

APPLE (*Malus x domestica* 'Honeycrisp', 'Royal Court', 'Cameo')  
Black rot; *Botryosphaeria obtusa*  
Bitter rot; *Colletotrichum* species  
Sooty blotch and flyspeck; species complex

D. A. Rosenberger, F. W. Meyer,  
A. L. Rugh, L. R. Sudol, and T.M. Hyatt  
Cornell's Hudson Valley Laboratory  
PO Box 727, Highland, NY 12528

### Comparison of Inspire Super and Pristine for Controlling Summer Diseases on Apples, 2012.

The objective of this trial was to compare Inspire Super and Pristine for their effectiveness as summer sprays and to determine how different spray intervals would affect the incidence of disease at harvest. In previous trials, Pristine has repeatedly proven to be more effective than Flint, Topsin M + Captan, or Topsin M + ProPhyt in terms of broad-spectrum activity against sooty blotch and flyspeck (SBFS) as well as against summer fruit decays. In several recent trials, however, Inspire Super has performed very well in summer sprays, but we lacked direct comparisons with Pristine, especially in programs where Pristine was used in more than just the last spray or two of the season.

Treatments were evaluated in an orchard planted in 2001 wherein each plot contained one Cameo tree on Bud.9 rootstock and one tree each of Royal Court and Honeycrisp on EMLA.111 rootstocks with M.9 interstems. Treatments were applied using a high-pressure handgun and trees were sprayed to drip. Treatment dates and application schedules are shown in Table 1, and the cumulative rainfall and hours of wetting between sprays or between the last spray and harvest for Royal Court and Cameo are shown in Table 2. Prior to this trial, this same block was used for evaluation of apple scab fungicides as described on pages 29-34 of this report. The last two fungicide sprays in that trial were applied across the entire block, so all plots had been treated uniformly since 25 May, four weeks before this trial was initiated. Plots were re-randomized for this summer treatment, but plots that served as controls or were used for IKF-5411 (Trt 6 in the spring trial) were excluded from this trial. Treatments were evaluated by observing 50 fruit per tree for signs of SBFS at varying time intervals through summer. Disease incidence was recorded for all three cultivars at harvest.

Preliminary observations from the data tables (I have not yet had time for a thorough review of results!):

Table 3:

- Flyspeck first became evident in control plots on 10 Aug and had affected 99.5% of the fruit by 30 Aug.
- Development of flyspeck was delayed in all treatments, but Treatments 2-3-4-5-6-12 generally had less disease than treatments 7-8-9-10-11.
- Trts 7-8-9-10-11 showed a large increase in flyspeck incidence between 1 and 5 Oct, a period that included 72 hr of wetting. After fruit were harvested on 5 Oct, they were held at ca. 55-65°F in a storage room until they were evaluated on 8 Oct. Although it is possible that some additional SBFS signs appeared during the time between harvest and evaluation, we doubt that this was a significant factor because fruit were dry at harvest and during storage.
- In paired treatments involving the same spray timings for Inspire Super and Pristine, Inspire Super was superior to Pristine in two of the three comparisons that showed significant differences (see means printed in bold type in Table 3).
- In the final evaluation, on 5 Oct, Inspire Super had less flyspeck than comparable Pristine treatments for all three of the paired timing comparisons (Table 4 and Fig. 1).

Table 4:

- Sooty blotch developed more slowly in control plots than did flyspeck. Disease incidence in the controls reached only 96% by the time of the last evaluation on 5 Oct. The dip in flyspeck incidence noted on 14 Sep may reflect loss of colony viability due to undefined environmental parameters or it may just be a sampling artifact. It cannot be attributed to red color development on the fruit because fruit were still green on 14 Sep.
- Treatment means followed the same general patterns noted for flyspeck, but there were fewer significant differences among the treatments.
- In paired treatments involving the same spray timings for Inspire Super and Pristine, Pristine provided better control of sooty blotch than did Inspire Super for two of the three comparisons from the last evaluation of fruit harvested 5 Oct.

Table 5:

- Honeycrisp harvested 23 Aug showed relatively little SBFS, but treatments 8-9-11 developed a lot more disease during postharvest incubation.
- On Royal Court fruit at harvest, Inspire Super was superior to Pristine for flyspeck control in two of the three paired comparisons
- Percent fruit out of grade due to SBFS was much lower than the disease incidence recorded for Cameo in Tables 3 & 4 or for Royal Court (Table 9). Thus, even though some treatments appeared to have a high disease incidence, Trts 2-4-6-12 all had 6% or less fruit out-of-grade for SBFS for both Royal Court and Cameo.

Figure 2:

- The full-season program (Trt-2) provided better control at the end of the season than any of the programs where one or two sprays were omitted during June and July.
- The poorest control occurred where two of the first three treatments were omitted (Trts 7 and 9).

Figure 3:

- Omitting sprays toward the end of the season had less negative effects on disease control than omitting sprays earlier in the season as shown by the fact that most treatments in Fig. 3 topped out at less than 30% flyspeck and less than 40% sooty blotch whereas Trts 7 & 9 reached ca. 50% for both diseases (Fig. 3).

Table 6:

- Pristine provided better control of bitter rot than did Inspire Super in all 11 of the paired treatment comparisons in this table, and differences were significant in 4 of the 11 comparisons.

Table 7:

- Pristine provided better control of black rot than did Inspire Super in 10 of the 11 paired treatment comparisons in this table, and differences were significant in 2 of the 11 comparisons.
- Some of the black rot may have become established on fruit as quiescent infections before this trial was initiated, so there is at least a slight possibility that the spring treatments applied in these plots may have impacted the amount of black rot that developed, thereby adding to the variability in our summer plots after they were re-randomized in June.

Table 8:

- Honeycrisp were sprayed on the same schedules used for Royal Court.
- Some Honeycrisp trees carried only a light crop due to spring frosts. Treatments with less than 5 fruit per tree in two or more replicates were not included in our data reports. Fruit numbers for those treatments and replicates that were included varied considerably.
- Treatments did not appear to affect disease incidence on Honeycrisp.

Table 9:

- Affects of treatments on flyspeck incidence for Royal Court are similar to those shown for Cameo (Table 4) and for fruit out of grade due to SBFS (Table 5).
- In paired treatment comparisons, Inspire Super provided better control of flyspeck in all 6 of the comparisons shown in this table, and differences were significant in 3 of the 6 comparisons.
- We do not know the reasons for the high variability and concomitant inability to find significant treatment effects for sooty blotch.
- However, Pristine was superior to Inspire Super for sooty blotch control in comparisons of Trts 4 vs. 5 and of 7 vs. 8, but not for 10 vs. 11.

Figure 4: Graphical representation of treatment effects for various parameters measure on Royal Court fruit at harvest and again after incubation.

Table 1. Products tested and dates when they were applied.

Fungicide program and rate/100 gal <sup>z</sup>	Jun 22	Jul 6	Jul 24	Aug 8	Aug 22 <sup>y</sup>	Sep 6 <sup>y</sup>	Sep 21 <sup>y</sup>
1. Control (no fungicides all summer) .....							
2. Inspire Super 4 fl oz (all summer) .....	X	X	X	X	X	Xc <sup>y</sup>	Xc
3. Inspire Super 4 fl oz (skip 6 Jul; end early) .....	X		X	X	Xc	Xc	
4. Inspire Super 4 fl oz (end early) .....	X	X	X	X	Xc		
5. Pristine 5 oz (end early) .....	X	X	X	X	Xc		
6. Inspire Super 4 fl oz (skip 22 Jun) .....		X	X	X	X	Xc	Xc
7. Inspire Super 4 fl oz (skip 22 Jun & 6 July) .....			X	X	X	Xc	Xc
8. Pristine 5 oz (skip 22 Jun & 6 July) .....			X	X	X	Xc	Xc
9. Inspire Super 4 fl oz (skip 22 Jun & 24 July) .....		X		X	X	X	Xc
10. Inspire Super 4 fl oz (skip 22 Jun, 24 Jul, 6 Sep) .....		X		X	X		Xc
11. Pristine 5 oz (skip 22 Jun, 24 Jul, 6 Sep) .....		X		X	X		Xc
12. Inspire Super 4 fl oz (skip 26 Jul, 8 Aug, 6 Sep) .....	X		X		X		Xc

<sup>z</sup> Formulations were Inspire Super 2.85EW and Pristine 38W.<sup>y</sup> Xc = applied to Cameo only

Table 2. Time, rainfall, and wetting accumulations between sprays for the N40 SBFS spray timing trial, starting from the last full cover spray of Captan 80WDG 2 lb/A + Flint 50WG 2 oz/A that was applied on 1 June.

Treatments	Spray intervals and rainfall/wetting accumulated from the last fungicide application until the date shown														
	22-Jun			6-Jul			24-Jul			8-Aug			22-Aug		
	days	rain	wet	days	rain	wet	days	rain	wet	days	rain	wet	days	rain	wet
1. Control	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2. InSprS -7 sprays	21	3.02	84	14	2.8	35	18	2.5	63	15	1.5	44	14	2.1	58
3. InSprS -5 sprays	21	3.02	84	---	---	---	32	5.3	98	15	1.5	44	14	2.1	58
4. InSprS -5 sprays	21	3.02	84	14	2.8	35	18	2.5	63	15	1.5	44	14	2.1	58
5. Pristine - 5 sprays	21	3.02	84	14	2.8	35	18	2.5	63	15	1.5	44	14	2.1	58
6. InSprS -6 sprays	---	---	---	35	5.8	119	18	2.5	63	15	1.5	44	14	2.1	58
7. InSprS -5 sprays	---	---	---	---	---	---	53	8.3	182	15	1.5	44	14	2.1	58
8. Pristine 5 sprays	---	---	---	---	---	---	53	8.3	182	15	1.5	44	14	2.1	58
9. InSprS -5 sprays	---	---	---	35	5.8	119	---	---	---	33	4	107	14	2.1	58
10. InSprS -4 sprays	---	---	---	35	5.8	119	---	---	---	33	4	107	14	2.1	58
11. Pristine - 4 sprays	---	---	---	35	5.8	119	---	---	---	33	4	107	14	2.1	58
12. InSprS -4 sprays	21	3.02	84	---	---	---	32	5.3	98	---	---	---	29	3.7	102
Hours of unprotected wetting for Trt 2 <sup>z</sup>			0			30			8			0			9

Table 2 (continued).

Treatments	Spray intervals and rainfall/wetting accumulated from the last fungicide application until the date shown													
	6-Sep			21-Sep			17 Sep Royal Court harvest <sup>y</sup>				5 Oct Cameo harvest <sup>y</sup>			
	days	rain	wet	days	rain	wet	days	rain	wet	Total un-protected wetting hours	days	rain	wet	Total un-protected wetting hours
1. Control	---	---	---	---	---	---	123	16.8	354	280	141	20.7	519	435
2. InSprS -7 sprays	15	2.0	48	15	3.4	46	26	2.8	70	72	14	3.3	141	157
3. InSprS -5 sprays	15	2.0	48	---	---	---	40	5.0	128	134	29	6.8	187	203
4. InSprS -5 sprays	---	---	---	---	---	---	40	5.0	128	117	44	8.8	235	237
5. Pristine - 5 sprays	---	---	---	---	---	---	40	5.0	128	117	44	8.8	235	237
6. InSprS -6 sprays	15	2.0	48	15	3.4	46	26	2.8	70	77	14	3.3	141	162
7. InSprS -5 sprays	15	2.0	48	15	3.4	46	26	2.8	70	153	14	3.3	141	217
8. Pristine 5 sprays	15	2.0	48	15	3.4	46	26	2.8	70	153	14	3.3	141	217
9. InSprS -5 sprays	15	2.0	48	15	3.4	46	11	0.8	22	99	14	3.3	141	206
10. InSprS -4 sprays	---	---	---	30	5.5	94	26	2.8	70	121	14	3.3	141	245
11. Pristine - 4 sprays	---	---	---	30	5.5	94	26	2.8	70	121	14	3.3	141	245
12. InSprS -4 sprays	---	---	---	30	5.5	94	26	2.8	70	176	14	3.3	141	250
Hours of unprotected wetting for Trt 2 <sup>z</sup>			3			7				0			100	

<sup>z</sup> "Hours of unprotected wetting" refers to the number of hours of wetting that accumulated prior to the spray date indicated if one assumes that all protection from the previous spray was eliminated by 2 inches of rainfall. Wetting hours for calculating unprotected wetting durations were counted only for events that began after >2.0 inches of rain had already occurred except that on a few occasions where long wetting periods with large amounts of rain occurred, we added the wetting periods if the previous spray had already been exposed to >1.95 inches of rainfall. Where sprays were omitted, the unprotected hours were calculated by adding the unprotected hours noted for the period prior to the skipped spray plus all of the wetting hours recorded during the interval when the spray was omitted. Treatment 2 was considered our "standard" program timing, so protection gaps for that program as applied to Cameo trees are shown at the bottom of the table.

<sup>y</sup> Note that the harvest date for Royal Court was prior to the 21 Sep application date, and most Royal Court trees also were not sprayed on 6 Sep.

Table 3. Effects of treatments on development of flyspeck on Cameo fruit.

Fungicide program and rate/100 gal <sup>z</sup>		Cameo fruit with flyspeck (%) <sup>y</sup>						Grand means <sup>x</sup>
		10 Aug	30 Aug	14 Sep	1 Oct	5 Oct		
1. Control	(no fungicides).....	33.7 d	99.5 f	100.0 f	100.0 f	99.5 f		86.6 f
2. Inspire Super	(all summer).....	1.0 a	3.4 a	7.6 a	16.5 abcd	5.4 a		6.8 a
3. Inspire Super	(skip 6/7, 9/20).....	1.0 a	7.0 abc	14.0 ab	14.5 abc	19.1 b		11.1 ab
<sup>v</sup> 4. Inspire Super	(end early).....	1.0 a <sup>w</sup>	3.4 a	7.6 a	14.0 ab	<b>19.5 b</b>		9.1 ab
5. Pristine	(end early).....	0.5 a	3.0 ab	12.8 ab	9.0 a	<b>41.3 cd</b>		13.3 ab
6. Inspire Super	(skip 6/22).....	1.5 ab	12.5 bcd	13.1 ab	16.3 abcd	23.8 b		13.4 abc
7. Inspire Super	(skip 6/22, 7/6).....	3.7 ab	17.5 cde	35.4 de	30.4 cde	<b>49.4 d</b>		27.3 cde
8. Pristine	(skip 6/22, 7/6).....	6.2 bc	28.0 e	45.7 e	34.3 e	<b>63.7 e</b>		35.6 e
9. Inspire Super	(skip 6/22, 7/6).....	13.5 c	21.2 de	21.6 bcd	29.5 de	54.0 de		28.0 de
10. Inspire Super	(skip 6/22, 7/6, 9/6) ..	<b>13.5 c</b>	21.2 de	21.6 bcd	23.5 bcde	48.4 de		25.6 de
11. Pristine	(skip 6/22, 7/6, 9/6) ..	<b>2.5 ab</b>	12.7 bcd	29.6 cde	35.1 e	58.3 de		27.6 cde
12. Inspire Super	(skip 7/6, 8/8, 9/6) ....	5.0 abc	17.2 cde	17.6 abc	16.0 abcd	28.5 bc		16.9 bcd
Grand means for dates.....		6.9 A	20.5 B	27.2 C	28.3 C	42.6 D		

<sup>z</sup> For details of treatment timing, see Table 1.<sup>y</sup> Prior to counts made on 10 Aug, incidence of flyspeck in control plots only was determined on 24 Jul and 1 Aug and means were 0.0% and 17.0%, respectively. Data for the first four observation dates in the table above were collected by observing 50 apples per tree without removing them from the trees. Data from 5 Oct is from 60 fruit harvested from each tree (or all fruit available: range = 9 to 61 fruit/tree; mean = 52).<sup>x</sup> *P*-values for the repeated measure analysis for flyspeck over five observations dates for effects of treatment, date, and the treatment\*date interaction were <0.001, <0.001, and <0.001, respectively. Letter separations were obtained by applying Fishers Protected LSD test (*P*≤0.05).<sup>w</sup> Data that is underlined was copied from another treatment that was treated identically in all sprays applied up until 6 Sep because we did not collect separate data from identical treatments. The first three observations for Trt 4 are from Trt 2 and for Trt 9 are from Trt 10.<sup>v</sup> Shaded rows indicate pairs of treatments where Inspire Super and Pristine were applied on identical schedules. Means in both type within those rows indicate comparisons where there were significant differences between the paired treatments.

Table 4. Effects of treatments on development of sooty blotch on Cameo fruit.

Fungicide program and rate/100 gal <sup>z</sup>		Cameo fruit with sooty blotch (%) <sup>y</sup>					Grand means <sup>x</sup>
		10 Aug	30 Aug	14 Sep	1 Oct	5 Oct	
1. Control	(no fungicides).....	29.0 c	54.5 c	27.0 bc	56.5 c	96.0 e	52.6 c
2. Inspire Super	(all summer).....	2.5 ab	3.2 a	10.6 a	13.5 ab	13.0 a	8.6 a
3. Inspire Super	(skip 6/7, 9/20).....	2.0 ab	7.0 ab	11.5 ab	9.0 ab	35.0 bcd	12.9 ab
4. Inspire Super	(end early).....	2.5 ab	3.2 a	10.6 a	13.5 ab	26.2 bc	11.2 a
5. Pristine	(end early).....	2.0 ab	2.5 a	11.9 abc	6.0 a	18.9 ab	8.3 a
6. Inspire Super	(skip 6/22).....	4.1 ab	9.0 ab	15.4 abc	11.6 ab	28.3 bc	13.7 ab
7. Inspire Super	(skip 6/22, 7/6).....	4.7 ab	24.1 b	28.9 c	25.1 b	53.0 d	27.1 b
8. Pristine	(skip 6/22, 7/6).....	1.5 ab	7.2 ab	16.0 abc	12.9 ab	40.4 cd	15.6 ab
9. Inspire Super	(skip 6/22, 7/6).....	9.5 b	8.1 ab	11.2 a	20.0 b	49.8 d	19.7 ab
10. Inspire Super	(skip 6/22, 7/6, 9/6) ...	<b>9.5 b</b>	8.1 ab	11.2 a	13.4 ab	33.3 bcd	15.1 ab
11. Pristine	(skip 6/22, 7/6, 9/6) ...	<b>2.0 a</b>	9.9 a	22.0 abc	22.3 b	47.5 d	20.7 ab
12. Inspire Super	(skip 7/6, 8/8, 9/6) ....	2.5 ab	9.1 ab	14.0 abc	11.8 ab	39.1 cd	15.3 ab
Grand means for dates.....		6.0 A	12.2 B	15.8 C	18.0 C	40.0 D	

<sup>z</sup> For details on spray timing, data collection, and shading/underlining/bold print in the table, see footnotes for Table 3.<sup>y</sup> Prior to counts made on 10 Aug, incidence of sooty blotch in control plots only was determined on 24 Jul and 1 Aug and means were 0.0% and 10.3%, respectively.<sup>x</sup> *P*-values for the repeated measure analysis for sooty blotch over five observations dates for effects of treatment, date, and the treatment\*date interaction were <0.001, <0.001, and 0.003, respectively.

Table 5. Effects of treatments on flyspeck incidence or fruit out of grade due to SBFS across all 3 cultivars.

Fungicide program and rate/100 gal <sup>z</sup>	Percent Honeycrisp fruit with flyspeck <sup>y</sup>		Fruit (%) out of grade due to SBFS <sup>v</sup>		
	at harvest 23 Aug	after incubation <sup>u</sup>	Royal Court <sup>x</sup>		Cameo <sup>w</sup> at harvest 5 Oct
			at harvest 17 Sep	after incubation 27 Sep <sup>u</sup>	
1. Control (no fungicides).....	39.2 c	95.5 d	99.7 e	100.0 e	95.2 d
2. Inspire Super (all summer).....	0.0 a	5.6 a	1.0 a	2.7 a	2.1 ab
3. Inspire Super (skip 6/7, 9/20).....	0.0 a	12.6 a	6.7 abc	13.1 abc	2.1 ab
4. Inspire Super (end early).....	0.9 a	13.0 a	3.4 ab	8.6 ab	1.7 ab
5. Pristine (end early).....	1.8 a	13.5 ab	7.7 abc	21.3 bc	3.8 abc
6. Inspire Super (skip 6/22).....	2.0 a	20.4 ab	5.7 abc	14.5 abc	0.0 a
7. Inspire Super (skip 6/22, 7/6).....			<b>10.9 bc</b>	36.8 cd	6.0 abc
8. Pristine (skip 6/22, 7/6).....	15.6 bc	68.8 c	<b>35.1 d</b>	47.8 d	12.4 bc
9. Inspire Super (skip 6/22, 7/6).....	7.8 ab	58.1 c	14.0 c	27.4 bcd	13.3 c
10. Inspire Super (skip 6/22, 7/6, 9/6).....			<b>6.7 abc</b>	29.7 bcd	6.0 abc
11. Pristine (skip 6/22, 7/6, 9/6).....	2.2 a	40.7 bc	<b>31.7 d</b>	36.9 cd	13.5 bc
12. Inspire Super (skip 7/6, 8/8, 9/6).....			6.0 abc	13.7 abc	6.0 abc
P-value.....	<0.001	<0.001	<0.001	<0.001	<0.001

<sup>z</sup> For treatment timings, see Table 1. For the significance of shaded data and bold-face type, see footnotes for Table 3.

<sup>y</sup> Data for Honeycrisp from trts 7-10-12 were excluded because fruit were available from only one replicate in each of these treatments due to spring frosts. Actual fruit numbers evaluated for each replicate of the other treatments is shown in Table 8. Because of the large amount of missing data (i.e., reps with no fruit), all data from Honeycrisp was analyzed using the analysis for a completely random design due to limitations of our statistical software package.

<sup>x</sup> Data for Royal Court is from 75 fruit per tree.

<sup>w</sup> Data for Cameo is from 60 fruit per tree or all fruit available: range = 9 to 61 fruit/tree; mean = 52.

<sup>v</sup> Fruit out of grade due to sooty blotch and flyspeck did not meet the criteria for USDA Extra Fancy grade.

<sup>u</sup> Fruit were incubated at 70°F and 100% RH for 10 days to allow incubating SBFS to become apparent on fruit surfaces. Fruit with decays at harvest were not incubated, so the numbers of fruit evaluated after incubation were somewhat lower than for fruit evaluated at harvest.

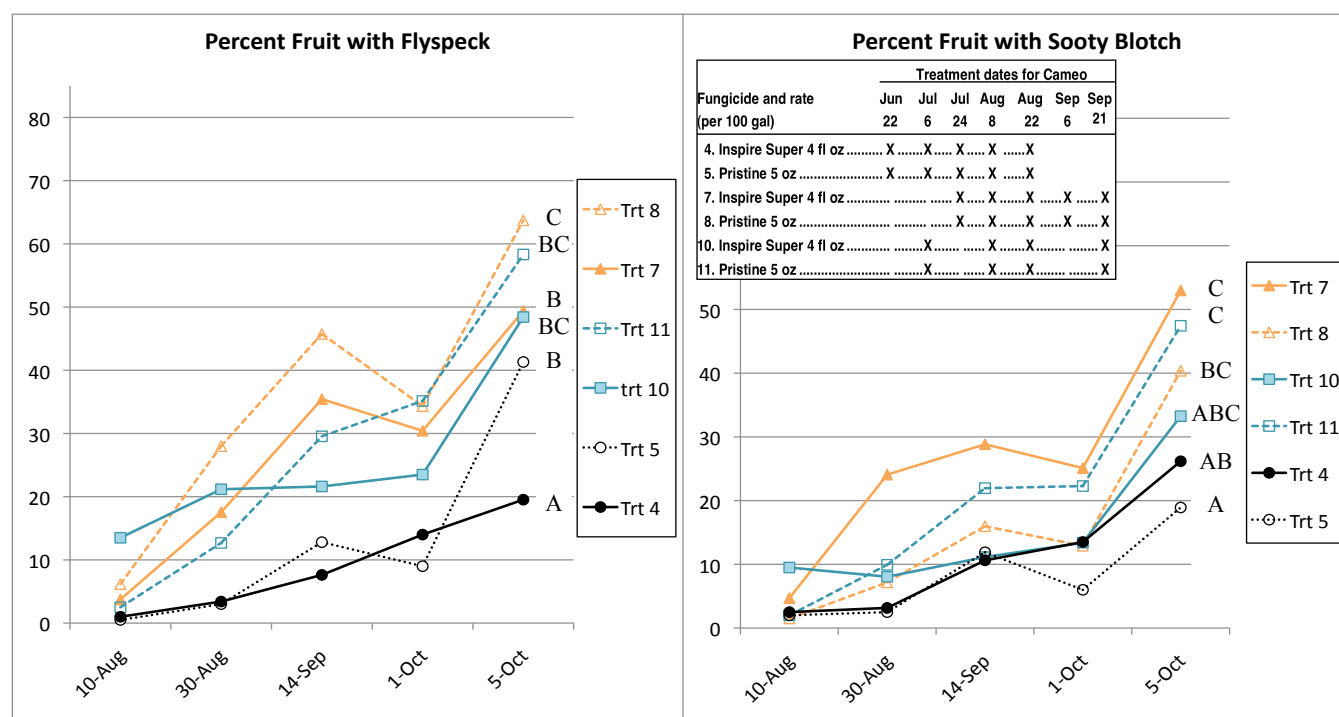


Figure 1. Increase in the incidence of SBFS on Cameo fruit over time showing the comparisons for Pristine (dotted lines) versus Inspire Super (solid lines) for three different timing comparisons (shown in three different colors). Letter separations shown to the right of each graph line are from the final evaluations from fruit harvested 5 Oct (see Tables 3-4).

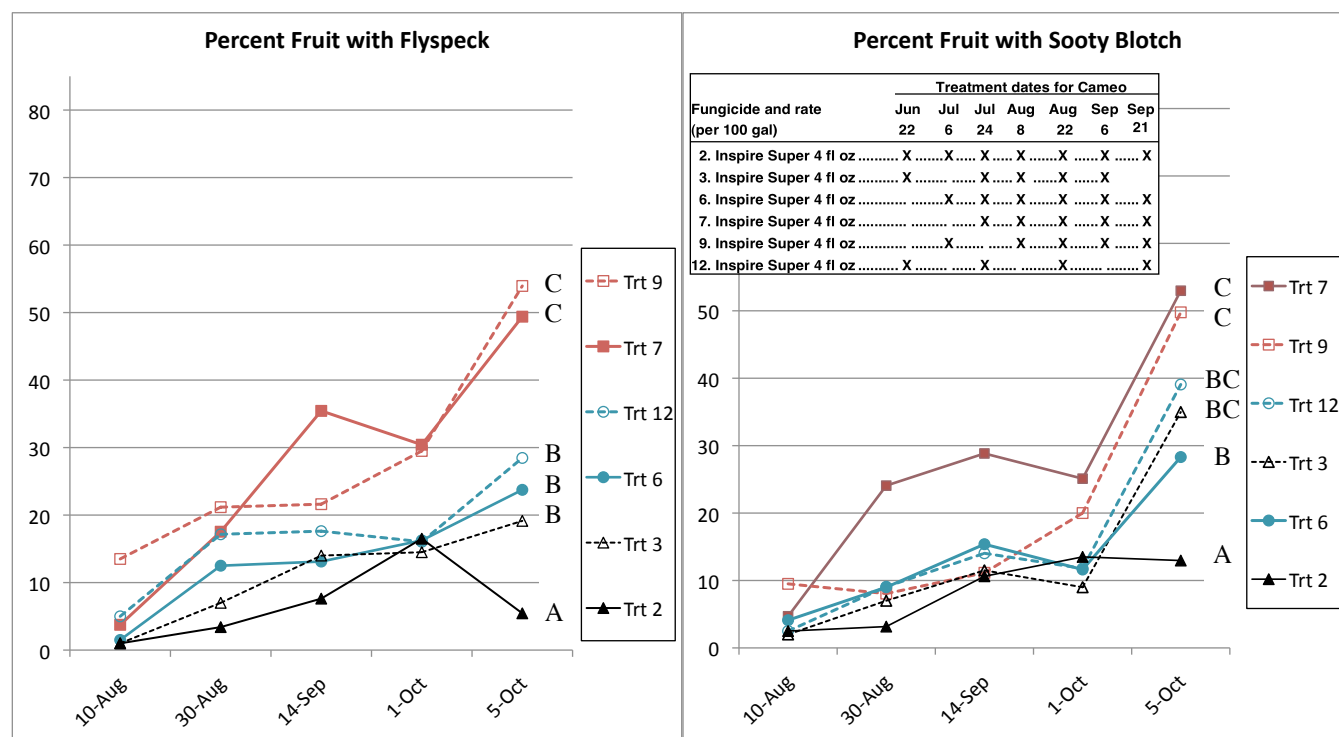


Figure 2. Increase in the incidence of SBFS on Cameo fruit over time as affected by six different spray programs with Inspire Super wherein the starting times and/or the gaps between treatments were varied among treatments. Letter separations shown to the right of each graph line are from the final evaluations from fruit harvested 5 Oct (see Tables 3-4).

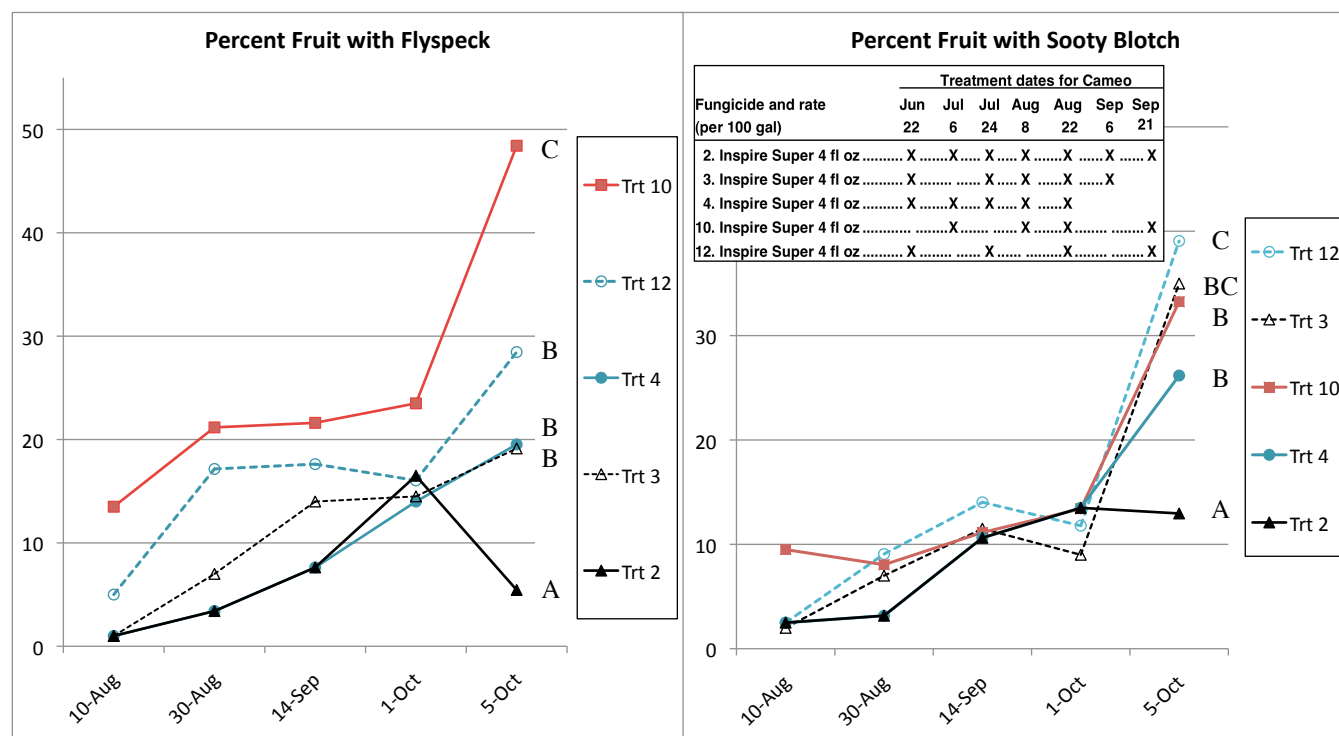


Figure 3. Increase in the incidence of SBFS on Cameo fruit over time as affected by five different spray programs with Inspire Super wherein the timing of the last spray and/or the gaps between treatments were varied among treatments. Note that the scale has been expanded compared to Figures 2 and 3. Letter separations shown to the right of each graph line are from the final evaluations from fruit harvested 5 Oct (see Tables 3-4).

Table 6. Effects of treatments on bitter rot across all 3 cultivars.

Fungicide program and rate/100 gal <sup>z</sup>		Fruit (%) with bitter rot				
		Honeycrisp <sup>y</sup>		Royal Court <sup>x</sup>		Cameo <sup>w</sup>
		at harvest 23 Aug	after incubation <sup>v</sup>	at harvest 77 Sep	after incubation 27 Sep <sup>v</sup>	at harvest 5 Oct
1. Control	(no fungicides) .....	13.1	18.1 bc	4.0 d	4.3 c	7.7 abcd
2. Inspire Super	(all summer) .....	5.8	10.1 bc	0.7 ab	2.0 bc	2.3 a
3. Inspire Super	(skip 6/7, 9/20) .....	3.5	5.7 ab	1.0 abc	1.7 bc	7.5 abcd
4. Inspire Super	(end early) .....	14.4	<b>30.1 c</b>	0.7 abc	<b>2.1 bc</b>	5.8 abcd
5. Pristine	(end early) .....	3.5	<b>5.4 ab</b>	0.0 a	<b>0.0 a</b>	3.3 abc
6. Inspire Super	(skip 6/22) .....	8.8	1.8 ab	1.0 abc	3.7 bc	13.3 de
7. Inspire Super	(skip 6/22, 7/6) .....			1.4 bcd	2.1 bc	8.8 bcde
8. Pristine	(skip 6/22, 7/6) .....	2.5	3.7 ab	1.0 abc	1.0 ab	2.5 ab
9. Inspire Super	(skip 6/22, 7/6) .....	9.1	11.3 abc	2.3 cd	3.0 bc	7.5 abcde
10. Inspire Super	(skip 6/22, 7/6, 9/6) .....			1.3 bc	<b>3.6 c</b>	<b>18.0 e</b>
11. Pristine	(skip 6/22, 7/6, 9/6) .....	0.0	0.0 a	0.3 ab	<b>1.0 ab</b>	<b>3.3 abc</b>
12. Inspire Super	(skip 7/6, 8/8, 9/6) .....			1.3 abc	2.6 bc	12.1 cde
<i>P</i> -value	.....	0.371	0.023	0.018	0.025	0.023

See footnotes below Table 7.

Table 7. Effects of treatments on the incidence of black rot across all three cultivars.

Fungicide program and rate/100 gal <sup>z</sup>		Fruit (%) with black rot				
		Honeycrisp <sup>y</sup>		Royal Court <sup>x</sup>		Cameo <sup>w</sup>
		at harvest 23 Aug	after incubation <sup>v</sup>	at harvest 77 Sep	after incubation 27 Sep <sup>v</sup>	at harvest 5 Oct
1. Control	(no fungicides) .....	21.2	22.3	5.3	10.6	8.1 abc
2. Inspire Super	(all summer) .....	9.0	13.2	5.4	11.7	8.7 abc
3. Inspire Super	(skip 6/7, 9/20) .....	15.0	23.1	4.0	6.3	6.2 abc
4. Inspire Super	(end early) .....	35.1	26.3	3.2	7.1	9.6 abcd
5. Pristine	(end early) .....	1.8	1.8	2.3	4.3	5.0 ab
6. Inspire Super	(skip 6/22) .....	12.7	9.2	2.7	6.7	12.9 bcd
7. Inspire Super	(skip 6/22, 7/6) .....			4.8	8.9	<b>16.2 cd</b>
8. Pristine	(skip 6/22, 7/6) .....	10.8	14.1	5.0	6.0	<b>4.5 a</b>
9. Inspire Super	(skip 6/22, 7/6) .....	9.6	19.0	3.3	8.0	2.9 a
10. Inspire Super	(skip 6/22, 7/6, 9/6) .....			6.0	16.6	<b>19.1 d</b>
11. Pristine	(skip 6/22, 7/6, 9/6) .....	1.4	3.3	3.7	5.7	<b>3.8 ab</b>
12. Inspire Super	(skip 7/6, 8/8, 9/6) .....			5.9	11.2	7.6 abc
<i>P</i> -value	.....	0.155	0.075	0.715	0.165	0.021

<sup>z</sup> For treatment timings, see Table 1. For the significance of shaded data and bold-face type, see footnotes for Table 3.<sup>y</sup> Data for Honeycrisp from trts 7-10-12 were excluded because fruit were available from only one replicate in each of these treatments due to spring frosts. Actual fruit numbers evaluated for each replicate of the other treatments is shown in Table 8. Because of the large amount of missing data (i.e., reps with no fruit), all data from Honeycrisp was analyzed using the analysis for a completely random design due to limitations of our statistical software package.<sup>x</sup> Data for Royal Court is from 75 fruit per tree.<sup>w</sup> Data for Cameo is from 60 fruit per tree or all fruit available: range = 9 to 61 fruit/tree; mean = 52.<sup>v</sup> Fruit were incubated at 70°F and 100% RH for 10 (Honeycrisp) or 14 (Royal Court) days to allow incipient decays to develop. Fruit with decays at harvest were not incubated, so the numbers of fruit evaluated after incubation were somewhat lower than for fruit evaluated at harvest. However, for both Honeycrisp and Royal Court, the means for fruit with bitter rot or black rot after incubation represent the totals for fruit with these diseases at harvest plus those additional fruit that developed decays during incubation.

Table 8. Effects of treatments on disease incidence at harvest.

Fungicide program and rate/100 gal <sup>z</sup>	No. of replicates with fruit for evaluations and no. fruit evaluated <sup>y</sup>	Honeycrisp fruit with sooty blotch	
		at harvest 3 Aug	after incubation for 10 days at 100% relative humidity <sup>x</sup>
1. Control (no fungicides) .....	3 (60-61-0-14)	3.3	54.2
2. Inspire Super (all summer) .....	4 (60-60-19-60)	1.3	17.8
3. Inspire Super (skip 6/7, 9/20) .....	3 (18-31-59-0)	0.6	22.5
4. Inspire Super (end early) .....	4 (58-60-60-5)	0.0	25.2
5. Pristine (end early) .....	3 (60-48-60-0)	0.0	13.9
6. Inspire Super (skip 6/22) .....	4 (45-62-61-15)	4.1	23.6
8. Pristine (skip 6/22, 7/6) .....	4 (60-61-60-60)	1.7	20.5
9. Inspire Super (skip 6/22, 7/6) .....	3 (28-60-60-0)	0.6	28.5
11. Pristine (skip 6/22, 7/6, 9/6) .....	3 (40-0-60-60)	2.5	25.7
P value .....		0.749	0.841

<sup>z</sup> For treatment timings, see Table 1.<sup>y</sup> Data for Honeycrisp from trts 7-10-12 were excluded because fruit were available from only one replicate in each of these treatments due to spring frosts. Actual fruit numbers evaluated for each replicate of the other treatments is shown in Table 8. Because of the large amount of missing data (i.e., reps with no fruit), all data from Honeycrisp was analyzed using the analysis for a completely random design due to limitations of our statistical software package.<sup>x</sup> Fruit were incubated at 70°F and 100% RH for 10 days to allow incipient decays to develop. Fruit with decays at harvest were not incubated, so the numbers of fruit evaluated after incubation were somewhat lower than for fruit evaluated at harvest. However, for both Honeycrisp and Royal Court, the means for fruit with bitter rot or black rot after incubation represent the totals for fruit with these diseases at harvest plus those additional fruit that developed decays during incubation.

Table 9. Effects of treatments on incidence of sooty blotch and flyspeck on Royal Court fruit.

Fungicide program and rate/100 gal <sup>z</sup>	Royal Court fruit (%) <sup>y</sup> harvested 17 Sep with:		Royal Court from 17 Sep after incubation at 100% RH for 10 d. <sup>x</sup>	
	Flyspeck	Sooty blotch	Flyspeck	Sooty blotch
1. Control (no fungicides) .....	100.0 h	26.6	100.0 g	52.1
2. Inspire Super (all summer) .....	33.5 a	6.1	44.9 a	22.2
3. Inspire Super (skip 6/7, 9/20) .....	52.5 abc	22.7	62.6 abc	24.5
4. Inspire Super (end early) .....	45.3 ab	16.7	<b>59.9 ab</b>	26.2
5. Pristine (end early) .....	59.0 bcde	6.3	<b>78.1 cd</b>	8.9
6. Inspire Super (skip 6/22) .....	62.0 bcde	15.3	69.3 bcd	26.1
7. Inspire Super (skip 6/22, 7/6) .....	72.4 efg	36.3	79.3 de	46.6
8. Pristine (skip 6/22, 7/6) .....	87.6 fg	11.5	92.7 ef	13.0
9. Inspire Super (skip 6/22, 7/6) .....	75.3 def	19.0	82.3 de	26.3
10. Inspire Super (skip 6/22, 7/6, 9/6) .....	<b>69.1 cde</b>	9.6	<b>82.6 de</b>	19.3
11. Pristine (skip 6/22, 7/6, 9/6) .....	<b>89.7 g</b>	24.0	<b>95.8 fg</b>	32.3
12. Inspire Super (skip 7/6, 8/8, 9/6) .....	57.9 bcd	20.8	67.9 bcd	32.2
P-values .....	<0.001	0.199	<0.001	0.078

<sup>z</sup> For treatment timings, see Table 1. For the significance of shaded data and bold-face type, see footnotes for Table 3.<sup>y</sup> Data for Royal Court is from 75 fruit per tree.<sup>x</sup> Fruit were incubated at 70°F and 100% RH for 10 days to allow incipient SBFS to develop. Fruit with decays at harvest were not incubated, so the numbers of fruit evaluated after incubation were somewhat lower than for fruit evaluated at harvest.



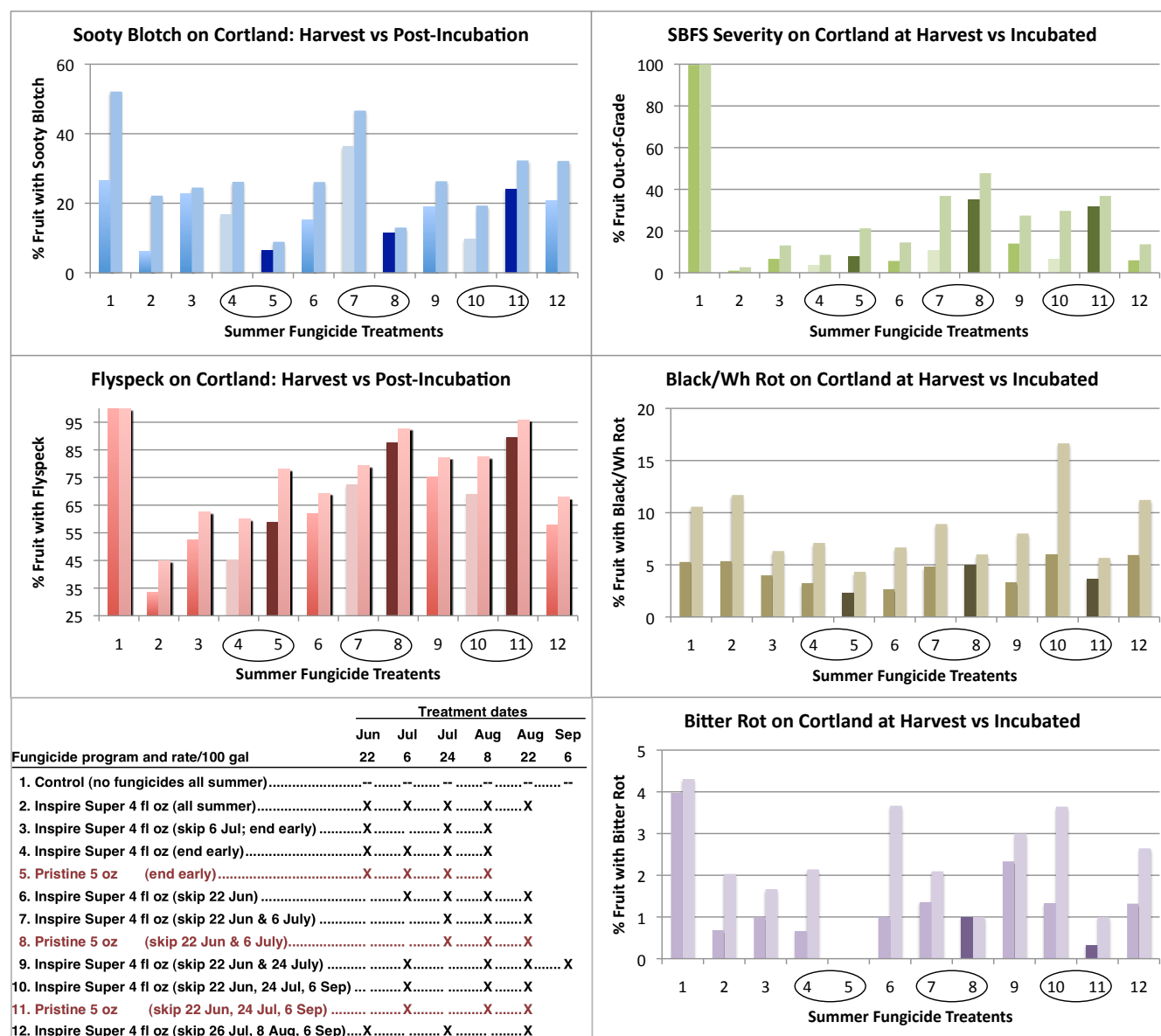


Fig. 4. Effects of treatments on disease incidence on Royal Court fruit at harvest (left-side bar in each pair) and after incubation at 70°F and 100% relative humidity for 10 days after harvest (right-side bar in each pair). Circled treatments are pairs where Inspire Super and Pristine were applied on identical schedules.