

TITLE: Identifying critical temperature ranges of strawberry flower buds and blossoms for different types of cold conditions and seasonal growth stages

SRSFC 2007-03

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SUMMARY: A no cost extension of SRSFC grant 2007-03 was granted on 29-Nov-07 due to equipment problems encountered at the NCSU Phytotron with chambers not being able to reach the freezing points specified in this proposal. As of early December 2007 repairs have been completed, and we are now able to reach 21 F ( $-6^{\circ}$  C) in the chamber required for super-cooling studies. Also, the plan is to do a test run of the frost simulation chamber in early January 2008. Plants of the Camarosa variety will be ordered from Lassen Canyon in December (frigo) and will be planted out in early January for freeze evaluations in mid-February.

#### FIELD BENCHMARKING

In the absence of growth chamber facilities in 2007 to carry out the major portion of this research project, field work was conducted at Clayton Central Crops Research Station on the performance of 1 oz weight row cover (Gro-Guard) under freeze conditions that occurred on 5-Feb, 17-March and 19-March. On these 3 separate nights temperatures were recorded by a Watchdog underneath the 1 oz cover vs. no cover. The instrument under the cover was next to a strawberry plant, but not under the leaf (exposed); the instrument outside the cover was placed on a slightly elevated mound (not quite the height of the bed), and on top of dead annual ryegrass.

Results: On Feb. 5 we had a low of 14.2 outside the cover, and under the cover the minimum was 19.2 (around 5 F difference). On March 17 we had a rainstorm and covers went into Friday/Sat (March 18) night wet, and then froze at some point (not sure when); but at 3:23 am the low outside the cover was 31.4 F and the temp under the cover at that same moment was 35.4 F (4 degree difference). On March 18-19 we had the covers dry again. At 2:51 am the low outside the cover was 30.6 F and underneath the cover it was 38.5 = 7.1 F difference.

Thus, in a severe freeze in early Feb 2007 we achieved 5 F protection at the coldest point in the night; on March 17/18 the cover was frozen by rain and provided only 4 degrees protection at the coldest point; and on March 19 at 2:51 am, before we turned on irrigation on top of the cover, there was a 7.1 difference. The manufacturers for 1 oz covers usually give a range of 6 - 8 F protection for this material, and as you can see we have gone somewhat below this level in two field experiences in February and March 2007.

In going back a little further in time (March 2005), we had experience with both Typar (1.2 oz) and a 2 oz weight cover. In the freeze that occurred on 3-4 March, we noted that

both the 1.2 oz and 2 oz covers provided a very high level of protection on a night in which temperatures reached a minimum of 16.3 F (Fig. 1). In the early evening it was interesting to note that the lighter weight cover maintained a slightly higher temperature underneath the cover than the 2 oz product, but at around 2 am in the morning the temperature of plants beneath the lighter cover dropped below the 2 oz material. The lowest temperature recorded under the 2 oz was 28.1 F, and the low under the 1.2 oz was 26.4 F at 6 am.

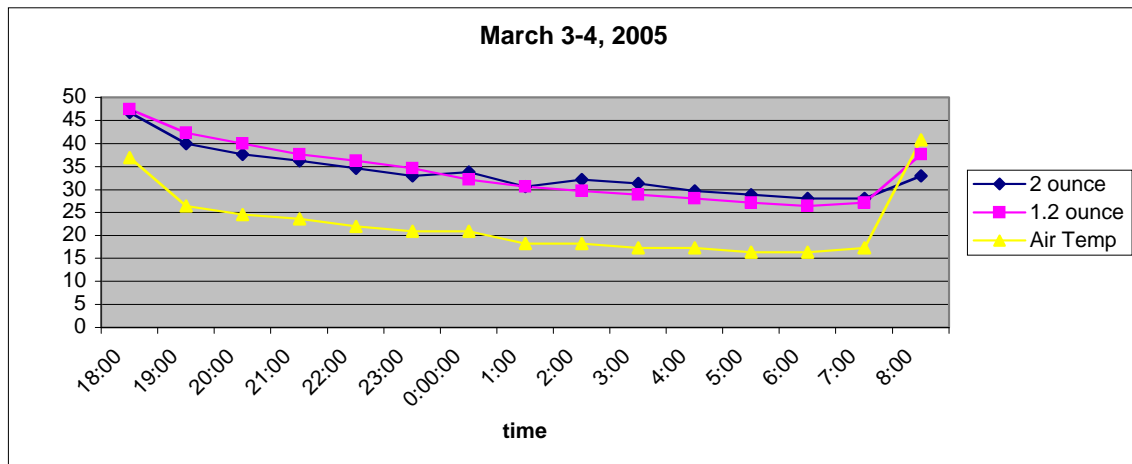


Figure 1. March 3-4, 2005 temperatures of strawberry plants beneath 1.2 and 2 oz covers.

In mid-March 2005 we tested the 1.2 oz cover against no cover (using Watchdogs). At approximately 2 am in the morning sprinkler irrigation was initiated as there was concern of damage to blossoms at that point in the evening when temperatures reached 27.2 F in the aisle. In this evaluation we observed 7.3 F of protection with the 1.2 oz cover at 1 am when the temperature under the cover was 36.2 F, and on top of an adjacent plasticulture bed (with no cover), the minimum was 28.9 F.

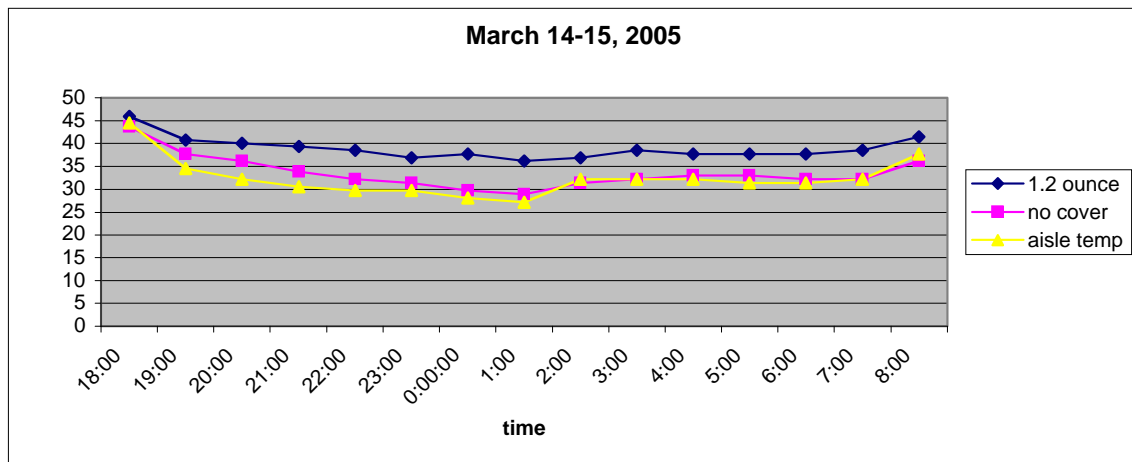


Figure 2. March 14-15, 2005 temperatures of strawberry plants beneath 1.2 cover