

Title: Frost/freeze advisories for southern region strawberry growers

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Objectives:

Provide timely strawberry frost, freeze and heat advisories to SRSFC growers and agents that can be posted on www.smallfruits.org in the 2008 strawberry season

Justification:

In 2007, the enews product berry-mg provided both commercial strawberry growers and agents with 24/7 frost and freeze advisories that were instrumental to the success of North Carolina's growers during the April 2007 Easter Freeze (results of this program are reported on the SRSFC website). During the week preceding the weekend freeze of April 7-8, over 14 advisories were issued on berry-mg (free enews product of NCCES), and a number of these were adapted for posting on www.smallfruits.org. These advisories helped strawberry producers formulate appropriate frost and freeze protection strategies for the Easter Freeze (EF) week, as well as assisting them during various other cold events prior to and following the EF. The PI utilizes several subscription weather services as a basis for these advisories, and also pays a license fee to AWIS for permission to share various weather maps over the SRSFC website and through berry mg. In 2007, North Carolina growers were the main benefactors of this service, and with financial support of this initiative, this program can be successfully extended into other states participating in the SRSFC. Part-time assistance of a trained person in meteorology will be required as well as subscription funds for AWIS, and licensing fees for re-producing regional weather maps.

Methodologies:

- 1) Subscribe to several private weather services as well as obtain permission from AWIS to reproduce weather maps on berry mg
- 2) Issue frost, frost/freeze and freeze advisories in the spring 2008 season, as needed
- 3) Issue blossom heat stress advisories in late spring 2008, as needed

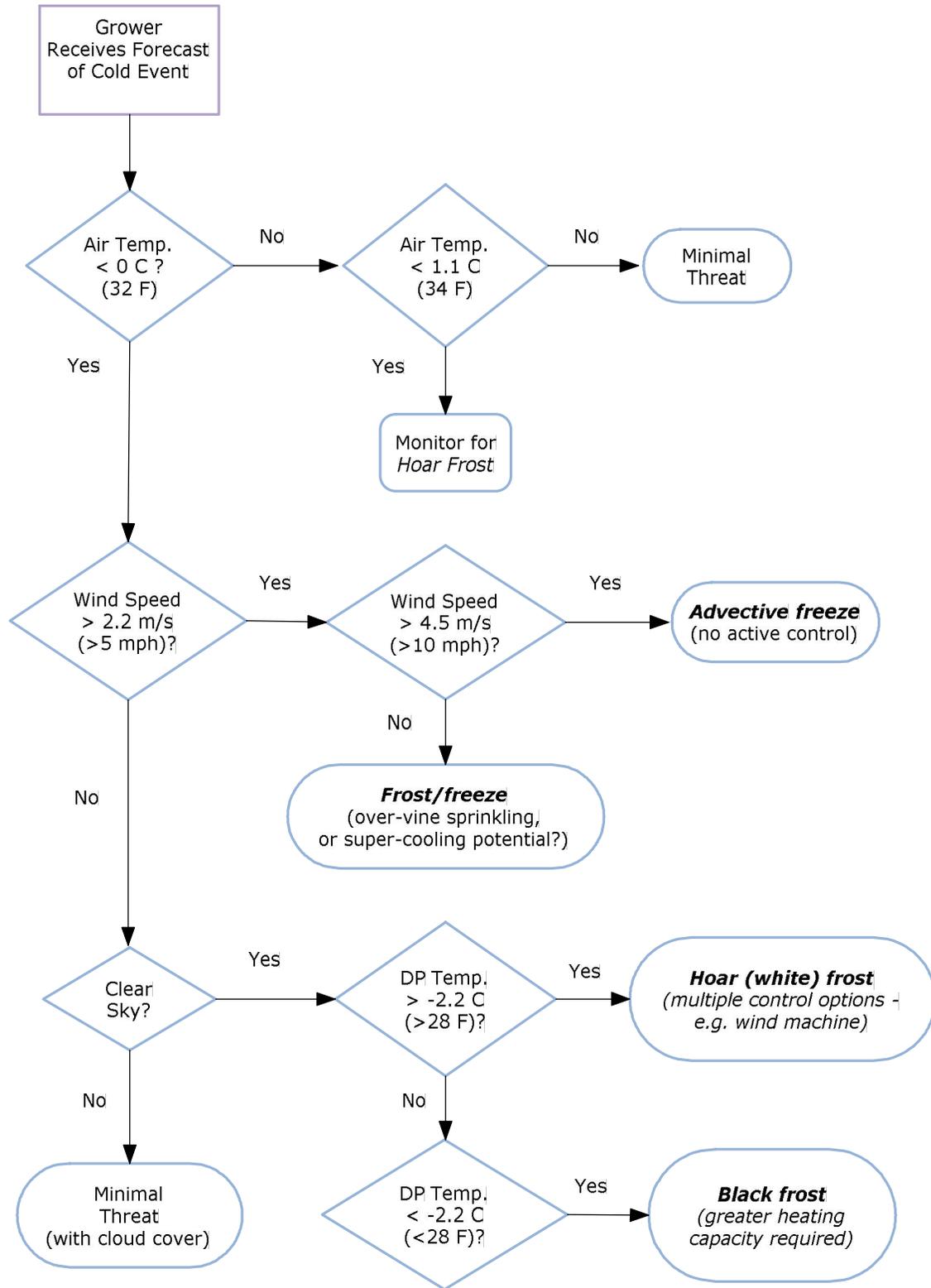
Results:

Strawberry crop yields are easily diminished due to unfavorable or abrupt changes in the weather, and even one timely berry mg frost or heat stress advisory can significantly mitigate crops losses. Numerous North Carolina, South Carolina, Virginia and even Georgia growers were served by the *berry mg* frost and heat alerts in spring 2008. These E-NEWS type alerts are issued without interruption in periods of threatening weather events, such as the Easter Freeze of 2007 in which there were 14 updates over a period of one week (including several weekend alerts).

In spring 2008 we did not have to contend with any cold events during the bloom period and early fruit set stages that even began to approach the severity of the Easter Freeze of 2007. But, we did experience some very complicated cold events starting on the weekend of March 8-9 (and lasting until mid-week), and research on a related SRSFC project (Project No. 2007-03, Identifying critical temperature ranges of strawberry flower buds and blossoms for different types of cold events), was very helpful in explaining what happened over the period of March 8-10. In this period, the PI noted that open strawberry blossoms in research plots at Clayton Central Crops that survived temperatures in the range of 25.5 to 28.1°F early Sunday morning (3/9/08), were killed the very next morning at temperatures in the range of 28.1-29.7°F. The difference was that Sunday morning we had a “black frost” (no ice crystal formation), and apparently it did not get cold enough to kill the blossoms that experienced temperatures of 25.5 to 28.1°F (this was supercooling, as we have simulated in NCSU Phytotron studies – see 12-1-08 Progress Report for Project No. 2007-03). But, the very next morning there was a hoar (white) frost event when unprotected control blossoms (no row cover) were observed at Clayton to be killed at 28.1-29.7 °F. This provided field confirmation that there can be a considerable range in strawberry blossoms critical temperatures (in this period, the range was from 25.5 to 29.7 °F), and that the different types of cold conditions and events (e.g. black frost vs. hoar frost), are the more “deciding factor” as to whether a freeze stress occurs, or not. Because of these findings (both in the field and under controlled conditions), we now in a better position to make *berry mg* advisories more “event-based” as far as control strategies that growers need to follow. For example, a relatively high dew point (greater than 28 °F) indicates the potential for hoar frost (white frost), and there is little possibility of blossom supercooling in these relatively humid atmospheric conditions. This information proved to be invaluable for 2008 “frost season,” as there were at least ½ dozen nights when growers who subscribe to *berry mg* were advised to be extremely cautious about the potential for “light frost” or “scattered frost.” These are conditions may cause irreversible damage even at temperatures slightly below freezing (32 °F).

Out of this project has evolved a new cold event “decision-tree” (next page) that can become the basis for making better cold protection decisions, and our hope is to receive additional support in 2009 that would allow us to test this new model with a pilot group of strawberry plasticulture growers from member states of the Southern Region Small Fruit Consortium.

Figure 4. Cold Event Diagnosis



Conclusions:

In summary, the funds for this SRSFC extension grant were primarily utilized for expenses related to several weather service subscriptions, and these subscriptions included AWIS, AccuWeather Pro, and SkyBit. In addition, there were additional fees required for licensing of AWIS weather maps that appear in numerous *berry mg* advisories. In past years *berry mg* was supported by the NC Strawberry Association, Inc., and so it was very helpful the SRSFC could help in 2008 with the costs of these advisories. These advisories benefited strawberry growers in all of the member states of the SRSFC in 2008. In addition, numerous strawberry growers and agents in Virginia, South Carolina made direct phone calls to Dr. Poling about their respective crop situations with threatening cold events in March and April (Poling is listed as a resource person on the SRSFC website <http://www.smallfruits.org/RegExperts/regncs.htm>). In conversations the PI had in spring 2008 with growers and agents from various SRSFC states, extensive use was made of the AWIS and AccuWeather Pro products supported by this grant. By partnering with the State Climate Office of NC (SCO), it is our hope to substantially reduce, if not eliminate the need for these subscriptions in 2009.

Impact Statement:

It is widely recognized that strawberries are a very high value crop in all SRSFC states, and in North Carolina alone the crop generates \$25 million annually. Unfortunately, strawberry crop yields can be easily diminished due to unfavorable or abrupt changes in the weather. For example, ice crystals forming in the plant tissue can destroy or significantly lower yield. Through the *berry mg* advisory service supported by the SRSFC in 2008, strawberry plasticulture growers across a six state region were able to make well informed decisions to mitigate potential crop losses due to extremes in cold and/or heat, and detailed and timely *berry mg* advisories throughout the spring of 2008 made a significant contribution to the overall financial success of the 2007-2008 strawberry season for growers in NC, VA, SC, GA, TN and AR.

Citation(s) for any publications arising from the project:

None