

CHAPTER THREE

Direct Drivers of California's Nitrogen Cycle

Appendix 3.3 Published University of California N Fertilizer Rate Guidelines for Select Crops

Lead Authors:

T.S. ROSENSTOCK AND T.P. TOMICH

Contributing Authors:

H. LEVERENZ, D. LIPTZIN, D. MEYER, D. MUNK,
P.L. PHELAN, AND J. SIX

This is an appendix to Chapter 3 of *The California Nitrogen Assessment: Challenges and Solutions for People, Agriculture, and the Environment*. Additional information about the California Nitrogen Assessment (CNA) and appendices for other chapters are available at the Agricultural Sustainability Institute website: asi.ucdavis.edu/nitrogen

Suggested citation:

TS Rosenstock, TP Tomich, H Leverenz, D Liptzin, D Meyer, D Munk, PL Phelan, and J Six. "Appendix 3.3: Published University of California N Fertilizer Rate Guidelines for Select Crops." Online appendices for California Nitrogen Assessment: Challenges and Solutions for People, Agriculture, and the Environment. TP Tomich, SB Brodt, RA Dahlgren, and KM Scow, eds. Agricultural Sustainability Institute at UC Davis. (2016). asi.ucdavis.edu/nitrogen.

Appendix 3.3 Published University of California N Fertilizer Rate Guidelines for Select Crops

Crop	N guidelines (lbs. per acre)		Source
	Minimum	Maximum	
Alfalfa	0	50	Summers and Putnam 2008 (Pub #3512)
Almond	100	200	Micke 1996 (Pub #3364)
Avocado	67	100	Faber et al. 2011 (Pub #3436), Lovatt 2001, Wolstenholme 2004
Bean, dry	86	116	Long et al. 2010 (Pub #8402)
Broccoli	100	200	LeStrange et al. 2010 (Pub # 7211)
Carrot	100	250	Nuñez et al. 2008 (Pub #7226)
Celery	200	275	Daugovish et al. 2008 (Pub #7220)
Corn	150	275	
Corn, sweet	100	200	Smith et al. 1997 (Pub #7223)
Cotton	100	200	Hake et al. 1996 (Pub #3352)
Environment horticulture			Newman 2009 (Pub #3508)
Grape, raisin	20	60	Christensen 2000 (Pub #3393)
Lawn (Heavy soil)	174	261	Harivandi and Gibeault 1997 (Pub #7227)
Lawn (Shade)	87	130	Harivandi and Gibeault 1996 (Pub #7214)
Lemon			Ingels et al. 1994 (Pub #21521)
Lettuce	170	220	Turini 2011 (Pub #7215), Smith et al. 2011b (Pub #7216)
Melon, cantaloupe	80	150	Hartz et al. (2008b) (Pub #7218)
Melon, watermelon		160	Baameur et al. 2009 (Pub #7213)
Melons (mixed)	100	150	Mayberry et al. 1996 (Pub #7209)
Nectarine	100	150	Strand 1999 (Pub #3389)
Oats	50	120	Munier et al. 2006 (Pub #8167)
Onion	100	400	Smith et al. 2011a (Pub #7242)
Oranges			Ingels et al. 1994 (Pub #21521)
Peach, cling	50	100	Norton et al. 2007a (Pub #8276)
Peach, free	50	100	Norton et al. 2009 (Pub #8358)
Pepper, bell	180	240	Hartz et al. 2008a (Pub #7217)

Pepper, chile	150	200	Smith et al. 2011c (Pub #7244)
Pistachios	100	225	Beede et al. 2005
Plums, dried (prunes)		100	Norton et al. 2007b (Pub #8264)
Plums, fresh	110	150	La Rue and Johnson 1989 (Pub #3331)
Potato			Strand et al. 2006 Pub. #3316.
Rice	110	145	Mutters and Thompson 2009 (Pub #3514)
Safflower	100	150	Kaffka and Kearney 1999 (Pub #21565)
Strawberry	150	300	Strand et al. 2008 (Pub #3351)
Tomatoes, fresh market	125	350	Le Strange et al. 2000 (Pub #8017)
Tomatoes, processing	100	150	Hartz et al. 2008 (Pub #7228)
Walnuts	150	200	Anderson 2006 (Pub #21623), Ramos 1997 (Pub. #3373)
Wheat	100	240	Munier et al. 2006 (Pub #8167)

References

- Anderson, K., 2006. Guide to Efficient Nitrogen Fertilizer Use in Walnut Orchards (Publication #21623). University of California Agriculture and Natural Resources.
- Baameur, A., Hartz, T.K., Turini, T., Natwick, E., Takele, E., Aguiar, J., Cantwell, M., Mickler, J., 2009. Watermelon Production in California.
- Beede, R., Brown, P.H., Kallsen, C., Weinbaum, S.A., 2005. Diagnosing and Correcting Nutrient Deficiencies, in: Ferguson, L. (Ed.), Pistachio Production Manual. University of California, Davis, p. Chapter 16.
- Christensen, L.P., 2000. Raisin Production Manual (Publication #3393). University of California Agriculture and Natural Resources.
- Daugovish, O., Smith, R., Cahn, M.D., Koike, S.T., Smith, H., Aguiar, J., Quiros, C., Cantwell, M., Takele, E., 2008. Celery Production in California (No. 7220). University of California Division of Agriculture and Natural Resources.
- Faber, B.A., Wilen, C.A., Morse, J.G., Eskalen, A., 2011. Avocado: UC IPM Pest Management Guidelines - Publication 3436 (Rev. 2015) (No. 3436).
- Hake, S.J., Kerby, T.A., Hake, K.D., 1996. Cotton Production Manual. University of California Agriculture and Natural Resources.
- Harivandi, A., Gibeault, V., 1997. Managing Lawns on Heavy Soils.
- Harivandi, A., Gibeault, V., 1996. Managing Lawns in Shade.

- Hartz, T.K., Cantwell, M., LeStrange, M., Smith, R., Aguiar, J., Daugovish, O., 2008a. Bell Pepper Production in California.
- Hartz, T.K., Cantwell, M., Mickler, J., Mueller, S., Stoddard, S., Turini, T., 2008b. Cantaloupe Production in California (Publication 7218).
- Hartz, T.K., Miyao, G., Mickler, J., Le Strange, M., Stoddard, S., Nuñez, J., Aegerter, B., 2008. Processing Tomato Production in California.
- Ingels, C., 1994. Protecting Groundwater Quality in Citrus Production - Publication 21521.
- Kaffka, S.R., Kearney, T.E., 1999. Safflower Production in California. University of California Agriculture and Natural Resources.
- La Rue, J.H., Johnson, R.S., 1989. Peaches, Plums, and Nectarines: Growing and Handling for Fresh Market (Publication 3331). University of California Agriculture and Natural Resources.
- LeStrange, M., Cahn, M.D., Koike, S.T., Smith, R.F., Daugovish, O., Fennimore, S.A., Natwick, E., Dara, S.K., Takele, E., Cantwell, M., 2010. Broccoli Production in California, Publication 7211. U.C. Sustainable Agriculture and Education Program, Division of Agriculture and Natural Resources.
- LeStrange, M., Schrader, W.L., Hartz, T.K., 2000. Fresh-Market Tomato Production in California. University of California Division of Agriculture and Natural Resources.
- Long, R., Temple, S.R., Schmierer, J., Canevari, M., Meyer, R.D., 2010. Common Dry Bean Production in California: Second Edition (Publication 8402).
- Lovatt, C.J., 2001. Properly Timed Soil-applied Nitrogen Fertilizer Increases Yield and Fruit Size of 'Hass' Avocado. *J. Amer. Soc. Hort. Sci.* 126, 555–559.
- Mayberry, K.S., Hartz, T.K., Valencia, J., 1996. Mixed Melon Production in California (Publication 7209).
- Micke, W., 1996. Almond Production Manual (Publication 3364). University of California Agriculture and Natural Resources.
- Munier, D., Kearney, T.E., Pettygrove, G.S., Brittan, K., Matthews, M., Jackson, L.E., 2006. Small Grain Production Manual - Part 4 (Publication 8167). University of California Division of Agriculture and Natural Resources.
- Mutters, R.G., Thompson, J.F., 2009. Rice Quality Handbook (Publication 3514). University of California Division of Agriculture and Natural Resources.
- Newman, J., 2009. Greenhouse and Nursery Management Practices to Protect Water Quality (Publication 3508). University of California Division of Agriculture and Natural Resources.
- Norton, M., 2009. Growing Processing Freestone Peaches in California: An Overview (Publication 8358).
- Norton, M., 2007a. Growing Processing Cling Peaches in California: An Overview (Publication 8276).

- Norton, M., 2007b. Growing Prunes (Dried Plums) in California: An Overview (Publication 8264) [WWW Document]. URL <http://anrcatalog.ucdavis.edu/Details.aspx?itemNo=8264>
- Nuñez, J., Hartz, T., Suslow, T., McGiffen, M.E., Natwick, E., 2008. Carrot Production in California (Publication 7226).
- Ramos, D.E., 1997. Walnut Production Manual. University of California Division of Agriculture and Natural Resources.
- Smith, R., Aguiar, J., Caprile, J., 1997. Sweet Corn Production in California (Publication 7223).
- Smith, R., Biscaro, A., Cahn, M.D., Daugovish, O., Natwick, E., Nuñez, J., Takele, E., Turini, T., 2011a. Fresh-Market Bulb Onion Production in California (Publication 7242).
- Smith, R., Cahn, M., Daugovish, O., Koike, S.T., Natwick, E., Smith, H., Subbarao, K., Takele, E., Turini, T., 2011b. Leaf Lettuce Production in California (Publication 7216).
- Smith, R., Hartz, T.K., Aguiar, J., Molinar, R., 2011c. Chile Pepper Production in California (Publication 7244).
- Strand, L., 2008. Integrated Pest Management for Strawberries, 2nd Edition, 2nd Edition edition. ed. University of California Division of Agriculture and Natural Resources, 2nd Edition, Oakland, Calif.
- Strand, L., 2006. Integrated Pest Management for Potatoes in the Western United States (Publication 3316).
- Strand, L., 1999. Integrated Pest Management for Stone Fruits (Publication 3389).
- Summers, C.G., Putnam, D.H., 2008. Irrigated Alfalfa Management for Mediterranean and Desert Zones (Publication 3512).
- Turini, T., Cahn, M.D., Cantwell, M., Jackson, L., Holgate, S.T., Natwick, E., Smith, R., Subbarao, K., Takele, E., 2011. Iceberg Lettuce Production in California (Publication 7215).
- Wolstenholme, B.N., 2004. Nitrogen – the manipulator element: Managing inputs and outputs in different environments. South African Avocado Growers' Association Yearbook 27, 45–61.