Online Conference of the wine-growing countries of the Danube region

"Impact of climate change on viticulture"

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"Huglin index for Romanian PDOs - average value for the period 2009-2020"

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Abstract

There are a very large number of indices that can be used for describing vitiviniculture areas by climate, many of them are using more or less sophisticated calculation models, based on eco-physical concepts. The Multicriteria Climatic Classification proposed by *Tonietto, 1999* and *Tonietto and Carbonneau, 2004* were the impulse for a long term project to redefine the Romanian viticultural areas in modern scientifically terms.

For the beginning, the **Huglin Heliothermal Index** (Huglin, 1978), which is the sum of a particular temperature value, was chosen considering the influence of temperatures during the afternoon (temperatures close to maximum), when the photosynthetic activity of the vine is at maximum. It also introduces a length of day coefficient, dependant on latitude, to integrate the potentially higher photosynthetic activity period, from the vines growing season, in high latitudes. Other important indices will be analysed in next period, in other works. This work will be useful for all the actors in the vine and wine sector, no matter if they are growers, winemakers or simple wine consumers. All of them will have the possibility to take a look thru this little gate to the applied science.

Material and methods

Were used:

- climate data between 2009-2020, provided by https://www.worldweatheronline.com/,
- on the GPS coordinates of the locations provided by https://www.mapsdirections.info/ro/coordonate-gps.html
- Denominations of origin and their charactheristics provided by www.onvpv.ro
- Names of villages from each Romanian PDOs, randomized
- **Huglin** index formula for the North Hemisphere, based on the "day lenght coefficient" = k

k coefficient value	latitude in north or south hemisphere
k= 1.02	from 40°1' to 42°0'
k= 1.03	from 42°1' to 44°0'
k= 1.04	from 44°1' to 46°0'
k= 1.05	from 46°1' to 48°0'
k= 1.06	from 48°1' to 50°0'

$$HI = \sum_{01/04}^{30/9} \frac{(TG_i - 10) + (TX_i - 10)}{2} K$$

with Tm_d : daily mean temperature
$Tmax_d$: daily maximum temperature
k: day length coefficient

Weather Stations used for collecting data

Iași, Bacău, Târgu Mureș, Sibiu, Satu Mare,

Baia Mare, Oradea, Arad, Timișoara, Craiova,

București-Otopeni, Constanța from Romania

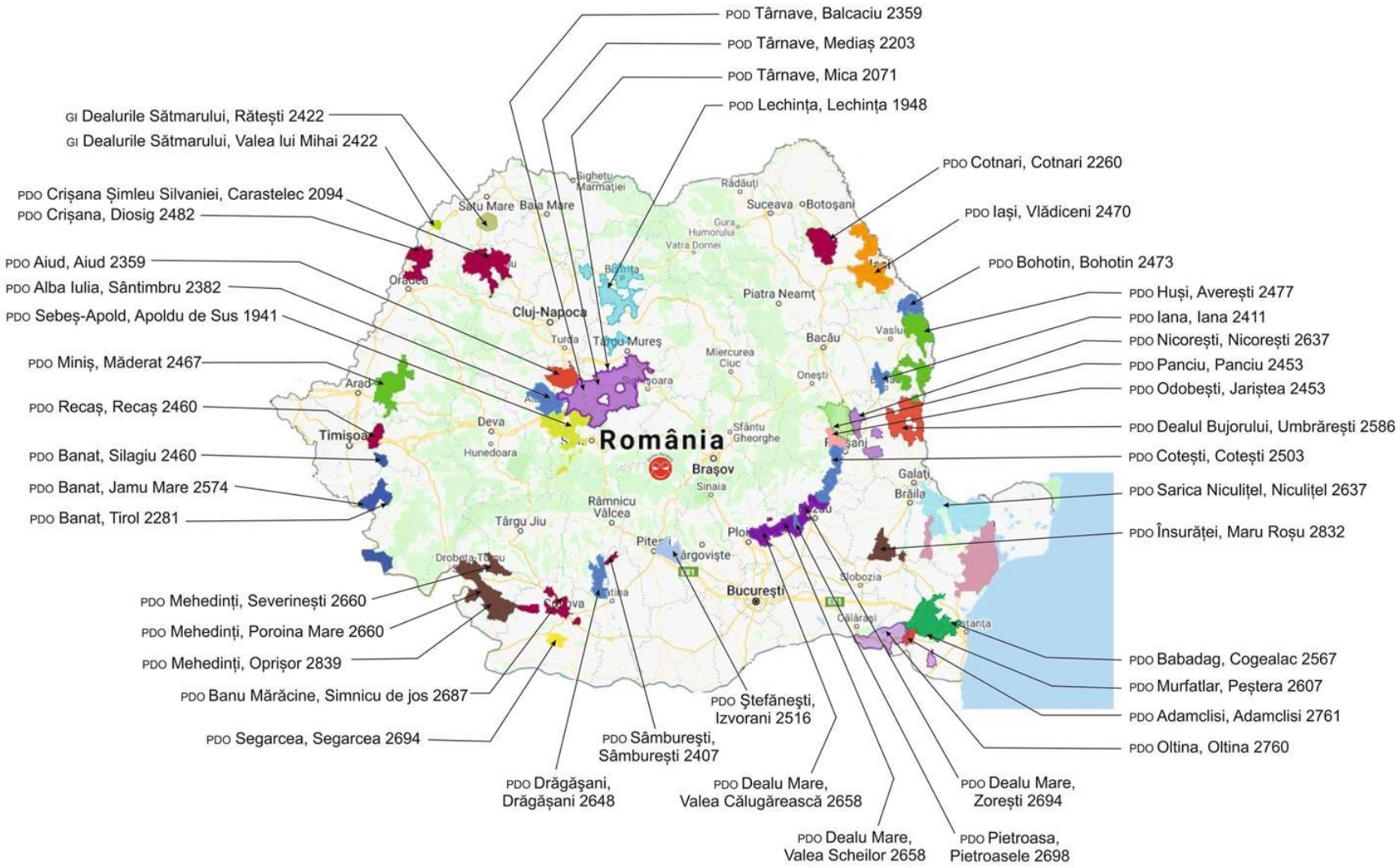
and Cahul from Moldova

Results and discussions

- according to Huglin's experiment made 1978 some wine grape varieties can allow a sugar content of minimum 180 – 200 g/l
- according to our data, average for twelve years between 2009 and 2020, many Romanian PDOs are suitable for wine grape varieties specific to warm climate, so we can forget about *Pinot* family, *Chardonnay, Riesling, Sauvignon*. In the same time, Romania became suitable for reds, as well as we have a 2422 Huglin index in Rătești, at 48 degrees North Latitude.

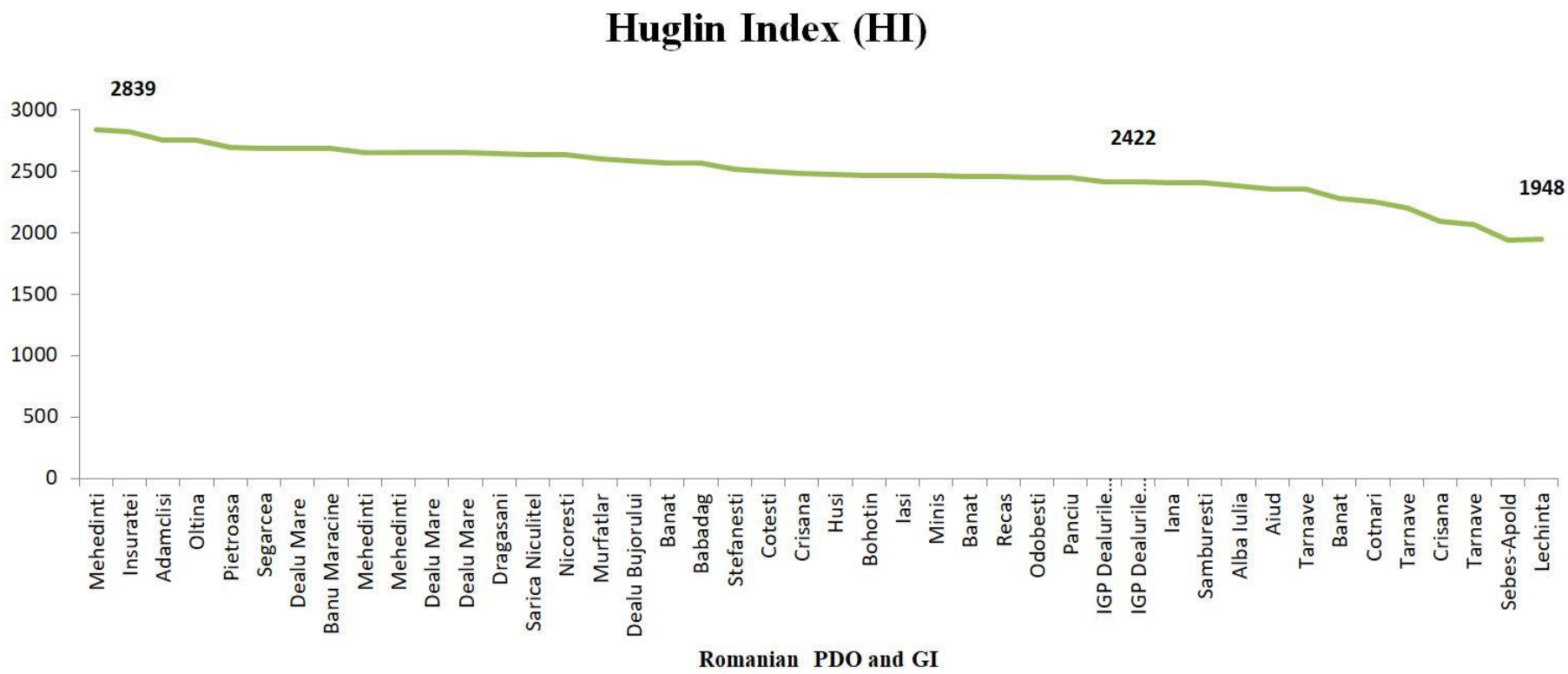
Huglin Index values	Varieties of grapes
1600	Pinot Blanc, Gamay, Gewurtztraminer
1700	Pinot Noir, Chardonnay, Riesling, Sylvaner, Sauvignon
1800	Cabernet Franc
1900	Cabernet Sauvignon, Chenin Blanc, Merlot, Sémillon, Italian Riesling
2000	Ugni Blanc
2100	Cinsaut, Grenache, Syrah
2200	Carignan
2300	Aramon

Huglin Index in Romanian PDOs and GIs



Huglin Index

from higher(2839 in Oprișor/ Golul Drîncei, PDO Mehedinți) to lower (1948 in Lechința, PDO Lechința) and surprisingly 2422 in Rătești GI Dealurile Sătmarului, at 48 degrees North Latitude



Huglin Index by PDOs as registered on the www.onvpv.ro

Nr. crt.	Wine Region	PDO	subsecvent PDO	Location Village-County	North Latitude (degrees)	k	Huglin Index (HI)	Year	HI Max	Year	HI Min
1	Banat	Banat	Dealurile Tirolului	Tirol - CS	45	1,040	2281	2009	2512	2020	1861
				Jamu Mare - TM	45	1,040	2574	2009	2845	2020	2369
			Silagiu	Silagiu - TM	46	1,044	2460	2009	2840	2018	1958
2		Recas		Recas - TM	46	1,044	2460	2009	2840	2018	1958
3	Colinele Dobrogei	Babadag		Cogealac - CT	45	1,400	2567	2012	2719	2011	2385
4		Murfatlar	Medgidia	Pestera - CT	44	1,036	2607	2012	2771	2011	2376
5		Sarica Niculitel		Niculitel - TL	45	1,040	2637	2012	2783	2011	2417
6	Crisanei and Maramuresului	Crisana	Diosig	Diosig - BH	47	1,048	2482	2009	2802	2020	2130
			Simleu Silvaniei	Carastelec - SJ	47	1,048	2094	2009	2338	2020	1794
7		Minis		Maderat - AR	46	1,044	2467	2009	2872	2018	2022
*		IGP Dealurile Satmarului		Ratesti - SM	48	1,520	2422	2009	2748	2020	2106
				Valea lui Mihai - SM	47	1,048	2422	2009	2802	2020	2098
8	Dealurile Moldovei	Bohotin		Bohotin - IS	47	1,048	2473	2012	2675	2020	2242
9		Cotesti		Cotesti - VN	45	1,040	2503	2012	2686	2011	2353
10		Cotnari		Cotnari - IS	47	1,048	2260	2012	2418	2011	2051
11		Dealu Bujorului		Umbraresti - GL	46	1,044	2586	2012	2808	2018	2021
12		Husi		Averesti - VS	47	1,048	2477	2012	2659	2011	2276
13		Iasi	Bucium	Vladiceni - IS	47	1,048	2470	2012	2659	2011	2244
14		Odobesti		Jaristea - VN	46	1,044	2453	2012	2697	2018	1941
15		Nicoresti		Nicoresti - GL	46	1,044	2637	2012	2856	2018	2053
16		Panciu		Panciu - VN	46	1,044	2453	2012	2697	2018	1941
17		Iana		Iana - VS	46	1,044	2411	2012	2633	2018	1845
18	Terasele Dunarii	Insuratei		Maru Rosu - BR	44	1,036	2823	2018	3071	2011	2581

Huglin Index by PDOs as registered on the www.onvpv.ro

Nr. crt.	Wine Region	PDO	subsecvent PDO	Location Village-County	North Latitude (degrees)	k	Huglin Index (HI)	Year	HI Max	Year	HI Min
19	Dealurile Munteniei and Olteniei	Dealu Mare	Valea Calugareasca	Valea Calugareasca - PH	45	1,040	2658	2012	2814	2014	2514
			Tohani	Valea Scheilor - PH	45	1,040	2658	2012	2814	2014	2514
			Zoresti	Zoresti - BZ	45	1,040	2694	2012	2828	2020	2527
20		Dragasani		Dragasani - VL	44	1,036	2648	2018	2815	2014	2424
21		Pietroasa		Pietroasele - BZ	45	1,040	2698	2012	2877	2020	2527
22		Samburesti		Samburesti - OT	45	1,040	2407	2012	2671	2010	2261
23		Stefanesti		Izvorani - AG	45	1,040	2516	2018	2747	2010	2324
24		Banu Maracine		Simnicu de Jos - DJ	44	1,036	2687	2009	2836	2014	2487
25		Segarcea		Segarcea - DJ	44	1,036	2694	2018	2864	2014	2487
26		Mehedinti	Golul Drincei	Oprisor - MH	44	1,036	2839	2012	3024	2014	2678
			Severin	Poroina Mare - MH	44	1,036	2660	2012	2866	2014	2456
			Corcova	Severinesti - MH	44	1,036	2660	2012	2866	2014	2456
27	Podisul Transilvaniei	Aiud		Aiud - AB	46	1,044	2359	2012	2632	2018	1862
28		Alba Iulia		Santimbru - AB	46	1,044	2382	2012	2712	2018	1926
29		Sebes-Apold		Apoldu de Sus - SB	46	1,044	1941	2012	2282	2018	1447
30		Lechinta		Lechinta - BN	47	1,048	1948	2018	2145	2010	1751
31		Tarnave	Jidvei	Balcaciu - AB	46	1,044	2359	2012	2632	2018	1862
			Tarnaveni	Mica - MS	46	1,044	2071	2009	2393	2018	1543
			Medias	Medias - SB	46	1,044	2203	2012	2473	2018	1670
32	Terasele Dunarii	Oltina		Oltina - CL	44	1,036	2760	2012	2929	2011	2534
33		Adamclisi		Adamclisi - CT	44	1,036	2761	2012	2929	2011	2534

Extreme Huglin Index per location

- The higher Huglin index per location was recorded in

2009 (in 11 areas from 5 PDOs and 1 GI), in
2012 (in 28 areas from 23 PDOs) and in
2018 (in 5 areas from 5 PDOs)

3071, in 2018, Măru Roșu (BR), PDO Însurăței
2145, in 2018, Lechința (BN), PDO Lechința

- The smaller Huglin index per location was recorded in

2010 (in 3 areas from 3 PDOs), in
2011 (in 10 areas from 10 PDOs), in
2014 (in 8 areas from 5 PDOs), in
2018 (in 14 areas from 11 PDOs), in
2020 (in 9 areas from 4 PDOs and 1 GI)

1447, in 2018, Apoldu de Sus (SB), PDO Sebeș Apold
2678, in 2014, Oprișor (MH), PDO Mehedinți – Golul Drîncei

Monthly observations of climate change

- February has become warmer and April colder in the last twelve years. The *Mustoasă de Măd*erat variety, which was an indicator of the budding, it's time being around March 25-th, in western Romania, is now the budding around date of April 20-th, almost a month later.

- July and August have approximately the same level of the mean temperature, around 27-28 Celsius degrees.

- September gets warmer and so does October. But often in October there are early frosts more frequently.

Huglin Index in Romanian PDOs from 44 to 45 degrees North Latitude

Nr. PDO	Wine Region	PDO	subsecvent PDO	Location Village-County	North Latitude (degrees)	k	Huglin Index (HI)	Year	HI Max	Year	HI Min
26	Dealurile Munteniei and Olteniei	Mehedinti	Golul Drincei	Oprisor - MH	44	1,036	2839	2012	3024	2014	2678
18	Terasele Dunarii	Insuratei		Maru Rosu - BR	44	1,036	2823	2018	3071	2011	2581
33	Terasele Dunarii	Adamclisi		Adamclisi - CT	44	1,036	2761	2012	2929	2011	2534
32	Terasele Dunarii	Oltina		Oltina - CL	44	1,036	2760	2012	2929	2011	2534
25	Dealurile Munteniei and Olteniei	Segarcea		Segarcea - DJ	44	1,036	2694	2018	2864	2014	2487
24	Dealurile Munteniei and Olteniei	Banu Maracine		Simnicu de Jos - DJ	44	1,036	2687	2009	2836	2014	2487
26	Dealurile Munteniei and Olteniei	Mehedinti	Severin	Poroina Mare - MH	44	1,036	2660	2012	2866	2014	2456
26	Dealurile Munteniei and Olteniei	Mehedinti	Corcova	Severinesti - MH	44	1,036	2660	2012	2866	2014	2456
20	Dealurile Munteniei and Olteniei	Dragasani		Dragasani - VL	44	1,036	2648	2018	2815	2014	2424
4	Colinele Dobrogei	Murfatlar	Medgidia	Pestera - CT	44	1,036	2607	2012	2771	2011	2376
21	Dealurile Munteniei and Olteniei	Pietroasa		Pietroasele - BZ	45	1,040	2698	2012	2877	2020	2527
19	Dealurile Munteniei and Olteniei	Dealu Mare	Zoresti	Zoresti - BZ	45	1,040	2694	2012	2828	2020	2527
19	Dealurile Munteniei and Olteniei	Dealu Mare	Valea Calugareasca	Valea Calugareasca - PH	45	1,040	2658	2012	2814	2014	2514
19	Dealurile Munteniei and Olteniei	Dealu Mare	Tohani	Valea Scheilor - PH	45	1,040	2658	2012	2814	2014	2514
5	Colinele Dobrogei	Sarica Niculitel		Niculitel - TL	45	1,040	2637	2012	2783	2011	2417
1	Banat	Banat	Dealurile Tirolului	Jamu Mare - TM	45	1,040	2574	2009	2845	2020	2369
3	Colinele Dobrogei	Babadag		Cogealac - CT	45	1,400	2567	2012	2719	2011	2385
23	Dealurile Munteniei and Olteniei	Stefanesti		Izvorani - AG	45	1,040	2516	2018	2747	2010	2324
9	Dealurile Moldovei	Cotesti		Cotesti - VN	45	1,040	2503	2012	2686	2011	2353
22	Dealurile Munteniei and Olteniei	Samburesti		Samburesti - OT	45	1,040	2407	2012	2671	2010	2261
1	Banat	Banat	Dealurile Tirolului	Tirol - CS	45	1,040	2281	2009	2512	2020	1861

Huglin Index in Romanian PDOs from 46 to 48 degrees North Latitude

Nr. PDO	Wine Region	PDO	subsecvent PDO	Location Village-County	North Latitude (degrees)	k	Huglin Index (HI)	Year	HI Max	Year	HI Min
15	Dealurile Moldovei	Nicoresti		Nicoresti - GL	46	1,044	2637	2012	2856	2018	2053
7	Crisanei and Maramuresului	Minis		Maderat - AR	46	1,044	2467	2009	2872	2018	2022
1	Banat	Banat	Silagiu	Silagiu - TM	46	1,044	2460	2009	2840	2018	1958
2	Banat	Recas		Recas - TM	46	1,044	2460	2009	2840	2018	1958
11	Dealurile Moldovei	Dealu Bujorului		Umbraresti - GL	46	1,044	2586	2012	2808	2018	2021
14	Dealurile Moldovei	Odobesti		Jaristea - VN	46	1,044	2453	2012	2697	2018	1941
16	Dealurile Moldovei	Panciu		Panciu - VN	46	1,044	2453	2012	2697	2018	1941
17	Dealurile Moldovei	Iana		Iana - VS	46	1,044	2411	2012	2633	2018	1845
28	Podisul Transilvaniei	Alba Iulia		Santimbru - AB	46	1,044	2382	2012	2712	2018	1926
27	Podisul Transilvaniei	Aiud		Aiud - AB	46	1,044	2359	2012	2632	2018	1862
31	Podisul Transilvaniei	Tarnave	Jidvei	Balcaciu - AB	46	1,044	2359	2012	2632	2018	1862
31	Podisul Transilvaniei	Tarnave	Medias	Medias - SB	46	1,044	2203	2012	2473	2018	1670
31	Podisul Transilvaniei	Tarnave	Tarnaveni	Mica - MS	46	1,044	2071	2009	2393	2018	1543
29	Podisul Transilvaniei	Sebes-Apold		Apoldu de Sus - SB	46	1,044	1941	2012	2282	2018	1447
6	Crisanei and Maramuresului	Crisana	Diosig	Diosig - BH	47	1,048	2482	2009	2802	2020	2130
12	Dealurile Moldovei	Husi		Averesti - VS	47	1,048	2477	2012	2659	2011	2276
8	Dealurile Moldovei	Bohotin		Bohotin - IS	47	1,048	2473	2012	2675	2020	2242
13	Dealurile Moldovei	Iasi	Bucium	Vladiceni - IS	47	1,048	2470	2012	2659	2011	2244
*	Crisanei and Maramuresului	IGP Dealurile Satmarului		Valea lui Mihai - SM	47	1,048	2422	2009	2802	2020	2098
10	Dealurile Moldovei	Cotnari		Cotnari - IS	47	1,048	2260	2012	2418	2011	2051
6	Crisanei and Maramuresului	Crisana	Simleu Silvaniei	Carastelec - SJ	47	1,048	2094	2009	2338	2020	1794
30	Podisul Transilvaniei	Lechinta		Lechinta - BN	47	1,048	1948	2018	2145	2010	1751
*	Crisanei and Maramuresului	IGP Dealurile Satmarului		Ratesti - SM	48	1,520	2422	2009	2748	2020	2106

Huglin Index in Romanian PDOs by descending values, higher zone

Nr. PDO	Wine Region	PDO	subsecvent PDO	Location Village-County	North Latitude (degrees)	k	Huglin Index (HI)	Year	HI Max	Year	HI Min
26	Dealurile Munteniei and Olteniei	Mehedinti	Golul Drincei	Oprisor - MH	44	1,036	2839	2012	3024	2014	2678
18	Terasele Dunarii	Insuratei		Maru Rosu - BR	44	1,036	2823	2018	3071	2011	2581
33	Terasele Dunarii	Adamclisi		Adamclisi - CT	44	1,036	2761	2012	2929	2011	2534
32	Terasele Dunarii	Oltina		Oltina - CL	44	1,036	2760	2012	2929	2011	2534
21	Dealurile Munteniei and Olteniei	Pietroasa		Pietroasele - BZ	45	1,040	2698	2012	2877	2020	2527
25	Dealurile Munteniei and Olteniei	Segarcea		Segarcea - DJ	44	1,036	2694	2018	2864	2014	2487
19	Dealurile Munteniei and Olteniei	Dealu Mare	Zoresti	Zoresti - BZ	45	1,040	2694	2012	2828	2020	2527
24	Dealurile Munteniei and Olteniei	Banu Maracine		Simnicu de Jos - DJ	44	1,036	2687	2009	2836	2014	2487
26	Dealurile Munteniei and Olteniei	Mehedinti	Severin	Poroina Mare - MH	44	1,036	2660	2012	2866	2014	2456
26	Dealurile Munteniei and Olteniei	Mehedinti	Corcova	Severinesti - MH	44	1,036	2660	2012	2866	2014	2456
19	Dealurile Munteniei and Olteniei	Dealu Mare	Valea Calugareasca	Valea Calugareasca - PH	45	1,040	2658	2012	2814	2014	2514
19	Dealurile Munteniei and Olteniei	Dealu Mare	Tohani	Valea Scheilor - PH	45	1,040	2658	2012	2814	2014	2514
20	Dealurile Munteniei and Olteniei	Dragasani		Dragasani - VL	44	1,036	2648	2018	2815	2014	2424
5	Colinele Dobrogei	Sarica Niculitel		Niculitel - TL	45	1,040	2637	2012	2783	2011	2417
15	Dealurile Moldovei	Nicoresti		Nicoresti - GL	46	1,044	2637	2012	2856	2018	2053

Huglin Index in Romanian PDOs by descending values, lower zone

Nr. PDO	Wine Region	PDO	subsecvent PDO	Location Village-County	North Latitude (degrees)	k	Huglin Index (HI)	Year	HI Max	Year	HI Min
4	Colinele Dobrogei	Murfatlar	Medgidia	Pestera - CT	44	1,036	2607	2012	2771	2011	2376
11	Dealurile Moldovei	Dealu Bujorului		Umbraresti - GL	46	1,044	2586	2012	2808	2018	2021
1	Banat	Banat	Dealurile Tirolului	Jamu Mare - TM	45	1,040	2574	2009	2845	2020	2369
3	Colinele Dobrogei	Babadag		Cogealac - CT	45	1,400	2567	2012	2719	2011	2385
23	Dealurile Munteniei and Olteniei	Stefanesti		Izvorani - AG	45	1,040	2516	2018	2747	2010	2324
9	Dealurile Moldovei	Cotesti		Cotesti - VN	45	1,040	2503	2012	2686	2011	2353
6	Crisanei and Maramuresului	Crisana	Diosig	Diosig - BH	47	1,048	2482	2009	2802	2020	2130
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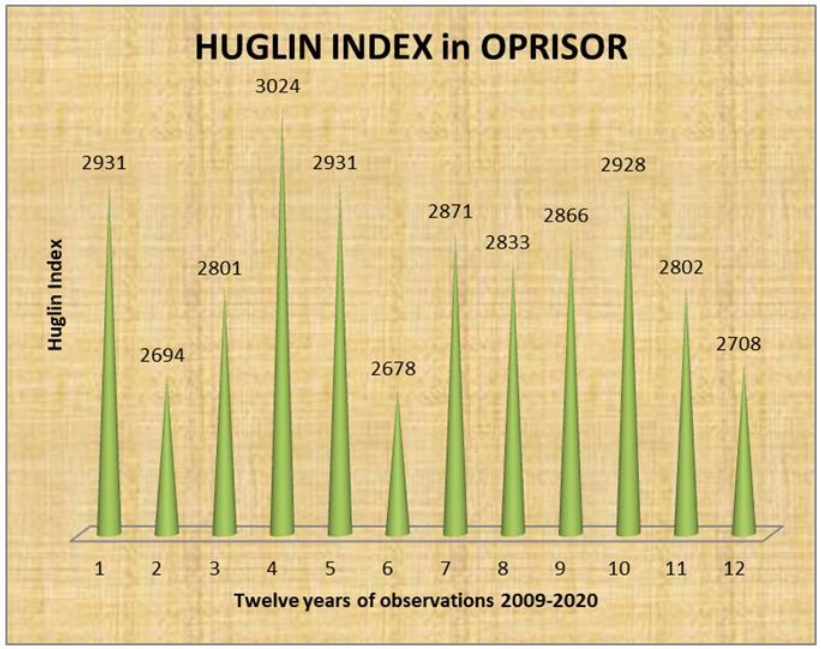
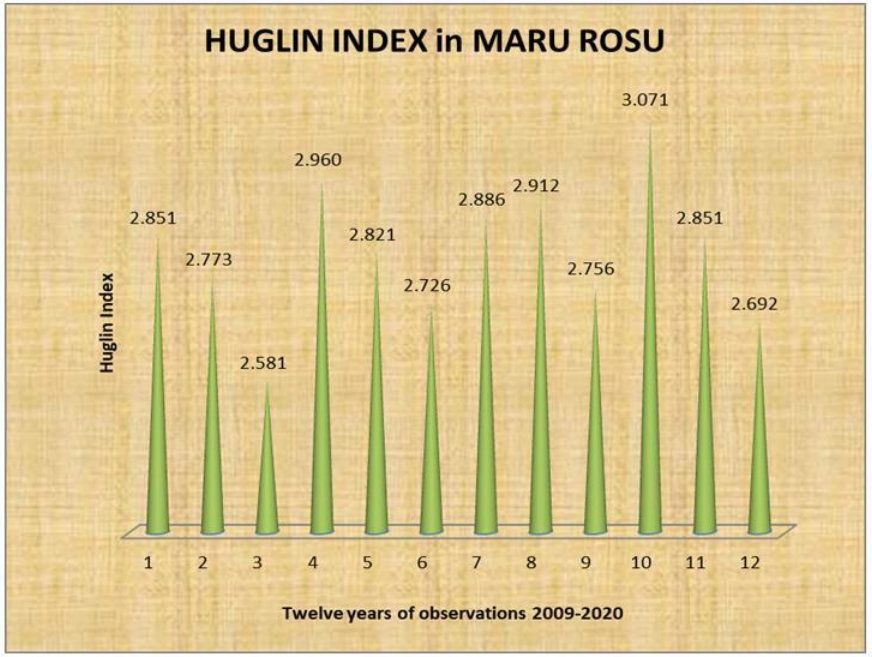
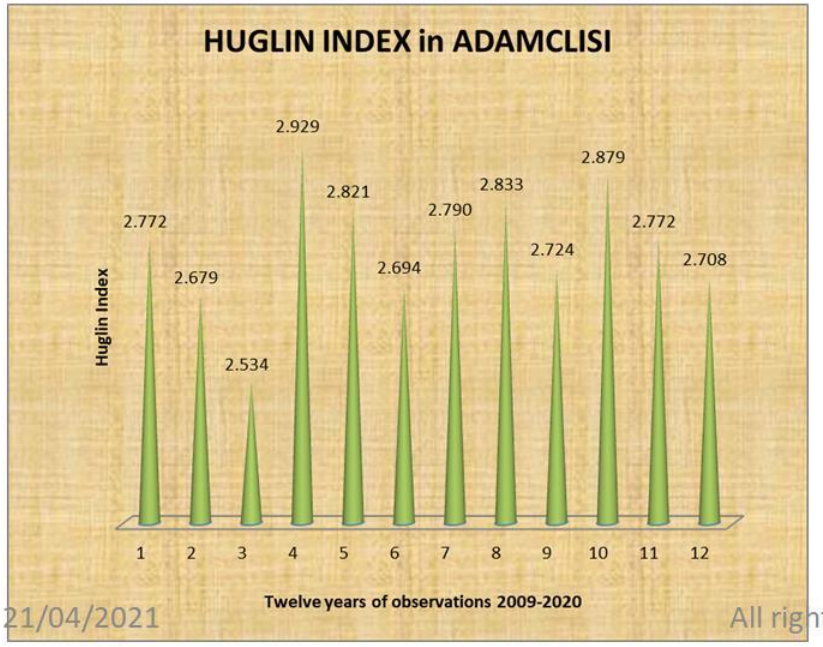
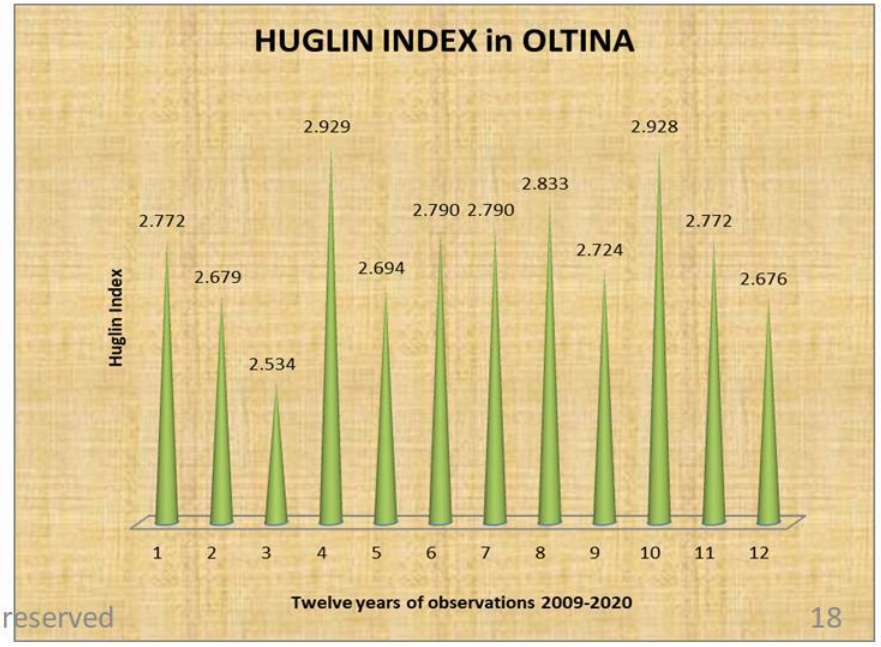
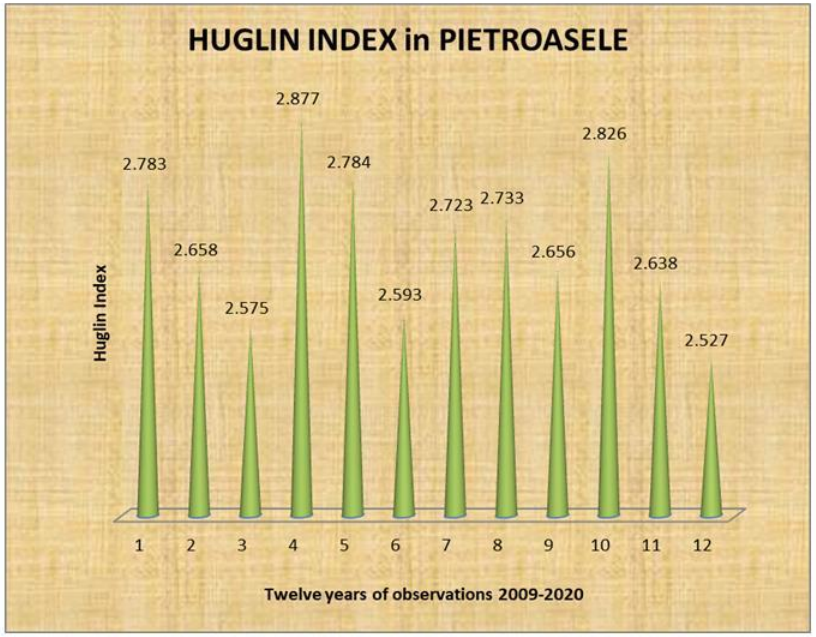
7	Crisanei and Maramuresului	Minis		Maderat - AR	46	1,044	2467	2009	2872	2018	2022
1	Banat	Banat	Silagiu	Silagiu - TM	46	1,044	2460	2009	2840	2018	1958
2	Banat	Recas		Recas - TM	46	1,044	2460	2009	2840	2018	1958
14	Dealurile Moldovei	Odobesti		Jaristea - VN	46	1,044	2453	2012	2697	2018	1941
16	Dealurile Moldovei	Panciu		Panciu - VN	46	1,044	2453	2012	2697	2018	1941
*	Crisanei and Maramuresului	IGP Dealurile Satmarului		Valea lui Mihai - SM	47	1,048	2422	2009	2802	2020	2098
*	Crisanei and Maramuresului	IGP Dealurile Satmarului		Ratesti - SM	48	1,520	2422	2009	2748	2020	2106
17	Dealurile Moldovei	Iana		Iana - VS	46	1,044	2411	2012	2633	2018	1845
22	Dealurile Munteniei and Olteniei	Samburesti		Samburesti - OT	45	1,040	2407	2012	2671	2010	2261
28	Podisul Transilvaniei	Alba Iulia		Santimbru - AB	46	1,044	2382	2012	2712	2018	1926
27	Podisul Transilvaniei	Aiud		Aiud - AB	46	1,044	2359	2012	2632	2018	1862
31	Podisul Transilvaniei	Tarnave	Jidvei	Balcaciu - AB	46	1,044	2359	2012	2632	2018	1862
1	Banat	Banat	Dealurile Tirolului	Tirol - CS	45	1,040	2281	2009	2512	2020	1861
10	Dealurile Moldovei	Cotnari		Cotnari - IS	47	1,048	2260	2012	2418	2011	2051
31	Podisul Transilvaniei	Tarnave	Medias	Medias - SB	46	1,044	2203	2012	2473	2018	1670
6	Crisanei and Maramuresului	Crisana	Simleu Silvaniei	Carastelec - SJ	47	1,048	2094	2009	2338	2020	1794
31	Podisul Transilvaniei	Tarnave	Tarnaveni	Mica - MS	46	1,044	2071	2009	2393	2018	1543
29	Podisul Transilvaniei	Sebes-Apold		Apoldu de Sus - SB	46	1,044	1941	2012	2282	2018	1447
30	Podisul Transilvaniei	Lechinta		Lechinta - BN	47	1,048	1948	2018	2145	2010	1751

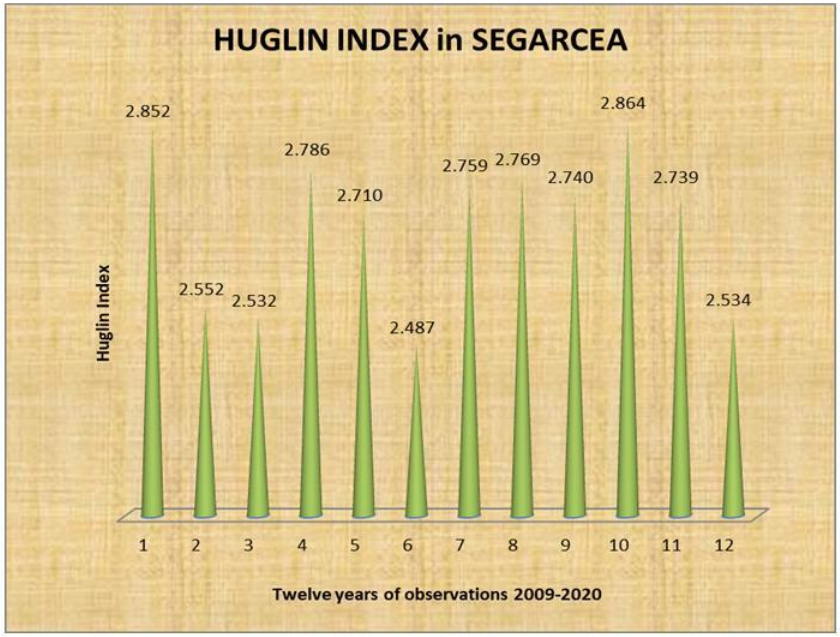


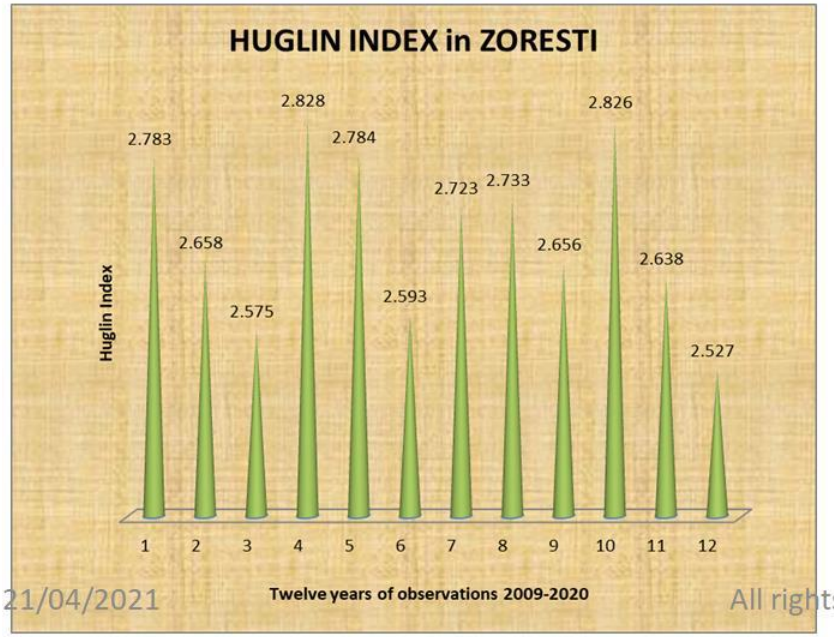


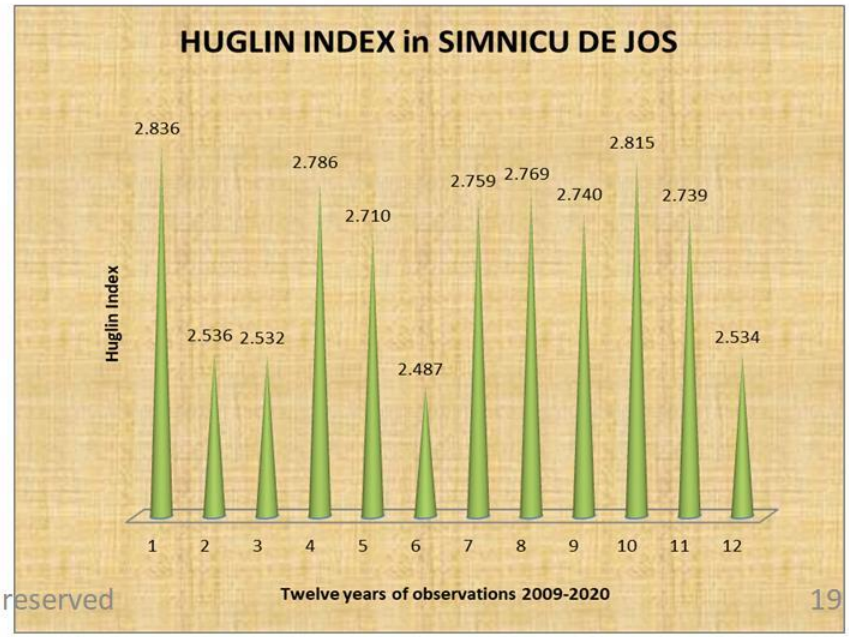


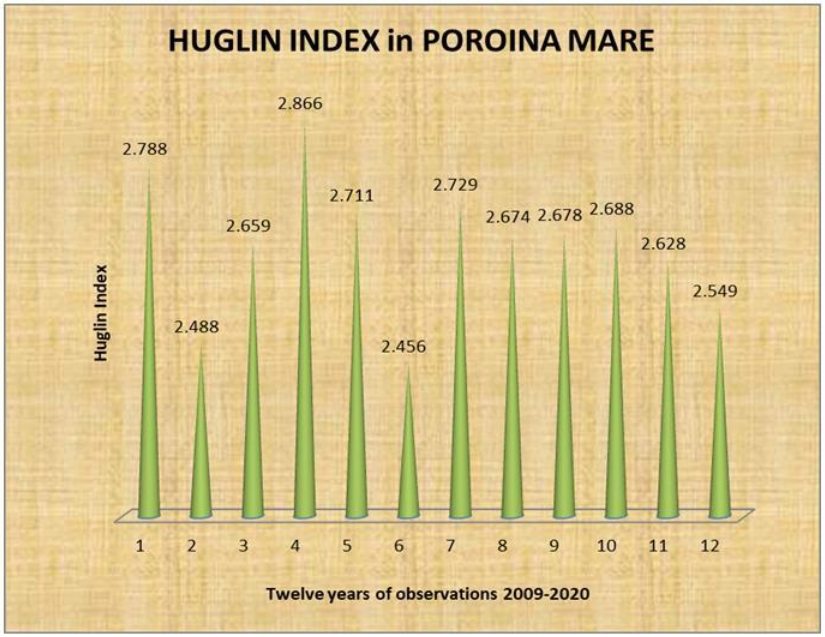


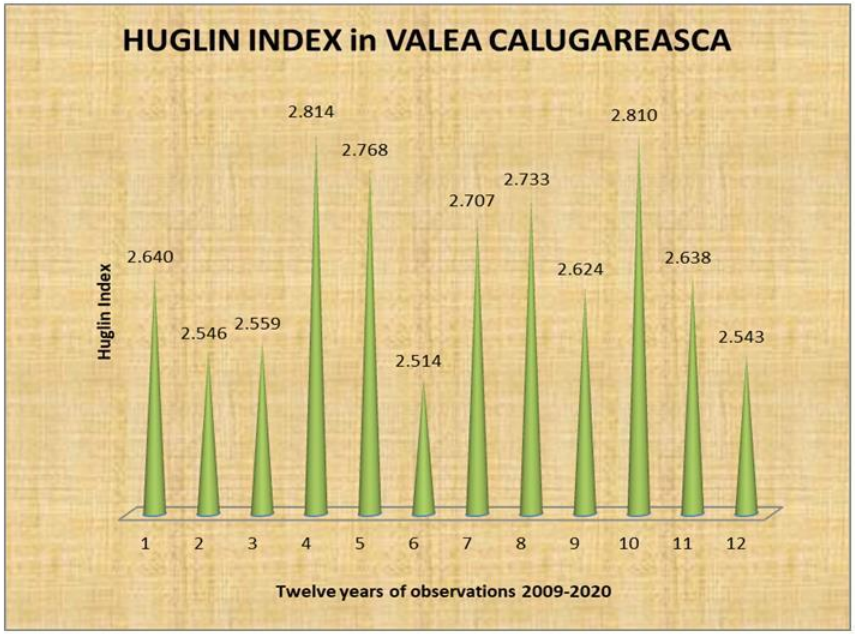


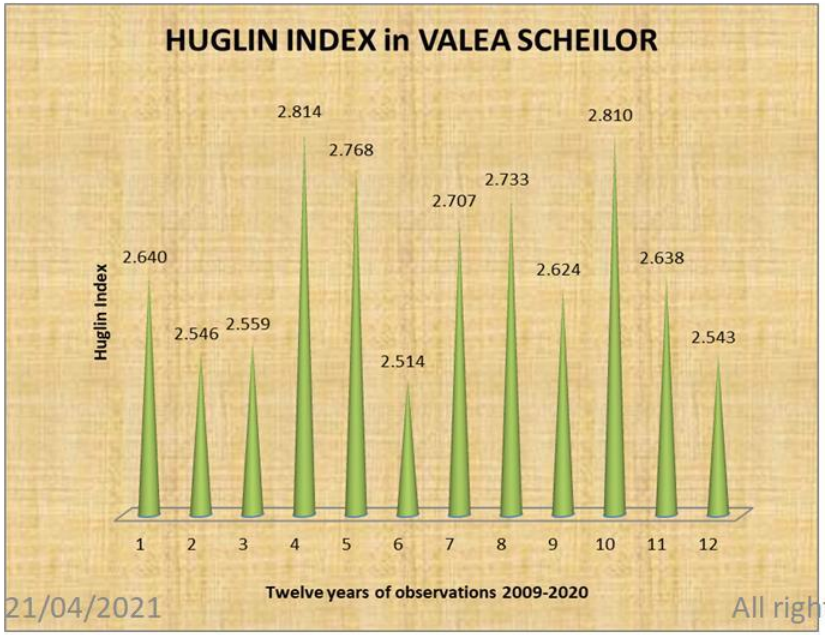


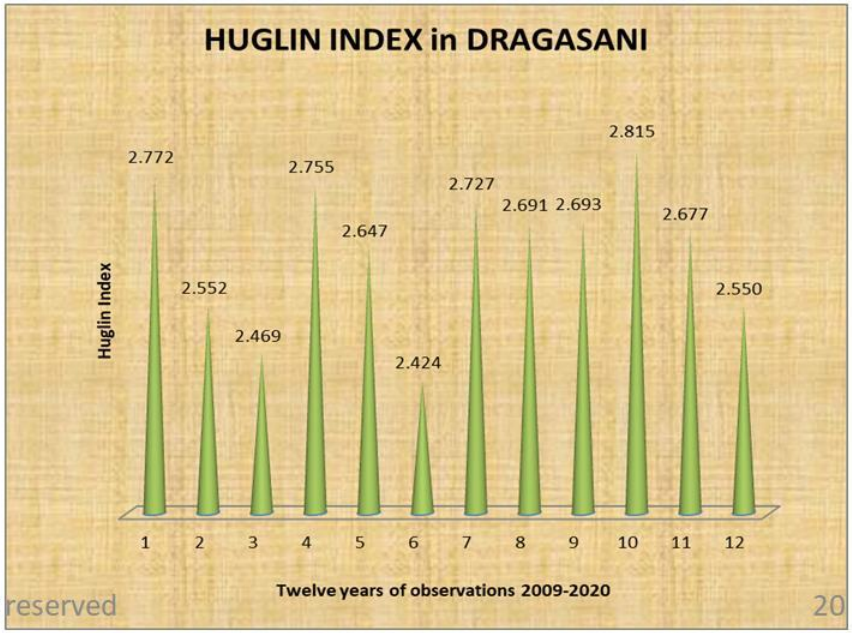


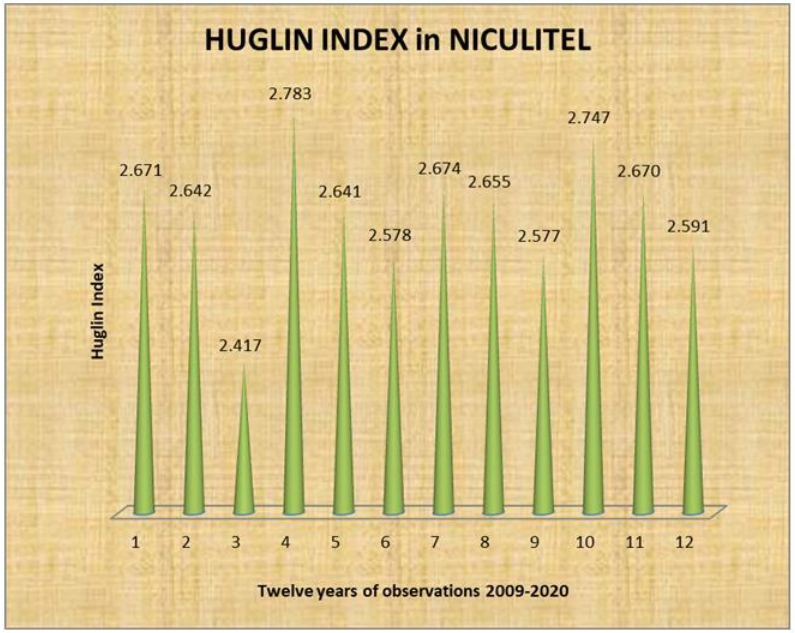


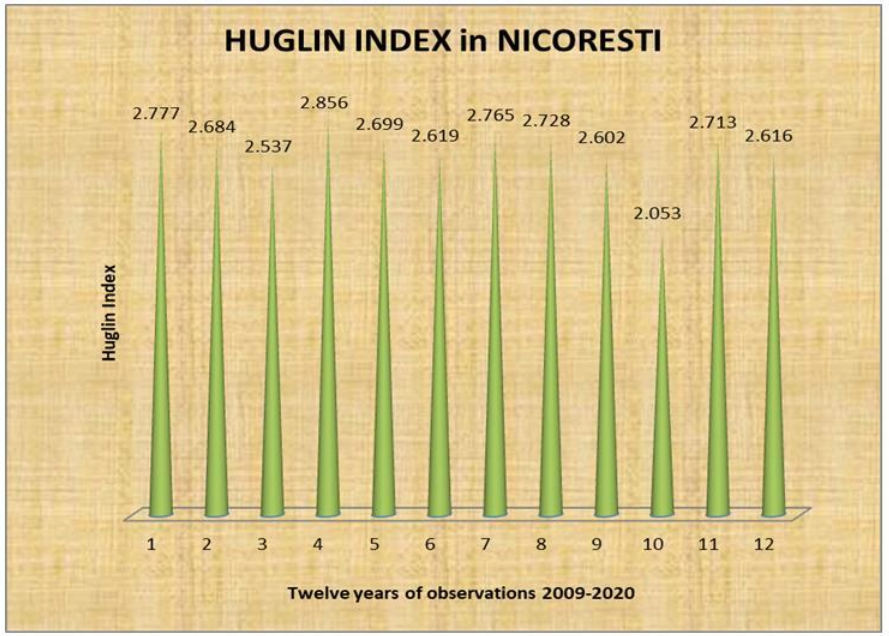


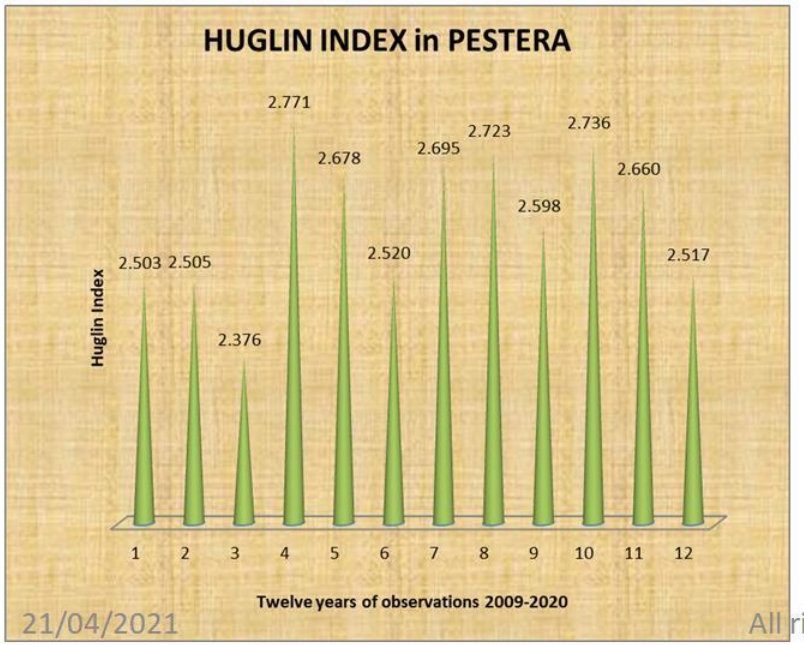


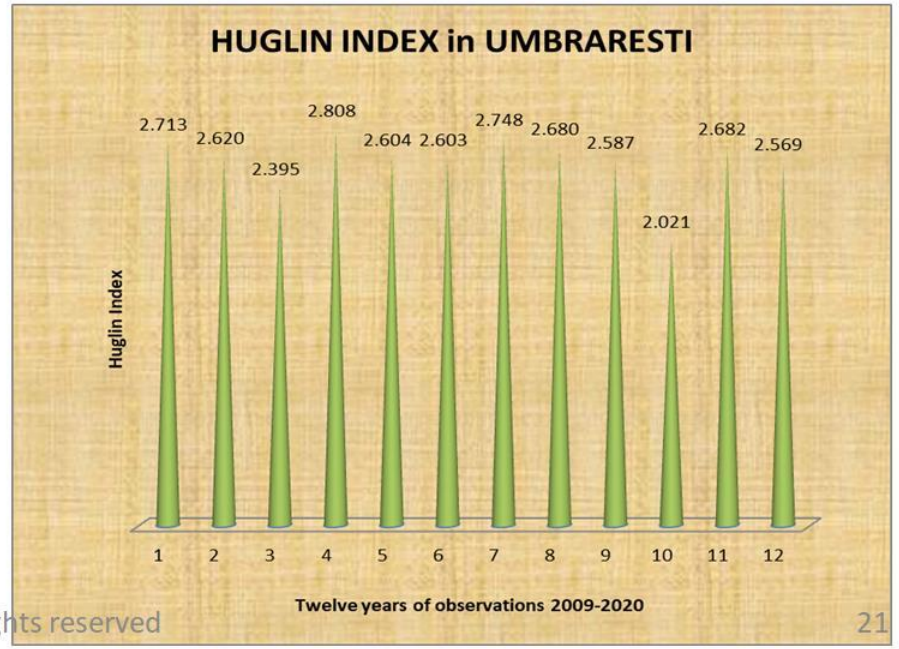


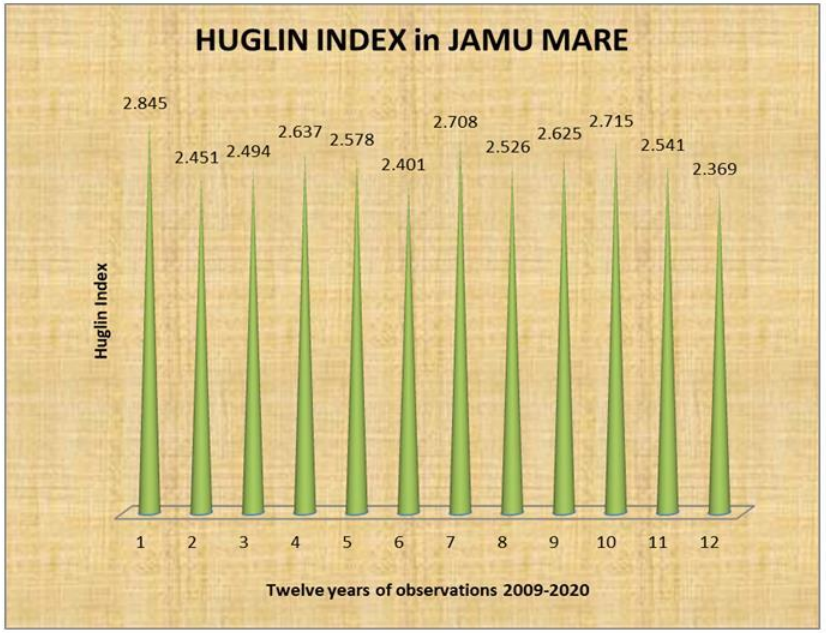


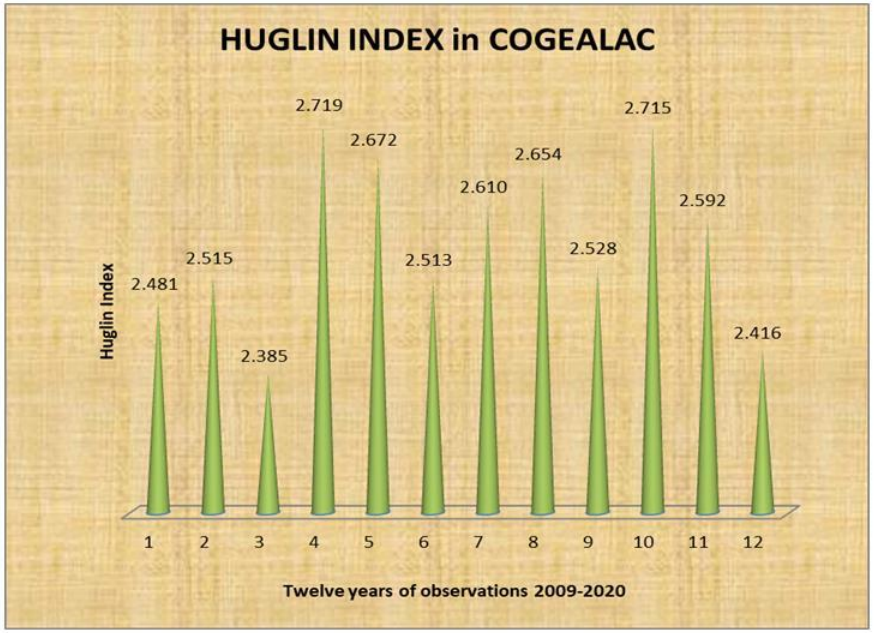


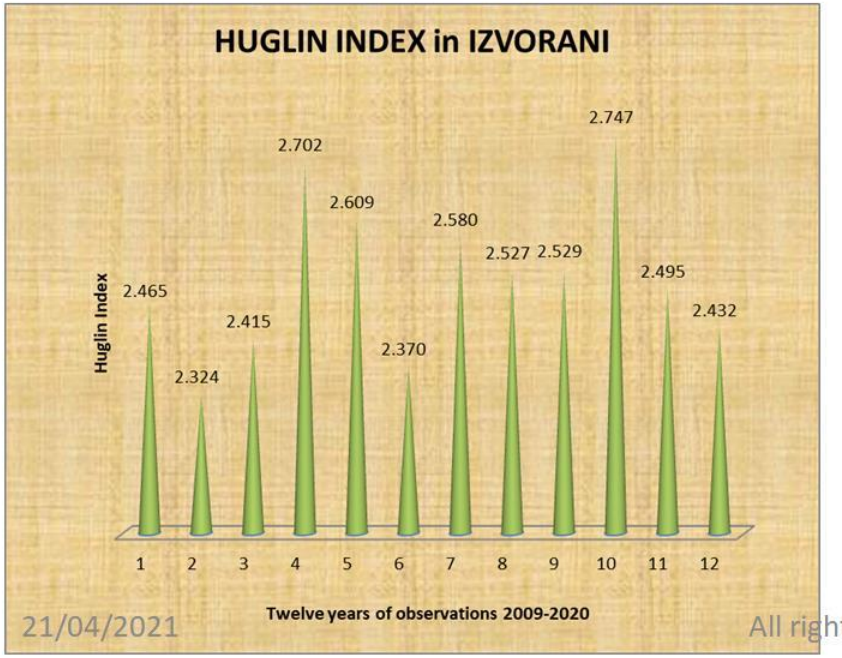


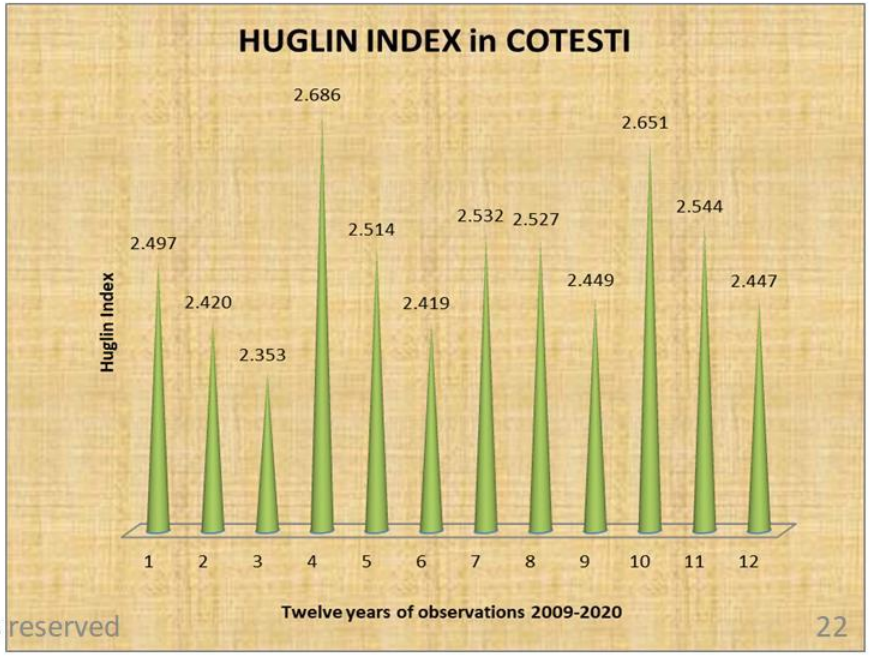


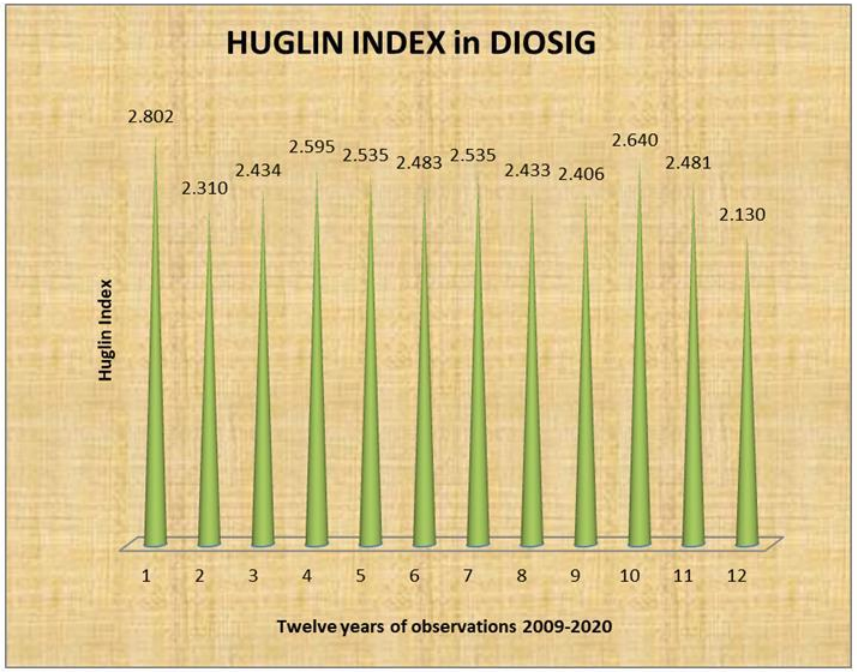


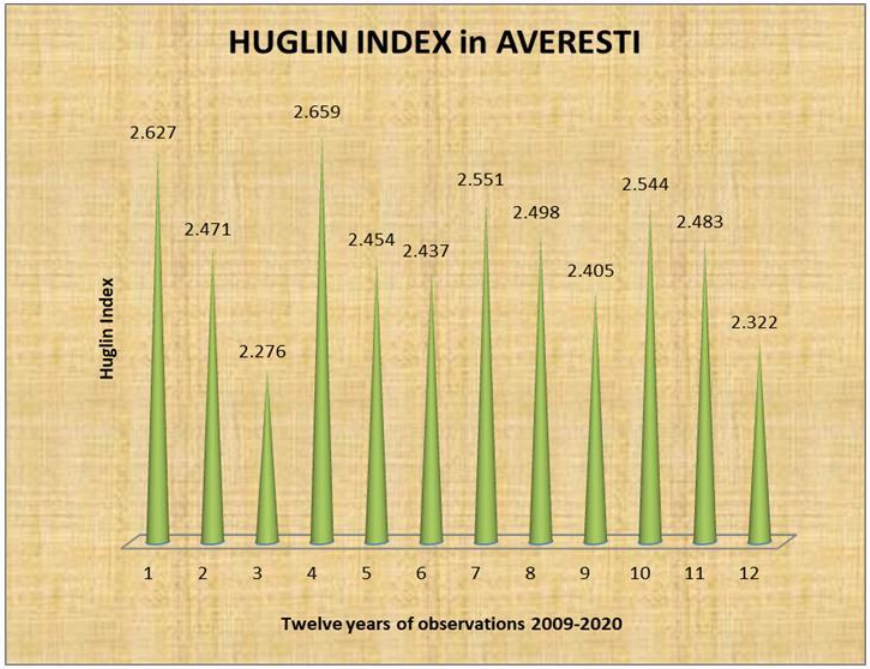


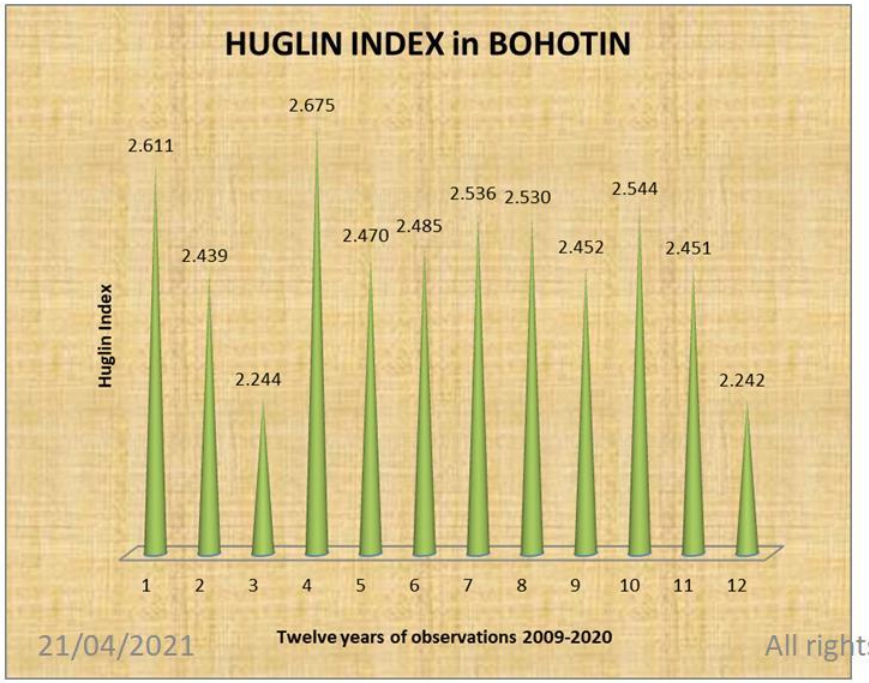


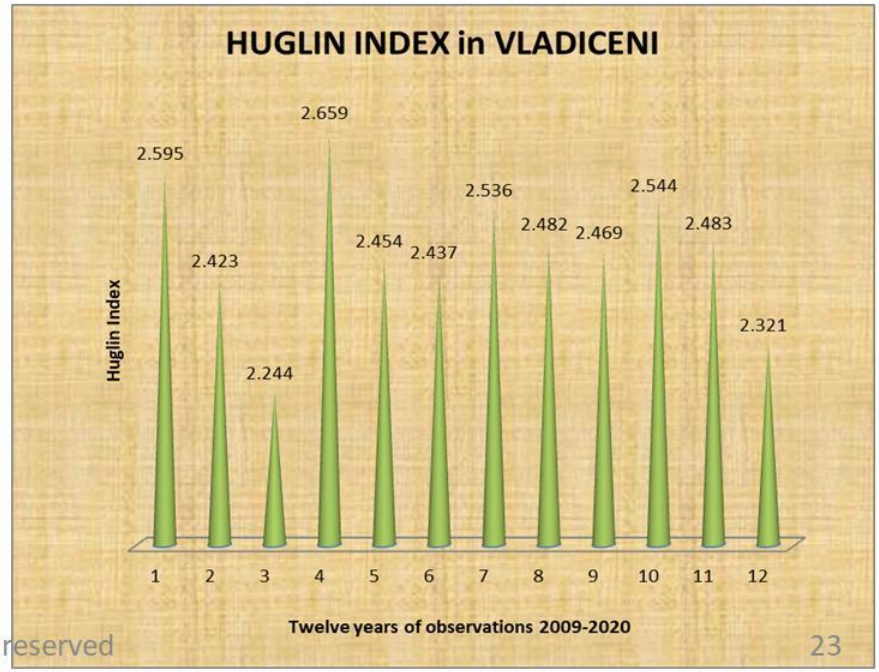


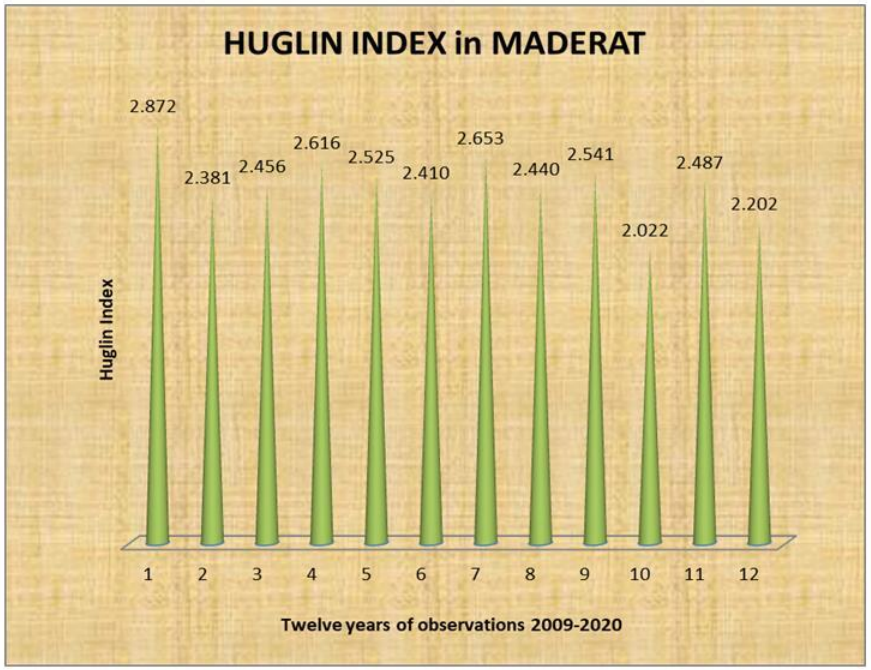


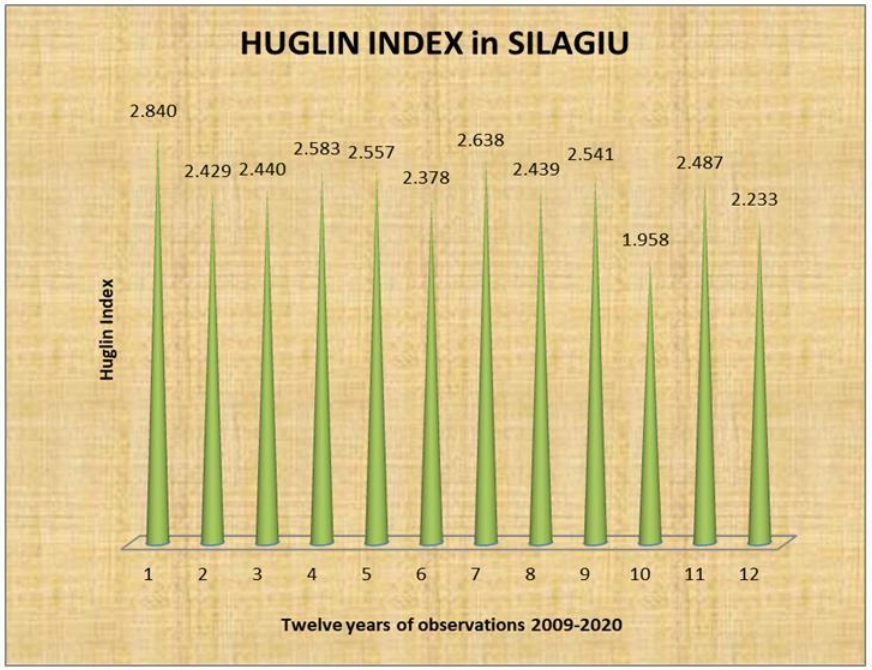


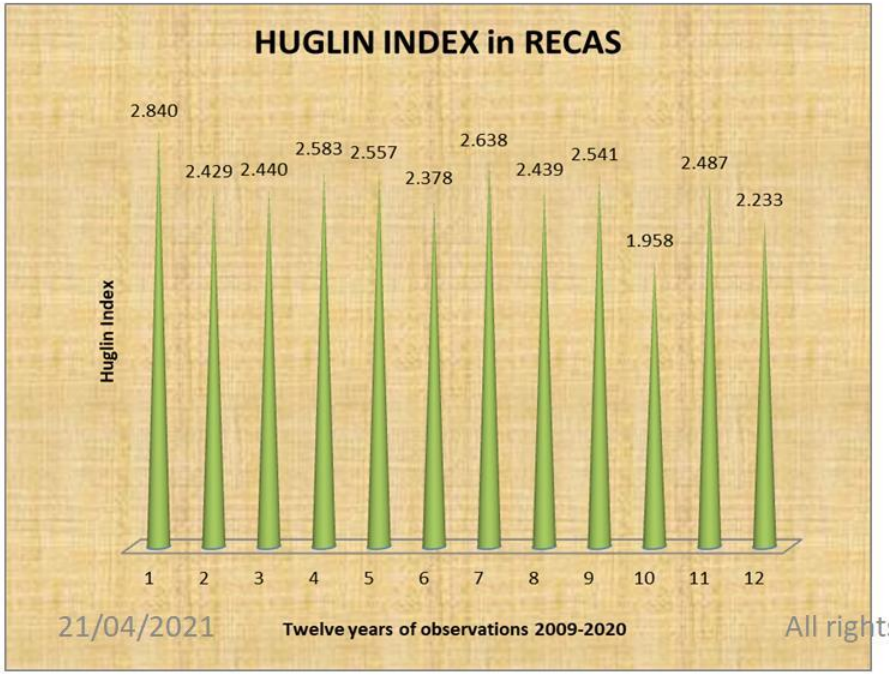


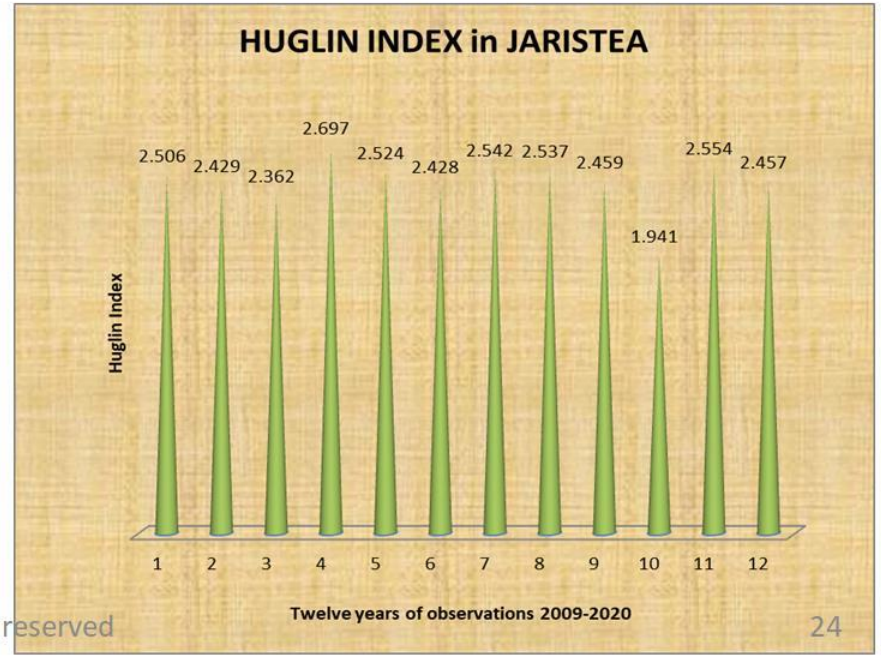


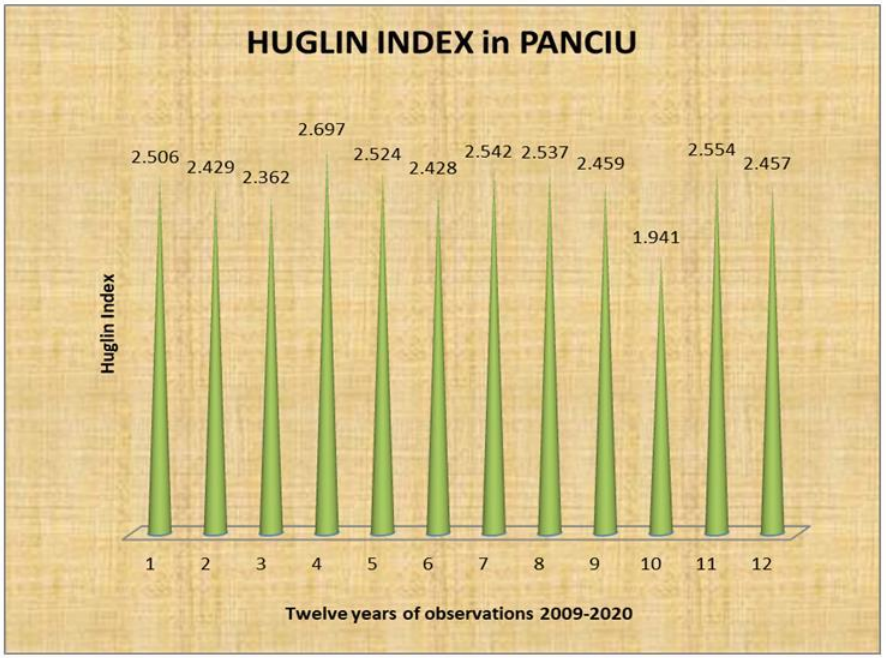


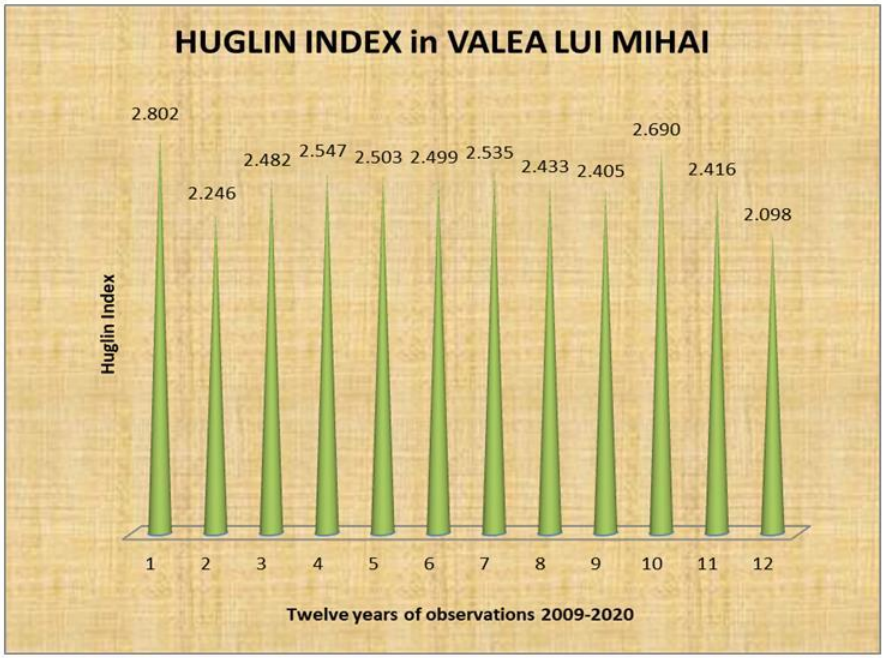


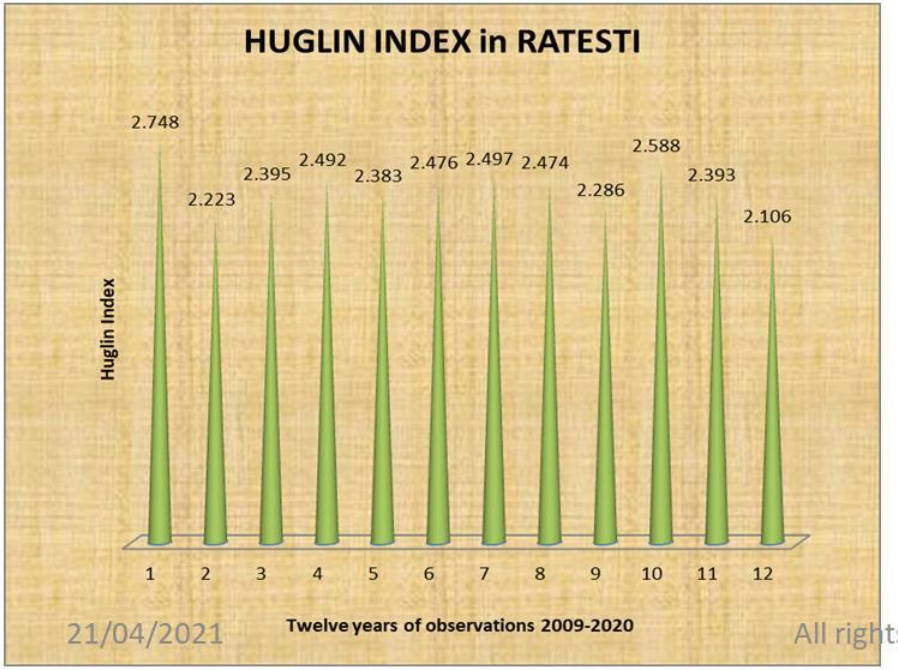


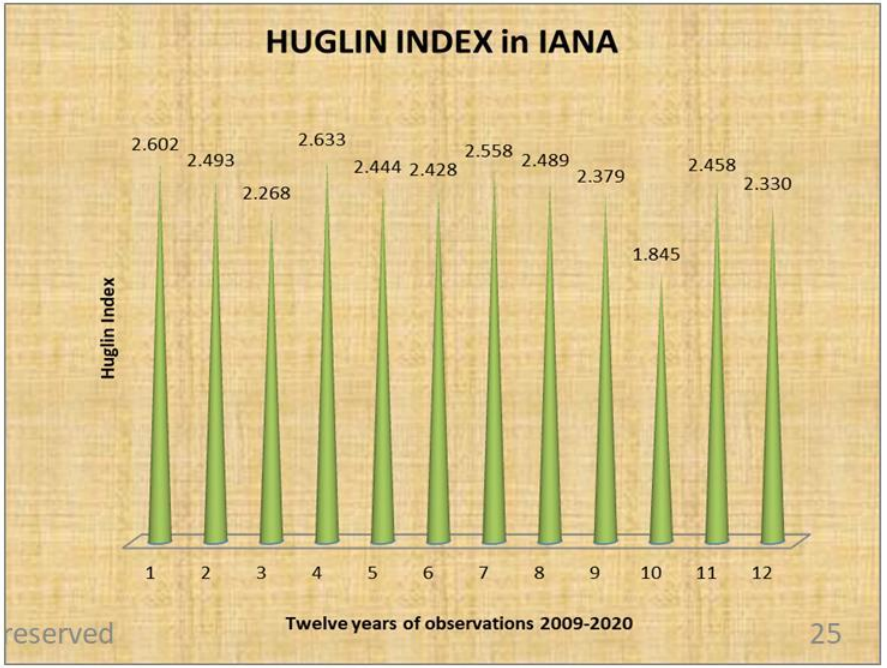


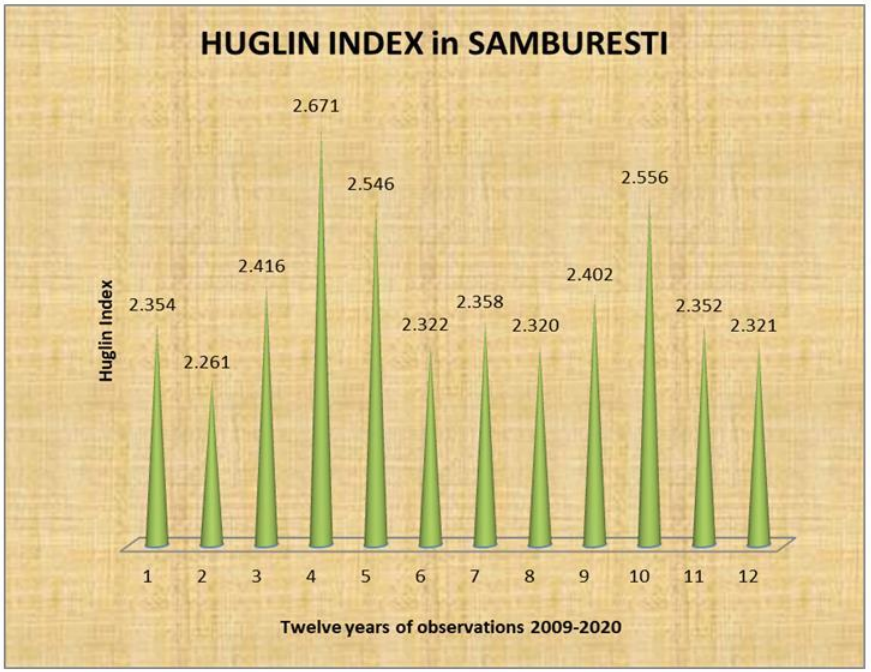


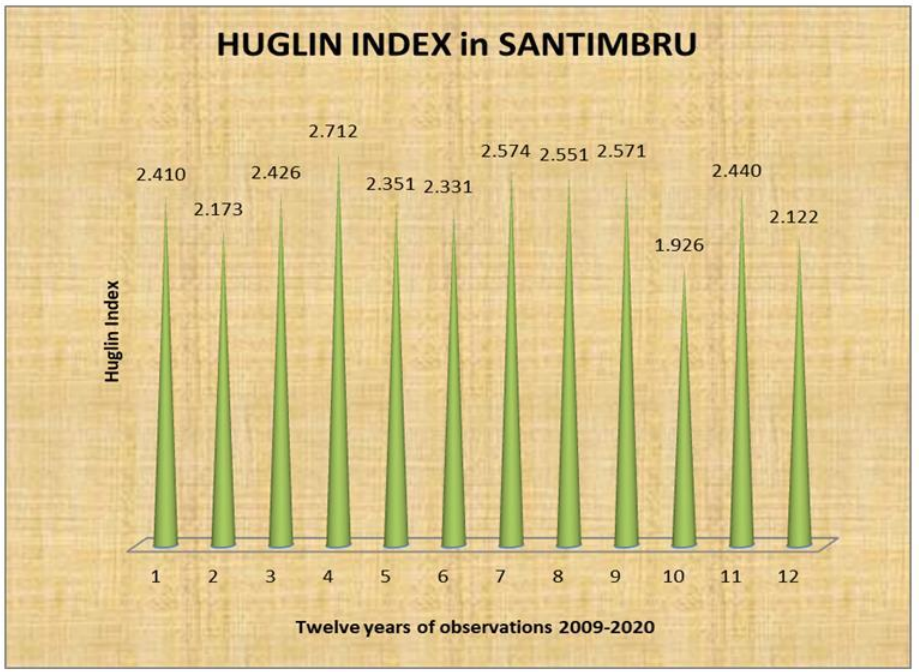


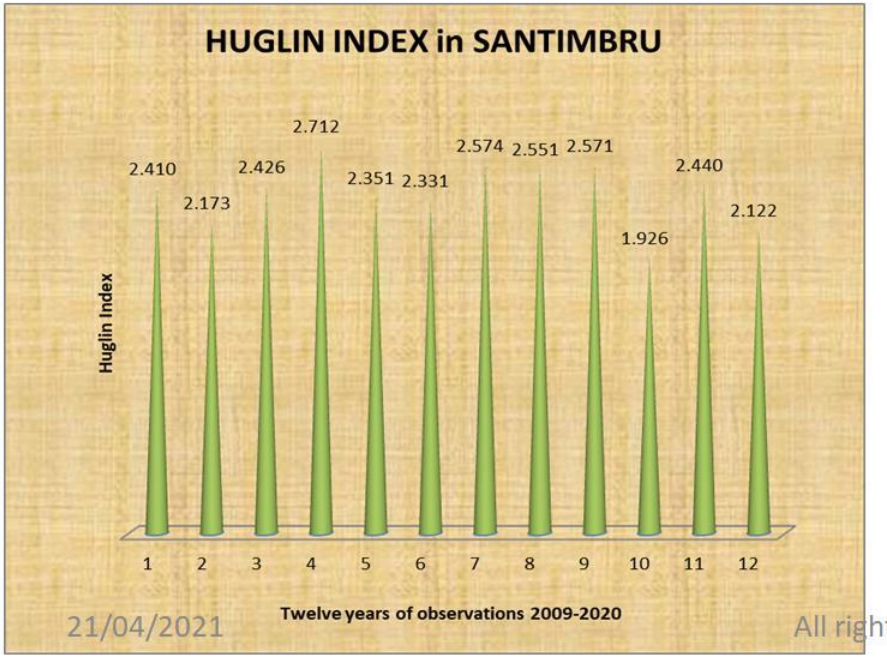


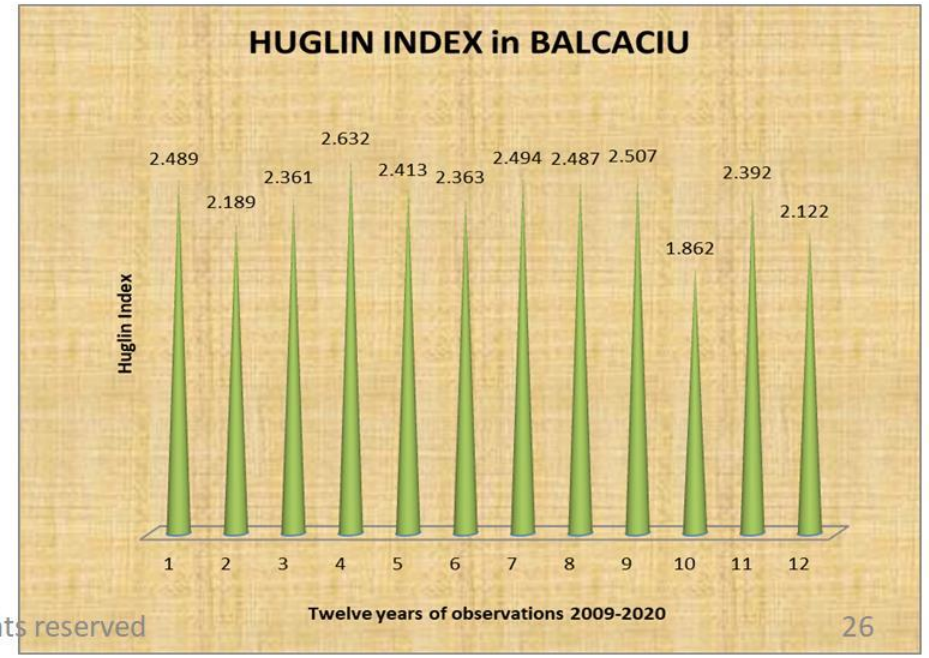


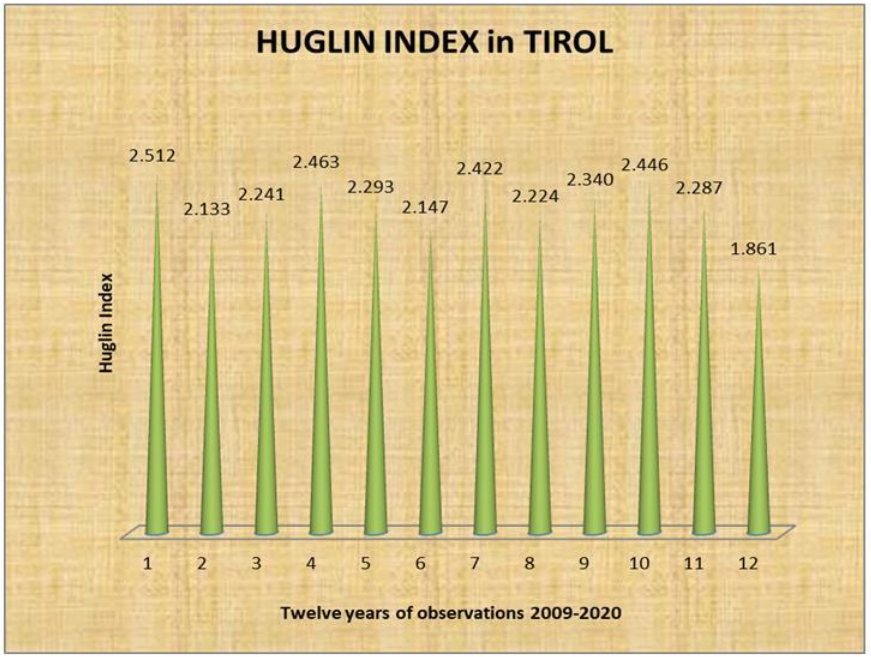


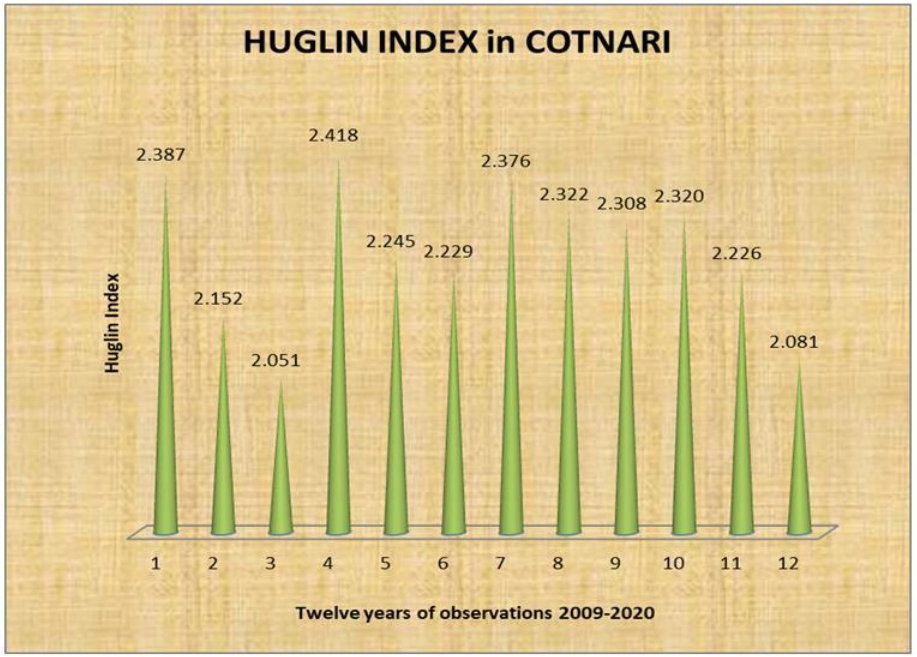


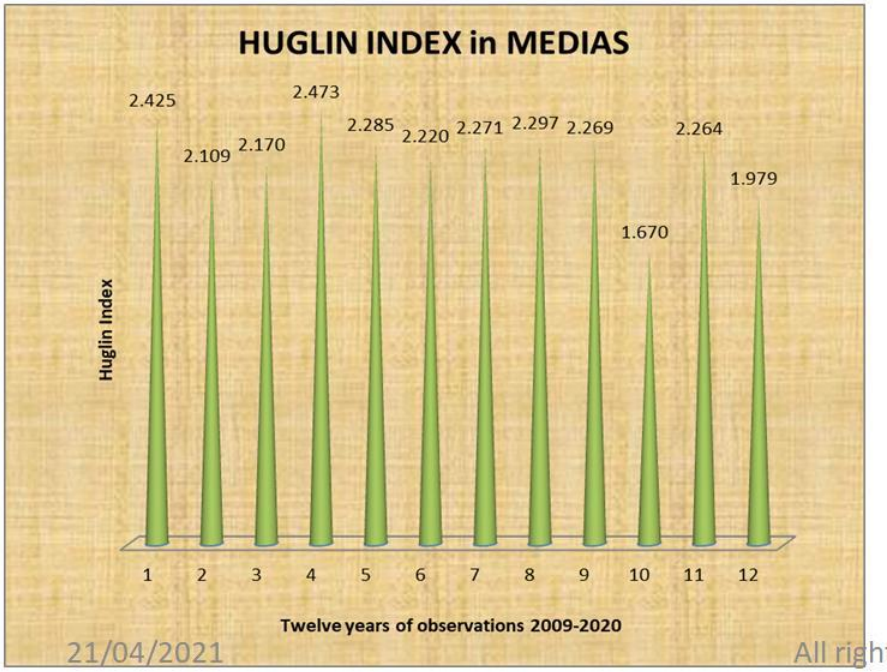


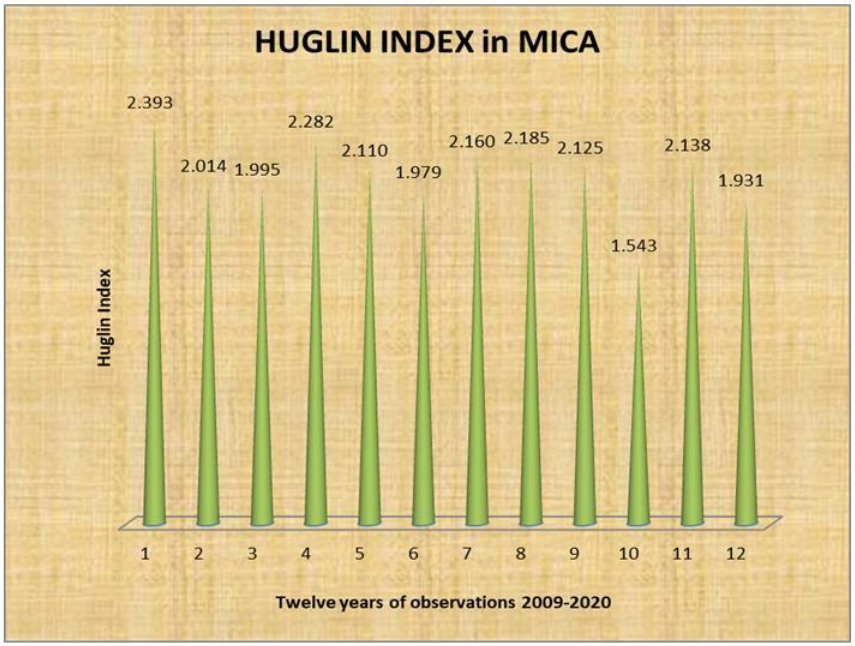


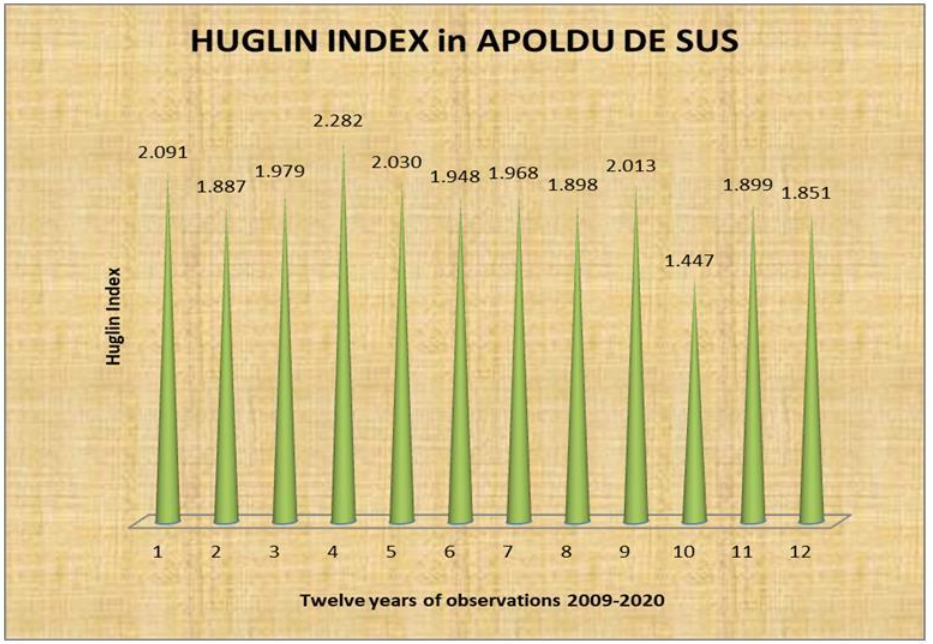


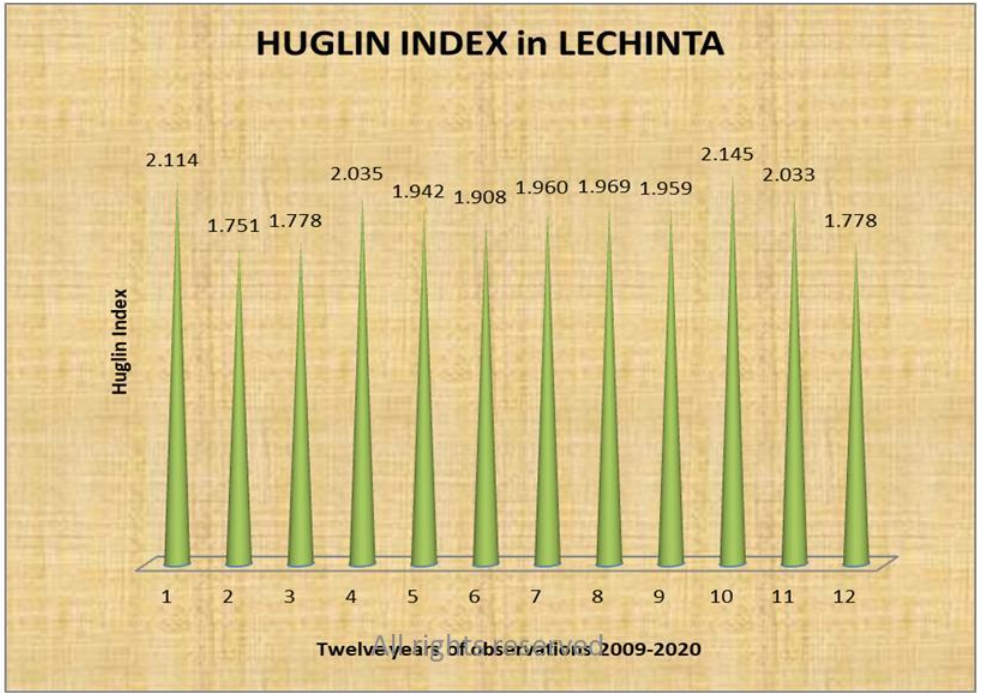












Characteristics	Ranks	Values	Examples
VERY WARM	IH + 3	IH > 3000	Sao Francisco Valley (Brazil)
WARM	IH + 2	2400 <IH < 3000	Malaga (Spain), Marsala (Italy)
WARM TEMPERATE	IH + 1	2100 <IH < 2400	Napa (USA), Montpellier (France)
TEMPERATE	IH - 1	1800 <IH < 2100	Pau, Bordeaux (France)
COOL	IH - 2	1500 <IH < 1800	Colmar, Angers (France)
VERY COOL	IH - 3	IH < 1500	Québec (Canada), London (UK)

This means that most of all, **24** PDOs in Romania are now in the **WARM CLIMATE**, **5** in **WARM TEMPERATE CLIMATE**: Sântimbru (PDO ALBA IULIA), Aiud (PDO AIUD), Bălcaciu (PDO TÂRNAVE-Jidvei), Tirol (PDO BANAT-Dealurile Tirolului), Cotnari (PDO COTNARI) and Mediaș (PDO TÂRNAVE-Mediaș) and only **4** in **TEMPERATE** areas: Carastelec (PDO CRIȘANA-Șimleu Silvaniei), Mica (PDO TÂRNAVE-Târnăveni), Apoldu de Sus (PDO SEBEȘ APOLD) and Lechința (PDO LECHINȚA).

In some specific warm years (2012, 2018) areas like in PDO MEHEDINȚI-Golul Drîncei, at Oprișor (MH) registered (HI=3024) or higher, in PDO ÎNSURĂȚEI, at Măru Roșu (BR) (HI=3071), so these areas have **VERY WARM CLIMATE** characteristics.

Conclusions

This database will be useful for:

- new vineyards, in the decision to choose wine grape varieties suitable for new microclimate trends
- existing vineyards, in the decision to start and direct the harvest depending on the type of wine desired
- existing vineyards, in the decision of time and the system for winter/ dormancy pruning or green pruning
- existing vineyards, to improve the microclimate, by adding an irrigation system
- existing vineyards in the acquisition of logistics necessary to prevent the effects of extreme weather events

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Thank you!

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