Supplementary material: The values of three main crops (corn, soybean, and winter wheat) presented in Figures 5-8

1. The values of three main crops (corn, soybean, and winter wheat) presented in Figure 5.

Corn														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
HH	-13.48	2.98	-24.10	4.13	-12.23	2.66	-14.95	2.36	-17.54	2.09	-20.54	1.60	-19.47	2.39
HV	-28.67	3.82	-40.87	5.09	-25.39	2.89	-25.88	1.96	-27.01	2.00	-30.81	2.02	-27.70	3.65
VV	-14.19	2.93	-24.36	4.22	-15.40	2.19	-18.70	2.71	-20.47	2.20	-23.02	1.94	-19.92	3.49
Span	-2.70	1.24	-7.48	1.80	-2.40	0.99	-3.53	0.95	-4.39	0.80	-5.67	0.64	-6.26	1.08
HH+VV	-8.28	3.03	-18.57	4.27	-9.88	2.16	-13.28	2.59	-15.48	2.15	-17.83	1.73	-20.52	2.09
HH-VV	-27.40	3.26	-38.54	4.02	-19.81	4.00	-21.71	2.57	-24.12	2.30	-28.14	1.95	-24.77	5.29
HH/VV	0.78	1.26	0.37	1.14	3.15	1.80	3.98	1.84	3.10	1.73	2.71	1.85	4.09	2.38
HV/VV	-14.22	3.16	-16.32	3.31	-9.88	2.47	-6.81	2.07	-6.32	1.77	-7.65	1.86	-9.01	2.15
HV/HH	-14.99	2.90	-16.68	3.15	-12.94	2.09	-10.67	1.86	-9.25	1.86	-10.13	2.09	-12.60	2.95
Soybean														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
HH	-14.17	2.21	-17.27	3.37	-16.38	2.34	-14.43	1.70	-15.11	1.77	-18.21	1.75	-18.84	2.20
HV	-29.30	3.45	-33.97	4.26	-30.02	2.70	-24.45	1.61	-24.48	1.74	-26.56	2.24	-27.47	2.68
VV	-15.75	1.84	-18.69	3.06	-17.51	2.10	-16.86	1.53	-15.68	1.54	-17.11	1.72	-18.64	2.93
Span	-3.07	0.85	-4.57	1.35	-3.88	0.90	-2.97	0.58	-2.93	0.57	-3.89	0.62	-8.46	1.62
HH+VV	-9.72	1.95	-12.48	3.21	-12.10	2.23	-11.78	1.63	-11.02	1.63	-13.19	1.86	-22.49	3.12
HH-VV	-26.43	3.18	-31.05	3.97	-26.69	2.34	-21.75	1.78	-23.34	1.76	-25.87	2.20	-35.02	6.23
HH/VV	1.62	1.55	1.41	1.36	1.14	1.44	2.49	1.50	0.69	1.61	-0.96	1.62	1.09	1.63
HV/VV	-13.53	3.02	-15.06	3.51	-12.38	2.26	-7.43	1.88	-8.65	1.96	-9.27	2.38	-11.40	4.74
HV/HH	-15.12	2.63	-16.48	3.11	-13.46	2.01	-9.80	1.94	-9.22	1.89	-8.11	2.63	-12.22	4.95
Winter wheat														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
HH	-18.79	4.06	-23.53	3.80	-17.84	2.92	-15.74	2.66	-15.42	2.76	-22.83	5.61	-20.81	4.09
HV	-34.38	5.19	-39.40	6.06	-30.35	4.43	-28.70	4.02	-25.22	4.46	-34.96	7.44	-30.54	6.20
VV	-18.41	3.70	-25.28	3.59	-24.48	4.20	-21.67	4.40	-17.80	3.45	-23.76	5.40	-21.40	4.47
Span	-2.70	1.67	-7.48	1.56	-2.40	1.29	-3.53	1.16	-4.39	1.18	-5.67	2.42	-6.26	2.14
HH+VV	-13.09	3.99	-19.43	3.54	-18.29	3.19	-14.87	3.71	-12.46	3.35	-18.14	5.60	-19.21	4.81
HH-VV	-31.83	3.81	-34.55	5.48	-23.71	3.01	-23.51	3.45	-23.55	3.36	-33.49	5.74	-33.90	5.54
HH/VV	-0.40	1.45	2.06	2.50	8.01	4.17	7..42	3.94	2.92	2.31	1.34	1.67	1.50	1.71
HV/VV	-16.07	3.20	-13.89	4.77	-5.39	3.34	-5.35	5.61	-6.51	5.00	-111.27	3.87	-10.58	4.10
HV/HH	-15.70	2.69	-16.14	3.52	-12.41	3.71	-12.72	3.39	-9.63	3.60	-12.68	3.24	-12.11	3.50

2. The values of three main crops (corn, soybean, and winter wheat) presented in Figure 6.

Corn														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
Ps (%)	57.78	-	61.71	-	38.59	-	27.11	-	22.47	-	28.99	-	20.73	-
Pd (%)	1.58	-	4.61	-	7.55	-	6.00	-	4.22	-	3.73	-	23.34	-
Pv (%)	40.65	-	33.68	-	53.86	-	66.89	-	73.31	-	67.28	-	55.92	-
H	0.60	0.09	0.56	0.09	0.78	0.07	0.84	0.04	0.86	0.04	0.82	0.04	0.81	0.06
A	0.16	0.07	0.19	0.08	0.26	0.09	0.20	0.08	0.18	0.07	0.18	0.07	0.28	0.10
α(Degree)	22.51	4.258	20.63	4.32	35.56	5.78	40.27	4.20	40.56	3.44	37.39	3.50	43..20	6.61
τ	0.89	0.05	0.88	0.06	0.83	0.07	0.82	0.07	0.86	0.06	0.87	0.06	0.73	0.14
$\|\delta\|$	0.52	0.08	0.49	0.07	0.75	0.11	0.84	0.09	0.85	0.08	0.78	0.07	0.94	0.17
ϕ_δ(Degree)	-46.98	71.43	-63.42	66.86	9.41	45.58	17.66	34.52	7.14	50.30	13.81	52.89	42.40	38.13
Soybean														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
Ps (%)	54.48	-	61.01	-	48.02	-	27.41	-	30.78	-	30.24	-	37.10	-
Pd (%)	3.07	-	3.34	-	4.15	-	4.41	-	2.18	-	1.53	-	5.16	-
Pv (%)	42.45	-	35.65	-	47.82	-	68.18	-	67.04	-	68.23	-	57.74	-
H	0.64	0.08	0.59	0.09	0.71	0.06	0.84	0.04	0.80	0.05	0.79	0.07	0.72	00.13
A	0.19	0.08	0.19	0.08	0.21	0.08	0.18	0.07	0.15	0.06	0.14	00.06	0.22	0.09
α(Degree)	24.92	4.57	22.18	4.36	28.36	3.57	38.00	3.15	34.32	3.46	34.09	5.45	30.44	8.42
τ	0.88	0.06	0.88	0.06	0.90	0.05	0.88	0.06	0.92	0.04	0.91	0.05	0.90	0.05
$\|\delta\|$	0.56	0.08	0.51	0.08	0.62	0.06	0.79	0.07	0.72	0.07	0.72	0.10	0.66	0.15
ϕ_δ(Degree)	-13.20	66.27	-33.53	58.78	-27.07	71.07	10.55	50.32	-3.26	94.09	-3.14	122.47	-6.06	78.11
Winter wheat														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
Ps (%)	60.23	-	55.14	-	21.26	-	27.49	-	26.88	-	44.76	-	40.71	-
Pd (%)	2.45	-	5.45	-	7.23	-	4.85	-	1.96	-	2.05	-	3.51	-
Pv (%)	37.32	-	39.41	-	71.52	-	67.66	-	71.16	-	53.20	-	55.78	
H	0.58	0.09	0.63	0.11	0.81	0.07	0.77	0.11	0.80	0.11	0.70	0.10	0.71	0.10
A	0.20	0.09	0.25	0.09	0.23	0.10	0.19	0.09	0.16	0.08	0.18	0.10	0.18	0.09
α(Degree)	22.72	4.51	26.71	7.72	43.96	4.32	39.70	8.97	37.19	7.85	28.11	6.43	29.51	6.43
τ	0.85	0.08	0.80	0.10	0.68	0.14	0.70	0.13	0.86	0.07	0.90	0.06	0.89	0.06
$\|\delta\|$	0.51	0.08	0.58	0.13	0.93	0.10	0.84	0.18	0.78	0.15	0.62	0.11	0.63	0.11
ϕ_δ(Degree)	-91.02	56.91	-64.01	39.51	-15.54	38.72	-20.97	40.92	-34.19	55.96	-18.27	77.97	-13.03	82.14

3. The values of three main crops (corn, soybean, and winter wheat) presented in Figure 7.

Corn														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
ρ_{HHVV}	0.74	0.07	0.76	0.06	0.49	0.12	0.42	0.10	0.42	0.08	0.49	0.08	0.42	0.11
ρ_{HVVV}	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.12	0.07
ρ_{HHHV}	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.12	0.07
$\rho_{HH+VV,HH-VV}$	0.15	0.07	0.16	0.08	0.16	0.09	0.24	0.09	0.19	0.08	0.18	0.08	0.32	0.15
ϕ_{HHVV}(Degree)	4.87	4.98	5.79	4.77	-7.19	14.80	-11.39	15.20	-4.62	13.40	-5.27	10.17	-47.86	36.70
ϕ_{HVVV}(Degree)	8.16	108.13	6.49	106.61	-4.99	103.06	-10.11	100.30	-1.02	102.43	4.88	103.18	-5.98	101.64
ϕ_{HVHH}(Degree)	-11.46	112.05	-9.76	109.62	1.68	101.64	11.83	97.66	8.43	101.86	0.05	101.27	16.28	91.91
$\phi_{HH+VV,HH-VV}$ (Degree)|	-51.69	59.63	-65.09	61.86	-23.95	74.83	18.70	30.94	6.86	42.38	13.45	48.29	43.19	37.43
Soybean														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
ρ_{HHVV}	0.69	0.07	0.73	0.07	0.63	0.07	0.47	0.07	0.55	0.07	0.56	0.10	0.60	0.14
ρ_{HVVV}	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.05	0.11	0.06	0.12	0.06	0.12	0.06
ρ_{HVHH}	0.11	0.06	0.11	0.06	0.12	0.06	0.10	0.05	0.11	0.06	0.11	0.06	0.12	0.06
$\rho_{HH+VV,HH-VV}$	0.16	0.08	0.17	0.07	0.17	0.09	0.17	0.07	0.12	0.06	0.13	0.07	0.13	0.07
ϕ_{HHVV}(Degree)	0.69	5.99	3.39	4.98	3.18	6.32	-3.23	10.20	0.71	7.37	0.52	7.49	0.80	7.95
ϕ_{HVVV}(Degree)	8.01	103.00	10.55	99.57	7.97	92.29	5.49	94.83	-5.51	108.38	5.38	117.72	2.88	108.39
ϕ_{HVHH}(Degree)	-3.21	101.90	-7.23	98.44	-12.18	99.81	2.01	102.92	7.92	108.72	2.80	119.58	2.30	109.03
$\phi_{HH+VV,HH-VV}$ (Degree)|	-13.89	62.65	-32.96	54.70	-23.35	75.47	11.86	44.22	-8.22	91.47	-9.71	129.95	-2.04	78.39
Winter wheat														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
ρ_{HHVV}	0.74	0.08	0.67	0.12	0.31	0.11	0.43	0.17	0.50	0.14	0.65	0.11	0.64	0.10
ρ_{HVVV}	0.11	0.06	0.11	0.06	0.11	0.06	0.12	0.06	0.12	0.06	0.11	0.06	0.12	0.06
ρ_{HVHH}	0.13	0.07	0.12	0.06	0.11	0.06	0.14	0.07	0.12	0.06	0.11	0.06	0.12	0.07
$\rho_{HH+VV,HH-VV}$	0.20	0.10	0.25	0.11	0.17	0.09	0.38	0.15	0.22	0.09	0.14	0.07	0.15	0.08
ϕ_{HHVV}(Degree)	9.17	5.42	14.21	10.34	22.37	21.17	18.10	21.22	8.62	10.10	2.75	6.53	2.00	6.76
ϕ_{HVVV}(Degree)	9.76	104.69	3.78	105.52	7.50	99.30	-25.25	89.72	0.00	112.62	14.98	101.40	7.85	100.25
ϕ_{HVHH}(Degree)	-16.94	112.35	-7.13	113.59	-7.24	108.47	43.40	105.11	-12.12	114.87	-10.82	103.29	-6.87	106.42
$\phi_{HH+VV,HH-VV}$ (Degree)|	-93.55	46.70	-63.75	38.40	-20.92	76.60	-22.52	38.00	-34.34	44.93	-19.78	71.49	-12.29	72.34

4. The values of three main crops (corn, soybean, and winter wheat) presented in Figure 8.

Corn														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
RVI	0.36	0.09	0.31	0.08	0.50	0.09	0.62	0.08	0.66	0.08	0.61	0.08	0.53	0.11
Soybean														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
RVI	0.39	0.09	0.34	0.09	0.44	0.07	0.63	0.08	0.59	0.08	0.59	0.11	0.48	0.17
Winter wheat														
Observable	12 April 2015		6 May 2015		23 June 2015		17 July 2015		10 August 2015		3 September 2015		27 September 2015	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
RVI	0.33	0.09	0.36	0.11	0.57	0.13	0.54	0.14	0.61	0.17	0.46	0.12	0.48	0.12