practical, all crop containers before harvest.
- ☑ When sanitizing, use an approved sanitizer according to the manufacturer's directions. Common sanitizers include chlorine bleach and quaternary ammonia. Store sanitizers and solutions away from the produce.
- ☑ Cover harvest containers to keep crop dust, animals, insects and birds out.
- ☑ Clean harvesting aids each day with potable water. This means they should be free of visible soil and residue.
- ☑ Keep harvesting equipment in good working order. Set up a maintenance schedule.
- ☑ Train workers to follow good hygiene practices.
- ☑ Do not haul produce in equipment that has been used to transport garbage, manure or animals.

*[Adapted from the New England Extension Food Safety Consortium]*

## Pre-Harvest Checklist for Pick-Your-Own

David Handley, Univ. of Maine

It's that time again! As harvest approaches, make sure that your customers are going to have an enjoyable experience. Review the checklist below to evaluate your customer readiness.

- Signs to the farm are neat and easy to read
- Easy access to the fields and plenty of parking
- Someone is ready to greet customers and offer parking instructions and directions to the field
- Access to the field is free of hazards
- Transportation is provided for the elderly and disabled
- The rules regarding picking are clearly posted
- Someone is in the field to show customers where to pick and to answer questions
- There are plenty of picking containers available
- Clean restroom facilities are available
- Handwashing station is available
- Someone is available to help customers carry fruit out of the field
- The checkouts are fast and efficient
- Beverages are available
- Shade and seats are available for customers wanting to rest
- The help are friendly and knowledgeable

Your clean, neat and friendly atmosphere will leave a lasting impression on your customers, encouraging them to come back and to recommend your farm to their friends.

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## Meetings

### Vermont Twilight Meeting

**Tuesday June 18, 2002, from 5 to 7 pm at Crossroad Farm, Fairlee VT.** Tim and Janet Taylor operate a diversified vegetable, berry and ornamental farm with 13 greenhouses and high tunnels and 50 acres in cultivation. Dairy manure is the primary source of soil fertility in the fields, and the many weeds that result are managed without herbicides. Tim will demonstrate cultivation equipment he uses, including: a Perfecta field cultivator, Lely tine weeder, Budding baskets, 'bat-wing' shovels, Lilliston rolling cultivators and his latest tool, a Reigi weeder, which has PTO-driven rotating mechanical fingers that are steered by an operator.

**Directions:** Take Exit 14 off I-91 (Thetford), turn west onto Route 113 and go about 7 miles. North of Post Mills look for the state sign saying Crossroad Farm. Turn right, the farm is a half mile on the right. From the northwest, take the Exit 5 (Northfield) off I-89 onto Route 64 east into Williamstown. Turn right onto Route 14 south. Just past the village turn left onto Williamstown Rd. Take that over the hill to Route 110, turn right go to Chelsea, then turn left onto Route 113 east. After West Fairlee turn left on Crossroad, the farm is about a half mile on the right. (*Source: Vermont Vegetable and Berry News, June 15, 2002*)

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