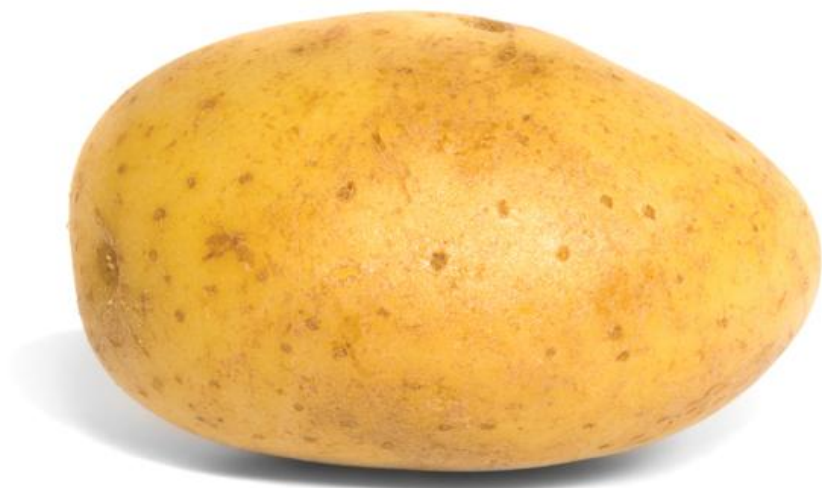




## **APPENDIX**



## APPENDIX -A

## A1: Spectral Absorption Feature

HR no	450-550nm			550-750nm		
	$\lambda_{BDmax}$	$BD_{max}$	Area	$\lambda_{BDmax}$	$BD_{max}$	Area
145	500.80	0.43	35.76	683.80	0.85	85.89
146	499.30	0.45	35.84	683.80	0.86	82.07
147	502.30	0.28	34.48	679.60	0.72	79.11
148	496.30	0.32	33.98	678.20	0.76	77.54
149	496.30	0.24	33.73	678.20	0.65	73.91
150	499.30	0.35	34.70	678.20	0.81	79.30
151	500.80	0.52	36.72	675.50	0.89	85.31
152	500.80	0.42	36.00	676.90	0.81	81.72
153	500.80	0.34	34.50	678.20	0.75	76.77
154	494.80	0.30	33.78	678.20	0.72	73.88
155	499.30	0.36	35.09	676.90	0.76	76.25
156	497.80	0.34	35.13	678.20	0.71	73.79
157	496.30	0.22	33.85	676.90	0.58	68.37
158	497.80	0.41	35.29	676.90	0.83	80.47
159	497.80	0.34	34.94	676.90	0.75	77.16
160	503.80	0.39	35.40	676.90	0.85	87.85
161	503.80	0.36	35.11	676.90	0.84	87.77
162	499.30	0.35	34.80	678.20	0.74	74.57
163	497.80	0.37	35.00	678.20	0.79	81.04
164	496.30	0.34	35.02	678.20	0.76	79.04
165	494.80	0.44	34.93	678.20	0.81	76.55
166	502.30	0.45	35.89	675.50	0.87	86.60

167	499.30	0.45	35.74	676.90	0.85	83.88
168	500.80	0.33	34.76	678.20	0.74	78.48
171	500.80	0.36	35.63	678.20	0.75	82.38
172	500.80	0.38	35.92	678.20	0.77	82.91
174	499.30	0.40	35.46	678.20	0.80	81.42
175	499.30	0.45	35.61	678.20	0.83	82.43
176	500.80	0.34	35.41	676.90	0.71	78.22
177	503.80	0.42	35.85	676.90	0.83	84.67
178	497.80	0.38	35.14	676.90	0.76	79.27
179	497.80	0.40	35.22	678.20	0.79	79.84
180	499.30	0.42	35.88	676.90	0.82	84.92
181	499.30	0.43	35.63	676.90	0.84	83.45
182	503.80	0.44	35.80	676.90	0.87	88.13
184	499.30	0.46	36.45	676.90	0.82	85.22
185	500.80	0.30	36.86	681.00	0.59	79.37
186	499.30	0.37	35.70	679.60	0.78	83.85
187	502.30	0.43	35.82	679.60	0.84	87.21
188	502.30	0.36	35.62	678.20	0.80	84.46
189	500.80	0.40	35.59	676.90	0.81	83.76
190	496.30	0.44	35.18	676.90	0.83	80.51
191	499.30	0.32	34.35	678.20	0.74	79.97
192	497.80	0.28	34.66	678.20	0.65	75.56
193	499.30	0.34	35.15	676.90	0.75	78.92
194	500.80	0.21	34.56	679.60	0.58	72.09
195	503.80	0.36	35.53	678.20	0.79	82.64
197	497.80	0.34	35.27	678.20	0.72	75.09

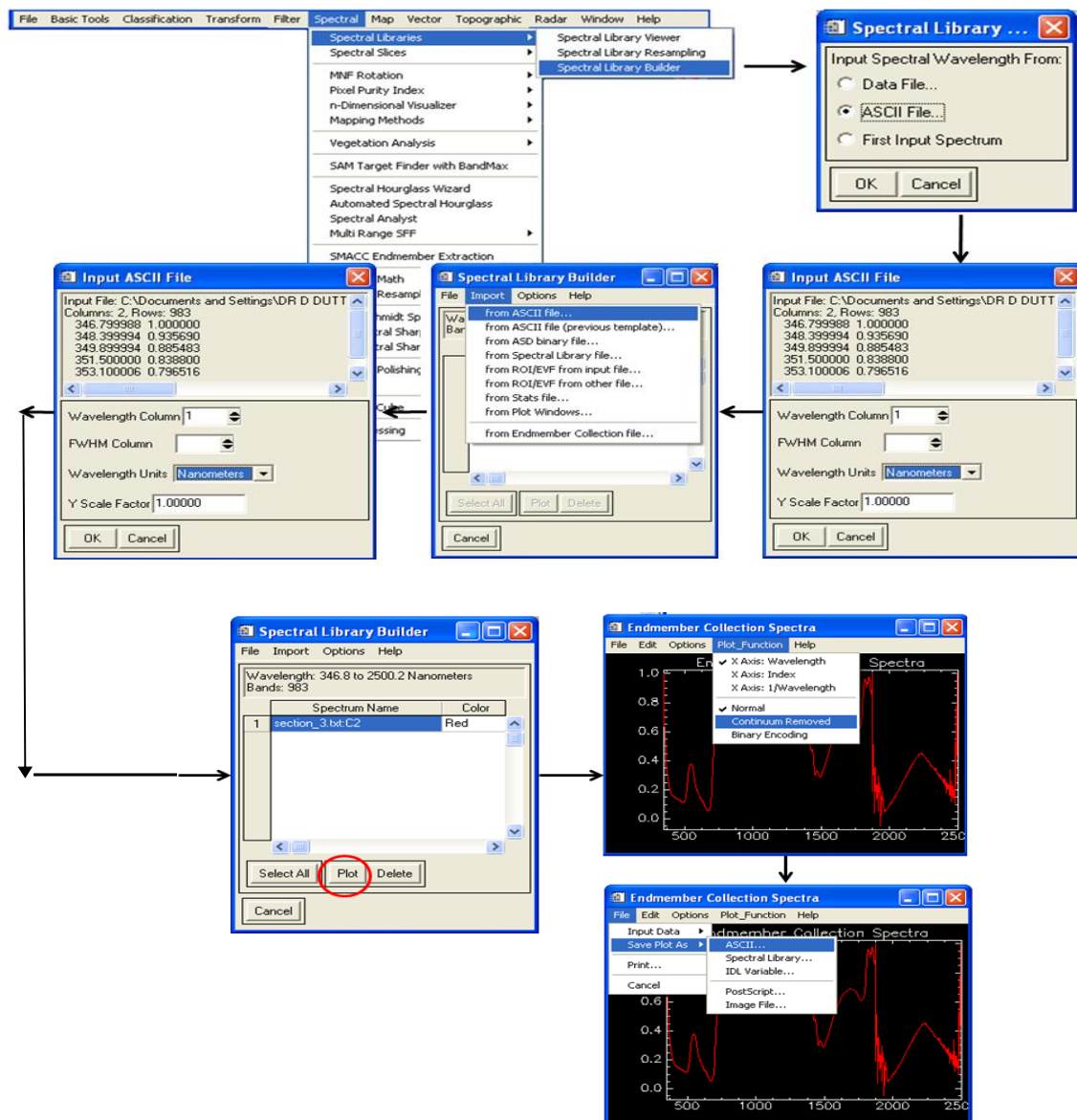
198	497.80	0.31	34.50	678.20	0.72	74.83
199	499.30	0.36	35.39	676.90	0.78	80.53
200	503.80	0.38	35.19	678.20	0.83	87.96
201	499.30	0.49	36.27	678.20	0.86	82.72
202	502.30	0.39	35.59	678.20	0.80	82.98
203	494.80	0.37	34.30	676.90	0.73	78.36
204	496.30	0.59	37.56	675.50	0.88	79.58
205	497.80	0.58	36.94	676.90	0.91	86.23
206	503.80	0.40	35.07	676.90	0.82	86.31
207	503.80	0.41	35.32	676.90	0.83	86.71
208	497.80	0.51	35.70	676.90	0.84	76.46
209	496.30	0.54	37.09	676.90	0.79	64.72
210	500.80	0.38	35.41	678.20	0.80	82.34
211	496.30	0.21	33.62	676.90	0.64	73.69
213	494.80	0.63	38.73	675.50	0.67	48.28
214	499.30	0.47	36.30	678.20	0.80	73.25
219	502.30	0.46	36.11	678.20	0.86	86.62
220	499.30	0.44	35.48	675.50	0.83	83.28
222	500.80	0.47	35.61	681.00	0.87	86.67
224	494.80	0.38	34.03	676.90	0.79	76.15
225	499.30	0.51	36.40	675.50	0.89	86.99
226	500.80	0.37	35.61	676.90	0.84	86.12
227	500.80	0.42	35.27	681.00	0.85	87.28
228	500.80	0.34	35.23	679.60	0.79	83.05
229	496.30	0.32	34.64	678.20	0.80	82.98
231	499.30	0.42	36.32	678.20	0.82	82.10

232	500.80	0.41	35.19	675.50	0.80	82.72
233	500.80	0.42	35.68	678.20	0.80	76.83
234	500.80	0.48	35.73	678.20	0.84	82.10
235	503.80	0.50	36.80	675.50	0.88	86.50
236	499.30	0.50	36.60	675.50	0.89	86.40
237	503.80	0.40	36.32	678.20	0.83	81.61
239	499.30	0.46	36.44	678.20	0.86	81.57
241	502.30	0.29	35.16	678.20	0.75	77.45
242	494.80	0.23	34.02	675.50	0.63	70.86
243	494.80	0.18	32.58	676.90	0.58	65.30
245	503.80	0.40	35.23	678.20	0.83	84.31
246	503.80	0.32	34.12	676.90	0.79	84.14
247	499.30	0.17	34.44	675.50	0.58	75.06
248	497.80	0.19	34.72	678.20	0.60	72.64
249	503.80	0.35	35.15	678.20	0.78	78.45
251	502.30	0.28	33.57	675.50	0.73	81.63
252	499.30	0.37	33.79	674.10	0.76	77.27
253	493.30	0.48	35.27	676.90	0.41	44.27
255	494.80	0.20	30.71	675.50	0.62	71.58
256	500.80	0.24	34.62	678.20	0.72	80.69
257	505.30	0.31	35.01	679.60	0.75	80.27
258	503.80	0.33	34.03	679.60	0.77	82.50
259	499.30	0.47	35.12	676.90	0.87	82.08
261	503.80	0.29	33.73	679.60	0.75	81.35
263	494.80	0.27	30.70	675.50	0.71	68.13
264	493.30	0.23	31.22	675.50	0.68	67.24

265	493.30	0.41	32.58	678.20	0.90	80.73
266	496.30	0.42	34.07	679.60	0.89	85.80
268	494.80	0.53	35.33	678.20	0.91	82.46
269	496.30	0.61	37.11	678.20	0.95	91.53
270	494.80	0.42	32.99	678.20	0.91	84.23
271	499.30	0.46	34.70	679.60	0.92	86.55

$\lambda_{BDmax}$  = wavelength of band depth maxima,  $BD_{max}$  = band depth maxima, Area = Area under the absorption curve

### A2: The Steps for Continuum Removal in ENVI Software



## APPENDIX –B

## B1: Late Blight Affected Areas of Different Blocks during 2012-13 Cropping Season

District	Block / Taluka Name	Potato Cultivated Area (ha)	PLB Disease Affected Potato Area (ha)	% of PLB Disease Affected Potato Area (ha)
Bankura	Gangajalghati	174.35	30.10	17.27
	Barjora	476.33	172.16	36.14
	Sonamukhi	4300.48	2475.74	57.57
	Bankura II	305.43	77.46	25.36
	Patrasayer	6202.36	4316.16	69.59
	Onda	3812.23	1851.71	48.57
	Indus	3107.29	1640.98	52.81
	Bishnupur	3921.04	1837.60	46.87
	Joypur	9707.28	2329.61	24.00
	Taldangra	4707.19	2440.30	51.84
	Kotulpur	17752.56	3259.07	18.36
	Khatra	198.18	28.85	14.56
	Simlapal	3889.37	1265.93	32.55
	Raipur	3791.53	1969.30	51.94
	Sarenga	3087.85	1517.43	49.14
Burdwan	Ketugram I	410.17	215.75	52.60
	Ketugram II	702.43	315.15	44.87
	Kanksa	926.01	253.06	27.33
	Katwa I	1035.14	631.56	61.01
	Katwa II	555.04	313.58	56.50
	Mangolkoat	6118.95	1447.19	23.65
	Ausgram I	4427.48	760.44	17.18
	Ausgram II	3409.90	760.44	22.30
	Manteswar	730.02	296.02	40.55
	Purbasthali I	763.57	245.54	32.16
	Purbasthali II	3463.21	2159.33	62.35
	Bhatar	2849.84	1250.26	43.87
	Galsi I	1116.98	671.38	60.11
	Galsi II	3226.77	1406.11	43.58
	Burdwan I	1298.55	648.18	49.92
	Burdwan II	2773.01	587.65	21.19
	Memari I	9823.93	1598.33	16.27
	Memari II	7831.11	912.84	11.66
	Kalna I	7275.44	899.36	12.36
	Kalna II	6076.30	280.66	4.62
Khandaghosh	2498.00	1054.58	42.22	
Jamalpur	16023.46	2634.72	16.44	

	Raina I	3677.39	356.23	9.69
	Raina II	4076.89	534.35	13.11
Hooghly	Balagarh	2286.02	504.87	22.09
	Pandua	12416.32	775.18	6.24
	Dhaniakhali	13922.46	1582.97	11.37
	Chinsura Mogra	489.82	16.62	3.39
	Goghat I	8244.72	1957.70	23.74
	Goghat II	12872.27	1473.84	11.45
	Polba Dadpur	10734.89	970.54	9.04
	Arambag	8937.74	1081.55	12.10
	Pursura	7886.93	859.22	10.89
	Tarekeswar	8812.00	622.46	7.06
	Haripal	8978.51	1139.87	12.70
	Singur	3618.75	316.72	8.75
	Jangipara	8269.50	1364.71	16.50
	Chanditala I	1452.83	273.44	18.82
	Chanditala II	150.83	13.80	9.15
	Khanakul I	7219.31	1010.05	13.99
	Khanakul II	3619.06	1384.47	38.25
Howrah	Udaynarayanpur	5631.64	1310.46	23.27
	Amta I	512.39	148.01	28.89
	Amta II	1980.90	735.67	37.14
	Jagatballavpur	65.54	10.35	15.79
	Bagnan I	190.34	19.44	10.21
Paschim Medinipur	Garhbeta I	18755.71	8260.72	44.04
	Garhbeta II	12278.97	5352.23	43.59
	Garhbeta III	10562.10	5368.85	50.83
	Chandrakona I	12505.06	2261.25	18.08
	Chandrakona II	12013.99	2635.98	21.94
	Ghatal	3209.52	864.23	26.93
	Binpur I	3856.76	2128.60	55.19
	Binpur II	146.44	59.58	40.69
	Salbani	6708.48	3548.51	52.90
	Kespur	14430.78	5795.01	40.16
	Daspur I	2183.16	491.07	22.49
	Daspur II	395.43	71.18	18.00
	Debra	612.43	94.07	15.36
	Medinipur	2227.07	1261.86	56.66
	Jhargram	722.50	535.60	74.13
	Kharagpur I	201.95	117.91	58.39
	Kharagpur II	351.84	184.70	52.50
	Gopiballavpur I	241.46	51.43	21.30
	Gopiballavpur II	429.92	48.92	11.38
Kesiari	151.77	20.70	13.64	



**B2: Late Blight Affected Areas of Different Blocks during 2013-14 Cropping Season**

District	Block / Taluka Name	Potato Cultivated Area (ha)	PLB Disease Affected Potato Area (ha)	% of PLB Disease Affected Potato Area (ha)
Bankura	Gangajalghati	111.58	14.88	13.33
	Barjora	921.19	356.76	38.73
	Sonamukhi	4014.85	2289.95	57.04
	Bankura II	203.64	58.27	28.61
	Patrasayer	6098.98	3058.33	50.14
	Onda	3189.75	1277.63	40.05
	Indus	2999.74	1081.74	36.06
	Bishnupur	3357.74	952.18	28.36
	Joypur	10162.80	4443.51	43.72
	Taldangra	3678.55	1228.35	33.39
	Kotulpur	18595.13	12738.87	68.51
	Khatra	256.33	62.61	24.43
	Simlapal	2903.35	858.27	29.56
	Raipur	1985.88	817.66	41.17
Sarenga	1809.21	645.33	35.67	
Burdwan	Ketugram I	224.84	211.04	93.86
	Ketugram II	1465.78	415.34	28.34
	Kanksa	456.89	252.43	55.25
	Katwa I	2076.70	668.26	32.18
	Katwa II	1379.92	346.53	25.11
	Mangolkoat	6852.49	2490.49	36.34
	Ausgram I	3790.44	1184.34	31.25
	Ausgram II	2799.20	848.04	30.30
	Manteswar	1533.97	491.90	32.07
	Purbasthali I	1377.13	439.21	31.89
	Purbasthali II	4773.93	1879.88	39.38
	Bhatar	2976.50	938.54	31.53
	Galsi I	3431.51	1577.36	45.97
	Galsi II	3431.51	1577.36	45.97
	Burdwan I	1696.69	749.78	44.19
	Burdwan II	3785.48	1865.31	49.28
	Memari I	12911.80	5038.63	39.02
	Memari II	9457.35	2851.59	30.15
	Kalna I	8067.51	1745.05	21.63
	Kalna II	7047.76	1206.03	17.11
	Khandaghosh	2436.56	1341.18	55.04
	Jamalpur	20028.98	6603.90	32.97
Raina I	4192.45	1449.66	34.58	
Raina II	4537.43	1065.63	23.49	

Hooghly	Balagarh	2781.23	1002.08	36.03
	Pandua	14684.43	3589.90	24.45
	Dhaniakhali	17225.44	5397.25	31.33
	Chinsura Mogra	849.59	176.36	20.76
	Goghat I	8444.41	4956.58	58.70
	Goghat II	8444.41	5415.84	64.14
	Polba Dadpur	14684.43	2724.19	18.55
	Arambag	9971.56	6410.83	64.29
	Pursura	8842.09	2217.11	25.07
	Tarekeswar	10106.39	2256.78	22.33
	Haripal	10253.62	1927.92	18.80
	Singur	17225.44	647.81	3.76
	Serampur Uttarpara	423.71	132.66	31.31
	Jangipara	9015.35	2023.08	22.44
	Chanditala I	1876.47	538.70	28.71
	Chanditala II	524.75	172.33	32.84
	Khanakul I	8769.25	2913.89	33.23
	Khanakul II	5710.92	2549.69	44.65
Howrah	Udaynarayanpur	7051.17	2242.52	31.80
	Amta I	1322.89	323.59	24.46
	Amta II	2794.55	925.22	33.11
	Jagatballavpur	378.77	44.01	11.62
	Bagnan I	467.10	114.99	24.62
Paschim Medinipur	Garhbeta I	18437.05	9759.72	52.94
	Garhbeta II	9149.87	3306.60	36.14
	Garhbeta III	11336.91	3751.39	33.09
	Chandrakona I	12986.49	4363.24	33.60
	Chandrakona II	13009.43	3115.98	23.95
	Ghatal	3910.08	1326.30	33.92
	Binpur I	3035.70	1298.71	42.78
	Binpur II	76.83	51.43	66.94
	Salbani	5042.66	1805.18	35.80
	Kespur	14134.88	3812.76	26.97
	Daspur I	2892.81	598.52	20.69
	Daspur II	1712.50	372.57	21.76
	Debra	660.20	65.71	9.95
	Midnapur	1838.65	683.45	37.17
	Jhargram	621.15	302.83	48.75
	Kharagpur I	285.16	79.04	27.72
	Kharagpur II	383.41	129.25	33.71
	Gopiballavpur I	107.56	42.96	39.94
Gopiballavpur II	70.87	46.72	65.93	
Kesiari	39.83	18.19	45.67	

## APPENDIX –C

### Field Photographs Taken during Ground Truth Verification



**Plate 1: Acquisition of Canopy Spectra using ASD Spectroradiometer**



**Plate 2: Healthy Potato Leaves**



**Plate 3: Potato Crop Canopy**



**Plate 4: Open Field of Potato Crops**

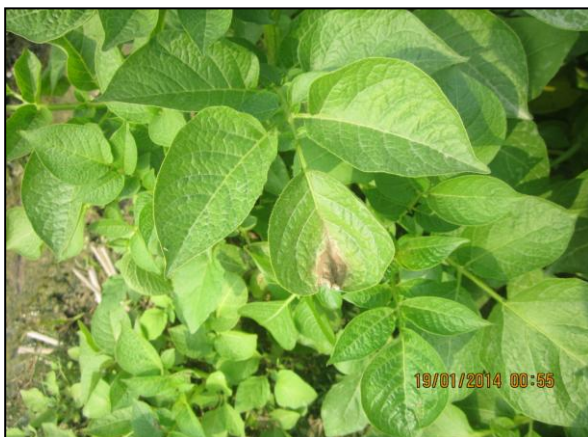


**Plate 5: Fungicide Spray to Protect PLB**





**Plate 6: Field Visit in Potato Late Blight Disease Affected Crop Area**



**Plate 7: Visual Symptoms of Potato Late Blight Disease on Potato Leaves**





**Plate 8: Potato Late Blight Disease at Canopy Level of Potato Plants**





**Plate 9: Potato Late Blight Disease Affected Potato Fields**



## APPENDIX –D

### Questionnaire-1: For MIS Development on Potato Late Blight Disease

#### 1. Geographical Details

Dag No		Field Size:		Latitude:	
Village Name		Sub-div Name:		Longitude:	

#### 2. Contact Details

Name of the Farmer		Mob/Tel. No	
Name of KPS/Extn. Agent		Mob/Tel. No	

#### 3. Cropping History

	Kharif	Rabi	Summer
2012-13			
2011-12			
2010-11			
2009-10			
2008-09			
Years of major attack of Late blight in potato			

#### 4. Variety information

Year	2012-13	2011-12	2010-11	2009-10	2008-09
Variety					

#### 5. Irrigation information

Year	2012-13	Year	2011-12
No. of irrigations		Dates of irrig. (so far)	

#### 6. Fertilizer

	Kharif		Rabi		Summer	
	N:P:K	Others	N:P:K	Others	N:P:K	Others
2012-13 (Current)			10:26:26			
2011-12			10:26:26			

#### 7. Disease History

	Planting date of potato in own field (Early/Timely/Late)	Disease severity - No disease (N)/Light (L)/Moderate (M)/Severe (S)			
		Own field		Neighbouring Field	
		Potato	Other related crop (tomato or other)	Potato	Other related crop (tomato or other)
2012-13 *					
2011-12					
2010-11					
2009-10					
2008-09					

**8. Seed Information**

Previous year (2011-12)	Source of Seed (Yes / No)	Own <input type="text"/>	If Purchased.....
			Govt Farm (Yes/No) <input type="text"/>
			Local (Yes/No) <input type="text"/>
Current year (2012-13)	Source of Seed (Yes / No)	Own <input type="text"/>	If Purchased.....
			Govt Farm (Yes/No) <input type="text"/>
			Local (Yes/No) <input type="text"/>

**9. Crop Protection Measure**

Seed Treatment (Yes/No)      Previous year       Current year

No. of spraying

Previous year

Before disease

After disease

**Current year**

Dates of spraying (as applied so far)	1	<input type="text"/>
	2	<input type="text"/>
	3	<input type="text"/>
	4	<input type="text"/>
	5	<input type="text"/>
	6	<input type="text"/>
	7	<input type="text"/>
	8	<input type="text"/>
	9	<input type="text"/>

**10. Remark (Information related to any other disease/ pest/natural disaster)**

Signature of the Supervisor/KPS/Extension Agent



## Questionnaire-2: For Synoptic Development on Potato Late Blight Disease in Relation to Crop Management

### A. Geographical Details

<b>Dag no</b>		<b>Field Size:</b>		<b>Latitude:</b>	
<b>Village Name</b>		<b>Sub-div Name:</b>		<b>Longitude:</b>	

### B. Contact Details

<b>Name of the Farmer</b>		<b>Mob/Tel. No</b>	
<b>Name of KPS/Extn. Agent</b>		<b>Mob/Tel. No</b>	

### C. Crop Details

<b>1</b>	<b>Name of Potato variety</b>				
<b>2</b>	<b>Date of planting</b>				
<b>3</b>	<b>Planting density :</b>	<b>Row to row</b>		<b>Plant to plant</b>	
<b>4</b>	<b>Fertilizer application</b>				
	<b>Date of appl.</b>				
	<b>Dose Kg/ha of urea:SSP:Potash*</b>				
	<i>*Amount of fertilizer write down according to farmer information</i>				

### 5 Management Practice

-Dates-

<b>Weeding</b>				
<b>Earthing-up</b>				
<b>Irrigation</b>				

### 6 Details of Disease Severity of Late Blight

Disease development stages	Date
a) Appearance (first report)	
b) 25% Foliage affected	
c) 50% Foliage affected	
d) 100% foliage affected	
e) Complete crop damage	

### 7 Other disease

Name of the disease	Remark : Light(L)/Moderate (M)/Severe (S)
a)	
b)	

**8 Crop Protection measure**

	<b>Date of application</b>	<b>Name of chemical</b>	<b>Dose</b>
1)			
2)			
3)			
4)			
5)			

**9 Harvest**

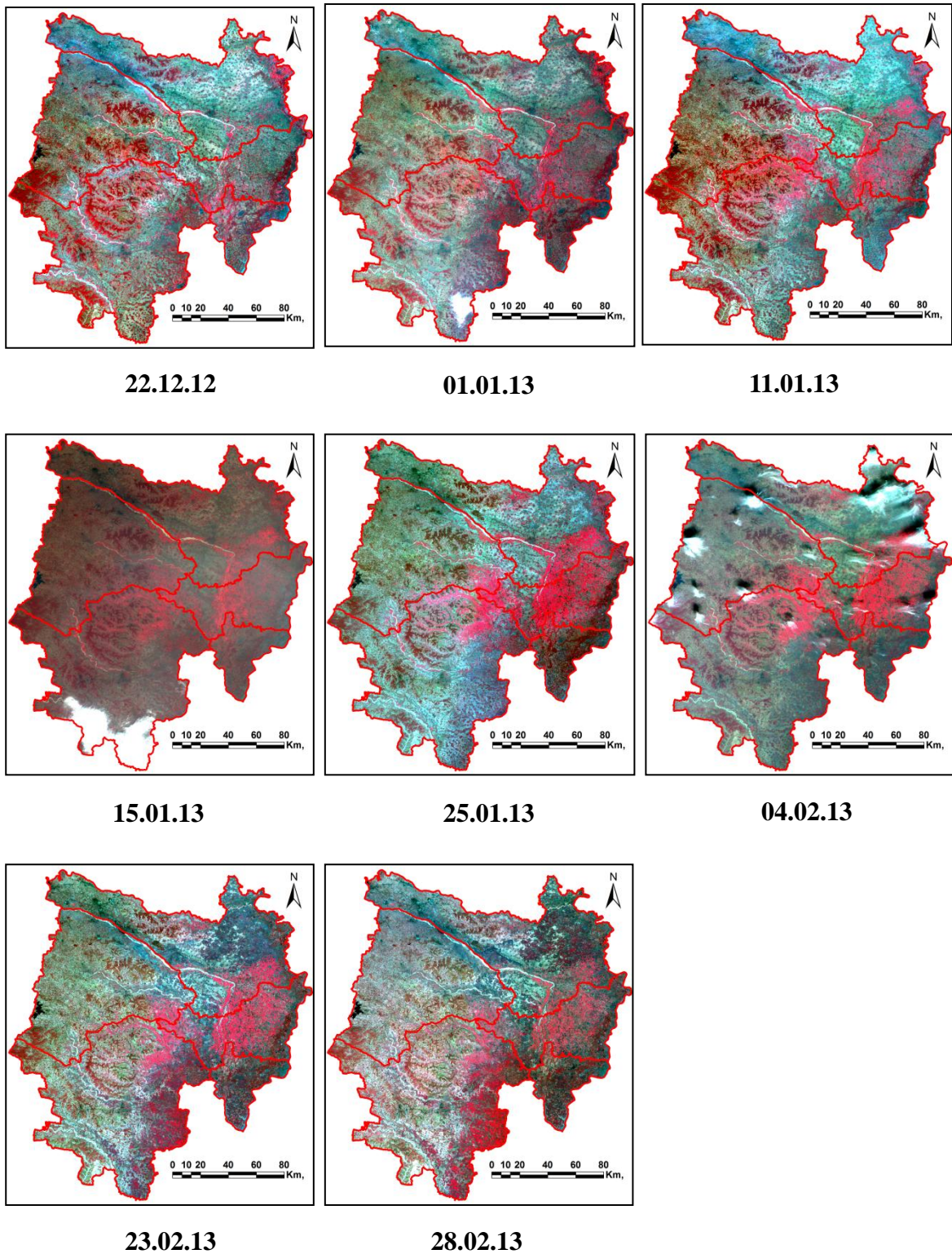
**Date of harvest**

**Yield (q/ha)**

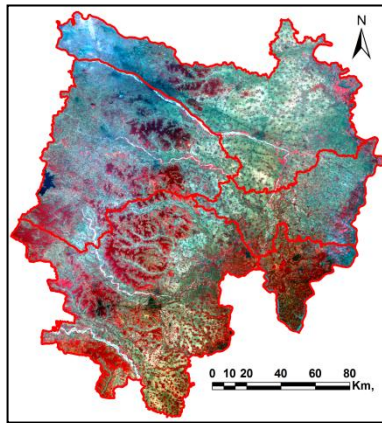
**Signature of the Supervisor/KPS/Extension Agent**

### APPENDIX –E

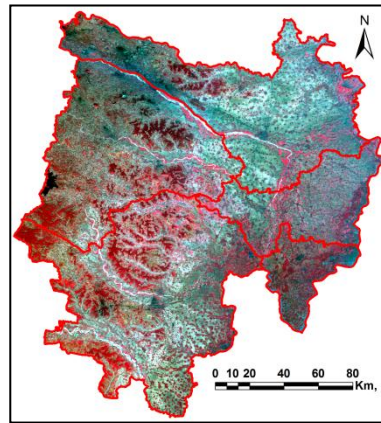
**E1: Temporal View of AWiFs Data in Potato Season 2012-13 over the Study Area**



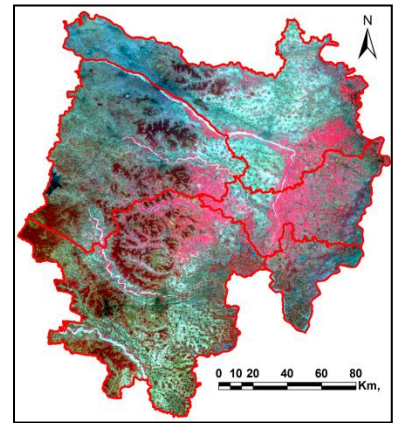
**E2: Temporal View of AWiFs Data in Potato Season 2013-14 over the Study Area**



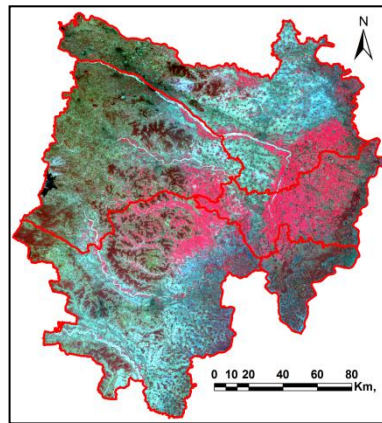
**17.12.13**



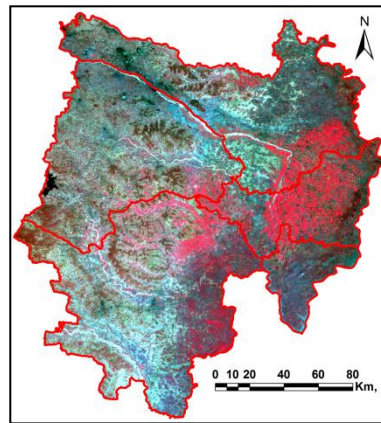
**27.12.13**



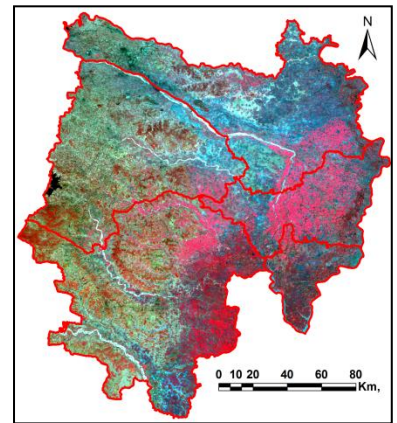
**10.01.14**



**25.01.14**



**13.02.14**



**18.02.14**