Correlation analysis of agricultural drought risk on wet farming crop and meteorological drought index in the tropical humid region

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Appendix 1

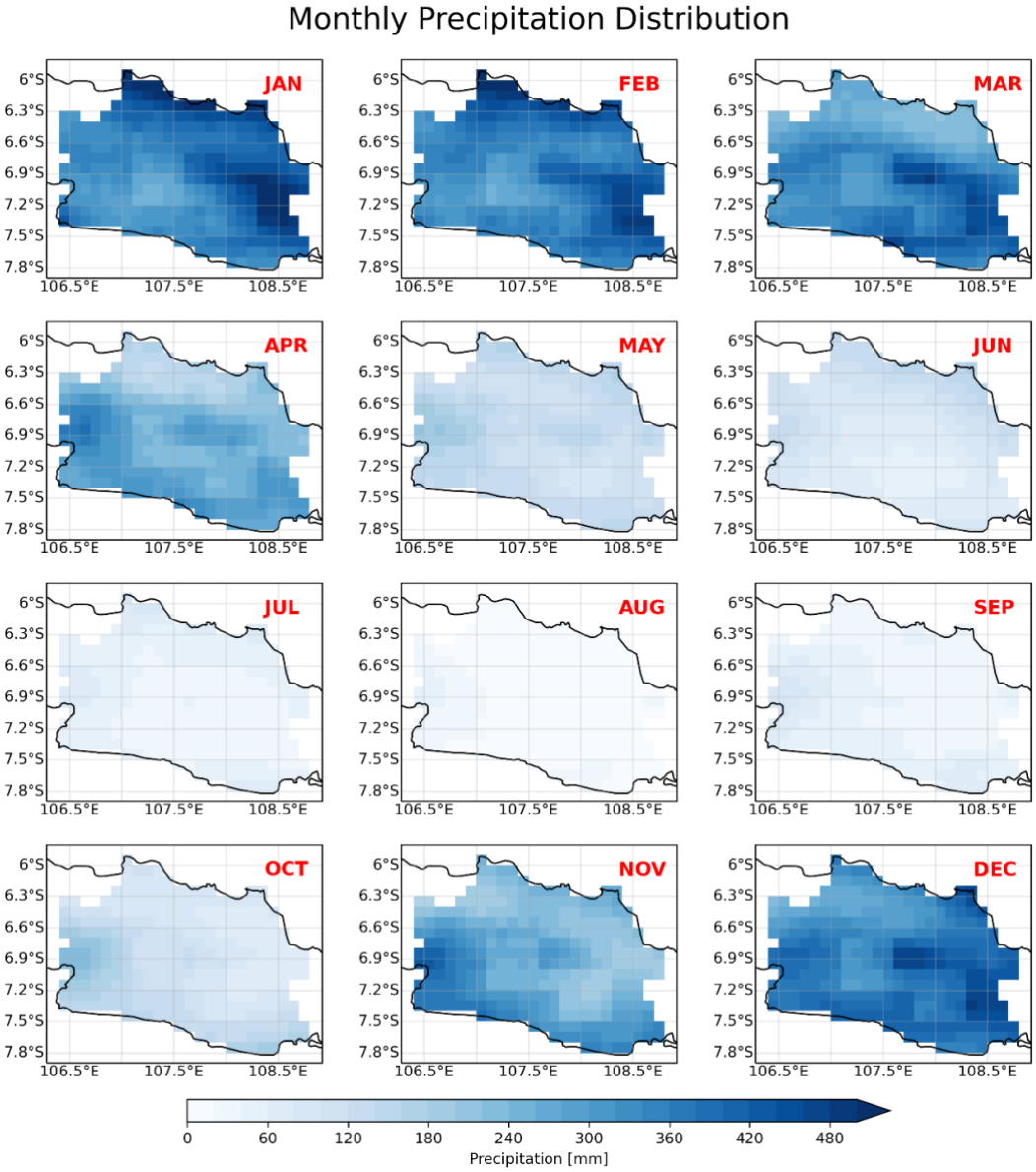

Figure A. 1 Monthly Precipitation Distribution in West Java

Figure A. 1 was generated based on the monthly average precipitation dataset within the period March 2000 – April 2001 obtained from the Japan Aerospace Exploration Agency (JAXA), specifically on their product called Global Satellite Mapping of Precipitation (GSMaP), and retrieved from the following link: https://sharaku.eorc.jaxa.jp/GSMaP/.

Appendix 2

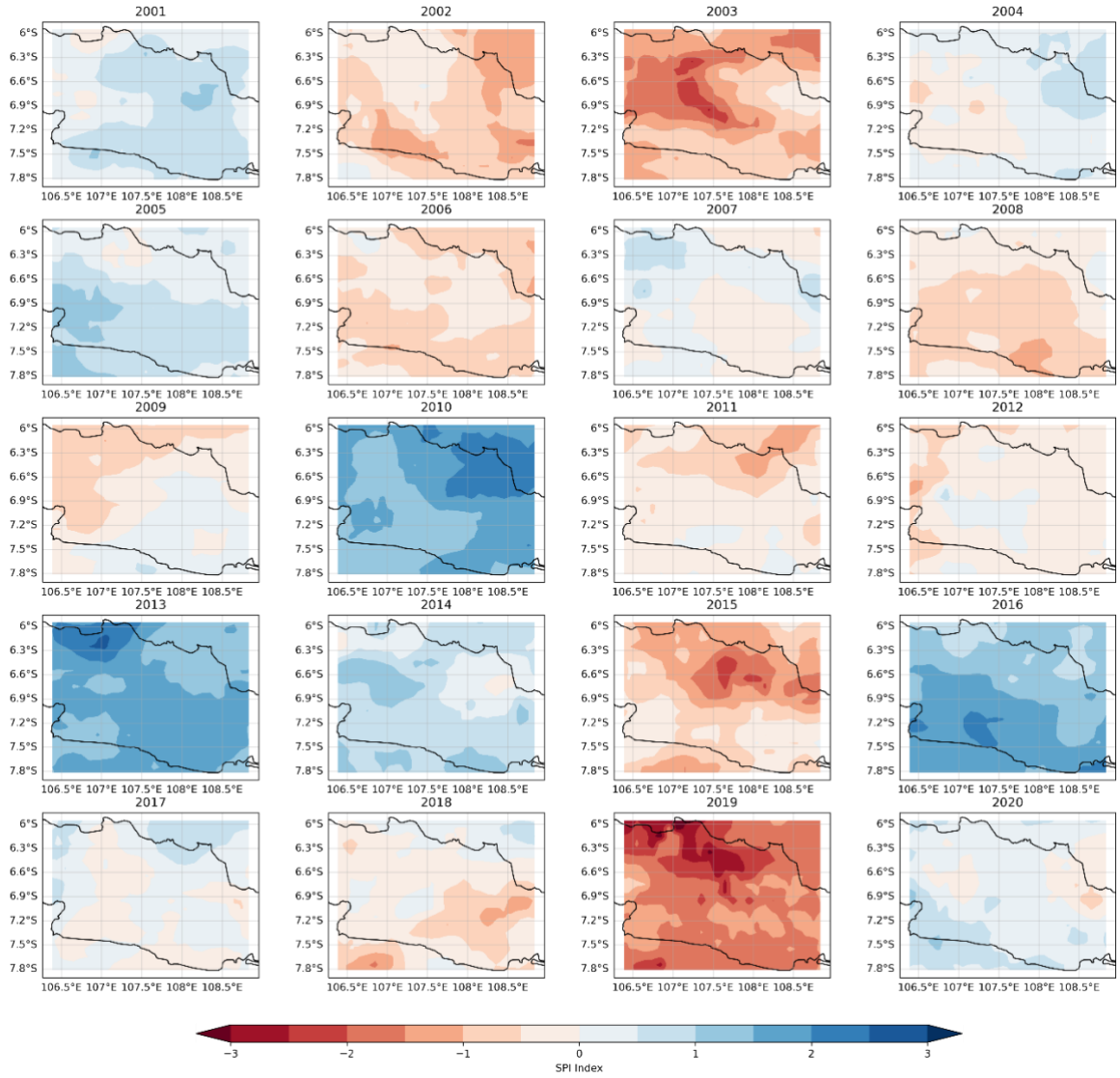

Figure A. 2 Result of SPI Interpolation from 2001 - 2020

Figure A. 2 was the interpolation result of SPI-3 in August across the West Java using Inverse Distance Weighted (IDW) method. This data was used for correlation analysis between SPI-3 and detrended crop yield on grid-scale.

Appendix 3

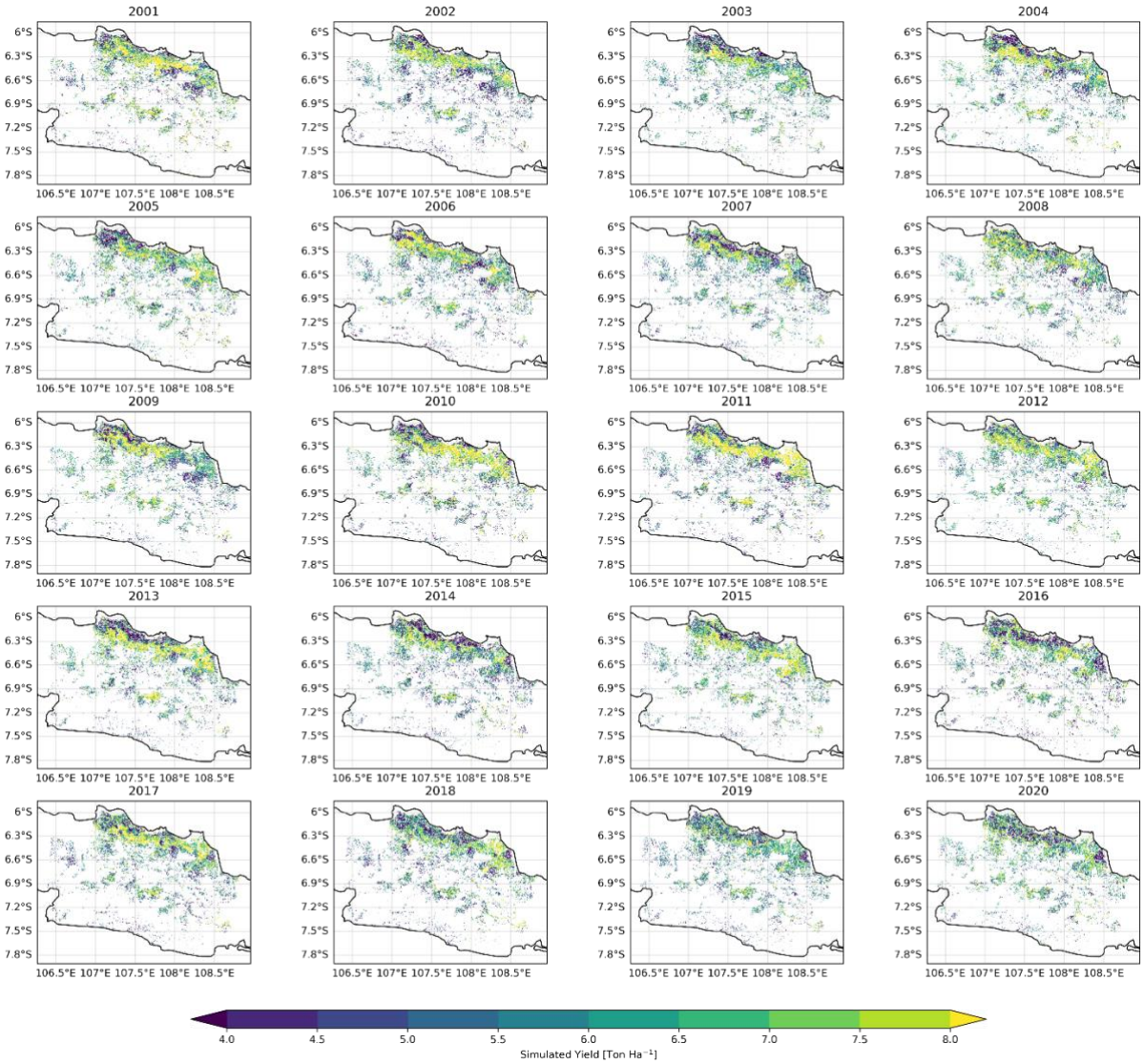

Figure A. 3 Crop Yield Estimation during the Dry Cropping Season on Grid-Scale from 2001 – 2020

Figure A. 3 was the result of the dry cropping season's crop yield estimation model on grid-scale from 2001 – 2020.

Appendix 4

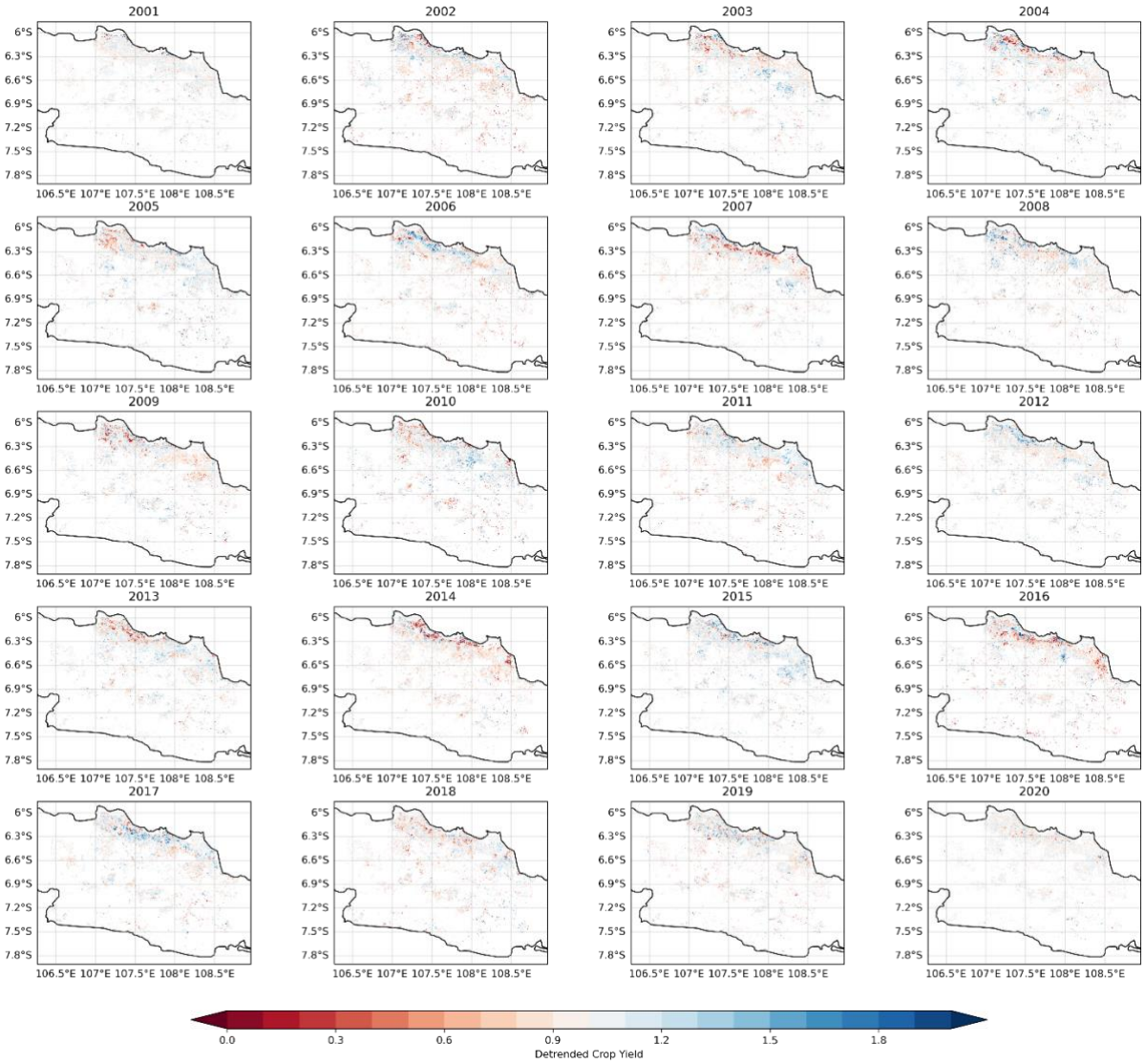

Figure A. 4 Detrended Crop Yield during the Dry Cropping Season on Grid-Scale from 2001 – 2020

Figure A. 4 was the result of detrended dry cropping season crop yield using LOWESS (Locally Weighted Scatterplot Smoothing) method where the blue colour indicated crop yield gain while red colour indicated crop yield loss. This dataset was used for correlation analysis between SPI-3 and detrended crop yield on grid-scale.

Appendix 5

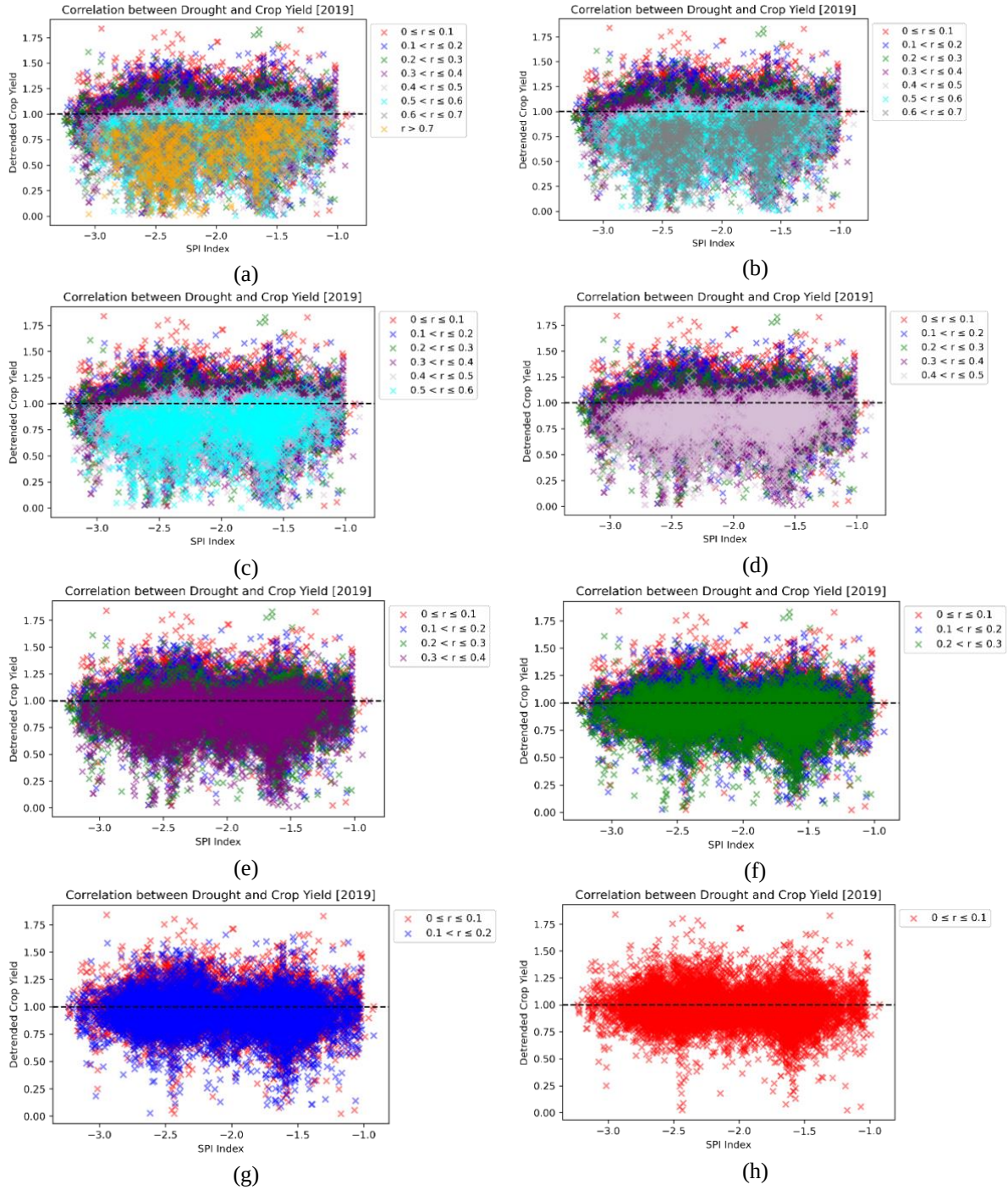

Figure A. 5 Data Characteristics of r-Value Group

Figure A. 5 showed the plot of each group started from figure (a) which consist of all the 7 group, then figure (b) where the group with largest r ($r > 0.7$) was removed, and so on until Figure (h) where the remaining plot only from group with the lowest r ($0 \leq r \leq 0.1$). The horizontal axis indicated the detrended crop yield and vertical axis indicated the SPI index.

Appendix 6

Table A. 1 Result of Correlation between SPI-1 and Drought Affected Areas

No	Regency	January	February	March	April	May	June	July	August	September	October	November	December
1	Bandung	0.320	-0.346	-0.421	-0.336	-0.173	-0.293	-0.128	-0.464	-0.344	-0.365	0.040	-0.162
2	Bekasi	0.154	0.098	-0.070	-0.465	-0.658	-0.465	-0.266	-0.174	-0.296	-0.478	0.298	-0.229
3	Ciamis	0.089	-0.305	-0.065	0.090	0.421	-0.102	-0.133	-0.466	-0.643	-0.374	-0.409	0.179
4	Cianjur	-0.182	-0.070	-0.413	0.184	-0.203	-0.056	-0.570	-0.696	-0.469	-0.462	-0.384	-0.071
5	Cirebon	0.210	-0.044	-0.451	-0.538	-0.395	0.132	0.137	-0.196	-0.232	-0.046	0.307	-0.242
6	Garut	-0.313	-0.413	-0.266	-0.280	-0.420	-0.432	-0.717	-0.398	-0.546	-0.092	-0.081	-0.469
7	Indramayu	0.436	0.020	-0.326	-0.335	-0.344	-0.346	0.075	-0.245	-0.412	-0.359	-0.237	0.111
8	Karawang	-0.266	-0.110	-0.360	0.002	-0.335	-0.009	-0.578	-0.252	-0.359	-0.148	-0.192	0.092
9	Kuningan	-0.152	0.254	-0.002	-0.430	0.147	-0.283	-0.243	-0.172	-0.030	0.047	0.044	0.050
10	Majalengka	-0.085	0.002	0.300	0.130	-0.193	-0.492	-0.469	-0.280	-0.474	-0.367	-0.186	0.200
11	Purwakarta	-0.264	-0.045	-0.007	-0.016	-0.365	-0.408	-0.649	-0.442	-0.217	-0.227	0.082	0.051
12	Subang	0.221	-0.158	-0.111	-0.154	0.010	-0.425	-0.001	-0.390	-0.498	-0.555	-0.431	0.165
13	Sukabumi	-0.001	-0.124	0.144	-0.103	0.022	-0.046	-0.313	-0.223	-0.227	-0.415	-0.123	0.648
14	Sumedang	0.388	-0.046	0.003	-0.336	-0.195	-0.178	0.143	-0.289	-0.188	-0.436	-0.106	-0.259
15	Tasikmalaya	0.098	0.029	-0.095	-0.061	-0.026	0.025	0.030	-0.153	-0.128	-0.142	-0.114	0.263

Table A. 1 shows the details of Pearson correlation analysis between SPI-1 based on various month reference and the drought affected area on each city.

Appendix 7

Table A. 2 Result of Correlation between SPI-3 and Drought Affected Areas

No	Regency	January	February	March	April	May	June	July	August	September	October	November	December
1	Bandung	-0.346	-0.175	-0.284	-0.390	-0.437	-0.579	-0.598	-0.675	-0.393	-0.371	-0.458	-0.519
2	Bekasi	-0.335	-0.105	-0.100	0.068	-0.145	-0.569	-0.606	-0.636	-0.296	-0.261	-0.425	-0.268
3	Ciamis	-0.341	-0.165	-0.134	-0.098	-0.139	-0.568	-0.572	-0.587	-0.360	-0.307	-0.325	-0.242
4	Cianjur	-0.015	0.059	-0.262	-0.414	-0.188	-0.257	-0.486	-0.512	-0.344	-0.202	-0.292	-0.270
5	Cirebon	-0.094	-0.019	0.099	0.089	0.099	-0.335	-0.459	-0.512	-0.378	-0.182	-0.295	-0.198
6	Garut	-0.263	-0.034	-0.277	-0.225	-0.217	-0.445	-0.591	-0.711	-0.604	-0.423	-0.439	-0.477
7	Indramayu	-0.266	-0.020	0.037	0.150	0.107	-0.426	-0.658	-0.717	-0.467	-0.234	-0.410	-0.327
8	Karawang	-0.480	-0.223	-0.298	-0.039	-0.294	-0.411	-0.555	-0.619	-0.264	-0.003	-0.090	0.084
9	Kuningan	-0.179	-0.019	0.096	0.087	0.029	-0.417	-0.447	-0.473	-0.395	-0.230	-0.314	-0.271
10	Majalengka	-0.057	0.072	-0.007	-0.003	-0.154	-0.519	-0.659	-0.553	-0.367	-0.134	-0.212	-0.219
11	Purwakarta	-0.500	-0.157	-0.383	-0.396	-0.540	-0.705	-0.655	-0.649	-0.095	-0.028	-0.133	-0.255
12	Subang	-0.542	-0.305	-0.390	-0.235	-0.191	-0.479	-0.505	-0.617	-0.178	-0.068	-0.180	-0.198
13	Sukabumi	0.082	0.089	-0.154	-0.186	-0.124	-0.406	-0.676	-0.674	-0.411	-0.211	-0.207	0.048
14	Sumedang	-0.037	0.146	-0.095	-0.308	-0.396	-0.569	-0.536	-0.476	-0.326	-0.177	-0.285	-0.329
15	Tasikmalaya	-0.224	-0.152	-0.282	-0.344	-0.242	0.461	-0.500	-0.627	-0.566	-0.555	-0.543	-0.467

Table A. 2 shows the details of Pearson correlation analysis between SPI-3 based on various month reference and the drought affected area on each city. Specifically, SPI-3 in August has a highest correlation thus was chosen as the most suitable SPI index to be used for assessing agricultural drought on the wet farming crop in West Java.

Appendix 8

Table A. 3 Result of Correlation between SPI-6 and Drought Affected Areas

No	Regency	January	February	March	April	May	June	July	August	September	October	November	December
1	Bandung	-0.369	-0.438	-0.510	-0.489	-0.379	-0.467	-0.483	-0.528	-0.574	-0.522	-0.562	-0.521
2	Bekasi	-0.245	-0.144	-0.144	-0.171	-0.191	-0.321	-0.271	-0.460	-0.528	-0.482	-0.549	-0.325
3	Ciamis	-0.339	-0.353	-0.316	-0.327	-0.224	-0.384	-0.288	-0.324	-0.563	-0.499	-0.439	-0.311
4	Cianjur	-0.200	-0.377	-0.466	-0.317	-0.111	-0.431	-0.516	-0.314	-0.357	-0.358	-0.373	-0.331
5	Cirebon	-0.121	-0.139	-0.074	-0.078	-0.020	-0.180	-0.298	-0.245	-0.374	-0.385	-0.416	-0.278
6	Garut	-0.273	-0.349	-0.480	-0.364	-0.181	-0.411	-0.385	-0.377	-0.535	-0.584	-0.555	-0.528
7	Indramayu	-0.291	-0.252	-0.200	-0.154	-0.019	-0.232	-0.248	-0.339	-0.456	-0.524	-0.571	-0.404
8	Karawang	-0.494	-0.418	-0.446	-0.398	-0.350	-0.454	-0.360	-0.517	-0.392	-0.334	-0.288	-0.042
9	Kuningan	-0.202	-0.195	-0.106	-0.133	-0.029	-0.116	-0.161	-0.224	-0.411	-0.376	-0.422	-0.318
10	Majalengka	-0.109	-0.134	-0.093	-0.087	-0.048	-0.318	-0.366	-0.382	-0.475	-0.463	-0.353	-0.266
11	Purwakarta	-0.438	-0.470	-0.548	-0.649	-0.465	-0.636	-0.533	-0.625	-0.540	-0.347	-0.295	-0.229
12	Subang	-0.503	-0.570	-0.592	-0.643	-0.394	-0.538	-0.411	-0.441	-0.388	-0.331	-0.347	-0.214
13	Sukabumi	-0.143	-0.217	-0.208	-0.106	-0.081	-0.346	-0.448	-0.350	-0.484	-0.445	-0.370	-0.147
14	Sumedang	-0.066	-0.082	-0.110	-0.274	-0.201	-0.417	-0.475	-0.513	-0.533	-0.420	-0.373	-0.370
15	Tasikmalaya	-0.166	-0.301	-0.400	-0.436	-0.267	-0.414	-0.440	-0.390	-0.518	-0.555	-0.621	-0.511

Table A. 3 shows the details of Pearson correlation analysis between SPI-6 based on various month reference and the drought affected area on each city.

Appendix 9

Table A. 4 Result of of Correlation between SPI-9 and Drought Affected Areas

No	Regency	January	February	March	April	May	June	July	August	September	October	November	December
1	Bandung	-0.376	-0.437	-0.515	-0.555	-0.554	-0.582	-0.542	-0.443	-0.464	-0.485	-0.571	-0.588
2	Bekasi	-0.185	-0.155	-0.117	-0.148	-0.219	-0.322	-0.384	-0.353	-0.402	-0.332	-0.522	-0.442
3	Ciamis	-0.356	-0.379	-0.303	-0.367	-0.388	-0.484	-0.446	-0.340	-0.421	-0.346	-0.414	-0.462
4	Cianjur	-0.228	-0.379	-0.455	-0.485	-0.505	-0.561	-0.424	-0.223	-0.426	-0.438	-0.349	-0.353
5	Cirebon	-0.113	-0.183	-0.104	-0.118	-0.164	-0.298	-0.378	-0.273	-0.275	-0.281	-0.329	-0.330
6	Garut	-0.308	-0.353	-0.392	-0.420	-0.435	-0.536	-0.460	-0.311	-0.460	-0.439	-0.483	-0.545
7	Indramayu	-0.242	-0.244	-0.211	-0.216	-0.272	-0.413	-0.465	-0.294	-0.323	-0.258	-0.424	-0.433
8	Karawang	-0.384	-0.409	-0.425	-0.469	-0.542	-0.596	-0.563	-0.469	-0.455	-0.285	-0.374	-0.183
9	Kuningan	-0.232	-0.246	-0.149	-0.180	-0.197	-0.275	-0.302	-0.181	-0.185	-0.196	-0.306	-0.380
10	Majalengka	-0.156	-0.194	-0.140	-0.156	-0.227	-0.334	-0.374	-0.247	-0.346	-0.311	-0.344	-0.384
11	Purwakarta	-0.398	-0.445	-0.476	-0.598	-0.627	-0.696	-0.690	-0.528	-0.559	-0.402	-0.444	-0.439
12	Subang	-0.406	-0.529	-0.525	-0.627	-0.643	-0.718	-0.677	-0.492	-0.479	-0.329	-0.365	-0.331
13	Sukabumi	-0.201	-0.242	-0.275	-0.267	-0.311	-0.367	-0.325	-0.243	-0.396	-0.384	-0.332	-0.280
14	Sumedang	-0.122	-0.133	-0.118	-0.262	-0.310	-0.384	-0.425	-0.309	-0.425	-0.424	-0.474	-0.477
15	Tasikmalaya	-0.241	-0.309	-0.343	-0.400	-0.401	-0.495	-0.491	-0.372	-0.458	-0.512	-0.525	-0.535

Table A. 4 shows the details of Pearson correlation analysis between SPI-9 based on various month reference and the drought affected area on each city.

Appendix 10

Table A. 5 Result of Correlation between SPI-12 and Drought Affected Areas

No	Regency	January	February	March	April	May	June	July	August	September	October	November	December
1	Bandung	-0.423	-0.453	-0.511	-0.518	-0.537	-0.579	-0.604	-0.606	-0.582	-0.554	-0.525	-0.556
2	Bekasi	-0.243	-0.076	-0.148	-0.134	-0.218	-0.272	-0.364	-0.379	-0.414	-0.453	-0.494	-0.440
3	Ciamis	-0.282	-0.249	-0.197	-0.355	-0.389	-0.450	-0.476	-0.491	-0.522	-0.480	-0.405	-0.428
4	Cianjur	-0.235	-0.253	-0.366	-0.455	-0.490	-0.549	-0.572	-0.567	-0.539	-0.395	-0.298	-0.466
5	Cirebon	-0.146	-0.095	-0.060	-0.116	-0.206	-0.297	-0.361	-0.374	-0.403	-0.390	-0.318	-0.260
6	Garut	-0.250	-0.255	-0.301	-0.396	-0.414	-0.478	-0.519	-0.536	-0.575	-0.512	-0.418	-0.515
7	Indramayu	-0.269	-0.174	-0.193	-0.202	-0.272	-0.409	-0.492	-0.495	-0.493	-0.450	-0.377	-0.343
8	Karawang	-0.426	-0.331	-0.398	-0.403	-0.528	-0.571	-0.641	-0.642	-0.598	-0.511	-0.430	-0.330
9	Kuningan	-0.283	-0.209	-0.135	-0.209	-0.242	-0.293	-0.327	-0.333	-0.344	-0.340	-0.250	-0.235
10	Majalengka	-0.195	-0.124	-0.128	-0.197	-0.271	-0.346	-0.384	-0.385	-0.392	-0.371	-0.271	-0.333
11	Purwakarta	-0.414	-0.382	-0.454	-0.557	-0.597	-0.629	-0.678	-0.682	-0.651	-0.595	-0.456	-0.506
12	Subang	-0.385	-0.375	-0.433	-0.533	-0.617	-0.663	-0.698	-0.700	-0.660	-0.584	-0.452	-0.424
13	Sukabumi	-0.289	-0.196	-0.244	-0.288	-0.318	-0.406	-0.446	-0.437	-0.423	-0.331	-0.286	-0.334
14	Sumedang	-0.131	-0.058	-0.123	-0.279	-0.325	-0.361	-0.397	-0.401	-0.421	-0.434	-0.337	-0.430
15	Tasikmalaya	-0.199	-0.232	-0.278	-0.403	-0.384	-0.447	-0.475	-0.500	-0.542	-0.562	-0.486	-0.515

Table A. 5 shows the details of Pearson correlation analysis between SPI-1 based on various month reference and the drought affected area on each city.