

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
2 SPOT MITE	GRAPE	Hi N	Worse	Hansen, (2014)
ANTHOCYANIN CONTENT	GRAPE	Hi N	Worse	Hilbert, et al (2003)
ANTIOXIDANT CONTENT	GRAPE	Hi N	Worse	Malusa, Laurenti, Ghibaudi, Rolle (2002)
AROMA	GRAPE	Hi N	Worse	Peyrot des Gachons, et al (2005)
AROMA POTENTIAL	GRAPE	Moderate N	Better	Peyrot des Gachons, et al (2005)
AROMATICS	GRAPE	Ca + Si sprays	Better	Garde-Cerdán, et al (2023)
BERRY - DISEASE RESISTANCE	GRAPE	Hi Ca	Better	Saxton, V. (2002)
BLACK LEAF	GRAPE	Low K	Worse	Pearson, Goheen (1988)
BLACK-FOOT DISEASE, <i>Cylindrocarpon</i>	GRAPE	Hi CaCO ₃	Worse	Berlanas, et al, (2017)
BLOSSOM SHATTER	GRAPE	Hi N, Low Zn or B	Worse	Christensen, Kasimatis, Jensen (1978)
BLOSSOM SHATTER	GRAPE	Low P	Worse	Cook, Ward, Wicks (1983)
BOIS NOIR, GV YELLOWS DISEASE	GRAPE	Low Ca	Worse	Schweigkofler, Cassar, Stimpfl (2008)
BUD FORMATION	GRAPE	Hi N	Worse	Martín, et al (2004)
BUNCH ROT	GRAPE	Hi N	Worse	Conradie, & Saayman (1989)
BUNCH ROT	GRAPE	Hi N	Worse	R'Houma, Chérif, & Boubaker (1998)
BUNCH ROT	GRAPE	Hi N	Worse	R-Houma, Cherif, Boubacker (1998)
BUNCH ROT	GRAPE	Hi N	Worse	Thomidis, et al (2016)
BUNCH ROT <i>Botrytis</i>	GRAPE	Hi Ca	Better	Mundy, Elmer, Wood, Agnew (2022)
BUNCH ROT <i>Botrytis</i>	GRAPE	Hi Ca	Better	Cole, Wiechel, Warren, Holmes, (2004).
BUNCH ROT, <i>Botrytis</i>	GRAPE	Ca sprays	Better	Amiri, Fallahi, & Safari (2009)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Ca, K sprays	Better	Youssef & Roberto (2014)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Chardonnet, Doneche (1995)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Chardonnet, Doneche (1995)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Chardonnet, et al (1997).
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Hunter, Ruffner, Volschenk (1995)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi K	Better	Kiraly (1976)

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Mundy, Elmer, Wood, Agnew (2022)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Chambers, et al (1993)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Chérif, Boubaker (1997)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Delas, Molot, Soyer (1991)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Delas, Molot, Soyer, (1984)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Keller, Kummer, Vasconcelos (2001)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Mundy & Beresford (2007)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Shen, Wu, Han, Wang, Li, Liu (2021)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Wilcox, (2005)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Wolf (2003)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N Low Ca & K	Worse	Gurnsey, (2005)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N Low Ca & K	Worse	Young (1988)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N, Low K	Worse	Munson (1985)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N, Poor Ca:Mg:K	Worse	Fregoni (1983)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Pre harvest Ca spray	Better	Miceli, Ippolito, Linsalata, Nigro (1999)
BUNCH ROT, POWDERY MILDEW	GRAPE	Hi N	Worse	CSWA., WI., CAWG (2012)
BUNCH ROTS, <i>Botrytis</i> & others	GRAPE	Hi Ca	Better	Miceli, Ippolito, Linsalata, Nigro (1999)
BUNCH STEM NECROSIS	GRAPE	Hi N	Worse	Keller, Kummer, Vasconcelos (2001)
BUNCH STEM NECROSIS	GRAPE	Low N	Worse	Capps (1999)
CANE & LEAF SPOT, <i>Phomopsis</i>	GRAPE	Hi N	Worse	Christensen, Peacock (2000)
CLUSTER ROTS	GRAPE	Hi N	Worse	Crandall, et al (2022)
COLOR, OXIDATIVE STABILITY	GRAPE	Hi N	Worse	Keller, Pool, Henick-Kling (1999)
CROWN GALL	GRAPE	Hi N, Low K	Worse	Munson (1985)
DELAYED RIPENING	GRAPE	Hi N	Worse	Delgado, et al (2004)
DELAYED RIPENING	GRAPE	Hi N	Worse	Wade, et al (2002)
DIE BACK, <i>Phomopsis</i>	GRAPE	Hi N	Worse	Kast (1991)

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
DIEBACK, <i>Eutypa</i>	GRAPE	Optimum Mg	Better	Colrat, et al (1999)
DOWNEY MILDEW, <i>Plasmopara</i>	GRAPE	Hi N	Worse	Furiosi, et al (2022)
DOWNEY MILDEW, <i>Plasmopara</i>	GRAPE	Hi N	Worse	Bavaresco, Eibach (1987)
EUROPEAN GRAPEVINE MOTH	GRAPE	Mod N	Better	Filip (1985)
FLAVONOIDS, ANTHOCYANINS	GRAPE	Hi N	Worse	Habran, et al (2016)
FREEZE DAMAGE	GRAPE	Hi N	Worse	Úbeda et al (2021)
FREEZE RESISTANCE	GRAPE	Hi Ca	Better	Eifert, Szoeké Varnai, Nagy (1986)
FROST RESISTANCE	GRAPE	Hi Ca, P	Better	Eifert, Szoeké, Varnai, Nagy (1986)
FRUIT COLOR	GRAPE	Hi N	Worse	Hawk, Martinson (2006)
FRUIT CRACKING, ROT	GRAPE	Hi N	Worse	Commenil, Brunet, Audran (1997)
FRUIT FIRMNESS	GRAPE	Hi N	Worse	James, et al (2023)
FRUIT, CANE, LEAF ROT, <i>Phomopsis</i>	GRAPE	Hi N	Worse	CSWA., WI., CAWG. (2012)
GRAPE BERRY MOTH, <i>Lobesia</i>	GRAPE	Low N	Better	Vartholomaïou, et al. (2008).
GRAPE LEAFHOPPER	GRAPE	Hi N	Worse	CSWA., WI., CAWG (2012)
GRAPE <i>Phylloxera</i>	GRAPE	Higher soil pH	Better	Reisenzein, et al (2007)
GRAPE <i>Phylloxera</i>	GRAPE	Low Mn	Worse	Perov, et al (1971)
GRAPE <i>Phylloxera</i>	GRAPE	Poor K:Mg ratio	Worse	Reisenzein, et al. (2007)
GRAPE SKIN THICKNESS	GRAPE	Hi N	Worse	Keller, Arnink, Hrazdina (1998)
GRAPE STALK NECROSIS	GRAPE	Hi K:Ca ratio	Worse	Cocucci, et al (1988)
GRAPE TRUNK DISEASE, <i>Esca</i>	GRAPE	Hi N	Worse	Guérin-Dubrana et al, (2008)
HEAT STRESS	GRAPE	Hi Ca	Better	Liu, et al (2022).
INFLORESCENCE NECROSIS	GRAPE	Hi NH ₃	Worse	Jordan (1989)
IRON CHLOROSIS	GRAPE	Hi NO ₃	Worse	Tagliavini, Rombolà (2001)
LEAF STRIPE DISEASE, <i>Esca</i>	GRAPE	Ca, Mg sprays	Better	Calzarano, Di Marco (2018)
LEAFHOPPER	GRAPE	Hi N	Worse	Garcia, (1994)
LEAFHOPPER	GRAPE	Hi water & vigor	Worse	Daane, et al (1995)

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
LEAFHOPPER FEEDING, <i>Scaphoideus</i>	GRAPE	Hi N	Worse	Chuche, Boursault, Thiery (2011)
MEALYBUG	GRAPE	Hi N	Worse	Daane, et al (2002)
MEALYBUG - female size, fecundity	GRAPE	Hi N	Worse	Daane, K., et al (2012)
NEMATODES	GRAPE	Low Ca	Worse	Traynor (1986)
PACIFIC MITE	GRAPE	Hi N	Worse	Wilson (1988)
PACIFIC MITE	GRAPE	Hi N	Worse	Wilson, et al (1988)
PACIFIC MITE	GRAPE	Hi N	Worse	Wilson, et al (1988)
PHENOLICS, WINE QUALITY	GRAPE	Low N, Water	Better	Choné, et al (2017)
PHYLLOXERA	GRAPE	Hi Vigor	Worse	Kimberling, Scott, & Price (1990)
PIERCE'S DISEASE	GRAPE	Low Ca:P	Better	Leite, et al (2004)
PLANT PARASITIC NEMATODES	GRAPE	Hi C:N organic C	Better	Landi, et al (2023)
POOR FRUIT SET	GRAPE	Hi N (Bloom)	Worse	Pollock (2017)
POWDERY MILDEW	GRAPE	Foliar P	Better	Reuveni, Reuveni (1995)
POWDERY MILDEW	GRAPE	Hi N	Worse	Keller, Rogiers, Schultz (2003)
POWDERY MILDEW	GRAPE	Hi N	Worse	WSU (1995)
POWDERY MILDEW	GRAPE	Hi Si	Better	Devi, Pongener, Devi, Hemanta (2022).
POWDERY MILDEW	GRAPE	Low NPK	Worse	Reuveni, et al (1994)
POWDERY MILDEW, <i>Oidium</i>	GRAPE	Hi N	Worse	Bavaresco, Eibach (1987)
RACHIS NECROSIS	GRAPE	Hi N, Poor Ca:Mg:K	Worse	Cline (1987)
RESVERATROL CONTENT	GRAPE	Hi N	Worse	Bavaresco, et al (2005)
RING NEMATODE, <i>Mesocriconema</i>	GRAPE	Hi N, irrigation	Worse	Forge, et al (2019)
ROOT DAMAGE, <i>Phylloxera</i>	GRAPE	Compost, cover crops	Better	Lotter (2000)
ROOT POPULATION, <i>Phylloxera</i>	GRAPE	Compost, cover crops	No Change	Lotter (2000)
ROOT POPULATION, <i>Phylloxera</i>	GRAPE	Low pH, carbonates	Worse	Reisenzein, et al (2007)
ROOT POPULATION, <i>Phylloxera</i>	GRAPE	Poor K/Mg ratio	Worse	Reisenzein, et al (2007)
SHELF LIFE	GRAPE	Low Ca	Worse	Salisbury, Ross (1992)

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
SHOOT NECROSIS	GRAPE	Low Ca	Worse	Fournioux, Bessis (1987)
SKIN COLOR	GRAPE	Hi N	Worse	Hilbert (2003)
SKIN COLOR	GRAPE	Hi N	Worse	Keller, Pool, Henick-Kling (1999)
SOUR ROT	GRAPE	Hi N	Worse	Bisiach, Minervini, Zerbetto (1986)
SPIDER MITE LEVELS, <i>Panonychus</i>	GRAPE	Hi K	Better	Schreiner, (1984)
STEM DIEBACK (STIELLAEHME)	GRAPE	Ca + Mg sprays	Better	Boselli, Bavaresco, Fregoni (1985)
STEM NECROSIS (STIELLAEHME)	GRAPE	Hi K:Ca + Mg	Worse	Brechbuhler (1975)
STORAGE LIFE	GRAPE	Ca dips	Better	Siddiqui, Bangerth (1995)
STORAGE LIFE	GRAPE	Hi Ca, B	Better	Kruger, Snjидier, Fraser (2003)
STORAGE QUALITY	GRAPE	K ₂ SiO ₃ sprays	Better	Abdelaziz, Shaarawi, Ibrahim (2022).
STORAGE ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Miceli, Ippolito, Linsalata, Nigro (1999)
STORAGE WEIGHT LOSS, DECAY	GRAPE	CaNO ₃ sprays	Better	Gupta, Jindal, Singh (1979)
SUGAR, ACIDITY, PHENOLS	GRAPE	Ca, K sprays	Better	Karimi, Saberi, Khadivi (2021).
SUGAR, ACIDITY, PHENOLS	GRAPE	CaSO ₄ , KSO ₄ sprays	Better	Karimi, Saberi, Khadivi (2021)
TRUNK DIEBACK, <i>Esca</i>	GRAPE	Hi N	Worse	Muntean, et al (2022)
VAM FUNGI POPULATIONS	GRAPE	Hi N	Worse	Tian (2021)
VINE GROWTH, <i>Phylloxera</i>	GRAPE	N fertilization	Better	Kopf (2000)
VINE MEALYBUG	GRAPE	Hi N	Worse	Aphids (2013)
VINE MEALYBUG	GRAPE	Hi N	Worse	Cocco, et al (2014)
VINE MEALYBUG	GRAPE	Hi N	Worse	Cocco, et al (2021)
VINE MEALYBUG	GRAPE	Hi N	Worse	Muscas, et al (2017)
WATER BERRY	GRAPE	Hi N	Worse	Christensen, Boggero (1985)
WATERBERRY	GRAPE	Hi N	Worse	Crisosto & Smilanick (2004)
WATERBERRY	GRAPE	Hi N, Low K	Worse	Singh, Mehta (2019)
XYLEM NO ₃ CONTENT	GRAPE	Hi N	Higher	Keller, et al (1995)

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

GRAPES

TOTAL	DATE	Hi N = Worse	% Hi N	Ca = Better	% Ca	K = Involved	% K
130	10/17/23	76	58%	31	24%	14	11%
		Hi N = Worse or Low N = Better		Hi Ca = Better or Low Ca = Worse		(Hi or Low K)	

Micros, Si Involved	Nutrient Ratio Involved
6	6
5%	5%

Major Grape Pests & Diseases

Bunch Rots/ <i>Botrytis</i>	Hi Ca = Better
20	13
Hi N = Worse or Low N = Better	Hi Ca = Better or Low Ca = Worse

INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS

Hi N = Worse

Insects & Mites
14
Hi N = Worse

Powdery & Downey Mildew
6
Hi N = Worse