Supplemental Material

A Standardized Approach for Estimating the Permeability of Plastic Films to Soil Fumigants under Various Field and Environmental Conditions

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Table S1. Description of films used in permeability studies.

Sample number	Area-Wide Trial	Film Type	Film Name, Manufacturer	Color	Thickness (μm)	Source
			USDA-ARS Area-wide film tests			
FM1	1	HDPE	Hilex Poly LLC	black	17	field
FM2	1	Metalized	Vaporshield, Canslit, Inc.	silver	30	field
FM3	1	LDPE	Pliant Corp.	black	30	field
FM4	1	VIF	Hytibar, Klerks	white	30	field
FM5	1	HDPE	Hilex Poly, LLC	black	17	roll
FM6	1	Metalized	Vaporshield, Canslit, Inc.	silver	30	roll
FM7	1	LDPE	Pliant Corp.	black	30	roll
FM8	1	VIF	Hytibar, Klerks	white	30	roll
FM9	3	LDPE	Pliant Corp.	black	30	roll
FM10	3	VIF	Blockade, Pliant Corp.	black	30	field
FM11	3	VIF	Blockade, Pliant Corp.	black	30	roll
FM12	4	VIF	Hytibar, Klerks	black	30	field
FM13	4	VIF	Hytibar, Klerks	black	30	roll
FM14	5	VIF	Blockade, Pliant Corp.	black	30	field
FM15	5	VIF	Blockade, Pliant Corp.	black	30	roll
FM16	5	LDPE	Pliant Corp.	black	30	roll
FM17	7	Metalized	Vaporshield, Canslit Inc.	silver	30	field
FM18	7	Metalized	Heatstrip, Canslit, Inc.	silver/black	30	field
FM19	7	Metalized	Heatstrip, Canslit, Inc.	silver/black	30	roll
FM20	7	Metalized	Vaporshield, Canslit, Inc.	silver	30	roll
FM21	6	VIF	Blockade, Pliant Corp.	black	30	roll
FM22	6	VIF	Blockade, Pliant Corp.	black	30	field
FM25	10	VIF	Embossed VIF, Guardian, Grupo Olefinas	black/white	30	roll
FM26	10	VIF	Embossed VIF, Guardian, Grupo Olefinas	black/white	30	field
FM27	11	HDPE	Cadillac Plastics, Inc.	clear	25	roll
FM28	11	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM29	12	HDPE	Cadillac Plastics, Inc.	clear	25	roll

FM30	12	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM31	9	HDPE	Cadillac Plastics, Inc.	clear	25	roll
FM32	9	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM33	13	VIF	Blockade, Pliant Corp.	black	30	roll
FM34	13	VIF	Blockade, Pliant Corp.	black	30	field
FM35	13	LDPE	Ginegar Plastic Products Ltd.	black	17	roll
FM36	13	LDPE	Ginegar Plastic Products Ltd.	black	17	field
FM37	14	VIF	Blockade, Pliant Corp.	black/white	30	roll
FM38	14	VIF	Blockade, Pliant Corp.	black/white	30	field
FM39	15	VIF	Blockade, Pliant Corp.	black	30	roll
FM40	15	VIF	Blockade, Pliant Corp.	black	30	field
FM41	18	VIF	Blockade, Pliant Corp.	black	30	roll
FM42	18	VIF	Blockade, Pliant Corp.	black	30	field
FM43	17	HDPE	Cadillac Plastics Inc.	clear	25	roll
FM44	17	HDPE	Cadillac Plastics Inc.	clear	25	field
FM45	13	LDPE	Ginegar Plastic Products Ltd.	black	17	roll
FM46	23	HDPE	Cadillac Plastics, Inc.	clear	20	roll
FM47	23	HDPE	Cadillac Plastics, Inc.	clear	20	field
FM48	24	VIF	Bromostop, Industria Plastica Monregalese	clear	30	roll
FM49	24	VIF	Bromostop, Industria Plastica Monregalese	clear	30	field
FM50	25	VIF	Blockade, Pliant Corp.	black	30	roll
FM51	25	VIF	Blockade, Pliant Corp.	black	30	field
FM52	26	HDPE	Cadillac Plastics, Inc.	clear	25	roll
FM53	26	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM54	20	VIF	Cadillac Plastics, Inc.	black	NA[a]	roll
FM55	20	VIF	Cadillac Plastics, Inc.	black	NA	field
FM56	21	VIF	Cadillac Plastics, Inc.	black	NA	roll
FM57	21	VIF	Cadillac Plastics, Inc.	black	NA	field
FM58	22	VIF	Cadillac Plastics, Inc.	black	NA	roll
FM59	22	VIF	Cadillac Plastics, Inc.	black	NA	field
FM60	22	VIF	Blockade, Pliant Corp.	black	30	roll
FM61	22	VIF	Blockade, Pliant Corp.	black	30	field
FM62	27	VIF	Blockade, Pliant Corp.	black/white	30	roll
FM63	27	VIF	Blockade, Pliant Corp.	black/white	30	field
FM66	28	VIF	Cadillac Plastics, Inc.	black	NA	roll
FM67	28	VIF	Cadillac Plastics, Inc.	black	NA	field
FM68	30	HDPE	Cadillac Plastics, Inc.	clear	25	roll
FM69	30	HDPE	Cadillac Plastics, Inc.	clear	25	field

FM70	30	LDPE	AEP Industries, Inc.	clear	25	roll
FM71	30	LDPE	AEP Industries, Inc.	clear	25	field
FM72	25	VIF	Blockade, Pliant Corp.	black	30	roll
FM73	25	VIF	Blockade, Pliant Corp.	black	30	field
FM74	37	Metalized	Vaporshield, Canslit, Inc.	silver/black	30	roll
FM75	37	Metalized	Vaporshield, Canslit, Inc.	silver/black	30	field
FM76	37	VIF	Guardian, Grupo Olefinas	black	30	roll
FM77	37	VIF	Guardian, Grupo Olefinas	black	30	field
FM78	37	VIF	Guardian, Grupo Olefinas	black	30	roll
FM79	38	LDPE	Pliant Corp.	black	17	roll
FM80	38	LDPE	Pliant Corp.	black	17	field
FM81	38	VIF	Blockade, Pliant Corp.	black	30	roll
FM82	38	VIF	Blockade, Pliant Corp.	black	30	field
FM83	39	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM84	39	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM85	39	HDPE	Cadillac Plastics, Inc.	clear	25	field
FM86	39	HDPE	Cadillac Plastics, Inc.	clear	25	roll

Other films tested

OFM1		VIF	Bromostop, Industria Plastica Monregalese	NA	NA
OFM2		VIF	Bromostop, Industria Plastica Monregalese	NA	NA
OFM4		VIF	Bromostop, Industria Plastica Monregalese	NA	NA
OFM7		HDPE	NA	NA	NA
OFM11		VIF	Hytibar, Klerks	black/white	NA
OFM12		HDPE	NA	NA	NA
OFM13		HDPE	NA	NA	NA
OFM14			NA	NA	NA
OFM15		VIF	DW-VIF	clear	25
OFM16		VIF	New Blockade, Pliant Corp.	black	NA
OFM17		VIF	Original Blockade, Pliant Corp.	black	NA
OFM18		LDPE	NA	black	NA
OFM19		Paper	Paper	NA	NA

[a]NA – not available

Table S2. Permeability (*R*) of films to various fumigant compounds. Values are the mean of three replicate cells ± standard error. All films tested at 25°C. For each value not quantified, the lower limit is calculated from Equation 2, using the maximum observed value of *f* and the duration of the experiment as t_0.

	R (h cm^{-1})							
Film ID	Methyl bromide	Methyl iodide	cis-1,3-D	trans-1,3-D	Chloropicrin	MITC	Sulfuryl fluoride	DMDS
USDA-ARS Area-wide film tests								
LDPE films								
FM3	0.6± 0.1	0.27± 0.02			0.2			
FM3	0.59± 0.04	0.33± 0.04						
FM7	0.54± 0.01	0.29± 0.00			0.21± 0.01			
FM9	0.87± 0.06	0.44± 0.03	0.09± 0.02	0.05± 0.02	0.34± 0.06	0.06± 0.00		
FM16	0.8± 0.1	0.40± 0.06	0.14± 0.01	0.10± 0.01	0.41± 0.06	0.06± 0.00		
FM35	0.67± 0.03	0.40± 0.01	0.11± 0.00	0.07± 0.00	0.38± 0.01			
FM36	0.60± 0.03	0.37± 0.01	0.10± 0.00	0.06± 0.00	0.35± 0.02			
FM45	0.70± 0.01	0.39± 0.01	0.12± 0.00	0.07± 0.00	0.34± 0.01			
FM70	2.1± 0.1	1.21± 0.04	0.35± 0.01	0.23± 0.01	1.26± 0.08			
FM71	2.1± 0.1	1.24± 0.08	0.35± 0.03	0.22± 0.01	1.20± 0.09			
FM79	0.82± 0.01	0.46± 0.00	0.13± 0.00	0.08± 0.00	0.37± 0.00	0.05± 0.00		
FM80	0.80± 0.01	0.45± 0.01	0.13± 0.00	0.08± 0.00	0.38± 0.00	0.05±		
HDPE films								
FM1	0.48± 0.03	0.26± 0.01	0.07± 0.00	0.04± 0.00	0.22± 0.01			
FM1	0.53± 0.03	0.27± 0.01						
FM5	0.51± 0.02	0.25± 0.01	0.07± 0.00	0.05± 0.00	0.21± 0.02			
FM27	1.99± 0.02	1.18± 0.03	0.36± 0.02	0.21± 0.01	1.32± 0.05			0.25± 0.00
FM28	1.59± 0.07	0.94± 0.04	0.27± 0.01	0.16± 0.00	1.07± 0.05			0.34± 0.01
FM29	2.3± 0.1	1.39± 0.09	0.41± 0.02	0.26± 0.01	1.6± 0.1		187± 6	
FM30	1.75± 0.07	1.06± 0.04	0.32± 0.01	0.19± 0.02	1.23± 0.05			
FM31	1.90± 0.09	1.18± 0.04	0.38± 0.02	0.24± 0.02	1.5± 0.1			
FM32	1.75± 0.02	1.12± 0.03	0.36± 0.01	0.22± 0.01	1.50± 0.06			
FM43	2.1± 0.1	1.26± 0.07	0.42± 0.03	0.26± 0.02	1.6± 0.1			
FM44	1.99± 0.09	1.18± 0.04	0.38± 0.01	0.22± 0.01	1.44± 0.07			
FM46	1.21± 0.04	0.72± 0.01	0.20± 0.01	0.12± 0.00	0.67± 0.01		115± 3	
FM47	1.42± 0.04	0.81± 0.03	0.21± 0.01	0.13± 0.00	0.76± 0.03			
FM52	1.91± 0.02	1.15± 0.01	0.35± 0.01	0.23± 0.01	1.32± 0.03			0.37± 0.03
FM53	1.8± 0.2	1.1± 0.1	0.35± 0.04	0.19± 0.03	1.3± 0.2			0.32± 0.04
FM68	1.62± 0.04	1.03± 0.03	0.30± 0.01	0.19± 0.00	1.21± 0.03			

FM69	1.68± 0.01	1.01± 0.02	0.30± 0.01	0.19± 0.00	1.20± 0.05		
FM83	1.8± 0.2	1.0± 0.1	0.31± 0.03	0.19± 0.02	1.2± 0.1		
FM84	1.98± 0.03	1.22± 0.02	0.37± 0.00	0.23± 0.00	1.47± 0.03		
FM85	1.8± 0.2	1.0± 0.2	0.36± 0.07	0.23± 0.04	1.1± 0.1		
FM86	1.46± 0.08	0.90± 0.03	0.27± 0.01	0.16± 0.00	1.15± 0.08		
Metalized films							
FM2	7± 2	5± 0	2± 0	1.0± 0.1	7± 2		
FM2	8± 1	4± 0	1± 0	0.93± 0.09	4± 1		
FM6	11± 2	6.0± 0.7	1.90± 0.07	1.17± 0.04	5.5± 0.4		
FM17	5± 2	2.9± 0.8	0.9± 0.2	0.6± 0.1	3.1± 0.7		
FM18[a]	7± 1	4.0± 0.7	1.1± 0.2	0.6± 0.1	4.1± 0.7		
FM18[b]	1.6± 0.1	0.89± 0.06	0.25± 0.00	0.15± 0.00	0.85± 0.02		
FM19[a]	7.3± 0.4	4.0± 0.3	1.06± 0.09	0.62± 0.04	4.1± 0.3		
FM19[a]	1.3± 0.2	0.75± 0.07	0.26± 0.00	0.17± 0.00	0.72± 0.04		
FM20	7± 2	4± 1	1.2± 0.3	0.93± 0.04	4± 1		
FM74	58± 17	35± 11	10± 3	6± 2	37± 12		
FM75	9± 3	5± 1	1.6± 0.4	1.0± 0.3	5± 1	0.9± 0.1	
VIF							
FM4	311± 65	646± 156	670± 133	235± 45	>2800		
FM4	569± 41	1261± 167	>2800	800± 109	>7400		
FM8	383± 98	780± 381	827± 417	346± 162	>10,000		
FM10	35.8± 0.9	48± 1	27± 2	13.0± 0.2	1950± 1205		
FM11	33.8± 0.4	49± 3	33± 4	14± 2	2538± 1018		
FM12	266± 103	618± 357	262± 80	154± 7	1800± 1600		
FM13	505± 23	1086± 25	1478± 135	580± 43	>11,000		
FM14	63± 8	97± 14	114± 12	48± 3	983± 553		
FM15	64± 2	116± 8	130± 2	46.8± 0.6	>7200		
FM21	64± 4	125± 12	125± 13	45± 7	>7200		
FM22	28± 20	48± 39	48± 36	21± 10	>15		
FM25	104± 8	146± 10	70± 6	32± 2	908± 71		>9600
FM26	91± 21	118± 32	58± 11	27± 3	726± 305		
FM33	57± 1	87± 2	52± 1	21.6± 0.8	1440± 55		
FM34	55± 2	80± 3	48± 2	20.6± 0.8	1273± 76		
FM37	61.7± 0.7	91.96± 0.33	58± 1	21± 1	2034± 75	4.6± 0.4	
FM38	53.9± 0.8	86± 3	48± 2	18.9± 0.8	1328± 284	4.1± 0.1	
FM39	48.9± 0.7	71± 2	44.1± 0.3	17.9± 0.2	953± 55		>9600

FM40	42± 4	63± 6	37± 5	15± 1	769± 80			
FM41	33± 10	42± 16	22± 10	8± 4	406± 262	3.8± 0.3		
FM42	46± 2	60± 4	30± 3	11.8± 1.0	671± 57	4.7± 0.3		
FM48	498± 56	812± 108	601± 34	208± 19	>9200		>4800	
FM49	361± 23	530± 34	301± 18	120± 6	>4100			
FM50	43.6± 0.9	63± 2	33± 4	13.9± 0.9	710± 97			74± 3
FM51	48± 2	69± 3	39± 1	16± 1	709± 120			59± 1
FM54	225± 14	346± 10	219± 33	86± 13	>7200	8± 1		
FM55	210± 12	352± 11	225± 8	90± 6	>2900	4.3± 0.3		
FM56	195± 12	387± 14	259± 20	106± 9	>7800			
FM57	128± 55	220± 98	90± 29	68± 21	>75			
FM58	351± 16	822± 25	936± 35	331± 10	>7800			
FM59	252± 147	549± 405	679± 489	289± 129	>300			
FM60	351± 35	659± 117	713± 112	381± 8	>1500			
FM61	606± 251	1023± 439	1142± 342	418± 116	>8400			
FM62	78± 1	133± 4	110± 7	42± 6	3579± 2377			
FM63	60± 22	100± 40	86± 30	41± 10	7770± 4470			
FM66	287± 33	497± 46	316± 39	122± 16	>9600			
FM67	249± 21	400± 48	283± 32	120± 11	>1700			
FM72	44± 3	62± 4	35± 3	16± 1	913± 152			
FM73	45± 2	59± 4	33± 3	13.8± 0.6	895± 42			
FM76	102± 4	175± 4	104± 3	41± 1	3618± 292	2.6± 0.4		
FM77	86± 2	139± 3	78± 2	28± 3	2477± 228	2.1± 0.2		
FM78	101± 2	185± 20	123± 13	48± 4	3907± 1464			
FM81	323± 2	683± 15	601± 19	227± 4	>9600	6± 3		
FM82	221± 70	418± 154	310± 94	133± 28	>330	6.9± 0.6		

Other films tested

OFM1			1222± 127	448± 23	>14,000			
OFM2			1653± 134	551± 32	>14,000			
OFM1		2278± 146	1206± 360	486± 196	>7000			
OFM4		4001± 3613	1893± 1476	633± 329	>12,000			
OFM11		>5600	>2800	>2400	>2500			
OFM12		0.8± 0.2	0.26± 0.03	0.17± 0.02	0.9± 0.2			
OFM13		0.99± 0.01	0.31± 0.00	0.19± 0.01	1.29± 0.02			
OFM14	54.8± 0.6	93± 5	70± 7	29± 3	4100± 1400			

OFM15						>3500
OFM16	459±	18	1157± 70	1894± 109	523± 56	>7800
OFM17	468±	17	998± 19	1800± 68	615± 16	>7800
OFM18	0.92±	0.02	0.52± 0.01	0.16± 0.00	0.09± 0.00	0.48± 0.00
OFM19	0.02±	0.00	0.02± 0.00	0.03± 0.00	0.03± 0.00	0.02± 0.01

[a]Silver area tested
[b]Black area tested

Table S3. Activation energies (E_a) and pre-exponential factors (A) for predicting the decrease in resistance to diffusion (*R*, h cm^{-1}) with increasing temperature. Values (±standard error) were determined by nonlinear regression to the Arrhenius equation.

	Methyl bromide	Methyl iodide	cis-1,3-D	trans-1,3-D	Chloropicrin
FM5, HDPE					
E_a (kJ mol^{-1})	-27.3±0.5	-27±3	-18±1	-18.8±0.4	-36±6
A (h cm^{-1})	0.61±0.00	0.32±0.01	0.08±0.00	0.06±0.00	0.29±0.02
r^2	0.99	0.98	0.99	0.99	0.97
FM9, LDPE					
E_a (kJ mol^{-1})	-33.2±0.6	-32±5	-29±16	-29±21	-45±13
A (h cm^{-1})	1.10±0.01	0.59±0.03	0.14±0.02	0.09±0.02	0.55±0.06
r^2	0.99	0.98	0.77	0.63	0.94
FM19, black area					
E_a (kJ mol^{-1})	-35±6	-35±5	-24.4±0.6	-19±1	-47±7
A (h cm^{-1})	1.8±0.09	1.03±0.05	0.31±0.00	0.19±0.00	1.09±0.06
r^2	0.97	0.98	0.99	0.99	0.98
FM19, silver area					
E_a (kJ mol^{-1})	-60±4	-62±6	-57±7	-55±11	-58±3
A (h cm^{-1})	11.6±0.4	6.5±0.3	1.7±0.1	1.04±0.09	5.9±0.1
r^2	0.99	0.99	0.98	0.97	0.99
FM20, metalized					
E_a (kJ mol^{-1})	-27±3	-27±3	-21±8	-15±18	-31±4
A (h cm^{-1})	8.3±0.3	4.8±0.1	1.3±0.1	0.8±0.2	4.7±0.2
r^2	0.98	0.99	0.88	0.43	0.98
FM15, VIF					
E_a (kJ mol^{-1})	-59.5±0.3	-61±1	-53±8	-52±7	
A (h cm^{-1})	97±0.2	174±2	172±11	62±3	ND[a]
r^2	0.99	0.99	0.97	0.99	
FM13, VIF					
E_a (kJ mol^{-1})	-69±9	-108±24	-106±32	-104±27	
A (h cm^{-1})	890±60	2700±470	3880±890	1450±280	ND
r^2	0.97	0.98	0.97	0.97	

[a]ND - Not determined

Table S4. Film permeability (R) as affected by film handling. Each pair is the same film tested directly from the roll (roll) and within 48 hours after installation in the field (field) by commercial growers or fumigant applicators. Values are the mean of three replicate cells ± standard error. All films tested at 25°C. For chloropicrin values not quantified, the lower limit was calculated from Equation 2, using the maximum observed value of *f* and the duration of the experiment as t_0.

Film ID	Handling	R (h cm^{-1})						
		Methyl bromide	Methyl iodide	cis-1,3-D	trans-1,3-D	Chloropicrin	MITC	DMDS
LDPE films								
FM36	field	0.60 ± 0.03	0.37 ± 0.01	0.10 ± 0.00	0.06 ± 0.00	0.35 ± 0.02		
FM35	roll	0.67 ± 0.03	0.40 ± 0.01	0.11 ± 0.00	0.07 ± 0.00	0.38 ± 0.01		
FM71	field	2.1 ± 0.1	1.24 ± 0.08	0.35 ± 0.03	0.22 ± 0.01	1.20 ± 0.09		
FM70	roll	2.1 ± 0.1	1.21 ± 0.04	0.35 ± 0.01	0.23 ± 0.01	1.26 ± 0.08		
FM80	field	0.80 ± 0.01	0.45 ± 0.01	0.13 ± 0.00	0.08 ± 0.00	0.38 ± 0.00	0.05[†]	
FM79	roll	0.82 ± 0.01	0.46 ± 0.00	0.13 ± 0.00	0.08 ± 0.00	0.37 ± 0.00	0.05 ± 0.00	
HDPE films								
FM28	field	1.59 ± 0.07	0.94 ± 0.04	0.27 ± 0.01	0.16 ± 0.00	1.07 ± 0.05		0.34 ± 0.01
FM27	roll	1.99 ± 0.02	1.18 ± 0.03	0.36 ± 0.02	0.21 ± 0.01	1.32 ± 0.05		0.25 ± 0.00
FM30	field	1.75 ± 0.07	1.06 ± 0.04	0.32 ± 0.01	0.19 ± 0.02	1.23 ± 0.05		
FM29	roll	2.3 ± 0.1	1.39 ± 0.09	0.41 ± 0.02	0.26 ± 0.01	1.6 ± 0.1		
FM32	field	1.75 ± 0.02	1.12 ± 0.03	0.36 ± 0.01	0.22 ± 0.01	1.50 ± 0.06		
FM31	roll	1.90 ± 0.09	1.18 ± 0.04	0.38 ± 0.02	0.24 ± 0.02	1.5 ± 0.1		
FM44	field	1.99 ± 0.09	1.18 ± 0.04	0.38 ± 0.01	0.22 ± 0.01	1.44 ± 0.07		
FM43	roll	2.1 ± 0.1	1.26 ± 0.07	0.42 ± 0.03	0.26 ± 0.02	1.6 ± 0.1		
FM47	field	1.42 ± 0.04	0.81 ± 0.03	0.21 ± 0.01	0.13 ± 0.00	0.76 ± 0.03		
FM46	roll	1.21 ± 0.04	0.72 ± 0.01	0.20 ± 0.01	0.12 ± 0.00	0.67 ± 0.01		
FM53	field	1.8 ± 0.2	1.1 ± 0.1	0.35 ± 0.04	0.19 ± 0.03	1.3 ± 0.2		0.32 ± 0.04
FM52	roll	1.91 ± 0.02	1.15 ± 0.01	0.35 ± 0.01	0.23 ± 0.01	1.32 ± 0.03		0.37 ± 0.03
FM69	field	1.68 ± 0.01	1.01 ± 0.02	0.30 ± 0.01	0.19 ± 0.00	1.20 ± 0.05		
FM68	roll	1.62 ± 0.04	1.03 ± 0.03	0.30 ± 0.01	0.19 ± 0.00	1.21 ± 0.03		
FM85	field	1.8 ± 0.2	1.0 ± 0.2	0.36 ± 0.07	0.23 ± 0.04	1.1 ± 0.1		
FM86	roll	1.46 ± 0.08	0.90 ± 0.03	0.27 ± 0.01	0.16 ± 0.00	1.15 ± 0.08		
Metalized films								
FM17	field	5 ± 2	2.9 ± 0.8	0.9 ± 0.2	0.6 ± 0.1	3.1 ± 0.7		
FM20	roll	7 ± 2	4 ± 1	1.2 ± 0.3	0.93 ± 0.04	4 ± 1		
FM18[a]	field	7 ± 1	4.0 ± 0.7	1.1 ± 0.2	0.6 ± 0.1	4.1 ± 0.7		
FM19[a]	roll	7.3 ± 0.4	4.0 ± 0.3	1.06 ± 0.09	0.62 ± 0.04	4.1 ± 0.3		

FM18[b]	field	1.6 ± 0.1	0.89 ± 0.06	0.25 ± 0.00	0.15 ± 0.00	0.85 ± 0.02		
FM19[b]	roll	1.3 ± 0.2	0.75 ± 0.07	0.26 ± 0.00	0.17 ± 0.00	0.72 ± 0.04		
FM75	field	9 ± 3	5 ± 1	1.6 ± 0.4	1.0 ± 0.3	5 ± 1	0.9 ± 0.1	
FM74	roll	58 ± 17	35 ± 11	10 ± 3	6 ± 2	37 ± 12		
VIF								
FM10	field	36 ± 1	48 ± 1	27 ± 2	13.0 ± 0.2	1950 ± 1205		
FM11	roll	34 ± 0	49 ± 3	33 ± 4	14 ± 2	2538 ± 1018		
FM12	field	266 ± 103	618 ± 357	262 ± 80	154 ± 7	1800 ± 1600		
FM13	roll	505 ± 23	1086 ± 25	1478 ± 135	580 ± 43	>11,000		
FM14	field	63 ± 8	97 ± 14	114 ± 12	48 ± 3	983 ± 553		
FM15	roll	64 ± 2	116 ± 8	130 ± 2	46.8 ± 0.6	>7200		
FM22	field	28 ± 20	48 ± 39	48 ± 36	21 ± 10	>15		
FM21	roll	64 ± 4	125 ± 12	125 ± 13	45 ± 7	>7200		
FM26	field	91 ± 21	118 ± 32	58 ± 11	27 ± 3	726 ± 305		
FM25	roll	104 ± 8	146 ± 10	70 ± 6	32 ± 2	908 ± 71		
FM34	field	55 ± 2	80 ± 3	48 ± 2	20.6 ± 0.8	1273 ± 76		
FM33	roll	57 ± 1	87 ± 2	52 ± 1	21.6 ± 0.8	1440 ± 55		
FM38	field	53.9 ± 0.8	86 ± 3	48 ± 2	18.9 ± 0.8	1328 ± 284	4.1 ± 0.1	
FM37	roll	61.7 ± 0.7	92.0 ± 0.3	58 ± 1	21 ± 1	2034 ± 75	4.6 ± 0.4	
FM42	field	46 ± 2	60 ± 4	30 ± 3	11.8 ± 1.0	671 ± 57	4.7 ± 0.3	
FM41	roll	33 ± 10	42 ± 16	22 ± 10	8 ± 4	406 ± 262	3.8 ± 0.3	
FM49	field	361 ± 23	530 ± 34	301 ± 18	120 ± 6	>4100		
FM48	roll	498 ± 56	812 ± 108	601 ± 34	208 ± 19	>9200		
FM51	field	48 ± 2	69 ± 3	39 ± 1	15.7 ± 0.7	709 ± 120		59 ± 1
FM50	roll	43.6 ± 0.9	63 ± 2	33 ± 4	13.9 ± 0.9	710 ± 97		74 ± 3
FM55	field	210 ± 12	352 ± 11	225 ± 8	90 ± 6	>2900	4.3 ± 0.3	
FM54	roll	225 ± 14	346 ± 10	219 ± 33	86 ± 13	>7200	8 ± 1	
FM57	field	128 ± 55	220 ± 98	90 ± 29	68 ± 21	>75		
FM56	roll	195 ± 12	387 ± 14	259 ± 20	106 ± 9	>7800		
FM59	field	252 ± 147	549 ± 405	679 ± 489	289 ± 129	>300		
FM58	roll	351 ± 16	822 ± 25	936 ± 35	331 ± 10	>7800		
FM61	field	606 ± 251	1023 ± 439	1142 ± 342	418 ± 116	>8400		
FM60	roll	351 ± 35	659 ± 117	713 ± 112	381 ± 8	>1500		
FM63	field	60 ± 22	100 ± 40	86 ± 30	41 ± 10	7770 ± 4470		
FM62	roll	78 ± 1	133 ± 4	110 ± 7	42 ± 6	3579 ± 2377		
FM67	field	249 ± 21	400 ± 48	283 ± 32	120 ± 11	>1700		

FM66	roll	287 ± 33	497 ± 46	316 ± 39	122 ± 16	>9600	
FM73	field	45 ± 2	59 ± 4	33 ± 3	13.8 ± 0.6	895 ± 42	
FM72	roll	44 ± 3	62 ± 4	35 ± 3	16 ± 1	913 ± 152	
FM77	field	86 ± 2	139 ± 3	78 ± 2	28 ± 3	2477 ± 228	2.1 ± 0.2
FM76	roll	102 ± 4	175 ± 4	104 ± 3	41 ± 1	3618 ± 292	2.6 ± 0.4
FM82	field	221 ± 70	418 ± 154	310 ± 94	133 ± 28	>330	6.9 ± 0.6
FM81	roll	323 ± 2	683 ± 15	601 ± 19	227 ± 4	>9600	6 ± 3

[a]Silver area tested
[b]Black area tested
[†]n=1 cell