2008 Lygus Small Plot Efficacy Trial

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The 2008 Lygus small plot efficacy trial was marked by a large number of entries (18), steady and earlier populations of Lygus than normal, and excellent yield potential given the typically late planting date. The fall was warm and open and provided for significant compensation by the plants, well after Lygus exited the field. To counter this, we attempted to the terminate the irrigations early and accelerate defoliation. The result was the earliest harvest for this trial in 15 years and one of my earlier "final" reports to cooperators (and nearly 5 months sooner than last year!).

Pressure
The previous two years (2006 & 2007) had some of the lowest Lygus pressures we have ever seen in our small plot trials, despite our best efforts to place this trial at greater than commercially normal risk. While Lygus were at best low to moderate statewide in 2008, we were able to challenge this trial with significant pressures for at least 5–6 weeks. Our Lygus trial reached a maximum density of Lygus around 80 total Lygus per 100 sweeps, above 2006 (43/100) and well above 2007 (16/100) but still well short of maxima seen in prior years (up to 200/100).

Whitefly pressure in this trial was exceptionally high, among the highest in recent years. Efforts were made to selectively control whiteflies in this trial (except for T13-T18) with two sprays of Intruder and one spray of Knack. This regime was more than adequate to eliminate whiteflies as a major confounding factor of the design. However, it should be noted that whiteflies were actually yield-limiting this year as demonstrated by the difference between our completely untreated plots (T0) and our untreated Lygus check (T12), which did receive whitefly maintenance sprays with the rest of the test.

Timing
Generally, we try to time our sprays according to University of Arizona guidelines of 15 total Lygus with 4 nymphs per 100 sweeps (i.e. '15:4'). After two years of exceptionally low densities of Lygus, I made the decision to delay the first application somewhat for the core treatments in this trial (T2-T11). Based on the data, we estimate that threshold-level Lygus may have been present by 1 August. T2-T11 were initiated 11 d later on 12 August. T13-T18 were jointly evaluated for whitefly and Lygus suppression and as a result were initiated on 24 July (T13-T17) and 6 August (T18) well before the rest of the entries. The final spray was made on 5 September for all entries and was likely both effective and timely in that Lygus exited the field shortly thereafter due to cessation of flowering. This spray likely contributed to yield protection, but less so than earlier sprays made during the peak blooming period.

As noted in the tables, sprays were made on different timings. However, most all entries re-triggered based on the 15:4 threshold at the same time and were therefore sprayed on the same dates. Thus, the major difference among entries is the total number of sprays made against Lygus (3, 4, or 5 times). Keep this in mind when reviewing the yield data. Had we made the initial spray on a timely basis, I believe that 4 or 5 sprays would have likely been necessary to maximize yield.

Weather
Generally, weather was very favorable to cotton development in this trial. Some early losses (in this late planting) were evident to heat stress, but thereafter conditions were quite good. The monsoon was exceptionally active in Arizona this year, generally among the top 10 wettest on record. This had only limited bearing on this trial, though late dust storms contributed to a reduction in all pest pressures, especially whiteflies and mites.

This balance of this report is told mainly through a series of self-explanatory tables and figures:

Figure 1, Field map.
Replicates run N to S as our Lygus pressures often distribute along this axis (with the water runs). You should note here that anything planted in border 106 ended up in a piece of ground that behaved significantly differently than the other borders. This was noticeable even by the start of the test with shorter statured plants, which seemed to be subject to more severe water stress. Unfortunately, this source of variation runs counter to our blocking and therefore our bug and yield results are affected. I attempted to eliminate this bias by excluding these data in analyses, but the resulting unbalance in the design prevented any new or different statistical inferences.

Table 1, List of treatments, 18 total with UTC-Lygus (T12) and the totally untreated (T0).
Note that in some tables, I have provided comparable data from the adjacent whitefly trial. However, these entries were receiving whitefly insecticides earlier and were sprayed just twice (and not enough) for Lygus. These treatments (including the UTC from that test, UTC-wf) were not included in the analyses of Lygus data.

Table 2, Spray summary
This table shows the actual dates of sprays made for each entry (as indicated by '•'). One weed spray, one PGR (two were likely needed), and two defoliations (one was likely adequate) were made in a maintenance fashion across the entire trial (except T0 did not receive a PGR).

Table 3, Samples summary
There were 5 weekly samples taken from all treatments and an additional 3 weeks of samples taken from the early-started entries (T13–T18). This table is color-coded to emphasize what treatments can be compared head-to-head.

Table 4a, ANOVA summary for Lygus variables
Note while there were often significant treatment effects, the separation of means in some cases was minimal. This reflects some of the inherent variation noted above in the ground in the trial. Please note that statistics on date by date data were performed on sqrt-transformed data and on log-transformed data for the seasonal mean. Please also note the abbreviation conventions observed throughout this report.
Typically we do not see large "adult" effects, at least not directly. However, over time, we often see a reduction in the recruitment to this life stage via nymphal control. So there is often a time lag before adult effects are seen. In this case, the impact of the early spray regimes (T13-T18) helped to pull this out as an effect 3 weeks into the trial.

Table 4b, Seasonal means for Lygus numbers

These are averages of 5 post-spray weekly samples. Again, note that our threshold is 15:4 or 15 total Lygus with 4 nymphs per 100 sweeps, and that T13-T18 were initiated sooner than the remaining entries. In general, holding numbers below or about 20 total Lygus with 8 nymphs per 100 sweeps would be indicative of excellent control potential. You should also note that our 2-spray regime (Carbine) in the whitefly test (Trt No. > T18) was inadequate to control Lygus in that test.

Table 4c, Means and ANOVA results for yield components

Data are for raw seedcotton per A, bales per A (based on plot specific gin turnouts), gin turnout (%), trash (%), and % lint, this latter variable tends to be relatively constant for a given variety and set of production practices. We individually gin grab-samples taken from each plot's harvest in a scaled-down version of a commercial gin.

In 2007 for the first time ever, we were unable to separate yield means from the UTC because of the very low Lygus pressure. However, this year (2008) there were large and significant yield effects. Two additional things were apparent in this year's test: 1) whiteflies were yield-limiting, reducing yield by about 3/4 bale (compare T12 to T0), and 2) delaying sprays by just 11 d (i.e., relative to threshold) likely cost our main Lygus entries (T2-T11) at least 1/2 bale (compare T15-T17 to T9).

As is typical, Lygus bug numbers are highly correlated with yield. In this case, I have provided a quick regression between seasonal average nymph numbers and sdctn/A. The fit is fairly good and can reveal to you some instances where yield was either lower or higher than expected relative to the bug numbers. Restricting the analysis just to one product and timing (T13–T18) and the UTC-Lygus (T12) to eliminate noise associated with variable control and other confounding factors (e.g., secondary pests), the fit is especially good and reveals the importance of nymphs in the Lygus density : yield relationship.

On 2 October, a plant lodging rating was conducted by blindly visiting plots and subjectively assigning a value of 1 (no lodging) to 5 (severe or complete lodging). These data sometimes serve as a good proxy for yield, i.e., more severely lodged plants are ones more heavily loaded with bolls. The lodging ratings track very closely to yields, with just one notable exception. Eliminating that exception (T3) results in an exceptionally good fit to the data ($R2 = 0.91$). The result for T3 is anomalous. This was the high rate of Carbine combined with a moderate rate of V10170, in both cases higher than the rates used in T5 which yielded more by 200 lbs and showed moderate lodging. This level of difference in seed cotton yields is not large and might not be noticeable except for the definite departure in the lodging ratings. It is very difficult to interpret this result. Interference between the two compounds at high rates might be one explanation. However, the bug counts were significantly lower in T3. In fact, T3 had the lowest nymphal counts of any treatment. Mites and whiteflies were significant secondary pests throughout this trial, and their greater abundance in some treatments might be one factor contributing to variation seen in yields. In this case, whiteflies were well-controlled in T3 and T5; however, mites were possibly higher in T3. Mite ratings were taken too late in the season, after the infestation abated, and were not informative.

Table 5, Means and statistical tests for all Lygus bug variables (multi-page table)

All the post-treatment sample dates are available in this multi-page table. There are interesting trends throughout these date by date data. Note, all the means presented in this table are

sqrt-transformed. If you wish to examine the actual means, you will have to consult the Excel table provided as an attachment. However, the seasonal means (table 4b) and log-transformed seasonal means (table 6a) are also provided and show good separation of treatments.

Color-coding is used to guide your comparisons. Two statistical tests are presented: a Tukey's HSD, which tests all means against each other, and a Dunnett's T, which examines paired comparisons of candidate treatments to the UTC.

All products showed some amount of significant Lygus activity on at least one date and one variable, but at varying degrees, regardless of the number of sprays made. All bug results are consistent with the resulting yield trends, except again in T3 which yielded considerably less than would have been predicted.

Table 6a, Means and statistical tests for seasonal average transformed Lygus bug variables

All seasonal average bug variables were log-transformed and analyzed.

Table 6b, Means and statistical tests for transformed yield and ginning parameters

This table provides the specific statistical results for yield parameters seen in Table 4c.

In addition to this narrative and tables, you should find an Excel table attached that contains the date by date and seasonal means for the Lygus numbers. The additional columns provided are the SEs for the means.

In sum, the Lygus efficacy trial was very successful in challenging this set of insecticide treatments. As sprays were initiated in many cases well after the threshold had been reached, this test should be viewed as a robust assessment of the control potential for these compounds. In nearly all cases, the seasonal bug counts and yield results provide the best understanding of the comparable performance of these materials and rates.

Let me know if you have any questions, and thank you for your support. I will be in touch with each of you early next year to discuss plans for 2009.

F3 Lyg

2008 F3 Lygus

Located in Field 3 border 100-106

S

Test Design

Planted DP164B2RF on 5/21/08
and watered up on 5/27/08

Plots

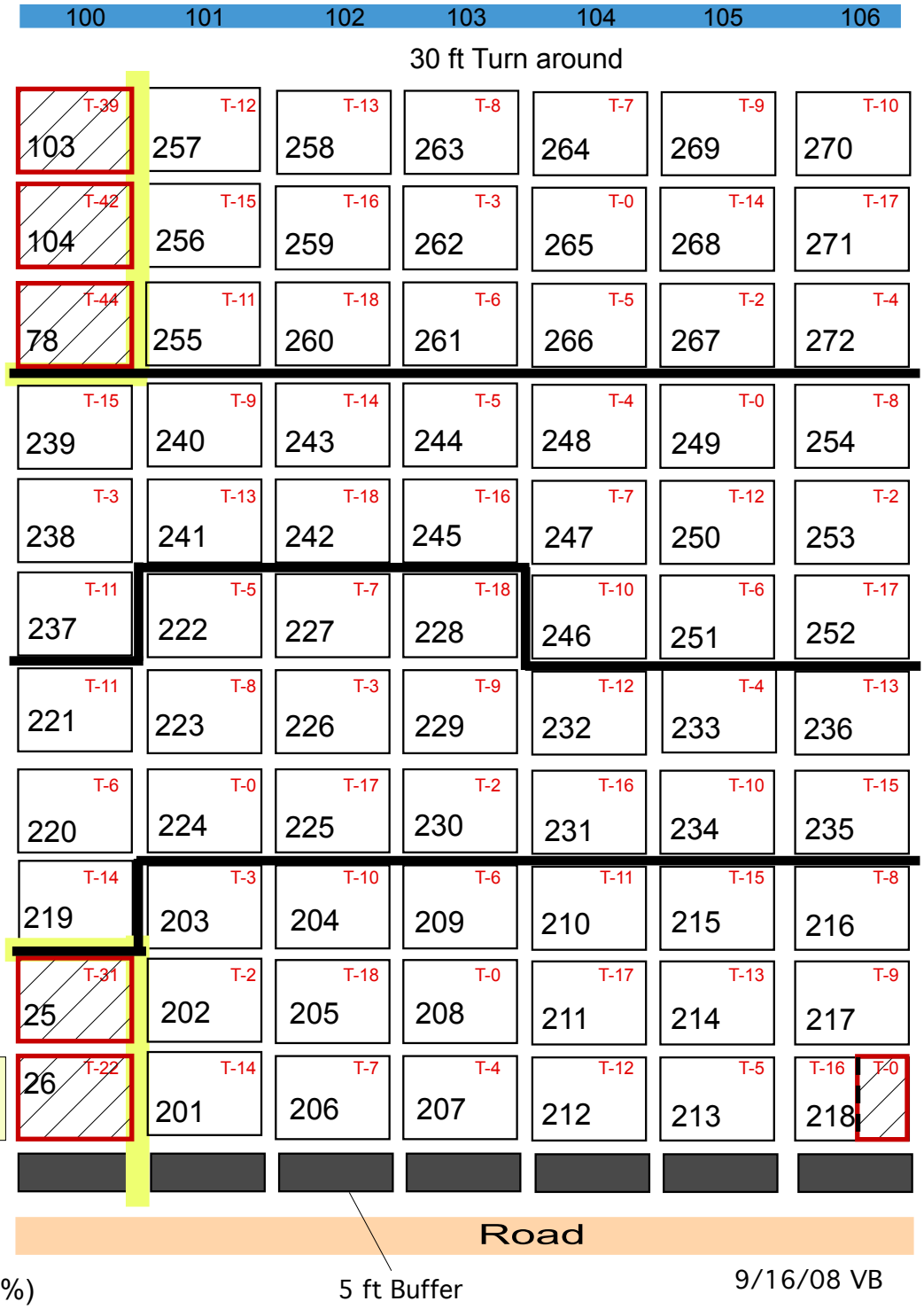
12 rows by 39ft with 8ft alleys and 2 row skips between plots.

Treatments

T0 = UTC-UTC
T2 = Carbine r2
T3 = Carbine r2+ V10170 r2
T4 = V10170 r3
T5 = Carbine r1 + V10170 r1
T6 = BAS32005l r1
T7 = BAS32005l r1*
T8 = BAS32005l r2
T9 = BAS32005l r2*
T10 = Vydate C-LV
T11 = Orthene97 + X-77
T12 = UTC-Lygus

T13 = UA-EXP32 r1**
T14 = UA-EXP32 r2**
T15 = UA-EXP32 r3**
T16 = UA-EXP32 r4**
T17 = UA-EXP32 r5**
T18 = UA-EXP32 r6**

Whitefly + Lygus



* + Penetrator Plus(0.5%)
** + UAN32(2.5%) + Dyne-Amic(0.5%)

9/16/08 VB

Table 1. Treatment summary for 2008 small plot Lygus efficacy trial, Maricopa, AZ (08F3L).

Trt No.	Name	Product	Formulation	Rate	No. of Sprays†
0	UTC - UTC				0
2	flonicamid r2	Carbine r2	50 WG	0.088	3
3	flonicamid r2 +	Carbine r2 +	50 WG	0.088	3
	V10170r2	V10170r2	2.13 SC	0.047	
4	V10170 r3	V10170 r3	2.13 SC	0.075	3
5	flonicamid r1+	Carbine r1+	50 WG	0.045	3
	V10170r1	V10170 r1	2.13 SC	0.03	
6	metaflumizone r1	BAS32000I r1	1.67 EC	0.21	3
7	metaflumizone r1*	BAS32000I r1	1.67 EC	0.21	3
8	metaflumizone r2	BAS32000I r2	1.67 EC	0.25	3
9	metaflumizone r2*	BAS32000I r2	1.67 EC	0.25	3
10	oxamyl	Vydate C-LV	3.77 L	1	3
11	acephate***	Orthene97	97 PE	1	3
12	UTC-Lygus	Intruder 2X fb Knack			0
13	UA-EXP32r1**			0.011	5
14	UA-EXP32r2**			0.022	5
15	UA-EXP32r3**			0.033	5
16	UA-EXP32r4**			0.045	5
17	UA-EXP32r5**			0.067	5
18	acetamiprid fb	Intruder fb	70 WSP	0.1	1
	UA-EXP32r6**			0.089	4
44	UTC-wf				0

*, 0.5% Penetrator Plus added; **, 2.5% UAN32 + 0.5% Dyne-Namic added; ***, 0.25% X-77 added.

†Sprays initiated at ca. threshold; see Table 2.

Table 2. Summary of sprays made in 2008 small plot Lygus efficacy trial, Maricopa, AZ (08F3L).

Trt No.	Treatment	No. Sprays	6/16/08	7/24/08	7/24/08	8/6/08	8/12/08	8/26/08	8/26/08	9/5/08	10/7/08	10/15/08
0	UTC - UTC	0	glyphosate								8 oz Ginstar	8 oz Ginstar
2	CarbineR2	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
3	CarbineR2+V10170r2	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
4	V10170r3	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
5	CarbineR1+V10170r1	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
6	BAS32005I r1	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
7	BAS32005I r1*	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
8	BAS32005I r2	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
9	BAS32005I r2*	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
10	Vydate C-LV	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
11	Orthene97***	3	glyphosate	Pentia	Intruder	Intruder	•	Knack	•	•	8 oz Ginstar	8 oz Ginstar
12	UTC-Lygus	0	glyphosate	Pentia	Intruder	Intruder		Knack			8 oz Ginstar	8 oz Ginstar
13	UA-EXP32r1**	5*	glyphosate	Pentia	•	•	•		•	•	8 oz Ginstar	8 oz Ginstar
14	UA-EXP32r2**	5*	glyphosate	Pentia	•	•	•		•	•	8 oz Ginstar	8 oz Ginstar
15	UA-EXP32r3**	5*	glyphosate	Pentia	•	•	•		•	•	8 oz Ginstar	8 oz Ginstar
16	UA-EXP32r4**	5*	glyphosate	Pentia	•	•	•		•	•	8 oz Ginstar	8 oz Ginstar
17	UA-EXP32r5**	5*	glyphosate	Pentia	•	•	•		•	•	8 oz Ginstar	8 oz Ginstar
18	UA-EXP32r6**	4*	glyphosate	Pentia	Intruder	•	•		•	•	8 oz Ginstar	8 oz Ginstar
44	UTC-wf	2	glyphosate	Pentia	Carbine				Carbine		8 oz Ginstar	8 oz Ginstar
	* +0.5% Penetrator Plus, **+2.5% UAN32 + 0.5% Dyne-Namic, ***+ 0.25% X-77	*Some triggered for wf control	weed control	12 oz/A; PGR	wf spray; 2.3 oz/A; all > threshold	wf spray; 2.3 oz/A	1st Lygus spray	wf spray; 8 oz/A	2nd Lygus spray	3rd Lygus spray	1st Defoliation	2nd Defoliation

Table 3. Summary of sample dates and number of days after treatment (#DAT), Maricopa, AZ (08F3L).

Trt No.	Treatment	No. Sprays	8/1/08	8/5/08	8/13/08	8/18/08	8/25/08	9/3/08	9/10/08	9/18/08
0	UTC - UTC	0								
2	flonicamid	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
3	flonicamid r2 + V10170r2	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
4	V10170 r3	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
5	flonicamid r1 + V10170r1	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
6	metaflumizone r1	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
7	metaflumizone r1*	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
8	metaflumizone r2	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
9	metaflumizone r2*	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
10	oxamyl	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
11	acephate***	3	Pretrt	Pretrt	Pretrt	6DAT	13DAT	8DAT2	5DAT3	13DAT3
12	UTC-Lygus	0								
13	UA-EXP32r1**	5	8DAT	12DAT	1DAT3	6DAT3	13DAT3	8DAT4	5DAT5	13DAT5
14	UA-EXP32r2**	5	8DAT	12DAT	1DAT3	6DAT3	13DAT3	8DAT4	5DAT5	13DAT5
15	UA-EXP32r3**	5	8DAT	12DAT	1DAT3	6DAT3	13DAT3	8DAT4	5DAT5	13DAT5
16	UA-EXP32r4**	5	8DAT	12DAT	1DAT3	6DAT3	13DAT3	8DAT4	5DAT5	13DAT5
17	UA-EXP32r5**	5	8DAT	12DAT	1DAT3	6DAT3	13DAT3	8DAT4	5DAT5	13DAT5
18	UA-EXP32r6**	4	Pretrt	Pretrt	1DAT2	6DAT2	13DAT2	8DAT3	5DAT4	13DAT4
44	UTC-wf	2	8DAT	12DAT	20DAT	25DAT	32DAT	8DAT2	15DAT2	23DAT2

*,**,*** Various adjuvants added

Table 4a. Test for treatment effects on sqrt-transformed Lygus variables by means 08F3L, Maricopa, AZ

Date	ANOVA	S/100	L/100	N/100	A/100	T/100
8/1/08	P=	0.0055	0.1794	0.0005	0.1235	0.0055
8/5/08	P=	0.7928	0.0651	0.2793	0.9495	0.4518
8/13/08	P=	0.0167	0.0005	0.0008	0.0012	0.0001
8/18/08	P=	0.0191	0.0001	0.0001	0.0554	0.0001
8/25/08	P=	0.1832	0.0877	0.0728	0.0116	0.0101
9/3/08	P=	0.0048	0.024	0.003	0.0074	0.004
9/10/08	P=	0.1336	0.0001	0.0001	0.0324	0.0001
9/18/08	P=	0.0597	0.0914	0.0177	0.0086	0.0037
Seasonal*	P=	0.0014	0.0001	0.0001	0.002	0.0001

S/100 = Small nymphs (instars 1-3) per 100 sweeps.

L/100 = Large nymphs (instars 4-5) per 100 sweeps.

N/100 = All nymphs (instars 1-5) per 100 sweeps.

A/100 = Adult Lygus per 100 sweeps.

T/100 = Total Lygus per 100 sweeps.

* = Log-transformed mean of 5 weeks post-spray for all treatments (see note below).

Note: T12-T17 were initiated 19 d & T18 was 6 d sooner than other Lygus treatments.

Table 4b. Seasonal means and treatment effects for log-transformed means by ANOVA, 08F3L, Maricopa, AZ.

Trts	Product	N Rows	S/100	L/100	N/100	A/100	T/100
0	UTC - UTC	4	9.2	13	22.2	31.2	53.4
2	Carbine r2	4	3.8	2.8	6.6	13.2	19.8
3	Carbr2+170r2	4	1.6	1	2.6	13.4	16
4	V10170 r3	4	4.6	4.4	9	12.8	21.8
5	Carbr1+170r1	4	7.4	7.2	14.6	18	32.6
6	BAS320r1	4	10.4	8	18.4	22	40.4
7	BAS320+PPr1	4	7.2	7.8	15	17.2	32.2
8	BAS320r2	4	2.2	2.8	5	11.2	16.2
9	BAS320+PPr2	4	4.4	3.6	8	13	21
10	VydateCLV	4	8.2	2.4	10.6	16.4	27
11	O97+X77	4	7	6	13	22.2	35.2
12	UTC-Lygus	4	7.2	12.2	19.4	17	36.4
13	UA-EXP32r1**	4	4.6	5.2	9.8	14	23.8
14	UA-EXP32r2**	4	6.4	7.4	13.8	19.8	33.6
15	UA-EXP32r3**	4	3.8	2.2	6	10.2	16.2
16	UA-EXP32r4**	4	1.6	2.6	4.2	8.8	13
17	UA-EXP32r5**	4	2.4	1.4	3.8	9.4	13.2
18	UA-EXP32r6**	4	4.8	1.2	6	10.8	16.8
21	HGW86r2*	4	8.8	11	19.8	24.8	44.6
23	E2Y45 fb Requiem*	4	5.4	11.2	16.6	21.4	38
34	fenpyroximate**	4	7.6	8	15.6	20.2	35.8
39	NNI0772**	4	8.8	9.4	18.2	22.6	40.8
44	UTC-wf	4	11.4	9	20.4	33	53.4
98	UTC-UTCalt	1	7.2	13.6	20.8	39.2	60

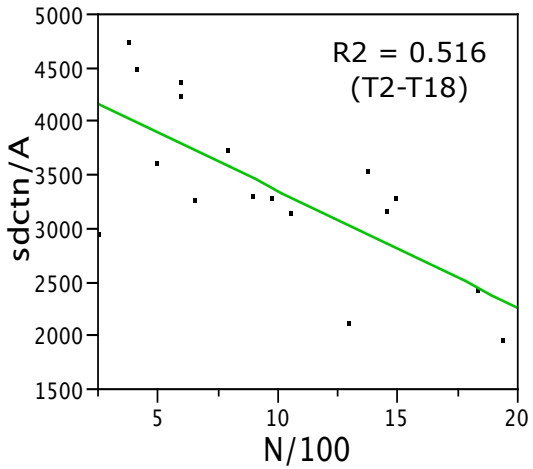
Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.
Some representative whitefly trial treatments (Trt > 20) are provided for general comparison only.
These were sprayed with Carbine twice for Lygus on different timing.

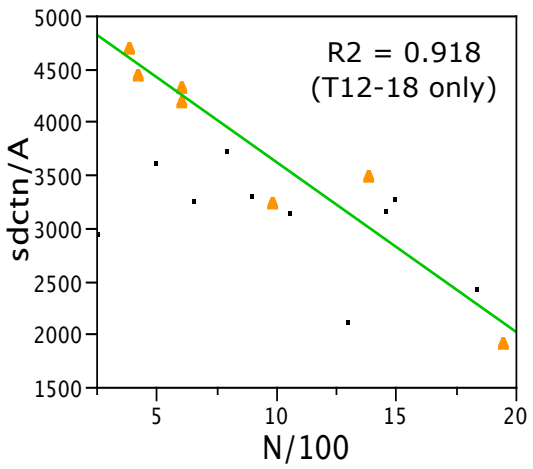
Table 4c. Means and treatment effects for sqrt-transformed harvest means by ANOVA, 08F3L, Maricopa, AZ.

Trt	ANOVA	Sdctn/A	Bales/A	T.O.	%Trash	%Lint	Lodging
	P=	0.0001	0.0001	0.0196	0.0729	0.0113	0.0001
0	UTC - UTC	882	0.57	31.2%	12.8%	35.8%	1.5
2	Carbine r2	3257	2.31	33.8%	7.6%	36.6%	3
3	Carbr2+170r2	2941	1.96	31.9%	10.1%	35.4%	4
4	V10170 r3	3292	2.22	32.3%	9.0%	35.5%	3
5	Carbr1+170r1	3150	2.11	32.2%	8.8%	35.3%	3
6	BAS320r1	2421	1.58	31.4%	9.0%	34.6%	1
7	BAS320+PPr1	3278	2.27	33.1%	8.3%	36.1%	2
8	BAS320r2	3606	2.28	30.3%	12.2%	34.5%	2.75
9	BAS320+PPr2	3715	2.53	32.4%	8.7%	35.5%	3
10	VydateCLV	3139	1.95	30.0%	11.2%	33.7%	2.25
11	O97+X77	2111	1.35	30.4%	10.2%	33.8%	1
12	UTC-Lygus	1948	1.29	31.7%	10.8%	35.6%	1
13	UA-EXP32r1**	3276	2.14	31.3%	10.0%	34.7%	2.5
14	UA-EXP32r2**	3521	2.29	31.2%	10.1%	34.7%	3
15	UA-EXP32r3**	4360	3.08	33.9%	6.6%	36.3%	4.5
16	UA-EXP32r4**	4480	2.89	30.9%	10.3%	34.4%	4.5
17	UA-EXP32r5**	4733	3.28	33.3%	8.9%	36.5%	4.25
18	UA-EXP32r6**	4218	2.84	32.3%	8.6%	35.3%	4.25

Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.

** = Treatments initiated 6 - 19 d sooner than remainder of Lygus treatments; adjuvant included.





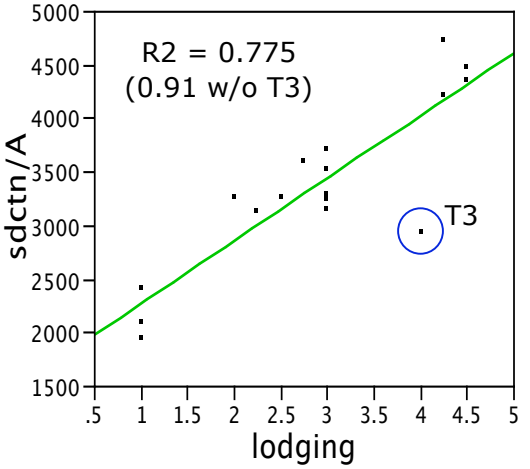


Table 5. Means separation tests for sqrt-transformed Lygus means by sample date, Dunnett's T & Tukey's HSD (P < 0.05).

1-Aug									5-Aug							
S/100	Treatment	Trt No.				Mean	|Dif | - LSD	P	S/100	Treatment	Trt No.		Mean	|Dif | - LSD	P
Pretrt	UA-EXP32r6**	18	A			3.6	-1.37	1	Pretrt	UA-EXP32r6**	18	A	2.9	-1.26	0.998
8DAT	UA-EXP32r1**	13	A	B		2.94	-0.71	0.576	0	UTC-Lygus	12	A	2.56	-1.6	1
8DAT	UA-EXP32r2**	14	A	B		2.85	-0.62	0.456	12DAT	UA-EXP32r1**	13	A	2.52	-1.56	1
8DAT	UA-EXP32r3**	15	A	B		2.16	0.071	0.037	12DAT	UA-EXP32r3**	15	A	2.45	-1.49	1
8DAT	UA-EXP32r4**	16		B		1.87	0.36	0.011	12DAT	UA-EXP32r2**	14	A	2.37	-1.41	1
8DAT	UA-EXP32r5**	17		B		1.87	0.36	0.011	12DAT	UA-EXP32r4**	16	A	2.36	-1.4	1
8DAT	UTC-wf	44		B		1.58	0.649	0.003	12DAT	UTC-wf	44	A	2.23	-1.27	0.999
									Pretrt	fenpyroximate**	34	A	2.23	-1.27	0.999
									Pretrt	HGW86r2*	21	A	2.07	-1.11	0.973
									Pretrt	NNI0772**	39	A	2.07	-1.11	0.973
									0	UTC - UTC	0	A	1.87	-0.91	0.821
									Pretrt	E2Y45 fb Requiem*	23	A	1.87	-0.91	0.821
									12DAT	UA-EXP32r5**	17	A	1.87	-0.91	0.821
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks															
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.														

1-Aug									5-Aug							
L/100	Treatment	Trt No.				Mean	|Dif | - LSD	P	L/100	Treatment	Trt No.		Mean	|Dif | - LSD	P
8DAT	UA-EXP32r1**	13	A			2.16	-0.41	0.71	12DAT	UA-EXP32r1**	13	A	2.79	-1.16	1
Pretrt	UA-EXP32r6**	18	A			1.87	-0.7	1	0	UTC - UTC	0	A	2.65	-1.3	1
8DAT	UA-EXP32r2**	14	A			1.58	-0.41	0.71	Pretrt	UA-EXP32r6**	18	A	2.65	-1.3	1
8DAT	UA-EXP32r4**	16	A			1.58	-0.41	0.71	0	UTC-Lygus	12	A	2.56	-1.39	1
8DAT	UA-EXP32r5**	17	A			1.58	-0.41	0.71	12DAT	UA-EXP32r3**	15	A	2.45	-1.28	1
8DAT	UA-EXP32r3**	15	A			1.58	-0.41	0.71	12DAT	UA-EXP32r2**	14	A	2.23	-1.06	0.996
8DAT	UTC-wf	44	A			1.58	-0.41	0.71	Pretrt	E2Y45 fb Requiem*	23	A	2.16	-0.99	0.983
									12DAT	UA-EXP32r4**	16	A	1.87	-0.7	0.691
									12DAT	UA-EXP32r5**	17	A	1.87	-0.7	0.691
									Pretrt	HGW86r2*	21	A	1.58	-0.41	0.293
									Pretrt	fenpyroximate**	34	A	1.58	-0.41	0.293
									Pretrt	NNI0772**	39	A	1.58	-0.41	0.293
									12DAT	UTC-wf	44	A	1.58	-0.41	0.293
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks															
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.														

1-Aug									5-Aug							
N/100	Treatment	Trt No.				Mean	|Dif | · LSD	P	N/100	Treatment	Trt No.		Mean	|Dif | · LSD	P	
Pretrt	UA-EXP32r6**	18	A			3.8	-1.26	1	Pretrt	UA-EXP32r6**	18	A	3.68	-1.4	0.989	
8DAT	UA-EXP32r1**	13	A	B		3.34	-0.8	0.793	12DAT	UA-EXP32r1**	13	A	3.3	-1.78	1	
8DAT	UA-EXP32r2**	14	A	B	C	2.85	-0.31	0.184	0	UTC-Lygus	12	A	3.16	-1.93	1	
8DAT	UA-EXP32r3**	15		B	C	2.16	0.381	0.008	12DAT	UA-EXP32r3**	15	A	3.05	-1.81	1	
8DAT	UA-EXP32r4**	16		B	C	1.87	0.67	0.002	0	UTC - UTC	0	A	2.81	-1.57	1	
8DAT	UA-EXP32r5**	17		B	C	1.87	0.67	0.002	12DAT	UA-EXP32r2**	14	A	2.72	-1.48	0.997	
8DAT	UTC-wf	44			C	1.58	0.96	0	12DAT	UA-EXP32r4**	16	A	2.52	-1.28	0.954	
									Pretrt	E2Y45 fb Requiem*	23	A	2.36	-1.12	0.844	
									12DAT	UTC-wf	44	A	2.23	-0.99	0.717	
									Pretrt	fenpyroximate**	34	A	2.23	-0.99	0.717	
									12DAT	UA-EXP32r5**	17	A	2.16	-0.92	0.639	
									Pretrt	HGW86r2*	21	A	2.07	-0.83	0.54	
									Pretrt	NNI0772**	39	A	2.07	-0.83	0.54	
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks																
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.															

1-Aug									5-Aug							
A/100	Treatment	Trt No.				Mean	|Dif | · LSD	P	A/100	Treatment	Trt No.		Mean	|Dif | · LSD	P	
Pretrt	UA-EXP32r6**	18	A			4.43	-2.16	1	Pretrt	NNI0772**	39	A	4	-1.21	0.894	
8DAT	UA-EXP32r1**	13	A			3.64	-1.37	0.798	12DAT	UTC-wf	44	A	3.93	-1.29	0.94	
8DAT	UA-EXP32r2**	14	A			3.56	-1.3	0.739	Pretrt	E2Y45 fb Requiem*	23	A	3.66	-1.55	0.999	
8DAT	UTC-wf	44	A			2.66	-0.4	0.136	Pretrt	UA-EXP32r6**	18	A	3.64	-1.58	0.999	
8DAT	UA-EXP32r3**	15	A			2.56	-0.3	0.106	0	UTC - UTC	0	A	3.6	-1.61	1	
8DAT	UA-EXP32r4**	16	A			2.56	-0.3	0.106	12DAT	UA-EXP32r5**	17	A	3.6	-1.61	1	
8DAT	UA-EXP32r5**	17	A			2.45	-0.19	0.081	12DAT	UA-EXP32r3**	15	A	3.59	-1.62	1	
									Pretrt	fenpyroximate**	34	A	3.56	-1.65	1	
									12DAT	UA-EXP32r2**	14	A	3.55	-1.66	1	
									12DAT	UA-EXP32r4**	16	A	3.46	-1.75	1	
									12DAT	UA-EXP32r1**	13	A	3.27	-1.94	1	
									0	UTC-Lygus	12	A	3.24	-1.97	1	
									Pretrt	HGW86r2*	21	A	2.79	-1.52	0.997	
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks																
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.															

1-Aug									5-Aug							
T/100	Treatment	Trt No.				Mean	|Dif | · LSD	P	T/100	Treatment	Trt No.		Mean	|Dif | · LSD	P	
Pretrt	UA-EXP32r6**	18	A			5.63	-2.24	1	Pretrt	UA-EXP32r6**	18	A	5.05	-1.19	0.897	
8DAT	UA-EXP32r1**	13	A	B		4.71	-1.32	0.716	12DAT	UA-EXP32r3**	15	A	4.58	-1.66	1	
8DAT	UA-EXP32r2**	14	A	B		4.31	-0.92	0.387	12DAT	UA-EXP32r1**	13	A	4.56	-1.68	1	
8DAT	UA-EXP32r3**	15	A	B		3.14	0.255	0.026	12DAT	UA-EXP32r2**	14	A	4.32	-1.93	1	
8DAT	UA-EXP32r4**	16		B		2.72	0.672	0.008	0	UTC-Lygus	12	A	4.31	-1.93	1	
8DAT	UTC-wf	44		B		2.66	0.731	0.007	0	UTC - UTC	0	A	4.3	-1.93	1	
8DAT	UA-EXP32r5**	17		B		2.65	0.743	0.007	Pretrt	NNI0772**	39	A	4.26	-1.89	1	
									12DAT	UTC-wf	44	A	4.24	-1.87	1	
									Pretrt	E2Y45 fb Requiem*	23	A	4.24	-1.87	1	
									12DAT	UA-EXP32r4**	16	A	3.98	-1.6	1	
									12DAT	UA-EXP32r5**	17	A	3.94	-1.56	0.999	
									Pretrt	fenpyroximate**	34	A	3.88	-1.51	0.998	
									Pretrt	HGW86r2*	21	A	3.01	-0.63	0.34	
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks																
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.															

Table 5 (continued).

13-Aug S/100	Treatment	Trt No.					Mean	|Dif | LSD	P	18-Aug S/100	Treatment	Trt No.					Mean	|Dif | LSD	P
20DAT	UTC-wf	44	A				4.26	-1.91	0.999	0	UTC - UTC	0	A				3.86	-1.43	1
1DAT2	HGW86r2*	21	A				3.79	-2.37	1	0	UTC-Lygus	12	A	B			3.47	-1.81	1
0	UTC-Lygus	12	A				3.78	-2.39	1	6DAT	O97+X77	11	A	B			2.65	-0.98	0.833
0	UTC - UTC	0	A				3.69	-2.3	1	6DAT	BAS320r1	6	A	B			2.56	-0.89	0.733
1DAT3	UA-EXP32r1**	13	A				3.51	-2.12	1	6DAT	Carbine r2	2	A	B			2.52	-0.86	0.687
1DAT2	fenpyroximate**	34	A				3.19	-1.8	0.995	6DAT	BAS320r2	8	A	B			2.16	-0.5	0.288
1DAT2	E2Y45 fb Requiem*	23	A				3.02	-1.63	0.967	6DAT	BAS320+PPr1	7	A	B			2.16	-0.5	0.288
1DAT2	NNI0772**	39	A				2.99	-1.59	0.955	6DAT	VydateCLV	10	A	B			2.07	-0.41	0.219
1DAT2	UA-EXP32r6**	18	A				2.36	-0.97	0.485	6DAT	Carbr1+170r1	5	A	B			1.87	-0.21	0.111
1DAT3	UA-EXP32r2**	14	A				2.07	-0.68	0.277	6DAT	V10170 r3	4	A	B			1.87	-0.21	0.111
1DAT3	UA-EXP32r3**	15	A				1.87	-0.48	0.176	6DAT2	UA-EXP32r6**	18	A	B			1.87	-0.21	0.111
1DAT3	UA-EXP32r4**	16	A				1.58	-0.19	0.085	6DAT	Carbr2+170r2	3	A	B			1.87	-0.21	0.111
1DAT3	UA-EXP32r5**	17	A				1.58	-0.19	0.085	6DAT3	UA-EXP32r3**	15	A	B			1.87	-0.21	0.111
										6DAT3	UA-EXP32r2**	14	A	B			1.87	-0.21	0.111
										6DAT3	UA-EXP32r4**	16	A	B			1.87	-0.21	0.111
										6DAT3	UA-EXP32r1**	13		B			1.58	0.082	0.036
										6DAT3	UA-EXP32r5**	17		B			1.58	0.082	0.036
										6DAT	BAS320+PPr2	9		B			1.58	0.082	0.036

Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks

Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.

13-Aug										18-Aug									
L/100	Treatment	Trt No.					Mean	|Dif | LSD	P	L/100	Treatment	Trt No.					Mean	|Dif | LSD	P
0	UTC-Lygus	12	A				4.29	-1.61	1	0	UTC-Lygus	12	A				6.15	-2.18	1
1DAT2	HGW86r2*	21	A	B			3.37	-0.7	0.541	0	UTC - UTC	0	A	B			5.66	-1.68	1
1DAT2	NNI0772**	39	A	B			3.15	-0.48	0.294	6DAT	Carbr1+170r1	5	A	B	C		4.44	-0.47	0.209
0	UTC - UTC	0	A	B			2.85	-0.18	0.102	6DAT	BAS320r1	6	A	B	C	D	3.66	0.313	0.016
20DAT	UTC-wf	44	A	B			2.45	0.222	0.019	6DAT3	UA-EXP32r2**	14	A	B	C	D	3.5	0.475	0.009
1DAT2	E2Y45 fb Requiem*	23	A	B			2.36	0.313	0.012	6DAT	V10170 r3	4		B	C	D	3.44	0.534	0.007
1DAT3	UA-EXP32r2**	14		B			2.16	0.512	0.005	6DAT	BAS320+PPr2	9		B	C	D	3.34	0.637	0.005
1DAT2	fenpyroximate**	34		B			2.07	0.602	0.003	6DAT	O97+X77	11			C	D	2.95	1.023	0
1DAT3	UA-EXP32r1**	13		B			2.07	0.602	0.003	6DAT	BAS320+PPr1	7			C	D	2.85	1.125	0
1DAT2	UA-EXP32r6**	18		B			1.87	0.801	0.001	6DAT	BAS320r2	8			C	D	2.81	1.163	0
1DAT3	UA-EXP32r3**	15		B			1.87	0.801	0.001	6DAT	Carbine r2	2			C	D	2.61	1.362	0
1DAT3	UA-EXP32r4**	16		B			1.58	1.091	0	6DAT3	UA-EXP32r1**	13			C	D	2.36	1.614	0
1DAT3	UA-EXP32r5**	17		B			1.58	1.091	0	6DAT	Carbr2+170r2	3			C	D	2.16	1.813	0
										6DAT3	UA-EXP32r4**	16			C	D	2.16	1.813	0
										6DAT3	UA-EXP32r3**	15			C	D	2.16	1.813	0
										6DAT	VydateCLV	10			C	D	1.87	2.103	0
										6DAT3	UA-EXP32r5**	17			C	D	1.87	2.103	0
										6DAT2	UA-EXP32r6**	18				D	1.58	2.392	0
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks																			
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.																		

13-Aug										18-Aug									
N/100	Treatment	Trt No.					Mean	|Dif | LSD	P	N/100	Treatment	Trt No.					Mean	|Dif | LSD	P
0	UTC-Lygus	12	A				5.51	-2.67	1	0	UTC-Lygus	12	A				7.11	-2.32	1
1DAT2	HGW86r2*	21	A	B			4.79	-1.95	0.989	0	UTC - UTC	0	A				6.86	-2.07	1
20DAT	UTC-wf	44	A	B			4.62	-1.78	0.952	6DAT	Carbr1+170r1	5	A	B			4.61	0.189	0.027
0	UTC - UTC	0	A	B			4.42	-1.59	0.862	6DAT	BAS320r1	6	A	B			4.29	0.508	0.009
1DAT2	NNI0772**	39	A	B			4.18	-1.34	0.684	6DAT3	UA-EXP32r2**	14		B			3.66	1.135	0
1DAT3	UA-EXP32r1**	13	A	B			3.78	-0.94	0.383	6DAT	O97+X77	11		B			3.64	1.159	0
1DAT2	E2Y45 fb Requiem*	23	A	B			3.64	-0.8	0.298	6DAT	V10170 r3	4		B			3.56	1.231	0
1DAT2	fenpyroximate**	34	A	B			3.39	-0.56	0.184	6DAT	BAS320+PPr2	9		B			3.34	1.458	0
1DAT2	UA-EXP32r6**	18	A	B			2.52	0.316	0.022	6DAT	BAS320r2	8		B			3.3	1.496	0
1DAT3	UA-EXP32r2**	14	A	B			2.52	0.316	0.022	6DAT	BAS320+PPr1	7		B			3.21	1.586	0
1DAT3	UA-EXP32r3**	15		B			2.16	0.677	0.008	6DAT	Carbine r2	2		B			3.2	1.597	0
1DAT3	UA-EXP32r4**	16		B			1.58	1.256	0.001	6DAT3	UA-EXP32r4**	16		B			2.45	2.346	0
1DAT3	UA-EXP32r5**	17		B			1.58	1.256	0.001	6DAT3	UA-EXP32r3**	15		B			2.45	2.346	0
										6DAT	Carbr2+170r2	3		B			2.36	2.436	0
										6DAT3	UA-EXP32r1**	13		B			2.36	2.436	0
										6DAT	VydateCLV	10		B			2.23	2.563	0
										6DAT3	UA-EXP32r5**	17		B			1.87	2.924	0
										6DAT2	UA-EXP32r6**	18		B			1.87	2.924	0
Color-coded timings indicate best head-to-head treatment comparisons; I.e., treatments sprayed during same weeks																			
	Blue-colored treatments are significantly different from the UTC-Lygus (Trt No. 12), Dunnett's, P < 0.05.																		