

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
2 SPOT MITE	APPLE	Hi N	Worse	Fritzsche, Wolfgang, Reiss, Thiele (1980)
2 SPOT MITE	APPLE	Hi N	Worse	Hamstead, Gould (1957)
2 SPOT MITE	APPLE	Hi N	Worse	Jesiotr, Suski, Badowska-Czubik (1979)
2 SPOT MITE	APPLE	Hi N	Worse	Rodriguez (1958)
2 SPOT MITE	APPLE	Hi N	Worse	Rodriguez, (1958)
2 SPOT MITE	APPLE	Hi N	Worse	Storms (1969)
2 SPOT MITE	APPLE	Hi N	Worse	Storms, (1969)
2 SPOT MITE	APPLE	Hi N	Worse	Suski, Badowska (1975)
2 SPOT MITE	APPLE	Hi N	Worse	Wermelinger, Delucchi (1990)
2 SPOT MITE	APPLE	Hi N	Worse	Wermelinger, Oertli, Delucchi (1985)
2 SPOT MITE	APPLE	Hi N	Worse	Wermelinger, et al (1991)
ALFALFA GREENING	APPLE	Hi N	Worse	Raese (1980)
ANTIOXIDANT CONTENT	APPLE	Hi N	Worse	Warner (2007a)
APHID	APPLE	Hi N	Worse	Brown & Welker (1992)
APHID	APPLE	Hi N	Worse	Hokusima & Ando. (1967)
APHID	APPLE	Hi N	Worse	Kaakeh, Pfeiffer, & Marini (1992)
APHID	APPLE	Hi N	Worse	Takeda, Hokusima, Kawada (1967)
APHIDS	APPLE	Hi N	Worse	Cocuzza (2019)
APPLE PROLIFERATION DISEASE	APPLE	Hi Ca	Better	Musetti, et al (2010)
APPLE REPLANT DISEASE	APPLE	Hi P	Better	BCFGA (2017)
APPLE SCAB, <i>Venturia</i>	APPLE	Ca sprays	Better	Hickey, Conway, Sams (1995)
APPLE SCAB, <i>Venturia</i>	APPLE	Hi K, P	Better	Felipini (2016)
BITTER PIT	APPLE	Hi Ca	Better	Perring, (1986)
BITTER PIT	APPLE	Hi K:Ca	Worse	Ferguson, Watkins (1992)
BITTER PIT	APPLE	Hi K:Ca	Worse	Smith (2009)
BITTER PIT	APPLE	Hi K:Ca	Worse	Volz, Tustin, Ferguson (1996)

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BITTER PIT	APPLE	Hi Mg	Worse	Burnmeister & Dilley (1993)
BITTER PIT	APPLE	Hi Mg, Lo Ca	Worse	Hofman (1998)
BITTER PIT	APPLE	Hi N, K	Worse	AHDB (2015)
BITTER PIT	APPLE	Hi N, Low Ca	Worse	Day, Crisosto (1993)
BITTER PIT	APPLE	Hi N, Low Ca	Worse	Shear (1975)
BITTER PIT	APPLE	Hi N, P; Low Ca	Worse	Warner (2014)
BITTER PIT	APPLE	Hi soil K:Ca	Worse	Weibel, (1997)
BITTER ROT	APPLE	Hi Ca	Better	Biggs, (1999)
BLACK ROT, <i>Spaeropsis</i>	APPLE	Low Fe	Worse	Butler, Jones (1955)
BLACKHEART – FREEZE DAMAGE	APPLE	Hi N	Worse	Ward Gauthier, et al (2014)
BLOSSOM END ROT	APPLE	Ca, B sprays	Better	Khalifa, Omaima, Abd-El-Khair (2009)
BLUE MOLD, STORAGE QUALITY	APPLE	Ca dips	Better	Janisiewicz, Conway, Glenn, Sams, (1998)
BOTRYTIS FRUIT DECAY	APPLE	Hi Ca	Better	Conway, Sams, Wang, Abbott (1994)
BROWN ROT	APPLE	Ca sprays	Better	Holba, Ballaa, Vamasa, Gallc (2012)
CALCIUM UPTAKE	APPLE	Hi N	Worse	Martin, Lewis, Cerny, Grassia (1970)
COLD HARDINESS	APPLE	Hi N	Worse	Pole, et al (2017)
COLLECTOTRICHUM ROT	APPLE	Hi Ca	Better	Park, et al (2001)
COLOR, FLAVOR	APPLE	Hi N	Worse	Tahir, Johansson, Olsson (2007)
COLOR, FRUIT FIRMNESS	APPLE	Hi N	Worse	Blanpied, et al (1978)
COLOR, STORAGE QUALITY	APPLE	Hi N	Worse	Cline (1980)
CORK SPOT	APPLE	Low Ca	Worse	Raese (1980)
DELAYED FRUIT RIPENING	APPLE	Hi N	Worse	Kuzin, Trunov, Solovyev (2018)
DISCOLORATION	APPLE	Hi Mn	Worse	Ferree, et al (1984)
E. RED MITE - egg production	APPLE	Hi N	Worse	Papp, Jenser, Haltrich (2001)
EUROPEAN RED MITE	APPLE	Hi N	Worse	Breukel, Post (1959)
EUROPEAN RED MITE	APPLE	Hi N	Worse	Smith, Stiles, Weires (1989)

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EUROPEAN RED MITE	APPLE	Hi N	Worse	van de Vrie, McMurty, Huffaker (1972)
EUROPEAN RED MITE	APPLE	Hi N; Lo P, K	Worse	Bhardwaj, Sharma, Bhardwaj (2003)
EUROPEAN RED MITE - egg laying	APPLE	Hi N	Worse	Brunkel, Post (1959)
EXCESS ETHYLENE PRODUCTION	APPLE	Hi N	Worse	Fallahi, Conway, Hickey, Sams (1997)
EXCESS SHOOT GROWTH	APPLE	Hi N	Worse	Pole, et al (2017)
FIREBLIGHT	APPLE	Hi Ca, S, B, Zn Lo K,P	Better	Tadayon, Sadeghi (2023)
FIREBLIGHT	APPLE	Hi K	Worse	Chase, et al (1968)
FIREBLIGHT	APPLE	Hi N	Worse	Fallahi, Mohan (2000)
FIREBLIGHT	APPLE	Hi N	Worse	Fallahi, Mohan (2000)
FIREBLIGHT	APPLE	Hi N	Worse	Hildebrand, Heinicke (1937)
FIREBLIGHT	APPLE	Hi N	Worse	Hildebrand, Heinicke (1937)
FIREBLIGHT	APPLE	Hi N	Worse	Pest Management Center (2013)
FIREBLIGHT	APPLE	Hi N	Worse	van der Zwet, Beer (1991)
FIREBLIGHT	APPLE	Hi N	Worse	van der Zwet, Keil (1979)
FIREBLIGHT	APPLE	Hi N, Low Ca	Worse	Bastas (2016)
FIRMNESS, SUGAR, WEIGHT LOSS	APPLE	Hi Ca	Better	Alhaj Alali., et al (2020).
FLAVONOID CONTENT	APPLE	Hi N	Worse	Strissel, et al (2005)
FLAVOR, COLOR	APPLE	Hi N	Worse	Link (1980)
FLOWER BUD FORMATION	APPLE	Low C: Hi N	Worse	Cameron, Dennis (1986)
FLYSPECK, <i>Schizothyrium</i>	APPLE	Ca sprays	Better	Hickey, Conway, Sams (1995)
FREEZE INJURY	APPLE	Hi N	Worse	Cline (1980)
FRUIT COLOR	APPLE	Hi N	Worse	Fallahi, Conway, Hickey, Sams (1997)
FRUIT COLOR	APPLE	Hi N	Worse	Marsh, Volz, Cashmore, Reay (1996)
FRUIT FIRMNESS	APPLE	Hi N	Worse	Racskó, Szabó, Nyéki, (2005)
FRUIT FIRMNESS	APPLE	Optimum K:Ca ratio	Better	Dilmaghani, et al (2005)
FRUIT FRIMNESS	APPLE	Low P	Worse	Sharples, (1980)

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FRUIT QUALITY	APPLE	Hi N	Worse	Raese & Drake (1997)
FUNGAL ROTS	APPLE	Hi N	Worse	Wallace (1953)
INTERNAL BREAKDOWN	APPLE	Hi Ca	Better	Raese, (1993)
INTERNAL BREAKDOWN	APPLE	Low Ca	Worse	Wojcik, Szwonek (2002).
INTERNAL BROWNING	APPLE	Hi Ca, Mg, or B	Better	Hernández, Biasi, Mitcham (2005)
INTERNAL CORKING	APPLE	Low B	Worse	AHDB (2015)
LATE STORAGE CORKING	APPLE	Hi K, Low Ca	Worse	AHDB (2015)
LENTICEL BLOTCH PIT	APPLE	Hi N	Worse	Łysiak, (2013)
LENTICEL BREAKDOWN	APPLE	Hi N, Low Ca	Worse	Martins, et al (2013)
LOW ETHYLENE PRODUCTION	APPLE	Ca dips	Better	Siddiqui, Bangerth (1995)
MITES	APPLE	Hi N	Worse	Hampstead, Gould (1957)
MITES	APPLE	Hi N	Worse	Kuenen (1964)
ORCHARD REPLANT DISEASE	APPLE	Hi P	Better	Braun, Fuller, McRae., Fillmore (2010)
PATHOGEN RESISTANCE	APPLE	Hi Ca	Better	Yaghubi Akram et al (2019)
PHYTOPHTHORA CROWN ROT	APPLE	Hi N	Worse	Utkhede (1984)
PHYTOPHTHORA CROWN ROT	APPLE	Hi N (Ammonium)	Worse	Utkhede & Smith (1995)
POST HARVEST BROWNING	APPLE	Zn fertilization	Better	Malakouti, (2001)
POST HARVEST DECAY, <i>Botrytis</i>	APPLE	Hi Ca	Better	Klein, Conway, Whitaker, Sams (1997)
POST HARVEST DECAY, <i>Botrytis</i>	APPLE	Hi Ca	Better	Wisniewski, et al (1995)
POST HARVEST DECAY, <i>Penicillium</i>	APPLE	Hi Ca	Better	Sams, et al (1993)
POST HARVEST ROT	APPLE	Hi N	Worse	Station (1983)
POSTHARVEST ROT, <i>Penicillium</i>	APPLE	Hi Ca	Better	Conway, et al (1988)
POWDERY MILDEW	APPLE	Hi N	Worse	Weibel, Hãseli (2003)
RED COLOR	APPLE	Hi N	Worse	Fallahi, Fallahi, Seyedbagheri (2006)
RED COLOR	APPLE	Hi N	Worse	Hernández, Biasi, Mitcham (2005)
REDUCED FRUIT COLOR	APPLE	Hi N	Worse	Smith (2012)

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REPLANT DISEASE	APPLE	CaCO ₃	Better	Utkhede (1989)
SCAB	APPLE	Hi N	Worse	Leser, Treutter (2006)
SCAB	APPLE	Hi N	Worse	Strissel, et al, (2005)
SCAB	APPLE	Hi N	Worse	Weibel, Hařseli (2003)
SCAB	APPLE	Low N	Better	Kühn, Pedersen (2009)
SCAB - spore production + lesions	APPLE	Hi N	Worse	Pedersen, et al (2012)
SCAB, FIREBLIGHT	APPLE	Hi N	Worse	Weibel, Hařseli 2003
SHOOT EXCESS, LOOSE LEAVES	APPLE	Hi N	Worse	Kuzin, Trunov, Solovyev (2018)
SKIN SPLITTING	APPLE	Hi N, Low Ca	Worse	Martins, et al (2013)
SOGGY BREAKDOWN	APPLE	Hi K+Mg:Ca	Worse	Hansen (2012)
SOGGY BREAKDOWN	APPLE	Hi N:Ca	Worse	Hansen (2012)
SOOTY BLOTCH, <i>Gloeodes</i>	APPLE	Ca sprays	Better	Hickey, Conway, Sams (1995)
STORAGE BREAKDOWN	APPLE	Hi N	Worse	Sharples (1980)
STORAGE BREAKDOWN, BITTER PIT	APPLE	Low K	Worse	Perring (1968)
STORAGE ROT	APPLE	Hi N	Worse	Kuzin, Trunov, Solovyev (2018)
STORAGE ROT, <i>Alternaria</i>	APPLE	Ca sprays	Better	Biggs, Ingle, Solihati (1993)
STORAGE ROT, <i>Penicillium</i>	APPLE	Hi Ca	Better	Brackmann, Ceretta, Vizzotto (2001)
SUGAR/SOLUBLE SOLID LEVELS	APPLE	Hi N	Worse	Dris, Niskanen, & Fallahi (1999)
SUGAR:ACID RATIO	APPLE	Hi N	Worse	Cheng, Ma, Ranwala (2004)
TASTE	APPLE	Hi N	Worse	Kuzin, Trunov, Solovyev (2018)
TWO SPOT MITE	APPLE	Hi N	Worse	van de Vrie, McMurty, Huffaker (1972)
TWO SPOT MITE	APPLE	Hi N	Worse	Wermelinger, et al (1991)
WATER CORE	APPLE	Low Ca	Worse	AHDB (2015)
WINTER COLD HARDINESS	APPLE	Hi N	Worse	Pole, et al (2017)
YIELDS	APPLE	Hi Ca, Micros, Lo N, P	Better	Tadayon, Saghafi, Sadeghi (2022)
Zn, Fe, Cu DEFICIENCY	APPLE	Hi N	Worse	Kuzin, Trunov, Solovyev (2018)

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FRUIT RESPIRATION - STORAGE	APPLE, PEAR	Hi N, Low Ca	Worse	Swindeman (2002)
SUGAR, ACID, STORAGE	APPLES	Hi N	Worse	Palacios-Peralta, et al (2022)
BACTERIAL CANKER	APRICOT	Hi Ca	Better	Vigouroux, Bussi (1993)
BACTERIAL CANKER	APRICOT	Hi Ca	Better	Vigouroux, Bussi (1995)
BACTERIAL CANKER, <i>Pseudomonas</i>	APRICOT	Low Ca	Worse	Scortichini (2010)
BROWN ROT, <i>Sclerotinia</i>	APRICOT	Hi K	Better	Wade (1956)
CELL WALL THICKNESS	APRICOT	Hi N	Worse	Jia, Mizuguchi, Hirano, Okamoto (2006)
DISCOLORATION (Drying)	APRICOT	Hi N	Worse	Rettke, Pitt, Maier, Jones (2006)
DRIED FRUIT DARKENING	APRICOT	Hi N	Worse	Rettke, Pitt, Maier, Jones (2006)
FIRMNESS, SO2 CONTENT	APRICOT	Hi N	Worse	Rettke, Pitt, Maier, Jones (2006)
FLESH FIRMNESS	APRICOT	Hi N	Worse	Thokchom, Thakur, Sharma (2021)
FROST DAMAGE	APRICOT	Hi N	Worse	Szücs (1985)
FROST HARDINESS – FLOWERS	APRICOT	Hi N	Worse	Szücs (1985)
FRUIT CRACKING	APRICOT	Ca sprays	Better	Liu, Wang, Li, Fu, Suo (2018)
FRUIT FLAVOR, COLOR	APRICOT	Hi N	Worse	Glozer, Ferguson (2007)
FRUIT SUGAR	APRICOT	Hi N, Low K	Worse	Bayram, et al (2007)
INFECTION, <i>Pseudomonas</i>	APRICOT	Low Ca	Worse	Vigouroux, Bussi (1999)
PHENOLIC COMPOUNDS, SUGAR	APRICOT	Hi N, Low K	Worse	Radi, Mahrouz, Jaouad, Amiot 2003)
PHENOLIC COMPOUNDS, SUGAR	APRICOT	Low N	Better	Radi, et al (1997)
PIT BURN	APRICOT	Hi N	Worse	Claypool, (1975)
PREMATURE BROWNING	APRICOT	Hi N	Worse	Rettke, Pitt, Maier, Jones (2006)
SHOT HOLE	APRICOT	Sprays of Ca, K salts	Better	Azmy, A., Korra, A. (2010)
STORAGE LONGEVITY	APRICOT	Ca sprays	Better	El-Motty, et al (2007)
SUGAR, COLOR	APRICOT	Hi N	Worse	Khasawneh, et al. (2022)
BROWN ROT	APRICOT, PLUM	Hi N	Worse	Gheorghe, Leveanu, Amuza (2020).
RED DRUPELET DISORDER	BLACKBERRY	Hi N	Worse	Edgley, Close, Measham (2016)

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BACTERIAL BLIGHT <i>Pseudomonas</i>	BLUEBERRY	Hi N	Worse	Sanchez, Demchak (2004)
BLOSSOM, TWIG BLIGHT, <i>Botrytis</i>	BLUEBERRY	Hi N	Worse	Carroll, Pritts, Heidenreich (2016)
FLOWER FORMATION	BLUEBERRY	Hi N	Worse	Adams (2014)
FOLIAR PATHOGENS	BLUEBERRY	Hi N	Worse	Fulcher, et al (2015)
FROST RESISTANCE	BLUEBERRY	Hi N	Worse	Adam (2014)
FRUIT FIRMNESS	BLUEBERRY	Hi N	Better	Ehret, et al (2014)
ROT, <i>Botrytis</i>	BLUEBERRY	Hi N	Worse	Neilsen, Lowery, Forge, Neilsen (2009)
APHID	CHERRY	Hi N	Worse	Schüepp, et al (2014)
BACTERIAL CANKER	CHERRY	Hi N	Worse	Olsen, et al (2014)
BACTERIAL CANKER	CHERRY	Hi N	Worse	OSU (1999)
BACTERIAL CANKER	CHERRY	Hi N	Worse	Spotts, et al (2010)
BOTRYTIS ROT	CHERRY	Ca, biocontrol sprays	Better	Ippolito et al (2005)
BOTRYTIS ROT	CHERRY	Increased Ca	Better	Demirsoy, Bilgener (1998)
BROWN, STORAGE ROTS	CHERRY	Ca dips	Better	Feliziani, Santini, Landi, Romanazzi (2013)
CHERRY DECLINE	CHERRY	Low Ca, K	Worse	Melakeberhan, Bird, Jones (2001)
COLD HARDINESS	CHERRY	Urea N sprays	Better	Ouzounis, & Lang (2011)
DELAYED MATURITY	CHERRY	Hi N	Worse	Stanberry, Clore (1950).
FIRMNESS, FLESH BROWNING	CHERRY	Hi N	Worse	Palacios-Peralta, et al (2022)
FRUIT CRACKING	CHERRY	Ca foliar	Better	Westwood, Bjomstad (1972)
FRUIT FIRMNESS, FLAVOR	CHERRY	Hi N	Worse	Swarts, Mertes, Close (2017)
FRUIT MATURITY, COLORING	CHERRY	Hi N	Worse	Fogle, et al (1973)
NEMATODES	CHERRY	Optimum Fertilization	Better	Melakeberhan, Bird, Gore (1997)
NEMATODES, (Species; <i>H.d.</i> & <i>Tyl.</i>)	CHERRY	Hi K	Worse	Kirkpatrick, Mai, Parker, Fisher (1964)
NEMATODES, (Species; <i>X.a.</i> & <i>P.p.</i>)	CHERRY	Low K	Worse	Kirkpatrick, Mai, Parker, Fisher (1964)
PHENOLICS, ANTIOXIDENTS	CHERRY	Hi N	Worse	Palacios-Peralta, et al (2022)
PHYTOPHTHORA	CHERRY	Poor drainage	Worse	Mircetich, Schreader, et al (1979)

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POST HARVEST DECAY	CHERRY	Ca foliar	Better	Rupert, Vikupitz, et al (1997)
POST HARVEST DECAY	CHERRY	Post harvest Ca	Better	Vangdal, Nordbø, Flatland (2005)
POWDERY MILDEW, BROWN ROT	CHERRY	Hi N	Worse	Murray, Jepson (2018)
PRE HARVEST CRACKING	CHERRY	Low Ca	Worse	Shear (1975)
RESPIRATION/OXIDATION	CHERRY	Hi N	Worse	Palacios-Peralta, et al (2022)
SOFT FRUIT	CHERRY	Hi K, Low Ca	Worse	Curwen, McArdle & Ritter (1966)
SOIL QUALITY	CHERRY	Hi N	Worse	Rutkowski, et al, (2022)
STECKLENBERG DISEASE	CHERRY	Low P, Ca, & Mg	Worse	Baumann, von Olfers (1976)
STORAGE ABILITY	CHERRY	Ca sprays	Better	Díaz-Mula, et al (2013)
STORAGE QUALITY	CHERRY	Hi Ca	Better	Wang, Xie, Long (2014)
STORAGE, SHIPPING QUALITY	CHERRY	Ca sprays	Better	Wang, Einhorn (2016).
WINTER INJURY	CHERRY	Hi N	Worse	Lehnert, (2011)
WINTER KILL	CHERRY	Hi N	Worse	Fogle, et al (1973)
FLAVOR	FRUIT	Hi N, Water	Worse	Kader (2008)
2 SPOT MITE Damage	FRUIT TREES	Low N, P	Worse	Harries (1966)
2 SPOT MITE Populations	FRUIT TREES	Low N, P	Lower	Harries (1966)
APHID	FRUIT TREES	Hi N	Worse	Murray (2015)
CANKER, <i>Cytospora</i>	FRUIT TREES	Hi N	Worse	Murray (2015)
GREEN PEACH APHID, WINGED	FRUIT TREES	Low Zn, Fe	Worse	Raccah, Tahori, Applebaum (1971)
IRON CHLOROSIS	FRUIT TREES	Hi N, HCO ₃	Worse	Lucena, (2000)
IRON CHLOROSIS	FRUIT TREES	Hi NO ₃	Worse	Tagliavini, Rombolà (2001)
LEAFHOPPERS	FRUIT TREES	Hi N:C ratio	Worse	Brodbeck, Andersen, Mizell (1996)
MEALYBUG	FRUIT TREES	Hi vigor	Worse	Lowery (2006)
MITES	FRUIT TREES	Hi N	Worse	Hanna, Zaher, & Ibrahim (1982)
MITES	FRUIT TREES	Low N	Better	Post (1961)
ORCHARD DECLINE	FRUIT TREES	Low Ca	Worse	Traynor (1986)

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THIN CUTICLES	FRUIT TREES	Hi N	Worse	Hanna, Zaher, & Ibrahim (1982)
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, et al (2005)
AROMA POTENTIAL	GRAPE	Moderate N	Better	Peyrot des Gachons, et al (2005)
BERRY - DISEASE RESISTANCE	GRAPE	Hi Ca	Better	Saxton, V. (2002)
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)
<i>Botrytis</i> & OTHER BUNCH ROTS	GRAPE	Hi Ca	Better	Miceli, Ippolito, Linsalata, Nigro (1999)
<i>Botrytis</i> ROT	GRAPE	Hi Ca	Better	Chardonnet, Doneche (1995)
<i>Botrytis</i> ROT	GRAPE	Hi K	Better	Kiraly (1976)
<i>Botrytis</i> ROT	GRAPE	Hi N	Worse	Chambers, et al (1993)
<i>Botrytis</i> ROT	GRAPE	HI N	Worse	Champagnol, 1984
<i>Botrytis</i> ROT	GRAPE	Hi N	Worse	Delas, Molot, Soyer (1991)
<i>Botrytis</i> ROT	GRAPE	Hi N	Worse	Delas, Molot, Soyer, (1984)
<i>Botrytis</i> ROT	GRAPE	Hi N	Worse	Keller, et al (1995)
<i>Botrytis</i> ROT	GRAPE	Hi N	Worse	Keller, Kummer, Vasconcelos (2001)
<i>Botrytis</i> ROT	GRAPE	HI N	Worse	Maigre, Mirisier (1992)
<i>Botrytis</i> ROT	GRAPE	Hi N Low Ca & K	Worse	Gurnsey, (2005)
<i>Botrytis</i> ROT	GRAPE	Hi N Low Ca & K	Worse	Young (1988)
<i>Botrytis</i> ROT	GRAPE	Hi N, Low K	Worse	Munson (1985)
<i>Botrytis</i> ROT	GRAPE	Hi N, Poor Ca:Mg:K	Worse	Fregoni (1983)
<i>Botrytis</i> ROT	GRAPE	Pre harvest Ca spray	Better	Miceli, Ippolito, Linsalata, Nigro (1999)
BUD FORMATION	GRAPE	Hi N	Worse	Martín, et al (2004)

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BUNCH ROT	GRAPE	Ca, K sprays	Better	Youssef & Roberto (2014)
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	Ca sprays	Better	Amiri, Fallahi, & Safari (2009)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Chardonnet, Doneche (1995)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi Ca, Mod N	Better	Mundy, Elmer, Wood, Agnew (2022)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Chérif, Boubaker (1997)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Mundy & Beresford (2007)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Wilcox, (2005)
BUNCH ROT, <i>Botrytis</i>	GRAPE	Hi N	Worse	Wolf (2003)
BUNCH ROT, POWDERY MILDEW	GRAPE	Hi N	Worse	CSWA., WI., CAWG (2012)
BUNCH ROT, STEM NECROSIS	GRAPE	Hi N	Worse	Keller, Kummer,& Vasconcelos (2001)
BUNCH STEM NECROSIS	GRAPE	Hi N	Worse	Keller, Kummer, Vasconcelos (2001)
BUNCH STEM NECROSIS	GRAPE	Low N	Worse	Capps (1999)
BUNCH STEM NECROSIS	GRAPE	Mg sprays	Better	Bachteler (2014)
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)
DOWNEY MILDEW	GRAPE	Hi N	Worse	Bavaresco, Eibach (1987)
DOWNEY MILDEW	GRAPE	Hi N	Worse	Champagnol, 1984
DOWNEY MILDEW, <i>Plasmopara</i>	GRAPE	Hi N	Worse	Bavaresco, Eibach (1937)

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

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
EUROPEAN GRAPEVINE MOTH	GRAPE	Mod N	Better	Filip (1985)
<i>Eutypa</i> DIEBACK	GRAPE	Optimum Mg	Better	Colrat, et al (1999)
FLAVONOIDS, ANTHOCYANINS	GRAPE	Hi N	Worse	Habran, et al (2016)
FLAVONOIDS, ANTHOCYANINS	GRAPE	Hi N	Worse	Habran, et al (2016)
FREEZE RESISTANCE	GRAPE	Hi Ca	Better	Eifert, Szoeker Varnai, Nagy (1986)
FROST RESISTANCE	GRAPE	Hi Ca, P	Better	Eifert, Szoeker, Varnai, Nagy (1986)
FRUIT BUD FORMATION	GRAPE	Hi N:K	Worse	Isak, A. (2023)
FRUIT COLOR	GRAPE	Hi N	Worse	Hawk, Martinson (2006)
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	Vartholomaiou, 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	Poor K:Mg ratio	Worse	Reisenzein, et al. (2007)
GRAPE STALK NECROSIS	GRAPE	Hi K:Ca ratio	Worse	Cocucci, et al (1988)
GRAPE TRUNK DISEASE <i>Esca</i>	GRAPE	Hi Ca	Better	Schilling, et al (2021)
GRAPE TRUNK DISEASE <i>Esca</i>	GRAPE	Hi N	Worse	Muntean (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	Mayse, Roltsch, Roy, (1991)
LEAFHOPPER	GRAPE	Hi water & vigor	Worse	Daane, et al (1995)
MEALYBUG	GRAPE	Hi N	Worse	Daane, et al (2002)
MEALYBUG - female size, fecundity	GRAPE	Hi N	Worse	Daane, K., et al (2012)
MITES	GRAPE	Hi N:P ratio	Worse	Schreiner, (1984)
NEMATODE	GRAPE	Hi TOC, C/N ratio	Better	Landi, et al (2023)
NEMATODES	GRAPE	Low Ca	Worse	Traynor (1986)

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

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
PACIFIC MITE	GRAPE	Hi N	Worse	Wilson (1988)
PEST, DISEASE SUSCEPTIBILITY	GRAPE	Hi N:K	Worse	Isak, A. (2023)
PHENOLICS, WINE QUALITY	GRAPE	Low N, Water	Better	Choné, et al (2017)
PHOMOPSIS CANE SPOT	GRAPE	Hi N	Worse	Christensen, Peacock (2000)
PHOMOPSIS CANE SPOT	GRAPE	Hi N	Worse	Katz (1999)
PHYLLOXERA	GRAPE	Hi Vigor	Worse	Kimberling, Scott, & Price (1990)
<i>Phylloxera</i>	GRAPE	Low Mn	Worse	Perov, et al (1971)
PIERCE'S DISEASE	GRAPE	Low Ca:P	Better	Leite, et al (2004)
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	Bavaresco, Eibach (1987)
POWDERY MILDEW	GRAPE	Hi N	Worse	Christensen, Peacock (2000)
POWDERY MILDEW	GRAPE	Hi N	Worse	Keller, Rogiers, Schultz (2003)
POWDERY MILDEW	GRAPE	Hi N	Worse	WSU (1995)
POWDERY MILDEW	GRAPE	Low NPK	Worse	Reuveni, et al (1994)
POWDERY MILDEW, <i>Oidium</i>	GRAPE	Hi N	Worse	Bavaresco, Eibach (1937)
RACHIS NECROSIS	GRAPE	Hi N, Poor Ca:Mg:K	Worse	Cline (1987)
RESVERATROL CONTENT	GRAPE	Hi N	Worse	Bavaresco, et al (2005)
SHELF LIFE	GRAPE	Low Ca	Worse	Salisbury, Ross (1992)
SHOOT NECROSIS	GRAPE	Low Ca	Worse	Fournioux, Bessis (1987)
SKIN ANTHOCYANIN CONTENT	GRAPE	Moderate N	Better	Delgado, et al (2004)
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)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
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 ROT, <i>Botrytis</i>	GRAPE	Hi Ca	Better	Miceli, Ippolito, Linsalata, Nigro (1999)
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)
SUMMER BUNCH ROT	GRAPE	Hi N	Worse	Christensen, Peacock (2000)
VAM FUNGI POPULATIONS	GRAPE	Hi N	Worse	Tian (2021)
VINE DECLINE/ESCA DIEBACK	GRAPE	Hi N	Worse	Guérin-Dubrana, et al (2008)
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 DISORDER	GRAPE	Hi N	Worse	Christensen, Peacock (2000)
WINE AROMA	GRAPE	Hi N	Worse	Marangoni, et al (2001)
GRAPE MEALYBUG	GRAPES	Hi N	Worse	Daniel, Matray, Stoeckli, Niggli, (2018)
STORAGE WEIGHT LOSS, DECAY	GRAPES	CaNO ₃ sprays	Better	Gupta, Jindal, Singh (1979)
<i>Botrytis</i> ROT	KIWI	Hi N	Worse	Pertot, Perin (1999)
<i>Botrytis</i> ROT	KIWI	Hi N:Ca	Worse	Prasad, Spiers (1992)
FLOWER BLIGHT, <i>Pseudomonas</i>	KIWI	Hi N	Worse	Balestra, Varvaro (1997)
FRUIT FIRMNESS	KIWI	Hi N: Low Ca	Worse	Zoffoli, Gil , Crisosto (1999)
FRUIT FIRMNESS	KIWI	Hi N, K:Ca	Worse	Pacheco, et al (2008)
FRUIT FIRMNESS	KIWI	Low N	Better	Hasey, et al (1997)
FRUIT PITTING	KIWI	Hi Ca	Better	Thorp, Ferguson, Boyd, Barnett (2003)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
FRUIT SOFTENING	KIWI	Hi N	Worse	Vizzotto, Lain, & Costa (1999)
POST HARVEST BRUISING	KIWI	Hi Ca	Better	Benge, Banks, Tillman, De Silva (2000)
STORAGE QUALITY	KIWI	Hi N, Lo K	Worse	Cuquel, Motta, Tutida, Mio (2011)
STORAGE QUALITY	KIWI	Hi N:Ca ratio	Worse	Tagliavini (1993)
STORAGE ROT	KIWI	Low Ca	Worse	Dichio, Remorini, & Lang (2003)
SUGAR CONTENT	KIWI	Hi N, P or K	Worse	Smith, et al (1994)
BROWN ROT	NECTARINE	Hi N	Worse	Michailides, et al (1993)
BROWN ROT	NECTARINE	Hi N	Worse	Daane, et al (1995)
BROWN ROT	NECTARINE	Hi N	Worse	Johnson, et al (2013)
BROWN ROT	NECTARINE	Hi N	Worse	Michailides, Johnson (1991).
COLOR, WATER LOSS	NECTARINE	Hi N	Worse	Crisosto (1994)
CUTICLE DENSITY	NECTARINE	Hi N	Worse	Day (1997)
FRUIT BROWNING	NECTARINE	Low N, P	Worse	Olivos, et al (2012)
FRUIT BROWNING in STORAGE	NECTARINE	Low P	Worse	Johnson, et al (2013)
FRUIT FIRMNESS	NECTARINE	Ca sprays	Better	Manganaris, et al. (2006)
FRUIT WATER LOSS	NECTARINE	Hi N	Worse	Day (1997)
NECTARINE POX	NECTARINE	Hi N, K, Mg; Low Ca, B	Worse	Ogawa, et al (1995)
PEACH TWIG BORER	NECTARINE	Hi N	Worse	Daane, et al (1995)
PEACH TWIG BORER	NECTARINE	Hi N	Worse	Weinbaum, Johnson, DeJong (1992)
POWDERY MILDEW	NECTARINE	Foliar P	Better	Reuveni, Reuveni, (1995)
RED COLORATION	NECTARINE	Hi N	Worse	Day (1997)
2 SPOT MITE	PEACH	Hi N	Worse	Altieri (2005)
APHID	PEACH	Low or Hi N	Better	Sauge, Grechi, Poëssel (2010)
APHID	PEACH	Mod N	Worse	Sauge, Grechi, Poëssel (2010)
APHID	PEACH	Mod N	Worse	Sauge, Grechi, Poëssel (2010)
APHID	PEACH	Optimum N	Better	Sauge, Grechi, Poëssel (2010)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
APHIDS	PEACH	Mod N	Worse	Sauge, Grechi, Poëssel (2010)
BACTERIAL CANKER	PEACH	Hi K, Low Ca	Worse	Vigouroux, Berger, Bussi (1987).
BACTERIAL CANKER	PEACH	Hi N:Ca	Worse	Cao et al (2013)
BACTERIAL CANKER	PEACH	High C:N ratio	Worse	Cao, et al (2005)
BACTERIAL CANKER	PEACH	Low N	Worse	Cao, et al. (2005)
BACTERIAL CANKER, <i>Pseudomonas</i>	PEACH	Low C/N	Worse	Reighard, Bridges, Glenn, Mayer (2016)
BACTERIAL CANKER, <i>Pseudomonas</i>	PEACH	Low Ca	Worse	Scortichini (2010)
BACTERIAL DIEBACK	PEACH	Hi Ca	Better	Vigouroux, Bussi. (1989)
BACTERIAL SPOT	PEACH	Hi K	Better	Mathee & Daines (1969)
BACTERIAL SPOT, <i>Xanthomonas</i>	PEACH	Low K	Worse	Matthee, Daines (1969)
BROWN ROT	PEACH	B sprays, dips	Better	Thomidis, Exadaktylou (2010)
BROWN ROT	PEACH	Ca dips	Better	Biggs, et al, (1997)
BROWN ROT	PEACH	Ca sprays	Better	Manganaris, et al (2005)
BROWN ROT	PEACH	Ca, B sprays	Better	Kavvadias, et al (2012)
BROWN ROT	PEACH	Hi Ca	Better	Thomidis, et al (2007)
BROWN ROT	PEACH	Hi N	Worse	Michailides, et al (1993)
BROWN ROT	PEACH	Hi N	Worse	Sarkhosh, et al (2020)
BROWN ROT	PEACH	Hi N (compost)	Worse	Hasey, et al (2006)
BROWN ROT	PEACH	Increased Ca	Better	Elmer, Spiers, Wood (2007)
BROWN ROT FRUIT LESIONS	PEACH	Hi N	Worse	Parda (2012)
BROWNING IN STORAGE	PEACH	Hi N	Worse	Pascual,et al (2013)
CANKER, <i>Cytospora</i>	PEACH	Hi or Low N	Worse	Cline (1980)
COLORING, MATURITY	PEACH	Hi N	Worse	Sistrunk (1985)
DELAYED RIPENING	PEACH	Hi N	Worse	Domingo Martinez (2010)
DIEBACK, <i>Phytophthora</i>	PEACH	Poor drainage	Worse	Burnham (1996)
FIRMNESS, STORAGE DISEASE	PEACH	Ca dips	Better	Rahman, (2016)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
FLESH FIRMNESS	PEACH	B sprays, dips	Better	Thomidis, Exadaktylou (2010)
FLESH FIRMNESS, PECTIN	PEACH	Hi N	Worse	Jia, Mizuguchi, Hirano, Okamoto (2006)
FRUIT COLOR	PEACH	Hi N	Worse	Kato, et al (2000)
FRUIT CRACKING	PEACH	Ca, B sprays	Better	Kavvadias, et al (2012)
FRUIT FIRMNESS	PEACH	Hi N	Worse	Hernandez-Fuentes, et al (2001)
FRUIT FIRMNESS	PEACH	Post harvest Ca	Better	Prussia, (2005)
FRUIT SET	PEACH	Optimum – Hi B	Better	Johnson (2003)
FRUIT SUTURE SOFTENING	PEACH	Hi N	Worse	Ma, Liu (2006)
GREEN PEACH APHID	PEACH	Hi N	Worse	Rousselin, et al (2016)
INFECTION, <i>Pseudomonas</i>	PEACH	Low Ca	Worse	Vigouroux, Bussi (1999)
INTERNAL BREAKDOWN	PEACH	Low Ca	Worse	Manganaris, et al. (2006)
LEUCOSTOMA CANCER	PEACH	Hi N	Worse	Biggs, (1989)
PEACH CANCER, <i>Phomopsis</i>	PEACH	Hi N	Worse	Simões, et al (2008)
PEACH DECLINE	PEACH	Low Ca	Worse	Gallaher, Perkins, Jones (1975)
PEACH TWIG CANCER	PEACH	Ca salts	Better	Biggs, El-Kholi, El-Neshawy (1994)
POST HARVEST BRUISING	PEACH	Hi Ca	Better	Prussia, S., et al (2005)
POST HARVEST DECAY	PEACH	Hi Ca	Better	Conway, (1989)
POST HARVEST DEHYDRATION	PEACH	Hi N	Worse	Crisosto, Mitchell (2002)
<i>Pseudomonas</i> CANCER	PEACH	Injected Hi N, Low Ca	Better	Cao, et al (2006)
SOFT FRUIT	PEACH	Hi N	Worse	Southwick (2004)
SPLIT PIT	PEACH	Hi N	Worse	Claypool, Uriu, Lasker (1972)
STORAGE QUALITY	PEACH	Hi Ca	Better	Gupta, Jawandha, Gill (2011)
SUGAR	PEACH	Hi N	Worse	Takano (2003)
VITAMIN C, SUGAR, PECTIN	PEACH	Hi Ca	Better	Singh (2000)
WOUND HEALING - BROWN ROT	PEACH	Hi Ca	Better	Souza (2001)
2 SPOT MITE	PEAR	Hi N	Worse	Hukusima, Tsugawa, Taneichi, (1958)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
BACTERIAL CANKER, <i>Phytophthora</i>	PEAR	Hi N	Worse	Laywisadkul (2007)
BLACK END	PEAR	Low Ca	Worse	Peterson & Stevens (1994)
BLOSSOM BLAST	PEAR	Low B	Worse	Turner (1970)
BROWN ROT	PEAR	Hi N	Worse	Llorente & Montesinos (2006)
BROWN SPOT, <i>Stemphylium</i>	PEAR	Hi Ca	Better	Toselli, et al (1994)
COLD TOLERANCE	PEAR	Hi N	Worse	Raese (1997)
CORK ROT	PEAR	Hi N	Worse	Musacchi, Iglesias, Neri (2021)
CORK SPOT	PEAR	Hi Ca	Better	Raese, J. (1993)
CORK SPOT	PEAR	Hi K:Ca	Worse	Warner (2007)
EUROPEAN RED MITE	PEAR	Hi N	Worse	van de Vrie, McMurty, Huffaker (1972)
EXCESSIVE SHOOT GROWTH	PEAR	Hi N	Worse	Musacchi, Iglesias, Neri (2021)
FALL SHOOT BLIGHT, <i>Pseudomonas</i>	PEAR	Hi N	Worse	Pataky (2002)
FIRE BLIGHT	PEAR	Hi K	Better	Parker, et al (1961)
FIREBLIGHT	PEAR	Good soil Ca balance	Better	Stanley (1993)
FIREBLIGHT	PEAR	Hi Ca	Better	Lewis, Kenworthy (1962)
FIREBLIGHT	PEAR	Hi Ca	Better	Toselli, et al (1994)
FIREBLIGHT	PEAR	Hi N	Worse	Agrios (1997)
FIREBLIGHT	PEAR	Hi N	Worse	Lewis, Kenworthy (1962)
FIREBLIGHT	PEAR	Hi N	Worse	Van der Zwet, Keil (1979)
FIREBLIGHT	PEAR	Hi N	Worse	Williams, Couey, Moffitt, Coyier (1978)
FIREBLIGHT	PEAR	Hi N, Low K, Mn	Worse	Koseoglu, Tokmak, Momol (1996)
FRECKLE PIT	PEAR	Hi N	Worse	Raese & Staiff (1989)
FREEZE DAMAGE	PEAR	Ca sprays	Better	Raese, Drake (1997)
FRUIT FIRMNESS	PEAR	Ca sprays	Better	Moon, Lim, Choi, Suh (2000)
FRUIT ROT, <i>Botrytis</i>	PEAR	Hi Ca	Better	Vaz (1984)
FRUIT ROT, <i>Penicillium</i>	PEAR	Hi Ca	Better	Vaz (1984)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
GREEN BLOTCH (alfalfa greening)	PEAR	Hi N, Lo Ca	Worse	Raese, 1980
PEAR PSYLLA	PEAR	Hi N	Worse	Beers, Brunner, Willet, Warner (1993)
PEAR PSYLLA	PEAR	Hi N	Worse	Burkhart, Shearer (1990)
PEAR PSYLLA	PEAR	Hi N	Worse	Daugherty, Briggs, Welter (2007)
PEAR PSYLLA	PEAR	Hi N	Worse	Khanet al, (2020)
PEAR PSYLLA	PEAR	Hi N	Worse	McMullen & Jong (1972)
PEAR PSYLLA	PEAR	Hi N	Worse	Pfeiffer, Burts (1983)
PEAR PSYLLA	PEAR	Hi N	Worse	Qin, et al (2021)
PEAR PSYLLA	PEAR	Hi N	Worse	Shaltiel-Harpaz, et al (2010)
PEAR PSYLLA	PEAR	Hi N	Worse	Shaltiel-Harpaz, et al (2010)
PEAR PSYLLA	PEAR	Hi N	Worse	Sugar, Righetti, Westigard (1989)
PEAR PSYLLA	PEAR	Hi N	Worse	Warner (2014)
PEAR PSYLLA - Damage	PEAR	Hi N	Worse	Raese, Staiff (1989)
PEAR PSYLLA - Fecundity	PEAR	Hi N	Worse	Hodkinson (1974)
PEAR PSYLLA, Honeydew production	PEAR	Low N	Worse	Pfeiffer, Burts (1984)
PEAR ROT, <i>Penicillium</i>	PEAR	Hi N, Low Ca	Worse	Sugar, et al (1992)
<i>Phytophthora</i>	PEAR	Hi N	Worse	Laywisadkul, (2008)
PHYTOPLASMA DISEASE	PEAR	Poor Fe:Mn	Worse	Rossi (2010)
POST HARVEST FIRMNESS	PEAR	Ca sprays	Better	Moon, Lim, Choi, Suh (2000)
POSTHARVEST ROT	PEAR	Low N, Hi Ca	Better	Sugar, Righetti, et al (1992)
PREMATURE FRUIT DROP	PEAR	Hi B, K; Low Mg, Fe	Worse	Admin/Editor (2012)
PREMATURE FRUIT DROP	PEAR	Hi N	Worse	Admin/Editor (2012)
SPIDER MITES	PEAR	Hi N	Worse	Post (1962)
STORAGE ROT	PEAR	Hi N	Worse	Musacchi, Iglesias, Neri (2021)
STORAGE ROTS	PEAR	Low N, Hi Ca	Better	Warner (2010)
STORAGE TIME	PEAR	Hi Ca	Better	Wills, Tirmazi, Scott (1982)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
SUGAR, SCALD, FLAVOR	PEAR	Hi N	Worse	Joshi, Bhutani (1995)
WINTER INJURY	PEAR	Hi N	Worse	Olsen, et al (2014)
CANKER, DEAD ARM, <i>Sphaeropsis</i>	PEAR, APPLE	Fe sprays	Better	Graham (1983)
FIREBLIGHT	PEAR, APPLE	Hi N	Worse	Fulcher, Bowers (2013)
FIREBLIGHT	PEAR, APPLE	Low N, Optimum Ca	Better	Ostenson, Granatstein (2013)
EUROPEAN RED MITE	PEARS	Hi N	Worse	Post (1959)
NITRATE, NITRITE, level in fruit juice	PERSIMMON	Hi N	Worse	Ennab, Soliman, Mikhael (2018)
BACTERIAL CANKER	PLUM	Hi P	Worse	Beard, Wormald (1936)
BROWN ROT	PLUM	Hi N	Worse	May-De-Mio, et al (2008)
BROWN ROT, STORAGE QUALITY	PLUM	Hi Ca	Better	Vangdal, Borge (2002)
COLOR & SUGAR CONTENT	PLUM	Hi N	Worse	Cuque, Motta, Tutida, De Mio (2011)
FIRMNESS, SOLUBLE SOLIDS	PLUM	Low N, Hi K	Better	Cuquel, Motta, Tutida, Mio (2011)
FRESH & STORAGE QUALITY	PLUM	Hi N, Low K	Worse	May-De-Mio, et al (2008)
FRUIT FIRMNESS	PLUM	Hi N	Worse	Cuquel, Motta, Tutida, Mio (2011)
FRUIT SIZE	PLUM	Adequate K	Better	Southwick (2004)
HARVEST DAMAGE; FIRMNESS	PLUM	Ca sprays	Better	Manganaris, Vicente, & Crisosto (2008)
MECHANICAL DAMAGE- Resistance	PLUM	Ca sprays	Better	Serrano, et al (2004)
NEMATODES	PLUM	Hi K	Worse	Sharma, Thakur, Kashyap (2003).
NEMATODES	PLUM	Hi K	Worse	Sharma, Thakur, Kashyap (2003).
SCAB, <i>Cladiporium</i>	PLUM	Hi K	Better	May-De-Mio, et al (2008)
SHOT HOLE	PLUM	Hi N	Worse	Lamey, Stack (1991)
SHOT HOLE, <i>Pseudomonas</i>	PLUM	Hi N	Worse	Lamey, Stack (1991)
SOLUBLE SOLIDS	PLUM	Adequate K	Better	Southwick (2004)
SOLUBLE SOLIDS/SUGAR	PLUM	Hi K	Better	Cuquel, Motta, Tutida, Mio (2011)
SPIDER MITES	PLUM	Hi N	Worse	Post (1962)
STORAGE QUALITY	PLUM	Hi N	Worse	Cuquel, Motta, Tutida, De Mio (2011)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	Effect On Problem	REFERENCE
STORAGE QUALITY	PLUM	Hi N, Lo K	Worse	Cuquel, Motta, Tutida, Mio (2011)
STORAGE QUALITY	PLUM	Low N, Hi K	Better	Cuquel, Motta, Tutida, & Mio (2011)
STORAGE QUALITY	PLUM	Optimum N, K	Better	Cuquel, et al. (2011)
TOTAL ACIDITY	PLUM	Hi N	Worse	Cuquel, Motta, Tutida, Mio (2011)
BACTERIAL CANCER	PRUNE	Low N	Worse	Southwick, et al (1997)
BACTERIAL CANCER, <i>Pseudomonas</i>	PRUNE	Low N	Worse	Southwick, et al (1997)
BROWN ROT	PRUNE	Ca sprays	Better	Wojcik (2001)
BROWN ROT	PRUNE	Hi N	Worse	Buchner (2012)
BROWN ROT	PRUNE	Hi N	Worse	Niederholzer, Adaskaveg (2009)
BROWN ROT	PRUNE	Wet soil	Worse	Michailides, Luo, Ma, Morgan (2007)
CANKER, <i>Cytospora</i>	PRUNE	Hi K	Better	Bertrand, English, Carlson (1976)
CANKER, <i>Cytospora</i>	PRUNE	Low K	Worse	Johnson (2017)
CANKER, <i>Cytospora</i>	PRUNE	Low N, Low K	Worse	Ogawa, et al (1995)
CYTOSPORA CANCER	PRUNE	Low K	Worse	Bertand, English, Carlson (1976)
DIE-BACK	PRUNE	Low K	Worse	Dixon (1990)
DRYING QUALITY, MATURITY	PRUNE	Hi N	Worse	Stebbins, et al (1982)
SPUR BLIGHT, <i>Didymella</i>	RASPBERRY	Hi N	Worse	Klodd, Worth (2021)
BACTERIAL CANCER	STONE FRUIT	Low N	Worse	Cao, et al (2005)
BACTERIAL ROT	STONE FRUIT	Hi N	Worse	Stefani (2010)
BACTERIAL SPOT, <i>Xanthomonas</i>	STONE FRUIT	Hi N	Worse	University of Illinois (1989)
PEACH FLATHEAD ROOTBORER	STONE FRUIT	Hi N	Worse	Sharon, Peles, Gordo, & Harari (2010)
SHOT HOLE	STONE FRUIT	Ca, K sprays	Better	Azza, Korra (2010)
SHOTHOLE	STONE FRUIT	Hi N	Worse	Lamey, Stack (1991)
MITES	TREE FRUITS	Hi N	Worse	Daniel, Matray, Stoeckli, Niggli, (2018)
APHID	VARIOUS	Hi N	Worse	Denno (1985)
APHID	VARIOUS	Hi N	Worse	Strauss (1987)

**INTERACTIONS between NUTRIENTS/SOIL CONDITIONS and PESTS, DISEASES & PHYSIOLOGICAL DISORDERS
DECIDUOUS FRUITS & VINES**

DECIDUOUS FRUITS & VINES

TOTAL	DATE	Hi N = Worse	% Hi N	Ca = Better	% Ca	K = Involved	% K	Nutrient Ratio/ Balance Involved
520	9/18/2023	332	64%	147	28%	65	12%	4%
		(or low N = Better)		(or low Ca = Worse)		(Hi or Low K)		(25 studies)

Hi N = Better	(or low N = Worse)
19	4%

Micronutrients Involved
3%
Low or Hi = Better

Nutrient Ratio/ Balance Involved
4%
(25 studies)

Hi N = Worse (number of studies)

Pests
81
Hi N = Worse

Diseases
116
Hi N = Worse