

Potatoes (fresh market, processing, and niche market types) are widely grown in NYS. Disease control is important for yield, marketability and storage capabilities. Management strategies need to include the following:

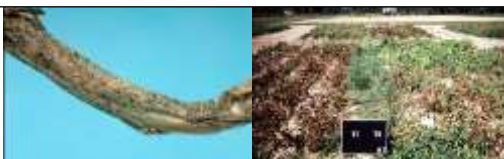
1.) **Early Blight** (EB, Fig. 1 see “target” lesions) occurs every season. In general early and mid-season varieties are quite susceptible and may need more attention, otherwise tuber infection is possible.



Fig. 1. EB

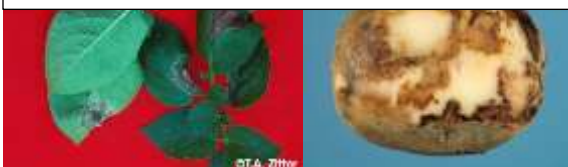
2.) **Crop rotation** is critical to reduce overwintering inoculum for **Black dot** (*Colletotrichum coccodes*) (BD, Fig. 2 L, R). A minimum 3 year rotation out of all solanaceous crops, will reduced inoculum levels, and a timely foliar fungicide spray (late July to early August) can reduce the early dying of the most susceptible varieties.

Fig. 2 Black dot, on stem (L) and early dying of foliage (R).



3.) **Disease-free seed tubers** is critical to preventing the introduction of **Late blight** (*Phytophthora infestans*) (Fig. 3 L, R) into the field.

Fig. 3. Late blight, on foliage (L) and on tubers (R).



Once LB is introduced into an area, timely monitoring of weather conditions and choosing the most appropriate fungicides as listed on the opposite page need to be applied in a timely manner following a Decision Support System (DSS).

4) **Tuber Blemish Diseases - Post Harvest** (A, B, C) have assumed more importance now that washed tubers has become the marketing norm. **A.)** Individual dots (microsclerotia) of **BD** appear on the tuber surface (L), mostly in round discolored patches (M), but can develop into sunken lesions once in longer storage (R).

Fig 4A Black dot microsclerotia, discolored patch & sunken lesions



B.) Black Scurf (M) and **Canker** (L) caused by *Rhizoctonia solani* can be reduced by using in-furrow treatments for conventional or organic production. **C.) Silver Scurf** (R) can be controlled with seedpiece and in-furrow fungicides. (*Helminthosporium solani*), especially on red-skins.

Fig. 4B Rhizoc. stolon canker & black scurf





Fig 4C Silver scurf

5) If you choose to **spray foliar fungicides**, then spray preventatively as determined by scouting or DSS. For **Late Blight** following the tracking maps at USAblight.org.

6.) The accompanying sheet (page 2 conventional, page 3 organic) provides a **listing of fungicides** for conventional, organic and home garden use. To prevent resistance from developing, follow the label to avoid making sequential applications before alternating to a fungicide with a different MOA. (Prepared NOV 2013, T.A. Zitter, Dept. Plant Path. Ithaca, NY 14850, taz1@cornell.edu). Additional Potato Disease Resource at:

<http://vegetablemendonline.ppath.cornell.edu/NewsArticles/NewsList.htm> .

Partial Listing of Conventional Potato Fungicides for Selected Diseases - T.A. Zitter NOV 2013

Fungicide Information							Tuberborne							Foliar					Comments below are to assist in the appropriate use of these products. <u>Read the label for rates, uses and specific diseases.</u>		
Trade Names	MOA Code	Common Name	Uses	Activity	REI (hrs.)	PHI (Days)	Black Dot-C. coccodes	BlkScf/Canker-Rhizoctonia	Com.Scab/Pow.Scab=Streptomyces/Spongospora	FusariumDryRot-F.spp.	Late Blt. Tuber Blt- P.i.	Leak-Pythium	PinkRot-P.erythrosepatica	Silver Scurf-H. solani	Black Dot-C. coccodes	Early Blight-A. solani	Brown spot-A. alternata	Gray Mold-B. cinerea		Late Blight-P. infestans	WhtMid-S. sclerotiorum
Fungicides if <u>UNDERLINED</u> , are registered in NYS. * = Restricted for use by certified applicator. OLP = other label products exist; See complete OMRI at - http://vegetablemndonline.ppath.cornell.edu/NewsArticles/OMRI .																					
 Cornell University  Cornell University Cooperative Extension																					
Protectants - Conventional, Organic, Home																					
C Bravo WS or OLP	M5	<u>chlorothalonil</u>	F	C	12	7					P				G	G		G	G		Alone or TM partner.
C Dithane DF or OLP	M3	<u>mancozeb</u>	SP, F	C	24	3		F	F=CS	F	P			F		G			G		Seed piece; alone or TM
C Polyram 80DF	M3	<u>metiram</u>	SP, F	C	24	3					P					G			F		Alone or TM partner.
C Agri-Tin [*] SuperTin [*]	30	<u>triphenyltin hydroxide</u>	F	C	48	7					OK					G			F		Alone/TM partner; Su Beetles.
C Ranman 400SC	21	<u>cyazofamid</u>	IF, F	C	12	7					G		OK, IF						G		TM for EB control.
C Gavel 75DF [*]	22+M3	<u>zoxamide + mancozeb</u>	F	C	48	3					G					G			G		[*] Restricted.
O <u>Champ WG</u> or OLP	M1	<u>copper hydroxide</u>	F	C	24	0					P					G			F, G		7 other OMRI coppers
H <u>Bonide Copper</u>	M1	<u>basic copper sulfate</u>	F	C	12	1					P					G			F, G		Other coppers exist.
H <u>Bonide Fung-onil</u>	M1	<u>chlorothalonil</u>	F	C	4	7					P					G		G	G		Other chlorothalonils exist.
Translaminar - Conventional only; Others <u>Headline SC</u> (aerial except w/in 100ft surface water) (IF, F), <u>Gem</u> (F, no aerial), [†]<u>Reason</u>(F, not LI).																					
C <u>Quadris Opti</u>	11+M5	<u>azoxystrobin+chlorothal.</u>	F	TL	12	14	G				P					E	G		F		EB Res . is resolved by mix.
C <u>Quadris Top</u>	11+3	<u>azoxystrobin+difenocon.</u>	F	TL	12	14	G				P					E	G	G	F		EB Res . resolved by mixture
C <u>Cabrio Plus</u>	11+M3	<u>pyraclostrobin + metiram</u>	F	TL	24	3	G				P					G	G		F	Su	EB Res . resolved by mixture
C <u>Revus Top</u>	40+3	<u>mandipropamid+difeno.</u>	F	TL	12	14	G				F					G	G	G	F		Quite broad spectrum
Systemic or Locally systemic (leaf base to tip) in <u>BOLD</u> - Conventional only; Others <u>Tanos</u> (<u>cymoxanil</u> + <u>famoxadone</u>) (Foliar)																					
C <u>Curzate, TM</u>	27+?	<u>cymoxanil + protect.</u>	SP, F	Sy	12	14					SpOk, FolP								F- G		Needs mod. temps & active growth for LB Fol. trt. to be effective.
C <u>Presidio[*], TM</u>	43+?	<u>fluopicolide + protect.</u>	IF, F	C	12	7					E		G, F			G			E		TM requirement.
C <u>Previcur Flex[*], TM</u>	28	<u>propamocarb + protect.</u>	F	Sy	12	14					Su					G			G		Needs partner other dis.
C <u>Quash</u>	3	<u>metconazole</u>	F	LS	12	1	G									G	G	G	Su	G	Needs partner for LB control
C <u>Ridomil Gold Bravo</u>	4+M5	<u>mefenoxam + chlorothalonil</u>	F	Sy	48	14					G	F	F		F	G		G	E		Only US22 ^{P&T} , US23 ^{P&T} , US24 ^P .

MOA= if M then multi; Uses: IF=InFurrow, F=Foliar, SP=seedpiece; Activity: Sy=systemic, LS=local sys; Rating: P=poor, F=fair, G=good, Su=suppression, TM=TankMix.

Prepared by T. A. Zitter, Dept of Plant Path & Plant-Microbe Biology, Cornell University, Ithaca, NY NOV 2013

Potato Fungicide Information							Tuberborne					Foliar					Comments				
Trade Names(p.OMRI)	MOA Code	Common Name	Uses	Activity	REI (hrs.)	PHI (Days)	Black Dot	Black Scurf/Canker Com. Scab/Pow. Scab	Fusarium Dry Rot	Late Blt. Tuber Blt.	Leak	Pink Rot	Silver Scurf	Black Dot	Early Blight	Gray Mold		Late Blight	Verticillium	White Mold	
<u>Actinovate AG</u> (p.2)	Bio.	<i>Streptomyces lydicus</i>	IF,SD	C	1	0		G		F					F	F				In-furrow, Soil drench, Fol.	
<u>Actino-Iron</u> (p.2)	Bio.	<i>Streptomyces lydicus</i>	SD	C	4	0		G		F											In-furrow or side dress.
<u>Agri-mycin 17</u> (p.3)	Bio.	<i>Streptomyces sulfate</i>	SP	C	12	0															On cut seed for Soft Rot & Blk. Leg
<u>BadgeX</u> , (p.10)	M1	<i>Cu oxychloride + Cu hyd</i>	F	C	4	0															Use preventatively esp. for LB.
<u>Cease</u> (p.22)	Bio.	<i>Bacillus subtilis</i>	F	C	4	0									F		P				For suppression only.
<u>Contans WG</u> (p.26)	Bio.	<i>Coniothyrium minitans</i>	Soil	C	4	0													G		Incorporate in soil prior to plt.
<u>Camelot O</u> , <u>Cueva</u> p. 22/27	M1	<i>copper octanoate</i>	F	C	4	0				P					F		F				Use preventatively esp. for LB.
<u>Champ WG</u> p.22, <u>Nu-Cop</u> 50DF p.74	M1	<i>copper hydroxide</i>	F	C	24	0				P					F		F				Use preventatively esp. for LB
<u>JMS Stylet Oil</u> p.78	NC	<i>mineral oil</i>	F	C	4	0									F						Primarily used for insects.
<u>Kumulus DF</u> p.58	M2	<i>sulfur</i>	F	C	24	0															For Pow. Mildew and mites.
<u>M-Pede</u> p.67	NC	<i>K salts of fatty acids</i>	F	C	12	0															For Pow. Mildew and mites.
<u>Micro Sulf</u> p.63	M2	<i>sulfur</i>	F	C	24	0															For Pow. Mildew and mites.
<u>Microthiol Dispers</u> p.64	M2	<i>sulfur</i>	F	C	24	0															for PM and mites.
<u>Nordox 75WG</u> p.73	M1	<i>cuprous oxide</i>	F	C	12	0				P					F		F				Use preventatively esp. for LB.
<u>Oxidate</u> p.81	NC	<i>hydrogen peroxide</i>	F	C	1	0									P		P				Limited efficacy.
<u>RootShield Plus</u> ⁺ WP p.93	Bio.	<i>Trichoderma harzianum</i> & <i>T. virens</i>	SP,IF	C	4	0		G													Use for SP or IF treatment. Also <u>Bio-Tam</u> p.16
<u>Serenade</u> p. 98	Bio.	<i>Bacillus subtilis</i>	F	C	4	0									F		P				Various formulations.
<u>Serenade Soil</u> p.99	Bio.	<i>Bacillus subtilis</i>	IF,SD	C	4	0		G		F											Use in-furrow or as soil drench.
<u>T-22 HC</u> p. 105	Bio.	<i>Trichoderma harzianum</i>	SP	C	4	0															Also <u>RootShield Plus</u> WP p.93
<u>Taegro</u> p. 105	Bio.	<i>B.s. amyloliquefaciens</i>	IF,SD	C	24	0		F		F											See also <u>Double Nickle 55</u> p.30
<u>Trilogy</u> p. 109	NC	<i>neem oil</i>	F	C	4	0															Generic for Dis, Ins., Mites.

IF UNDERLINED = then Labeled in NYS; MODE of ACTION: NC = Not Classified; USES: F = Foliar; IF = In-furrow; PH = Post harvest; SD = Soil Drench; SP = Seed Piece.

SCALE: P = Poor; F = Fair; G = Good. NOTE: OMRI list changes often so check latest web version @ <http://www.omri.org/omri-lists/download>

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Cultivar	Parentage (r=Release date)	Usage	Com Scab	SS	BD	PR ¹	E Blt	GN, Maturity, LB, EB, Vert, Comts, Yld, Blue Ribbon
Adirondack Blue	(Chieftain x BlkRussian) x NY96 (x93) r'03	TS, spec.	Sus	Sus				GNS; E; LBS; Dk purple skin; purple flesh; (Red+White+Blue possible).
Adirondack Red	(Chieftain x BlkRussian) x Q155-3(x94)r'04	TS, spec.	T like Atl.	Sus				GNR; E; LBS; Red pur skin; red flesh; flavor +++; (Red+White+Blue possible).
All Blue	Unknown r?	TS, spec.	Sus	Sus				GNS; L; LBS; Blu/pur skin; purple flesh; for TerraChips
Allegany (NY 72)	M297-17 x bulk pollen GNS(cro 19--) r'90	Chip, TS	Res			S/MS	MR	GNR; VeryL; LBMS; Spec. Grav. & color='Norchip'.
Andover, *GH2*	Allegany x Atlantic (cross 1981) r'95	Chip ^{45F} , TS	MRes		MS-S	R/MR		GNR; E; LBS; Chips from 45F; Multipurpose; flavor +++
Atlantic USDA	Waseon x B5141-6 (Lenape) r'76	Chip, TS	Tol			MR	MR	GNR; M; LBS; Tol Vert. & pink eye; high Spec. Gravity.
Banana	Unknown 90 years	TS, spec.	MR		VS			GNS; L; LBS; Md Sus Vert; pale yellow skin & flesh.
Chieftain (Red) Iowa, USDA	LA1027-18 x LA1354 r'66	TS	MR	MS	MS	MS	MR	GNS; M; LBS; Good ylds > 'Norland'; eating+++; (Red+White+Blue possible).
Chippewa USDA	USDA S40568 x USDAS24642 r1933	TS	Sus				MS	GNS; E; LBS; Hvy no. of sm tubers if dry conditions.
Elba (NY 59)	D29-10 X NY27 (cross 1968)	TS	Sus				MR	GNR; very L, later than 'Kat'; LBR, but tubers sus., Verticillium Res; Sus to Int. necrosis.
Eva (NY 103)	Steuben x bulk pollen hybrids (x 86) r'99	Chip, TS	MR = Mono	vis	MS	M/MS	Mod	GNR; M; LBS; Bright rnd, shallow eyes; long dormancy +++; Res PVX, PVY
Genesee (NY 78)	M348-45 x Katahdin (cross 77) r'93	TS	Tol = Mono	Sus	MS		MR	GNR; L; LBS; Verticillium Resistant; round white tubers; Sus to Rhiz.
Kanona (NY 71)	Peconic x bulk pollen GN sus r'89	Chip, TS	Sus				V Sus	GNR; M; LBS; Pale yellow flesh; Excellent yield potential; Small tuber size.
Kasoag Gold (NY125)	Keuka Gold x Genesee (cross 1993)	TS	Res = Atl.					GNR; E similar to 'Superior'; Good insect resistance from trichomes; consider for organic production.
King Harry (NY 131)	N142-72 x Pike (cross 1994)	TS	Vsus=Chip					GNR; E similar to 'Superior'; Good insect resistance from trichomes; consider for organic production.
Lamoka (NY 139)	NY120xNY115 (cross 1998)r'10PurF/WhTip	Chip	MR					GNR1; ML; LBS; Lrg tubers; dorm 1 wk>'Atlantic'; Int Def; Leak and Soft Rot? Low levels of Blackheart.
Lehigh (NY 126)	Keuka Gold x Pike (cross 1994)r'07	TS	Exc. Res		MR	S	?	GNR; M; LBS; Nice yellow flesh; firm after boiling.
Marcy (NY 112)	Atlantic x Q155-3 (cross '90)r'02	Chip	Res like Sup.			R/MR	?	GNR; L; LBS; Large vines; tubers with scruffy skin; Sus to Black Spot bruising.
Monticello (NY 102)	Steuben x Kanona (cross 1986)for ME r'03	Chip	MR				MS	GNR; M; LBS; ScabRes less than 'Superior' or 'Pike'.

Cultivar color coding refers to tuber skin color or flesh color; CScab= *Streptomyces scabies*; PScab= *Spongospora subterranea*; SS= Silver Scurf (*Helminthosporium solani*); BD= Black dot (*Colletotrichum coccodes*); PRt= refers to Pink Rot (*Phytophthora erythroseptica*) response for tuber susceptibility; EB= Early Blight (*Alternaria solani*); LB= Late blight (*Phytophthora infestans*); GNR= applies for Ro1 or 2 of the golden nematode. Unless indicated; Chippers compare to Atlantic, TS compares to Reba or Chieftain. Cultivars dropped from this page of an earlier version include Dakota Crisp, *E43-10*, and Monona (Frito-Lay).

Cornell or others that are used for NE Prod.; Maturity is E= early; EM= early/midsea; M= mid sea.; ML= med/late; L= late. NOV 2013 T.A. Zitter									
Cultivar	Parentage (r=Release date)	Usage	Com Scab	SS	BD	PR ¹	E Blt	GN,Maturity,LB, EB, Vert,Comts,Yld,BlueRibbon	
NorDonna (RedND)	ND206-IR x ND821-6R r'95	TS	Tol		MR	MS	tub inf	GNS;M;LBS; Medium to high yield.	
Norland (Red-ND)	Redkote x ND626 r'57	TS	Tol		MR	S	V Sus	GNS;E;LBS; widely adapted.	
Norwis (FL 657)	RD289-18 x Monona r'65	Chip	Sus		MR	R/MR	MS	GNS;M;LBS;wide adapted; Spec Grav>than 'Monona'.	
NY 79	S377-10 x NY79 (Elba) (cross 1977)	TS	Res				MS	GNR;E;LBS; ElyYld.= 'Superior'; Full sea.= 'Monona'.	
NY 115	Pike x NY88 (cross 1990)	Chip, TS	Tol=Atl.			S/MS		GNR;LBS; Use closer spacing; white fsh after boiling.	
NY 118 (Lt Red)	D191-103 x Chieftain (cross 1990)	TS	BetThChief					GNR1;LBS; Textured skin; Yield like 'Chieftain'.	
NY 140 (Y36-4)	NY121 x NY115 (cross 1998)	Chip/TS	Sus IkKat				MR	GNR1&2&Pal;L; LBMR; EBMR; dorm 6wk>'Atlantic';Good Res to blackspot bruise; Lrg Tubers, Yld. +++; Chip Color Good as Snowden.	
NY 141 (Y41-67)	R6-4 x NY115 (cross1998)	TS	Gd. Res					GNR1; E-M sea; LBS; Cons't yield performer = to 'Superior' with better Scab Res; very res. to blackspot bruise; Highest Appearance Score: Could replace Superior	
NY 148 (E106-4)	NY128 x Marcy (cross 2003)	Chip	MR					GNR1;L sea;LBMR, EBMR, PVYR;Good yld > 'Atlantic'; Nicer look than 'Snowden' & same Grav; Heat Nec? Deep eyes.	
NY 149 (F11-1)	Yukon Gold x Keuka Gold (cross 2004)	TS	MR					GNR1;M-Late; Yellow flesh & pink eyes like 'Yukon Gold'; low yld than 'YkGold'	
NY 150 (F52-1)	NY121 x Jacqueline Lee (cross 2004)	Niche	MR					GNR1;E;LBMR; HiSetSmTub;Bright wht;ResPVY+N.	
NY 151 (G73-1)	NY121 x Salem (cross 2005)	TS	MR					GNR1;L;2 nd best comp w NY141;Rev smoothskin	
NY 152 (H15-5)	B38-14 x Marcy (2006)	Chip	MR					GNS; L; low level of pickouts	
NY 153 (H25-4)	Waneta x Pike (2006)	Chip	MR					GNR; L; high Sp. Grav.; Hollowheart?	
H15-17	B38-14 x Marcy (2006)	Chip	MR					GNS; L;Promising chip color	
H122-4 (Pkskin)	NY136 x Nordonna (2006)	TS	MR					GN?; E; very light pink skin	
J15-7	MSK061-4 x Marcy (2007)	Chip	MR					GNS; L; High yielding	
Prince Harry	Hudson x PI310925	TS						GNR; E similar to 'Superior'; Good insect resistance from trichomes; consider for organic production.	
Reba (NY 87)	Monona x Allegany r'96	Chip, TS	M Res		MS-S	MS	MR	GNR;M;LBS;MR Verticillium; can boil & not fall apart; multipurpose	
Red LaSoda #10	Triumph x Katahdin (a DkRed mutant)SD'5	TS,SE	Sus	Sus?		VS	Sus	GNS;M;LBS; Low Spec. Grav., suited for boiling.	
Red Maria (NY 129)	N38-1 x ND2225-1R (cross 1994) r'10	TS	VRes=Pike			S/MS		GNR;L;LBS;Red skin & Excellent Shape; High yield potential; good boiling qualities.	
Salem (NY 84)	Rosa x NY66 (BR6862-2&Huds) x '80 r'94	TS	V Res				MR	GNR;M;LBS; MR to Verticillium; Spec. Grav. = 'Monona'; Good yield potential; flavor+++	
Shepody NB	BakeKing x F58050 (New Bru'wick) r'80	Proc, FF	V Sus				Sus	GNS;M;LBS; Sus. to Verticillium and pink eye.	
Snowden (Wis)	B5141-6 (Lenape) x Wischip r'90	Chip	Like Atl.			MR	Mod	GNS;L;LBMS; High Spec. Grav.; store above 45F.	
Superior (Wis)	B96-56 (Kennebec) x M59.44 r'62	TS	Res		MS	R/MR	V Sus	GNS;EM;LBS;VeryS to Vert, blackleg & Wh. mold.	
Waneta (NY 138)	Marcy x NY115 (cross 1998) r'10	Chip/TS	MR					GNR1;L;LBS; Some 1 scab; Exc. chip color; Large Tubers; Gravity edgy; Uneven emergence; dorm. 6wk>'Atlantic'; < sus to blackspot than 'Snowden'.	
Yukon Gold (Can)	W5279-4 x Norgleam r'81	TS	V Sus	MS	MS	S	Sus	GNS;ME;LBS; Shallow pink eyes; distinctive terminal leaflet;V. sus to some PVY strains.	

See comments on bottom of page 1. Cultivars dropped from this page of an earlier version include NY136, NY144, Pike, Yukon Gem.