



berry mg  
Vol. 8, No. 67  
Sept. 7, 2007

## Strawberry Drought Advisory No. 4

Dear Growers and Agents,

You may wish to check out Jeff Masters' blog about an area of disturbed weather ([99L](#)) that formed along an old frontal boundary has grown less organized over the past 24 hours. I think what is most promising is the comment: "I wouldn't be surprised to see 99L become a tropical storm on Saturday. Most of the computer models bring 99L to the coast of North Carolina on Sunday. This does not give it much time to develop, and it is unlikely 99L would be able to intensify into a hurricane. The storm may not develop into a tropical cyclone at all, but even as a non-tropical storm, residents of the Carolinas can expect heavy rain and high winds on Sunday from this system. The storm is then expected to track northward and then northeastward along the coast, bringing heavy rains to the mid-Atlantic and New England areas on Monday and Tuesday. The Hurricane Hunters are scheduled to investigate 99L at 2pm EDT today, but NHC may cancel this flight unless 99L shows some significant improvement in organization."

<http://www.wunderground.com/blog/JeffMasters/show.html>

*Comment from VA Beach area (9/6/07)*

We watered (so far) 2 of our 2.5 acres of bone dry dust so we could fumigate and lay plastic. We got our moisture "right" and started with plastic today. Now they say that tropical-storm-wannabe Gabrielle might bring us a lot of rain and maybe wind on Saturday-Sunday. We don't need a bunch of rain to wash our ryegrass seed away or wind to mess up the plastic! Why can't Mother Nature get it right??? We need to invite her to speak at Expo and give us some "understanding." The room would be packed if you could get her on the schedule!

Tom Baker, Brookdale Farm  
Virginia Beach, VA

*Discussions with growers in NC yesterday*

1) From a grower near Salisbury NC, I learned yesterday that they had to irrigate 3x to get their land ready for fumigation and laying plastic. Each time they applied 1 inch (over 3 hours). After each irrigation, they have waited 1 day. After their final irrigation

yesterday, they plant to make beds for strawberry planting (in late Sept.) on Saturday. They have red clay. Their hope is to only have to irrigate the land 2x for the remaining acreage they must do next week.

2) Some issues with remaining water in ponds and fresh dug bare-root plants: Growers planning to use fresh dugs should evaluate their remaining water resources. In a Labor Day advisory, I erroneously reported that fresh dugs need about 8.3 gallons/plant, but the corrected figure is 11.6 gallons, or 174,000 gallons per acre (15,000 plants/A). This compares to about 21,000 gallons for plugs, 1.4 gallons each. One acre-inch of water is about 27,000 gallons, and one-acre foot is about 326,000 gallons. Thus, a fresh dug plant establishment program that normally requires at least 7-8 days of continuous irrigation during the day, is going to use up 6.4 inches per acre (0.53 acre-ft). If you are planting 4 acres of fresh dugs, you will potentially need more than 2 acre-feet of water. Do you have this kind of water left? One large tanker truck holds 30 metric tons of water, or 8,000 gallons. You would need 3.4 tanker trucks just to supply 1 acre inch of water!

3) A possible planting strategy suggested by one grower yesterday: Think about "diversifying" your plant types. In case you do not get any significant rain between now and planting time, you may wish to have a portion of your crop in plugs? It would be a tragedy for you (and your customers) to get up to planting time and discover that you don't have the water resources to establish a fresh dug plant!! This is why you may need to contact your plant supplier today about a hedging strategy where you plan for the possibility of not having quite enough water to plant 100% of your crop in fresh dugs.

For example, if you have 4 acres to plant, you could split the difference and set 50% fresh dug and 50% plugs, and the water saving would be 153,000 gallons/acre x 2 acres = 306,000 gallons -- that's almost one acre-ft of water (326,000 gallons). The added plant cost (for plugs) is about \$100/thous plants, or \$1,500/acre (\$3,000 for 2 acres). You may need to view the added cost for plug plants from the standpoint that you may not get to plant those 2 acres at all this fall (having only enough water to do 2 acres of fresh dugs), and what would be the cost to your operation of having just 2 acres for picking next spring vs. 4 acres? Unfortunately, the time to think about diversifying your plant types has just about run out -- I would say that you may have a few more days to place a plug order, or purchase some tips (these would not be ready until sometime in 1st week of October for planting).

4) No short cuts with fresh dugs (you cannot stretch your water with fresh dugs): If you try to limit irrigation during fresh-dug plant establishment, there is an excellent chance that **the planting will completely fail**. Please realize that there are no short-cuts in establishing fresh dug plants as far as watering. I located some older web articles on irrigation for fresh dugs:

[http://intra.ces.ncsu.edu/depts/hort/berrydoc/sept9\\_03/index.htm](http://intra.ces.ncsu.edu/depts/hort/berrydoc/sept9_03/index.htm)

Typically, it is important to plan on at least 7 days of CONTINUOUS overhead watering (in some years it is necessary to have up to 10-12 days). Start the irrigation each morning

when the plants show the first signs of wilting and continue to irrigate (1/10th inch per hour) until the hot part of the day has passed. After several days, irrigation can be initiated later in the morning and can be discontinued earlier in the afternoon. This is not irrigation for drought control this type of irrigation is essentially for evaporative cooling purposes. The purpose of this type of irrigation is to prevent foliage loss until the root system can get established again. The goal: you must make sure that plants have 3 or more fully green leaves (original) remaining at the end of the establishment period (Figure 7).

Related:

[http://intra.ces.ncsu.edu/depts/hort/berrydoc/sept25\\_03/index.htm](http://intra.ces.ncsu.edu/depts/hort/berrydoc/sept25_03/index.htm)

[http://intra.ces.ncsu.edu/depts/hort/berrydoc/sept3\\_03/index.htm](http://intra.ces.ncsu.edu/depts/hort/berrydoc/sept3_03/index.htm)

### **Pointers on plugs:**

**Store and handle runner tips carefully.** Extended storage of the runner tips is generally not needed. Commercial tip nurseries can harvest fresh tips weekly starting in late July and continuing through mid-October. The tips are shipped by refrigerated truck to the grower's farm for delivery approximately 35 days prior to field transplanting. Tips may be stored up to two weeks at 34 F without deterioration in quality, but you should try to stick them as soon as possible after arrival. The boxes containing approximately 1,000 plantlets must be stacked "loose" so that the cool air can circulate freely around the boxes. The strawberry tips are living, respiring plants and must be kept cool until the grower is ready to root them under mist. The humidity in the cooler should be kept at around 75 to 80 percent relative humidity.

**Root tips with moisture.** Prior to rooting tips, additional plantlet preparation is needed to trim away excess runner-cords. An approximate 3/8- to -inch runner "stub" serves to anchor the plantlet until new roots develop. Fresh strawberry tips are best rooted under a fine mist that will wet the foliage yet put very little excess water on the soil. Keep moisture on the leaves until the plant is well rooted, about 7 to 10 days. As the roots form, the plants can be weaned from the mist and allowed to draw their moisture from the soil. Gradually reduce the mist over 2 to 5 days. Two weeks after sticking, you should be able to pull most plants from the cell with the root ball remaining intact. When that occurs, misting can be terminated. This is a suggested misting schedule for **greenhouse rooting**:

- Days 1-3: Mist from 8:30 a.m. to 6:30 p.m. for 7 to 10 seconds of mist every 7 minutes
- Day 4-5: Mist from 9:30 a.m. to 5:30 p.m. for 10 seconds every 7 minutes.
- Day 6: Mist from 10 a.m. to 5 p.m. for 10 seconds every 7 minutes.
- Day 7: Mist from 10 a.m. to 5 p.m. for 10 seconds every 15 minutes
- Days 8-10: Mist from 10 a.m. to noon and from 2 p.m. to 5 p.m. for 10 seconds every 15 minutes.

- Days 11-13: Mist from 10 a.m. to 3 p.m. for 10 seconds every hour. Move the plugs outdoors at the end of day 13.
- Days 14-28: Sprinkle for 5 minutes at 1 p.m. and possibly again in the late afternoon if temperatures are high.

For outdoor rooting of plugs, this is the program recommended by Charlie O'Dell:

*An Outdoor System* is described by Charlie O'Dell

(<http://intra.ces.ncsu.edu/depts/hort/berrydoc/odell2/>). In this article, O'Dell describes a 80' long by 40' wide outdoor system in lieu of a greenhouse or shaded structure for rooting 1000 flats (50,000 plugs). Here are some of the specifics mentioned:

- Mini-wobblers (micro-sprinklers) at 25 psi water pressure use 0.56 gpm, or 33.6 gph
- Controller time clock is set for **20 seconds of water every 3 minutes** for 10 hrs (8 am-8pm) - this equals only about 7 minutes of watering/hr x 33.6 = 3.92 gph/wobbler
- On a 12' x 12' grid, 2 sprinkler lines were 12' apart, and 6 sprinklers per lateral line were also 12' apart on each line for good watering overlap - the 12 sprinklers used only 48 gph
- The first line is placed at the outer windward edge of the plants
- The main line is 1" PVC, and the lateral lines are ¾" PVC
- 3' tall risers for the mini-wobblers were ½" PVC pipe
- Plastic electric fence posts driven into the ground tied to risers are ideal for holding steady in the vertical position
- A fertilizer injector can be installed to feed the plugs several times during the last few weeks - a backflow check valve is required
- O'Dell recommends that in the second week you should lengthen the interval between watering to 10 minutes and 30 seconds of mist; then gradually to 15 minutes off, adjusting the on-off cycles according to the temperature, wind, cloud cover and plant needs.

Indoor (greenhouse) rooting has some definite advantages in the first week or so, as you may encounter a heavy thundershower soon after setting the tips in the trays! Also, rooting outside can be pretty "tough" for the first several days, especially when dealing with a heatwave, as we experienced this summer. There is really benefit to growing under protection in the initial rooting period (10 days), and moving outdoors in the final rooting phase (see Fig.1).



Fig. 1. For outdoor rooting it pays to have someone watering around edges, as the microsprinkler pattern is affected by winds. Also, this type of watering is recommended in the final 2 weeks.

**A good photo of the type of cell I like best is shown at this web location:** see Fig. 5a and Fig 5b <http://intra.ces.ncsu.edu/depts/hort/berrydoc/june15/index.htm>

**Use the right rooting medium.** Strawberry plugs should be grown in a specially prepared medium. Many different media are available, but a soil-less media composed of peat, sand, grit, vermiculite, perlite, polystyrene, or other materials is recommended. You will need about 4 cubic feet of media for approximately 1,000 tips, in 50-cell rigid plastic trays measuring 2 by 12 by 20 inches. The 50-cell tray is suggested for small and medium-size strawberry tips. If the tips you receive from your supplier are quite variable in plantlet length, it is well worth the extra step to grade the tips by size into large, medium, and small lots. The large tips should be rooted in 38-cell trays, the medium tips rooted in 50-cell trays, and the smaller tips rooted in 60-cell trays. Sticking large tips (longer than 5 inches) in the same tray with small tips (2 to 3 inches long) will result in light competition and irregular root growth of the smaller, shaded tip plants. During misting, shaded tips are susceptible to botrytis infection.

**Acclimate the plants.** After the misting cycle is complete, move the trays to a fully exposed gravel pad for another two to three weeks of growth and acclimation before field transplanting. During this final field-conditioning phase, a single daily watering is suggested along with a weekly supplemental drench of a complete fertilizer material. A root-bound plug is desirable for mechanical transplanting; plugs for hand transplanting can be set before this stage is reached.

## **Transplant Plugs to the Field**

The ideal age of the plug for field transplanting is four weeks. Plugs held for six weeks in the trays are not as desirable and may have a slower initial growth rate in the field following transplanting.

Plug plants pose less serious problems than freshly dug for field transplanting. Pot-mulch planters or vegetable water-wheels can be used to mechanically transplant and water strawberry plugs. Careful size-grading of tip plants will produce more uniform plugs for efficient machine transplanting.

**Depth.** Do not bury the growing point of the plug plant by setting too deeply. Plug plants are not very deep; the rootballs are only 2 inches in depth for 50-cell trays. Your planting hole should not be quite as deep as the plug rootball: A 2-inch hole is recommended for a 2- to 2-inch rootball. Press the plug into the hole so that the top of the rootball is about even with the soil surface. Even if you are mechanically setting plugs with a water wheel, it is a good idea to have one or two workers following the transplanter to brush a light layer of soil around the top of the plugs rootball without covering the growing point. This soil layer is helpful in keeping the plugs from wicking out. Without this slight soil layer, the exposed artificial soil media will wick moisture out of the plug very rapidly on sunny, windy days.

**Starter solution.** Tray-grown transplants that have been under a plug propagation nutritional program do not require a starter solution at transplanting. A typical feeding program for plug transplants while they are still in the trays is to apply 1 pound of 20-20-20 per 100 gallons of water (in weeks three and four) before transplanting. This supplies roughly the equivalent of 240 parts per million (ppm) N.

**Irrigation.** A few hours of overhead sprinkler irrigation immediately following transplanting of plugs is recommended. A number of commercial growers in North Carolina use light overhead sprinkling (1/10 inch per hr) for the first, second and possibly third day following transplanting for approximately 5 hours, 3 hours and 2 hours per day, respectively.

-----  
Barclay Poling  
Extension Specialist and Professor (Small Fruits)  
Dept. of Horticultural Science  
Box 7609  
252 Kilgore Hall  
NC State University  
Raleigh, NC 27695-7609  
919-515-1195 office  
919-418-9687 cell

