

From:
To: <mgowdy@waterboards.ca.gov>
Date: 10/21/2009 10:52 AM
Subject: (no subject)

Dear Mark:

Here are Terry Prichard and Alex Hildebrand's response to your inquiry about planting times and ag practices. Let me know if you need any other input/clarification. JOHH

Alfalfa:

6 to 7 cuttings a season. The number depends on spring and fall weather. Warm spring causes earlier cutting. Fall with good weather(no rain) can result in another cutting or green chop to lessen chance of rain damage. Typical is April 1st or so first cutting. Everyone talks a 28 day cutting interval but most are always more days resulting in the last harvest October 1st -7th. Irrigation for the first cutting is dependent on the spring rains but can be as early as March 15. Irrigation volume should meet the ET demand and the leaching fraction. Last irrigation is usually 15 days before the last harvest.

Pre-plant Bean irrigation:

Timing is 2-3 weeks before planting. Earlier planting requires more time-- depending on weather. It is hard to apply an average of less than 6 inches of water using furrow irrigation.

Bean planting Large Lima April. Baby Lima May - June 10 with vine types 1st followed by bush type which are a shorter crop(95 days).

We caution about assuming that all bean varieties have the same salinity and temperature sensitivity. Alex stopped growing blackeyes because the price didn't justify the risk of cold weather during germination in May or wet weather in late Sept. Various considerations determine choice of crops; we do not believe that water quality should be one of the limiting factors when making such choices.

JOHN HERRICK, Esq.

From: Mark Gowdy
To:
CC:
Date: 10/13/2009 3:29 PM
Subject: Follow-up on SDWA Comments to Hoffman Report
Attachments: Table A2.pdf

John,

We appreciate the comments provided last month by the SDWA on Dr. Hoffman's draft report. In considering these and other comments received, Dr. Hoffman has a couple of follow-up questions:

- 1) In addition to the information already provided regarding alfalfa harvest and irrigation scheduling, what are the typical number of alfalfa cuttings each year and the approximate dates of those cuttings. Goldhamer and Snyder (Table A.2, pg 57...attached) indicates 6 cuttings per year for San Joaquin County with harvests (after approximately 30 days of growth) in roughly mid-March and at the end of the months of April, May, June, July and August. Please confirm if these dates are representative of actual practice in the SDWA, or how they differ.
- 2) What are the pre-plant irrigation practices in the SDWA for field crops; in particular dry beans (eg. timing, quantity, and any climatic or other factors that influence this practice).

I'll leave it to you to forward this to Alex or others at the SDWA as appropriate. Also, please let me know that you received this, and how quickly you might be able to respond. Thanks in advance for your assistance.

Regards,

Appendix A

Crop Coefficients

The following tables list tree and vine crop coefficients (A.1), agronomic crop, vegetable crop, and miscellaneous coefficients (A.2), and coefficients for miscellaneous surfaces (A.3) for date B (Kc1), date C (Kc2), and date E (Kc3), with approximate growth dates. Growth dates correspond to the following: (A) planting (for field and row crops), (B) 10 percent ground shading (for field and row crops) or leaf out (for perennials), (C) peak canopy development, (D) leaf aging effects on transpiration, and (E) end of season.

Table A.1. Tree and vine crop coefficients

Region and crop	Crop coefficient*			Growth date			Code†
	Kc1	Kc2	Kc3	B	C	E	
Imperial Valley							
Citrus orchard	0.56	0.56	0.56	—	—	—	399
Guayule	0.55	0.72	0.50	01/01	07/24	12/31	166
Sacramento Valley							
Deciduous orchard‡	0.50	0.90	0.50	02/15	06/01	11/10	175
Deciduous orchard§	0.55	1.00	0.55	02/15	06/01	11/10	175
	0.55	1.00	0.55	04/15	07/07	11/10	190
Grape	0.27	0.82	0.34	03/15	06/15	10/22	170
Kiwifruit	0.31	1.05	1.05	04/15	06/01	10/31	199
San Joaquin Valley							
Citrus	0.65	0.65	0.65	—	—	—	399
Deciduous orchard‡	0.50	0.90	0.50	02/15	06/01	11/10	175
Deciduous orchard§	0.55	1.00	0.55	02/15	06/01	11/10	175
	0.55	1.00	0.55	04/15	07/07	11/10	190
Grape	0.27	0.82	0.34	03/15	06/15	10/22	170
Olive	0.80	0.80	0.80	—	—	—	399
Pistachio	0.43	1.19	0.25	04/23	06/15	11/15	165
Walnut	0.45	1.14	0.15	03/15	07/07	11/15	170

*Crop coefficients were estimated from Fereres et al. (1981), Doorenbos and Pruitt (1977), Letey and Vaux (1984), State of California Department of Water Resources (1986), Goldhamer et al. (1985), Goldhamer (1989), Pruitt and Snyder (1984), and Buchner, Shaw, and Schulbach (1985).

†The first digit of the code identifies the crop type (1 = deciduous; 3 = constant year-round Kc). For deciduous crops, the last two digits are the percentage of the season from leafout (date B) to the start of Kc decline caused by aging (date D). When the crop type is equal to 3, the Kc values do not decline, and the last two digits of the code are always 99.

‡Includes peaches, apricots, pears, plums, almonds, and pecans without a cover crop. Add 0.35 to Kc1, 0.30 to Kc2, and 0.25 to Kc3 for orchards with a cover crop.

§Includes apples and cherries without a cover crop. Add 0.35 to Kc1, 0.30 to Kc2, and 0.25 to Kc3 for orchards with a cover crop.

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Table A.2.—Continued

Region and crop	Crop coefficient*			Growth dates				Code†
	Kc1	Kc2	Kc3	A	B	C	E	
San Joaquin Valley (cont.)								
Small grains	0.30	1.17	0.20	01/01	02/01	03/22	06/30	272
	0.15	1.11	0.95	03/16	04/10	06/07	09/15	263
	0.25	1.20	0.40	11/01	12/14	01/25	05/15	274
	0.22	1.17	0.38	12/01	12/24	03/02	05/31	275
	0.23	1.16	0.40	12/16	12/23	03/01	05/31	272
	0.23	1.18	0.18	12/16	01/20	03/26	06/30	274
Sugarbeet	0.24	1.13	0.90	02/01	03/27	05/13	08/31	270
	0.20	1.07	1.00	05/01	05/20	07/13	12/15	289
	0.23	1.10	0.95	06/16	07/06	08/13	03/15	284
Tomato	0.25	1.16	0.70	03/01	04/28	06/10	08/15	272
	0.24	1.12	0.70	04/01	05/08	06/28	08/31	271
	0.25	1.12	0.68	05/01	05/22	07/18	09/15	269
Tomato	0.06	1.00	0.80	03/23	04/23	05/30	08/02	275

*Crop coefficients were estimated from Fereres et al. (1981), Doorenbos and Pruitt (1977), Lety and Vaux (1984), State of California DWR (1986), Phene et al. (1985), and Pruitt and Snyder (1984).

†The first digit of the code identifies the crop type (2=annual crop). The last two digits show the percentage of the growing season from date A to date D. Date D is the date when the Kc values begin to decline because of crop aging.

Table A.3. Coefficients for miscellaneous surfaces

Region and condition or crop	Crop coefficient*			Growth dates			Code†
	Kc1	Kc2	Kc3	B	C	E	
Statewide							
Open water surfaces	1.10	1.10	1.10	01/01	05/01	12/31	375
Wet light soil	1.05	1.05	1.05	01/01	05/01	12/31	375
Wet dark soil	1.10	1.10	1.10	01/01	05/01	12/31	375
Grazed pasture	0.90	0.90	0.90	01/01	05/01	12/31	375
Grass and clover	1.05	1.05	1.05	01/01	05/01	12/31	375
Statewide							
Evergreen shrubbery	1.15	1.15	1.15	01/01	05/01	12/31	375
Evergreen trees	1.20	1.20	1.20	01/01	05/01	12/31	375

*Crop coefficients are estimated from Doorenbos and Pruitt (1977), and Pruitt and Snyder (1984).

†The first digit of the code identifies the crop type (3=constant year-round Kc). The last two digits are the percentage of the growing season from beginning to date D. When the crop type is equal to 3, the percentage to date D is set to 75 to allow for more flexibility when using the CIMIS irrigation scheduling programs.

Table A.2. Agronomic, vegetable, and miscellaneous crop coefficients

Region and crop	Crop coefficient*			Growth dates				Code†
	Kc1	Kc2	Kc3	A	B	C	E	
Imperial Valley								
Alfalfa	0.40	1.20	1.20	11/15	11/19	12/09	01/15	274
	0.40	1.20	1.20	01/15	01/20	02/17	03/15	276
	0.40	1.20	1.20	03/15	03/16	04/04	04/14	281
	0.40	1.20	1.20	04/15	04/16	05/20	05/15	277
	0.40	1.20	1.20	05/15	05/16	06/01	06/15	277
	0.40	1.20	1.20	06/15	06/16	07/01	07/15	273
	0.40	1.20	1.20	07/15	07/16	07/31	08/15	277
	0.40	1.20	1.20	08/15	08/16	08/31	09/15	274
	0.40	1.20	1.20	09/15	09/16	10/09	11/15	274
Asparagus	0.30	0.95	0.15	01/01	03/30	05/01	12/31	286
Barley	0.73	1.11	0.01	11/30	12/16	03/06	05/31	273
Barley	0.23	1.04	0.01	11/30	12/16	02/02	05/31	261
Cantaloupe	0.42	0.96	0.90	01/31	03/01	04/15	05/31	291
	0.15	0.97	0.01	07/31	08/08	08/21	11/30	272
Carrots	0.43	1.06	0.75	09/30	10/27	12/21	04/30	269
Cotton	0.40	0.86	0.40	03/31	04/30	08/28	10/31	282
Lettuce	0.17	1.02	0.10	08/31	09/20	10/31	12/31	271
	0.30	0.83	0.30	10/31	11/20	01/15	03/31	264
Onion	0.75	1.03	0.20	12/31	02/15	04/01	05/31	265
Sorghum forage—cut 1	0.14	1.01	0.15	03/31	04/25	05/21	08/31	256
Sorghum forage—cut 2	0.57	1.39	0.30	07/30	08/11	09/07	11/40	243
Sorghum grain	0.10	1.15	0.01	02/28	03/15	04/02	07/31	233
Sorghum	0.09	1.19	0.01	05/31	06/12	07/06	10/31	237
Squash	0.19	0.85	0.80	08/31	09/15	10/27	12/31	296
	0.45	1.30	0.05	12/31	01/21	02/21	04/30	246
Sugarbeet	0.18	1.14	0.70	06/30	07/01	09/27	04/30	262
	0.28	1.10	0.75	09/30	10/17	12/06	06/30	283
Tomato, canning	0.41	1.20	0.48	01/31	03/07	04/18	06/30	279
Tomato, market	0.45	1.12	0.10	12/31	02/15	04/15	05/31	270
Wheat	0.38	1.07	0.15	12/31	01/15	02/13	05/31	279
Northern mountain valleys								
Alfalfa	0.40	1.20	1.20	04/01	04/07	04/30	05/25	280
	0.40	1.20	1.20	05/25	05/26	06/16	07/05	276
	0.40	1.20	1.20	07/05	07/06	07/26	08/15	276
	0.40	1.20	1.20	08/15	08/16	08/28	09/10	273
	0.40	1.20	1.20	04/01	04/07	05/01	05/31	273
	0.40	1.20	1.20	05/31	06/01	06/26	07/15	276
	0.40	1.20	1.20	07/15	07/16	08/06	08/31	274
Barley	0.27	1.15	0.01	04/30	05/01	06/14	08/31	269
Potato	0.08	1.20	0.70	04/30	05/01	08/20	09/30	282
Sacramento Valley								
Alfalfa	0.40	1.20	1.20	02/12	02/23	03/03	03/31	269
	0.40	1.20	1.20	04/01	04/03	04/18	05/15	279
	0.40	1.20	1.20	05/06	05/07	05/20	06/04	283
	0.40	1.20	1.20	06/05	06/06	06/18	07/02	270
	0.40	1.20	1.20	07/03	07/05	07/16	07/31	275
	0.40	1.20	1.20	08/01	08/02	08/16	08/31	273
	0.40	1.20	1.20	09/01	09/02	09/16	10/14	279
Bean, pinto	0.15	1.09	0.22	04/30	05/23	06/06	08/18	275
	0.08	1.08	0.30	06/03	06/11	07/14	09/22	276

*Crop coefficients were estimated from Fereres et al. (1981), Doorenbos and Pruitt (1977), Lety and Vaux (1984), State of California DWR (1986), Phene et al. (1985), and Pruitt and Snyder (1984).

†The first digit of the code identifies the crop type (2=annual crop). The last two digits show the percentage of the growing season from date A to date D. Date D is the date when the Kc values begin to decline because of crop aging.

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Table A.2.—Continued

Region and crop	Crop coefficient*			Growth dates				Code†
	Kc1	Kc2	Kc3	A	B	C	E	
Sacramento Valley (cont.) Corn	0.20	1.15	0.50	04/02	04/25	06/18	08/25	278
	0.20	1.15	0.48	04/30	05/24	07/07	09/08	273
	0.18	1.15	0.55	06/17	07/04	08/05	10/20	274
Milo	0.14	1.10	0.73	05/13	06/15	07/14	09/29	266
	0.13	1.12	0.43	06/17	07/13	08/05	10/27	262
	0.14	1.13	0.62	07/01	07/26	08/21	10/31	268
Rice	0.95	1.24	1.00	05/13	06/12	07/17	10/06	280
Small grains	0.20	1.23	0.09	10/14	11/06	01/10	06/02	273
	0.31	1.23	0.04	11/15	12/16	02/18	07/14	270
	0.25	1.20	0.15	12/16	01/12	03/30	08/04	271
Sugarbeet	0.25	1.10	1.00	02/28	03/19	05/15	08/25	292
	0.20	1.12	0.95	03/01	03/18	05/24	11/01	286
	0.11	1.14	0.83	04/02	04/15	06/29	12/31	287
Tomato	0.26	1.11	0.73	02/26	04/22	06/11	08/11	282
	0.25	1.10	0.63	04/02	05/15	06/24	09/08	277
	0.25	1.14	0.90	04/30	05/25	07/07	09/22	272
	0.20	1.14	0.80	06/03	06/18	07/31	09/29	275
San Joaquin Valley Alfalfa	0.40	1.20	1.20	02/12	02/22	03/07	03/21	279
	0.40	1.20	1.20	04/01	04/03	04/18	04/30	285
	0.40	1.20	1.20	05/06	05/07	05/20	06/04	283
	0.40	1.20	1.20	06/05	06/06	06/18	07/02	270
	0.40	1.20	1.20	07/03	07/04	07/15	07/31	275
	0.40	1.20	1.20	08/01	08/02	08/14	08/31	273
	0.40	1.20	1.20	08/01	08/02	08/14	08/31	273
Bean	0.14	1.15	0.30	04/01	04/30	05/25	07/31	274
	0.14	1.12	0.35	05/01	05/18	06/08	08/15	268
	0.13	1.07	0.20	06/16	07/01	07/26	09/30	274
Corn	0.19	1.17	0.40	03/16	04/12	05/27	08/15	272
	0.19	1.17	0.40	04/01	04/25	06/14	08/31	268
	0.18	1.10	0.45	04/16	05/07	06/28	09/15	274
	0.19	1.06	0.55	05/16	06/07	07/16	09/30	277
	0.26	1.07	0.15	06/16	06/21	07/25	10/15	269
Cotton	0.12	1.20	0.30	04/01	05/03	07/15	09/30	279
	0.16	1.18	0.40	04/16	05/18	07/06	10/15	269
	0.19	1.15	0.30	05/01	05/24	07/07	10/31	268
Melon	0.14	1.10	0.01	02/15	03/31	04/30	06/30	279
	0.18	1.11	0.08	03/16	04/17	05/23	07/31	275
	0.18	1.10	0.01	04/16	05/09	06/22	08/15	278
Milo	0.16	1.05	0.45	05/01	06/04	07/04	09/30	265
	0.14	1.08	0.30	06/16	07/12	08/10	10/31	263
	0.13	1.06	0.30	07/01	07/29	08/22	11/15	268
Onion	0.30	1.14	0.63	03/01	04/11	05/24	08/31	263
	0.18	1.15	0.78	09/16	10/06	01/01	05/31	272
	0.27	1.11	0.55	11/16	12/12	02/01	07/31	284
Potato	0.51	1.15	0.75	12/01	02/24	03/26	05/15	287
	0.43	1.18	0.25	02/01	02/28	04/12	06/15	275
	0.55	1.21	0.30	03/01	03/21	04/26	06/30	269
Rice	0.95	1.25	0.95	04/01	04/26	05/28	08/31	259

*Crop coefficients were estimated from Fereres et al. (1981), Doorenbos and Pruitt (1977), Letey and Vaux (1984), State of California DWR (1986), Phene et al. (1985), and Pruitt and Snyder (1984).

†The first digit of the code identifies the crop type (2=annual crop). The last two digits show the percentage of the growing season from date A to date D. Date D is the date when the Kc values begin to decline because of crop aging.

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