Nitrogen Management Plan Summary Report Analysis

2015 Crop Year

Prepared For
Central Valley Regional Water Quality Control Board

August 2, 2016

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LIST OF ACRONYMS

A	Total available nitrogen applied per acre
APN	Assessor Parcel Number
ESJWQC	East San Joaquin Water Quality Coalition
GQMP	Groundwater Quality Management Plan
MPEP	Management Practices Evaluation Program
MU	Management Unit

NMP	Nitrogen Management Plan
NMP MU	Nitrogen Management Plan Management Units
NMP SR	Nitrogen Management Plan Summary Report
T-R	Township-Range
Y	Yield per acre

LIST OF TERMS

Agricultural Commissioner – County Agriculture Commissioner

ArcGIS – Geographic Information Systems mapping software

Central Valley or Valley – California Central Valley

Coalition – East San Joaquin Water Quality Coalition

Coalition/ESJWQC region – The region within the Central Valley that is monitored by the East San Joaquin Water Quality Coalition

NMP Management Unit – Reporting unit in the NMP Summary Report

N Removed Conversion Factor – Pounds of nitrogen removed per pound of yield

Regional Water Board – Central Valley Regional Water Quality Control Board

INTRODUCTION / BACKGROUND

On May 31, 2015, the Coalition submitted a Nitrogen Management Plan Summary Report Analysis for the 2015 crop year. Due to the number of new NMP Summary Reports (NMP SR) received from growers since that report, the Coalition is submitting an updated NMP Summary Report Analysis with additional information. Due to the reanalysis of the data, this August 2, 2016 report replaces the May 31, 2016 analysis.

The East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is required to submit a summary of member's reported nitrogen data as a component of the Coalition's Annual Report. This report is an expansion of the brief summary included in the ESJWQC 2015 Water Year Annual Report submitted to the Central Valley Regional Water Quality Control Board (Regional Water Board) on May 2, 2016. The Order requires that the Coalition submit "At a minimum, the statistical summary of nitrogen consumption ratios by crop or other equivalent reporting units and the estimated crop nitrogen needs for the different crop types and soil conditions will describe the range, percentiles (10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}), and any outliers. A box and whisker plot or equivalent tabular or graphical presentation of the data approved by the Executive Officer may be used." Outliers are defined by the Regional Water Board as any member reporting nitrogen data below the 10^{th} percentile, and above the 90^{th} percentile (S. McConnell, personal communication).

To be in compliance with the Order, growers in high vulnerability groundwater areas are required to prepare and implement a Nitrogen Management Plan (NMP) by March 1 of each year using a NMP work sheet (approved December 23, 2014). Growers in high vulnerability areas farming more than 60 acres were required to submit a NMP SR to the Coalition by March 1, 2016 (NMP Summary Report template approved December 23, 2015).

On the NMP SR, growers report the total amount of nitrogen applied (pounds) A, and A/Y, the ratio of total available nitrogen applied per acre (A) to yield per acre (Y) as the indicator of nitrogen removed from the field at harvest for each management unit (MU). When possible, the Coalition converts A/Y to A/R where R is the amount of nitrogen removed in harvested material and sequestered in permanent tissue.

Once the data are analyzed, the Coalition reports back to the member their N-removed estimates on a per acre basis, placing their nitrogen use and nitrogen removal performance in the context of other growers of the same crop in their region.

This is the first year that NMP SR information is being collected and the Coalition is developing a format for reporting information back to growers. Information sent to growers will include plots of applied nitrogen compared to yield, and the Coalition is considering providing information on a Coalition wide basis by crop, which the member can use to compare to their information.

This Nitrogen Management Plan Summary Report analysis includes a reporting of A/Y values (and A/R where nitrogen removed values are known) by Township/Range including a summary of ranges and percentiles (10th, 25th, 50th, 75th and 90th), and identification of outliers. In addition, the Coalition

describes next steps for performing a more in-depth evaluation of outliers including verification of reported information and evaluation of potential reasons for a field being an outlier including soil type and irrigation practices, and outreach to those members who farm a management unit identified as a statistical outlier.

AVALIABLE DATA

The Coalition mailed 1,264 surveys in March 2016 to members in high vulnerability areas and by July 27, 2016 received surveys from 1,125 members (count includes members that are no longer required to return an NMP SR). This is the first year in which NMP SR submissions are required and the Coalition is still receiving surveys from members. NMP Summary Reports received after July 27, 2016 are not included in this report. The Coalition sent out reminder notices on May 9, 2016 and June 9, 2016 to members that had not returned NMP SRs; a final email notice was sent on July 19, 2016. Members that did not have an email on file for the July 19, 2016 final email notice, were called personally by Coalition representatives. The Coalition continues to contact members and be available for assistance in completing NMP SRs.

Of the returned surveys, 180 NMP MUs (from 70 members) were omitted from the analysis due to being incomplete. These were flagged for follow up with the member; however, the Coalition was unable to obtain updated information from the members in time to include the information in this analysis report (Table 1). Members could have surveys that are both complete and incomplete due to multiple NMP MUs. If a grower reported two management units, but one management unit was reported correctly and the other was not, this member would be counted as both complete and incomplete in Table 1.

Table 1. Summary of members and acreages associated with returned NMP Summary Reports.

NMP Summary Reports Status	Included in Analysis	Count of Members	Sum of Acreage
Not Received	No	139	37,402
Received - Complete	Yes	1,008	319,626
Received - Incomplete[1]	No	70	12,382
Received - Not Required	No	60	32,222
Total Received		**1,138**	**364,230**

[1] 70 members did not correctly report on 180 management units, consisting of 270 APNs and 12,382 acres (these NMP SRs were considered incomplete). Of the 1,125 received surveys, 100 NMP SRs had 268 APNs that were not reported on at all.

The largest acreage reported is for almonds, followed by grapes, pistachios, walnuts, and corn (Figure 1). Table 2 includes a summary of the acreage associated with specific crops for returned and complete NMP SRs. The amount of nitrogen reported as pounds per acre and the yield calculated as pounds per acre were multiplied by the reported acreage to obtain the sum of nitrogen applied and total yield for each specific crop type (Table 2). Nonbearing crops and crops with no yield are not included. Reasons for no yield include drought, salt damage or pest stress, economic stress, or the crop is associated with an experimental/research field (e.g. UC Davis).

Figure 1. Sum of acreage associated with primary crops reported on the NMP Summary Reports analyzed.
"All Other" crops are listed in Table 6.

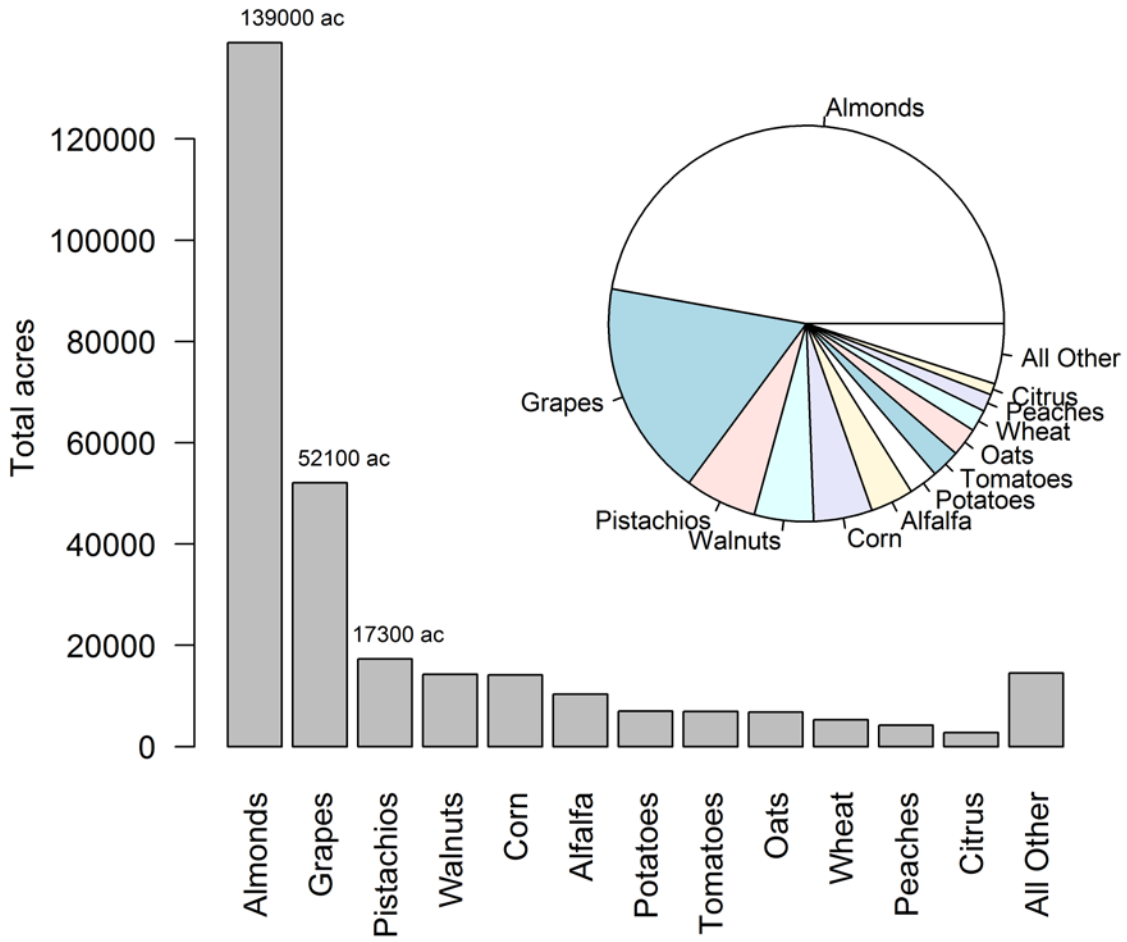


Table 2. Summary of nitrogen applied and calculated yield by specific crop. Includes sum of acreage and count of members. Crops are split out between those with reported yields, nonbearing and no yields.

Specific Crop Type	Total N Applied	Total Yield	Acreage	# of Members
Crops with Yields				
ALMONDS /YEAR > 4	23,210,077	254,008,322	116,877	604
ALMONDS /YEAR 1	94,209	387,111	1,437	12
ALMONDS /YEAR 2	182,208	2,060,185	1,490	19
ALMONDS /YEAR 3	649,485	7,980,974	7,070	63
ALMONDS /YEAR 4	423,085	3,326,749	2,016	23
ALMONDS /YEAR NR	1,921,415	26,642,291	10,123	65
APPLES, STANDARD SIZE /YEAR > 4	494	210,967	49	1
APPLES, STANDARD SIZE /YEAR NR	292	40,000	36	1
APRICOTS /YEAR > 4	1,520	628,843	21	2
BARLEY, IRRIGATED	50,736	1,533,157	382	2
BARLEY, SILAGE	22	260,100	18	1
BASIL	29,948	3,239,467	153	2
BEANS, BLACK EYED	37,623	1,131,737	150	4
BEANS, DRY EDIBLE	4,317	128,847	49	2
BEETS	15,289	3,575,447	110	1
BERRY, RASPBERRIES /YEAR > 3	7,942	138,107	107	1
BOK CHOY	9,666	2,416,489	54	1
BOK CHOY, BABY	10,390	1,949,418	65	1
CABBAGE, GREEN	21,590	4,318,000	108	1
CABBAGE, NAPA	14,552	3,055,923	73	1
CABBAGE, RED	5,950	1,487,500	30	1
CABBAGE, SAVOY	4,114	822,800	21	1
CARROT	90,643	45,321,500	563	1
CELERY ROOT	3,400	714,001	17	1
CHARD, GREEN	8,979	1,795,880	65	1
CHARD, RAINBOW	2,056	411,162	15	1
CHARD, RED	7,042	1,408,348	51	1
CHERRY, SWEET /YEAR > 4	39,926	5,950,866	508	9
CHERRY, SWEET /YEAR 2	2,000	480,000	20	1
CHERRY, SWEET /YEAR NR	1,925	318,642	36	3
CHESTNUTS /YEAR > 4	-	-	28	1
CILANTRO	28,899	2,889,949	208	1
CITRUS, MANDARINS /YEAR > 4	202,088	26,167,784	1,393	5
CITRUS, MANDARINS /YEAR 2	3,750	675,676	75	1
CITRUS, MANDARINS /YEAR NR	3,600	953,271	30	1
CITRUS, ORANGES /YEAR > 4	75,008	17,526,461	704	4
CITRUS, ORANGES /YEAR NR	20,025	111,250	180	1
CITRUS, TANGELO /YEAR NR	69,401	7,305,347	315	1
CORN, GRAIN	300,776	251,687,453	1,537	8
CORN, SILAGE	2,938,677	1,716,437,772	12,612	97
COTTON	173,220	2,037,017	1,097	5
COTTON, UPLAND	38,500	550,000	275	1
COVER CROP, NON-LEGUME	3,600	300,000	150	1
DAIKON	3,235	1,866,959	21	1
DANDELION	2,788	557,668	20	1
DILL	7,302	1,460,334	53	1
ENDIVE	2,258	322,514	14	1

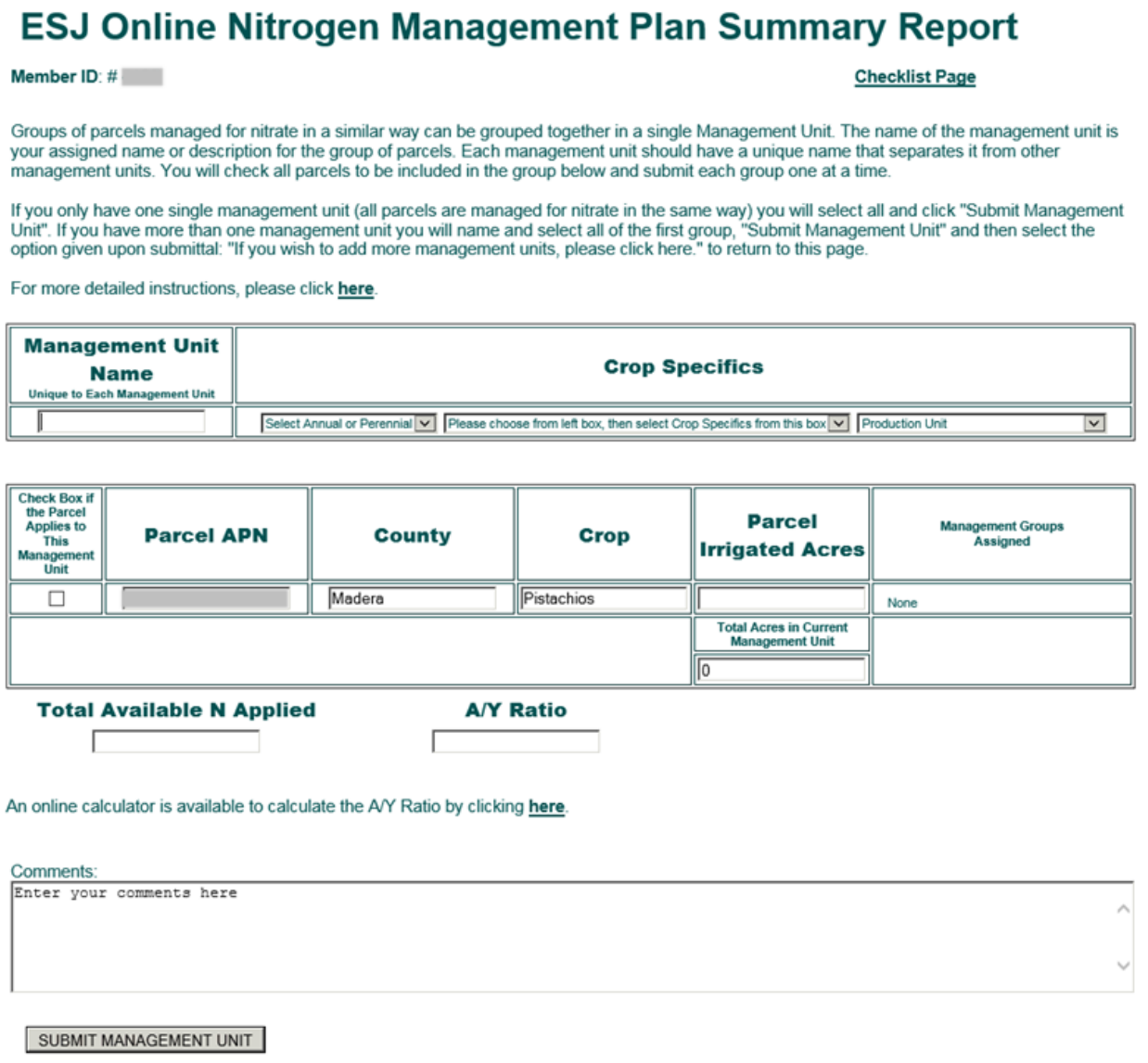
Specific Crop Type	Total N Applied	Total Yield	Acreage	# of Members
ESCAROLE	2,366	24,147	15	1
FENNEL	969	30,276	7	1
FIGS /YEAR > 4	135,821	8,466,059	1,570	8
FIGS /YEAR 2	2,136	12,712	16	1
FIGS /YEAR 3	270	89,867	100	1
FIGS /YEAR NR	10,375	292,612	83	1
GARLIC	95,185	5,740,207	392	2
GRAPES, RAISINS /YEAR >4	670,706	59,495,081	6,386	12
GRAPES, RAISINS /YEAR NR	425,014	98,944,518	6,966	34
GRAPES, TABLE /YEAR > 4	116,716	29,127,253	1,804	17
GRAPES, TABLE /YEAR 2	3,117	402,500	35	1
GRAPES, TABLE /YEAR 3	60,231	21,596,640	798	2
GRAPES, TABLE /YEAR 4	5,663	583,220	44	1
GRAPES, TABLE /YEAR NR	207,667	23,538,588	1,789	11
GRAPES, WINE /YEAR > 4	2,069,160	720,662,942	27,803	68
GRAPES, WINE /YEAR 1	20,142	7,961,359	927	2
GRAPES, WINE /YEAR 2	13,146	2,774,099	171	2
GRAPES, WINE /YEAR 3	7,123	3,618,737	193	3
GRAPES, WINE /YEAR 4	14,959	1,800,240	184	3
GRAPES, WINE /YEAR NR	341,715	137,127,829	4,998	10
GRASS MIX/ FORAGE/PASTURE	48,122	7,467,684	309	3
GREENS, COLLARD, FRESH MARKET	24,242	4,040,333	121	1
HAY, ALFALFA	1,163,306	511,939,241	9,760	75
HAY, SMALL GRAIN	106,944	11,176,741	1,008	17
HAY, TAME, (EXCL ALFALFA & SMALL GRAIN)	6,000	2,274,462	185	2
HAY, WILD	840	120,000	12	1
HAY, WILD, IRRIGATED	-	139,273	44	1
HAYLAGE, (EXCL ALFALFA)	80,526	15,110,876	829	5
HAYLAGE, ALFALFA	148,555	19,244,004	575	4
HERBS, FRESH CUT	378	5,251	3	1
KALE	26,078	3,490,667	130	1
KALE LACINATO	5,100	728,571	26	1
KIWIFRUIT /YEAR > 4	270	90,000	5	1
KOHLRABI	4,588	917,592	29	1
LEEKS	10,540	1,505,714	53	1
LETTUCE	66,729	9,012,520	426	1
MUSTARD, GREENS	24,181	4,836,160	151	1
NECTARINES /YEAR > 4	1,410	493,636	26	2
OATS, BALED	8,190	624,000	78	1
OATS, SILAGE	710,581	625,519,230	6,820	57
OLIVES /YEAR > 4	3,955	1,172,557	95	3
OLIVES /YEAR 3	-	-	156	1
OLIVES /YEAR NR	337	314,160	34	1
ONIONS, DRY	121,900	12,190,000	460	1
ONIONS, GREEN	100	14,925	1	1
ONIONS, SEED	2,220	2,741	10	1
PARSLEY	20,334	1,848,510	146	1
PASTURE	1,064	354,800	71	2
PEACHES, FRESH MARKET /YEAR > 4	117,104	95,712,982	938	14
PEACHES, FRESH MARKET /YEAR 3	1,368	649,800	11	1
PEACHES, FRESH MARKET /YEAR 4	1,267	236,047	11	1
PEACHES, FRESH MARKET /YEAR NR	57,490	15,843,304	340	6

Specific Crop Type	Total N Applied	Total Yield	Acreage	# of Members
PEACHES, PROCESSING /YEAR > 4	252,905	97,495,495	2,715	29
PEACHES, PROCESSING /YEAR 2	1,856	218,768	26	2
PEACHES, PROCESSING /YEAR 3	4,185	483,815	31	1
PEACHES, PROCESSING /YEAR NR	13,744	4,484,384	124	5
PERSIMMONS /YEAR 3	-	-	2	1
PERSIMMONS /YEAR 4	500	526,790	5	1
PISTACHIOS /YEAR > 4	2,578,838	28,852,166	14,996	47
PISTACHIOS /YEAR 2	27,814	556,280	497	2
PISTACHIOS /YEAR 3	104,000	1,529,184	748	3
PISTACHIOS /YEAR NR	181,566	1,705,179	1,064	6
PLUMS /YEAR > 4	625	208,500	7	2
POMEGRANATES /YEAR > 4	30,843	7,520,115	576	6
POTATOES	11,633	3,874,267	164	2
POTTED NURSERY PLANTS	122,412	21,086,689	360	2
PRUNES /YEAR > 4	198,616	13,903,187	1,282	4
PUMPKINS	4,650	1,240,000	31	1
RADICCHIO	563	62,560	4	1
RICE	27,200	544,000	68	1
RYE, GRAIN	-	345,920	218	3
SORGHUM, SILAGE	5,820	800,000	20	1
SPINACH	10,707	1,070,675	77	1
STRAWBERRIES	993	19,853	11	1
SUDAN, SILAGE	92,627	18,828,600	566	4
SWEET POTATOES	1,036,155	111,026,850,952	6,812	36
TOMATOES, FRESH MARKET	573,764	265,141,371	2,551	6
TOMATOES, PROCESSING	886,141	428,562,407	4,378	13
TRITICALE, IRRIGATED	20,349	1,189,071	185	1
TURNIPS	9,892	1,413,137	63	1
WALNUTS, ENGLISH /YEAR > 4	1,735,692	49,381,018	11,422	141
WALNUTS, ENGLISH /YEAR 1	8,840	65,071	124	2
WALNUTS, ENGLISH /YEAR 2	27,473	652,519	326	7
WALNUTS, ENGLISH /YEAR 3	23,698	72,543	288	4
WALNUTS, ENGLISH /YEAR 4	19,247	392,786	202	6
WALNUTS, ENGLISH /YEAR NR	295,901	6,484,837	1,917	22
WHEAT SEED	20,635	964,243	131	1
WHEAT, IRRIGATED	620,668	82,839,616	5,135	33
ZUCCHINI	150	4,000	1	1
Nonbearing Crops				
ALMONDS /YEAR > 4	-	-	31	2
ALMONDS /YEAR 1	362,485	-	6,467	97
ALMONDS /YEAR 2	275,862	-	4,581	81
ALMONDS /YEAR 3	113,461	-	1,810	22
ALMONDS /YEAR 4	5,720	-	57	3
ALMONDS /YEAR NR	8,435	-	173	6
CHERRY, SWEET /YEAR 1	-	-	42	2
CHERRY, SWEET /YEAR 3	-		3	1
CORN, SILAGE	-	-	28	1
FIGS /YEAR 1	-	-	35	1
FIGS /YEAR 2	3,019	-	80	1
GRAPES, TABLE /YEAR 1	14,768	-	349	1
GRAPES, TABLE /YEAR 2	19,853	-	179	1
GRAPES, WINE /YEAR > 4	2,389	-	29	2

Specific Crop Type	Total N Applied	Total Yield	Acreage	# of Members
GRAPES, WINE /YEAR 1	503	-	66	3
GRAPES, WINE /YEAR 2	21,110	-	302	2
HAY, ALFALFA	3,540	-	60	1
OATS, SILAGE	3,720	-	62	1
PEACHES, FRESH MARKET /YEAR 1	387	-	17	2
PEACHES, FRESH MARKET /YEAR 2	1,800	-	5	1
PEACHES, PROCESSING /YEAR 1	2,149	-	47	2
PECANS /YEAR 1	2,400	-	58	2
PECANS /YEAR 2	4,200	-	140	1
PERSIMMONS /YEAR 2	650	-	13	1
PISTACHIOS /YEAR > 4	6,000	-	80	1
PISTACHIOS /YEAR 1	102,980	-	2,457	10
PISTACHIOS /YEAR 2	86,434	-	1,380	9
PISTACHIOS /YEAR 3	140,363	-	2,229	7
PISTACHIOS /YEAR 4	19,655	-	209	1
PISTACHIOS /YEAR NR	22,566	-	292	3
POMEGRANATES /YEAR 1	-	-	40	1
POMEGRANATES /YEAR 3	-	-	17	1
POMEGRANATES /YEAR NR	-	-	36	1
PRUNES /YEAR 1	3,581	-	72	1
WALNUTS, ENGLISH /YEAR > 4	1,875	-	19	2
WALNUTS, ENGLISH /YEAR 1	17,499	-	744	16
WALNUTS, ENGLISH /YEAR 2	33,304	-	854	18
WALNUTS, ENGLISH /YEAR 3	16,240	-	310	7
WALNUTS, ENGLISH /YEAR 4	5,530	-	57	3
WALNUTS, ENGLISH /YEAR NR	1,875	-	15	1
WATERCRESS /YEAR 2	910	-	13	1
WHEAT, IRRIGATED	-	-	285	1
Crops with No Yield				
ALMONDS /YEAR > 4	540	-	24	2
ALMONDS /YEAR NR	6,042	-	86	3
APPLES, STANDARD SIZE /YEAR NR	150	-	3	1
CHERRY, SWEET /YEAR NR	50	-	1	1
CORN, SILAGE	26,750	-	299	2
COTTON	26,205	-	172	3
COTTON, UPLAND	8,865	-	59	1
FRUIT TREES, UNKNOWN	6,930	-	110	1
GRAPES, TABLE /YEAR NR	100	-	2	1
GRAPES, WINE /YEAR > 4	-	-	102	1
HAY, ALFALFA	350	-	7	1
HAY, SMALL GRAIN	-	-	40	1
NECTARINES /YEAR NR	50	-	1	1
PEACHES, FRESH MARKET /YEAR NR	100	-	2	1
PISTACHIOS /YEAR > 4	14,640	-	171	2
PLUMS /YEAR NR	50	-	1	1
POTTED NURSERY PLANTS	17,400	-	70	1
WALNUTS, ENGLISH /YEAR > 4	1,782		18	1
ZUCCHINI	600	-	12	1
Subtotal of Crops with Yields	**46,640,924**	**116,945,326,953**	**294,697**	**1,749**
Subtotal of Nonbearing Crops	**1,305,263**	**-**	**23,743**	**321**
Subtotal of Crops with No Yield	**110,604**	**-**	**1,180**	**26**
Total	**48,056,791**	**116,945,326,953**	**319,626**	**2,096**

The Coalition received through mail, NMP SRs from members which were then compiled for data entry and tracking. The Coalition also developed an online reporting tool where members could enter their NMP SR information (Figure 2). The Coalition tracked the surveys mailed and received (either as hardcopies or online data) to ensure that all reports returned were included in the NMP SR database.

Figure 2. Online NMP Summary Report form created to improve grower response. Includes calculators to sum acreage and calculate A/Y.



ESJ Online Nitrogen Management Plan Summary Report

Member ID: #

Checklist Page

Groups of parcels managed for nitrate in a similar way can be grouped together in a single Management Unit. The name of the management unit is your assigned name or description for the group of parcels. Each management unit should have a unique name that separates it from other management units. You will check all parcels to be included in the group below and submit each group one at a time.

If you only have one single management unit (all parcels are managed for nitrate in the same way) you will select all and click "Submit Management Unit". If you have more than one management unit you will name and select all of the first group, "Submit Management Unit" and then select the option given upon submittal: "If you wish to add more management units, please click here." to return to this page.

For more detailed instructions, please click here.

Management Unit Name (Unique to Each Management Unit)	Crop Specifics
	Select Annual or Perennial / Please choose from left box, then select Crop Specifics from this box / Production Unit

Check Box if the Parcel Applies to This Management Unit	Parcel APN	County	Crop	Parcel Irrigated Acres	Management Groups Assigned
☐		Madera	Pistachios		None
				Total Acres in Current Management Unit: 0	

Total Available N Applied

A/Y Ratio

An online calculator is available to calculate the A/Y Ratio by clicking here.

Comments:

Enter your comments here

SUBMIT MANAGEMENT UNIT

The hardcopy NMP SRs were reviewed for completeness. Members could submit their NMP SR form online but the submission was allowed only if all fields on the form were completed. NMP SRs were considered complete if all of a member's high vulnerability APNs were reported, and the specific crop

type, acreage, amount of nitrogen and the A/Y ratio was provided. A NMP SR was considered incomplete and required follow-up if:

1) Not all APNs in high vulnerability areas were reported.
2) Specific crop type was not indicated.
3) Acreage could not be determined either through what was provided on the report or their enrolled acreage.
4) Amount of nitrogen applied per acre was much greater than expected (often members reported total fertilizer applied versus the percentage of nitrogen in the fertilizer).
5) A/Y ratio provided as 0 due to no nitrogen applications (unable to determine yield based on this). Instructions did not state that the grower should report yield whether applications were made or not, therefore, many growers did not provide the yield.
6) A/Y ratio was not calculated correctly. An example would be the amount of nitrogen applied is the same as the A/Y ratio. Additionally, as data were recorded in an Access database, the per acre yield was calculated. If the per acre yield appeared incorrect, the data were flagged for verification.
7) Production unit was not provided. The Coalition could not determine how many pounds were associated with the calculated yield if a production unit was not provided.

Any data that met any of the criteria above were flagged for follow-up. The Coalition contacted as many growers as possible to correct the NMP SRs that were believed to be in error or incomplete. After follow-ups, the Coalition was able to use complete NMP SR data from 1,008 members farming 319,626 irrigated acres and 156 specific crop types. At the time of this report, there are a total of 180 NMP Management Units (NMP MUs) from 70 members that are still considered incomplete and are not included in this report. The Coalition is in the process of contacting those members to obtain correct information for the remaining NMP MUs.

Before the raw data were statistically analyzed, the Coalition made a final review of the raw data for possible discrepancies and corrected/excluded as necessary to ensure consistency with the following:

1) All reported APNs were associated with the correct membership ID and are within the ESJWQC boundary. Parcels not within the ESJWQC boundary were excluded.
2) All APNs that were reported as fallow or pasture were excluded from the analyses. These APNs had no yield that could be reported and no external nitrogen applied.
3) All APNs that were reported as nonbearing were not included in the A/Y and A/R analysis.
4) Removal of duplicate entries based on Identification number, APN, Specific Crop type, and Management Unit.
5) Reviewed and excluded entries that were missing NMP SR data including a specific crop type, pounds of nitrogen applied per acre, A/Y, or a production unit.
6) 30% of NMP SRs were reviewed for data entry accuracy.
7) Management units that reported yields or N applied two times larger the 75th percentile were verified against the hard copies submitted and then contacted to verify values reported.
8) Entries for management units that were reported as outliers in the NMP SR Analysis submitted May 31, 2016 as an A/Y outlier by Crop type and/or by T-R were reviewed for entry accuracy.

The NMP SR responses were associated with a Township-Range (T-R) location using ArcGIS and the statistical analyses were performed on these data. There were 79 MUs associated with an APN that could not be mapped and therefore the T-R is left blank.

CONVERSION FACTORS AND ESTIMATIONS

The Coalition used N applied and the A/Y ratio values submitted in the NMP SR to calculate the yield per acre. If the crop yield was reported in a production unit other than pounds, the Coalition converted the yield to pounds using the conversion values in Table 3. The A/Y ratio was recalculated by dividing the A applied (in pounds per acre) by the calculated yield (also in pounds per acre).

Table 3. Conversion factor for production units different from pounds.

Production Unit	Lbs Conversion
1/2-bushel carton (28 lbs)	28
1/2-bushel carton (30 lbs)	30
12, 1/2-pint baskets (6 lbs)	6
12, 1-pint (12 lbs)	12
15, 1/2-inch wirebound crate (50-53 lbs)	52
2 Layer Carton (22 lbs)	22
2 layer tray pack (20-25 lbs)	22
2/3 Carton (30 lbs)	30
4/5 Bushel Crate (20 lbs)	20
5-Dozen Bunches (20-25 lbs)	22
Bag (100 lbs)	100
Bag (25 lbs)	25
Bag (50 lbs)	50
Bale (200 lbs)	200
Bale (500 lbs)	500
Bin (1050 lbs)	1050
Bin (800 lbs)	800
Bin (850 lbs)	850
Bin (900 lbs)	900
Box (12 lbs)	12
Bundle (6 lbs)	6
Bushel (25 lbs)	25
Bushel (28-32 lbs)	30
Bushel (30 lbs)	30
Bushel (32 lbs)	32
Bushel (40 lbs)	40
Bushel (48 lbs)	48
Bushel (56 lbs)	56
Bushel (60 lbs)	60
Bushel (70 lbs)	70

Production Unit	Lbs Conversion
Bushel Basket (40 lbs)	40
Carton (100 lbs)	100
Carton (13 lbs)	13
Carton (18 lbs)	18
Carton (20 lbs)	20
Carton (23 lbs)	23
Carton (25 lbs)	25
Carton (30 lbs)	30
Carton (33 lbs)	33
Carton (38 lbs)	38
Carton (40 lbs)	40
Carton (50 lbs)	50
Carton (55 lbs)	55
Carton (60 lbs)	60
Carton (85 lbs)	85
Carton of 30 (11-12 lbs)	12
Carton or Lug (22 lbs)	22
Carton/25 Bunches (8 lbs)	8
Crate (30 lbs)	30
Crate (38 lbs)	38
Crate (40 lbs)	40
Crate (50 lbs)	50
Crate (50-60 lbs)	55
Crate (60 lbs)	60
Cwt (100 lbs)	100
Flat (4-6 lbs)	5
Flat (6 lbs)	6
Flat of 12 pots (10 lbs)	10
Lug Box (112 lbs)	112
Lug Box (12-15 lbs)	14
Lug Box (18 lbs)	18

Production Unit	Lbs Conversion
Lug Box (24 lbs)	24
Lug Box (25-30 lbs)	28
Lug Box (28 lbs)	28
Pounds	1
Sack (25 lbs)	25
Sack (50 lbs)	50

Production Unit	Lbs Conversion
Sack (60 lbs)	60
Sacks (100 lbs)	100
Sacks of 8, 5-pound bags (40 lbs)	40
SX (100 lbs)	100
Tons (2000 lbs)	2000
Units	1

The Coalition used N Removed Conversion Factors available from the California Department of Food and Agriculture Fertilizer Research and Education Program (CDFA FREP) fertilizer application guidelines to calculate the amount of N removed (R). These coefficients were provided in the ESJWQC 2015 Annual Report submitted on May 1, 2016 (Table 76 in the Annual Report). The N Removed Conversion Factor for wheat has been changed to fix an incorrect value used in the May 31st 2016 report (previously reported as 0.0069). For those crops were N Removed Conversion Factors were available, the Coalition calculated N Removed at harvest multiplying the yield (in pounds per acre) by the N Removed Conversion Factor (Table 4). No conversions were attempted for crops without a nitrogen removed coefficient.

Table 4. N Removed Conversion Factors from CDFA FREP.

Crop	N Removed Conversion Factor (Pounds of N per pound of yield)	Percent of Central Valley acreage (excluding rice)	Percent of ESJ NMP Summary Report acreage[3]
Almonds [1]	0.068	15.9	48
Barley	0.0185	0.1	0.1
Broccoli	0.0055	0.1	0
Cauliflower	0.0034	0.0	0
Citrus (Valencia orange) [2]	0.00185	4.1	0.9
Corn, Grain	0.00905	3.3	0.1
Corn, Silage	0.01345	8.5	4.5
Cotton, Acala	0.0751	2.2	0.25
Cotton, Pima	0.0569	4.2	0.25
Grapevines	0.001	11.5	16.6
Lettuce	0.0025	0.2	0.1
Pistachios	0.028	4.0	7.5
Prunes	0.006	0.9	0.4
Strawberry	0.0013	0.1	0
Tomatoes, Processing	0.00195	4.5	2.2
Walnuts	0.020	5.3	5.1
Wheat	0.0245	4.6	1.7
	Total Percent Acreage	**69.5%**	**87.4%**

Central Valley crop acreage is based off of USDA/NASS Quick Stats 2.0 (https://quickstats.nass.usda.gov/).
Nitrogen removed calculators are located on FREP's website (https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Guidelines.html).

[1] Nitrogen removed with harvested almonds expressed in pounds of N per pound of marketable kernels.

[2]The N Removed Conversion Factor for Citrus (Valencia orange) was applied to oranges, mandarins, and tangelos.

[3]Percent acreage is calculated using complete NMP SR data, not incomplete and not returned.

The Central Valley Regional Water Quality Control Board requested that the Coalition provide an analysis of N applied relative to recommended fertilizer application rates. The Coalition obtained

recommended fertilizer application rates from the CDFA FREP website (https://www.cdfa.ca.gov/is/ffldrs/frep/) and from the University of California Cooperative Extension cost analysis performed in cooperation with University of California, Davis (UC Davis) Department of Agricultural and Resource Economics (http://coststudies.ucdavis.edu/current/). The UC Davis cost analyses are not recommendations but estimates of the amount of fertilizer used in a typical operation. Actual recommendations may vary depending on factors such as age of crop, target yield, soil type, and irrigation method. The Coalition compiled available data from these two sources, and when possible, reported only values from studies conducted in counties within the ESJWQC (Table 5). Because the goal of this analysis is not to provide a comprehensive review of recommended application rates or to draw any conclusions regarding their accuracy or applicability to specific fields, all values were included for reference. Table 5 provides the details regarding the range of recommendations, sources, and specific conditions of the source study.

Table 5. Recommended nitrogen applications values as pounds per acre (minimum and maximum) for specific crops as they were reported on the NMP Summary Reports used for analysis. Recommended fertilizer application rates may differ according to target yield and irrigation method.

Specific Crop	Minimum	Maximum	Study details	Source	CDFA/UC Davis Referenced Source
Hay, Alfalfa	0	0	Alfalfa obtains N from the atmosphere through a symbiotic relationship with bacteria (Rhizobia) in the root nodules. Therefore, N fertilization of alfalfa is seldom beneficial or profitable.	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Alfalfa.html
Hay, Alfalfa (sowing)	20	40	A starter application may be beneficial when residual nitrate concentration is below 3-4 ppm (NO3-N). Larger amounts may inhibit bacterial colonization.		
Almonds /Year>4	95	380	Fertilization rate dependent on desired yield. Minimum value yields 1000 lbs/acre; maximum yields 4,000 lbs/acre. Fertigation via low volume irrigation.	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Almonds.html
Almonds /Year 1	20	35	A total annual application of up to 4 ounces/tree to first-leaf trees.	CDFA	Doll, D., 2012. Presentation held at the 40th Almond Conference in Sacramento. December 12, 2012.
Almonds /Year 1	6.25	18.75	Rate suggested for drip-irrigated trees on non-fertile soils. Values converted from ounces/tree to lbs/acre assuming 100 trees/acre	CDFA	Meyer, R.D., 2004. Nitrogen on drip irrigated almonds. In: Almond Board of California (Ed.) Years of Discovery. A compendium of production and environmental research projects 1972-2003. pp. 284-285.
Almonds /Year 2	12.5	37.5			
Almonds /Year 3	25	75			
Almonds /Year 4	37.5	100			
Almonds /Year 5	100	200			
Apples /Year > 4	80	80	14-30 tons/acre of granny smith variety. Density 340 trees/acre. Fertigation via micro-sprinkler.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/6e/24/6e24cf05-727f-4eb0-952c-1ed0da7bb256/applesjv2001.pdf
Apples /Year 1-3	20	60	Density 340 trees/acre. Fertigation via micro-sprinkler.		
Apricots /Year > 4	75	75	Fresh market apricots irrigated with mirco-sprinklers planted at 145 trees/acre. Typical yield is 4.5-7 tons/acre.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/bb/10/bb101479-e0b0-42e4-aeda-5e94ca48ce56/apricotsfreshsjv.pdf
Apricots /Year 1	0	12	Fresh market apricots irrigated with mirco-sprinklers planted at 145 trees/acre.		
Apricots /Year 2	12	24			
Apricots /Year 3	24	40	Fresh market apricots irrigated with mirco-sprinklers planted at 145 trees/acre. Typical yield is 1.5 tons/acre.		
Apricots /Year 4	40	75	Fresh market apricots irrigated with mirco-sprinklers planted at 145 trees/acre. Typical yield is 3.0 tons/acre.		
Barley	30	100	One or two applications of 30-50 lbs N/acre, depending on the winter rainfall and N status of the plants	CDFA	Munier, D., Kearney, T., Pettygrove, G.S., Brittan, K., Mathews, M., Jackson, L., 2006.
Beans, Blackeye	0	0	Blackeyed beans fix all N from the atmosphere, but a small amount of starter N can sometimes increase yield	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Beans.html
Common dry beans	65	125	Common dry beans do not fix enough N from the atmosphere to	CDFA	Long, R., Temple, S., Schmierer, J., Canevari, M.,

Specific Crop	Minimum	Maximum	Study details	Source	CDFA/UC Davis Referenced Source
			meet the requirements of a high yielding crop. Estimated N applications for dry bean crops with a yield goal of 2500 lbs/acre		Meyer, R.D., 2010. Common dry bean production in California, 2nd edition. UC ANR Publication 8402.
Carrots	60	80		UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/9d/ad/9dadf694-5389-42f9-b272-4b8bcee3c1a0/carrots.pdf
Sweet Cherries /Year < 4	10	30	Values are from cost studies, not recommendations, but rates considered typical of a well-managed orchard. May not be applicable to all operations	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/6f/9b/6f9b0a93-163b-4060-ba94-8a3fc689e97d/cherryvn2011.pdf
Sweet Cherries /Year > 4	35	60			
Citrus /Year >4	100	150	Based on study on navel orange. With a tree spacing of 22 x 20 feet.	CDFA	Arpaia, M.L., Lund, L.J., 2003. Nitrogen management in citrus under low volume irrigation.
Citrus /Year 1	13	25	Rate assumes 100 trees/acre. Nitrogen fertilizer requirements of young citrus trees depend on the N supplying capacity of the soil. The lower limit is adequate for soils with a soil organic matter content of 2% or more and soils previously used for pasture or vegetable production	CDFA	Fake, C., 2004. Fertilizing citrus in the foothills. University of California Cooperative Extension Placer & Nevada Counties January 2004.
Citrus /Year 2	25	50			
Citrus /Year 3	50	75			
Corn	180	216	Yield 5 ton/acre of Grain or 30 ton/acre of Silage	CDFA	Multiple sources from different states. https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Corn.html
Corn	225	270	Rates dependent on desired yield and pre-sidedress nitrate test (PSNT). Values are from other states and have not been tested in California. This value correspond to the lowest PSNT (< 10) and largest desired yield (6.3 tons/acre of grain or 38 tons/acre of silage)	CDFA	Multiple sources from different states. https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Corn.html
Cotton	180	200	1300 lbs lint/acre.	CDFA	Hutmacher, R.B., Travis, R.L., Rains, D.W., Vargas, R.N., Roberts, B.A., Weir, B.L., Wright, S.D., Munk, D.S., Marsh, B.H., Keeley, M.P., Fritschi, F.B., Munier, D.J., Nichols, R.L., Delgado, R., 2004. Response of recent Acala cotton varieties to variable nitrogen rates in the San Joaquin Valley of California. Agronomy Journal 96, 48-62.
Figs /Year > 5	80	100	Values are from cost studies, not recommendations, but rates considered typical of a well-managed orchard. May not be applicable to all operations. Conadria variety spaced 155 trees/acre. Typical yield for trees older than 3 is between 372-4,464 lbs/acre.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/1b/e4/1be4fa70-a3eb-47d3-8402-b95697f4733b/94figsconadria.pdf
Figs /Year 1	0	20			
Figs /Year 2	20	40			
Figs /Year 3	40	60			
Figs /Year 4	60	80			
Garlic		256	15,000 lbs/acre.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/47/9d/479d7861-de24-4a60-bad8-509a3470c360/gl-ir-

Specific Crop	Minimum	Maximum	Study details	Source	CDFA/UC Davis Referenced Source
					92-garlic-1992-processingintermountainregionshastafallrivervalley.pdf
Grapes	0	60	For furrow irrigated. Lower values recommended for vigorous vines; highest for weak vigor, inadequate canopy and sandy soils. Typical raisin yield averages 9-10 tons/acre, the yield of wine grapes averages 7 tons/acre in California.	CDFA	Christensen, L.P, Peacock, W., 2000. Mineral nutrition and fertilization. In: Raisin Production Manual. University of California Division of Agricultural and Natural Resources Publication 3393, Oakland, CA. pp. 102-114.
Grapes	0	40	For drip irrigated. Same conditions as above.		
Small Grain Silage		150	Application of Urea N in addition to pre-planting manure.		Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/1a/d8/1ad8788d-8db4-4c43-9a84-19d48916311f/smallgrainsilagevs2013.pdf
Sudan Grass	60	160	Value depends on residual soil nitrogen. Highest value may be used if the soil is deficient.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/a2/ba/a2ba6644-27fc-4e2a-b70e-611d9c23d636/sudangrass04.pdf
Orchard Grass Hay		200	Divided in three parts in the growing season. Does not include application at planting.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/c2/40/c2403d14-b0e0-4b4c-bb35-1afd9a9e7062/orchardgrasshayim06.pdf
Sorghum Silage		140	Commercial fertilizers may be reduced or eliminated with the use of dairy pond water or manure. Assumes yield of 20 tons/acre (70% moisture).	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/c2/a9/c2a9d0ea-f089-48a9-a9b2-64ec58355b46/2016sorghumsilagesjvfinaldraftmar23.pdf
Oat Hay	50	75	Values are from cost studies, not recommendations, but rates considered typical. May not be applicable to all operations. Assumes yield of 2.5 tons/acre.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/ae/dd/aedd57c9-f980-4bfb-810a-afdffe760a36/oathay_sv2012.pdf
Olives	0	144	N applications dependent on desired yield: minimum value typically yields 1.2 tons/acre and maximum value yields 5.4 tons/acre. Based on heavy crop year. Base fertilizer applications on leaf analysis, optimum levels of N should be between 1.5-2.0%.	UC Davis	Multiple references in: http://ceglenn.ucdavis.edu/files/90442.pdf
Olives /Year 1-2	60	80	High density olive orchard. N applied through drip irrigation system.		Multiple references in: http://ucanr.edu/datastoreFiles/391-517.pdf
Olives /Year >3	80	120	High density olive orchard. N applied through drip irrigation system. Mature olive orchards 5 years and older yield 5 tons/acre.		
Onions, Dry	Not		Mixed preplant fertilizer with other nutrients is custom applied	UC Davis	Multiple references in:

Specific Crop	Minimum	Maximum	Study details	Source	CDFA/UC Davis Referenced Source
	Provided		in April. N is applied directly into beds prior to planting. Fertilizer applied through sprinklers during irrigation. 480 cwt/acre yield achieved in study.		http://coststudyfiles.ucdavis.edu/uploads/cs_public/a7/1e/a71ed327-7d6c-4ae5-92a2-52854cb4195c/16_onionshydrostulelakefinaldraftmar22.pdf
Fresh market peaches and nectarines	25	75	Value considered enough to maintain adequate N fertility. Dependent upon the efficiency of the fertilization method.	CDFA	Day, K.R., DeJong, T., Johnson, R.S., 2015. University of California Fruit Report. Regents of the University of California.
Processing peaches	50	100	Common values. Higher rates will be required for N-deficient orchards.	CDFA	Niederholzer, F.J.A., DeJong, T.M., Saenz, J.-L., Muraoka, T.T., Weinbaum, S.A., 2001. Effectiveness of fall versus spring soil fertilization of field-grown peach trees. Journal of the American Society for Horticultural Science 125, 644- 648.
Mature peach and nectarine orchards	63	155	Approximate requirements dependent upon the desired yield; minimum value yields 6 tons/acre, maximum yields 30 tons/acre. Assumes that prunings are not removed from the orchard (59 lbs N/acre).		Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Peach_Nectarine.html
Peaches /Year 1	0	37.75	Calculated from 4, 8, 12 oz/tree per year of age, assuming 151 trees per acre. Rate should be adjusted for the N supplied by soil and irrigation water. In some cases, these are sufficient for the first season's growth and no additional N need be added	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Peach_Nectarine.html
Peaches /Year 2	37.75	75.5			
Peaches /Year 3	75.5	113.25			
Pistachios /Year 1	0	12	Optimal leaf N concentration of 2-6-2.9% for rapidly growing immature trees. 120 trees/acre. N is best applied mid-spring and early summer.	CDFA	Beede, B., Kallsen, C., 2008. How do I develop a sound pistachio nutrition management program?
Pistachios /Year 2	18	24			
Pistachios /Year 3	30	42			
Pistachios /Year 4	60	72			
Pistachios /Year 5	100	120			
Pistachios /Year 6	120	130			
Pistachios /Year 7	135	150			
Pistachios /Year >9 (Drip)	40	240	Approximate N application rates based on desired yield. Minimum value is for a yield of 1000 lbs/acre; maximum produces 6000 lbs/acre	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Pistachio.html
Pistachios /Year >9 (Furrow)	56	336			
Pomegranates /Year > 4	75	125	Assume furrow irrigation with no specific variety of pomegranates planted at 134 trees/acre. Trees older than four typically yield between 6,300-11,200 lbs/acre.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/d5/bd/d5bdaad2-b874-4b99-a3c2-cc7a89cfc72d/pomegranatevs2010.pdf
Pomegranates /Year 1	0	16.75			
Pomegranates /Year 2	16.75	26.8			
Pomegranates /Year 3	26.8	44.22			
Pomegranates /Year 4	44.22	100			
Potatoes	160	240	For a 22.4 tons/acre crop. Includes nitrogen from all sources. Rate varies considerably with variety, growing location and year.	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Potato.html
Sweet Potatoes		120	Value based on typical practices to produce transplants and	UC Davis	Multiple references in:

Specific Crop	Minimum	Maximum	Study details	Source	CDFA/UC Davis Referenced Source
			sweet potatoes. Not applicable to all fields. N applied with drip Irrigation.		http://coststudyfiles.ucdavis.edu/uploads/cs_public/6f/32/6f32eea8-df52-4607-897b-6a90537a8aff/potatosweetsjv2006.pdf
Prunes /Year 1	0	10	French variety and low-volume irrigation. Based on tree density of 183 trees/acre.	UC Davis	Multiple references in: http://coststudyfiles.ucdavis.edu/uploads/cs_public/dd/6b/dd6b6a51-8d7b-4392-8a03-723e50f6fa91/prunesv2012.pdf
Prunes /Year 2	20	25			
Prunes /Year 3	25	40			
Prunes /Year 4	40	75	French variety and low-volume irrigation. Based on tree density of 183 trees/acre. Yield of 2.4 green tons/acre.		
Prunes Year >7	75	150	French variety and low-volume irrigation. Based on tree density of 183 trees/acre estimated to be 30 years. Yield of 12 green tons/acre.		
Tomatoes, Processing	150	175	For drip irrigated tomatoes. Adequate for most soils	CDFA	Hartz, T.K, Bottoms, T.G., 2009. Nitrogen requirements of drip-irrigated processing tomatoes. HortScience 44, 1988–1993.
Tomatoes, Processing	100	150	For furrow irrigated tomatoes	CDFA	Hartz, T.K., Miyao, G., Mickler, J., LeStrange, M., Stoddard, S., Nunez, J., Aegerter B., 2008. Processing tomato production in California. University of California Publication 7228.
Walnuts /Year 1	10	20	Minimum rates refer to N applied through drip or micro-sprinkler irrigation. Based on tree density of 65 trees/acre	CDFA	Anderson, K.K., Grant, J., Weinbaum, S.A., Pettygrove, S., 2006. Guide to efficient nitrogen fertilizer use in walnut orchards. University of California, Agriculture and Natural Resources. Publication 21623.
Walnuts /Year 2	25	50			
Walnuts /Year 3	50	100			
Walnuts /Year 4	63	125			
Walnuts /Year 5	75	150			
Walnuts /Year > 5		169	N application rates dependent on Yield. This value is for 2.5 tons (5000 lbs) of projected yield. Fertigation	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Walnut.html
Walnuts /Year > 5		214	N application rates dependent on Yield. This value is for 2.5 tons (5000 lbs) of projected yield. Split broadcast		
Wheat	150	200	Produced a yield of 4-4.6 tons/acre. Does not include residual N in soil (30-80 lbs/acre)	CDFA	Multiple references in: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Wheat.html
Drum Wheat		240	Split into preplant, tillering, at boot stage		

[1]References for the sources listed above can be found in the Reference section of this document.

STATISTICAL ANALYSIS

All analyses and figures were performed using R software for statistical computing[1]. R codes are available upon request. Crops were classified by the specific crop type (e.g. almonds > 4 years, almonds 3 years, silage corn, processing tomatoes). Specific crops were grouped into primary crop categories (e.g. almonds, corn, tomatoes) to facilitate visualization of results. A complete list of specific crops and primary crop categories used in this analysis is provided in Table 6.

The analysis were performed at the level of NMP Management Units (NMP MUs), which is the level reported by the Coalition members. A single NMP MU may contain multiple parcels. NMP MUs with incomplete data (including not reporting on all registered parcels) were excluded from the analysis (180 NMP MUs). Non-yield or non-bearing NMP MUs (386) are also not reflected in the analysis because these NMP MUs do not have an A/Y value. The number of NMP MUs and total acreage from each specific crop included in this analysis are listed in Table 6.

Summary statistics by Township-Range (T-R) were calculated by grouping the data by primary crop category. Each T-R represents 36 sections (23,040 acres). Each data point represents one management unit (MU), but MUs associated with more than one T-R were analyzed more than once (once in each TR). Summary statistics were also calculated by specific crop (with all T-R together, and each MU counted only once). For each grouping, the Coalition calculated the minimum, the maximum, and the 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentiles of A/Y, and A/R (if the N conversion factor was known). All data points (MUs) above the 90^{th} percentile within each group were labeled as outliers.

Percentiles were calculated using the R function "quantile" per the default method. This is a quantile method for continuous variables, where the quantiles are obtained by linear interpolation between data points. For example, if only two data points are available, these would be considered to be the range (e.g. 0% and 100% percentiles), and all other percentiles would be calculated linearly, at the corresponding steps, between these two points. As a result, for any crop within a T-R with only two different data points, the highest value would be considered an outlier (>90^{th} percentile). Because different crops have different sample sizes within each T-R, the number of outliers identified is different. The percentiles are more accurate when more data are available.

As indicated in the Order, the Coalition used standard Box and Whisker plots to visualize data grouped by primary crop category and TR. The specific crop category was not used due to the limited sample size per TR. In Box and Whisker plots, the "boxes" draw the 25^{th}, 50^{th}, and 75^{th} percentiles, and "whiskers" the data range. The default boxplot method in R calculates the percentiles as described above, and the data range as the most extreme data point which is no more than 1.5 times the length of the box away from the box. Outliers larger than the 90^{th} quantile within each crop's boxplot (identified above) were drawn over the boxplot to aid comparison with the quantile analysis.

The Coalition used standard scatter plots of A vs. Y to visualize the range of N applications and Yields for each primary crop category. In these plots, each dot is a management unit, and outliers (A/Y > 90% for the whole crop category) were identified. These plots show when outlier A/Y values result from N

[1] R Core Team 2016. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/

applications that are very high, or from yield that was very low. Nitrogen Management Plan summary reports do not include information explaining very low yields (i.e., if a crop was lost or why). The recommended fertilizer application rates (top recommended values only) were added to the scatter plots to provide context for the applied N.

Table 6. Primary and specific crop groupings for returned complete NMP Summary Reports including a count of management units analyzed.

Primary Crop Group	Specific Crop	Count of Management Units	Sum of Total Acreage
Alfalfa	HAY, ALFALFA	110	9,760
Alfalfa	HAYLAGE, ALFALFA	7	575
Almonds	ALMONDS /YEAR > 4	1,362	116,877
Almonds	ALMONDS /YEAR 1	15	1,437
Almonds	ALMONDS /YEAR 2	23	1,490
Almonds	ALMONDS /YEAR 3	77	7,070
Almonds	ALMONDS /YEAR 4	26	2,016
Almonds	ALMONDS /YEAR NR	104	10,123
Apples	APPLES, STANDARD SIZE /YEAR > 4	3	49
Apples	APPLES, STANDARD SIZE /YEAR NR	1	37
Apricots	APRICOTS /YEAR > 4	2	21
Barley	BARLEY, IRRIGATED	3	382
Barley	BARLEY, SILAGE	2	18
Basil	BASIL	2	153
Beans	BEANS, BLACK EYED	4	150
Beans	BEANS, DRY EDIBLE	2	49
Beets	BEETS	1	110
Berries	BERRY, RASPBERRIES /YEAR > 3	3	107
Berries	STRAWBERRIES	1	11
Bok Choy	BOK CHOY	1	54
Bok Choy	BOK CHOY, BABY	1	65
Cabbage	CABBAGE, GREEN	1	108
Cabbage	CABBAGE, NAPA	1	73
Cabbage	CABBAGE, RED	1	30
Cabbage	CABBAGE, SAVOY	1	21
Carrots	CARROT	1	563
Celery	CELERY ROOT	1	17
Chard	CHARD, GREEN	1	65
Chard	CHARD, RAINBOW	1	15
Chard	CHARD, RED	1	51
Cherries	CHERRY, SWEET /YEAR > 4	12	508
Cherries	CHERRY, SWEET /YEAR 2	1	20
Cherries	CHERRY, SWEET /YEAR NR	3	36
Chestnuts	CHESTNUTS /YEAR > 4	1	28
Cilantro	CILANTRO	1	208
Citrus	CITRUS, MANDARINS /YEAR > 4	7	1,393
Citrus	CITRUS, MANDARINS /YEAR 2	1	75
Citrus	CITRUS, MANDARINS /YEAR NR	1	30
Citrus	CITRUS, ORANGES /YEAR > 4	4	704
Citrus	CITRUS, ORANGES /YEAR NR	1	180
Citrus	CITRUS, TANGELO /YEAR NR	1	315
Corn	CORN, GRAIN	15	1,537
Corn	CORN, SILAGE	150	12,612
Cotton	COTTON	8	1,097
Cotton	COTTON, UPLAND	1	275

Primary Crop Group	Specific Crop	Count of Management Units	Sum of Total Acreage
Cover Crop	COVER CROP, NON-LEGUME	1	150
Dandelion	DANDELION	1	20
Dill	DILL	1	53
Endive	ENDIVE	1	14
Escarole	ESCAROLE	1	15
Fennel	FENNEL	1	7
Figs	FIGS /YEAR > 4	13	1,570
Figs	FIGS /YEAR 2	1	16
Figs	FIGS /YEAR 3	1	100
Figs	FIGS /YEAR NR	4	83
Garlic	GARLIC	3	392
Grapes	GRAPES, RAISINS /YEAR >4	18	6,386
Grapes	GRAPES, RAISINS /YEAR NR	53	6,966
Grapes	GRAPES, TABLE /YEAR > 4	29	1,804
Grapes	GRAPES, TABLE /YEAR 2	1	35
Grapes	GRAPES, TABLE /YEAR 3	8	798
Grapes	GRAPES, TABLE /YEAR 4	2	44
Grapes	GRAPES, TABLE /YEAR NR	14	1,789
Grapes	GRAPES, WINE /YEAR > 4	163	27,803
Grapes	GRAPES, WINE /YEAR 1	2	927
Grapes	GRAPES, WINE /YEAR 2	2	171
Grapes	GRAPES, WINE /YEAR 3	3	193
Grapes	GRAPES, WINE /YEAR 4	3	184
Grapes	GRAPES, WINE /YEAR NR	19	4,998
Grass	GRASS MIX/ FORAGE/PASTURE	5	309
Greens	GREENS, COLLARD, FRESH MARKET	1	121
Hay	HAY, SMALL GRAIN	23	1,008
Hay	HAY, TAME, (EXCL ALFALFA & SMALL GRAIN)	2	185
Hay	HAY, WILD	1	12
Hay	HAY, WILD, IRRIGATED	3	44
Hay	HAYLAGE, (EXCL ALFALFA)	5	829
Herbs	HERBS, FRESH CUT	1	3
Kale	KALE	3	130
Kale	KALE LACINATO	1	26
Kiwis	KIWIFRUIT /YEAR > 4	1	5
Kohlrabi	KOHLRABI	1	29
Lettuce	LETTUCE	4	426
Mustard	MUSTARD, GREENS	2	151
Nursery	POTTED NURSERY PLANTS	2	360
Nectarines	NECTARINES /YEAR > 4	2	26
Oats	OATS, BALED	1	78
Oats	OATS, SILAGE	97	6,820
Olives	OLIVES /YEAR > 4	3	95
Olives	OLIVES /YEAR 3	1	156
Olives	OLIVES /YEAR NR	1	34
Onions	LEEKS	1	53
Onions	ONIONS, DRY	1	460
Onions	ONIONS, GREEN	1	1
Onions	ONIONS, SEED	1	10
Parsley	PARSLEY	2	146
Pasture	PASTURE	3	71
Peaches	PEACHES, FRESH MARKET /YEAR > 4	32	938
Peaches	PEACHES, FRESH MARKET /YEAR 3	1	11

Primary Crop Group	Specific Crop	Count of Management Units	Sum of Total Acreage
Peaches	PEACHES, FRESH MARKET /YEAR 4	1	11
Peaches	PEACHES, FRESH MARKET /YEAR NR	6	340
Peaches	PEACHES, PROCESSING /YEAR > 4	43	2,715
Peaches	PEACHES, PROCESSING /YEAR 2	2	26
Peaches	PEACHES, PROCESSING /YEAR 3	1	31
Peaches	PEACHES, PROCESSING /YEAR NR	6	124
Persimmons	PERSIMMONS /YEAR 3	1	2
Persimmons	PERSIMMONS /YEAR 4	1	5
Pistachios	PISTACHIOS /YEAR > 4	75	14,996
Pistachios	PISTACHIOS /YEAR 2	2	497
Pistachios	PISTACHIOS /YEAR 3	3	748
Pistachios	PISTACHIOS /YEAR NR	10	1,064
Plums	PLUMS /YEAR > 4	2	7
Pomegranates	POMEGRANATES /YEAR > 4	7	576
Potatoes	POTATOES	4	164
Potatoes	SWEET POTATOES	78	6,812
Prunes	PRUNES /YEAR > 4	4	1,282
Radicchio	RADICCHIO	1	4
Radish	DAIKON	1	21
Rice	RICE	1	68
Rye	RYE, GRAIN	3	218
Sorghum	SORGHUM, SILAGE	1	20
Spinach	SPINACH	1	77
Squash	PUMPKINS	1	31
Squash	ZUCCHINI	1	1
Sudan	SUDAN, SILAGE	7	567
Tomatoes	TOMATOES, FRESH MARKET	12	2,551
Tomatoes	TOMATOES, PROCESSING	17	4,378
Triticale	TRITICALE, IRRIGATED	2	185
Turnips	TURNIPS	1	63
Walnuts	WALNUTS, ENGLISH /YEAR > 4	196	11,422
Walnuts	WALNUTS, ENGLISH /YEAR 1	3	124
Walnuts	WALNUTS, ENGLISH /YEAR 2	7	326
Walnuts	WALNUTS, ENGLISH /YEAR 3	4	288
Walnuts	WALNUTS, ENGLISH /YEAR 4	7	203
Walnuts	WALNUTS, ENGLISH /YEAR NR	39	1,917
Wheat	WHEAT SEED	1	131
Wheat	WHEAT, IRRIGATED	49	5,135
	Total	**3,114**	**294,695**

RESULTS

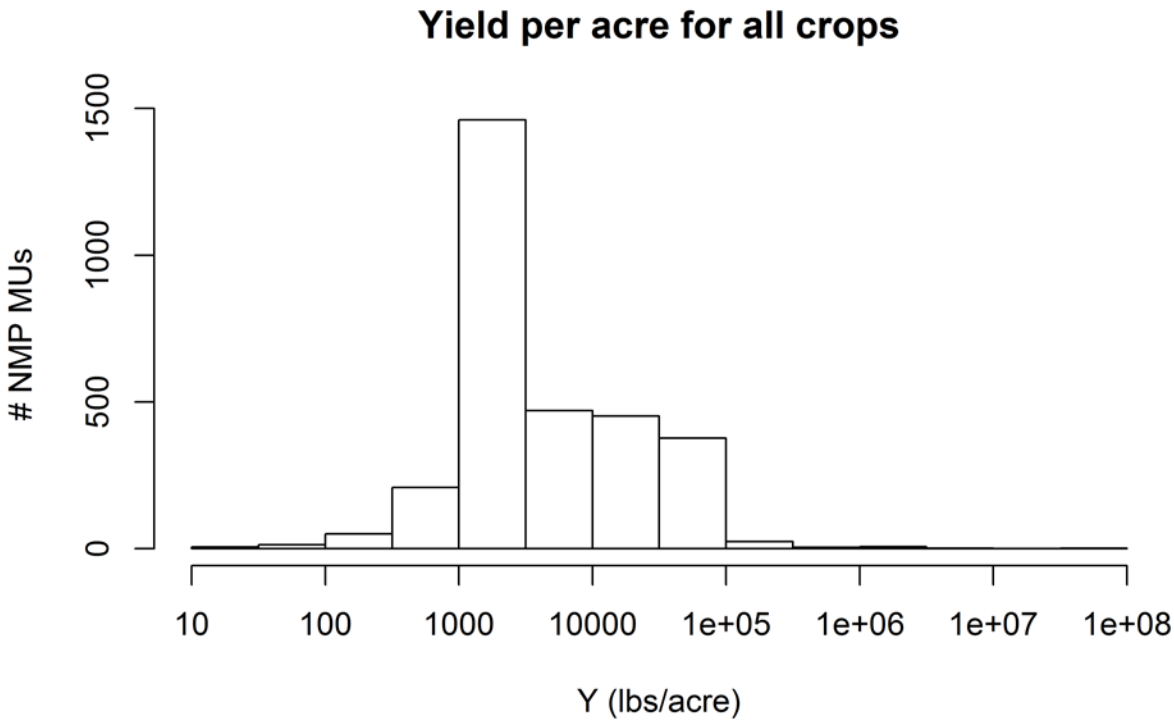
As an initial QA/QC step, the Coalition reviewed the yield per acre and the nitrogen applied per acre across all crops to determine if reported data appeared reasonable (Figure 3). Among all crops, yields varied by eight orders of magnitude, ranging from 0 pounds per acre, which is appropriate for management units of non-bearing crops or nitrogen fixing crops, to more than 1,000,000 lbs/acre which is clearly incorrect for any crop (Figure 3). Similarly, the majority of the N applications are less than 250 lbs/acre, with some NMP MUs receiving up to 600 lbs/acre. However, there were instances of N application rates higher than 1000, likely also representing error in the reporting.

The amount of N applied and the range of yields varied considerably among crops (Figure 4). The median amount of nitrogen added to each crop ranges from just over 0 lbs/acre (apples) to over 300 lbs/acre (tomatoes) (Figure 4). The Coalition identified unlikely high yields and N application rates for each crop based on the distribution of values shown in Figure 4. To correct these unlikely values, the Coalition reviewed the original submitted forms, and by the time this report was prepared, had contacted 68 members to work through their NMP and the NMP SR to determine where the error occurred. By the time this report was prepared, the Coalition had been able to correct 94 NMP MUs, but there remained at least 29 NMP MUs with likely erroneous values where the Coalition was not able to talk to the member (Table 7). Additional erroneous values may not be included in these numbers, if they belong to NMP SRs submitted close to the preparation of this report.

Table 7. Table listing the Specific Crop types and the number of management units and associated acreage not verified with growers for NMP MUs that are two times the 75th percentile.

Specific Crop Type	Count of MUs	Sum of Acreage
ALMONDS /YEAR > 4	3	1,361
ALMONDS /YEAR 2	1	62
ALMONDS /YEAR 3	1	32
ALMONDS /YEAR NR	1	188
APPLES, STANDARD SIZE /YEAR > 4	1	3
CORN, GRAIN	1	70
CORN, SILAGE	2	192
GRAPES, RAISINS /YEAR >4	1	156
GRAPES, WINE /YEAR > 4	3	197
HAY, ALFALFA	6	226
HAY, SMALL GRAIN	1	72
HAYLAGE, (EXCL ALFALFA)	1	132
HAYLAGE, ALFALFA	1	224
OATS, SILAGE	2	151
PEACHES, FRESH MARKET /YEAR > 4	2	42
SWEET POTATOES	1	1,624
WALNUTS, ENGLISH /YEAR > 4	1	24
Total	**29**	**4,756**

Figure 3. Histograms showing the range of values for yield and N applied reported for all crops together.
The height of the bars indicate the number or NMP MUs with that particular yield or N applied



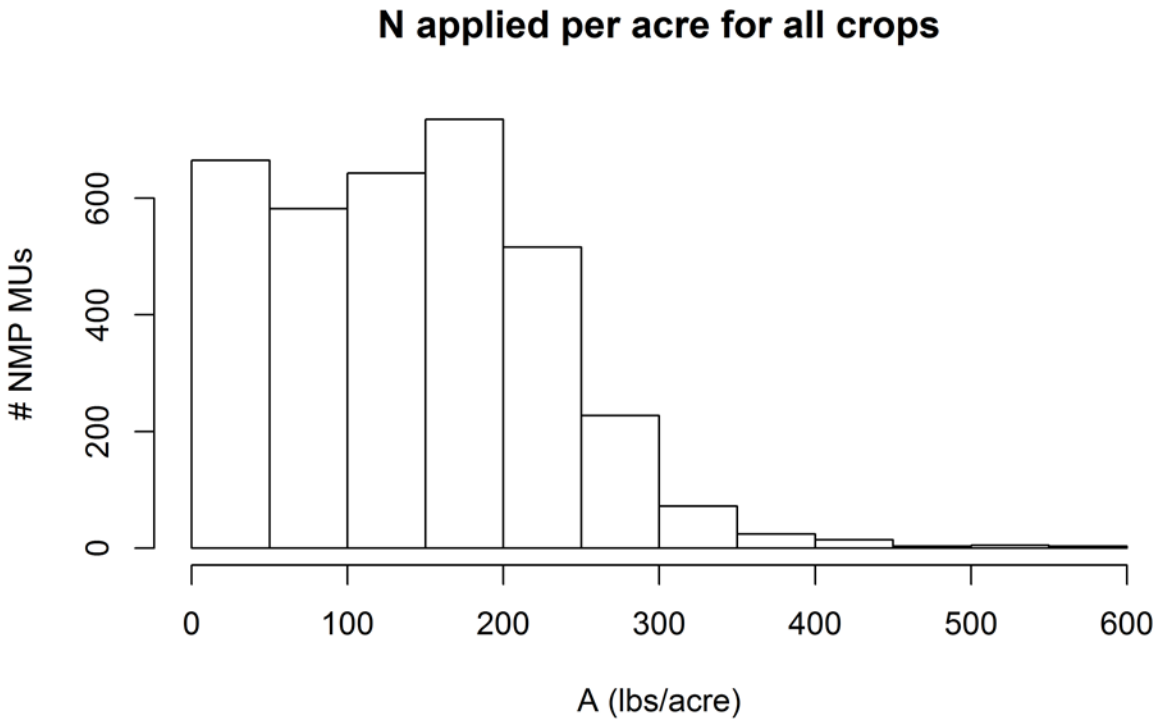
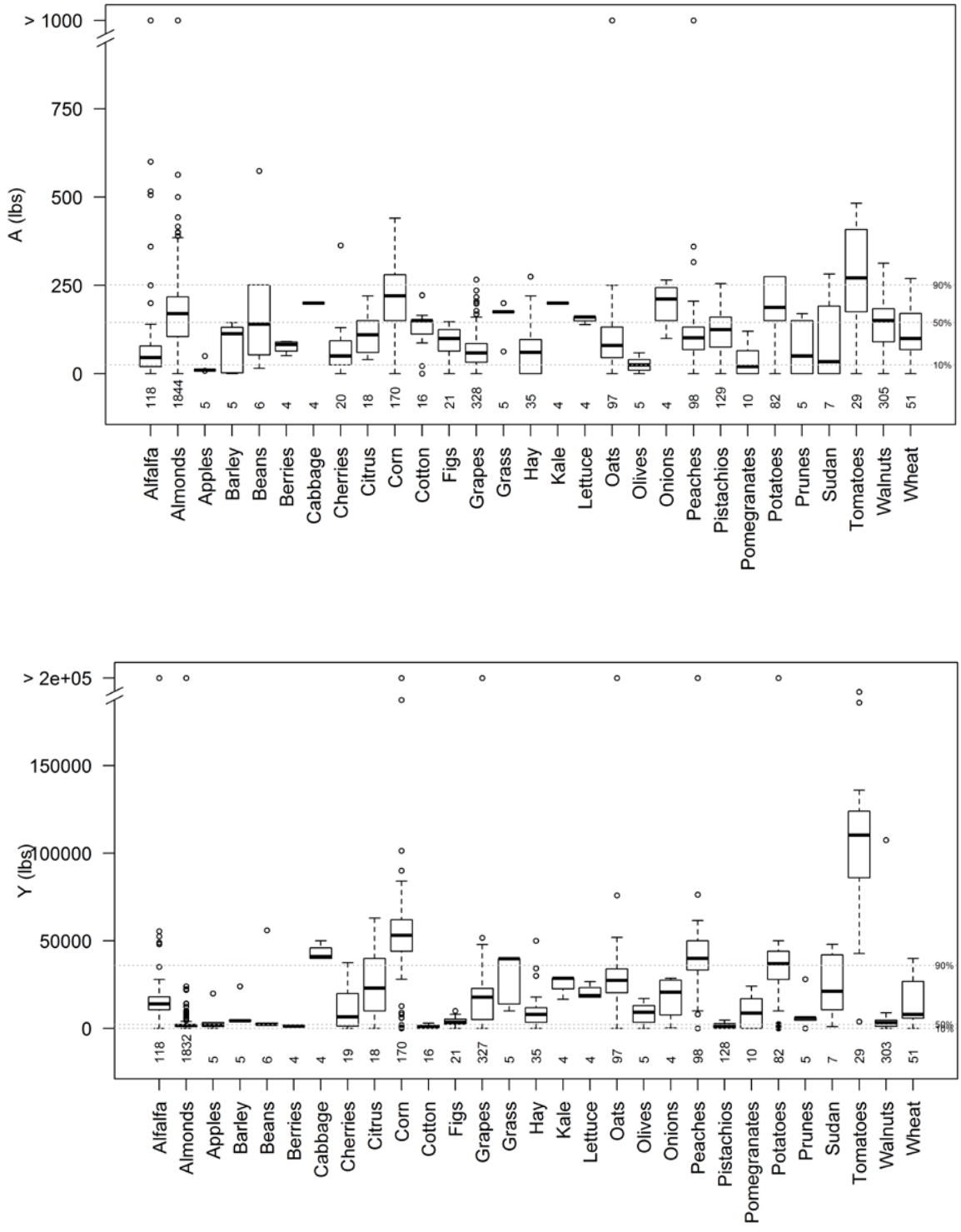


Figure 4. Box and Whisker plots showing the yield (Y) and nitrogen applied (A) per acre for the most common crop groups in the region.

Outliers with extremely high Y or A, are likely incorrectly reported values remaining by the time this report was prepared.



SUMMARY STATISTICS AND OUTLIERS BY T-R

The Order requires the Coalition to report statistical summaries for parcels grouped by township, and "any outliers for similar soil conditions and similar crops in that township". In this analysis, as in the previous report (submitted on May 31, 2016), the Coalition provides summary statistics and a list of outliers by crop group and by T-R (Appendix I). Further aggregation of the data by soil type or irrigation method as suggested by the Order, would have limited the ability of the Coalition to calculate summary statistics. Hence, to address this requirement of the Order, the Coalition conducted a separate analysis evaluating the reported A/Y values by soil type and by management practices. The goal of this analysis is to determine how soil and management practice groupings can be used to provide relevant summary statistics and identification of outliers in a meaningful way.

Detailed figures and summary statistics by crop and T-R are provided in Appendix I. For each primary crop group (e.g. almonds), the Coalition plotted individual box and whisker plots of A/Y by T-R, and generated tables detailing all summary statistics. The Coalition also calculated summary statistics by specific crop for the whole Coalition region (independent of T-R). In lieu of box and whisker plots for the summaries by specific crop (e.g. almonds / year >4), Appendix I includes scatter plots showing the amount of nitrogen applied vs. the yield in pounds per acre for each crop within the entire Coalition region. Outliers in both the box and whisker plots and scatter plots are identified as red circles. Outliers are defined as A/Y values > 90th percentile of the data for management units within each T-R (for box and whisker plots) and for the whole region (for scatter plots). Tables of summary statistics are also submitted with this report electronically as an Excel file.

Included as part of the scatter plots comparing yield to amount nitrogen applied, are fertilizer rates from CDFA FREP and UC Davis. The Regional Water Board requested that the Coalition evaluate and provide an analysis of nitrogen applied relative to recommended fertilizer application rates. The Coalition obtained fertilizer rates from the CDFA FREP website (https://www.cdfa.ca.gov/is/ffldrs/frep/) and from the University of California Cooperative Extension cost analysis. The cost analysis was performed in cooperation with the University of California, Davis (UC Davis) Department of Agricultural and Resource Economics (http://coststudies.ucdavis.edu/current/). It is important to note that the data from UC Davis analysis are not recommendations but estimates of the amount of fertilizer used in a typical operation. Actual recommendations may vary depending on factors such as age of crop, target yield, soil type, and irrigation method. The Coalition compiled available data from these two sources and, when possible, reported only values from studies conducted in counties within the ESJWQC (Table 5). Table 5 is not a comprehensive review of recommended application rates and should not be used to draw any conclusions regarding their accuracy or applicability to specific fields. Table 5provides some details of the fertilizer rate recommendations including the range of rates recommended, the source and specific conditions of the source study.

EVALUATION OF A/Y BY SOIL TYPE

The Coalition evaluated NMP MUs based on the hydraulic conductivity (Ksat) of the soils within the ESJWQC region. Soil Ksat is a measure of the potential for water percolation and leaching of nutrients through the soil. Ksat can be used to identify if a soil is clay, loam, or sand. Lower Ksat values are

characteristic of clay soils, with low conductivity and low potential for leaching of nutrients to groundwater. Higher Ksat values are characteristic of sandy soils with high potential for leaching of nutrients.

Soil data was obtained from the USDA Soil Survey Geographic Database (SSURGO: http://www.soils.usda.gov/survey/geography/ssurgo/). The "Gridded Soil Survey Geographic (gSSURGO) Database State-tile Package" product is derived from the Soil Survey Geographic (2.2) Database dated November 16, 2015. Parcel layer data was overlaid on the SSURGO soil data using the 'Identify' processing tool; all soil map units present in each parcel were identified. Soil information was associated to each NMP MU by linking the parcel soil data to each parcel within the NMP MU.

Soil Ksat in each parcel and NMP MU can vary vertically (with soil depth within a single soil type) and horizontally (among different soil types). Vertical variation in Ksat within each soil type was summarized by selecting the minimum value among all horizons down to a 1 meter depth. The horizon with the minimum Ksat is the one that will limit the hydraulic conductivity of the soil profile. Summarizing horizontal variation in Ksat within a parcel or NMP MU was more challenging. Most NMP MUs had two or more soil types associated to them (Figure 5, top panel), and often soil types within one NMP MUs could have dramatically different Ksat values (Figure 5, bottom panel).

The Coalition used a number of summary statistics to obtain a Ksat value descriptive or representative of each whole NMP MU. However, for NMP MUs with dramatically different soil types, single-value, summary statistics for Ksat are not necessarily a representative Ksat of the NMP MU as a whole. The Coalition evaluated three summary statistics to characterize the representative Ksat in each NMP MU (Table 8). Table 8 describes the meaning and limitations of each of the statistics. To account for the uncertainty in soil characterization, the analysis was performed using all three summary statistics, as each might provide slightly different information regarding the soils characteristics of each NMP MU (Table 8).

Figure 5. Number of soil types in ESJ NMP management units and the difference in hydraulic conductivity among the soil types

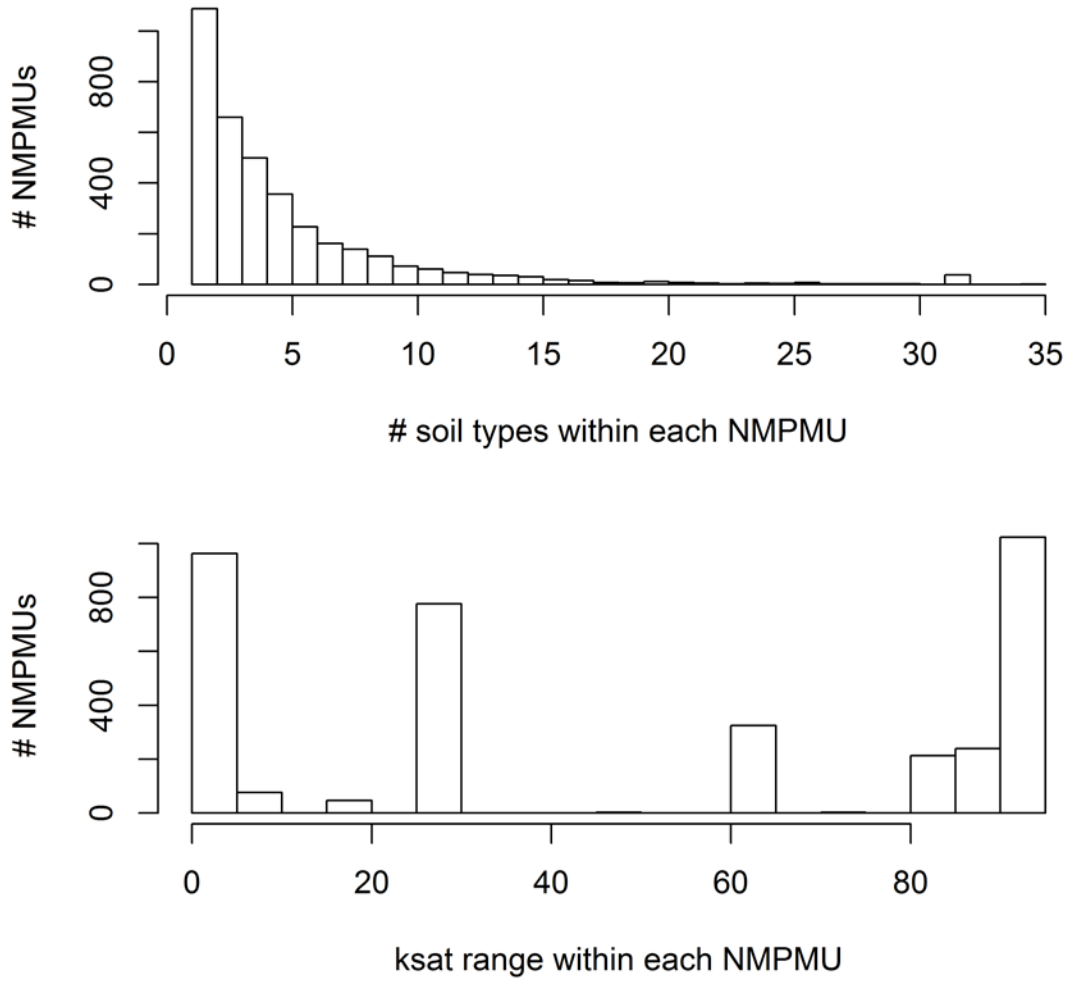


Table 8. Three possible summary statistics used to describe a representative Ksat for each NMP MU

	SUMMARY STATISTIC	DESCRIPTION	APPLICABILITY AND CONSTRAINTS
1)	Max Ksat	The maximum Ksat among all the soil types in the NMP MU	High values indicate NMP MUs with at least some areas of sandy soils regardless of its size, and low values indicate that all NMP MU area is comprised of finer soils.
2)	Most Frequent Ksat	The Ksat of the soil type with the largest area inside each NMP MU	Values indicate the most common or frequent Ksat in the NMP MU, but may represent only a small proportion of the area in some NMP MUs with multiple soil types.
3)	Mean Ksat	Weighted average of Ksat in the NMP MU, weighted by the area of each soil type.	Values identify NMP MUs with consistently large or small Ksat values. NMP MUs with contrasting soil types yield intermediate mean Ksat.

The Coalition tested for differences in A/Y among NMP MUs with different soil types. Soil types were described as categories of the representative Ksat values. For the purpose of this analysis soils with Ksat ≤ 20 were identified as clay, Ksat from 20 to 40, were designated as intermediate, and Ksat ≥ 40, sandy. Those categories are arbitrary but fit reasonably well with the distribution of Ksat values among

different soil types (Figure 6 to Figure 10, left hand panels). Because none of the single-value summary statistics for Ksat (max, most frequent or mean) is a full representation of the soil complexity of each NMP MUs as a whole, the analysis was conducted separately for each of them. Differences in average A/Y among the different soil types were evaluated using a simple linear model (Figure 6 to Figure 10).

The Coalition also evaluated the hypothesis that the outliers (calculated by specific crop for all T-Rs, Appendix I) may be explained by soil type. For example, one hypothesis tested was are outliers at least partly explained by the NMP MU soil type. To test this, the Coalition created contingency tables counting the number of outliers associated with each soil type. Differences in the frequency of outliers among the soil types were evaluated using Chi-square tests in Table 9. For visualization purposes, the Coalition also identified outliers calculated when grouping by crop and soil type.

For all five major crops, there was only limited evidence that soil type influences A/Y and the frequency of outliers in the ESJ region (Figure 6 to Figure 10, right hand panels, and Table 9). For example, there is little evidence to indicate that outlier status is associated with a high Ksat value (sandy soils). Only alfalfa, wine grapes and walnuts exhibited significant differences among soil types, but only in some tests. Figure 6 to Figure 10 also show how the identification of outliers might change when summary statistics are calculated by soil type and crop vs. when outliers are identified only by crop. Sometimes there were more outliers when classified by crop only, and sometimes there were more outliers when classified by crop and soil type. In most cases the outliers identified were the same.

In alfalfa, average A/Y was significantly higher in NMP MUs with at least some sandy soils (Figure 6, max_Ksat). However, the same analysis was not significant for NMP MUs with a majority of sandy soils or average sandy soils (high frequent_Ksat, or high mean_Ksat, Figure 6), reducing the reliability of this result. In addition, the frequency of A/Y outliers in alfalfa, was independent of soil type for all Ksat categories (Table 9). Alfalfa data included only 103 NMP MUs, and very few of the NMP MUs fell in areas with mostly sandy soils. The contradictory results could be due to this small sample size, or to the fact that there is generally very little fertilizer used in alfalfa, which is a nitrogen fixing crop. Thus, the Coalition cannot reliably conclude that soil type is in fact a factor influencing A/Y ratios for alfalfa.

In wine grapes, the frequency of A/Y outliers was larger for NMP MU in sandy soils (Table 9). This result is more reliable because it was reflected in all Ksat categories. However, the result was not significant in the evaluation of average A/Y (Figure 9). The difference is probably due to the latter analysis focusing on the average A/Y, since a few very large outliers can significantly affect those averages. In fact, the Figure 9 (right hand panels) show a trend consistent with higher A/Y in sandy soils.

In walnuts, average A/Y was significantly higher in NMP MUs with average sandy soils. While the other Ksat categories did not show similar results, the frequency of A/Y outliers for that category was also slightly (though not significantly) higher. This result was dependent on the definition of which mean_Ksat was considered to be a sandy soil. For instance, if only NMP MUs with mean_Ksat > 60 were considered sandy, then the comparison is not significant (not shown). These contradictory results seen in walnuts and alfalfa, both highlight the difficulty in characterizing soil types at the NMP MUs level, and the inaccuracy of analysis based on these characterizations.

Figure 6. Evaluation of soil types in alfalfa NMP MUs, and distribution of A/Y values within different soil type categories.

Left hand panels are histograms showing the frequency of NMP MUs in each representative Ksat value. Right hand panels are boxplots showing the distribution of A/Y values within three soil type categories (Ksat ranges). Red lines represent the 90% quantile for the crop (dotted) and for each soil category (dashed). Red points represent outliers for a soil category. The p-value indicates the average A/Y differs among soil categories. Separate tests were conducted for the three Ksat summary variables in Table 8.

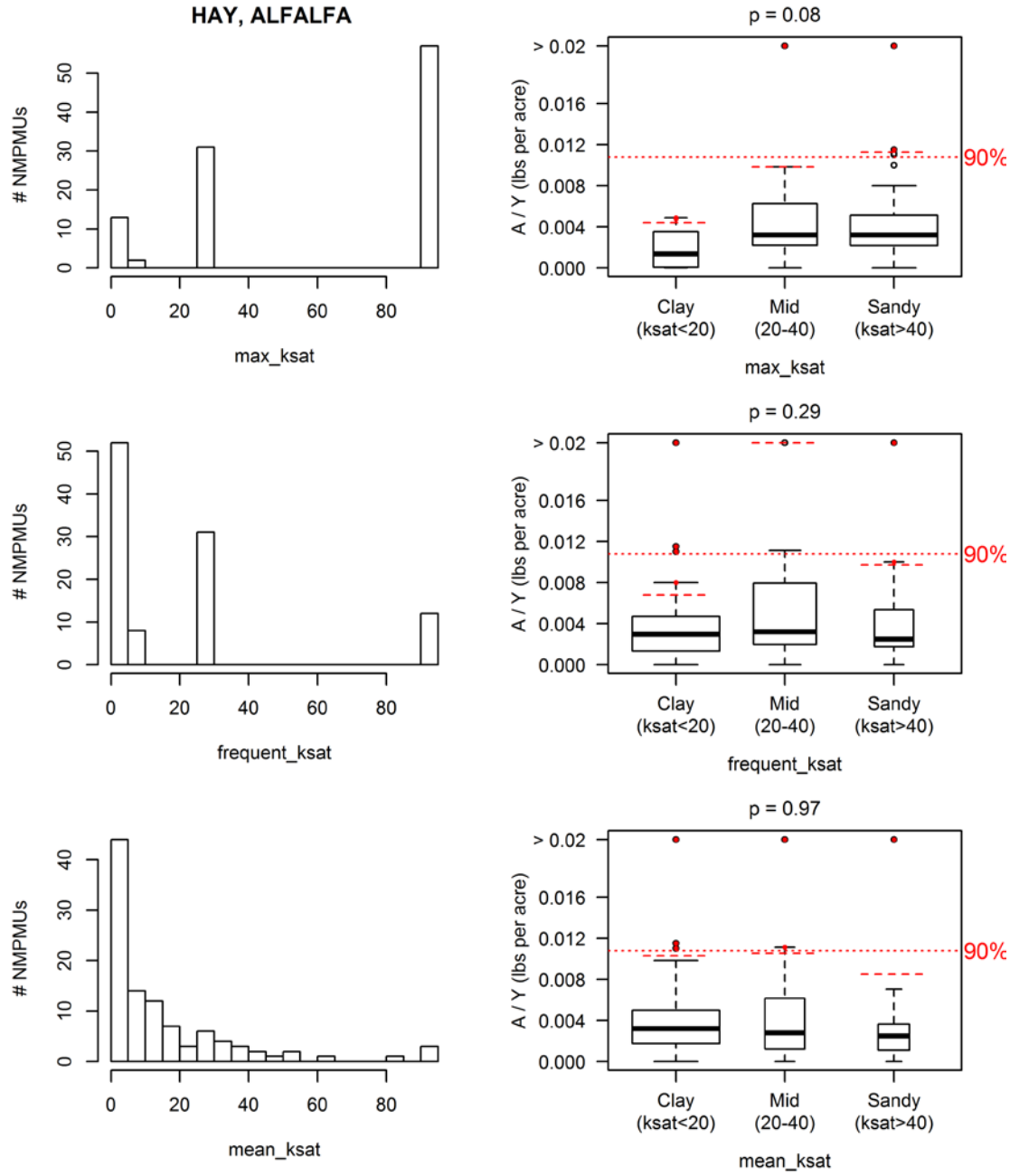


Figure 7. Evaluation of soil types in almonds NMP MUs, and distribution of A/Y values and outliers within different soil type categories.

Left hand panels are histograms showing the frequency of NMP MUs in each representative Ksat value. Right hand panels are boxplots showing the distribution of A/Y values within three soil type categories (Ksat ranges). Red lines represent the 90% quantile for the crop (dotted) and for each soil category (dashed). Red points represent outliers for a soil category. The p-value indicates the average A/Y differs among soil categories. Separate tests were conducted for the three Ksat summary variables in Table 8.

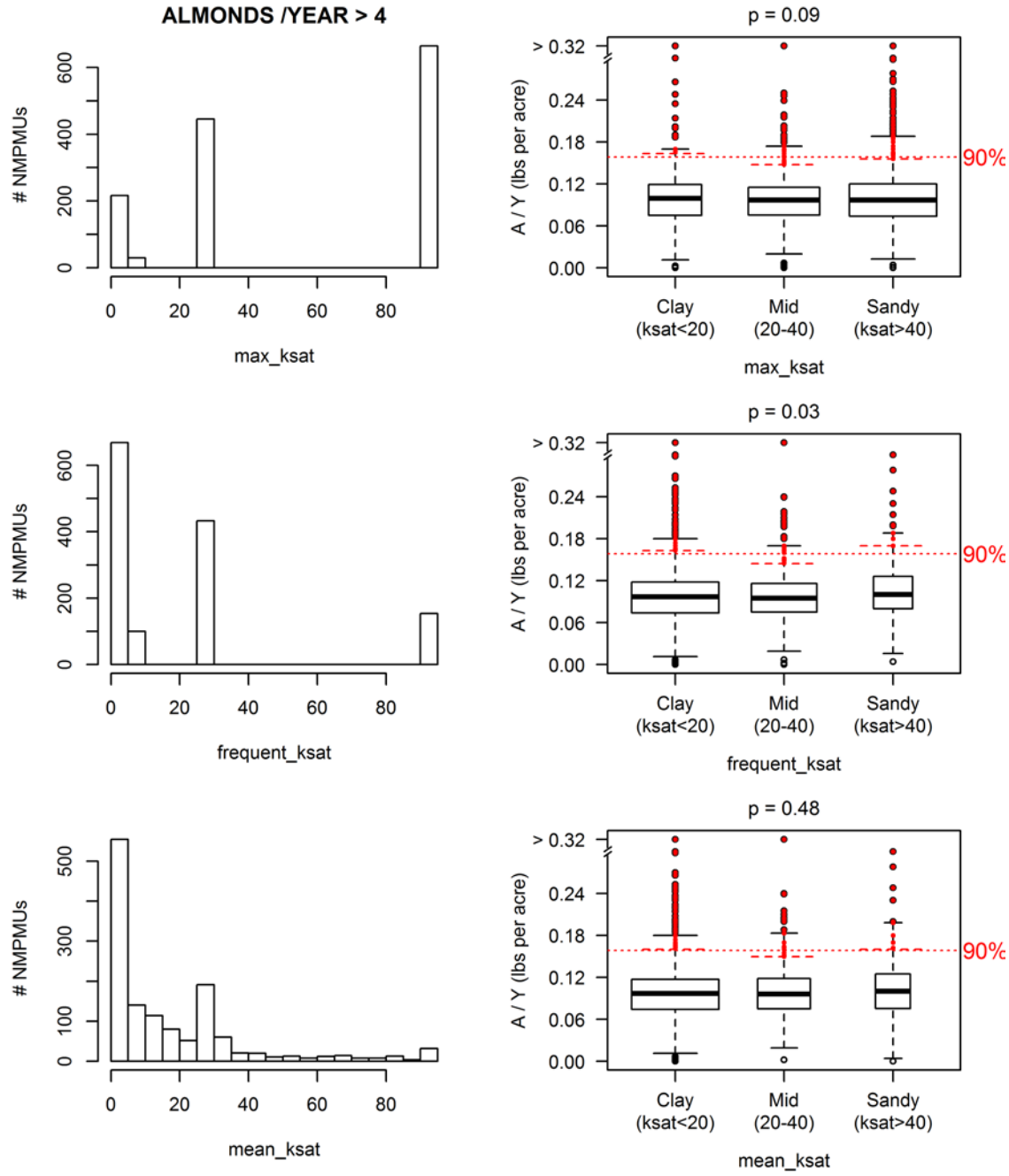


Figure 8. Evaluation of soil types in corn NMP MUs, and distribution of A/Y values within different soil type categories.

Left hand panels are histograms showing the frequency of NMP MUs in each representative Ksat value. Right hand panels are boxplots showing the distribution of A/Y values within three soil type categories (Ksat ranges). Red lines represent the 90% quantile for the crop (dotted) and for each soil category (dashed). Red points represent outliers for a soil category. The p-value indicates the average A/Y differs among soil categories. Separate tests were conducted for the three Ksat summary variables in Table 8.

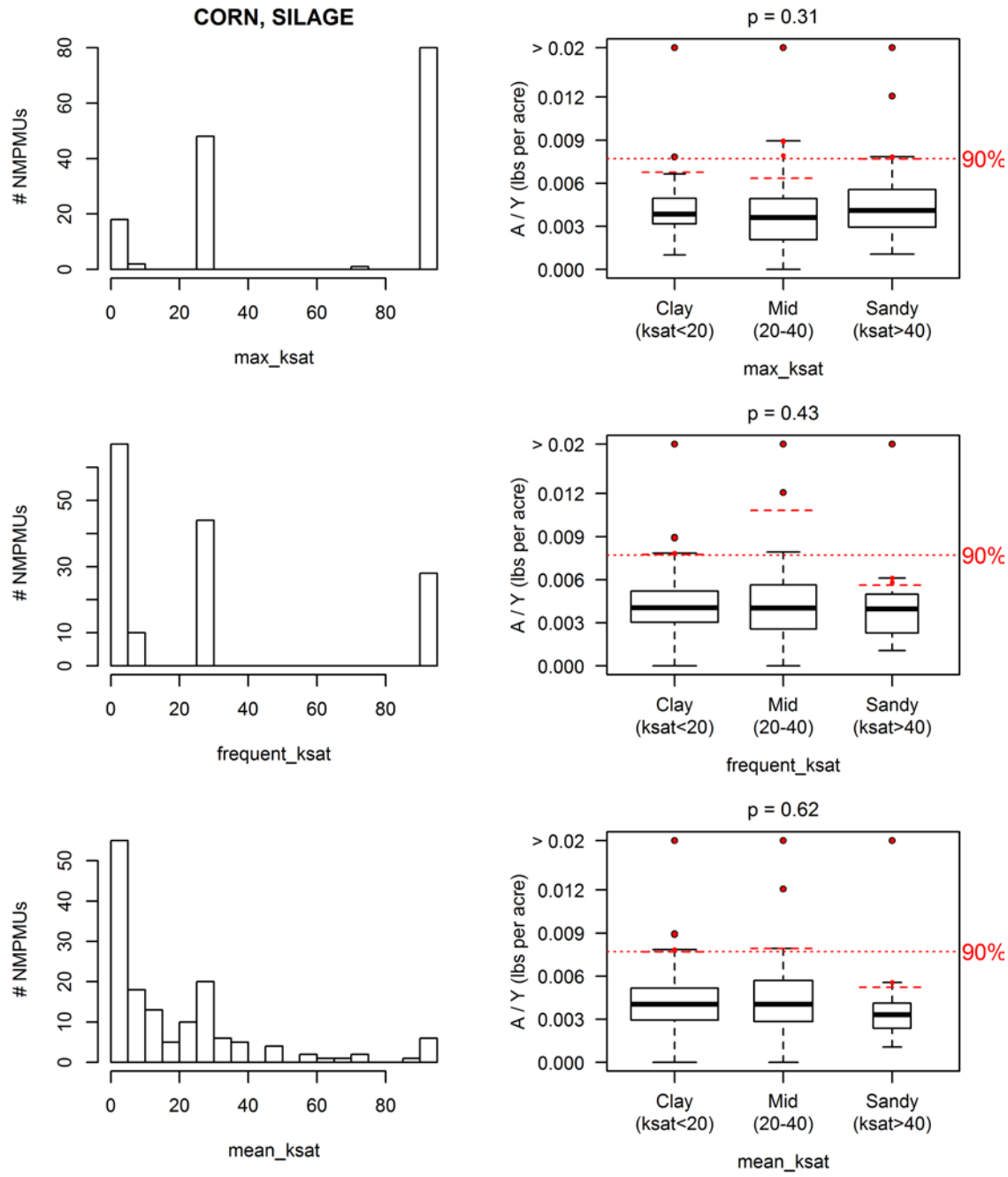


Figure 9. Evaluation of soil types in grapes NMP MUs, and distribution of A/Y values within different soil type categories.

Left hand panels are histograms showing the frequency of NMP MUs in each representative Ksat value. Right hand panels are boxplots showing the distribution of A/Y values within three soil type categories (Ksat ranges). Red lines represent the 90% quantile for the crop (dotted) and for each soil category (dashed). Red points represent outliers for a soil category. The p-value indicates the average A/Y differs among soil categories. Separate tests were conducted for the three Ksat summary variables in Table 8.

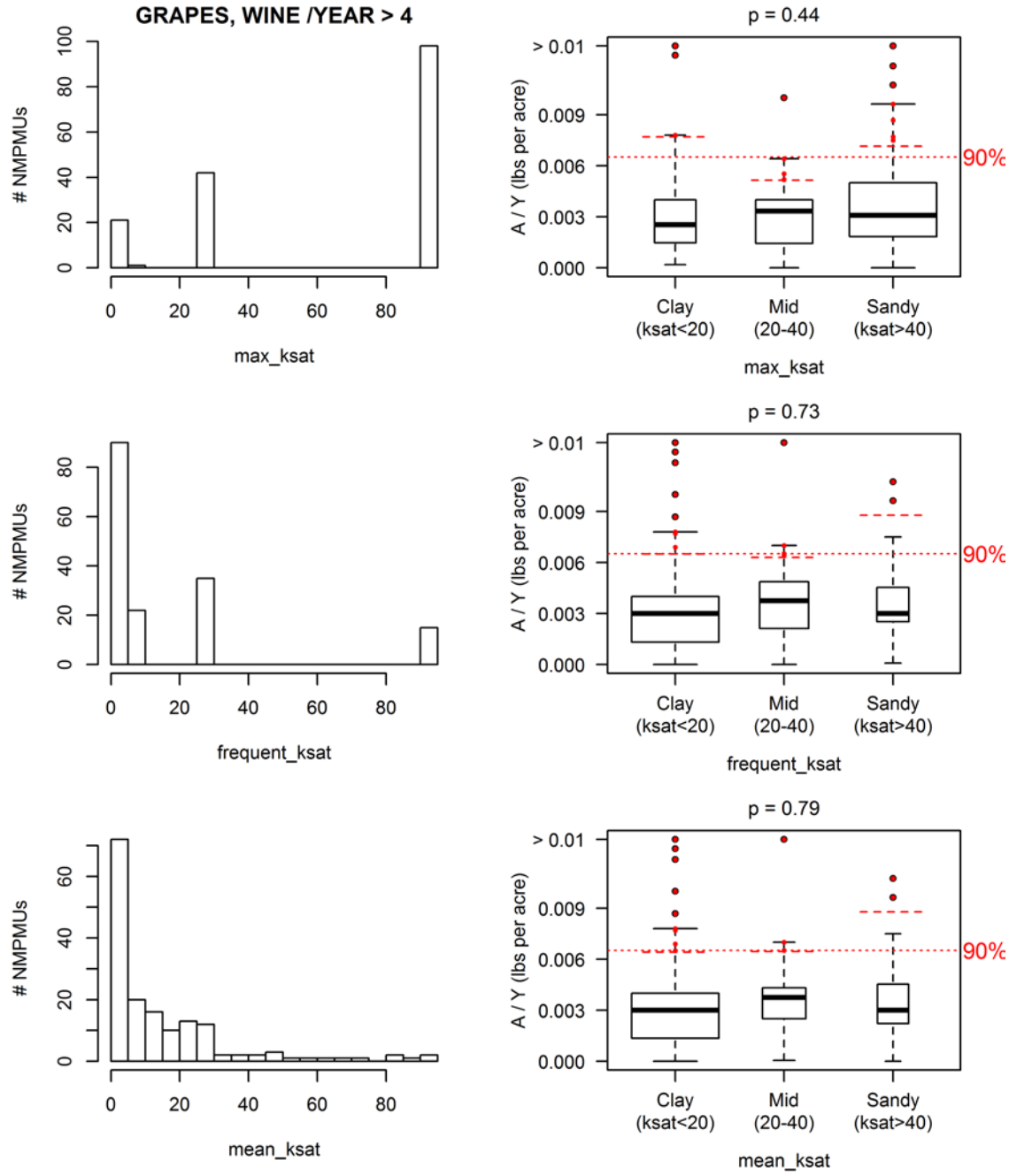


Figure 10. Evaluation of soil types in walnut NMP MUs, and distribution of A/Y values within different soil type categories.

Left hand panels are histograms showing the frequency of NMP MUs in each representative Ksat value. Right hand panels are boxplots showing the distribution of A/Y values within three soil type categories (Ksat ranges). Red lines represent the 90% quantile for the crop (dotted) and for each soil category (dashed). Red points represent outliers for a soil category. The p-value indicates the average A/Y differs among soil categories. Separate tests were conducted for the three Ksat summary variables in Table 8.

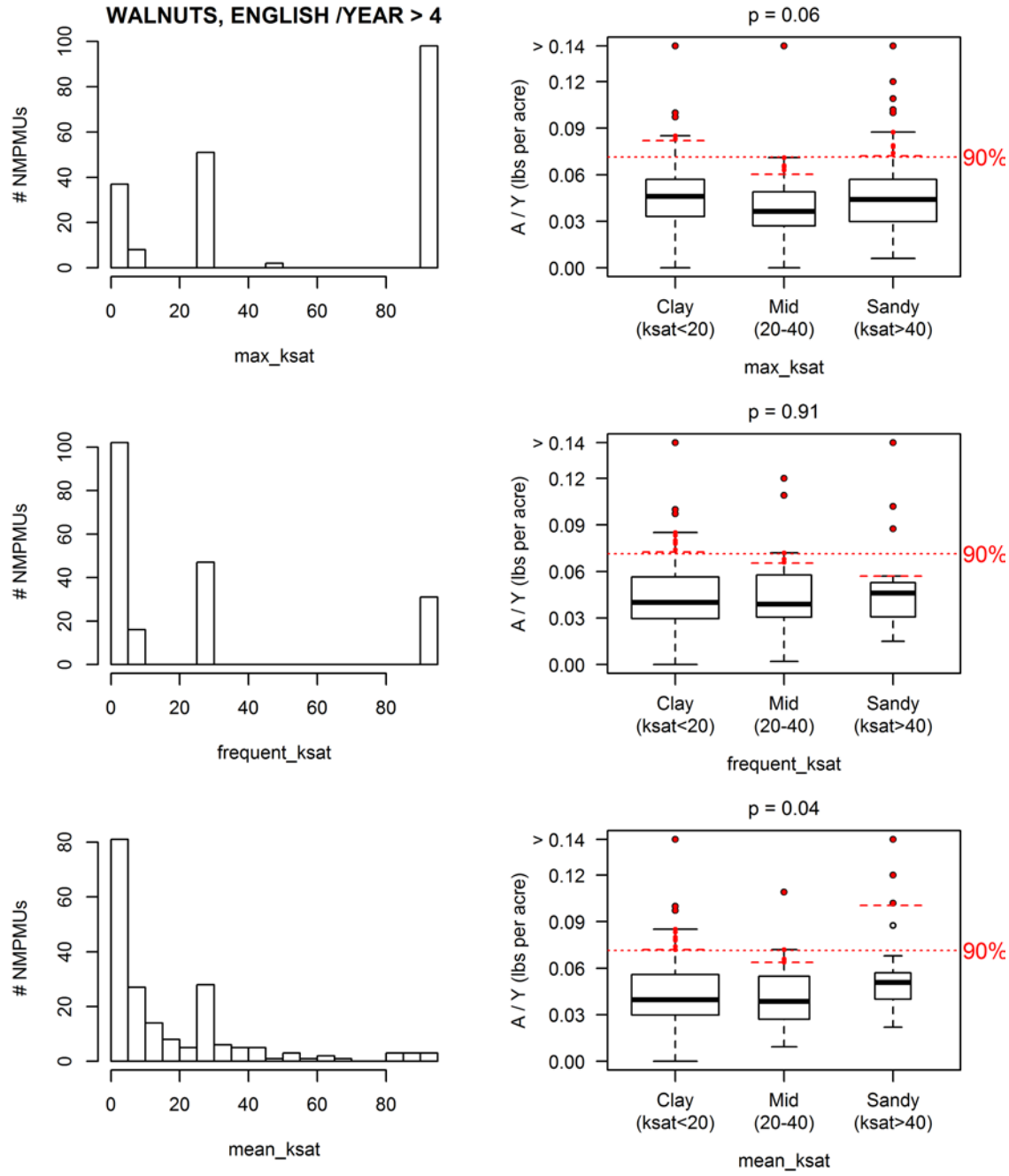


Table 9. Evaluation of the frequencies of A/Y outliers within for 5 major crops in the Coalition region grouped by soil type.

Outliers were identified using specific crop. Soil types were assigned based on the representative Ksat values as described before. Separate tests were conducted for the three Ksat summary variables in Table 8.

Specific Crop Outlier Count	Ksat summary variable	Contingency table			Proportion outliers	P-value
		Soil type	Non-outlier	Outlier		
ALMONDS /YEAR > 4 Outlier Count - 136	Max Ksat	Clay	219	31	14%	0.35
		Intermediate	402	40	10%	
		Sandy	598	65	11%	
	Most Frequent Ksat	Clay	691	84	12%	0.09
		Intermediate	383	31	8%	
		Sandy	143	21	15%	
	Mean Ksat	Clay	798	95	12%	0.17
		Intermediate	291	23	8%	
		Sandy	129	18	14%	
WALNUTS, ENGLISH /YEAR > 4 Outlier Count = 20	Max Ksat	Clay	37	6	16%	0.07
		Intermediate	50	1	2%	
		Sandy	89	13	15%	
	Most Frequent Ksat	Clay	106	11	10%	0.93
		Intermediate	44	6	14%	
		Sandy	26	3	12%	
	Mean Ksat	Clay	116	13	11%	0.07
		Intermediate	43	2	5%	
		Sandy	17	5	29%	
GRAPES, WINE /YEAR > 4 Outlier Count = 17	Max Ksat	Clay	19	4	21%	0.03
		Intermediate	43	0	0%	
		Sandy	83	13	16%	
	Most Frequent Ksat	Clay	99	12	12%	0.04
		Intermediate	34	1	3%	
		Sandy	11	4	36%	
	Mean Ksat	Clay	110	11	10%	0.05
		Intermediate	26	2	8%	
		Sandy	9	4	44%	
CORN, SILAGE Outlier Count = 15	Max Ksat	Clay	18	2	11%	0.93
		Intermediate	39	5	13%	
		Sandy	77	8	10%	
	Most Frequent Ksat	Clay	74	8	11%	0.39
		Intermediate	35	6	17%	
		Sandy	25	1	4%	
	Mean Ksat	Clay	88	9	10%	0.70
		Intermediate	32	5	16%	
		Sandy	14	1	7%	
HAY, ALFALFA Outlier Count = 11	Max Ksat	Clay	16	0	0%	0.26
		Intermediate	29	3	10%	
		Sandy	47	8	17%	
	Most Frequent Ksat	Clay	57	4	7%	0.15
		Intermediate	24	6	25%	
		Sandy	11	1	9%	
	Mean Ksat	Clay	69	7	10%	0.78
		Intermediate	15	3	20%	
		Sandy	8	1	13%	

Although more crops could be analyzed similarly, the power of the statistical tests decrease with the smaller sample size of the other crops. Lower power means a lower likelihood of detecting significant differences. In addition, when adding more crops to this analysis, the probability of finding a significant result simply by chance (i.e., not real differences) increases. For instance, when using an $\alpha = 0.05$ as the threshold to indicate statistical significance, it is possible to find p-values < 0.05 in 1 in every 20 tests (5%) purely by chance. The contradictory results in Alfalfa and Walnuts may well be examples of such spurious correlations.

Hence, the Coalition concludes that soil type is not an important factor in explaining A/Y for most crops across the Coalition region. It has been hypothesized that operations in sandy soils could be applying more nitrogen, or reaping lower yields, due to nutrient leaching. This analysis shows that, for most crops, the average A/Y and frequency of outliers is mostly unaffected by the soil type. It is unlikely that Coalition members farming sandy soils are systematically over-applying nitrogen to their crops or have generally lower yields than their counterparts farming on heavier soils. Based on the analysis to date, the only exception to this is wine grapes. In future analysis, the Coalition might evaluate if this difference exists for other crops with lower acreage and if having multiple years of data affects the analysis. The Coalition recognizes that soil type is important when understanding the potential for nitrogen to leach past the root zone and will continue to work with their members during grower outreach meeting and the Management Practices Effectiveness Program (MPEP) to better understand the effectiveness of practices in different soil types.

EVALUATION OF A/Y BY IRRIGATION PRACTICES

The Coalition also evaluated if management practices, specifically irrigation management practices, could influence A/Y and the occurrence of A/Y outliers. As with the soil types, the Coalition tested if there were differences in average A/Y among NMP MUs with different irrigation types. Differences in average A/Y among the different irrigation types were evaluated using a simple linear model. The Coalition evaluated the hypothesis of whether outliers were more frequent in areas with less efficient watering practices (e.g. furrow irrigation). To test this, the Coalition created contingency tables counting the number of outliers by specific crop and evaluating what percentage of outliers were associated with each irrigation type (Table 10). Differences in the frequency of outliers among the irrigation types were evaluated using Chi-square tests.

The Coalition obtained a list of management practices implemented by members from the Farm Evaluation surveys. Coalition members in high vulnerability areas are required to submit Farm Evaluation surveys annually which provide information regarding irrigation practices, nitrogen management practices, active and abandoned wells, pesticide practices and sediment/erosion control practices. The Coalition determined which management practices (MPs) were implemented in each NMP MU by linking the two datasets based on the parcel number. When one parcel included multiple NMP MUs, they were identified by the specific crop type. A number of NMP MUs (185) were not included in this analysis because the NMP MU could not be linked to the corresponding Farm Evaluation record. In those cases, the crop type may have changed or the parcel could not be associated with Farm Evaluation data.

The amount of nitrogen applied and removed as yield may vary depending on the irrigation practices. In fact, nitrogen recommended application rates can be higher for flood irrigated operations to compensate for the lower efficiency of the delivery method. Alternatively, yields can be lower in flood irrigated operations. Hence, A/Y could be higher in flood irrigated operations, and irrigation type can be a useful grouping to compare A/Y in the region. Irrigation practices were grouped in two broad categories: flood irrigation (which includes flood and furrow) and micro-irrigation (which includes drip, sprinkler, and micro-sprinkler). As with the soil analysis, the Coalition focused on the most abundant crops in the region.

Overall, there was no evidence that average A/Y was significantly different between these two categories for the six evaluated crops (Figure 11). Contrary to predictions, for almonds and walnuts, median A/Y and the 90% quantile, were slightly lower in flood irrigated NMP MUs. Consistently, for almonds, the frequency of outliers was significantly higher for drip/sprinkle irrigated NMP MUs (Table 10). Figure 11 also shows how the frequency of outliers might change when outliers are identified by irrigation and crop vs. when outliers are identified only by crop. In most cases the outliers identified were the same.

Figure 11. Evaluation of the effect of irrigation management practices on A/Y for the six major crops in the ESJ region.

Each dot represents one NMP MU. The p-value test the hypothesis of differences in average A/Y.

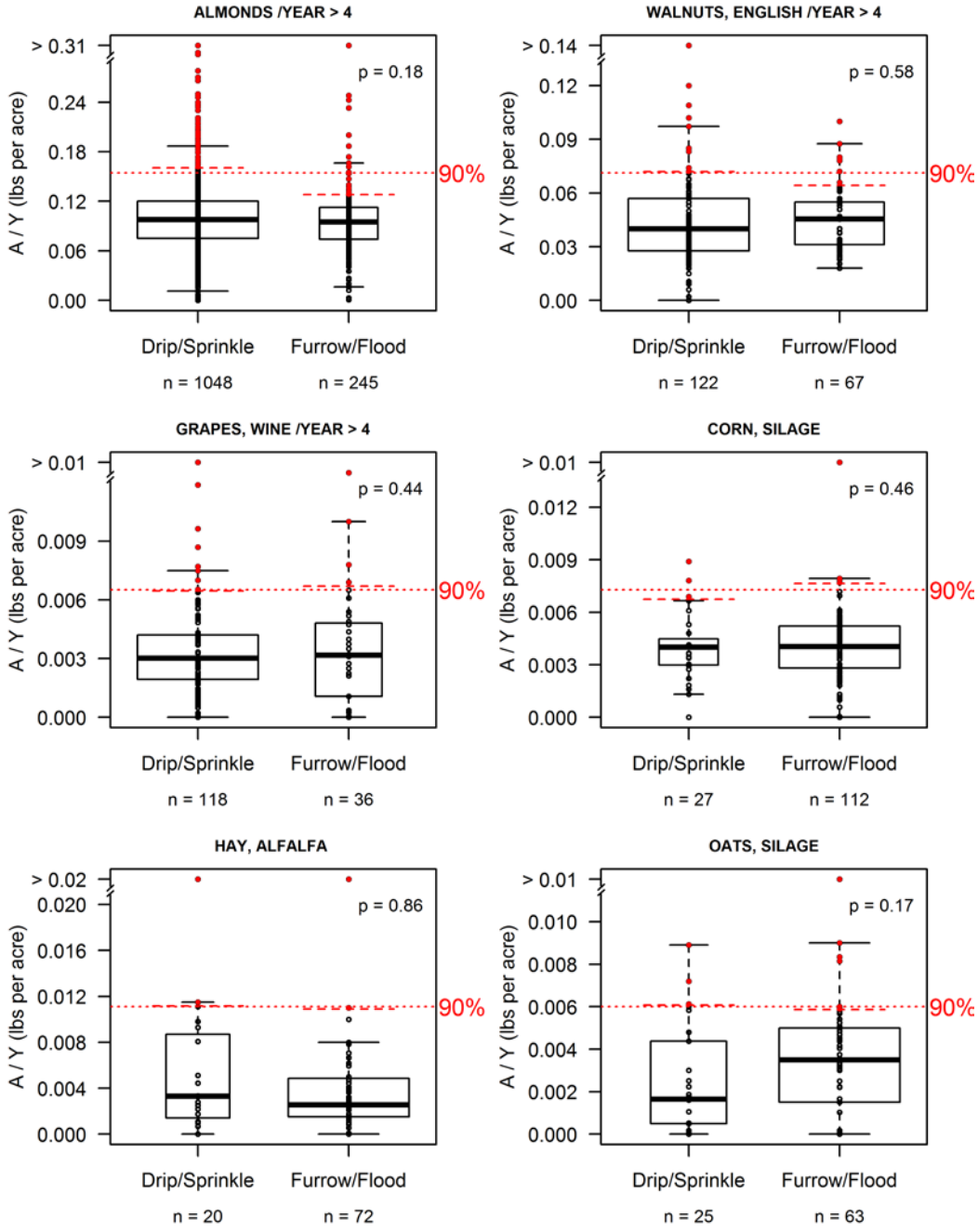


Table 10. Evaluation of the frequencies of A/Y outliers for six major crops in the Coalition region by irrigation practices.

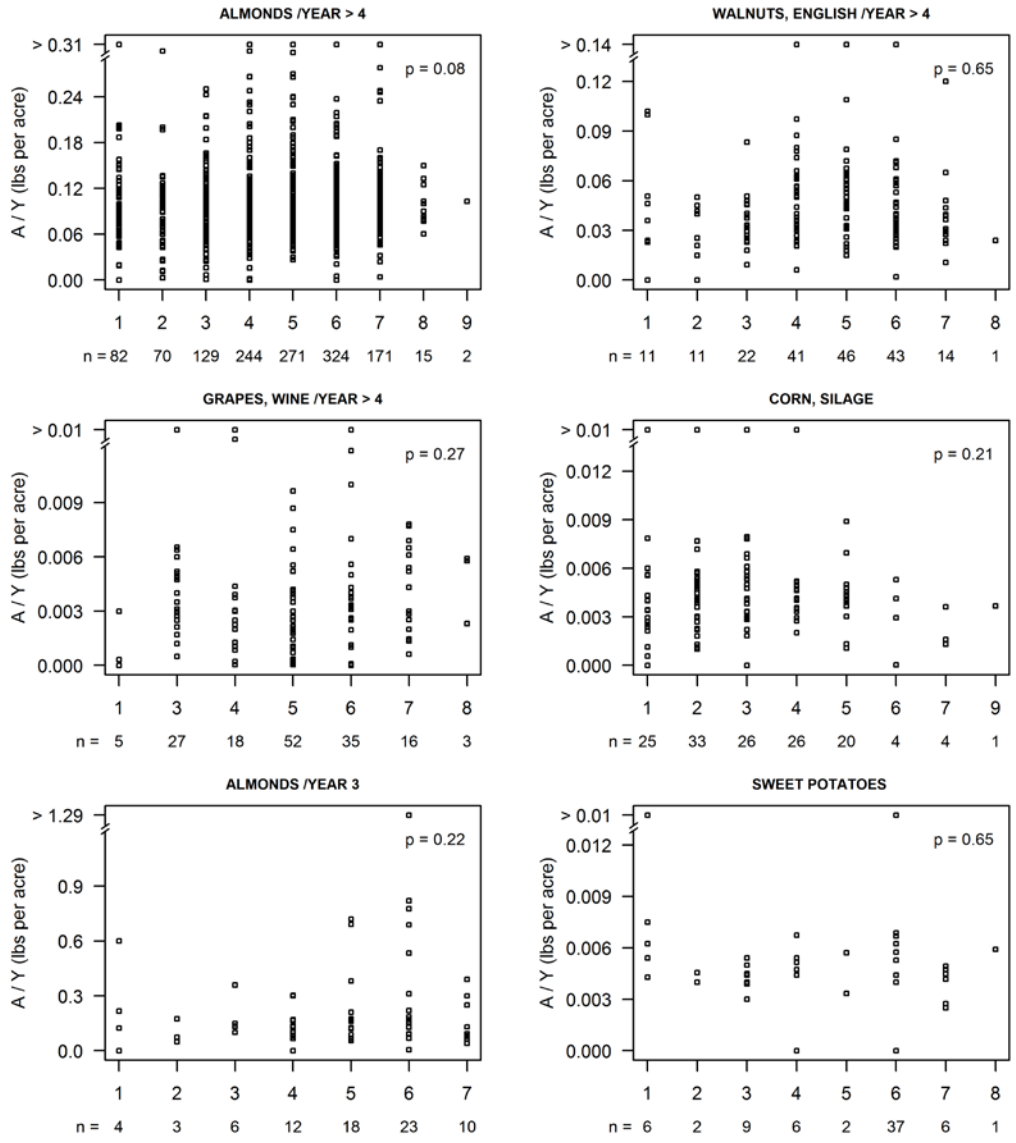
Outliers were identified by specific crop. Not all NMP MUs could be used in the analysis due to issues associated the NMP information with Farm Evaluation information.

Specific Crop Outlier Counts	Contingency table			Proportion of Outliers	p-value
	Irrigation	Non-outlier	Outlier		
ALMONDS /YEAR > 4 Outlier Count = 131	Drip/Sprinkle	930	118	13%	0.004
	Furrow/Flood	232	13	6%	
WALNUTS, ENGLISH /YEAR > 4 Outlier Count = 18	Drip/Sprinkle	109	13	12%	0.82
	Furrow/Flood	61	6	10%	
GRAPES, WINE /YEAR > 4 Outlier Count = 16	Drip/Sprinkle	106	12	11%	1.00
	Furrow/Flood	32	4	13%	
CORN, SILAGE Outlier Count = 14	Drip/Sprinkle	25	2	8%	0.73
	Furrow/Flood	100	12	12%	
HAY, ALFALFA Outlier Count = 10	Drip/Sprinkle	17	3	18%	0.69
	Furrow/Flood	65	7	11%	
OATS, SILAGE Outlier Count = 9	Drip/Sprinkle	22	3	14%	1.00
	Furrow/Flood	57	6	11%	

NITROGEN MANAGEMENT PRACTICES

Implementation of some nitrogen management practices can result in reduced nitrogen applications and hence, reduced A/Y. As a preliminary analysis, the Coalition evaluated if the number of nitrogen management practices implemented in a NMP MU resulted in a different average A/Y. Overall, there was little evidence that NMP MUs associated with members implementing a larger number of nitrogen management practices had lower A/Y ratios. In fact, for some crops like almonds, there was a non-significant trend for increased average A/Y as growers implemented more management practices. However, this is a preliminary analysis, and analysis of individual nitrogen management practices may show a relationship with average A/Y ratios. As work is performed through the MPEP to evaluate the effectiveness of management practices, and additional information is obtained on specific practices implemented through the Groundwater Quality Management Plan, the evaluation of nitrogen management practices compared to outliers may become more informative. This analysis is not suited to evaluation by contingency tables.

Figure 12. Evaluation of the effect of number of implemented N management practices on A/Y for the six major crops in the ESJWQC region.
Each dot represents one NMP MU. The p-value test the hypothesis of differences in average A/Y.



CAVEATS

There are several caveats that compromise a complete interpretation of the results at this time (e.g. identification of outliers) including:

1. Although the Coalition has achieved 89% response from members in high vulnerability areas, less than 100% return of the NMP SRs means that the box and whisker plots will change when more data are available. It is not possible to determine how those plots will change. NMP Summary Reports continue to be returned even after the preparation of this report.
2. Some information clearly is in error. Although the Coalition has conducted intensive outreach efforts to fix erroneous values, at least 5% of data had been verified and the Coalition had not

managed to fix all identified errors by the time this report was prepared. All summary statistics, box and whisker plots, and outliers, need to be recalculated as better data become available. Examples of information that need to be verified include:

   a. Some yields are still in the order of millions of pounds per acre which is not possible.
   b. Some A/R ratios indicate that growers are removing almost 1,000 times more nitrogen than is being applied.

3. Not all N removed Conversion Factors have been verified and many may need to be modified as better information becomes available.
4. The association of soils characteristics to specific NMP MUs reported by the members is very inexact. Members can include on a single NMP SR different fields located some distance from each other provided they are managed the same way. As a result, soils can vary considerably within management units, and is difficult to assign representative soils properties to those management units.
5. Even when all NMP SRs are returned, it is almost certain that many crops will still have only a few (five or less) management units in most TRs. The identification of outliers in this cases is not reliable.

OUTREACH AND EDUCATION

The Coalition is preparing documents to be included in its outreach to all members who returned a NMP SR. Appendix I contains scatter plots of applied nitrogen (lbs per acre) compared to yield (lbs per acre) for each crop; this figure is a potential tool for communicating to growers information regarding their own nitrogen applications and yields compared to other growers in the ESJWQC region. The plots in Appendix I also provide the recommended fertilizer application rates based on information in Table 5. Appendix II includes an example of an NMP Personalized Summary report which includes grower and crop specific information in a tabulated format followed by graphs illustrating the grower's performance relative to other growers in the Coalition area. The Coalition is developing the outreach packets to clearly and effectively communicate to members summaries of their crop specific A/Y and A/R (where applicable) information relative to other growers, fertilizer recommendations, and other crop specific outreach materials regarding nitrogen and irrigation management.

The Coalition intends to meet with members with management units that are A/Y outliers as outlined in the ESJWQC Groundwater Quality Management Plan (GQMP). Members may have management units that are considered outliers due to various factors including high application rates or low yield. High application rates may be due to not accounting for nitrogen in their irrigation water or over-application of synthetic fertilizer, manure or compost. Low yield may have occurred for reasons outside of the grower's control including pest damage or drought stress. The ESJWQC plans to conduct NMP Focused Outreach meetings during the fall of 2016 and discuss recommended fertilizer rates and timing, nitrogen uptake information, and nitrogen management practices that can be implemented to match nitrogen applications to the crop need. As a component of the GQMP, additional information regarding irrigation and nitrogen management practices will be collected during these meetings and tracked to evaluate the implementation of additional practices and changes in applied nitrogen and A/Y.

Based on the additional management practice information obtained from growers during these NMP Focused Outreach seminars, the Coalition will re-evaluate each member's A/Y to determine if the statistical outliers are verified as a member who may need to improve practices by either reducing A, increasing Y, or both. In some instances, members with an elevated A/Y may not be able to reduce the applied nitrogen because the majority, or all of the nitrogen, is applied in their irrigation water. Other members may be applying a recommended rate of nitrogen but because of their irrigation practices, the nitrogen may be leaching before it can be taken up by the crop. Practices will be recommended that help the grower save money (less nitrogen applied), increase their nitrogen use efficiency, maintain or increase their yield, and reduce the potential for leaching of nitrogen to groundwater.

RECOMMENDATIONS FOR DATA ANALYSIS

The analysis of A/Y by T-R (Appendix I) shows how, in most TRs, there are insufficient data to generate reliable summary statistics by crop. For instance, in almonds, the most common crop in the region, roughly one third of the TRs had only one NMP MU in them. It is not possible to estimate summary statistics or calculate outliers with a single data point. In addition, because of the definition of outlier used here (A/Y > 90% quantile), 10% of the data points are considered outliers. In TRs with only a few NMP MUs, that frequency is much higher, as the highest value is always an outlier regardless of how many data points there are and how different they are from each other. This results in a frequency of outliers that is unrealistically large (i.e., outliers represent 50% of the TRs with only two data points, or 33% with three data points). Furthermore, because of the way 90% quantiles are estimated, all TRs had outliers even when all data points in a particular T-R had low A/Y values relative to other TRs. In fact, a few NMP MUs that were analyzed in two TRs (because there are parcels in both TRs) were found to be outliers in one T-R but not in the other.

For that reason, the Coalition considers that conducting the analysis grouping by TR, as required by the Order, is an unreliable estimation of summary statistics and an unreliable method for identifying management units that are outliers requiring additional outreach, education and implementation of additional practices. On the other hand, because nitrogen use and yields clearly differ among crops, crop type is a good natural grouping for calculating summary statistics and identifying outliers.

The Order additionally requires the Coalition to report statistical summaries for parcels grouped by similar soil conditions. Using soil types or management practices as subgroupings within T-R would only exacerbate the problem with small sample size to a level where statistical analyses are meaningless. Instead, in this report, the Coalition conducted separate analysis of A/Y grouped by soil type and irrigation management practices to evaluate if these could be used as alternatives to grouping by TR. Recommended N applications rates may be higher for flood irrigation or sandy soils to account for nutrient loss. However, the analysis shows that these factors may only influence A/Y outliers in a few crops. Even for those few crops showing some statistically significant differences, A/Y ranges overlapped considerably, and the differences were actually quite small. Hence, the analysis do not provide a strong justification to extend this grouping to other crops in the region with smaller sample sizes.

The general goal of this NMP SR analysis is to understand N use patterns in the region, and identify Coalition members that can be targeted for focused outreach. With this goal in mind, there is little benefit in using these groupings to identify outliers for a number of reasons: 1) the differences in A/Y between soil types or irrigation practices are not large enough to justify separate analysis; 2) grouping crops by TR, soil type or management practices will reduce the sample size, and hence the accuracy of summary statistics, especially for less common crops; 3) if nitrogen use were indeed higher in sandy soils or flood irrigated crops, analyzing those categories separately could result in higher 90% quantile threshold for those groups, and fewer of those operations being targeted for focused outreach.

In conclusion, the Coalition considers that neither soil type, nor irrigation practices, are good alternatives to T-R for groupings used to calculate summary statistics or identify outliers. However, these categories may be useful to understand outliers and aid in the process of focused outreach to

farmers forced to work with less than optimal soil types. The Coalition recommends grouping only by crop type for calculating summary statistics and identifying outliers. If over the long term, the quality of the NMP data improves, and the use of nitrate becomes more homogeneous within crops, the Coalition could revisit the idea of calculating outliers based on soil types or irrigation practices. In the meantime, the most informative grouping, and the one that yields the better sample size is a simple grouping by specific crop type. This grouping can be refined by separating those outliers that are due to high N application rates from those that are due to low yields. The scatter plots of A vs. Y in Appendix I is a valuable tool for this.

REFERENCES

Anderson, K.K., Andris, H.L., Coates, J.L., Day, K.R., De Moura, R.L., Ferriera, W.C., Klonsky, K.M., Southwick, S.M., 2003. Sample costs to establish an apricot orchard and produce apricots. University of California Cooperative Extension (UCCE). Retrieved May 25, 2016 from: http://coststudyfiles.ucdavis.edu/uploads/cs_public/bb/10/bb101479-e0b0-42e4-aeda-5e94ca48ce56/apricotsfreshsjv.pdf

Anderson, K.K., Caprile, J.L., Coates, J.L., De Moura, R.L., Grant, J.A., Klonsky, K.M., 2011. Sample costs to establish an orchard and produce sweet cherries. University of California Cooperative Extension (UCCE). Retrieved May 25, 2016 from: http://coststudyfiles.ucdavis.edu/uploads/cs_public/6f/9b/6f9b0a93-163b-4060-ba94-8a3fc689e97d/cherryvn2011.pdf

Anderson, K.K., Grant, J., Weinbaum, S.A., Pettygrove, S., 2006. Guide to efficient nitrogen fertilizer use in walnut orchards. University of California, Agriculture and Natural Resources. Publication 21623.

Arpaia, M.L., Lund, L.J., 2003. Nitrogen management in citrus under low volume irrigation.

Beede, B., Kallsen, C., 2008. How do I develop a sound pistachio nutrition management program?

Blackmer, A.M., Voss, R.D., Mallarino, A.P., 1997. Nitrogen fertilizer recommendations for corn in Iowa. Iowa State University Extension.

Brouder, S.M., Mengel, D.B., 2003. The presidedess soil nitrate test for improving N management in corn. Purdue University Cooperate Extension Service. Agronomy Guide.

Caprile, J.L., De Moura, R.L., Grant, J.A., Holtz, B.A., Kelley, K.M., Klonsky, K.M., Mitcham, E.J., 2001. Sample costs to establish an apple orchard and produce apples. University of California Cooperative Extension (UCCE). Retrieved May 25, 2016 from: http://coststudyfiles.ucdavis.edu/uploads/cs_public/6e/24/6e24cf05-727f-4eb0-952c-1ed0da7bb256/applesjv2001.pdf

Christensen, L.P, Peacock, W., 2000. Mineral nutrition and fertilization. In: Raisin Production Manual. University of California Division of Agricultural and Natural Resources Publication 3393, Oakland, CA. pp. 102-114.

Day, K.R., De Moura, R.L., Klonsky, K.M., 2010. Sample costs to establish and produce pomegranates. University of California Cooperative Extension (UCCE). Retrieved May 25, 2016 from: http://coststudyfiles.ucdavis.edu/uploads/cs_public/d5/bd/d5bdaad2-b874-4b99-a3c2-cc7a89cfc72d/pomegranatevs2010.pdf

Day, K.R., DeJong, T., Johnson, R.S., 2015. University of California Fruit Report. Regents of the University of California.

Doll, D., 2012d. Presentation held at the 40th Almond Conference in Sacramento. December 12, 2012.

Elowad, H.O.A., Hall, A.E., Jarrell, W.M., 1987. Comparisons of ureide and acetylene reduction methods for estimating biological nitrogen fixation by glasshouse-grown cowpea. Field Crops Research 15, 215-227.

Fake, C., 2004. Fertilizing citrus in the foothills. University of California Cooperative Extension Placer & Nevada Counties January 2004.

Hannaway, D.B., Shuler, P.E., 1993. Nitrogen fertilization in alfalfa production. Journal of Production Agriculture 6, 80-85.

Hartz, T.K, Bottoms, T.G., 2009. Nitrogen requirements of drip-irrigated processing tomatoes. HortScience 44, 1988–1993.

Hartz, T.K., Miyao, G., Mickler, J., LeStrange, M., Stoddard, S., Nunez, J., Aegerter B., 2008. Processing tomato production in California. University of California Publication 7228.

Hays, T., 2012. Critical issues in alfalfa fertility. Proceedings of the California Alfalfa & Grains Symposium 2012.

Hutmacher, R.B., Travis, R.L., Rains, D.W., Vargas, R.N., Roberts, B.A., Weir, B.L., Wright, S.D., Munk, D.S., Marsh, B.H., Keeley, M.P., Fritschi, F.B., Munier, D.J., Nichols, R.L., Delgado, R., 2004. Response of recent Acala cotton varieties to variable nitrogen rates in the San Joaquin Valley of California. Agronomy Journal 96, 48-62.

Ketterings, Q., Albrecht, G., Czymmek, K., Stockin, K., 2012. Pre-sidedress nitrate test. Cornell University Cooperative Extension. Agronomy Fact Sheet 3.

Klonsky, K., Stewart, D., Sumner, D.A., Wilson, R., 2016. Sample costs to produce onions for dehydrating. University of California Cooperative Extension (UCCE). Retrieved May 25, 2016 from: http://coststudyfiles.ucdavis.edu/uploads/cs_public/a7/1e/a71ed327-7d6c-4ae5-92a2-52854cb4195c/16_onionshydrostulelakefinaldraftmar22.pdf

Koenig, R.T., 2002. Nitrogen, sulfur, potassium and phosphorus fertilization in alfalfa when are they necessary? Proceedings of the 32nd California Alfalfa Forage Symposium 2002.

Long, R., Temple, S., Schmierer, J., Canevari, M., Meyer, R.D., 2010. Common dry bean production in California, 2nd edition. UC ANR Publication 8402. From: https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Beans.html

Mayberry, K.S., 2000. Sample cost to establish and produce carrots. University of California Cooperative Extension (UCCE). Retrieved May 25, 2016 from: http://coststudyfiles.ucdavis.edu/uploads/cs_public/9d/ad/9dadf694-5389-42f9-b272-4b8bcee3c1a0/carrots.pdf

Meyer, R.D., 2004. Nitrogen on drip irrigated almonds. In: Almond Board of California (Ed.) Years of Discovery. A compendium of production and environmental research projects 1972-2003. pp. 284-285.

Meyer, R.D., Marcum, D.B., Orloff, S.B., Schmierer, J.L., 2007. Alfalfa fertilization strategies. In: Summers, C.G., Putnam, D.H. (Eds.) Irrigated Alfalfa Management in Mediterranean and Desert Zones. Chapter 6. University of California Agriculture and Natural Resources, Publication 8310.

Munier, D., Kearney, T., Pettygrove, G.S., Brittan, K., Mathews, M., Jackson, L., 2006. Fertilization of small grains. In: UC ANR (Ed.). Small Grain Production Manual. ANR Publication 8208.

Niederholzer, F.J.A., DeJong, T.M., Saenz, J.-L., Muraoka, T.T., Weinbaum, S.A., 2001. Effectiveness of fall versus spring soil fertilization of field-grown peach trees. Journal of the American Society for Horticultural Science 125, 644- 648.

Ventura, M., Scandellari, F., Bonora, E., Tagliavini, M., 2010. Nutrient release during decomposition of leaf litter in a peach (Prunus persica L.) orchard. Nutrient Cycling in Agroecosystems 87, 115-125.

Weinbaum, S.A., Murooka, T.T., Gatlin, P. B., Kelley, K., 1991. Utilization of fertilizer N by walnut trees. The Walnut Marketing Board of California.Walnut Research Reports 1991, 317-334.

APPENDIX I

SUMMARY STATISTICS BY CROP AND TOWNSHIP-RANGE

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INTRODUCTION

This appendix shows the results of summary statistics calculations for all crops in the region. Each section (**Error! Reference source not found.** to XXI) contains results for one primary crop. Each primary crop may group multiple specific crops (e.g., trees of different age). A number of crops had only a few management units with complete data in the whole region. Summary statistics for those crops are listed in Section XXII.

Because the focus of this appendix is to report summary statistics representing the relation between N applied and Yield, only management units with complete data and a yield larger than zero are included; i.e., the analysis does not include management units with non-bearing crops or with crops that were not harvested. Hence, the total acreage and number of management units reported for each crop here may or may not match the acreage for all the received summary reports.

Each section (**Error! Reference source not found.** to XXI) contains Box and Whisker plots, and summary statistics of A/Y by T-R. Summary statistics for A/R and A-R are also provided when an N removed conversion factor is available. Box and Whisker plots were not generated for the crops in Section XXII, because there are not sufficient management units per T-R to produce an informative figure. Each section also contains a scatter plot of A vs. Y. These plots show when outlier A/Y values result from N applications that are very high, or from yield that was very low. Nitrogen Management Plan summary reports do not include information explaining very low yields (i.e., if a crop was lost or why). Some extremely high yields and N applications that likely represent errors in the data entry, were left out of the scatterplots to improve readability. These yields appear in the Box and Whisker plots as very low or very high A/Y values. As explained in the main document, grower outreach initially focuses on these unlikely high values, as they may represent errors in the reporting.

Scatter plots show lines with some typical N application rates found in the literature. However, optimal N application rates can vary considerably due to factors such as crop stage, soil type, and irrigation system. Because the goal of this analysis is not to provide a comprehensive review of recommended application rates or to draw any conclusion regarding their accuracy or applicability to specific fields, all values are plotted for reference. An associated table provides more detail regarding the range of values, sources, specific conditions, and other information regarding the N application rates shown in the figure.

Some values were corrected to reflect issues in the reporting of yield and the application of N Removed conversion factors. Specifically, a number of farmers reported almond yields as gross yield, but the N Removed conversion factor for almonds is based on meat weight. In those cases, gross weight was converted to meat weight assuming that meat weight is 23% of the gross yield. Similarly, Silage Corn yield was reported by all farmers as wet weight, but the N Removed conversion factor is based on dry weight. In those cases, wet yield was converted to dry yield assuming that dry weight is 35% of the wet yield.

Figure I-1. Box and Whisker plots of A/Y for bearing Alfalfa management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

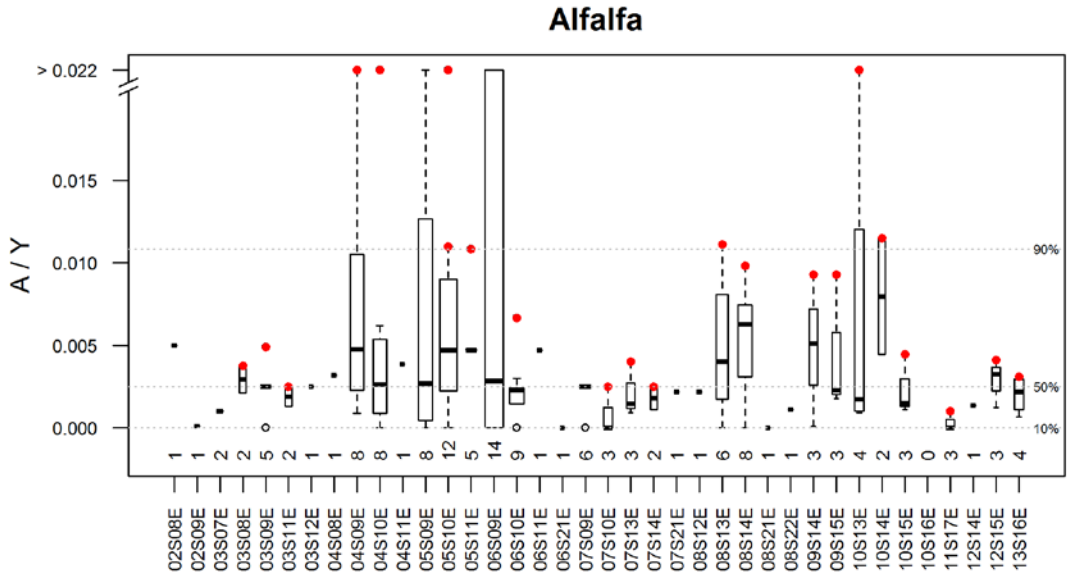


Table I-1. Summary statistics for Alfalfa management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S08E	1	60	0.005	0.005						
02S09E	1	62	0.000	0.000						
03S07E	2	92	0.001	0.001						
03S08E	2	93	0.002	0.004	0.002	0.003	0.003	0.003	0.004	1
03S09E	6	734	0.000	0.005	0.001	0.002	0.002	0.002	0.004	1
03S11E	2	141	0.001	0.002	0.001	0.002	0.002	0.002	0.002	1
03S12E	1	105	0.002	0.002						
04S08E	2	187	0.003	0.003						
04S09E	8	289	0.001	0.028	0.001	0.003	0.005	0.010	0.016	1
04S10E	9	363	0.000	0.029	0.000	0.001	0.003	0.005	0.013	1
04S11E	1	205	0.004	0.004						
05S09E	8	401	0.000	0.029	0.000	0.001	0.003	0.009	0.027	1
05S10E	12	394	0.000	0.028	0.001	0.003	0.005	0.008	0.011	2
05S11E	6	327	0.005	0.011	0.005	0.005	0.005	0.005	0.008	1
06S09E	14	664	0.000	0.029	0.000	0.001	0.003	0.019	0.028	2
06S10E	10	405	0.000	0.007	0.001	0.001	0.002	0.002	0.004	1
06S11E	1	10	0.005	0.005						
06S21E	1	245	0.000	0.000						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
07S09E	6	413	0.000	0.002	0.001	0.002	0.002	0.002	0.002	0
07S10E	3	345	0.000	0.002	0.000	0.000	0.000	0.001	0.002	1
07S13E	3	403	0.001	0.004	0.001	0.001	0.001	0.003	0.003	1
07S14E	3	154	0.001	0.002	0.001	0.001	0.002	0.002	0.002	1
07S21E	1	343	0.002	0.002						
08S12E	1	343	0.002	0.002						
08S13E	6	1238	0.000	0.011	0.001	0.002	0.004	0.007	0.010	1
08S14E	8	1342	0.000	0.010	0.001	0.004	0.006	0.007	0.008	1
08S21E	1	566	0.000	0.000						
08S22E	1	75	0.001	0.001						
09S14E	3	583	0.000	0.009	0.001	0.003	0.005	0.007	0.008	1
09S15E	3	967	0.002	0.009	0.002	0.002	0.002	0.006	0.008	1
10S13E	4	728	0.001	0.031	0.001	0.001	0.002	0.010	0.023	1
10S14E	2	470	0.004	0.011	0.005	0.006	0.008	0.010	0.011	1
10S15E	3	520	0.001	0.004	0.001	0.001	0.002	0.003	0.004	1
11S17E	3	90	0.000	0.001	0.000	0.000	0.000	0.000	0.001	1
12S14E	1	230	0.001	0.001						
12S15E	3	219	0.001	0.004	0.002	0.002	0.003	0.004	0.004	1
13S16E	4	381	0.001	0.003	0.001	0.001	0.002	0.003	0.003	1

Table I-2. Summary statistics for all Alfalfa management units (all T-R).
A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
HAY, ALFALFA	110	9759.77	0	0.031	0.001	0.002	0.003	0.005	0	11
HAYLAGE, ALFALFA	7	575.00	0	0.011	0.000	0.000	0.000	0.003	0	1

Figure I-2. Scatter plot of A vs. Y for Alfalfa crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

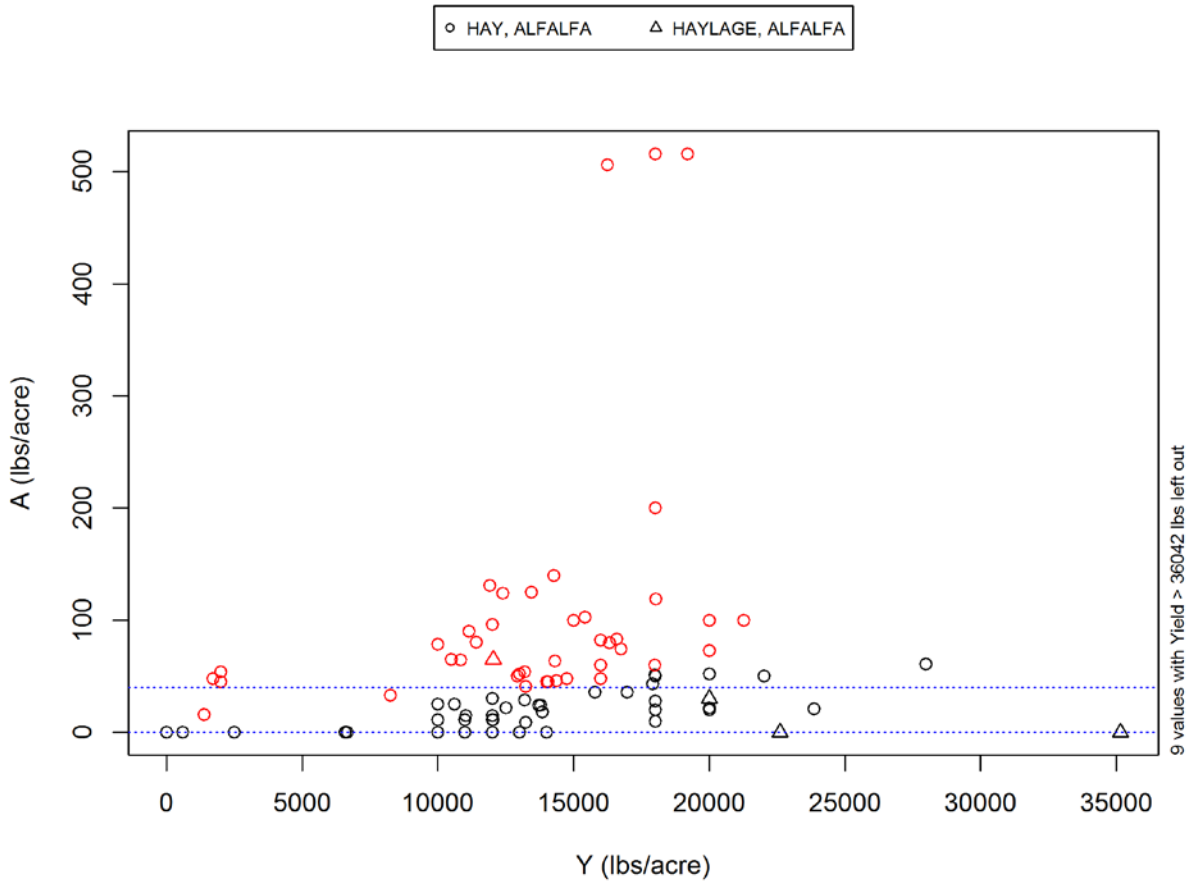


Table I-3. Description of recommended nitrogen application values for Alfalfa (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Hay, Alfalfa	0	0	Alfalfa obtains N from the atmosphere through a symbiotic relationship with bacteria (Rhizobia) in the root nodules. Therefore, N fertilization of alfalfa is seldom beneficial or profitable.	CDFA
Hay, Alfalfa (sowing)	20	40	A starter application may be beneficial When residual nitrate concentration is below 3-4 ppm (NO3-N). Larger amounts may inhibit bacterial colonization.	CDFA

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure II-1. Box and Whisker plots of A/Y for bearing Almonds management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

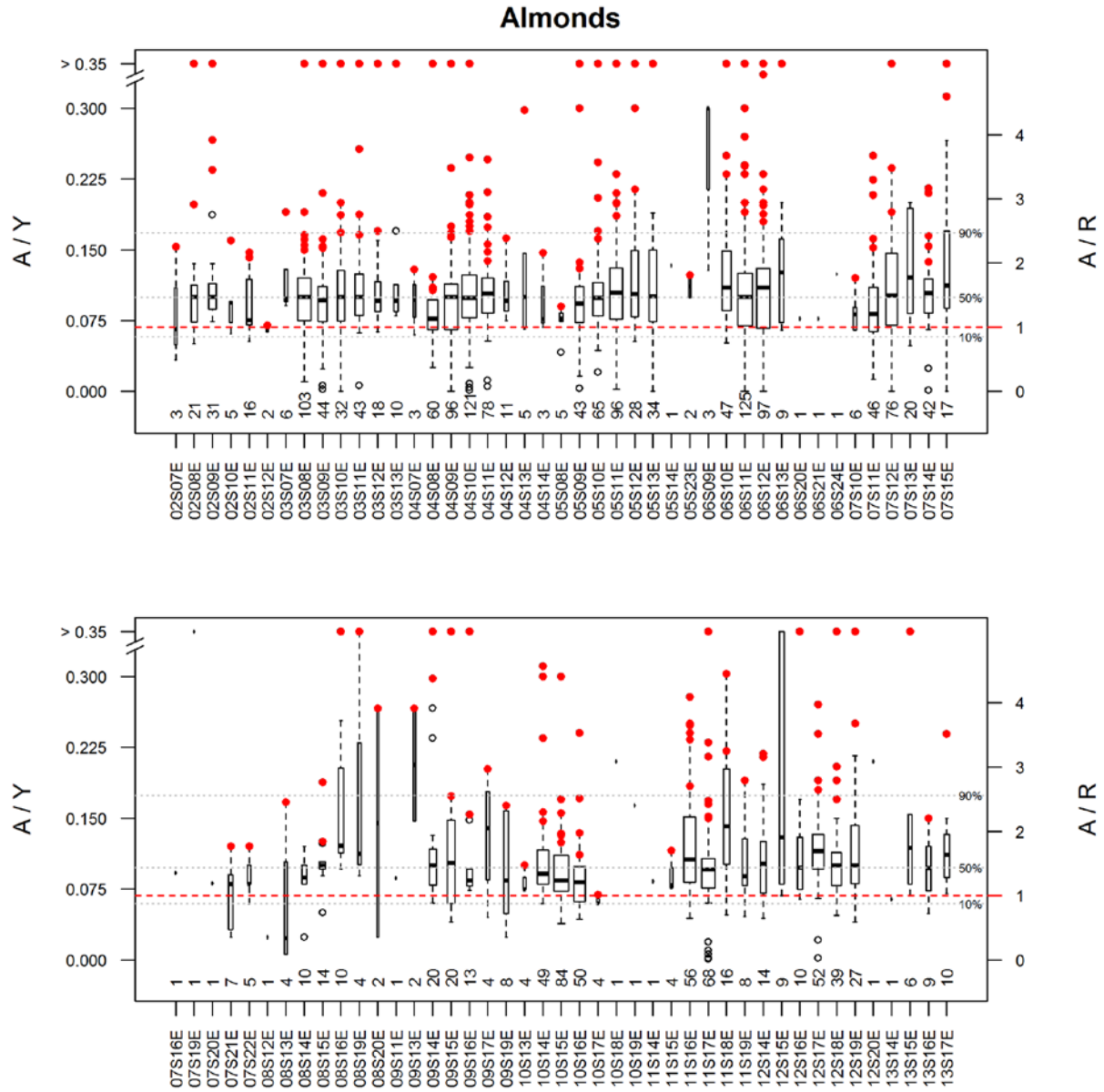


Table II-1. Summary statistics for Almonds management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	3	88	0.033	0.153	0.040	0.049	0.066	0.110	0.136	1
02S08E	21	1439	0.050	0.360	0.060	0.073	0.100	0.113	0.135	2
02S09E	31	3731	0.074	0.480	0.082	0.087	0.100	0.114	0.187	3
02S10E	5	274	0.061	0.160	0.066	0.073	0.094	0.095	0.134	1
02S11E	16	1903	0.053	0.147	0.053	0.071	0.076	0.117	0.132	2
02S12E	2	308	0.063	0.070	0.064	0.065	0.066	0.068	0.069	1
03S07E	6	1123	0.091	0.190	0.093	0.095	0.098	0.122	0.159	1
03S08E	103	7115	0.010	0.820	0.066	0.075	0.100	0.120	0.150	11
03S09E	44	9203	0.002	0.381	0.024	0.074	0.097	0.110	0.145	5
03S10E	32	3588	0.000	0.360	0.059	0.075	0.100	0.124	0.168	4
03S11E	43	5724	0.006	0.600	0.071	0.080	0.100	0.124	0.164	5
03S12E	18	1963	0.063	0.600	0.078	0.084	0.096	0.116	0.163	2
03S13E	10	1772	0.080	0.430	0.083	0.087	0.096	0.110	0.196	1
04S07E	3	723	0.060	0.129	0.067	0.078	0.097	0.113	0.123	1
04S08E	60	5122	0.025	0.950	0.058	0.065	0.077	0.097	0.101	6
04S09E	96	8271	0.000	0.780	0.053	0.066	0.100	0.114	0.163	10
04S10E	121	9316	0.001	0.690	0.059	0.078	0.099	0.123	0.168	12
04S11E	78	7590	0.005	0.246	0.067	0.083	0.103	0.120	0.137	8
04S12E	11	2910	0.075	0.163	0.080	0.085	0.096	0.117	0.149	1
04S13E	5	837	0.066	0.298	0.067	0.068	0.100	0.146	0.237	1
04S14E	3	803	0.068	0.147	0.070	0.072	0.076	0.112	0.133	1
05S08E	5	170	0.041	0.090	0.054	0.074	0.077	0.083	0.087	1
05S09E	43	2180	0.003	0.910	0.051	0.073	0.093	0.111	0.130	5
05S10E	65	8198	0.020	0.960	0.060	0.080	0.099	0.115	0.158	7
05S11E	96	9779	0.002	0.900	0.060	0.077	0.104	0.130	0.183	10
05S12E	28	7035	0.053	0.500	0.066	0.080	0.103	0.149	0.204	3
05S13E	34	6012	0.000	3.000	0.055	0.077	0.100	0.149	0.750	4
05S14E	1	115	0.133	0.133						
05S23E	2	459	0.099	0.123	0.101	0.105	0.111	0.117	0.121	1
06S09E	3	38	0.128	0.300	0.162	0.214	0.300	0.300	0.300	0
06S10E	47	2920	0.051	0.980	0.067	0.085	0.110	0.149	0.223	5
06S11E	125	15382	0.000	Inf	0.043	0.070	0.100	0.125	0.186	13
06S12E	98	8125	0.000	Inf	0.034	0.067	0.110	0.130	0.170	10
06S13E	9	1801	0.065	Inf	0.065	0.073	0.126	0.162	Inf	0
06S20E	1	63	0.077	0.077						
06S21E	1	63	0.077	0.077						
06S24E	1	51	0.124	0.124						
07S10E	6	192	0.065	0.120	0.065	0.068	0.082	0.088	0.104	1
07S11E	46	4696	0.012	0.250	0.050	0.064	0.082	0.108	0.145	5
07S12E	76	7038	0.000	0.780	0.053	0.070	0.102	0.146	0.163	6
07S13E	20	2333	0.048	0.200	0.058	0.085	0.121	0.191	0.200	0
07S14E	42	6093	0.001	0.215	0.071	0.083	0.104	0.118	0.136	5
07S15E	17	3419	0.000	Inf	0.058	0.088	0.112	0.170	0.285	2
07S16E	1	4	0.092	0.092						
07S19E	1	767	Inf	Inf						
07S20E	1	175	0.081	0.081						
07S21E	7	1225	0.024	0.120	0.024	0.032	0.080	0.090	0.108	1
07S22E	5	909	0.059	0.120	0.067	0.080	0.080	0.100	0.112	1
08S12E	1	499	0.024	0.024						
08S13E	4	2095	0.006	0.167	0.006	0.006	0.023	0.072	0.129	1
08S14E	10	1134	0.024	0.120	0.074	0.080	0.087	0.098	0.120	0
08S15E	14	2060	0.050	0.188	0.091	0.097	0.100	0.103	0.124	2

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S16E	10	1360	0.096	0.625	0.100	0.113	0.120	0.203	0.290	1
08S19E	4	1008	0.089	Inf	0.096	0.106	0.112	Inf	Inf	0
08S20E	2	315	0.024	0.266	0.048	0.084	0.145	0.205	0.242	1
09S11E	1	214	0.087	0.087						
09S13E	2	333	0.147	0.266	0.159	0.177	0.207	0.236	0.254	1
09S14E	20	4139	0.060	0.480	0.060	0.080	0.100	0.110	0.269	2
09S15E	20	2845	0.040	0.720	0.048	0.065	0.103	0.148	0.150	2
09S16E	15	3498	0.073	1.000	0.078	0.078	0.084	0.096	0.153	2
09S17E	4	948	0.045	0.202	0.069	0.104	0.139	0.166	0.188	1
09S19E	8	2082	0.024	0.163	0.025	0.061	0.084	0.156	0.162	1
10S13E	4	502	0.074	0.100	0.074	0.074	0.074	0.081	0.092	1
10S14E	52	8699	0.059	0.311	0.059	0.080	0.091	0.116	0.141	5
10S15E	84	9328	0.038	0.300	0.060	0.073	0.084	0.109	0.123	9
10S16E	50	6509	0.043	0.240	0.048	0.063	0.082	0.098	0.109	4
10S17E	4	206	0.060	0.069	0.060	0.060	0.060	0.062	0.066	1
10S18E	1	598	0.210	0.210						
10S19E	1	34	0.163	0.163						
11S14E	1	1060	0.083	0.083						
11S15E	4	2305	0.076	0.116	0.076	0.077	0.079	0.089	0.105	1
11S16E	56	8524	0.044	0.278	0.073	0.083	0.106	0.148	0.180	6
11S17E	68	9817	0.001	0.360	0.048	0.076	0.096	0.106	0.136	7
11S18E	17	2171	0.048	0.303	0.092	0.102	0.141	0.202	0.220	2
11S19E	8	2119	0.046	0.190	0.065	0.081	0.088	0.124	0.153	1
12S14E	14	3831	0.044	0.218	0.065	0.073	0.101	0.122	0.206	2
12S15E	9	3254	0.068	5.200	0.070	0.080	0.130	0.500	1.440	1
12S16E	10	3374	0.064	0.500	0.072	0.075	0.098	0.122	0.203	1
12S17E	52	7149	0.002	0.270	0.076	0.096	0.115	0.133	0.179	6
12S18E	39	5540	0.047	0.900	0.058	0.078	0.100	0.114	0.154	4
12S19E	27	2871	0.040	1.741	0.050	0.080	0.100	0.142	0.230	3
12S20E	1	598	0.210	0.210						
13S14E	1	218	0.064	0.064						
13S15E	6	2101	0.068	0.390	0.074	0.082	0.119	0.152	0.272	1
13S16E	9	2783	0.049	0.150	0.061	0.073	0.097	0.120	0.134	1
13S17E	10	1724	0.070	0.239	0.073	0.093	0.111	0.132	0.159	1
13S18E	5	358	0.120	0.149	0.124	0.130	0.133	0.137	0.144	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	3	88	0.5	2.3	0.6	0.7	1.0	1.6	2.0	1
02S08E	21	1439	0.7	5.3	0.9	1.1	1.5	1.7	2.0	2
02S09E	31	3731	1.1	7.1	1.2	1.3	1.5	1.7	2.7	3
02S10E	5	274	0.9	2.4	1.0	1.1	1.4	1.4	2.0	1
02S11E	16	1903	0.8	2.2	0.8	1.0	1.1	1.7	1.9	2
02S12E	2	308	0.9	1.0	0.9	1.0	1.0	1.0	1.0	1
03S07E	6	1123	1.3	2.8	1.4	1.4	1.4	1.8	2.3	1
03S08E	103	7115	0.1	12.1	1.0	1.1	1.5	1.8	2.2	11
03S09E	44	9203	0.0	5.6	0.4	1.1	1.4	1.6	2.1	5
03S10E	32	3588	0.0	5.3	0.9	1.1	1.5	1.8	2.5	4
03S11E	43	5724	0.1	8.8	1.1	1.2	1.5	1.8	2.4	5
03S12E	18	1963	0.9	8.8	1.1	1.2	1.4	1.7	2.4	2
03S13E	10	1772	1.2	6.3	1.2	1.3	1.4	1.6	2.9	1
04S07E	3	723	0.9	1.9	1.0	1.2	1.4	1.7	1.8	1
04S08E	60	5122	0.4	14.0	0.9	1.0	1.1	1.4	1.5	6

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
04S09E	96	8271	0.0	11.5	0.8	1.0	1.5	1.7	2.4	10
04S10E	121	9316	0.0	10.1	0.9	1.1	1.5	1.8	2.5	12
04S11E	78	7590	0.1	3.6	1.0	1.2	1.5	1.8	2.0	8
04S12E	11	2910	1.1	2.4	1.2	1.2	1.4	1.7	2.2	1
04S13E	5	837	1.0	4.4	1.0	1.0	1.5	2.1	3.5	1
04S14E	3	803	1.0	2.2	1.0	1.1	1.1	1.6	2.0	1
05S08E	5	170	0.6	1.3	0.8	1.1	1.1	1.2	1.3	1
05S09E	43	2180	0.0	13.4	0.8	1.1	1.4	1.6	1.9	5
05S10E	65	8198	0.3	14.1	0.9	1.2	1.5	1.7	2.3	7
05S11E	96	9779	0.0	13.2	0.9	1.1	1.5	1.9	2.7	10
05S12E	28	7035	0.8	7.4	1.0	1.2	1.5	2.2	3.0	3
05S13E	34	6012	0.0	44.1	0.8	1.1	1.5	2.2	11.0	4
05S14E	1	115	2.0	2.0						
05S23E	2	459	1.5	1.8	1.5	1.5	1.6	1.7	1.8	1
06S09E	3	38	1.9	4.4	2.4	3.1	4.4	4.4	4.4	0
06S10E	47	2920	0.7	14.4	1.0	1.3	1.6	2.2	3.3	5
06S11E	125	15382	0.0	11.8	0.6	1.0	1.5	1.8	2.6	13
06S12E	98	8125	0.0	4.9	0.5	1.0	1.6	1.9	2.4	10
06S13E	9	1801	1.0	2.9	1.0	1.0	1.5	2.3	2.5	1
06S20E	1	63	1.1	1.1						
06S21E	1	63	1.1	1.1						
06S24E	1	51	1.8	1.8						
07S10E	6	192	1.0	1.8	1.0	1.0	1.2	1.3	1.5	1
07S11E	46	4696	0.2	3.7	0.7	0.9	1.2	1.6	2.1	5
07S12E	76	7038	0.0	11.5	0.8	1.0	1.5	2.1	2.4	6
07S13E	20	2333	0.7	2.9	0.9	1.2	1.8	2.8	2.9	0
07S14E	42	6093	0.0	3.2	1.1	1.2	1.5	1.7	2.0	5
07S15E	17	3419	0.0	4.6	0.8	1.3	1.6	2.5	3.3	2
07S16E	1	4	1.4	1.4						
07S20E	1	175	1.2	1.2						
07S21E	7	1225	0.3	1.8	0.4	0.5	1.2	1.3	1.6	1
07S22E	5	909	0.9	1.8	1.0	1.2	1.2	1.5	1.6	1
08S12E	1	499	0.3	0.3						
08S13E	4	2095	0.1	2.5	0.1	0.1	0.3	1.1	1.9	1
08S14E	10	1134	0.4	1.8	1.1	1.2	1.3	1.4	1.8	0
08S15E	14	2060	0.7	2.8	1.3	1.4	1.5	1.5	1.8	2
08S16E	10	1360	1.4	9.2	1.5	1.7	1.8	3.0	4.3	1
08S19E	4	1008	1.3	1.6	1.4	1.5	1.6	1.6	1.6	0
08S20E	2	315	0.4	3.9	0.7	1.2	2.1	3.0	3.6	1
09S11E	1	214	1.3	1.3						
09S13E	2	333	2.2	3.9	2.3	2.6	3.0	3.5	3.7	1
09S14E	20	4139	0.9	7.1	0.9	1.2	1.5	1.6	4.0	2
09S15E	20	2845	0.6	10.6	0.7	1.0	1.5	2.2	2.2	2
09S16E	15	3498	1.1	14.7	1.1	1.1	1.2	1.4	2.2	2
09S17E	4	948	0.7	3.0	1.0	1.5	2.0	2.4	2.8	1
09S19E	8	2082	0.3	2.4	0.4	0.9	1.2	2.3	2.4	1
10S13E	4	502	1.1	1.5	1.1	1.1	1.1	1.2	1.4	1
10S14E	52	8699	0.9	4.6	0.9	1.2	1.3	1.7	2.1	5
10S15E	84	9328	0.6	4.4	0.9	1.1	1.2	1.6	1.8	9
10S16E	50	6509	0.6	3.5	0.7	0.9	1.2	1.4	1.6	4
10S17E	4	206	0.9	1.0	0.9	0.9	0.9	0.9	1.0	1
10S18E	1	598	3.1	3.1						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
10S19E	1	34	2.4	2.4						
11S14E	1	1060	1.2	1.2						
11S15E	4	2305	1.1	1.7	1.1	1.1	1.2	1.3	1.5	1
11S16E	56	8524	0.6	4.1	1.1	1.2	1.6	2.2	2.7	6
11S17E	68	9817	0.0	5.3	0.7	1.1	1.4	1.6	2.0	7
11S18E	17	2171	0.7	4.5	1.4	1.5	2.1	3.0	3.2	2
11S19E	8	2119	0.7	2.8	1.0	1.2	1.3	1.8	2.3	1
12S14E	14	3831	0.6	3.2	1.0	1.1	1.5	1.8	3.0	2
12S15E	9	3254	1.0	76.5	1.0	1.2	1.9	7.4	21.2	1
12S16E	10	3374	0.9	7.4	1.1	1.1	1.4	1.8	3.0	1
12S17E	52	7149	0.0	4.0	1.1	1.4	1.7	2.0	2.6	6
12S18E	39	5540	0.7	13.2	0.9	1.2	1.5	1.7	2.3	4
12S19E	27	2871	0.6	25.6	0.7	1.2	1.5	2.1	3.4	3
12S20E	1	598	3.1	3.1						
13S14E	1	218	0.9	0.9						
13S15E	6	2101	1.0	5.7	1.1	1.2	1.7	2.2	4.0	1
13S16E	9	2783	0.7	2.2	0.9	1.1	1.4	1.8	2.0	1
13S17E	10	1724	1.0	3.5	1.1	1.4	1.6	1.9	2.3	1
13S18E	5	358	1.8	2.2	1.8	1.9	2.0	2.0	2.1	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	3	88	-70	120	-57	-37	-4	58	95	1
02S08E	21	1439	-36	162	-23	8	59	76	95	2
02S09E	31	3731	10	400	20	40	59	80	116	3
02S10E	5	274	-24	66	-8	16	18	61	64	1
02S11E	16	1903	-27	125	-27	5	18	76	111	2
02S12E	2	308	-16	4	-14	-11	-6	-1	2	1
03S07E	6	1123	33	93	36	44	58	63	79	1
03S08E	103	7115	-1305	180	-4	14	58	84	103	11
03S09E	44	9203	-550	157	-89	14	46	68	96	5
03S10E	32	3588	-1632	162	-25	15	58	82	118	4
03S11E	43	5724	-62	168	7	26	54	93	120	5
03S12E	18	1963	-16	160	19	34	51	87	132	2
03S13E	10	1772	27	168	30	43	49	76	136	1
04S07E	3	723	-20	87	-9	7	33	60	76	1
04S08E	60	5122	-98	172	-32	-6	17	49	76	5
04S09E	96	8271	-125	208	-33	-6	55	89	135	10
04S10E	121	9316	-134	133	-14	22	54	91	105	12
04S11E	78	7590	-1387	157	-2	27	63	92	115	8
04S12E	11	2910	14	137	30	43	52	77	113	1
04S13E	5	837	-4	141	-2	0	48	116	131	1
04S14E	3	803	0	94	4	9	18	56	79	1
05S08E	5	170	-49	49	-26	9	16	36	44	1
05S09E	43	2180	-926	254	-49	11	54	67	112	5
05S10E	65	8198	-98	249	-17	22	64	87	117	7
05S11E	96	9779	-139	274	-10	17	62	98	144	10
05S12E	28	7035	-32	278	-6	24	69	94	142	3
05S13E	34	6012	-126	139	-34	16	44	86	112	4
05S14E	1	115	98	98						
05S23E	2	459	68	132	75	84	100	116	126	1
06S09E	3	38	72	116	81	94	116	116	116	0
06S10E	47	2920	-37	220	-4	34	92	105	145	5

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
06S11E	125	15382	-926	293	-63	2	53	96	157	13
06S12E	98	8125	-141	202	-54	-2	47	89	119	10
06S13E	9	1801	-7	109	-4	10	60	95	106	1
06S20E	1	63	27	27						
06S21E	1	63	27	27						
06S24E	1	51	71	71						
07S10E	6	192	-7	113	-7	2	35	46	80	1
07S11E	46	4696	-132	309	-42	-9	30	70	87	5
07S12E	76	7038	-136	208	-24	3	51	95	190	1
07S13E	20	2333	-30	147	-26	25	51	111	111	1
07S14E	42	6093	-550	173	7	25	69	80	128	5
07S15E	17	3419	-550	185	-21	20	88	103	184	2
07S16E	1	4	43	43						
07S19E	1	767	30	30						
07S20E	1	175	20	20						
07S21E	7	1225	-550	49	-302	-110	26	36	45	1
07S22E	5	909	-25	49	-5	26	29	43	47	1
08S12E	1	499	-136	-136						
08S13E	4	2095	-103	59	-103	-103	-94	-48	16	1
08S14E	10	1134	-550	53	-33	27	36	47	49	1
08S15E	14	2060	-36	147	30	46	46	67	111	2
08S16E	10	1360	60	154	68	71	98	100	116	1
08S19E	4	1008	30	88	30	31	60	88	88	0
08S20E	2	315	-550	185	-476	-366	-182	2	112	1
09S11E	1	214	56	56						
09S13E	2	333	94	223	107	126	158	190	210	1
09S14E	20	4139	-26	400	-18	39	80	90	134	2
09S15E	20	2845	-77	221	-46	-5	85	131	133	2
09S16E	15	3498	16	169	25	25	47	70	120	2
09S17E	4	948	-81	276	-32	41	125	196	244	1
09S19E	8	2082	-136	190	-79	-12	35	106	133	1
10S13E	4	502	17	93	17	17	17	36	71	1
10S14E	52	8699	-29	400	-29	24	58	101	113	5
10S15E	84	9328	-91	183	-26	14	36	82	107	9
10S16E	50	6509	-87	138	-63	-13	31	57	78	5
10S17E	4	206	-17	1	-17	-17	-17	-12	-4	1
10S18E	1	598	173	173						
10S19E	1	34	190	190						
11S14E	1	1060	36	36						
11S15E	4	2305	17	84	19	22	27	44	68	1
11S16E	56	8524	-44	246	12	35	60	121	175	6
11S17E	68	9817	-1305	162	-47	17	44	72	88	7
11S18E	17	2171	-71	277	29	65	81	152	259	2
11S19E	8	2119	-132	157	-26	44	66	91	131	1
12S14E	14	3831	-44	156	-7	11	50	89	142	2
12S15E	9	3254	0	154	5	23	104	106	123	1
12S16E	10	3374	-10	154	11	28	61	96	124	1
12S17E	52	7149	-139	213	18	45	87	127	150	5
12S18E	39	5540	-71	205	-15	28	70	127	161	4
12S19E	27	2871	-87	173	-54	31	56	65	127	3
12S20E	1	598	173	173						
13S14E	1	218	-10	-10						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
13S15E	6	2101	0	139	12	29	74	113	127	1
13S16E	9	2783	-53	123	-21	13	75	105	123	1
13S17E	10	1724	7	157	12	47	90	121	138	1
13S18E	5	358	112	272	122	136	159	186	238	1

Table II-2. Summary statistics for all Almonds management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
ALMONDS /YEAR > 4	1362	116877.07	0.000	Inf	0.058	0.075	0.097	0.119	0	136
ALMONDS /YEAR 1	15	1436.51	0.006	Inf	0.045	0.066	0.116	0.875	Inf	0
ALMONDS /YEAR 2	23	1489.64	0.000	5.20	0.032	0.073	0.124	0.293	0	3
ALMONDS /YEAR 3	77	7069.53	0.000	3.00	0.065	0.084	0.132	0.219	1	8
ALMONDS /YEAR 4	26	2015.50	0.074	0.74	0.085	0.101	0.148	0.173	0	3
ALMONDS /YEAR NR	104	10122.56	0.010	0.78	0.060	0.080	0.112	0.149	0	11

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
ALMONDS /YEAR > 4	1362	116877	0.0	14.6	0.9	1.1	1.4	1.8	2.3	136
ALMONDS /YEAR 1	15	1437	0.1	14.7	0.6	0.9	1.3	2.1	7.4	1
ALMONDS /YEAR 2	23	1490	0.0	76.5	0.5	1.1	1.8	4.3	6.8	3
ALMONDS /YEAR 3	77	7070	0.0	44.1	1.0	1.2	1.9	3.2	9.3	8
ALMONDS /YEAR 4	26	2016	1.1	10.9	1.2	1.5	2.2	2.5	3.5	3
ALMONDS /YEAR NR	104	10123	0.1	11.5	0.9	1.2	1.6	2.2	3.1	11

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
ALMONDS /YEAR > 4	1362	116877	-1387	400	-26	14	54	89	129	136
ALMONDS /YEAR 1	15	1437	-62	112	-22	-5	26	93	101	1
ALMONDS /YEAR 2	23	1490	-1632	142	-48	10	60	81	102	3
ALMONDS /YEAR 3	77	7070	-360	221	-4	19	51	116	158	8
ALMONDS /YEAR 4	26	2016	8	213	17	31	77	129	164	3
ALMONDS /YEAR NR	104	10123	-1305	274	-21	25	61	98	140	11

Figure II-2. Scatter plot of A vs. Y for Almonds crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

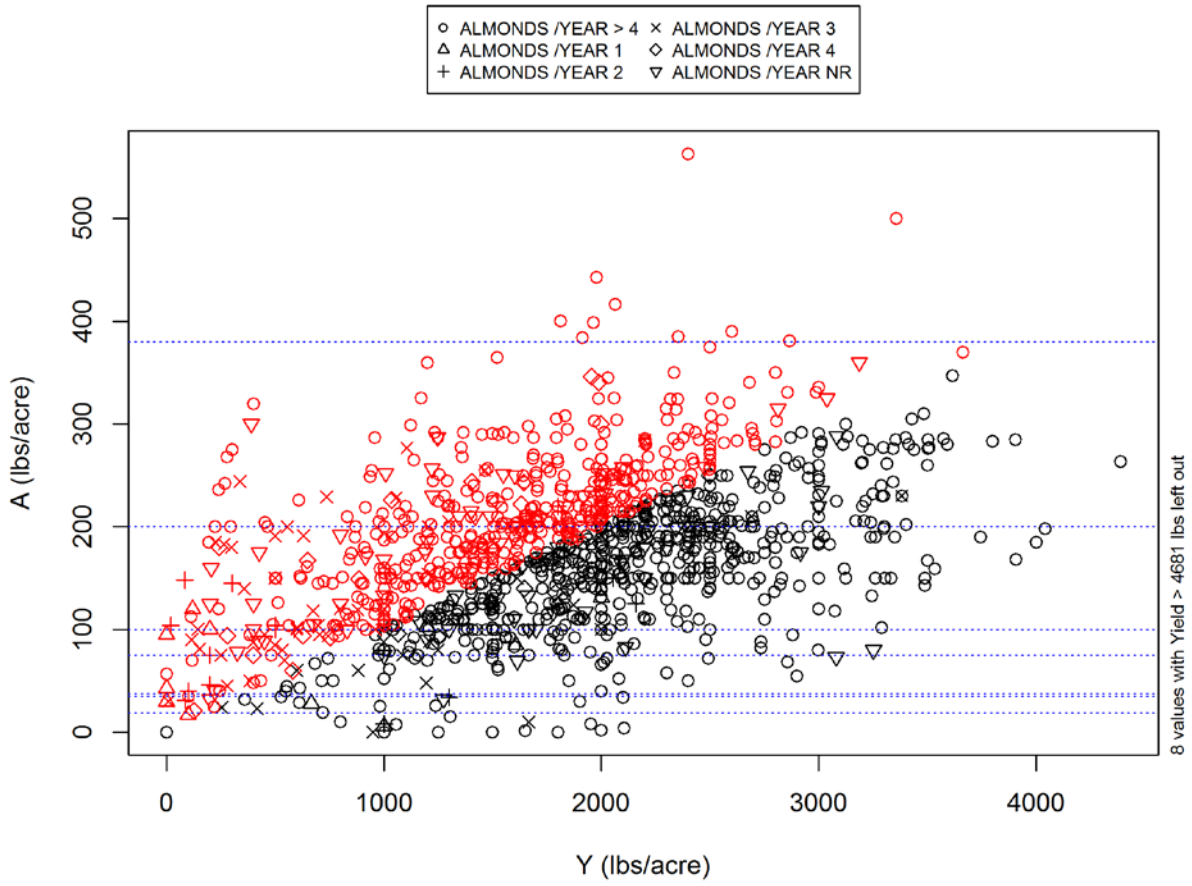


Table II-3. Description of recommended nitrogen application values for Almonds (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Almonds /Year>4	95	380.00	Fertilization rate dependent on desired yield. Minimum value yields 1000 lbs/acre; maximum yields 4,000 lbs/acre. Fertigation via low volume irrigation.	CDFA
Almonds /Year 1	20	35.00	A total annual application of up to 4 ounces/tree to first-leaf trees.	CDFA
Almonds /Year 1	6.25	18.75	Rates dependent on tree age; minimum is for year 1 trees, and maximum for year 5. Rate suggested for drip-irrigated trees on non-fertile soils. Values converted from ounces/tree to lbs/acre assuming 100 trees/acre	CDFA
Almonds /Year 2	12.5	37.50		
Almonds /Year 3	25	75.00		
Almonds /Year 4	37.5	100.00		
Almonds /Year 5	100	200.00		

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

III. BARLEY

Figure III-1. Box and Whisker plots of A/Y for bearing Barley management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

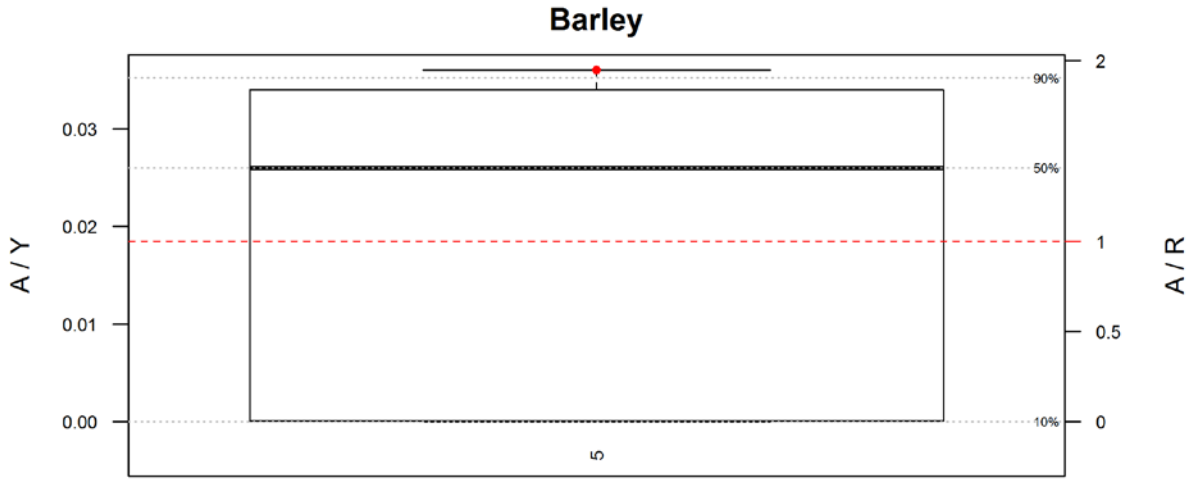


Table III-1. Summary statistics for Barley management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S13E	5	400	0	0.036	0	0	0.026	0.034	0.035	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S13E	5	400	1.4	1.9	1.5	1.6	1.8	1.9	1.9	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S13E	5	400	33	66	39	48	64	65	66	1

Table III-2. Summary statistics for all Barley management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
BARLEY, IRRIGATED	3	381.6	0.026	0.036	0.028	0.03	0.034	0.035	0	1
BARLEY, SILAGE	2	18.0	0.000	0.000	0.000	0.00	0.000	0.000	0	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
BARLEY, IRRIGATED	3	382	1.4	1.9	1.5	1.6	1.8	1.9	1.9	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
BARLEY, IRRIGATED	3	382	33	66	39	48	64	65	66	1

Figure III-2. Scatter plot of A vs. Y for Barley crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

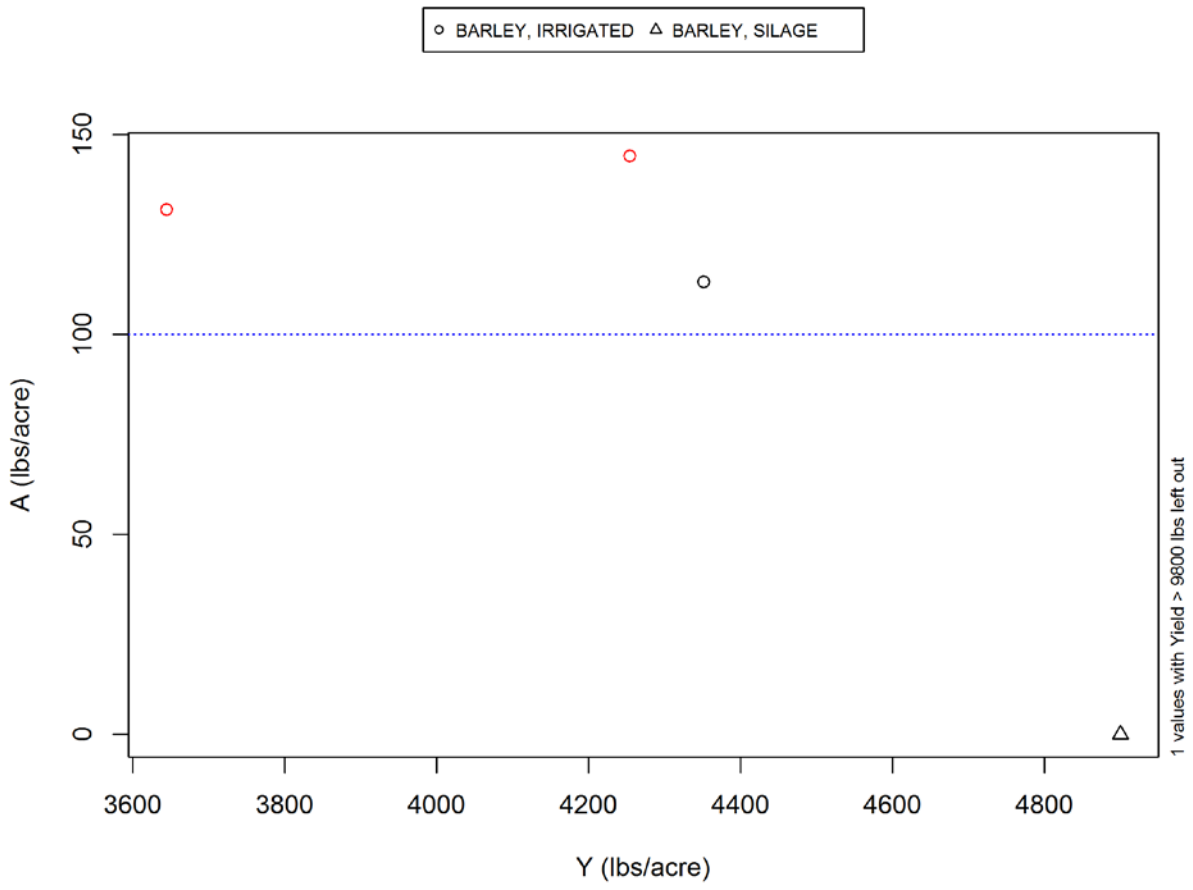


Table III-3. Description of recommended nitrogen application values for Barley (in lbs/acre).

Crop specifics	Min	Max	Study Specifics	Source
Barley	30	100	One or two applications of 30-50 lbs N/acre, depending on the winter rainfall and N status of the plants	CDFA

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure IV-1. Box and Whisker plots of A/Y for bearing Beans management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

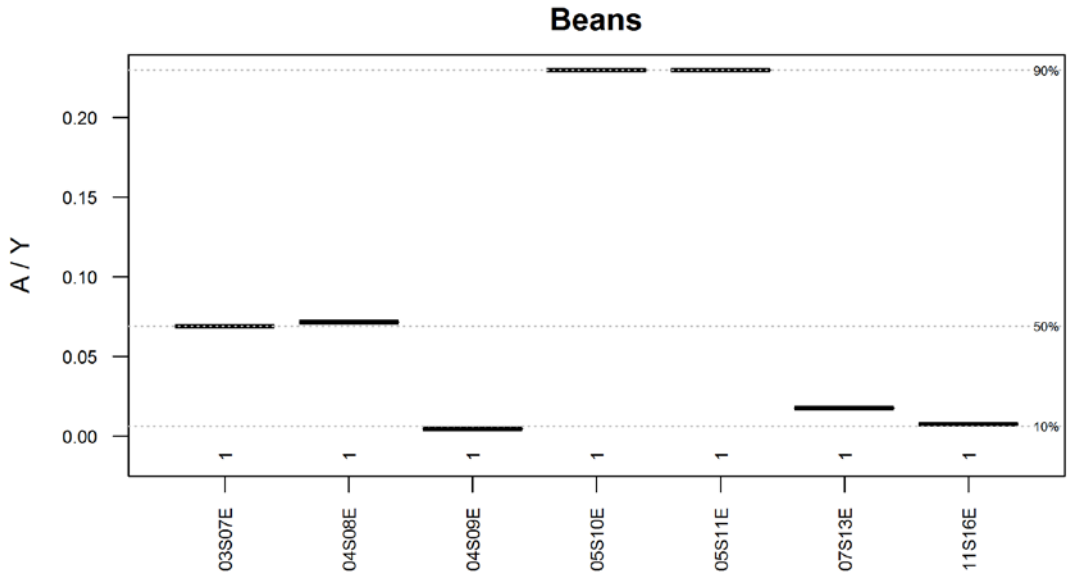


Table IV-1. Summary statistics for Beans management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.
A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S07E	1	72	0.069	0.069						
04S08E	1	19	0.072	0.072						
04S09E	1	15	0.004	0.004						
05S10E	1	41	0.230	0.230						
05S11E	1	41	0.230	0.230						
07S13E	1	30	0.018	0.018						
11S16E	1	22	0.008	0.008						

Table IV-2. Summary statistics for all Beans management units (all T-R).
A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
BEANS, BLACK EYED	4	150.0	0.004	0.230	0.005	0.007	0.038	0.109	0	1
BEANS, DRY EDIBLE	2	49.4	0.018	0.072	0.023	0.031	0.045	0.058	0	1

Figure IV-2. Scatter plot of A vs. Y for Beans crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

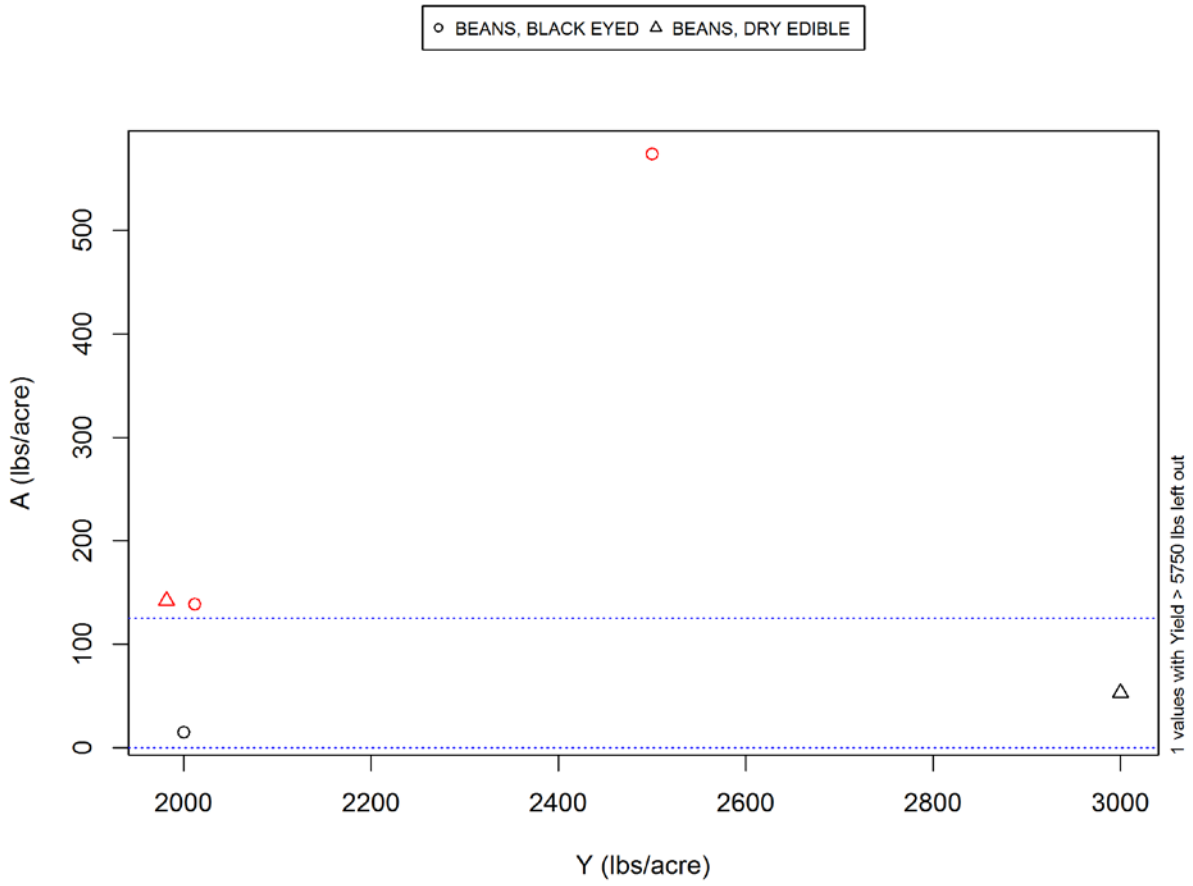


Table IV-3. Description of recommended nitrogen application values for Beans (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Beans, Blackeye	0	0	Blackeyed beans fix all N from the atmosphere, but a small amount of starter N can sometimes increase yield	CDFA
Common dry beans	65	125	Common dry beans do not fix enough N from the atmosphere to meet the requirements of a high yielding crop. Estimated N applications for dry bean crops with a yield goal of 2500 lbs/acre	

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure V-1. Box and Whisker plots of A/Y for bearing Cherries, management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

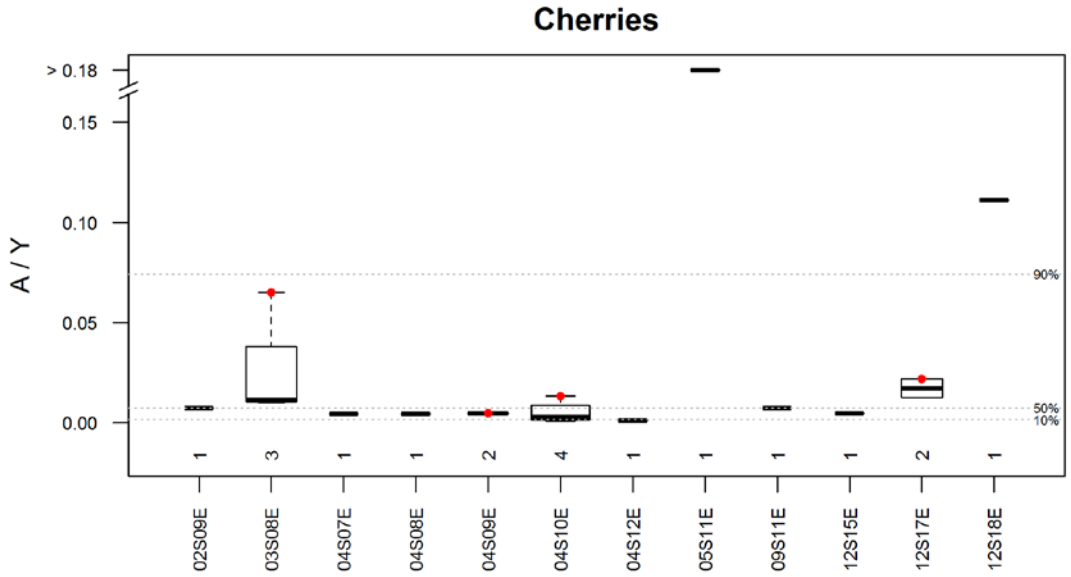


Table V-1. Summary statistics for Cherries management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	1	30	0.007	0.007						
03S08E	3	100	0.010	0.065	0.010	0.010	0.011	0.038	0.054	1
04S07E	1	25	0.004	0.004						
04S08E	1	25	0.004	0.004						
04S09E	2	40	0.004	0.005	0.005	0.005	0.005	0.005	0.005	1
04S10E	4	140	0.001	0.013	0.001	0.001	0.003	0.006	0.010	1
04S12E	1	30	0.001	0.001						
05S11E	1	4	0.202	0.202						
09S11E	1	30	0.007	0.007						
12S15E	1	20	0.005	0.005						
12S17E	2	174	0.012	0.022	0.013	0.015	0.017	0.019	0.021	1
12S18E	1	21	0.111	0.111						

Table V-2. Summary statistics for all Cherries management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CHERRY, SWEET /YEAR > 4	12	508.24	0.001	0.111	0.002	0.005	0.010	0.015	0	2

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CHERRY, SWEET /YEAR 2	1	20.00	0.004	0.004						
CHERRY, SWEET /YEAR NR	3	35.60	0.001	0.202	0.002	0.003	0.004	0.103	0	1

Figure V-2. Scatter plot of A vs. Y for Cherries crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

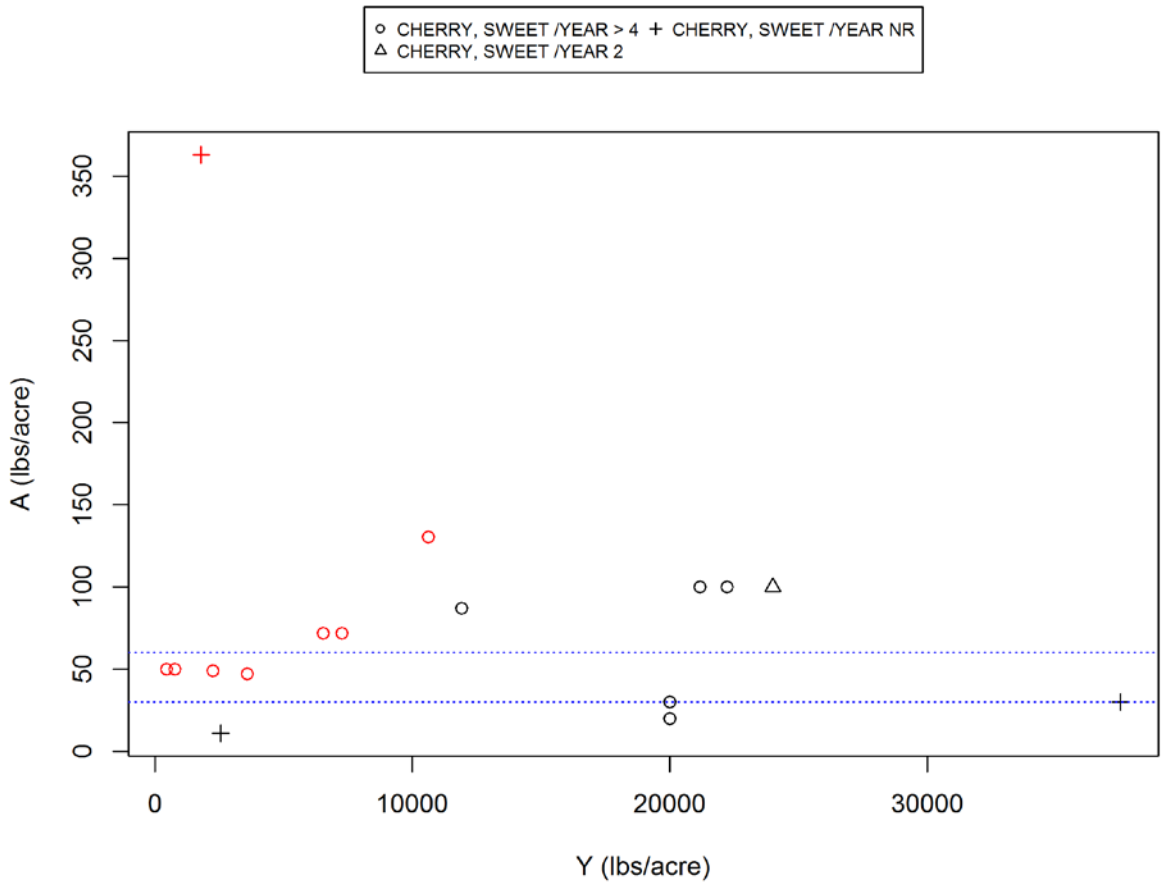


Table V-3. Description of recommended nitrogen application values for Cherries (in lbs/acre).

Crop Specifics	Min	Max	Study Specifics	Source
Sweet Cherries /Year < 4	10	30	Values are from cost studies, not recommendations, but rates considered typical of a well-managed orchard. May not be applicable to all operations	UC Davis
Sweet Cherries /Year > 4	35	60		

UC Davis - http://coststudies.ucdavis.edu/current/

Figure VI-1. Box and Whisker plots of A/Y for bearing Citrus management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

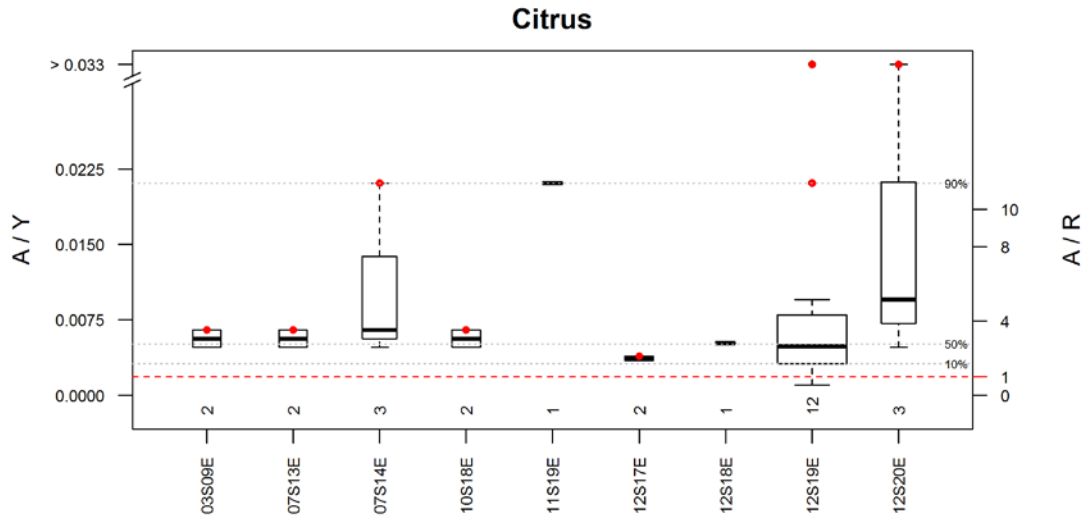


Table VI-1. Summary statistics for Citrus management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	2	1242	0.005	0.007	0.005	0.005	0.006	0.006	0.006	1
07S13E	2	1242	0.005	0.007	0.005	0.005	0.006	0.006	0.006	1
07S14E	3	1782	0.005	0.021	0.005	0.006	0.007	0.014	0.018	1
10S18E	2	1242	0.005	0.007	0.005	0.005	0.006	0.006	0.006	1
11S19E	1	540	0.021	0.021						
12S17E	2	84	0.003	0.004	0.003	0.004	0.004	0.004	0.004	1
12S18E	1	36	0.005	0.005						
12S19E	12	2577	0.001	0.180	0.002	0.003	0.005	0.007	0.020	2
12S20E	3	1040	0.005	0.180	0.006	0.007	0.009	0.095	0.146	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	2	1242	2.6	3.5	2.7	2.8	3.0	3.3	3.4	1
07S13E	2	1242	2.6	3.5	2.7	2.8	3.0	3.3	3.4	1
07S14E	3	1782	2.6	11.4	2.8	3.0	3.5	7.5	9.8	1
10S18E	2	1242	2.6	3.5	2.7	2.8	3.0	3.3	3.4	1
11S19E	1	540	11.4	11.4						
12S17E	2	84	1.8	2.1	1.9	1.9	2.0	2.0	2.1	1
12S18E	1	36	2.8	2.8						
12S19E	12	2577	0.5	97.3	1.4	1.9	2.6	3.9	10.8	2

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
12S20E	3	1040	2.6	97.3	3.1	3.9	5.1	51.2	78.9	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	2	1242	66	106	70	76	86	96	102	1
07S13E	2	1242	66	106	70	76	86	96	102	1
07S14E	3	1782	66	123	74	86	106	115	120	1
10S18E	2	1242	66	106	70	76	86	96	102	1
11S19E	1	540	123	123						
12S17E	2	84	89	103	91	93	96	100	102	1
12S18E	1	36	132	132						
12S19E	12	2577	-54	177	13	29	64	107	122	2
12S20E	3	1040	66	177	75	88	110	144	164	1

Table VI-2. Summary statistics for all Citrus management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CITRUS, MANDARINS /YEAR > 4	7	1392.98	0.002	0.021	0.003	0.004	0.005	0.006	0	1
CITRUS, MANDARINS /YEAR 2	1	75.00	0.006	0.006						
CITRUS, MANDARINS /YEAR NR	1	30.00	0.004	0.004						
CITRUS, ORANGES /YEAR > 4	4	703.67	0.001	0.005	0.001	0.002	0.003	0.004	0	1
CITRUS, ORANGES /YEAR NR	1	180.00	0.180	0.180						
CITRUS, TANGELO /YEAR NR	1	315.00	0.009	0.009						

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CITRUS, MANDARINS /YEAR > 4	7	1393	1.4	11.4	1.6	2.0	2.7	3.2	6.7	1
CITRUS, MANDARINS /YEAR 2	1	75	3.0	3.0						
CITRUS, MANDARINS /YEAR NR	1	30	2.0	2.0						
CITRUS, ORANGES /YEAR > 4	4	704	0.5	2.6	0.8	1.1	1.7	2.2	2.4	1
CITRUS, ORANGES /YEAR NR	1	180	97.3	97.3						
CITRUS, TANGELO /YEAR NR	1	315	5.1	5.1						

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CITRUS, MANDARINS /YEAR > 4	7	1393	16	132	30	65	103	115	127	1
CITRUS, MANDARINS /YEAR 2	1	75	33	33						
CITRUS, MANDARINS /YEAR NR	1	30	61	61						
CITRUS, ORANGES /YEAR > 4	4	704	-54	76	-34	-4	40	69	73	1
CITRUS, ORANGES /YEAR NR	1	180	110	110						
CITRUS, TANGELO /YEAR NR	1	315	177	177						

Figure VI-2. Scatter plot of A vs. Y for Citrus crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

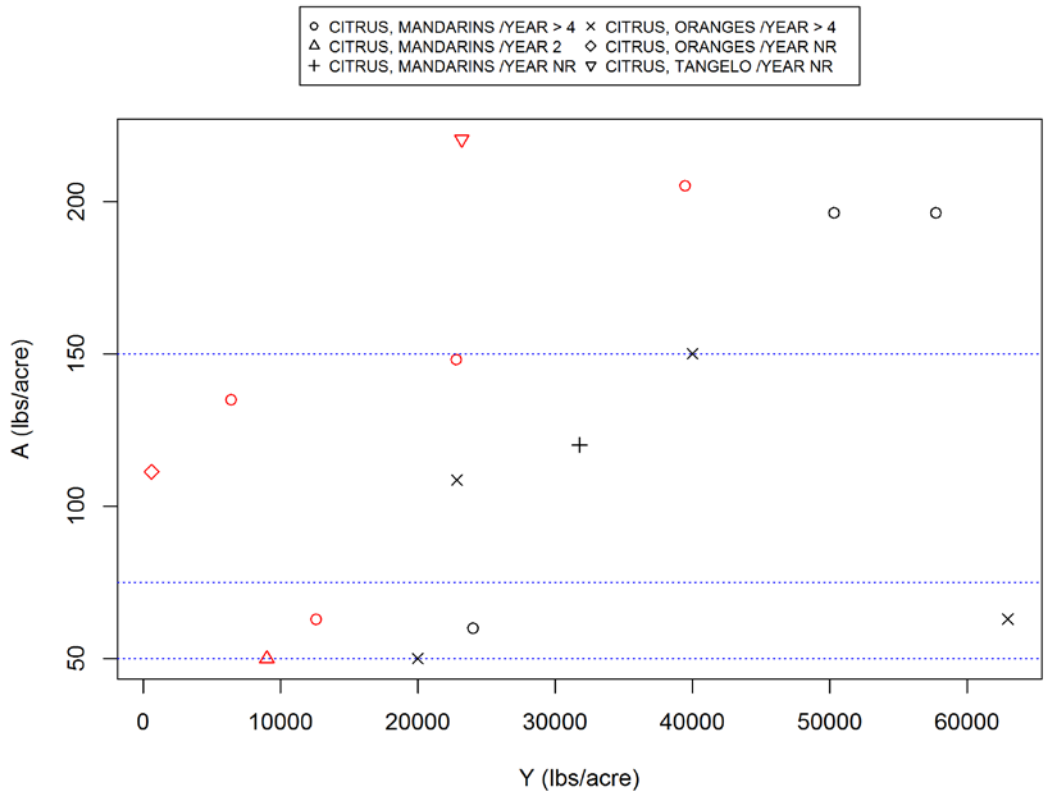


Table VI-3. Description of recommended nitrogen application values for Citrus (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Citrus /Year >4	100	150	Based on study on navel orange. With a tree spacing of 22 x 20 feet.	CDFA
Citrus /Year 1	13	25	Rate assumes 100 trees/acre. Nitrogen fertilizer requirements of young citrus trees depend on the N supplying capacity of the soil. The lower limit is adequate for soils with a soil organic matter content of 2% or more and soils previously used for pasture or vegetable production	
Citrus /Year 2	25	50		
Citrus /Year 3	50	75		

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure VII-1. Box and Whisker plots of A/Y for bearing Corn management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

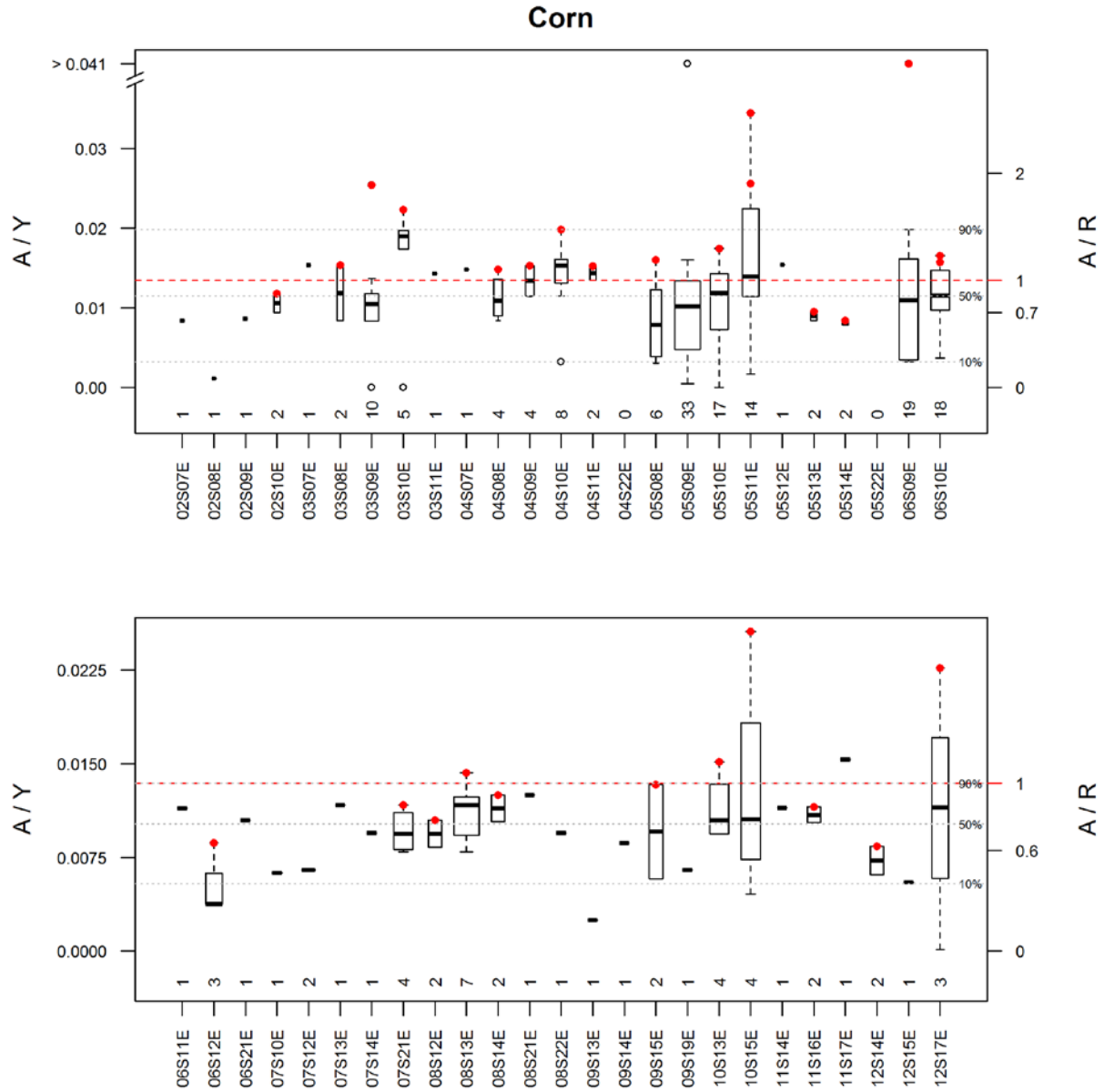


Table VII-1. Summary statistics for Corn management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	1	54	0.008	0.008						
02S08E	1	72	0.001	0.001						
02S09E	1	81	0.009	0.009						
02S10E	2	30	0.009	0.012	0.010	0.010	0.011	0.011	0.012	1
03S07E	1	54	0.015	0.015						
03S08E	2	107	0.008	0.015	0.009	0.010	0.012	0.014	0.015	1
03S09E	10	977	0.000	0.025	0.000	0.009	0.010	0.011	0.015	1
03S10E	5	96	0.000	0.022	0.007	0.017	0.019	0.020	0.021	1
03S11E	1	141	0.014	0.014						
04S07E	1	96	0.015	0.015						
04S08E	4	811	0.008	0.015	0.009	0.009	0.011	0.013	0.014	1
04S09E	4	143	0.011	0.015	0.011	0.012	0.013	0.015	0.015	1
04S10E	8	861	0.003	0.020	0.009	0.014	0.015	0.016	0.017	1
04S11E	2	83	0.013	0.015	0.014	0.014	0.014	0.015	0.015	1
05S08E	6	1615	0.003	0.016	0.003	0.004	0.008	0.012	0.014	1
05S09E	33	3431	0.000	0.100	0.003	0.005	0.010	0.013	0.083	4
05S10E	17	1054	0.000	0.017	0.005	0.007	0.012	0.014	0.017	2
05S11E	14	756	0.002	0.034	0.007	0.012	0.014	0.022	0.025	2
05S12E	1	60	0.015	0.015						
05S13E	2	450	0.008	0.010	0.009	0.009	0.009	0.009	0.009	1
05S14E	2	600	0.008	0.008	0.008	0.008	0.008	0.008	0.008	1
06S09E	20	2144	0.003	0.257	0.003	0.003	0.011	0.016	0.064	2
06S10E	18	1034	0.004	0.017	0.006	0.010	0.012	0.015	0.015	2
06S11E	1	40	0.011	0.011						
06S12E	3	58	0.004	0.009	0.004	0.004	0.004	0.006	0.008	1
06S21E	1	99	0.010	0.010						
07S10E	1	92	0.006	0.006						
07S12E	2	130	0.007	0.007						
07S13E	1	257	0.012	0.012						
07S14E	1	191	0.009	0.009						
07S21E	4	779	0.008	0.012	0.008	0.008	0.009	0.011	0.011	1
08S12E	2	476	0.008	0.010	0.009	0.009	0.009	0.010	0.010	1
08S13E	7	1275	0.008	0.014	0.008	0.009	0.012	0.012	0.013	1
08S14E	2	160	0.010	0.012	0.011	0.011	0.011	0.012	0.012	1
08S21E	1	100	0.012	0.012						
08S22E	1	191	0.009	0.009						
09S13E	1	71	0.002	0.002						
09S14E	1	81	0.009	0.009						
09S15E	2	391	0.006	0.013	0.007	0.008	0.010	0.011	0.013	1
09S19E	1	112	0.007	0.007						
10S13E	4	569	0.009	0.015	0.009	0.009	0.010	0.012	0.014	1
10S15E	4	387	0.005	0.026	0.006	0.009	0.011	0.015	0.021	1
11S14E	1	460	0.011	0.011						
11S16E	2	180	0.010	0.012	0.010	0.011	0.011	0.011	0.011	1
11S17E	1	54	0.015	0.015						
12S14E	2	64	0.006	0.008	0.006	0.007	0.007	0.008	0.008	1
12S15E	1	25	0.006	0.006						
12S17E	3	557	0.000	0.023	0.002	0.006	0.012	0.017	0.020	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	1	54	0.2	0.2						
02S08E	1	72	0.0	0.0						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	1	81	0.2	0.2						
02S10E	2	30	0.2	0.3	0.3	0.3	0.3	0.3	0.3	1
03S07E	1	54	0.4	0.4						
03S08E	2	107	0.2	0.4	0.2	0.3	0.3	0.4	0.4	1
03S09E	10	977	0.0	0.7	0.0	0.2	0.3	0.3	0.4	1
03S10E	5	96	0.0	0.6	0.2	0.5	0.5	0.5	0.6	1
03S11E	1	141	0.4	0.4						
04S07E	1	96	0.4	0.4						
04S08E	4	811	0.2	0.4	0.2	0.2	0.3	0.3	0.4	1
04S09E	4	143	0.3	0.4	0.3	0.3	0.3	0.4	0.4	1
04S10E	8	861	0.1	0.5	0.2	0.4	0.4	0.4	0.5	1
04S11E	2	83	0.3	0.4	0.4	0.4	0.4	0.4	0.4	1
05S08E	6	1615	0.1	0.5	0.2	0.3	0.4	0.4	0.4	1
05S09E	33	3431	0.1	2.6	0.1	0.2	0.3	0.4	2.2	4
05S10E	17	1054	0.0	0.6	0.1	0.3	0.4	0.4	0.5	2
05S11E	14	756	0.0	0.9	0.2	0.3	0.4	0.6	0.6	2
05S12E	1	60	0.4	0.4						
05S13E	2	450	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1
05S14E	2	600	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1
06S09E	20	2144	0.1	6.7	0.1	0.1	0.3	0.4	1.7	2
06S10E	18	1034	0.1	0.4	0.2	0.3	0.3	0.4	0.4	2
06S11E	1	40	0.3	0.3						
06S12E	3	58	0.1	0.2	0.1	0.1	0.1	0.2	0.2	1
06S21E	1	99	0.3	0.3						
07S10E	1	92	0.2	0.2						
07S12E	2	130	0.2	0.2						
07S13E	1	257	0.3	0.3						
07S14E	1	191	0.2	0.2						
07S21E	4	779	0.2	0.3	0.2	0.2	0.2	0.3	0.3	1
08S12E	2	476	0.2	0.3	0.2	0.2	0.2	0.3	0.3	1
08S13E	7	1275	0.2	0.4	0.2	0.2	0.3	0.3	0.3	1
08S14E	2	160	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1
08S21E	1	100	0.3	0.3						
08S22E	1	191	0.2	0.2						
09S13E	1	71	0.3	0.3						
09S14E	1	81	0.2	0.2						
09S15E	2	391	0.2	1.5	0.3	0.5	0.8	1.1	1.3	1
09S19E	1	112	0.2	0.2						
10S13E	4	569	0.3	1.0	0.3	0.4	0.7	1.0	1.0	0
10S15E	4	387	0.1	0.7	0.2	0.2	0.3	0.4	0.6	1
11S14E	1	460	0.3	0.3						
11S16E	2	180	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1
11S17E	1	54	0.4	0.4						
12S14E	2	64	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1
12S15E	1	25	0.6	0.6						
12S17E	3	557	0.0	0.6	0.1	0.2	0.3	0.4	0.5	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	1	54	-715	-715						
02S08E	1	72	-979	-979						
02S09E	1	81	-688	-688						
02S10E	2	30	-746	-508	-722	-686	-627	-567	-531	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S07E	1	54	-469	-469						
03S08E	2	107	-715	-469	-690	-653	-592	-530	-493	1
03S09E	10	977	-881	-128	-881	-776	-583	-411	-376	1
03S10E	5	96	-390	-251	-369	-339	-272	-269	-258	1
03S11E	1	141	-633	-633						
04S07E	1	96	-528	-528						
04S08E	4	811	-728	-528	-686	-623	-578	-557	-540	1
04S09E	4	143	-640	-472	-594	-527	-488	-484	-477	1
04S10E	8	861	-616	-373	-594	-525	-488	-446	-383	1
04S11E	2	83	-570	-470	-560	-545	-520	-495	-480	1
04S22E	1	20	0	0						
05S08E	6	1615	-693	-295	-657	-607	-527	-369	-313	1
05S09E	33	3431	-763	129	-693	-594	-467	-330	96	4
05S10E	17	1054	-23927	-121	-606	-535	-422	-376	-230	2
05S11E	14	756	-722	-43	-621	-502	-328	-274	-199	2
05S12E	1	60	-595	-595						
05S13E	2	450	-607	-588	-605	-602	-598	-593	-590	1
05S14E	2	600	-642	-588	-637	-629	-615	-602	-594	1
05S22E	1	20	0	0						
06S09E	20	2144	-1140	153	-616	-616	-544	-364	14	2
06S10E	18	1034	-1140	-291	-827	-598	-483	-431	-379	2
06S11E	1	40	-472	-472						
06S12E	3	58	-688	-485	-647	-586	-485	-485	-485	0
06S21E	1	99	-534	-534						
07S10E	1	92	-1140	-1140						
07S12E	2	130	-670	-670						
07S13E	1	257	-674	-674						
07S14E	1	191	-811	-811						
07S21E	4	779	-674	-534	-661	-643	-605	-566	-547	1
08S12E	2	476	-632	-534	-623	-608	-583	-559	-544	1
08S13E	7	1275	-692	-536	-681	-653	-597	-574	-557	1
08S14E	2	160	-786	-581	-765	-735	-683	-632	-601	1
08S21E	1	100	-581	-581						
08S22E	1	191	-811	-811						
09S13E	1	71	-393	-393						
09S14E	1	81	-688	-688						
09S15E	2	391	-656	39	-587	-483	-309	-135	-31	1
09S19E	1	112	-670	-670						
10S13E	4	569	-451	4	-448	-444	-219	4	4	0
10S15E	4	387	-2222	-180	-1790	-1141	-640	-419	-276	1
11S14E	1	460	-509	-509						
11S16E	2	180	-791	-492	-761	-716	-642	-567	-522	1
11S17E	1	54	-469	-469						
12S14E	2	64	-634	-589	-630	-623	-611	-600	-593	1
12S15E	1	25	-178	-178						
12S17E	3	557	-87165	-168	-69849	-43875	-584	-376	-251	1

Table VII-2. Summary statistics for all Corn management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CORN, GRAIN	15	1537.30	0	0.013	0.001	0.004	0.005	0.007	0	2

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CORN, SILAGE	150	12612.27	0	1.462	0.003	0.008	0.012	0.015	0	15

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CORN, GRAIN	15	1537	0	1.5	0.1	0.4	0.5	0.8	1.2	2
CORN, SILAGE	150	12612	0	38.0	0.1	0.2	0.3	0.4	0.6	15

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
CORN, GRAIN	15	1537	-23927	39	-372	-330	-221	-6	18	2
CORN, SILAGE	150	12612	-87165	339	-730	-631	-510	-412	-260	15

Figure VII-2. Scatter plot of A vs. Y for Corn crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

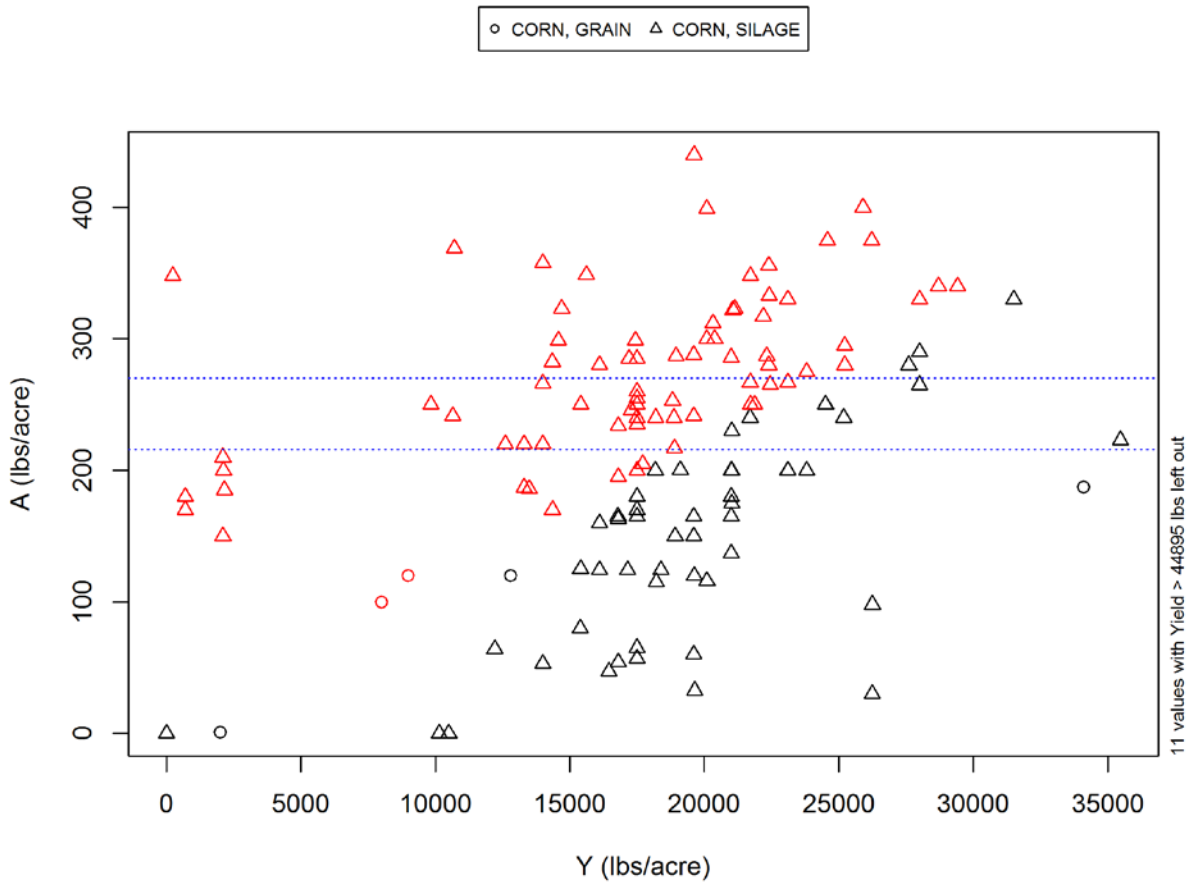


Table VII-3. Description of recommended nitrogen application values for Corn (in lbs/acre).

Crop specifics	Min	Max	Study Specifics	Source
Corn	180	216	Yield 5 ton/acre of Grain or 30 ton/acre of Silage	CDFA
Corn	225	270	Rates dependent on desired yield and pre-sidedress nitrate test (PSNT). Values are from other states and have not been tested in California. This value correspond to the lowest PSNT (< 10) and	CDFA

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
			largest desired yield (6.3 tons/acre of grain or 38 tons/acre of silage)	

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure VIII-1. Box and Whisker plots of A/Y for bearing Cotton management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

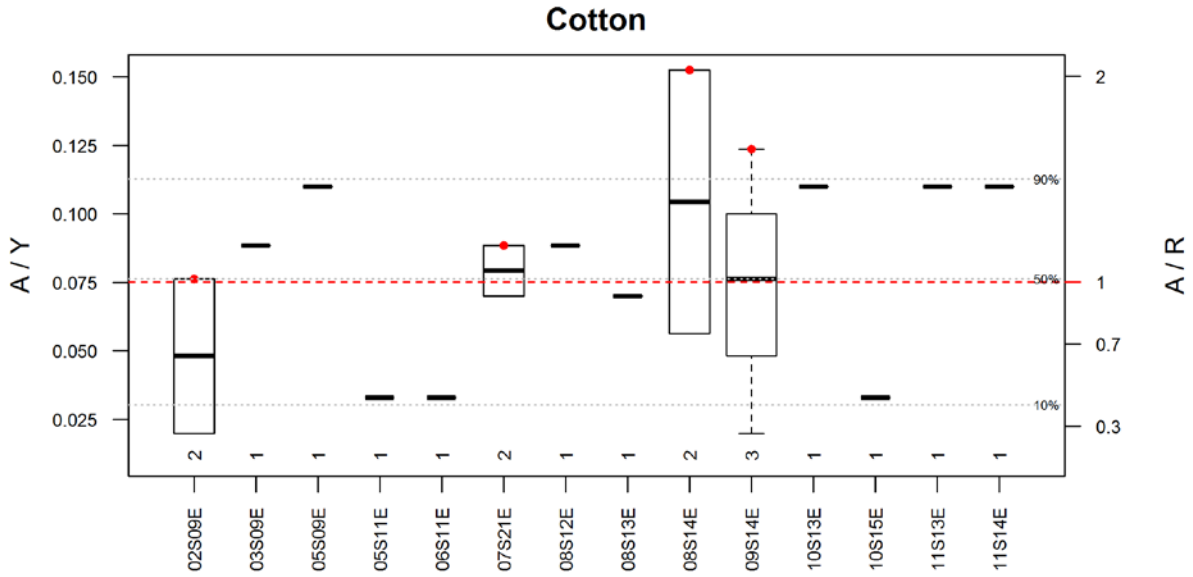


Table VIII-1. Summary statistics for Cotton management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	2	136	0.020	0.076	0.026	0.034	0.048	0.062	0.071	1
03S09E	1	275	0.089	0.089						
05S09E	1	402	0.110	0.110						
05S11E	1	93	0.033	0.033						
06S11E	1	93	0.033	0.033						
07S21E	2	550	0.070	0.089	0.072	0.075	0.079	0.084	0.087	1
08S12E	1	275	0.089	0.089						
08S13E	1	275	0.070	0.070						
08S14E	2	154	0.056	0.152	0.066	0.080	0.104	0.128	0.143	1
09S14E	3	174	0.020	0.124	0.031	0.048	0.076	0.100	0.114	1
10S13E	1	402	0.110	0.110						
10S15E	1	93	0.033	0.033						
11S13E	1	402	0.110	0.110						
11S14E	1	402	0.110	0.110						

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
07S21E	2	550	0.9	0.9						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S13E	1	275	0.9	0.9						

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
07S21E	2	550	-10	-10						
08S13E	1	275	-10	-10						

Table VIII-2. Summary statistics for all Cotton management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
COTTON	8	1097.3	0.02	0.152	0.029	0.051	0.082	0.113	0	1
COTTON, UPLAND	1	275.0	0.07	0.070						

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
COTTON, UPLAND	1	275	0.9	0.9						

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
COTTON, UPLAND	1	275	-10	-10						

Figure VIII-2. Scatter plot of A vs. Y for Cotton crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

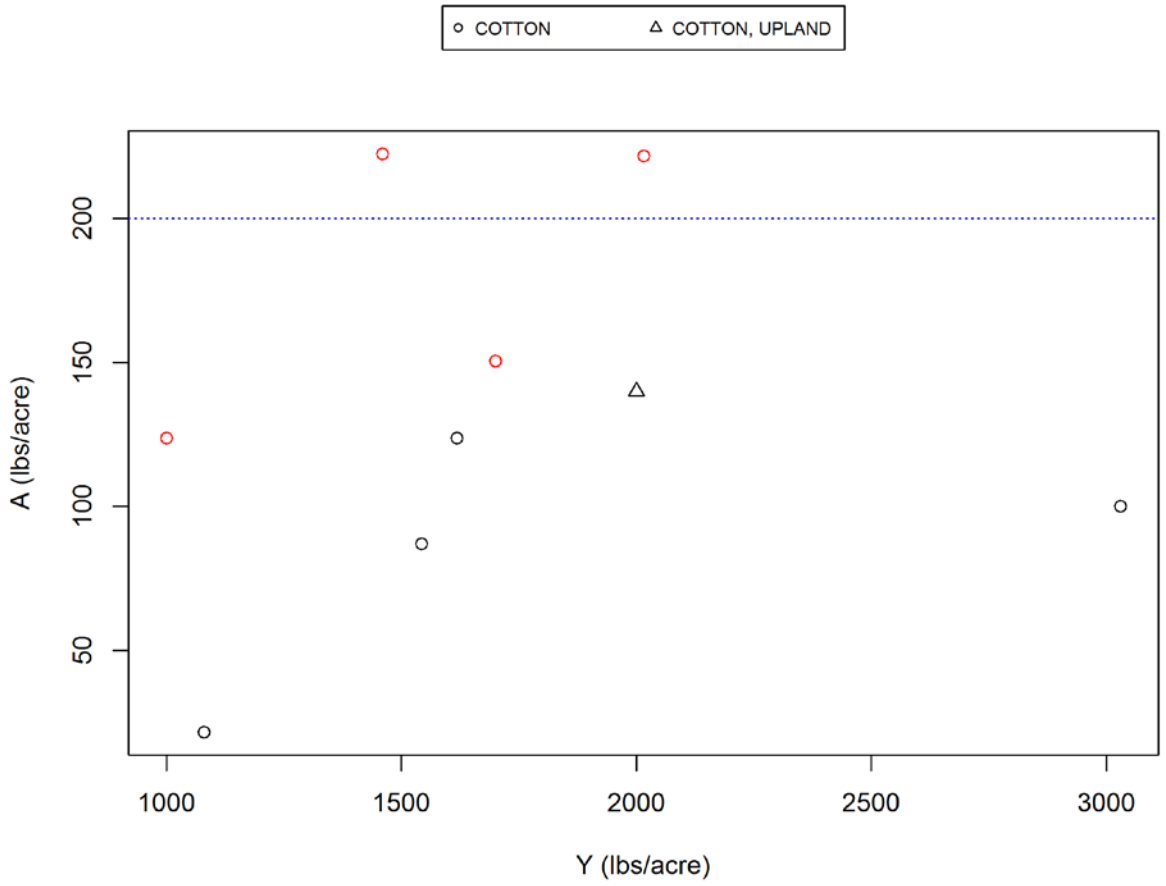


Table VIII-3. Description of recommended nitrogen application values for Cotton (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Cotton	180	200	1300 lbs lint/acre.	CDFA

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

IX. FIGS

Figure IX-1. Box and Whisker plots of A/Y for bearing Figs management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

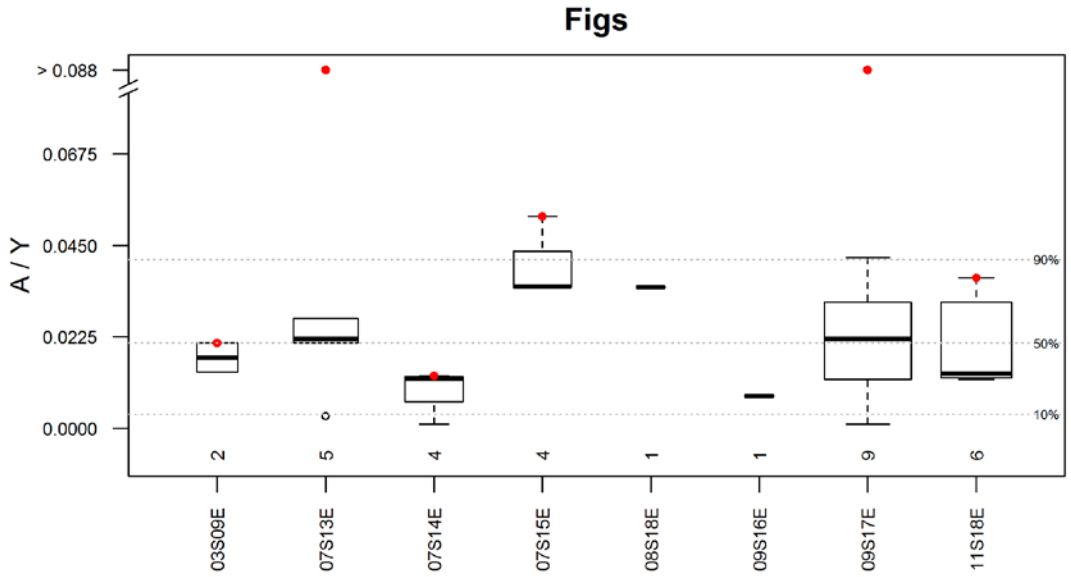


Table IX-1. . Summary statistics for Figs management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	2	240	0.014	0.021	0.015	0.016	0.017	0.019	0.020	1
07S13E	5	531	0.003	0.168	0.010	0.021	0.022	0.027	0.112	1
07S14E	4	550	0.001	0.013	0.004	0.009	0.012	0.013	0.013	1
07S15E	4	83	0.035	0.052	0.035	0.035	0.035	0.039	0.047	1
08S18E	1	20	0.035	0.035						
09S16E	1	160	0.008	0.008						
09S17E	9	886	0.001	0.168	0.003	0.012	0.022	0.031	0.067	1
11S18E	6	790	0.012	0.037	0.012	0.013	0.013	0.027	0.034	1

Table IX-2. Summary statistics for all Figs management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
FIGS /YEAR > 4	13	1570	0.001	0.042	0.009	0.012	0.014	0.027	0	2
FIGS /YEAR 2	1	16	0.168	0.168						
FIGS /YEAR 3	1	100	0.003	0.003						
FIGS /YEAR NR	4	83	0.035	0.052	0.035	0.035	0.035	0.039	0	1

Figure IX-2. Scatter plot of A vs. Y for Figs crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

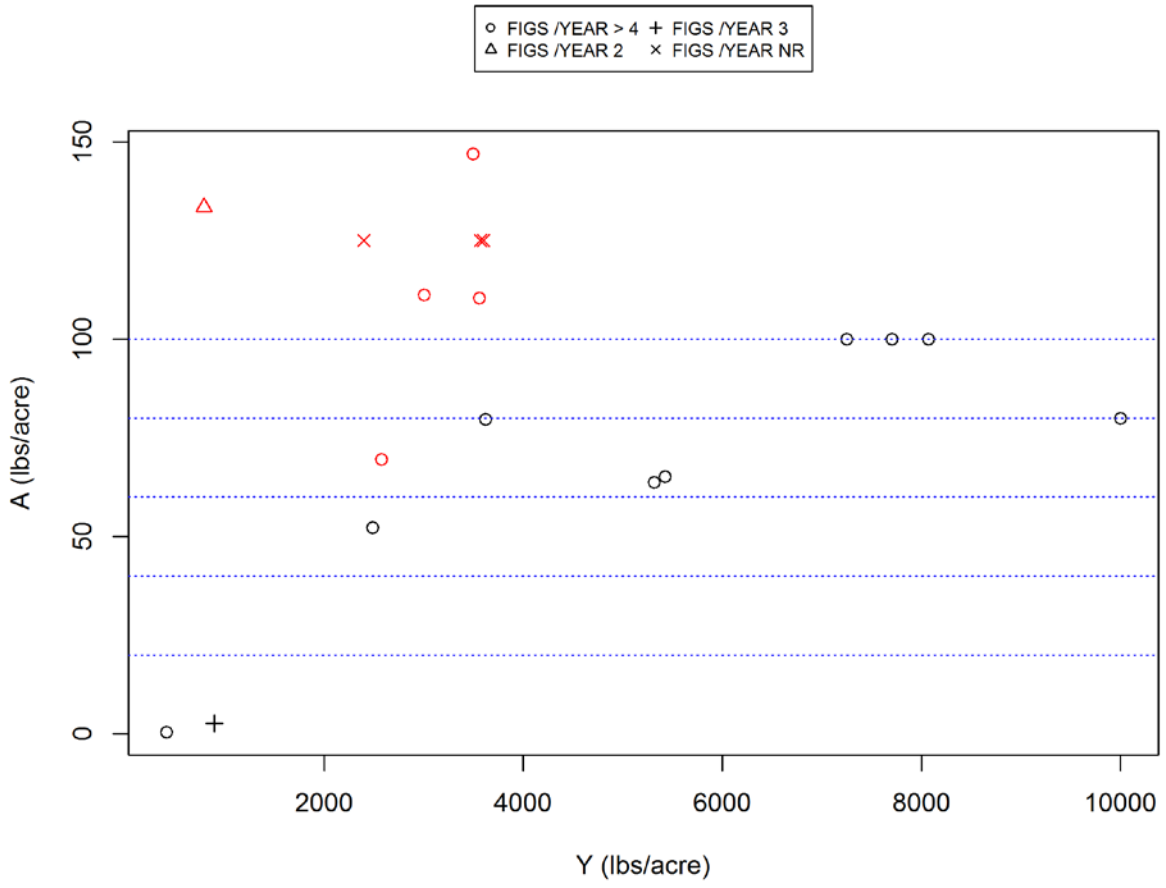


Table IX-3. Description of recommended nitrogen application values for Figs (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Figs /Year > 5	100	100	Values are from cost studies, not recommendations, but rates considered typical of a well-managed orchard. May not be applicable to all operations	UC Davis
Figs /Year 1	20	20	Conadria variety spaced 155 trees/acre. Typical yield for trees older than 3 is between 372-4,464 lbs/acre.	
Figs /Year 2	40	40		
Figs /Year 3	60	60		
Figs /Year 4	80	80		

UC Davis - http://coststudies.ucdavis.edu/current/

Figure X-1. Box and Whisker plots of A/Y for bearing Grapes management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

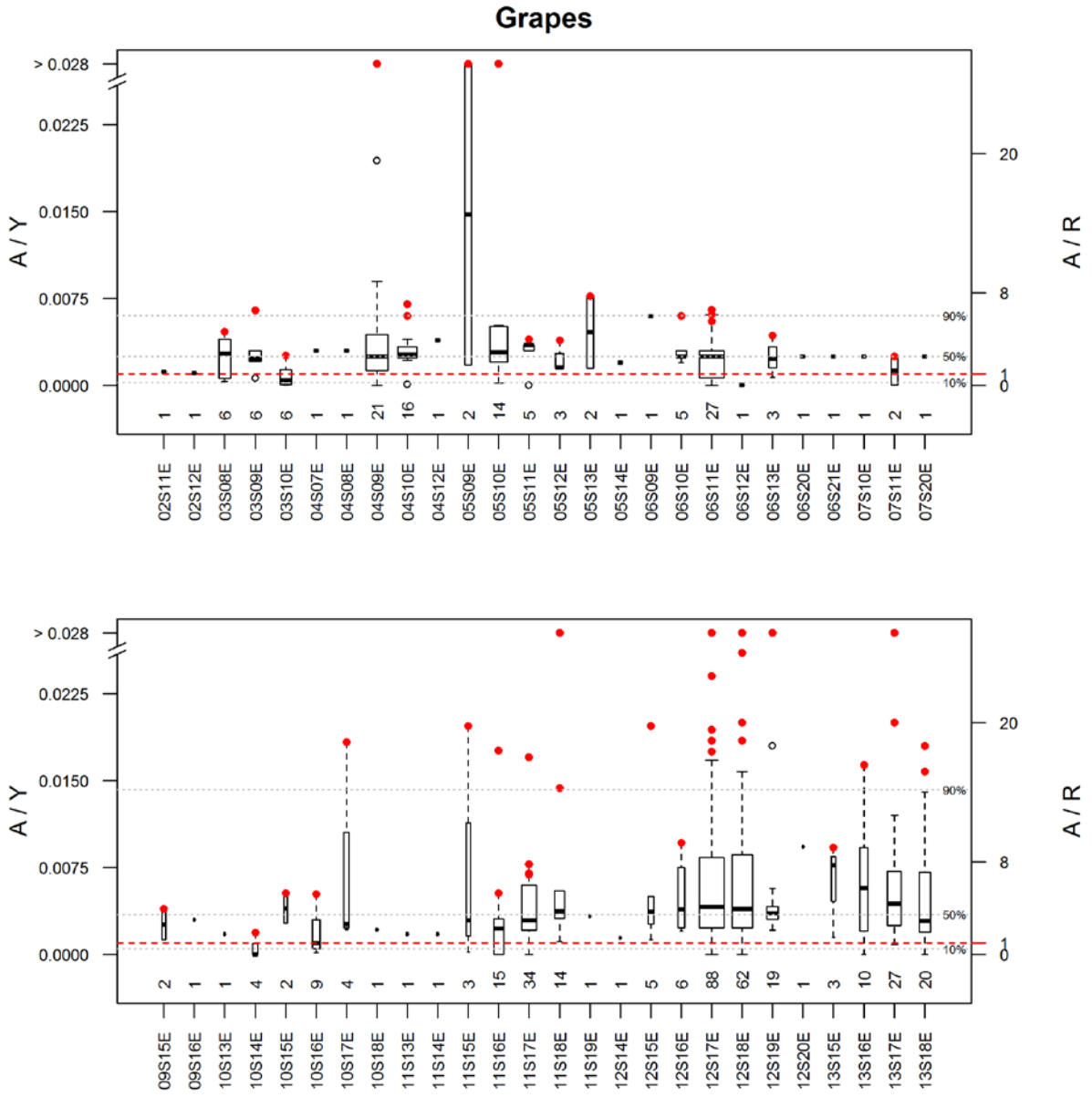


Table X-1. Summary statistics for Grapes management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S11E	1	218	0.001	0.001						
02S12E	1	55	0.001	0.001						
03S08E	6	410	0.000	0.005	0.000	0.001	0.003	0.004	0.004	1
03S09E	6	6350	0.001	0.007	0.001	0.002	0.002	0.003	0.005	1
03S10E	8	1484	0.000	0.003	0.000	0.000	0.000	0.001	0.002	1
04S07E	1	80	0.003	0.003						
04S08E	1	80	0.003	0.003						
04S09E	21	5116	0.000	0.694	0.001	0.001	0.002	0.004	0.019	2
04S10E	18	3814	0.000	0.007	0.001	0.002	0.003	0.003	0.005	2
04S12E	1	56	0.004	0.004						
05S09E	2	304	0.002	0.694	0.071	0.175	0.348	0.521	0.625	1
05S10E	14	1441	0.000	0.694	0.002	0.002	0.003	0.005	0.063	2
05S11E	5	105	0.000	0.004	0.001	0.003	0.004	0.004	0.004	1
05S12E	3	382	0.001	0.004	0.001	0.001	0.002	0.003	0.003	1
05S13E	2	3511	0.001	0.008	0.002	0.003	0.005	0.006	0.007	1
05S14E	1	112	0.002	0.002						
06S09E	1	59	0.006	0.006						
06S10E	5	5103	0.002	0.006	0.002	0.002	0.003	0.003	0.005	1
06S11E	27	10440	0.000	0.007	0.000	0.001	0.002	0.003	0.006	3
06S12E	1	18	0.000	0.000						
06S13E	3	162	0.001	0.004	0.001	0.002	0.002	0.003	0.004	1
06S20E	1	4510	0.003	0.003						
06S21E	1	4510	0.003	0.003						
07S10E	1	4510	0.003	0.003						
07S11E	2	4548	0.000	0.003	0.000	0.001	0.001	0.002	0.002	1
07S20E	1	4510	0.003	0.003						
09S15E	2	1302	0.001	0.004	0.002	0.002	0.003	0.003	0.004	1
09S16E	1	67	0.003	0.003						
10S13E	1	75	0.002	0.002						
10S14E	5	3064	0.000	0.002	0.000	0.000	0.000	0.000	0.001	1
10S15E	2	240	0.003	0.005	0.003	0.003	0.004	0.005	0.005	1
10S16E	9	3022	0.000	0.005	0.000	0.000	0.001	0.003	0.004	1
10S17E	4	2203	0.002	0.018	0.002	0.002	0.003	0.007	0.014	1
10S18E	1	868	0.002	0.002						
11S13E	1	75	0.002	0.002						
11S14E	1	75	0.002	0.002						
11S15E	3	3727	0.000	0.020	0.001	0.002	0.003	0.011	0.016	1
11S16E	15	2505	0.000	0.018	0.000	0.000	0.002	0.003	0.005	2
11S17E	34	7030	0.000	0.017	0.000	0.002	0.003	0.006	0.007	4
11S18E	14	1457	0.001	0.045	0.002	0.003	0.004	0.006	0.012	2
11S19E	1	134	0.003	0.003						
12S14E	1	166	0.001	0.001						
12S15E	5	4301	0.001	0.020	0.002	0.003	0.004	0.005	0.014	1
12S16E	6	4073	0.002	0.010	0.002	0.002	0.004	0.007	0.009	1
12S17E	89	12557	0.000	0.138	0.001	0.002	0.004	0.008	0.017	9
12S18E	63	14978	0.000	0.166	0.001	0.002	0.004	0.008	0.018	7
12S19E	19	2422	0.002	0.133	0.002	0.003	0.004	0.004	0.025	2
12S20E	1	145	0.009	0.009						
13S15E	3	5558	0.001	0.009	0.003	0.005	0.008	0.008	0.009	1
13S16E	10	7316	0.000	0.016	0.002	0.002	0.006	0.009	0.012	1
13S17E	27	9435	0.001	0.138	0.002	0.003	0.004	0.007	0.015	3
13S18E	20	5386	0.000	0.018	0.001	0.002	0.003	0.006	0.014	2

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
13S19E	2	103	0.003	0.004	0.004	0.004	0.004	0.004	0.004	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S11E	1	218	1.2	1.2						
02S12E	1	55	1.1	1.1						
03S08E	6	410	0.4	4.6	0.5	1.1	2.8	3.7	4.3	1
03S09E	6	6350	0.6	6.5	1.4	2.1	2.3	2.9	4.8	1
03S10E	8	1484	0.0	2.6	0.1	0.1	0.5	1.2	2.0	1
04S07E	1	80	3.0	3.0						
04S08E	1	80	3.0	3.0						
04S09E	21	5116	0.0	694.4	1.1	1.3	2.5	4.4	19.4	2
04S10E	18	3814	0.1	7.0	1.1	2.4	2.7	3.2	5.0	2
04S12E	1	56	3.9	3.9						
05S09E	2	304	1.8	694.4	71.0	174.9	348.1	521.2	625.1	1
05S10E	14	1441	0.2	694.4	1.5	2.0	2.9	5.0	63.2	2
05S11E	5	105	0.0	4.0	1.2	3.0	3.5	3.5	3.8	1
05S12E	3	382	1.4	3.9	1.5	1.5	1.6	2.7	3.4	1
05S13E	2	3511	1.5	7.7	2.1	3.0	4.6	6.1	7.1	1
05S14E	1	112	2.0	2.0						
06S09E	1	59	6.0	6.0						
06S10E	5	5103	2.0	6.0	2.2	2.5	2.5	3.0	4.8	1
06S11E	27	10440	0.0	6.5	0.3	0.7	2.5	3.0	5.5	3
06S12E	1	18	0.0	0.0						
06S13E	3	162	0.7	4.3	1.0	1.5	2.3	3.3	3.9	1
06S20E	1	4510	2.5	2.5						
06S21E	1	4510	2.5	2.5						
07S10E	1	4510	2.5	2.5						
07S11E	2	4548	0.1	2.5	0.3	0.7	1.3	1.9	2.3	1
07S20E	1	4510	2.5	2.5						
09S15E	2	1302	1.3	3.9	1.5	1.9	2.6	3.3	3.7	1
09S16E	1	67	3.0	3.0						
10S13E	1	75	1.8	1.8						
10S14E	5	3064	0.0	1.9	0.0	0.0	0.0	0.5	1.3	1
10S15E	2	240	2.7	5.3	3.0	3.3	4.0	4.6	5.0	1
10S16E	9	3022	0.2	5.2	0.2	0.5	1.0	3.0	3.6	1
10S17E	4	2203	2.1	18.3	2.2	2.4	2.6	6.6	13.7	1
10S18E	1	868	2.1	2.1						
11S13E	1	75	1.8	1.8						
11S14E	1	75	1.8	1.8						
11S15E	3	3727	0.2	19.7	0.8	1.6	3.0	11.3	16.4	1
11S16E	15	2505	0.0	17.6	0.0	0.0	2.3	3.1	4.7	2
11S17E	34	7030	0.0	17.0	0.1	2.1	3.0	5.9	6.8	4
11S18E	14	1457	1.1	45.2	1.7	3.3	3.8	5.5	11.7	2
11S19E	1	134	3.3	3.3						
12S14E	1	166	1.4	1.4						
12S15E	5	4301	1.3	19.7	1.8	2.6	3.7	5.0	13.8	1
12S16E	6	4073	2.0	9.6	2.2	2.4	3.9	6.9	8.6	1
12S17E	89	12557	0.0	138.0	0.8	2.4	4.1	8.3	17.0	9
12S18E	63	14978	0.0	166.0	1.1	2.3	3.9	8.1	18.2	7
12S19E	19	2422	2.1	133.0	2.3	3.1	3.6	4.1	24.6	2
12S20E	1	145	9.3	9.3						
13S15E	3	5558	1.5	9.2	2.7	4.6	7.7	8.5	8.9	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
13S16E	10	7316	0.0	16.3	1.7	2.1	5.8	9.1	12.3	1
13S17E	27	9435	0.9	138.0	1.7	2.5	4.4	7.2	15.2	3
13S18E	20	5386	0.0	18.0	1.0	1.9	2.9	6.2	14.2	2
13S19E	2	103	3.5	4.0	3.5	3.6	3.7	3.9	4.0	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S11E	1	218	2	2						
02S12E	1	55	2	2						
03S08E	6	410	-25	92	-17	3	38	49	72	1
03S09E	6	6350	-9	106	5	20	32	51	81	1
03S10E	8	1484	-23	39	-20	-16	-9	6	24	1
04S07E	1	80	33	33						
04S08E	1	80	33	33						
04S09E	21	5116	-4	105	2	6	21	60	81	2
04S10E	18	3814	-16	72	7	30	33	38	65	2
04S12E	1	56	47	47						
05S09E	2	304	15	25	16	18	20	23	24	1
05S10E	14	1441	-26	94	10	17	27	62	82	2
05S11E	5	105	-5	36	1	9	33	36	36	0
05S12E	3	382	9	47	9	10	10	29	39	1
05S13E	2	3511	13	114	23	38	64	89	104	1
05S14E	1	112	28	28						
06S09E	1	59	70	70						
06S10E	5	5103	27	81	28	28	36	39	64	1
06S11E	27	10440	-17	161	-13	-1	24	49	83	3
06S12E	1	18	-1027	-1027						
06S13E	3	162	-6	88	2	13	31	60	77	1
06S20E	1	4510	39	39						
06S21E	1	4510	39	39						
07S10E	1	4510	39	39						
07S11E	2	4548	-1128	39	-1011	-836	-544	-253	-78	1
07S20E	1	4510	39	39						
09S15E	2	1302	5	28	7	11	16	22	25	1
09S16E	1	67	37	37						
10S13E	1	75	15	15						
10S14E	5	3064	-22	28	-22	-22	-22	0	17	1
10S15E	2	240	43	47	43	44	45	46	47	1
10S16E	9	3022	-28	70	-28	-5	0	47	62	1
10S17E	4	2203	7	52	8	9	23	40	47	1
10S18E	1	868	10	10						
11S13E	1	75	15	15						
11S14E	1	75	15	15						
11S15E	3	3727	-26	131	-10	15	55	93	116	1
11S16E	15	2505	-21	81	-18	-5	38	47	55	2
11S17E	34	7030	-16	109	-3	24	41	68	102	4
11S18E	14	1457	2	63	5	12	47	63	63	0
11S19E	1	134	112	112						
12S14E	1	166	10	10						
12S15E	5	4301	5	135	29	65	113	131	134	1
12S16E	6	4073	31	106	32	36	59	80	93	1
12S17E	89	12557	-17	196	-1	23	56	78	105	9
12S18E	63	14978	-20	216	0	17	46	64	120	7

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
12S19E	19	2422	6	264	30	44	52	61	102	2
12S20E	1	145	84	84						
13S15E	3	5558	13	114	27	48	84	99	108	1
13S16E	10	7316	-4	176	14	36	50	106	145	1
13S17E	27	9435	0	197	8	36	56	80	105	3
13S18E	20	5386	-20	144	0	13	32	64	73	2
13S19E	2	103	46	54	47	48	50	52	53	1

Table X-2. Summary statistics for all Grapes management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
GRAPES, RAISINS /YEAR >4	18	6385.82	0.000	0.020	0.000	0.003	0.008	0.010	0	2
GRAPES, RAISINS /YEAR NR	53	6966.01	0.000	0.138	0.001	0.002	0.008	0.018	0	6
GRAPES, TABLE /YEAR > 4	29	1804.11	0.001	0.014	0.001	0.003	0.003	0.005	0	3
GRAPES, TABLE /YEAR 2	1	35.00	0.008	0.008						
GRAPES, TABLE /YEAR 3	8	798.00	0.002	0.005	0.002	0.002	0.003	0.003	0	1
GRAPES, TABLE /YEAR 4	2	44.00	0.008	0.011	0.008	0.008	0.009	0.010	0	1
GRAPES, TABLE /YEAR NR	14	1788.75	0.000	0.064	0.002	0.003	0.004	0.006	0	2
GRAPES, WINE /YEAR > 4	163	27802.91	0.000	0.694	0.000	0.002	0.003	0.004	0	17
GRAPES, WINE /YEAR 1	2	927.35	0.002	0.014	0.003	0.005	0.008	0.011	0	1
GRAPES, WINE /YEAR 2	2	170.93	0.002	0.018	0.004	0.006	0.010	0.014	0	1
GRAPES, WINE /YEAR 3	3	192.90	0.001	0.002	0.001	0.001	0.001	0.002	0	1
GRAPES, WINE /YEAR 4	3	184.00	0.003	0.018	0.004	0.005	0.007	0.012	0	1
GRAPES, WINE /YEAR NR	19	4997.70	0.000	0.009	0.002	0.002	0.003	0.005	0	2

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
GRAPES, RAISINS /YEAR >4	18	6386	0.0	19.7	0.0	3.0	7.9	9.6	13.5	2
GRAPES, RAISINS /YEAR NR	53	6966	0.0	138.0	0.5	2.5	8.5	17.6	43.1	6
GRAPES, TABLE /YEAR > 4	29	1804	1.2	14.4	1.5	2.7	3.5	5.3	9.8	3
GRAPES, TABLE /YEAR 2	1	35	7.7	7.7						
GRAPES, TABLE /YEAR 3	8	798	1.9	5.3	1.9	2.2	2.5	3.2	4.2	1
GRAPES, TABLE /YEAR 4	2	44	7.7	10.7	8.0	8.5	9.2	10.0	10.4	1
GRAPES, TABLE /YEAR NR	14	1789	0.4	64.0	2.1	2.8	4.0	6.1	55.0	2
GRAPES, WINE /YEAR > 4	163	27803	0.0	694.4	0.2	1.5	3.0	4.2	6.5	17
GRAPES, WINE /YEAR 1	2	927	2.1	13.9	3.3	5.1	8.0	11.0	12.7	1
GRAPES, WINE /YEAR 2	2	171	2.3	17.5	3.8	6.1	9.9	13.7	16.0	1
GRAPES, WINE /YEAR 3	3	193	1.0	2.5	1.0	1.0	1.1	1.8	2.2	1
GRAPES, WINE /YEAR 4	3	184	3.0	17.6	3.8	5.0	7.1	12.3	15.5	1
GRAPES, WINE /YEAR NR	19	4998	0.0	8.8	1.5	2.1	3.1	4.6	5.2	2

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
GRAPES, RAISINS /YEAR >4	18	6386	-5	131	-3	35	71	103	108	2
GRAPES, RAISINS /YEAR NR	53	6966	-20	264	-2	7	45	67	72	6
GRAPES, TABLE /YEAR > 4	29	1804	3	144	7	24	44	56	110	3
GRAPES, TABLE /YEAR 2	1	35	78	78						
GRAPES, TABLE /YEAR 3	8	798	25	81	25	32	39	55	63	1
GRAPES, TABLE /YEAR 4	2	44	78	139	84	93	108	124	133	1
GRAPES, TABLE /YEAR NR	14	1789	-25	197	12	24	49	94	177	2
GRAPES, WINE /YEAR > 4	163	27803	-1128	216	-13	5	38	63	102	17
GRAPES, WINE /YEAR 1	2	927	10	57	15	22	34	46	53	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
GRAPES, WINE /YEAR 2	2	171	31	99	38	48	65	82	92	1
GRAPES, WINE /YEAR 3	3	193	0	27	0	1	2	14	22	1
GRAPES, WINE /YEAR 4	3	184	4	105	13	27	50	77	94	1
GRAPES, WINE /YEAR NR	19	4998	-5	176	12	24	56	87	125	2

Figure X-2. Scatter plot of A vs. Y for Grapes crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

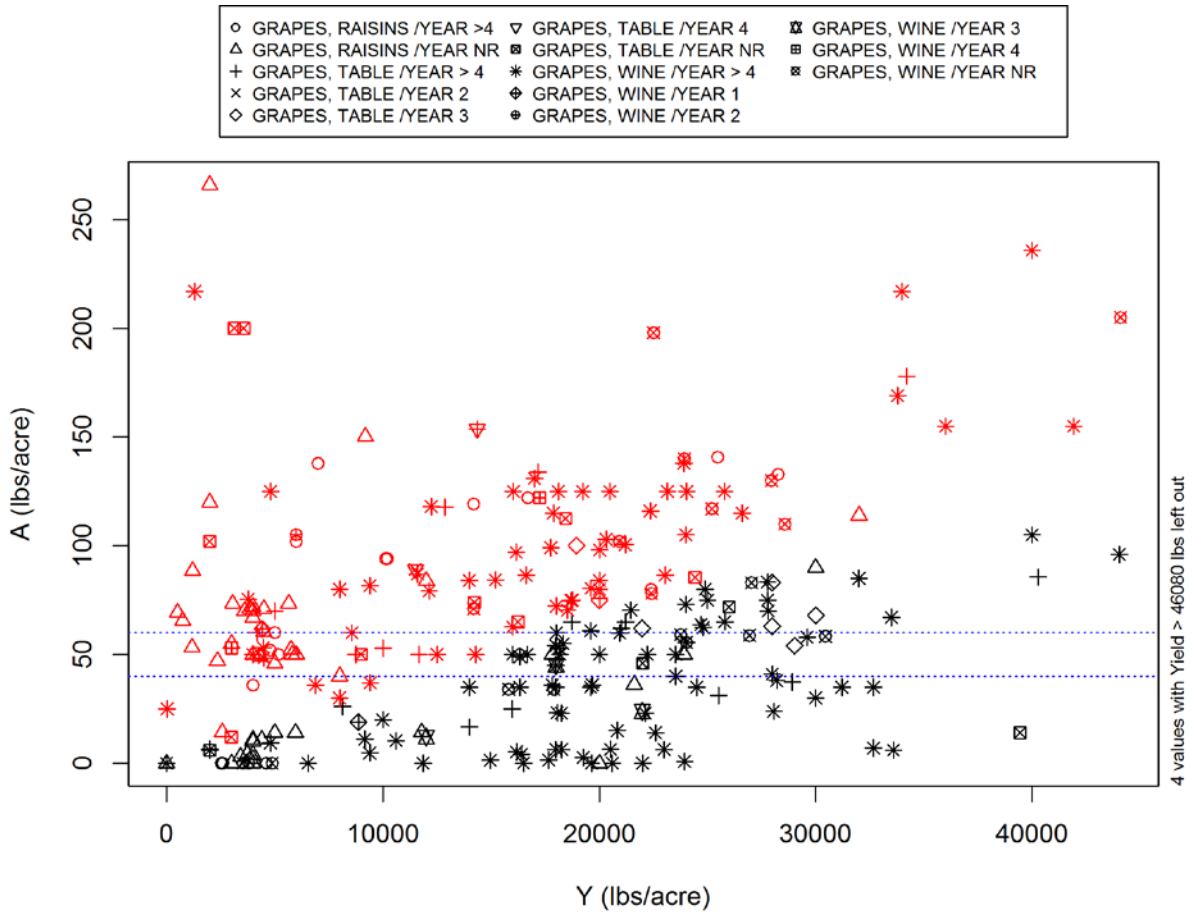


Table X-3. Description of recommended nitrogen application values for Grapes (in lbs/acre).

Crop specifics	Min	Max	Study Specifics	Source
Grapes	0	60	For furrow irrigated. Lower values recommended for vigorous vines; highest for weak vigor, inadequate canopy and sandy soils. Typical raisin yield averages 9-10 tons/acre, the yield of wine grapes averages 7 tons/acre in California.	CDFA
Grapes	0	40	For drip irrigated. Same conditions as above.	CDFA

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure XI-1. Box and Whisker plots of A/Y for bearing Hay management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

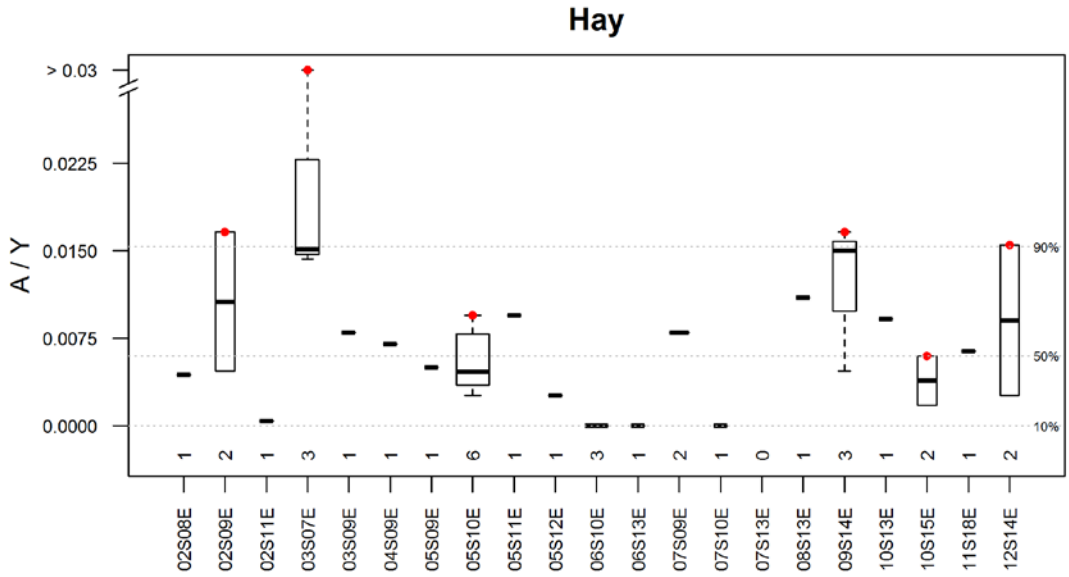


Table XI-1. Summary statistics for Hay management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

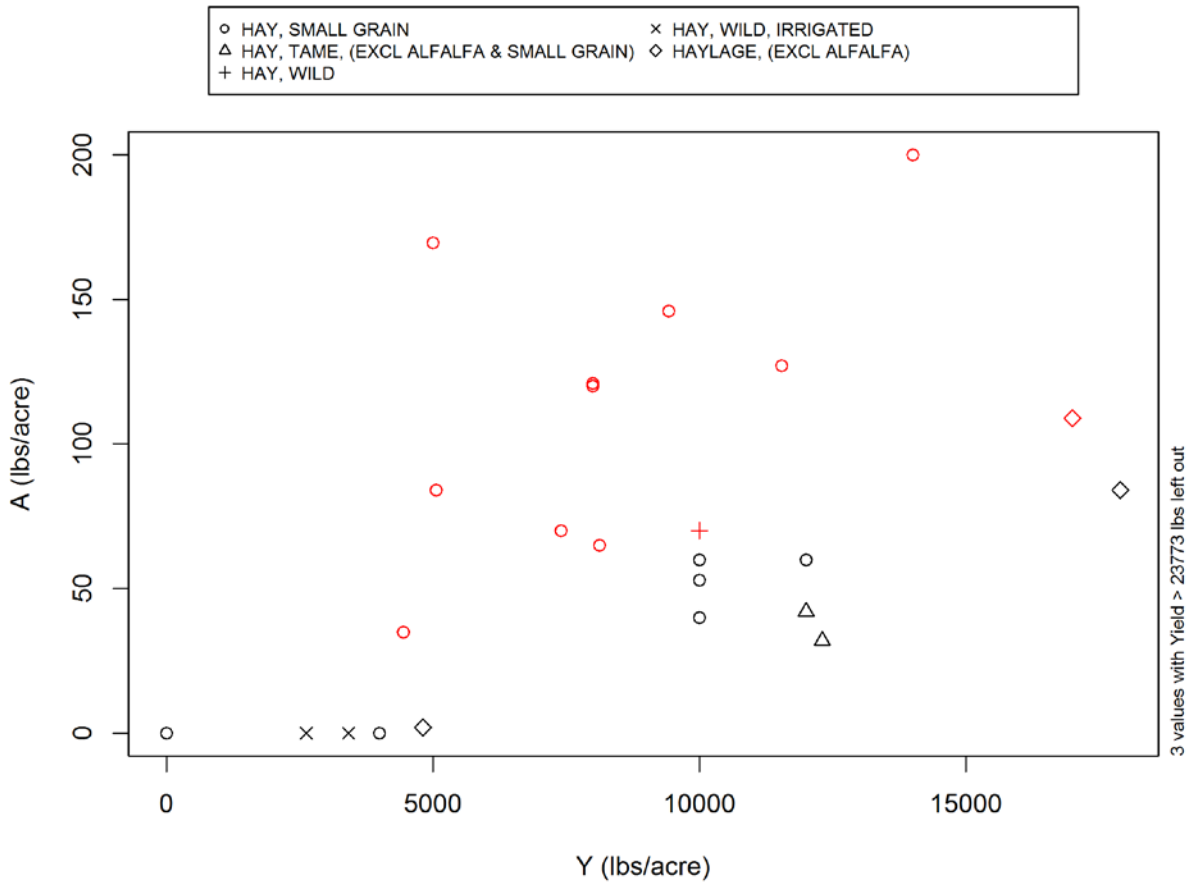
TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S08E	1	72	0.004	0.004						
02S09E	2	122	0.005	0.017	0.006	0.008	0.011	0.014	0.015	1
02S11E	1	332	0.000	0.000						
03S07E	3	253	0.014	0.034	0.014	0.015	0.015	0.025	0.030	1
03S09E	1	19	0.008	0.008						
04S09E	1	12	0.007	0.007						
05S09E	1	2	0.005	0.005						
05S10E	6	370	0.003	0.009	0.003	0.004	0.005	0.007	0.009	1
05S11E	1	56	0.009	0.009						
05S12E	1	177	0.003	0.003						
06S10E	3	44	0.000	0.000						
06S13E	1	25	0.000	0.000						
07S09E	2	47	0.008	0.008						
07S10E	1	15	0.000	0.000						
08S13E	1	110	0.011	0.011						
09S14E	3	167	0.005	0.017	0.007	0.010	0.015	0.016	0.016	1
10S13E	1	207	0.009	0.009						
10S15E	2	195	0.002	0.006	0.002	0.003	0.004	0.005	0.006	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
11S18E	1	72	0.006	0.006						
12S14E	2	248	0.003	0.015	0.004	0.006	0.009	0.012	0.014	1

Table XI-2. Summary statistics for all Hay management units (all T-R).
A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
HAY, SMALL GRAIN	23	1007.9	0.000	0.034	0.004	0.005	0.008	0.015	0	2
HAY, TAME, (EXCL ALFALFA & SMALL GRAIN)	2	185.0	0.003	0.004	0.003	0.003	0.003	0.003	0	1
HAY, WILD	1	12.0	0.007	0.007						
HAY, WILD, IRRIGATED	3	44.0	0.000	0.000						
HAYLAGE, (EXCL ALFALFA)	5	829.2	0.000	0.009	0.001	0.002	0.005	0.006	0	1

Figure XI-2. Scatter plot of A vs. Y for Hay crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.



XII. OATS

Figure XII-1. Box and Whisker plots of A/Y for bearing Oats management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

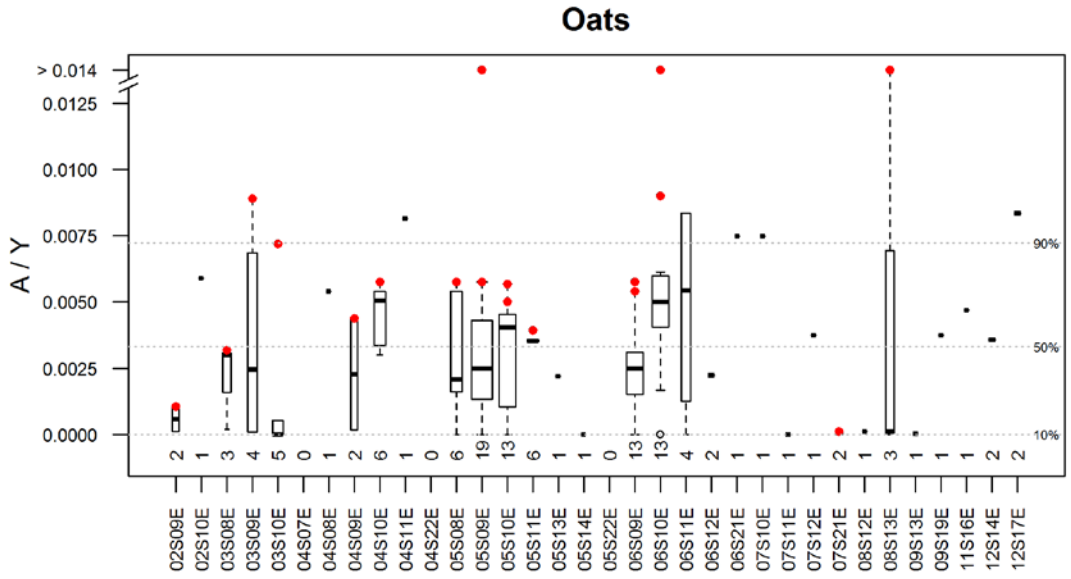


Table XII-1. Summary statistics for Oats management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	2	47	0.000	0.001	0.000	0.000	0.001	0.001	0.001	1
02S10E	1	7	0.006	0.006						
03S08E	3	91	0.000	0.003	0.001	0.002	0.003	0.003	0.003	1
03S09E	4	428	0.000	0.009	0.000	0.000	0.002	0.006	0.008	1
03S10E	5	96	0.000	0.007	0.000	0.000	0.000	0.001	0.005	1
04S08E	2	701	0.005	0.005						
04S09E	2	112	0.000	0.004	0.001	0.001	0.002	0.003	0.004	1
04S10E	6	682	0.003	0.006	0.003	0.004	0.005	0.005	0.006	1
04S11E	1	35	0.008	0.008						
05S08E	6	1615	0.000	0.006	0.001	0.002	0.002	0.005	0.006	1
05S09E	19	1924	0.000	0.033	0.000	0.001	0.002	0.004	0.005	2
05S10E	13	715	0.000	0.006	0.000	0.001	0.004	0.005	0.005	2
05S11E	6	168	0.004	0.004	0.004	0.004	0.004	0.004	0.004	1
05S13E	1	150	0.002	0.002						
05S14E	1	32	0.000	0.000						
06S09E	15	1543	0.000	0.006	0.002	0.002	0.002	0.003	0.005	2
06S10E	13	322	0.000	0.015	0.002	0.004	0.005	0.006	0.008	2
06S11E	4	145	0.000	0.008	0.001	0.002	0.005	0.008	0.008	0

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
06S12E	2	58	0.002	0.002						
06S21E	1	61	0.007	0.007						
07S10E	1	61	0.007	0.007						
07S11E	1	54	0.000	0.000						
07S12E	1	116	0.004	0.004						
07S21E	2	582	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1
08S12E	1	378	0.000	0.000						
08S13E	3	702	0.000	0.025	0.000	0.000	0.000	0.013	0.020	1
09S13E	1	70	0.000	0.000						
09S19E	1	116	0.004	0.004						
11S16E	1	66	0.005	0.005						
12S14E	2	64	0.004	0.004						
12S17E	2	26	0.008	0.008						

Table XII-2. Summary statistics for all Oats management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
OATS, SILAGE	97	6819.91	0	0.033	0	0.002	0.003	0.005	0	10

Figure XII-2. Scatter plot of A vs. Y for Oats crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

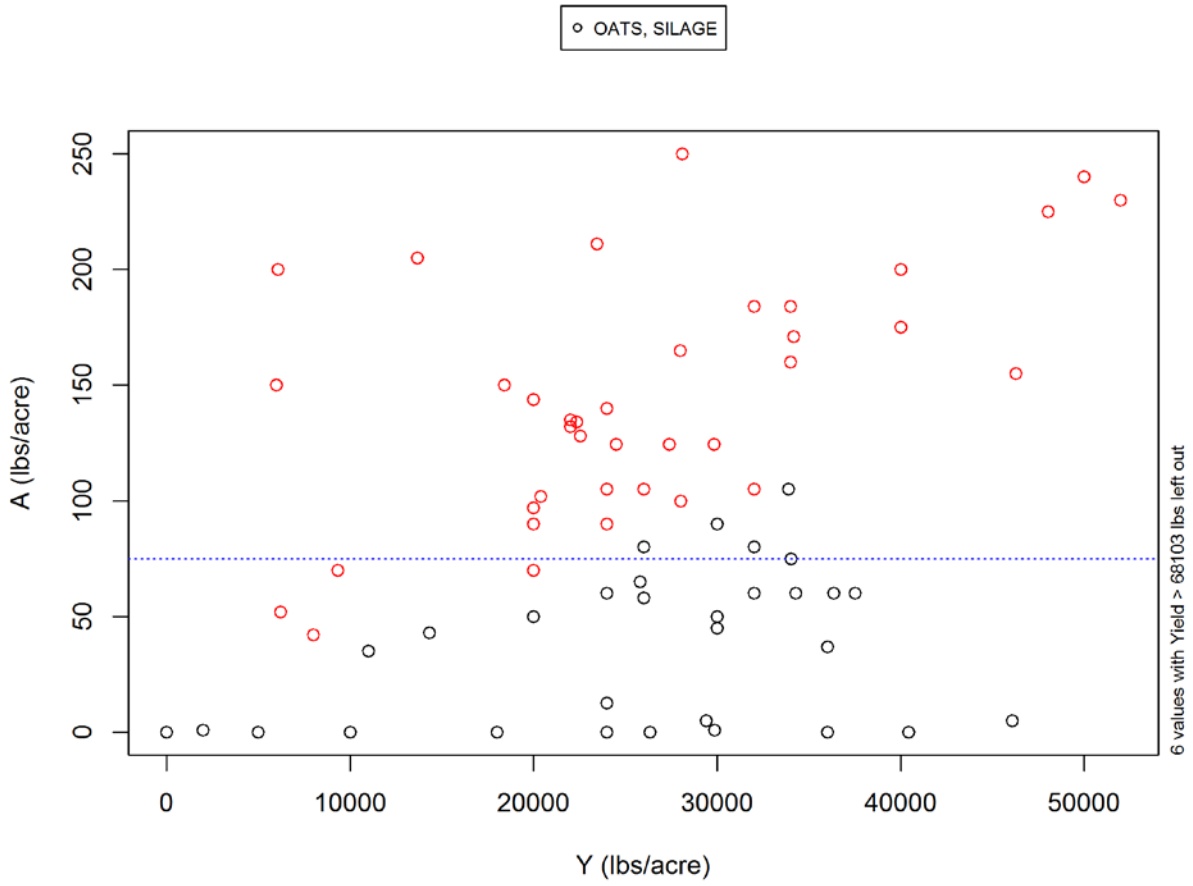


Table XII-3. Description of recommended nitrogen application values for Oats (in lbs/acre).
UC Davis values are from cost studies. They are not recommendations but application rates considered typical, and me not be applicable to all operations.

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Oat Hay	50	75	Assumes yield of 2.5 tons/acre.	UC Davis

UC Davis - http://coststudies.ucdavis.edu/current/

XIII. OLIVES

Figure XIII-1. Box and Whisker plots of A/Y for bearing Olives management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

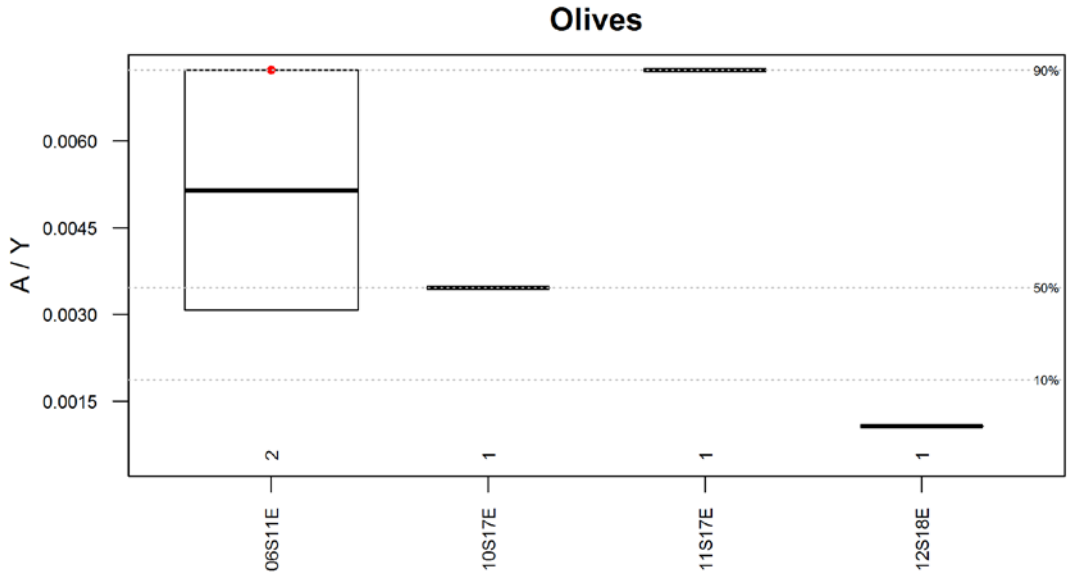


Table XIII-1. Summary statistics for Olives management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
06S11E	2	75	0.003	0.007	0.003	0.004	0.005	0.006	0.007	1
10S17E	1	20	0.003	0.003						
11S17E	1	15	0.007	0.007						
12S18E	2	190	0.001	0.001						

Table XIII-2. Summary statistics for all Olives management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
OLIVES /YEAR > 4	3	95	0.003	0.007	0.003	0.003	0.003	0.005	0	1
OLIVES /YEAR NR	1	34	0.001	0.001						

Figure XIII-2. Scatter plot of A vs. Y for Olives crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

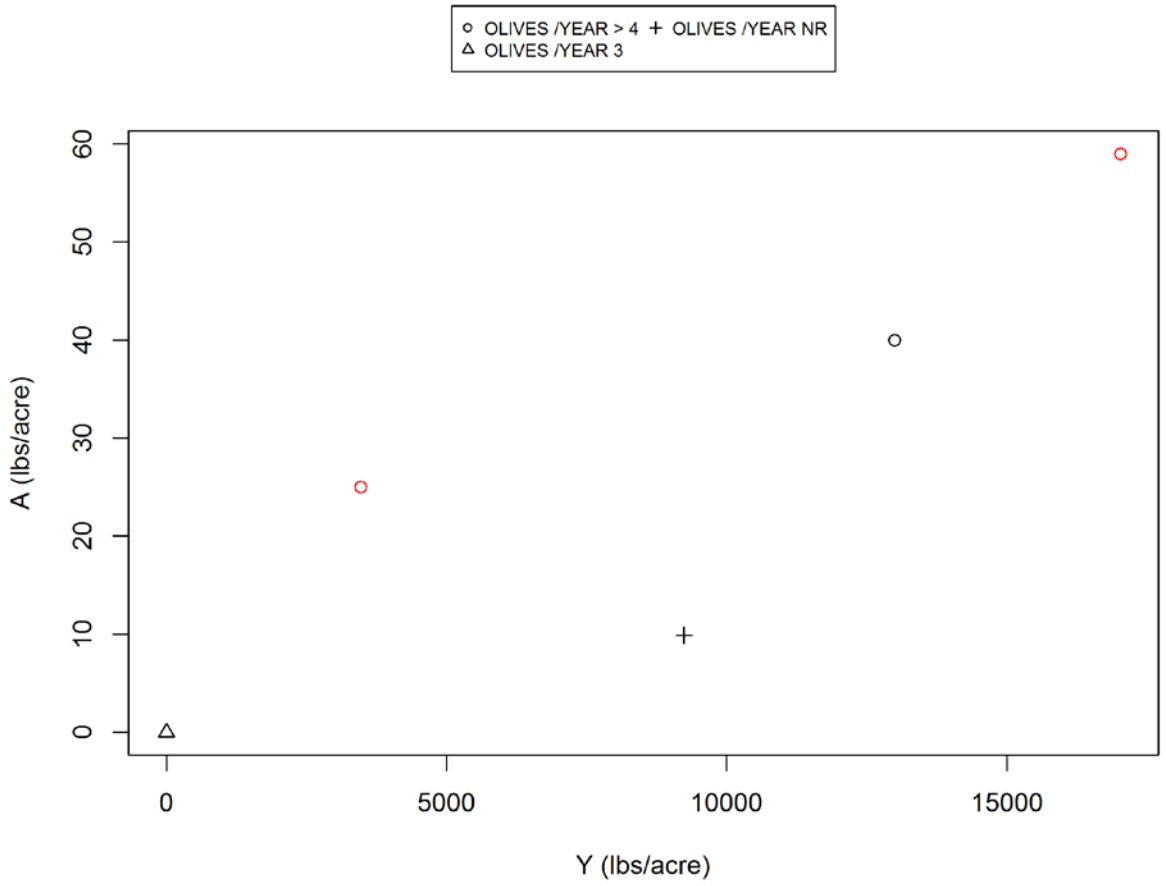


Table XIII-3. Description of recommended nitrogen application values for Olives (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Olives	0	144	N applications dependent on desired yield: minimum value typically yields 1.2 tons/acre and maximum value yields 5.4 tons/acre. Based on heavy crop year. Base fertilizer applications on leaf analysis, optimum levels of N should be between 1.5-2.0%.	UC Davis
Olives /Year 1-2	60	80	High density olive orchard. N applied through drip irrigation system.	
Olives /Year >3	80	120	High density olive orchard. N applied through drip irrigation system. Mature olive orchards 5 years and older yield 5 tons/acre.	

UC Davis - http://coststudies.ucdavis.edu/current/

Figure XIV-1. Box and Whisker plots of A/Y for bearing Peaches management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

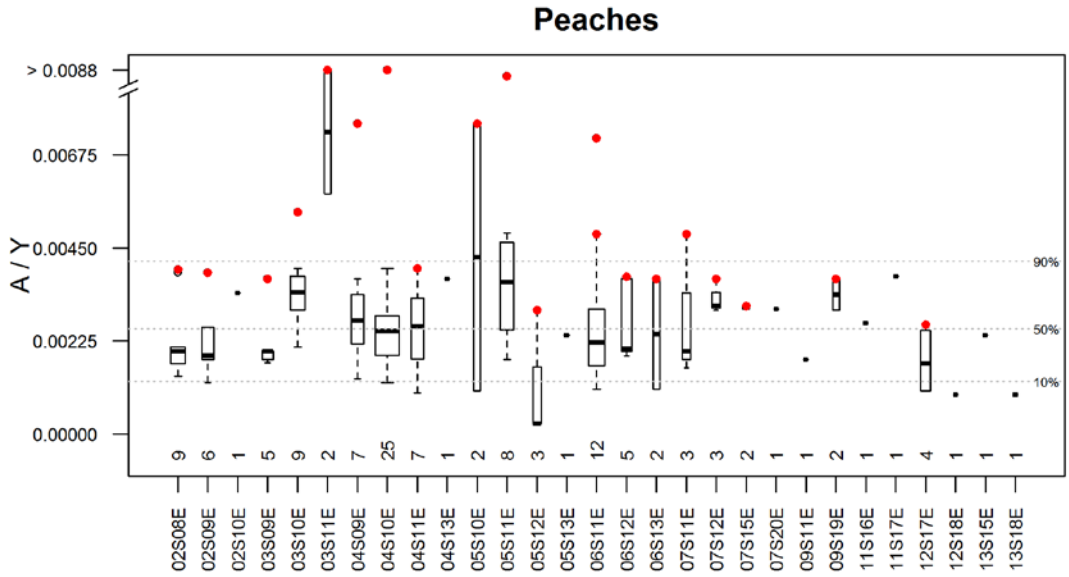


Table XIV-1. Summary statistics for Peaches management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S08E	9	203	0.001	0.004	0.002	0.002	0.002	0.002	0.004	1
02S09E	6	276	0.001	0.004	0.002	0.002	0.002	0.002	0.003	1
02S10E	1	39	0.003	0.003						
03S09E	5	975	0.002	0.004	0.002	0.002	0.002	0.002	0.003	1
03S10E	9	252	0.002	0.005	0.003	0.003	0.003	0.004	0.004	1
03S11E	2	33	0.006	0.010	0.006	0.007	0.008	0.009	0.010	1
04S09E	7	996	0.001	0.008	0.002	0.002	0.003	0.003	0.005	1
04S10E	25	585	0.001	0.085	0.001	0.002	0.002	0.003	0.004	1
04S11E	7	166	0.001	0.004	0.001	0.002	0.003	0.003	0.004	1
04S13E	1	806	0.004	0.004						
05S10E	2	32	0.001	0.008	0.002	0.003	0.004	0.006	0.007	1
05S11E	8	532	0.002	0.009	0.002	0.003	0.004	0.005	0.006	1
05S12E	3	153	0.000	0.003	0.000	0.000	0.000	0.002	0.002	1
05S13E	1	147	0.002	0.002						
06S11E	12	993	0.001	0.007	0.001	0.002	0.002	0.003	0.005	2
06S12E	5	1211	0.002	0.004	0.002	0.002	0.002	0.004	0.004	1
06S13E	2	882	0.001	0.004	0.001	0.002	0.002	0.003	0.003	1
07S11E	3	83	0.002	0.005	0.002	0.002	0.002	0.003	0.004	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
07S12E	3	902	0.003	0.004	0.003	0.003	0.003	0.003	0.004	1
07S15E	2	150	0.003	0.003	0.003	0.003	0.003	0.003	0.003	1
07S20E	1	145	0.003	0.003						
09S11E	1	63	0.002	0.002						
09S19E	2	883	0.003	0.004	0.003	0.003	0.003	0.004	0.004	1
11S16E	1	14	0.003	0.003						
11S17E	1	79	0.004	0.004						
12S17E	4	124	0.001	0.003	0.001	0.001	0.002	0.002	0.003	1
12S18E	1	20	0.001	0.001						
13S15E	1	147	0.002	0.002						
13S18E	1	20	0.001	0.001						

Table XIV-2. Summary statistics for all Peaches management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
PEACHES, FRESH MARKET /YEAR > 4	32	938.320	0.000	0.004	0.001	0.002	0.003	0.003	0	4
PEACHES, FRESH MARKET /YEAR 3	1	11.400	0.002	0.002						
PEACHES, FRESH MARKET /YEAR 4	1	10.560	0.005	0.005						
PEACHES, FRESH MARKET /YEAR NR	6	340.470	0.002	0.085	0.002	0.002	0.002	0.003	0	1
PEACHES, PROCESSING /YEAR > 4	43	2715.256	0.001	0.007	0.001	0.002	0.002	0.003	0	4
PEACHES, PROCESSING /YEAR 2	2	26.000	0.003	0.010	0.004	0.005	0.007	0.008	0	1
PEACHES, PROCESSING /YEAR 3	1	31.000	0.009	0.009						
PEACHES, PROCESSING /YEAR NR	6	124.100	0.001	0.008	0.001	0.002	0.004	0.006	0	1

Figure XIV-2. Scatter plot of A vs. Y for Peaches crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

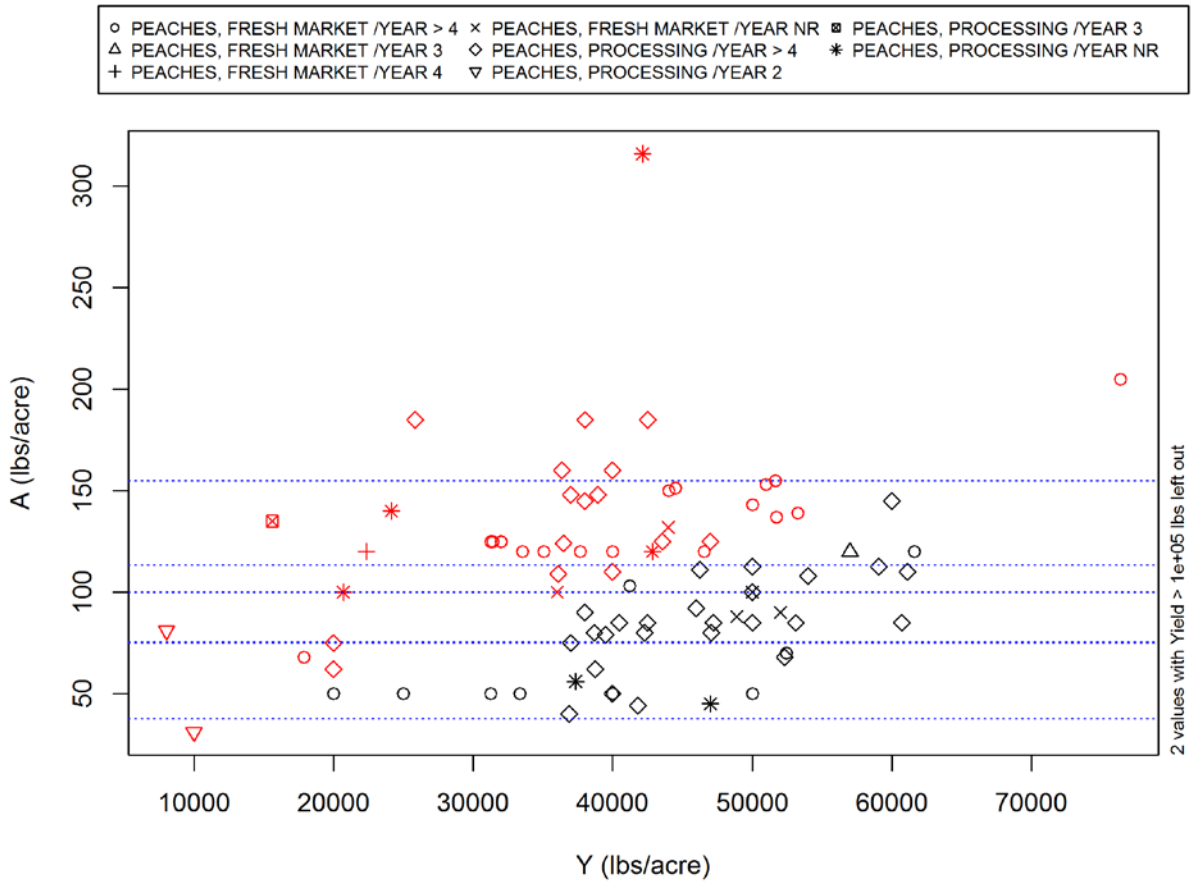


Table XIV-3. Description of recommended nitrogen application values for Peaches (in lbs/acre).

Crop Specifics	Min	Max	Study Specifics	Source
Fresh market peaches and nectarines	25	75.00	Value considered enough to maintain adequate N fertility. Dependent upon the efficiency of the fertilization method.	CDFA
Processing peaches	50	100.00	Common values. Higher rates will be required for N-deficient orchards.	CDFA
Mature peach and nectarine orchards	63	155.00	Approximate requirements dependent upon the desired yield; minimum value yields 6 tons/acre, maximum yields 30 tons/acre. Assumes that prunings are not removed from the orchard (59 lbs N/acre).	
Peaches /Year 1	0	37.75	Calculated from 4, 8, 12 oz/tree per year of age, assuming 151 trees per acre. Rate should be adjusted for the N supplied by soil and irrigation water. In some cases, these are sufficient for the first season's growth and no additional N need be added	CDFA
Peaches /Year 2	37.75	75.50		
Peaches /Year 3	75.5	113.25		

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure XV-1. Box and Whisker plots of A/Y for bearing Pistachios management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

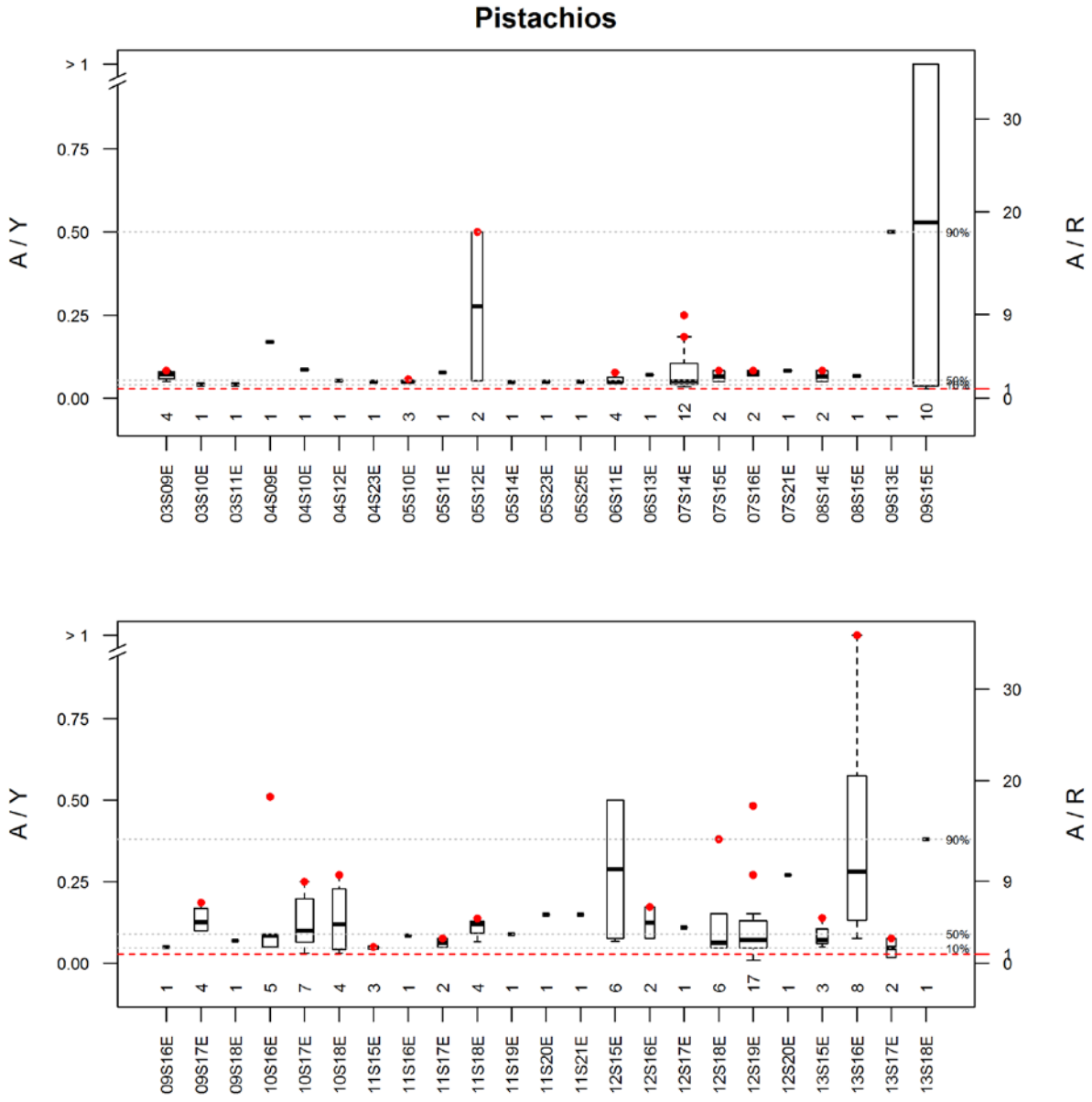


Table XV-1. Summary statistics for Pistachios management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	4	1431	0.050	0.083	0.055	0.063	0.072	0.079	0.081	1
03S10E	1	96	0.041	0.041						
03S11E	1	96	0.041	0.041						
04S09E	1	18	0.169	0.169						
04S10E	1	127	0.086	0.086						
04S12E	1	18	0.052	0.052						
04S23E	1	278	0.050	0.050						
05S10E	3	1624	0.049	0.057	0.049	0.049	0.050	0.053	0.055	1
05S11E	1	586	0.077	0.077						
05S12E	2	58	0.052	0.500	0.097	0.164	0.276	0.388	0.455	1
05S14E	1	1293	0.049	0.049						
05S23E	1	278	0.050	0.050						
05S25E	1	278	0.050	0.050						
06S11E	4	730	0.047	0.077	0.047	0.048	0.049	0.057	0.069	1
06S13E	1	300	0.070	0.070						
07S14E	12	1619	0.035	0.250	0.037	0.043	0.051	0.081	0.182	2
07S15E	2	473	0.050	0.083	0.053	0.058	0.067	0.075	0.080	1
07S16E	2	612	0.067	0.083	0.069	0.071	0.075	0.079	0.081	1
07S21E	1	320	0.083	0.083						
08S14E	2	598	0.050	0.083	0.053	0.058	0.067	0.075	0.080	1
08S15E	1	292	0.067	0.067						
09S13E	1	539	0.500	0.500						
09S15E	10	706	0.029	1.350	0.036	0.040	0.702	1.350	1.350	0
09S16E	1	58	0.050	0.050						
09S17E	4	468	0.100	0.185	0.100	0.100	0.126	0.160	0.175	1
09S18E	1	300	0.070	0.070						
10S16E	5	285	0.050	0.510	0.050	0.050	0.086	0.090	0.342	1
10S17E	7	981	0.031	0.250	0.036	0.065	0.100	0.198	0.226	1
10S18E	4	1239	0.031	0.270	0.038	0.049	0.120	0.207	0.245	1
11S15E	3	1524	0.049	0.050	0.049	0.049	0.049	0.049	0.050	1
11S16E	1	127	0.086	0.086						
11S17E	2	1834	0.049	0.077	0.052	0.056	0.063	0.070	0.074	1
11S18E	4	424	0.066	0.138	0.082	0.107	0.120	0.124	0.133	1
11S19E	1	150	0.090	0.090						
11S20E	1	2129	0.150	0.150						
11S21E	1	2129	0.150	0.150						
12S15E	7	1742	0.068	0.500	0.073	0.077	0.289	0.500	0.500	0
12S16E	2	1295	0.077	0.173	0.087	0.101	0.125	0.149	0.164	1
12S17E	1	153	0.110	0.110						
12S18E	6	504	0.047	0.380	0.047	0.047	0.064	0.134	0.266	1
12S19E	17	2414	0.010	0.482	0.030	0.047	0.072	0.130	0.199	2
12S20E	1	683	0.270	0.270						
13S15E	3	1250	0.050	0.140	0.054	0.061	0.072	0.106	0.126	1
13S16E	8	2920	0.077	6.000	0.087	0.153	0.281	0.547	2.241	1
13S17E	2	580	0.018	0.077	0.024	0.033	0.048	0.062	0.071	1
13S18E	1	34	0.380	0.380						

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	4	1431	1.8	3.0	2.0	2.2	2.6	2.8	2.9	1
03S10E	1	96	1.5	1.5						
03S11E	1	96	1.5	1.5						
04S09E	1	18	6.0	6.0						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
04S10E	1	127	3.1	3.1						
04S12E	1	18	1.9	1.9						
04S23E	1	278	1.8	1.8						
05S10E	3	1624	1.7	2.0	1.8	1.8	1.8	1.9	2.0	1
05S11E	1	586	2.8	2.8						
05S12E	2	58	1.9	17.9	3.5	5.9	9.9	13.9	16.3	1
05S14E	1	1293	1.7	1.7						
05S23E	1	278	1.8	1.8						
05S25E	1	278	1.8	1.8						
06S11E	4	730	1.7	2.8	1.7	1.7	1.7	2.0	2.5	1
06S13E	1	300	2.5	2.5						
07S14E	12	1619	1.3	8.9	1.3	1.5	1.8	2.9	6.5	2
07S15E	2	473	1.8	3.0	1.9	2.1	2.4	2.7	2.8	1
07S16E	2	612	2.4	3.0	2.5	2.5	2.7	2.8	2.9	1
07S21E	1	320	3.0	3.0						
08S14E	2	598	1.8	3.0	1.9	2.1	2.4	2.7	2.8	1
08S15E	1	292	2.4	2.4						
09S13E	1	539	17.9	17.9						
09S15E	10	706	1.0	48.2	1.3	1.4	25.1	48.2	48.2	0
09S16E	1	58	1.8	1.8						
09S17E	4	468	3.6	6.6	3.6	3.6	4.5	5.7	6.3	1
09S18E	1	300	2.5	2.5						
10S16E	5	285	1.8	18.2	1.8	1.8	3.1	3.2	12.2	1
10S17E	7	981	1.1	8.9	1.3	2.3	3.6	7.1	8.1	1
10S18E	4	1239	1.1	9.6	1.4	1.8	4.3	7.4	8.7	1
11S15E	3	1524	1.7	1.8	1.7	1.7	1.7	1.8	1.8	1
11S16E	1	127	3.1	3.1						
11S17E	2	1834	1.7	2.8	1.8	2.0	2.3	2.5	2.7	1
11S18E	4	424	2.4	4.9	2.9	3.8	4.3	4.4	4.7	1
11S19E	1	150	3.2	3.2						
11S20E	1	2129	5.4	5.4						
11S21E	1	2129	5.4	5.4						
12S15E	7	1742	2.4	17.9	2.6	2.8	10.3	17.9	17.9	0
12S16E	2	1295	2.8	6.2	3.1	3.6	4.5	5.3	5.9	1
12S17E	1	153	3.9	3.9						
12S18E	6	504	1.7	13.6	1.7	1.7	2.3	4.8	9.5	1
12S19E	17	2414	0.3	17.2	1.1	1.7	2.6	4.6	7.1	2
12S20E	1	683	9.6	9.6						
13S15E	3	1250	1.8	5.0	1.9	2.2	2.6	3.8	4.5	1
13S16E	8	2920	2.8	214.3	3.1	5.5	10.0	19.5	80.0	1
13S17E	2	580	0.7	2.8	0.9	1.2	1.7	2.2	2.5	1
13S18E	1	34	13.6	13.6						

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S09E	4	1431	44	135	51	61	91	121	129	1
03S10E	1	96	53	53						
03S11E	1	96	53	53						
04S09E	1	18	184	184						
04S10E	1	127	69	69						
04S12E	1	18	73	73						
04S23E	1	278	44	44						
05S10E	3	1624	44	68	46	50	56	62	65	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
05S11E	1	586	135	135						
05S12E	2	58	73	113	77	83	93	103	109	1
05S14E	1	1293	68	68						
05S23E	1	278	44	44						
05S25E	1	278	44	44						
06S11E	4	730	56	135	56	56	68	94	118	1
06S13E	1	300	102	102						
07S14E	12	1619	26	170	30	43	52	67	128	2
07S15E	2	473	44	66	46	50	55	61	64	1
07S16E	2	612	66	116	71	79	91	104	111	1
07S21E	1	320	66	66						
08S14E	2	598	44	66	46	50	55	61	64	1
08S15E	1	292	116	116						
09S13E	1	539	113	113						
09S15E	10	706	5	124	31	42	96	124	124	0
09S16E	1	58	75	75						
09S17E	4	468	64	170	73	86	97	118	149	1
09S18E	1	300	102	102						
10S16E	5	285	69	155	72	75	99	118	140	1
10S17E	7	981	12	170	37	77	104	141	157	1
10S18E	4	1239	12	174	31	60	123	171	173	1
11S15E	3	1524	57	68	59	62	68	68	68	0
11S16E	1	127	69	69						
11S17E	2	1834	68	135	74	84	101	118	128	1
11S18E	4	424	55	197	97	160	196	196	196	1
11S19E	1	150	110	110						
11S20E	1	2129	185	185						
11S21E	1	2129	185	185						
12S15E	7	1742	0	135	68	113	113	130	135	0
12S16E	2	1295	135	171	139	144	153	162	167	1
12S17E	1	153	119	119						
12S18E	6	504	56	130	56	58	71	79	105	1
12S19E	17	2414	-74	196	0	56	79	134	162	2
12S20E	1	683	174	174						
13S15E	3	1250	57	104	62	69	80	92	100	1
13S16E	8	2920	119	191	120	123	132	158	177	1
13S17E	2	580	-43	135	-25	1	46	90	117	1
13S18E	1	34	79	79						

Table XV-2. Summary statistics for all Pistachios management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
PISTACHIOS /YEAR > 4	75	14996.46	0.010	6.000	0.040	0.050	0.080	0.179	1	8
PISTACHIOS /YEAR 2	2	497.14	0.050	0.050						
PISTACHIOS /YEAR 3	3	748.00	0.050	0.083	0.053	0.059	0.067	0.075	0	1
PISTACHIOS /YEAR NR	10	1064.04	0.035	0.519	0.036	0.043	0.074	0.105	0	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
PISTACHIOS /YEAR > 4	75	14996	0.3	214.3	1.4	1.8	2.9	6.4	18.1	8
PISTACHIOS /YEAR 2	2	497	1.8	1.8						
PISTACHIOS /YEAR 3	3	748	1.8	3.0	1.9	2.1	2.4	2.7	2.9	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
PISTACHIOS /YEAR NR	10	1064	1.3	18.6	1.3	1.5	2.6	3.8	14.1	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
PISTACHIOS /YEAR > 4	75	14996	-74	197	39	65	104	127	170	8
PISTACHIOS /YEAR 2	2	497	0	44	4	11	22	33	40	1
PISTACHIOS /YEAR 3	3	748	44	116	48	55	66	91	106	1
PISTACHIOS /YEAR NR	10	1064	26	191	28	43	68	127	135	1

Figure XV-2. Scatter plot of A vs. Y for Pistachios crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

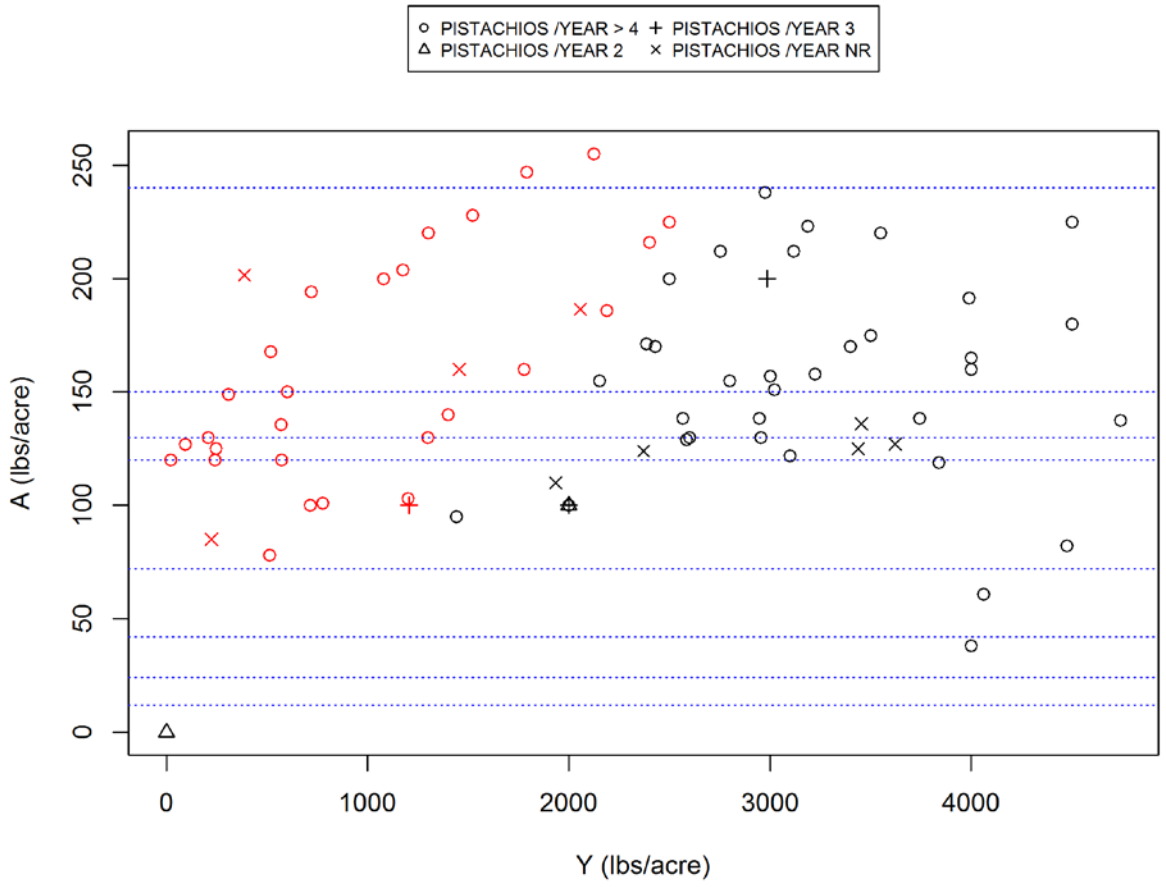


Table XV-3. Description of recommended nitrogen application values for Pistachios (in lbs/acre).

Crop Specifics	Min	Max	Study Specifics	Source
Pistachios /Year 1	0	12	Optimal leaf N concentration of 2-6-2.9% for rapidly growing immature trees. 120 trees/acre. N is best applied mid-spring and early summer.	CDFA
Pistachios /Year 2	18	24		
Pistachios /Year 3	30	42		
Pistachios /Year 4	60	72		
Pistachios /Year 5	100	120		
Pistachios /Year 6	120	130		

Crop Specifics	Min	Max	Study Specifics	Source
Pistachios /Year 7	135	150		
Pistachios /Year >9 (Drip)	40	240	Approximate N application rates based on desired yield. Minimum value is for a yield of 1000 lbs/acre; maximum produces 6000 lbs/acre	
Pistachios /Year >10 (Furrow)	56	336		

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

XVI. POMEGRANATES

Figure XVI-1. Box and Whisker plots of A/Y for bearing Pomegranates management units grouped by T-R blocks. Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

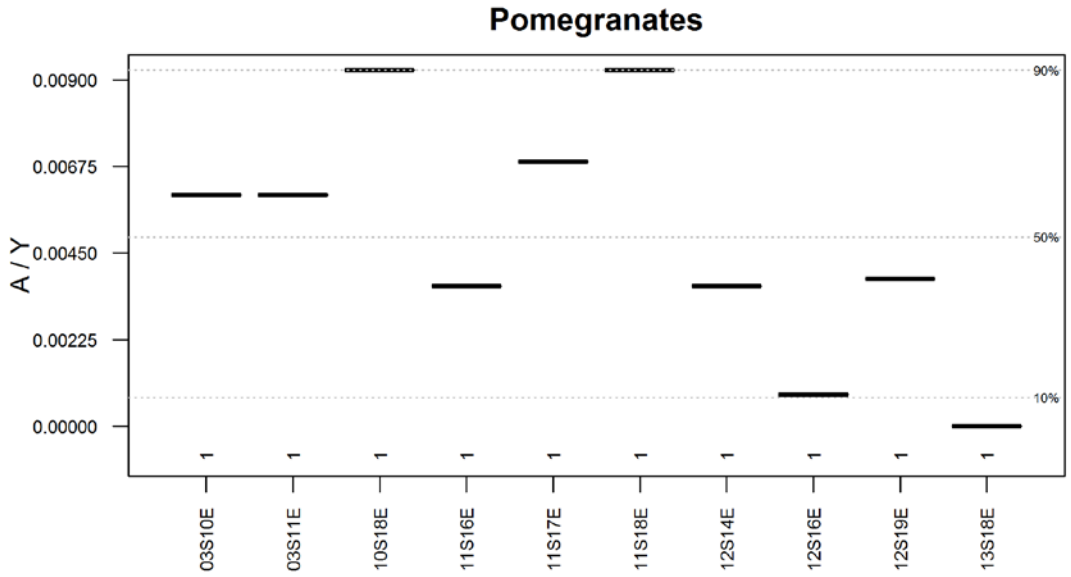


Table XVI-1. Summary statistics for Pomegranates management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S10E	1	24	0.006	0.006						
03S11E	1	24	0.006	0.006						
10S18E	1	152	0.009	0.009						
11S16E	1	124	0.004	0.004						
11S17E	1	64	0.007	0.007						
11S18E	1	152	0.009	0.009						
12S14E	1	124	0.004	0.004						
12S16E	1	110	0.001	0.001						
12S19E	1	75	0.004	0.004						
13S18E	1	27	0.000	0.000						

Table XVI-2. Summary statistics for all Pomegranates management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
POMEGRATES /YEAR > 4	7	576.4	0	0.009	0	0.002	0.004	0.006	0	1

Figure XVI-2. Scatter plot of A vs. Y for Pomegranates crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

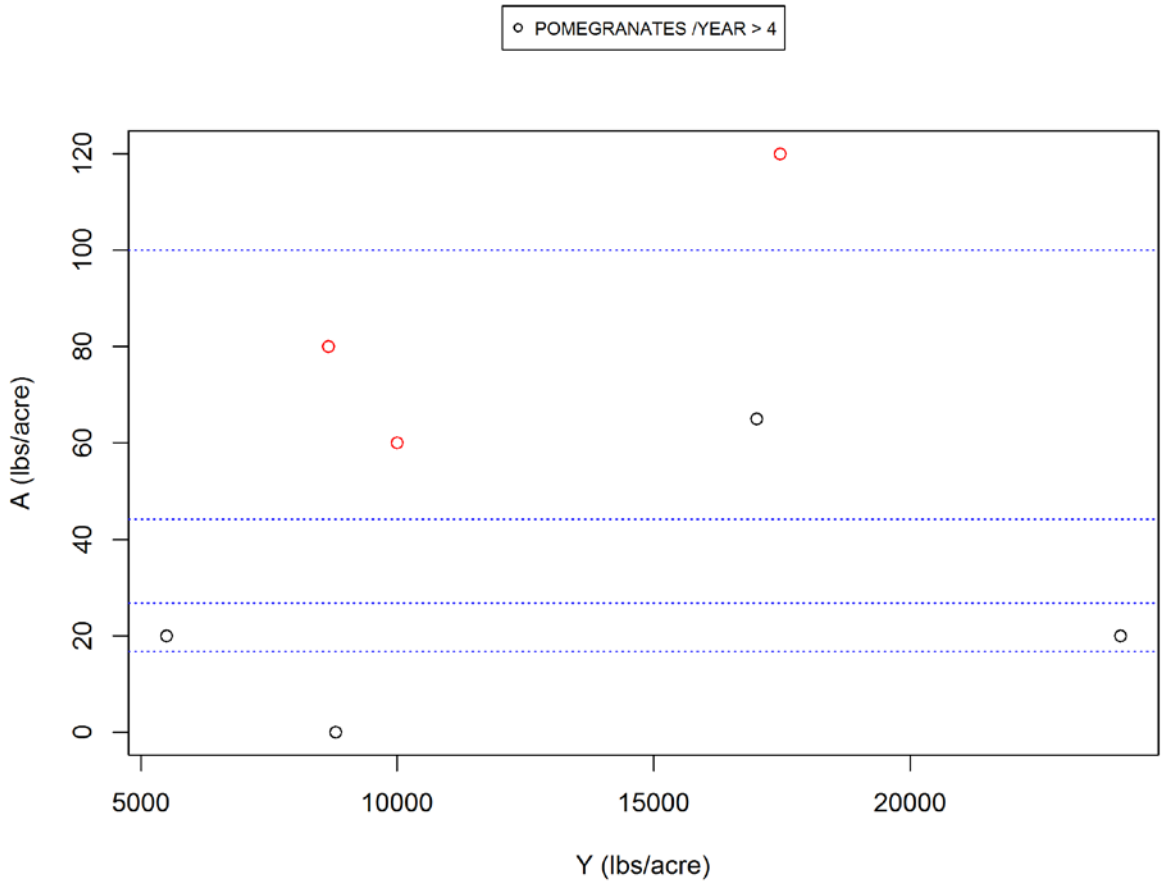


Table XVI-3. Description of recommended nitrogen application values for Pomegranates (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Pomegranates /Year > 4	75	125.00	Assume furrow irrigation with no specific variety of pomegranates planted at 134 trees/acre. Trees are assumed to be 25 years, and have a projected yield of 6,300-11,200 lbs/acre yield. Values are from a cost study, not a reccomen	UC Davis
Pomegranates /Year 1	0	16.75		
Pomegranates /Year 2	16.75	26.80		
Pomegranates /Year 3	26.8	44.22		
Pomegranates /Year 4	44.22	100.00		

UC Davis - http://coststudies.ucdavis.edu/current/

Figure XVII-1. Box and Whisker plots of A/Y for bearing Potatoes management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

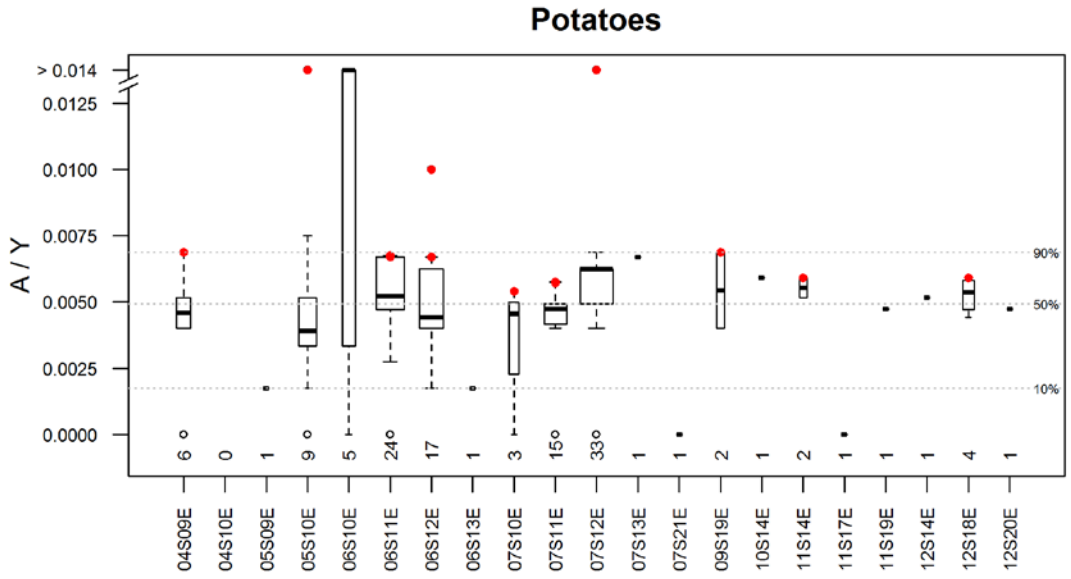


Table XVII-1. Summary statistics for Potatoes management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
04S09E	6	2574	0.000	0.007	0.002	0.004	0.005	0.005	0.006	1
05S09E	1	116	0.002	0.002						
05S10E	9	1014	0.000	0.069	0.001	0.003	0.004	0.005	0.020	1
06S10E	5	378	0.000	0.139	0.001	0.003	0.040	0.040	0.099	1
06S11E	25	3220	0.000	0.007	0.003	0.005	0.005	0.007	0.007	9
06S12E	17	2048	0.002	0.010	0.003	0.004	0.004	0.006	0.007	3
06S13E	1	116	0.002	0.002						
07S10E	3	1898	0.000	0.005	0.001	0.002	0.005	0.005	0.005	1
07S11E	15	4092	0.000	0.006	0.004	0.004	0.005	0.005	0.006	2
07S12E	33	3580	0.000	0.344	0.004	0.005	0.006	0.006	0.007	1
07S13E	1	20	0.007	0.007						
07S21E	1	1624	0.000	0.000						
09S19E	2	380	0.004	0.007	0.004	0.005	0.005	0.006	0.007	1
10S14E	1	38	0.006	0.006						
11S14E	2	324	0.005	0.006	0.005	0.005	0.006	0.006	0.006	1
11S17E	1	234	0.000	0.000						
11S19E	1	378	0.005	0.005						
12S14E	1	286	0.005	0.005						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
12S18E	4	408	0.004	0.006	0.005	0.005	0.005	0.006	0.006	1
12S20E	1	378	0.005	0.005						

Table XVII-2. Summary statistics for all Potatoes management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
POTATOES	4	164.10	0.002	0.004	0.002	0.004	0.004	0.004	0	0
SWEET POTATOES	79	6817.94	0.000	0.344	0.004	0.004	0.006	0.007	0	7

Figure XVII-2. Scatter plot of A vs. Y for Potatoes crops with all T-R together.

Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

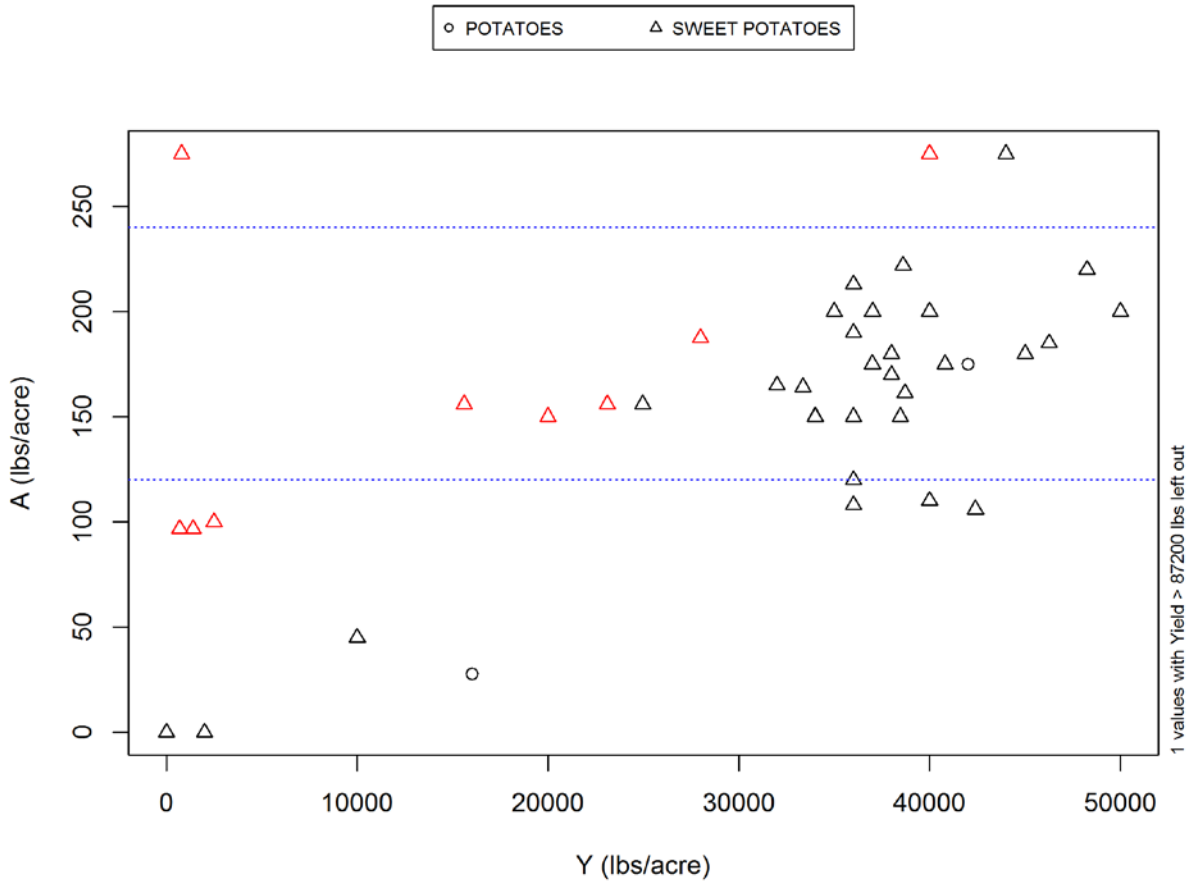


Table XVII-3. Description of recommended nitrogen application values for Potatoes (in lbs/acre).

Crop specifics	Min	Max	Study Specifics	Source
Potatoes	160	240	For a 22.4 tons/acre crop. Includes nitrogen from all sources. Rate varies considerably with variety, growing location and year.	CDFA
Sweet Potatoes		120	Value based on typical practices to produce transplants and sweet potatoes. Not applicable to all fields. N applied with drip Irrigation.	UC Davis

UC Davis - http://coststudies.ucdavis.edu/current/

XVIII. SUDAN

Figure XVIII-1. Box and Whisker plots of A/Y for bearing Sudan management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

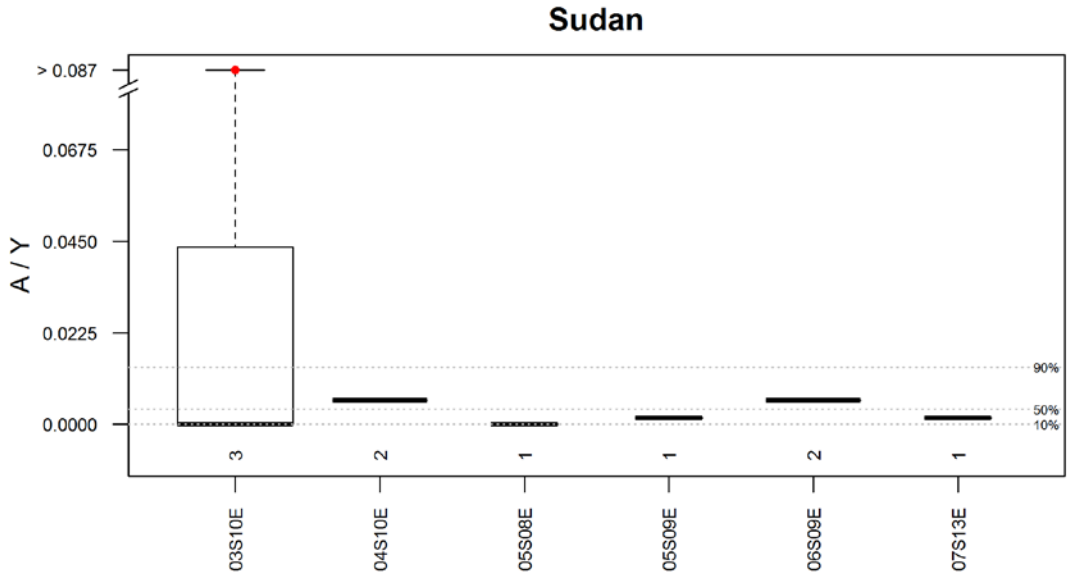


Table XVIII-1. Summary statistics for Sudan management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
03S10E	3	107	0.000	0.100	0	0	0	0.05	0.08	1
04S10E	2	306	0.006	0.006						
05S08E	1	90	0.000	0.000						
05S09E	1	64	0.002	0.002						
06S09E	2	306	0.006	0.006						
07S13E	1	64	0.002	0.002						

Table XVIII-2. Summary statistics for all Sudan management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
SUDAN, SILAGE	7	566.5	0	0.1	0	0	0.002	0.006	0	1

Figure XVIII-2. Scatter plot of A vs. Y for Sudan crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

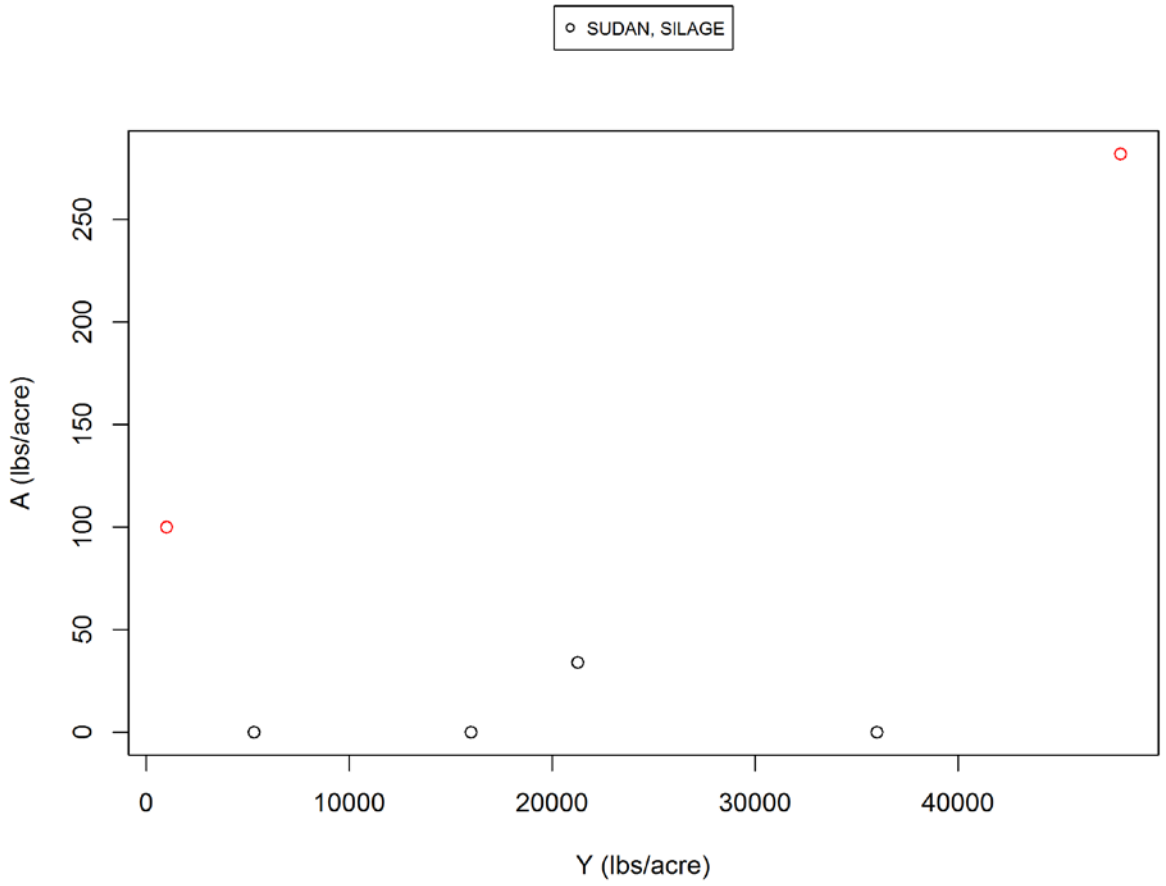


Figure XIX-1. Box and Whisker plots of A/Y for bearing Tomatoes management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

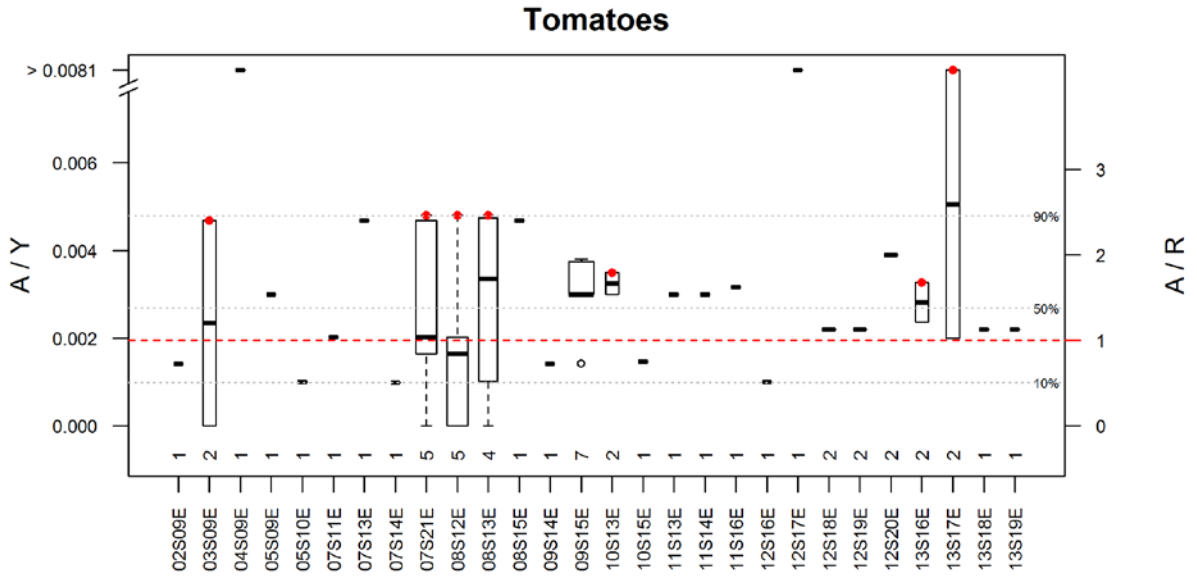


Table XIX-1. Summary statistics for Tomatoes management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	1	215	0.001	0.001						
03S09E	2	914	0.000	0.005	0.000	0.001	0.002	0.004	0.004	1
04S09E	1	36	0.050	0.050						
05S09E	1	216	0.003	0.003						
05S10E	1	898	0.001	0.001						
07S11E	1	891	0.002	0.002						
07S13E	1	604	0.005	0.005						
07S14E	1	32	0.001	0.001						
07S21E	5	2823	0.000	0.005	0.001	0.002	0.002	0.005	0.005	1
08S12E	5	2549	0.000	0.005	0.000	0.000	0.002	0.002	0.004	1
08S13E	4	2787	0.000	0.005	0.001	0.002	0.003	0.005	0.005	1
08S15E	1	604	0.005	0.005						
09S14E	1	215	0.001	0.001						
09S15E	7	417	0.001	0.004	0.002	0.003	0.003	0.004	0.004	0
10S13E	2	266	0.003	0.004	0.003	0.003	0.003	0.003	0.003	1
10S15E	1	91	0.001	0.001						
11S13E	1	216	0.003	0.003						
11S14E	1	216	0.003	0.003						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
11S16E	1	204	0.003	0.003						
12S16E	1	898	0.001	0.001						
12S17E	1	36	0.050	0.050						
12S18E	2	262	0.002	0.002						
12S19E	2	262	0.002	0.002						
12S20E	2	432	0.004	0.004						
13S16E	2	320	0.002	0.003	0.002	0.003	0.003	0.003	0.003	1
13S17E	2	186	0.002	0.050	0.007	0.014	0.026	0.038	0.045	1
13S18E	1	60	0.002	0.002						
13S19E	1	60	0.002	0.002						

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	1	215	0.7	0.7						
03S09E	2	914	0.0	2.4	0.2	0.6	1.2	1.8	2.2	1
04S09E	1	36	25.6	25.6						
05S09E	1	216	1.5	1.5						
05S10E	1	898	0.5	0.5						
07S11E	1	891	1.0	1.0						
07S13E	1	604	2.4	2.4						
07S14E	1	32	0.5	0.5						
07S21E	5	2823	0.0	2.5	0.3	0.8	1.0	2.4	2.4	1
08S12E	5	2549	0.0	2.5	0.0	0.0	0.8	1.0	1.9	1
08S13E	4	2787	0.0	2.5	0.3	0.8	1.7	2.4	2.4	1
08S15E	1	604	2.4	2.4						
09S14E	1	215	0.7	0.7						
09S15E	7	417	0.7	1.9	1.2	1.5	1.5	1.9	1.9	0
10S13E	2	266	1.5	1.8	1.6	1.6	1.7	1.7	1.8	1
10S15E	1	91	0.7	0.7						
11S13E	1	216	1.5	1.5						
11S14E	1	216	1.5	1.5						
11S16E	1	204	1.6	1.6						
12S16E	1	898	0.5	0.5						
12S17E	1	36	25.6	25.6						
12S18E	2	262	1.1	1.1						
12S19E	2	262	1.1	1.1						
12S20E	2	432	2.0	2.0						
13S16E	2	320	1.2	1.7	1.3	1.3	1.4	1.6	1.6	1
13S17E	2	186	1.0	25.6	3.5	7.2	13.3	19.5	23.2	1
13S18E	1	60	1.1	1.1						
13S19E	1	60	1.1	1.1						

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	1	215	-67	-67						
03S09E	2	914	-113	117	-90	-56	2	59	94	1
04S09E	1	36	189	189						
05S09E	1	216	95	95						
05S10E	1	898	-182	-182						
07S11E	1	891	8	8						
07S13E	1	604	117	117						
07S14E	1	32	-110	-110						
07S21E	5	2823	-113	132	-78	-26	8	117	126	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S12E	5	2549	-113	132	-113	-113	-26	8	82	1
08S13E	4	2787	-83	132	-56	-15	62	121	127	1
08S15E	1	604	117	117						
09S14E	1	215	-67	-67						
09S15E	7	417	-67	202	59	143	143	198	202	0
10S13E	2	266	78	95	79	82	86	91	93	1
10S15E	1	91	-59	-59						
11S13E	1	216	95	95						
11S14E	1	216	95	95						
11S16E	1	204	141	141						
12S16E	1	898	-182	-182						
12S17E	1	36	189	189						
12S18E	2	262	47	47						
12S19E	2	262	47	47						
12S20E	2	432	241	241						
13S16E	2	320	55	126	62	72	90	108	118	1
13S17E	2	186	6	189	24	52	97	143	171	1
13S18E	1	60	47	47						
13S19E	1	60	47	47						

Table XIX-2. Summary statistics for all Tomatoes management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
TOMATOES, FRESH MARKET	12	2550.68	0.001	0.050	0.003	0.003	0.004	0.004	0	2
TOMATOES, PROCESSING	17	4377.75	0.000	0.004	0.000	0.001	0.002	0.003	0	2

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
TOMATOES, FRESH MARKET	12	2551	0.5	25.6	1.5	1.5	1.9	2.1	2.5	2
TOMATOES, PROCESSING	17	4378	0.0	2.0	0.0	0.7	1.0	1.5	1.8	2

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
TOMATOES, FRESH MARKET	12	2551	-182	202	81	128	143	193	201	2
TOMATOES, PROCESSING	17	4378	-113	241	-111	-67	8	95	181	2

Figure XIX-2. Scatter plot of A vs. Y for Tomatoes crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

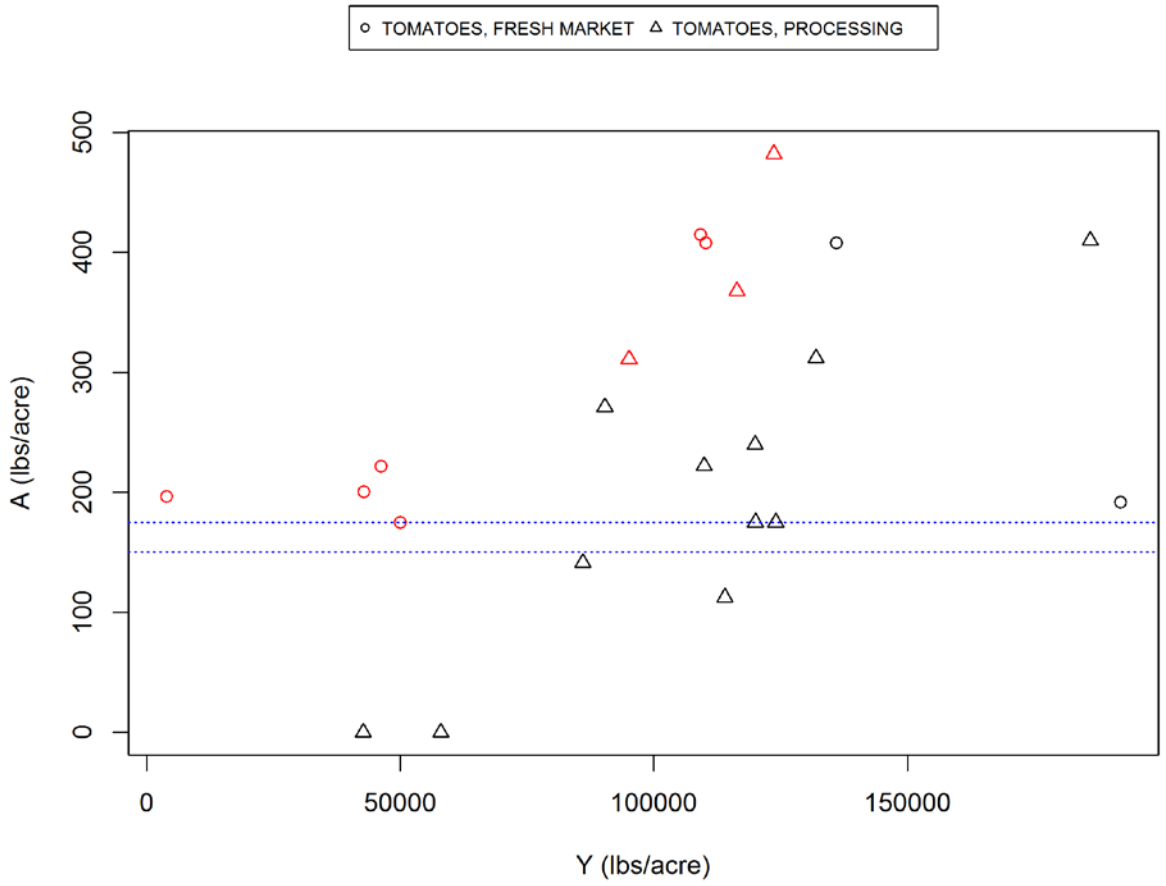


Table XIX-3. Description of recommended nitrogen application values for Tomatoes (in lbs/acre).

CROP SPECIFICS	MIN	MAX	STUDY SPECIFICS	SOURCE
Tomatoes, Processing	150	175	For drip irrigated tomatoes. Adequate for most soils	CDFA
Tomatoes, Processing	100	150	For furrow irrigated tomatoes	CDFA

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

Figure XX-1. Box and Whisker plots of A/Y for bearing Walnuts management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

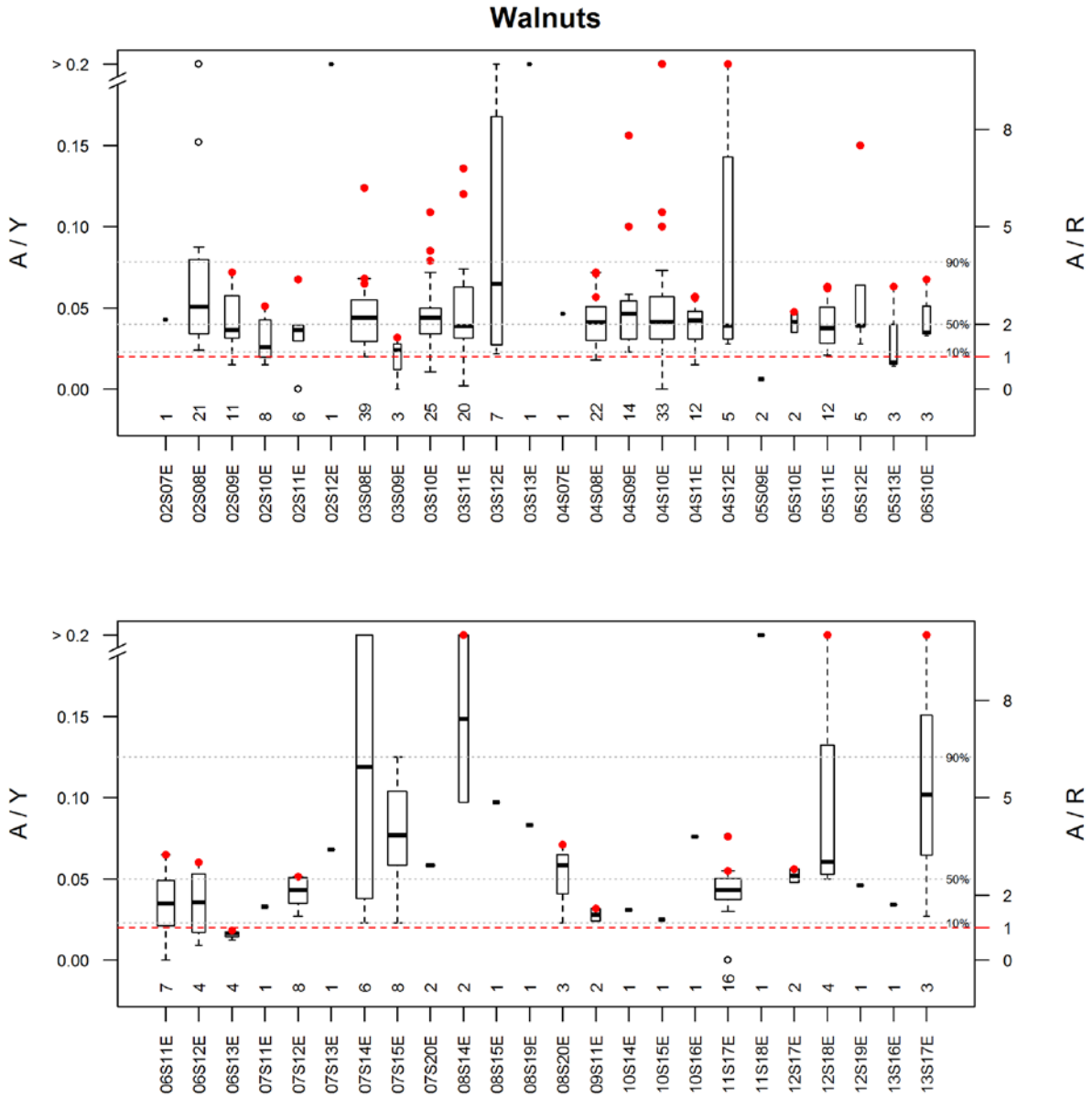


Table XX-1. Summary statistics for Walnuts management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	1	35	0.043	0.043						
02S08E	21	858	0.024	0.252	0.030	0.034	0.051	0.080	0.252	0
02S09E	11	416	0.015	0.072	0.024	0.031	0.037	0.057	0.061	1
02S10E	8	1026	0.015	0.051	0.016	0.021	0.026	0.041	0.047	1
02S11E	6	580	0.000	0.067	0.015	0.031	0.036	0.039	0.053	1
02S12E	1	75	0.281	0.281						
03S08E	39	1569	0.020	0.124	0.023	0.030	0.044	0.055	0.063	4
03S09E	3	208	0.000	0.032	0.005	0.012	0.024	0.028	0.030	1
03S10E	25	1424	0.011	0.109	0.028	0.034	0.044	0.050	0.076	3
03S11E	20	1648	0.002	0.136	0.023	0.032	0.039	0.061	0.079	2
03S12E	7	836	0.022	0.307	0.024	0.027	0.065	0.208	0.291	1
03S13E	1	70	0.574	0.574						
04S07E	1	25	0.046	0.046						
04S08E	22	1330	0.018	0.072	0.025	0.031	0.041	0.051	0.056	3
04S09E	14	561	0.023	0.156	0.028	0.031	0.046	0.054	0.088	2
04S10E	33	1654	0.000	1.007	0.022	0.031	0.042	0.057	0.095	4
04S11E	12	594	0.015	0.057	0.022	0.031	0.042	0.047	0.055	2
04S12E	5	677	0.028	2.800	0.029	0.031	0.039	0.143	1.737	1
05S09E	2	29	0.006	0.006						
05S10E	2	159	0.035	0.048	0.036	0.038	0.041	0.045	0.046	1
05S11E	12	595	0.021	0.063	0.024	0.029	0.038	0.050	0.061	2
05S12E	6	626	0.028	0.150	0.032	0.039	0.039	0.064	0.116	1
05S13E	3	380	0.014	0.063	0.015	0.015	0.017	0.040	0.054	1
06S10E	3	216	0.033	0.067	0.033	0.034	0.035	0.051	0.061	1
06S11E	7	484	0.000	0.065	0.006	0.021	0.035	0.049	0.056	1
06S12E	4	276	0.009	0.060	0.014	0.021	0.035	0.050	0.056	1
06S13E	4	283	0.012	0.018	0.014	0.016	0.017	0.017	0.018	1
07S11E	1	105	0.033	0.033						
07S12E	8	323	0.027	0.051	0.029	0.038	0.043	0.051	0.051	1
07S13E	1	80	0.068	0.068						
07S14E	6	257	0.023	0.330	0.030	0.038	0.144	0.250	0.290	1
07S15E	8	853	0.023	0.125	0.048	0.059	0.077	0.093	0.125	0
07S20E	2	673	0.059	0.059						
08S14E	2	56	0.097	0.200	0.107	0.123	0.149	0.174	0.190	1
08S15E	1	46	0.097	0.097						
08S19E	1	3	0.083	0.083						
08S20E	3	464	0.023	0.071	0.030	0.041	0.059	0.065	0.069	1
09S11E	2	163	0.024	0.032	0.025	0.026	0.028	0.030	0.031	1
10S14E	1	20	0.031	0.031						
10S15E	1	80	0.025	0.025						
10S16E	1	72	0.076	0.076						
11S17E	16	760	0.000	0.076	0.033	0.038	0.043	0.050	0.053	2
11S18E	1	70	0.574	0.574						
12S17E	2	108	0.048	0.056	0.049	0.050	0.052	0.054	0.055	1
12S18E	4	215	0.050	0.215	0.052	0.055	0.061	0.103	0.170	1
12S19E	1	45	0.046	0.046						
13S16E	1	40	0.034	0.034						
13S17E	3	189	0.027	0.272	0.042	0.065	0.102	0.187	0.238	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	1	35	2.1	2.1						
02S08E	21	858	1.2	12.6	1.5	1.7	2.5	4.0	12.6	0

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	11	416	0.8	3.6	1.2	1.6	1.8	2.9	3.1	1
02S10E	8	1026	0.8	2.6	0.8	1.0	1.3	2.1	2.3	1
02S11E	6	580	0.0	3.4	0.7	1.6	1.8	1.9	2.7	1
02S12E	1	75	14.0	14.0						
03S08E	39	1569	1.0	6.2	1.2	1.5	2.2	2.8	3.2	4
03S09E	3	208	0.0	1.6	0.2	0.6	1.2	1.4	1.5	1
03S10E	25	1424	0.5	5.4	1.4	1.7	2.2	2.5	3.8	3
03S11E	20	1648	0.1	6.8	1.2	1.6	1.9	3.1	3.9	2
03S12E	7	836	1.1	15.3	1.2	1.4	3.2	10.4	14.6	1
03S13E	1	70	28.7	28.7						
04S07E	1	25	2.3	2.3						
04S08E	22	1330	0.9	3.6	1.3	1.5	2.1	2.5	2.8	3
04S09E	14	561	1.1	7.8	1.4	1.6	2.3	2.7	4.4	2
04S10E	33	1654	0.0	50.3	1.1	1.5	2.1	2.8	4.7	4
04S11E	12	594	0.8	2.9	1.1	1.5	2.1	2.3	2.8	2
04S12E	5	677	1.4	140.0	1.5	1.6	2.0	7.1	86.9	1
05S09E	2	29	0.3	0.3						
05S10E	2	159	1.8	2.4	1.8	1.9	2.1	2.2	2.3	1
05S11E	12	595	1.0	3.2	1.2	1.4	1.9	2.5	3.0	2
05S12E	6	626	1.4	7.5	1.6	1.9	2.0	3.2	5.8	1
05S13E	3	380	0.7	3.2	0.7	0.8	0.8	2.0	2.7	1
06S10E	3	216	1.7	3.4	1.7	1.7	1.7	2.6	3.0	1
06S11E	7	484	0.0	3.2	0.3	1.1	1.8	2.4	2.8	1
06S12E	4	276	0.5	3.0	0.7	1.1	1.8	2.5	2.8	1
06S13E	4	283	0.6	0.9	0.7	0.8	0.8	0.9	0.9	1
07S11E	1	105	1.7	1.7						
07S12E	8	323	1.3	2.6	1.5	1.9	2.2	2.5	2.5	1
07S13E	1	80	3.4	3.4						
07S14E	6	257	1.1	16.5	1.5	1.9	7.2	12.5	14.5	1
07S15E	8	853	1.2	6.2	2.4	2.9	3.8	4.7	6.2	0
07S20E	2	673	2.9	2.9						
08S14E	2	56	4.9	10.0	5.4	6.1	7.4	8.7	9.5	1
08S15E	1	46	4.9	4.9						
08S19E	1	3	4.1	4.1						
08S20E	3	464	1.2	3.6	1.5	2.0	2.9	3.2	3.4	1
09S11E	2	163	1.2	1.6	1.2	1.3	1.4	1.5	1.5	1
10S14E	1	20	1.5	1.5						
10S15E	1	80	1.2	1.2						
10S16E	1	72	3.8	3.8						
11S17E	16	760	0.0	3.8	1.7	1.9	2.2	2.5	2.6	2
11S18E	1	70	28.7	28.7						
12S17E	2	108	2.4	2.8	2.4	2.5	2.6	2.7	2.8	1
12S18E	4	215	2.5	10.8	2.6	2.7	3.0	5.1	8.5	1
12S19E	1	45	2.3	2.3						
13S16E	1	40	1.7	1.7						
13S17E	3	189	1.4	13.6	2.1	3.2	5.1	9.4	11.9	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S07E	1	35	112	112						
02S08E	21	858	20	168	58	68	94	117	125	1
02S09E	11	416	-38	183	10	47	70	106	114	1
02S10E	8	1026	-38	100	-26	1	12	53	73	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S11E	6	580	-30	90	0	41	75	86	89	1
02S12E	1	75	166	166						
03S08E	39	1569	0	162	22	48	75	105	125	4
03S09E	3	208	-40	70	-30	-15	10	40	58	1
03S10E	25	1424	-31	188	25	70	80	120	131	3
03S11E	20	1648	-1935	205	19	60	75	88	131	2
03S12E	7	836	13	166	18	27	128	134	150	1
03S13E	1	70	79	79						
04S07E	1	25	119	119						
04S08E	22	1330	-5	188	5	40	102	127	136	3
04S09E	14	561	18	182	35	40	60	111	132	2
04S10E	33	1654	-40	188	6	58	82	112	149	4
04S11E	12	594	-10	151	8	59	98	112	124	2
04S12E	5	677	28	172	35	47	55	57	126	1
05S09E	2	29	-68	-68						
05S10E	2	159	90	182	99	113	136	159	173	1
05S11E	12	595	3	187	25	47	71	90	160	2
05S12E	6	626	47	137	51	57	104	107	125	1
05S13E	3	380	-33	76	-29	-24	-15	31	58	1
06S10E	3	216	21	88	25	30	39	64	78	1
06S11E	7	484	-75	90	-48	5	60	77	90	0
06S12E	4	276	-75	105	-46	-3	56	94	101	1
06S13E	4	283	-61	-7	-48	-27	-15	-13	-9	1
07S11E	1	105	39	39						
07S12E	8	323	14	125	39	59	78	99	125	0
07S13E	1	80	84	84						
07S14E	6	257	18	115	32	54	74	105	115	0
07S15E	8	853	7	175	27	52	81	122	175	0
07S20E	2	673	58	58						
08S14E	2	56	36	139	46	62	87	113	129	1
08S15E	1	46	139	139						
08S19E	1	3	175	175						
08S20E	3	464	7	58	13	21	36	47	54	1
09S11E	2	163	10	70	16	25	40	55	64	1
10S14E	1	20	67	67						
10S15E	1	80	24	24						
10S16E	1	72	139	139						
11S17E	16	760	-30	139	64	74	105	120	125	1
11S18E	1	70	79	79						
12S17E	2	108	64	161	74	88	112	137	151	1
12S18E	4	215	60	161	69	82	113	142	153	1
12S19E	1	45	105	105						
13S16E	1	40	125	125						
13S17E	3	189	30	141	51	83	135	138	140	1

Table XX-2. Summary statistics for all Walnuts management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WALNUTS, ENGLISH /YEAR > 4	196	11421.88	0.000	0.281	0.023	0.030	0.040	0.055	0	20
WALNUTS, ENGLISH /YEAR 1	3	124.00	0.025	0.250	0.070	0.138	0.250	0.250	0	0
WALNUTS, ENGLISH /YEAR 2	7	326.00	0.029	2.800	0.033	0.043	0.150	0.581	2	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WALNUTS, ENGLISH /YEAR 3	4	288.00	0.136	0.330	0.163	0.204	0.272	0.301	0	1
WALNUTS, ENGLISH /YEAR 4	7	202.50	0.024	0.124	0.029	0.034	0.068	0.072	0	1
WALNUTS, ENGLISH /YEAR NR	39	1916.75	0.000	0.574	0.017	0.030	0.043	0.079	0	2

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WALNUTS, ENGLISH /YEAR > 4	196	11422	0.0	14.0	1.1	1.5	2.0	2.8	3.6	20
WALNUTS, ENGLISH /YEAR 1	3	124	1.3	12.5	3.5	6.9	12.5	12.5	12.5	0
WALNUTS, ENGLISH /YEAR 2	7	326	1.4	140.0	1.6	2.2	7.5	29.1	86.2	1
WALNUTS, ENGLISH /YEAR 3	4	288	6.8	16.5	8.2	10.2	13.6	15.1	15.9	1
WALNUTS, ENGLISH /YEAR 4	7	202	1.2	6.2	1.5	1.7	3.4	3.6	4.6	1
WALNUTS, ENGLISH /YEAR NR	39	1917	0.0	28.7	0.8	1.5	2.1	4.0	12.6	2

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WALNUTS, ENGLISH /YEAR > 4	196	11422	-1935	205	8	43	80	115	142	20
WALNUTS, ENGLISH /YEAR 1	3	124	3	115	25	59	115	115	115	0
WALNUTS, ENGLISH /YEAR 2	7	326	15	137	15	22	34	57	96	1
WALNUTS, ENGLISH /YEAR 3	4	288	47	141	63	87	128	135	139	1
WALNUTS, ENGLISH /YEAR 4	7	202	10	104	17	29	43	67	92	1
WALNUTS, ENGLISH /YEAR NR	39	1917	-61	178	-15	56	80	114	162	4

Figure XX-2. Scatter plot of A vs. Y for Walnuts crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

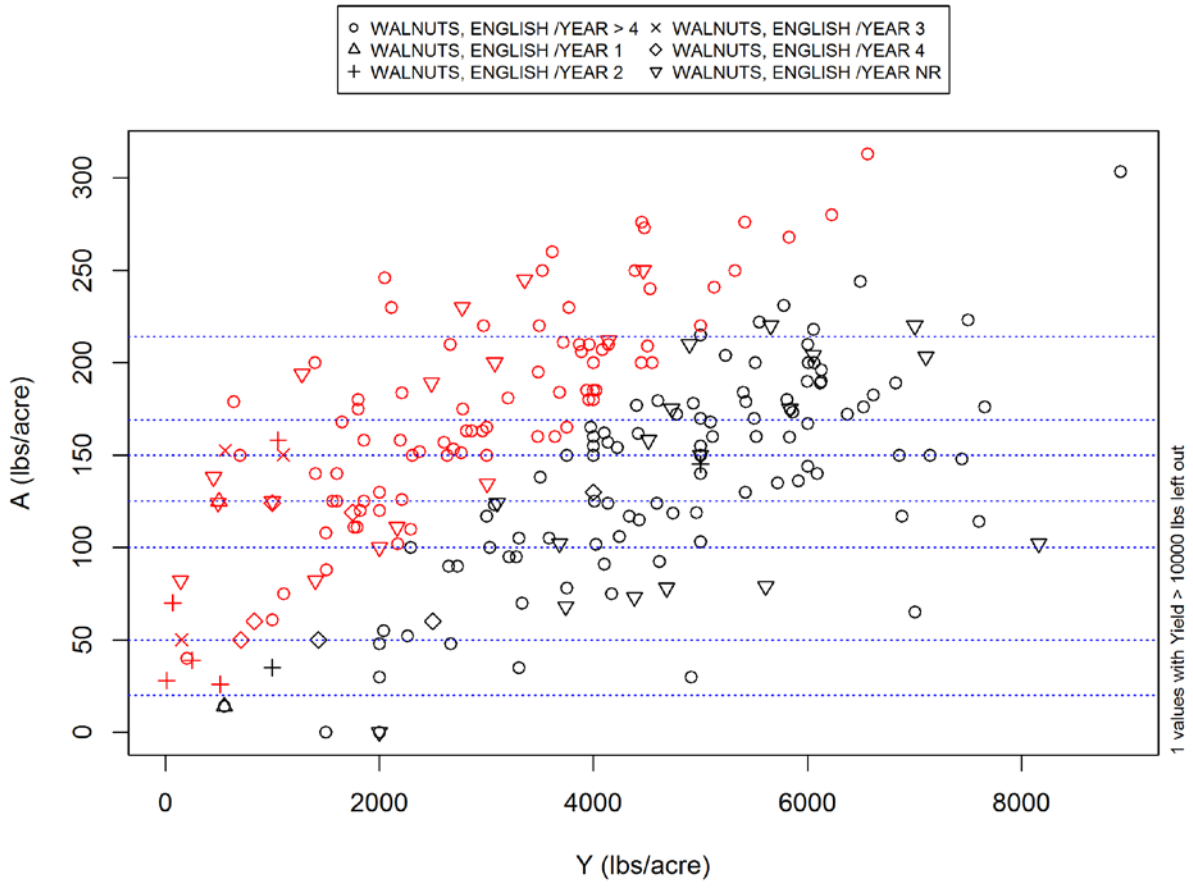


Table XX-3. Description of recommended nitrogen application values for Walnuts (in lbs/acre).

Crop Specifics	Min	Max	Study Specifics	Source
Walnuts /Year 1	10	20	Minimum rates refer to N applied through drip or micro-sprinkler irrigation. Based on tree density of 65 trees/acre	CDFA
Walnuts /Year 2	25	50		CDFA
Walnuts /Year 3	50	100		CDFA
Walnuts /Year 4	63	125		CDFA
Walnuts /Year 5	75	150		CDFA
Walnuts /Year > 5		169	N application rates dependent on Yield. This value is for 2.5 tons (5000 lbs) of projected yield. Fertigation	CDFA
Walnuts /Year > 5		214	N application rates dependent on Yield. This value is for 2.5 tons (5000 lbs) of projected yield. Split broadcast	CDFA

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

XXI. WHEAT

Figure XXI-1. Box and Whisker plots of A/Y for bearing Wheat management units grouped by T-R blocks.
Numbers at the bottom indicate the number of management units within each T-R. The width of the box is proportional to the sample size. Horizontal grey dashed lines represent the 10%, 50% (median), and 90% percentiles for all TRs together. Red dots are local outliers (A/Y > 90% percentile within each T-R).

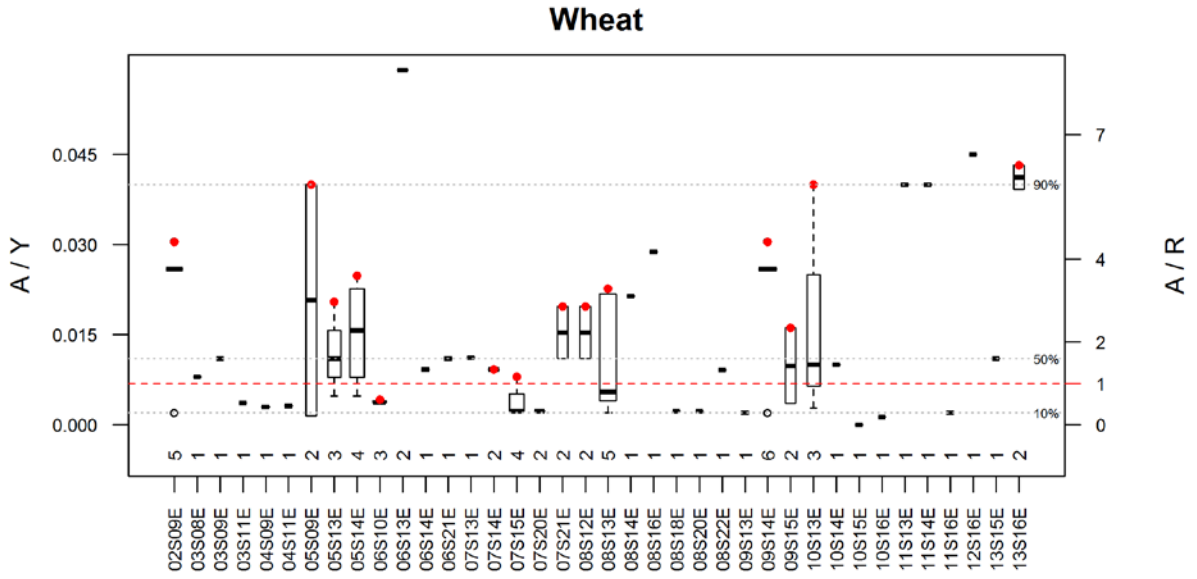


Table XXI-1. Summary statistics for Wheat management units grouped by T-R blocks.
TR blocks with only one management unit (Count = 1) have no summary statistics because a range of values is necessary to estimate percentiles. Management units that split across multiple T-R blocks are counted once within each TR, such that the Count and Sum of Acres by TRs adds up to a value larger than the total for the region.

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	5	158	0.002	0.030	0.012	0.026	0.026	0.026	0.029	1
03S08E	1	39	0.008	0.008						
03S09E	1	39	0.011	0.011						
03S11E	1	141	0.004	0.004						
04S09E	1	43	0.003	0.003						
04S11E	1	48	0.003	0.003						
05S09E	2	672	0.002	0.040	0.005	0.011	0.021	0.030	0.036	1
05S13E	3	740	0.005	0.020	0.006	0.008	0.011	0.016	0.019	1
05S14E	4	1040	0.005	0.025	0.007	0.009	0.016	0.022	0.024	1
06S10E	3	215	0.004	0.004	0.004	0.004	0.004	0.004	0.004	1
06S13E	2	70	0.059	0.059						
06S14E	1	194	0.009	0.009						
06S21E	1	39	0.011	0.011						
07S13E	1	20	0.011	0.011						
07S14E	2	360	0.009	0.009	0.009	0.009	0.009	0.009	0.009	1
07S15E	4	298	0.002	0.008	0.002	0.002	0.002	0.004	0.006	1
07S20E	2	108	0.002	0.002						
07S21E	2	262	0.011	0.020	0.012	0.013	0.015	0.018	0.019	1

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
08S12E	2	262	0.011	0.020	0.012	0.013	0.015	0.018	0.019	1
08S13E	5	534	0.002	0.023	0.003	0.004	0.005	0.022	0.022	1
08S14E	1	131	0.021	0.021						
08S16E	1	13	0.029	0.029						
08S18E	1	40	0.002	0.002						
08S20E	1	52	0.002	0.002						
08S22E	1	166	0.009	0.009						
09S13E	1	33	0.002	0.002						
09S14E	6	193	0.002	0.030	0.014	0.026	0.026	0.026	0.028	1
09S15E	2	338	0.004	0.016	0.005	0.007	0.010	0.013	0.015	1
10S13E	3	598	0.003	0.040	0.004	0.006	0.010	0.025	0.034	1
10S14E	1	42	0.010	0.010						
10S15E	1	77	0.000	0.000						
10S16E	1	38	0.001	0.001						
11S13E	1	401	0.040	0.040						
11S14E	1	401	0.040	0.040						
11S16E	1	116	0.002	0.002						
12S16E	1	190	0.045	0.045						
13S15E	1	200	0.011	0.011						
13S16E	2	98	0.039	0.043	0.040	0.040	0.041	0.042	0.043	1

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	5	158	0.3	4.4	1.7	3.8	3.8	3.8	4.2	1
03S08E	1	39	1.2	1.2						
03S09E	1	39	1.6	1.6						
03S11E	1	141	0.5	0.5						
04S09E	1	43	0.4	0.4						
04S11E	1	48	0.5	0.5						
05S09E	2	672	0.2	5.8	0.8	1.6	3.0	4.4	5.2	1
05S13E	3	740	0.7	3.0	0.9	1.1	1.6	2.3	2.7	1
05S14E	4	1040	0.7	3.6	1.0	1.4	2.3	3.1	3.4	1
06S10E	3	215	0.5	0.6	0.5	0.5	0.5	0.6	0.6	1
06S13E	2	70	8.6	8.6						
06S14E	1	194	1.3	1.3						
06S21E	1	39	1.6	1.6						
07S13E	1	20	1.6	1.6						
07S14E	2	360	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1
07S15E	4	298	0.3	1.2	0.3	0.3	0.3	0.5	0.9	1
07S20E	2	108	0.3	0.3						
07S21E	2	262	1.6	2.9	1.7	1.9	2.2	2.5	2.7	1
08S12E	2	262	1.6	2.9	1.7	1.9	2.2	2.5	2.7	1
08S13E	5	534	0.3	3.3	0.4	0.6	0.8	3.2	3.2	1
08S16E	1	13	4.2	4.2						
08S18E	1	40	0.3	0.3						
08S20E	1	52	0.3	0.3						
08S22E	1	166	1.3	1.3						
09S13E	1	33	0.3	0.3						
09S14E	6	193	0.3	4.4	2.0	3.8	3.8	3.8	4.1	1
09S15E	2	338	0.5	2.3	0.7	1.0	1.4	1.9	2.2	1
10S13E	3	598	0.4	5.8	0.6	0.9	1.4	3.6	4.9	1
10S14E	1	42	1.4	1.4						
10S15E	1	77	0.0	0.0						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
10S16E	1	38	0.2	0.2						
11S13E	1	401	5.8	5.8						
11S14E	1	401	5.8	5.8						
11S16E	1	116	0.3	0.3						
12S16E	1	190	6.5	6.5						
13S15E	1	200	1.6	1.6						
13S16E	2	98	5.7	6.3	5.7	5.8	6.0	6.1	6.2	1

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
02S09E	5	158	-178	126	-81	65	126	126	126	0
03S08E	1	39	32	32						
03S09E	1	39	33	33						
03S11E	1	141	-91	-91						
04S09E	1	43	-130	-130						
04S11E	1	48	-122	-122						
05S09E	2	672	-216	223	-172	-106	4	113	179	1
05S13E	3	740	-42	54	-29	-9	25	40	48	1
05S14E	4	1040	-42	90	-22	8	40	63	79	1
06S10E	3	215	-92	-64	-90	-88	-84	-74	-68	1
06S13E	2	70	221	221						
06S14E	1	194	12	12						
06S21E	1	39	33	33						
07S13E	1	20	18	18						
07S14E	2	360	12	32	14	17	22	27	30	1
07S15E	4	298	-103	28	-103	-103	-103	-70	-12	1
07S20E	2	108	-103	-103						
07S21E	2	262	33	77	37	44	55	66	72	1
08S12E	2	262	33	77	37	44	55	66	72	1
08S13E	5	534	-105	118	-100	-92	-43	88	106	1
08S16E	1	13	147	147						
08S18E	1	40	-103	-103						
08S20E	1	52	-103	-103						
08S22E	1	166	32	32						
09S13E	1	33	-105	-105						
09S14E	6	193	-178	126	-57	80	126	126	126	0
09S15E	2	338	-90	53	-76	-55	-19	17	38	1
10S13E	3	598	-124	223	-96	-54	16	119	182	1
10S14E	1	42	31	31						
10S15E	1	77	-41	-41						
10S16E	1	38	-172	-172						
11S13E	1	401	223	223						
11S14E	1	401	223	223						
11S16E	1	116	-196	-196						
12S16E	1	190	188	188						
13S15E	1	200	25	25						
13S16E	2	98	162	182	164	166	172	176	180	1

Table XXI-2. Summary statistics for all Wheat management units (all T-R).

A/Y

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WHEAT SEED	1	130.60	0.021	0.021						

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WHEAT, IRRIGATED	49	5135.32	0.000	0.059	0.002	0.003	0.009	0.025	0	5

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WHEAT, IRRIGATED	49	5135	0	8.6	0.3	0.5	1.3	3.6	5.7	5

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
WHEAT, IRRIGATED	49	5135	-216	223	-126	-92	18	90	166	5

Figure XXI-2. Scatter plot of A vs. Y for Wheat crops with all T-R together.
Each dot represents one management unit with complete data differentiated by the specific crop. Red dots represent regional wide outliers (A/Y > 90% for all T-R together). Blue lines represent different recommended N application rates described in the Table below.

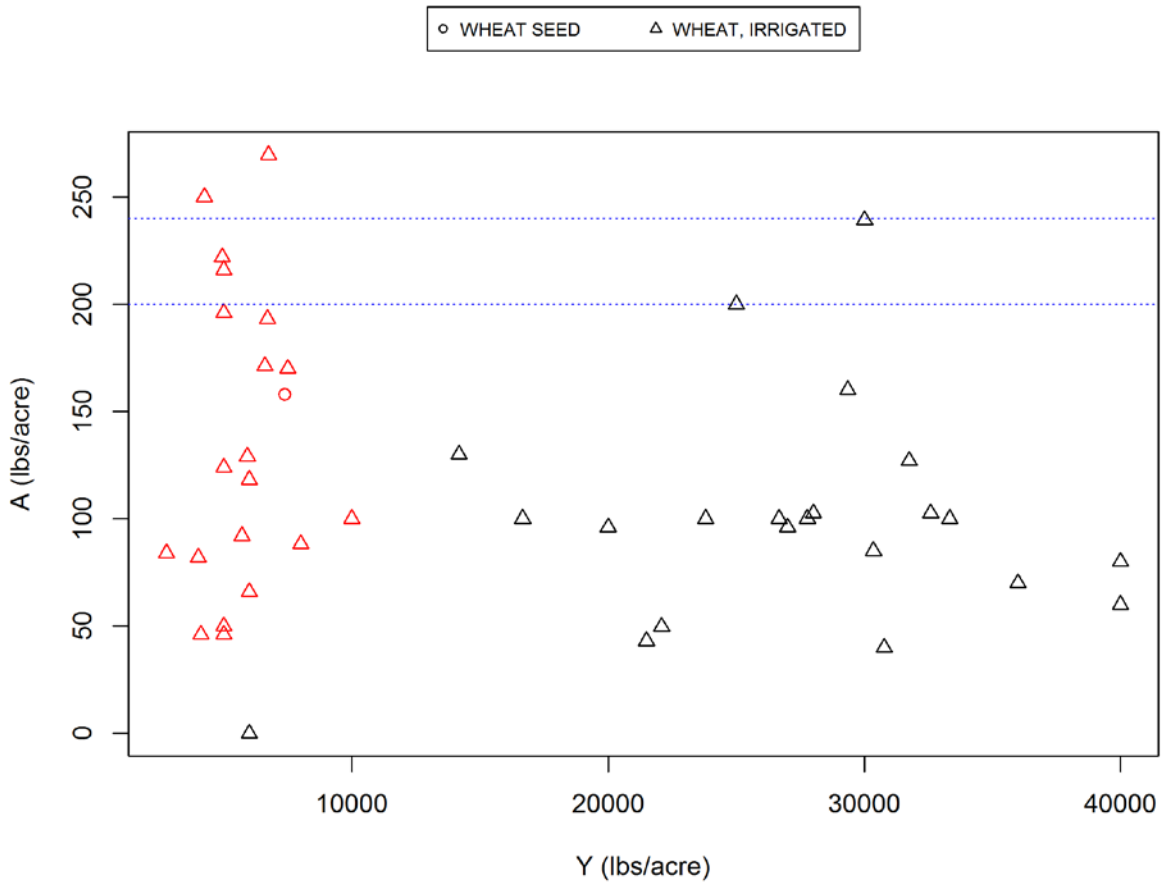


Table XXI-3. Description of recommended nitrogen application values for Wheat (in lbs/acre).

Crop Specifics	Min	Max	Study Specifics	Source
Wheat	150	200	Produced a yield of 4-4.6 tons/acre. Does not include residual N in soil (30-80 lbs/acre)	CDFA
Drum Wheat		240	Split into preplant, tillering, at boot stage	
Wheat		320	To produce 4 ton/acre	

CDFA - https://www.cdfa.ca.gov/is/ffldrs/frep/

XXII. OTHER CROPS

Table XXII-1. Summary statistics for crops with limited representation in the ESJWQC region.
Crops with only one management unit with complete data (Count = 1) or more than one management units with identical values, have no summary statistics because a range of values is necessary to estimate percentiles.
A/Y

TR	N Mgmnt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
APPLES, STANDARD SIZE /YEAR > 4	3	49	0.000	0.005	0.001	0.002	0.003	0.004	0.005	1
APPLES, STANDARD SIZE /YEAR NR	1	36	0.007	0.007						
APRICOTS /YEAR > 4	2	21	0.002	0.015	0.004	0.005	0.009	0.012	0.014	1
BASIL	2	153	0.007	0.015	0.008	0.009	0.011	0.013	0.014	1
BEETS	1	110	0.004	0.004						
BERRY, RASPBERRIES /YEAR > 3	3	107	0.040	0.070	0.044	0.050	0.060	0.065	0.068	1
BOK CHOY	1	54	0.004	0.004						
BOK CHOY, BABY	1	65	0.005	0.005						
CABBAGE, GREEN	1	108	0.005	0.005						
CABBAGE, PA	1	73	0.005	0.005						
CABBAGE, RED	1	30	0.004	0.004						
CABBAGE, SAVOY	1	21	0.005	0.005						
CARROT	1	563	0.002	0.002						
CELERY ROOT	1	17	0.005	0.005						
CHARD, GREEN	1	65	0.005	0.005						
CHARD, RAINBOW	1	15	0.005	0.005						
CHARD, RED	1	51	0.005	0.005						
CILANTRO	1	208	0.010	0.010						
COVER CROP, NON-LEGUME	1	150	0.012	0.012						
DAIKON	1	21	0.002	0.002						
DANDELION	1	20	0.005	0.005						
DILL	1	53	0.005	0.005						
ENDIVE	1	14	0.007	0.007						
ESCAROLE	1	15	0.098	0.098						
FENNEL	1	7	0.032	0.032						
GARLIC	3	392	0.011	0.019	0.011	0.012	0.013	0.016	0.018	1
GREENS, COLLARD, FRESH MARKET	1	121	0.006	0.006						
HERBS, FRESH CUT	1	3	0.072	0.072						
KALE	3	130	0.007	0.012	0.007	0.007	0.007	0.009	0.011	1
KALE LACITO	1	26	0.007	0.007						
KIWIFRUIT /YEAR > 4	1	5	0.003	0.003						
KOHLRABI	1	29	0.005	0.005						
LEEKS	1	53	0.007	0.007						
LETTUCE	4	426	0.006	0.009	0.006	0.007	0.008	0.009	0.009	0
MUSTARD, GREENS	2	151	0.005	0.005						
NECTARINES /YEAR > 4	2	25	0.002	0.004	0.002	0.003	0.003	0.004	0	1
ONIONS, DRY	1	460	0.010	0.010						
ONIONS, GREEN	1	1	0.007	0.007						
ONIONS, SEED	1	10	0.810	0.810						
PARSLEY	2	146	0.011	0.011						
PASTURE	3	71	0.003	0.003						
PERSIMMONS /YEAR 4	1	5	0.001	0.001						
PLUMS /YEAR > 4	2	7	0.002	0.015	0.003	0.005	0.008	0.012	0.014	1

TR	N Mgmnt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
POTTED NURSERY PLANTS	2	360	0.002	0.029	0.005	0.009	0.015	0.022	0.026	1
PRUNES /YEAR > 4	4	1282	0.000	0.028	0.000	0.000	0.003	0.011	0.021	1
PUMPKINS	1	31	0.004	0.004						
RADICCHIO	1	4	0.009	0.009						
RICE	1	68	0.050	0.050						
RYE, GRAIN	3	218	0.000	0.000						
SORGHUM, SILAGE	1	20	0.007	0.007						
SPICH	1	77	0.010	0.010						
STRAWBERRIES	1	11	0.050	0.050						
TRITICALE, IRRIGATED	2	185	0.011	0.020	0.012	0.013	0.016	0.018	0.019	1
TURNIPS	1	63	0.007	0.007						
ZUCCHINI	1	1	0.038	0.038						

A/R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
BERRY, RASPBERRIES /YEAR > 3	3	107	30.8	53.8	33.8	38.5	46.2	50.0	52.3	1
KALE	3	130	2.8	4.8	2.8	2.8	2.8	3.8	4.4	1
LETTUCE	4	426	2.4	3.6	2.5	2.7	3.2	3.6	3.6	0
MUSTARD, GREENS	2	151	2.0	2.0						
PRUNES /YEAR > 4	4	1282	0.0	4.7	0.0	0.0	0.4	1.8	3.5	1
SPICH	1	77	4.0	4.0						
STRAWBERRIES	1	11	38.5	38.5						

A-R

TR	N Mgmt Units	Sum Acres	Min	Max	10%	25%	50%	75%	90%	N Outliers
BERRY, RASPBERRIES /YEAR > 3	3	107	49	89	55	62	75	82	87	1
KALE	3	130	129	158	129	129	129	143	152	1
LETTUCE	4	426	89	116	91	92	104	116	116	0
MUSTARD, GREENS	2	151	80	80						
PRUNES /YEAR > 4	4	1282	-37	134	-34	-30	-23	20	88	1
SPICH	1	77	104	104						
STRAWBERRIES	1	11	86	86						

APPENDIX II

EXAMPLE OF AN NMP PERSONALIZED SUMMARY REPORT

NMP Personalized Summary

Member ID # 1000
XXXXXXXXXXX
XXXXXXXXX

Nitrogen Summary Report Evaluation for Year 2015

In 2015 you submitted a Nitrogen Management Summary Report for Almonds for the following management units.

Crop	Management Unit Name	Total Acres	N applied (pounds per acre)	N applied / Yield	Yield Units
ALMONDS /YEAR > 4	1	59.08	121	0.02210	Pounds
ALMONDS /YEAR > 4	2	58.46	121	0.01520	Pounds
ALMONDS /YEAR > 4	3	29.35	72	0.00818	Pounds
ALMONDS /YEAR > 4	4	38.99	227	0.02560	Pounds
ALMONDS /YEAR > 4	5	58.57	210	0.02810	Pounds
ALMONDS /YEAR > 4	6	19.86	72	0.02890	Pounds
ALMONDS /YEAR > 4	7	77.39	286	0.02820	Pounds
ALMONDS /YEAR > 4	8	164.00	182	0.02280	Pounds
ALMONDS /YEAR > 4	9	40.64	129	0.01290	Pounds
ALMONDS /YEAR > 4	10	29.06	93	0.01370	Pounds

This is your summary of nitrogen use for Almonds. Calculations assume that 0.068 pounds of N are removed per pound of Almonds yield.

Management Unit Name	Calculated Yield (in pounds)	N applied / Yield (pounds per pounds)	Estimated N Removed (pounds)	N applied / Removed	N applied - Removed
1	7982	0.02210	124.85	1	57.154
2	8867	0.01520	138.68	2	88.317
3	7473	0.00818	116.88	2	93.117
4	2491	0.02560	169.41	0	-97.412
5	10142	0.02810	158.62	2	127.382
6	8802	0.02890	137.66	1	-65.663
7	10000	0.02820	156.40	1	-27.400
8	6788	0.02280	106.17	1	-13.169
9	5475	0.01290	85.63	1	35.369
10	7961	0.01370	124.50	1	-3.503

This figure shows the yield and total N applied to your Almonds management units relative to all other farmers in the ESJWQC region