

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

PEST, DISEASE or CONDITION	CROP	SOIL or NUTRIENT CONDITION	EFFECT ON PROBLEM	REFERENCE
ACP, Development, Reproduction	CITRUS	Hi N & P	Worse	Telagamsetty, S. L. (2016).
APHIDS	CITRUS	Hi N	Worse	Braham, et al (2023)
ASIAN CITRUS CANKER	CITRUS	Hi N, Vigor	Worse	Krajewski & Krajewski, (2010)
ASIAN CITRUS PSYLLID	CITRUS	Hi N	Worse	Singh, Reddy, Deka (2020)
ASIAN CITRUS PSYLLID Feeding	CITRUS	Hi N	Worse	Serikawa, Backus, Rogers (2013)
ASIAN CITRUS PSYLLID Nymphal Mortality	CITRUS	Double N Rate	Better	Phillips, et al (2023)
ASIAN CITRUS PSYLLID Production	CITRUS	High N Rate	Better	Cantu, (2015)
BLACK SCALE	CITRUS	Hi N, Lo K	Worse	Chaboussou, (1976)
BLACKFLY, <i>Aleurocanthus</i>	CITRUS	Hi Si	Better	Vieira, et al (2016)
BROWN SPOT <i>Alternaria</i>	CITRUS	Hi N	Worse	Devite, et al (2023)
BROWN SPOT, <i>Alternaria</i>	CITRUS	Hi Ca	Better	Devite, et al (2023)
CITRUS LEAFMINER	CITRUS	Si fertilization	Better	Dito (2016)
CITRUS BLACKFLY	CITRUS	Hi N	Worse	Singh, Reddy, Deka (2020)
CITRUS BLIGHT	CITRUS	Hi pH; Ca	Worse	Wutscher (1989)
CITRUS BLIGHT, <i>Fusarium</i>	CITRUS	Hi NH3-nitrate	Worse	Burnett, Nemec, Patterson (1982)
CITRUS LEAF MINER	CITRUS	Hi K, Lo Ca	Worse	Mustaqeem, et al (2014)
CITRUS LEAFMINER	CITRUS	Hi N, Vigor	Worse	Krajewski & Krajewski, (2010)
CITRUS PSYLLA	CITRUS	Hi N	Worse	Catling (1969)
CITRUS PSYLLA	CITRUS	Hi N, Vigor	Worse	Krajewski & Krajewski, (2010)
CITRUS PSYLLA	CITRUS	Succulent Leaves	Worse	Pande (1972)
CITRUS ROOT WEEVIL, damage, <i>Diaprepes</i>	CITRUS	Higher pH; Ca	Better	Li, et al (2004)
COLD INJURY	CITRUS	Low Mg	Worse	Lawless, Camp, 1940
Cu Deficiency	CITRUS	Hi N	Worse	Mattos-Jr, (2023)
DIEBACK of TREES	CITRUS	Hi N	Worse	Fraps, & Asbury (1928)
DRY ROOT ROT	CITRUS	Hi NH3	Worse	Allen (1962)

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DRY ROOT ROT, <i>Fusarium</i>	CITRUS	Hi N	Worse	Malikoutsaki-Mathioudi, et al. (1987)
DRY ROOT ROT, <i>Fusarium</i>	CITRUS	Si fertilization	Better	Marais, (2015)
EXANTHEMA Cu DEFICIENCY	CITRUS	Hi N	Worse	Smoot, Houck, Johnson, (1971)
FRUIT SIZE	CITRUS	Lo K	Worse	Embleton, Jones, Platt, (1975)
FRUIT SIZE	CITRUS	Lo Zn or Fe	Worse	Jones, Smith, (1964)
GLASSY WING SHARPSHOOTER egg laying	CITRUS	Hi Protein (NH3)	Worse	Bi, et al (2005)
HUANGLONGBING (HLB; Citrus Greening)	CITRUS	Cu, Zn, Ca sprays	Better	Ahmad, et al (2011)
HUANGLONGBING HLB; Citrus Greening	CITRUS	Spray Ca, Mg, Mn, Zn	Better	Morgan, Rouse, Ebel (2016)
HUANGLONGBING, (HLB; Citrus Greening)	CITRUS	Lo Ca, Mg, B	Worse	Spann, & Schumann (2009)
HUANGLONGBING, (HLB; Citrus Greening)	CITRUS	Low Zn	Worse	Teixeira, et al (2008)
HUANGLONGBING, (HLB; Citrus Greening)	CITRUS	Low Zn, Fe	Worse	Masaoka, et al (2011)
HUANGLONGBING, Citrus Greening	CITRUS	Micronutrient sprays	No Change	Gottwald, et al (2012)
MEALYBUGS	CITRUS	Hi N	Worse	Franco, et al (2004)
MEALYBUGS	CITRUS	Hi N	Worse	Salama, El-Sherif, Megahed, (1985)
MEALYBUGS	CITRUS	Hi N	Worse	Singh, Reddy, Deka (2020)
MITE LEVELS	CITRUS	N sprays	Better	Menge, et al (1990)
MITE, CITRUS RED, <i>Panonychus</i>	CITRUS	Mod, Hi N	Better	Hare, et al (1992)
MITES, CITRUS RED	CITRUS	Hi N	Worse	Liu, Xu, Beattie, Zhang, Cen (2019)
NEMATODES	CITRUS	Low P	Worse	Salahi Ardakani, et al (2014)
NEMATODES	CITRUS	Mod N, K	Worse	Sorribas, et al (2008)
NEMATODES, <i>Tylenchulus</i> Populations	CITRUS	Standard N-P-K Fert.	Worse	Salahi Ardakani, et al (2014)
PHOTOSYNTHESIS	CITRUS	Hi N	Worse	Bernardi, et al (2015)
PURPLE SCALE <i>Lepidosaphes</i>	CITRUS	Hi N	Worse	Salama, Amin, Hawash (1972)
RED SCALE, <i>Aonidiella</i>	CITRUS	Hi N	Better	Salama, Amin, Hawash (1972)
ROOT ROT, <i>Phytophthora</i>	CITRUS	N sprays	Better	Menge, et al (1990)

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SCALE, <i>Parlatoria</i>	CITRUS	Hi N	Worse	Salama, El-Sherif, Megahed, (1985)
SOIL BACTERIAL DIVERSITY	CITRUS	Hi N	Worse	Wan, Li, Wang, Shi (2021)
THRIPS SCARRING	CITRUS	Hi N sprays	Worse	Menge, et al (1990)
VA MYCORRHIZAE	CITRUS	B fertilization	Better	Dixon, Garrett, Cox, (1989)
VEGETATIVE GROWTH vs FLOWERING	CITRUS	Hi N	Worse	Omari, et al (2023)
WHITE WAX SCALE, <i>Gascardia</i>	CITRUS	Hi N	Worse	Beattie, Weir, Clift, Jiang (1990).
WOOLLY WHITEFLY	CITRUS	Optimum N, P	Better	Nega, Getu, Hussein (2014)
Zn, K DEFICIENCY	CITRUS	Hi N	Worse	Fake (2004)
APHIDS, SCALES, MEALYBUGS	CITRUS,	Hi N	Worse	Manner, et al, (2006)
GREASY SPOT, <i>Mycosphaerella</i>	GRAPEFRUIT	Hi micros	Better	Timmer, Zitko, (1995)
HUANGLONGBING (HLB; Citrus Greening)	GRAPEFRUIT	Hi Mn	Better	Zampon, et al (2019)
ACP Egg Laying, Nymph Production	LEMON	Soft leaves	Worse	Moran, Buchan (1975)
CITRUS LEAFMINER	LEMON	Hi N	Worse	Ateyyat, Mustafa (2001)
ESSENTIAL OIL CONTENT	LEMON	Hi N	Worse	Quaggio (2002)
LEMON GUMMOSIS	LEMON	Hi N, Low K	Worse	Shenglin, Xuannan (1996)
MAL SECCO, <i>Plenodomus</i>	LEMON	Hi N	Worse	Raciti, et al (1990)
MITES, CITRUS BUD	LEMON	Low K	Worse	Sternlicht, Regev, Goldenberg (1975)
RED SCALE, <i>Aonidiella</i>	LEMON	Low N, Ca, Hi P	Worse	Steyn (1951)
SCAB	LEMON	Hi N	Worse	Koo, Young, Reese, (1973)
ASIAN CITRUS PSYLLID Oviposition Reduction	LIME	Foliar K, Ca & Si	Better	Ramirez-Godoy, et al (2018)
KEY LIME ANTHRACNOSE, <i>Colletotrichum</i>	LIME	Hi N	Worse	Crane (2010)
CITRUS WHITEFLY	MANDARIN	Hi N	Worse	Onillon et al (1985)
HUANGLONGBING (HLB; Citrus Greening)	MANDARIN	Hi Fe	Better	Pustika, et al (2008)
NEMATODES, Root Populations	MANDARIN	Hi NH3	Lower	Salahi Ardakani, et al (2014)
RIND PUFFING	MANDARIN	Ca sprays	Better	Shiraishi, et al (1999)

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ALBEDO BREAKDOWN	ORANGE	Ca sprays	Better	Treeby, Storey (2002)
ASIAN CITRUS PSYLLID	ORANGE	Hi NH3	Worse	Malik, et al (2012)
ASIAN CITRUS PSYLLID Growth	ORANGE	Lo N	Worse	Catling (1971)
CITRUS LEAF MINER	ORANGE	Low N	Better	Tsagkarakis, et al (2011)
CITRUS LEAFMINER, <i>Phyllocnistis</i>	ORANGE	K silicate sprays	Better	Abo El-Enien, et al (2007)
CITRUS ROOT WEEVIL, <i>Diaprepes</i>	ORANGE	Hi N	Worse	Borowicz, Albrecht, Mayer (2003)
CREASE	ORANGE	Low Ca	Worse	Storey, Treeby, Milne (2002).
CREASING	ORANGE	Hi N, K; Low Ca	Worse	Sallato, Bonomelli, Martiz (2017)
FRUIT STORAGE, TREE GROWTH, w/ HLB	ORANGE	Hi, Low N	Worse	Atta, et al (2023)
GREASY SPOT DISEASE, <i>Mycosphaerella</i>	ORANGE	Lo Ca, micros	Worse	Mann, Schumann, Spann, (2011)
GREEN MOLD, <i>Penicillium</i>	ORANGE	Ca sprays	Better	Youssef, et al (2012)
HOLLOW CORE	ORANGE	Low P	Worse	Ladaniya, (2008)
HUANGLONGBING (HLB; Citrus Greening)	ORANGE	Hi micros, K; Low N	Better	Spann, et al. (2011)
MITES	ORANGE	Hi N	Worse	Borowicz, Albrecht, Mayer (2003)
MITES, 2 SPOT – Populations	ORANGE	Low Mycorrhiza	Worse	Manresa-Grao, et al (2022)
MITES, CITRUS RED	ORANGE	Hi N + Urea Sprays	Better	Hare, et al (1989)
NITRATE, NITRATE CONTENT, JUICE	ORANGE	Lower soluble N	Better	Abd El-Migeed, et al (2007)
REGREENING	ORANGE	Hi N	Worse	Farag, et al (2014)
RIND STAINING	ORANGE	Hi N	Worse	Eckert & Eaks, (1989)
ROOT ROT, <i>Phytophthora</i>	ORANGE	Ca salts	Better	Campanella, Ippolito, Nigro (2002)
THRIPS	ORANGE	Hi N	Worse	Hare, et al (1989)
ARBUSCULAR MYCORRHIZAL FUNGI	TANGERINE	Hi N, P	Worse	Youpensuk, et al (2008)
BROWN SPOT, <i>Alternaria</i>	TANGERINE	Hi N	Worse	Timmer, et al, (2001)
BROWN SPOT, <i>Alternaria</i>	TANGERINE	Hi N	Worse	Whiteside J., (1976)
MITES, CITRUS	TANGERINE	Micronutrient sprays	Better	Chávez-Dulanto, et al (2018)

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HI-MOD N – WORSE or LOW N BETTER	CALCIUM INVOLVED	K INVOLVED	MICROS INVOLVED	HI – MOD N BETTER * or LOW N WORSE
57 = 57%	14	9	12	8

* High ammonia fertilization has been found to decrease populations of citrus nematodes temporarily; foliar sprays of urea will reduce mite populations on the leaves. Part of this effect is their inherent toxicity from concentrated solutions.

CITRUS

TOTAL	DATE	Hi N = Worse	% Hi N	Ca = Better	% Ca	K = Involved	% K
100	12/4/2023	87	87%	12	12%	11	11%
		(or low N = Better)		(or low Ca = Worse)		(Hi or Low K)	

Nutrient Ratio/ Balance Involved
8%
(8 studies)

Hi N = Better	(or low N = Worse)
9	9%

Micronutrients Involved
12%
Low or Hi = Better