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Genetic Variability and Horti-economic traits in Okra (*Abelmoschus esculentus*)

***Vishal Sharma, Vijay Bahadur, Anita Kerketta and V.M. Prasad**

Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj 211 007

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ABSTRACT

An experiment was conducted on Genetic variability and Horti-economic traits in fifteen genotypes of Okra with three replication during summer season 2021-22 at the Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The observations were recorded on various yield and yield contributing characters of Okra. The results from the present investigation revealed that 3 genotypes namely; Prabhani Kranti, Gujrat Okra 8 and Arka Anamika exhibited substantially higher fruit yield per plant and performed better for other desirable traits. Both High GCV% and PCV% are recorded highest at Yield / plot (kg) (GCV %35.46) (PVC%35.69) followed by Fruit Weight (g) (GCV%31.30) and (PCV % 31.55), Fruit Length(cm) (GCV %28.18) and PVC % 28.34) , Number of Branches(60DAS) (GCV %27.92) and PVC % 28.42) and Fruit yield (q/ha) (GCV %26.20) and PVC % 26.44). Moderate GCV% and PCV% are recorded at Number of branches (30 DAS) (GCV %23.10) and (P C V % 24.50), Fruit Width (cm) (GCV %22.8) and PVC % 22.60) and Fruit yield per plant (g) (GCV %20.94) and PVC % 21.19). Genotypic and Phenotypic correlation coefficient analysis revealed that Fruit yield (q/ha) showed positive significant association with Yield / plot (kg), Fruit yield /plant (g), Length (cm), Weight (g), While negative significant association was observed with Days taken to 50% flowering and Days taken to first picking.

Key words: *Okra, Heritability, Genotypic and phenotypic coefficient of variation, Genetic advance.*

Introduction

Okra (*Abelmoschus esculentus* (L.) *Moench*) is an annual, often cross- pollinated important vegetable of the tropical and subtropical areas. It was originated in Africa (Rao, 1985), but now grown in many parts of the world. It is a traditional vegetable crop commercially cultivated in West Africa, India, Southeast Asia, the southern United States, Brazil, Turkey and northern

Australia (Duzyaman, 1997). India ranks first for okra production in the world. At present, India is the second largest producer of the vegetables in the world after china with an annual production of about 33.24 lakh metric tonnes from an area of 3.47 lakh hectares (Anonymous, 2022).

Knowledge about the nature and magnitude of variation existing in available breeding materials are requisite to choose the characters for effective selection of desirable genotypes to undertake planned breeding programme. Further, to improve the productivity, information about the nature and magnitude of genetic divergence would help selection of diverse effective genere combination. The available literature reveals that breeding programme on the basis of variability and diversity can help in okra improvement. The present investigation was, therefore, undertaken to evaluate the genetic variability for different characters and diversity of genotypes for identification of suitable parents for okra improvement (Pradip *et al.,* 2010). The possibility of improvement in any crop is measured by variability available in the crop. Hence, it is essential to partition overall variability into its heritable and non heritable components with the help of genetic parameters like coefficient of variation, heritability, genetic advance and genetic diversity.

Materials and Methods

The experiment was conducted at Vegetable Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P.) during The Zaid Season of 2022 using randomized block design with three replications. The experimental material consisted of 15 genotypes of Okra, Collected from different sources (Table 1). Five randomly selected plants from each genotype were subjected to made observation on Plant height (cm) at 30,45,60,90 DAYS, Number of leaves per plant at 30,45,60,90 DAYS, Number of branches per plant at 30,45,60,90 DAYS, Days taken to first flowering, Days taken to 50% flowering, Days taken to first picking Fruit length(cm), Fruit width(cm), Fruit weight(g), Number of fruits per plant, Yield per plant(g), Yield per plot (kg) and Yield per hectare (t/ha). Variability for different qualitative characters and expected genetic advance at 5 per cent intensity

Table 1. The experimental material consisting of 15 genotypes of Okra, Collected from different sources.

SL No	Name of Genotypes	Source
1	Pusa Makhmali	IARI, NEW DELHI
2	Pusa Bhindi 5	IARI, NEW DELHI
3	Prabhani Kranti	VNMKV PARBHANI
4	Arka Anamika	IIHR, BENGALURU
5	Pusa Swani	IARI, NEW DELHI
6	Dov92	NBPGR NEW DELHI
7	Gujrat okra 5	AAU, GUJARAT
8	Gujrat okra 8	AAU, GUJARAT
9	Neelam okra	LOCAL VARIETY
10	Sel.GR 51	LOCAL VARIETY
11	Jolika	LOCAL VARIETY
12	Sonal Gold	LOCAL VARIETY
13	Bhindi green Bahar	LOCAL VARIETY
14	Kashi Lalima	IIVR, VARANASI
15	IC288892	NBPGR NEW DELHI

were calculated as per Burton (1953) and Johnson *et al.,* (1955), respectively.

Results and Discussion

Analysis of variance in these 15 genotypes of Okra showed that highly significant differences for all the quantitative and qualitative traits studied indicating adequate genetic variability among the genotypes studied (Table 2). The maximum value of vegetative, qualitative and quantitative characters in genotype may be due to genetic make-up of a plant. Similar results were reported by Kumar *et al.,* (2016**)** in Okra. Large variation among the genotypes found for the traits, Genetic variability estimates including mean, range, genotypic and phenotypic variances, genotypic and phenotypic coefficient of variances, broad sense heritability, genetic advance and genetic advance over mean for different characters are presented in Table 3.

Genotypic and Phenotypic coefficient of variation

In the present study it is concluded from Table 3 that in general, estimates of phenotypic coefficient of variation was found higher than their corresponding genotypic coefficient of variation, i.e. indicating that the expression of these characters. Both High GCV% and PCV% are recorded highest at Yield/plot (kg) (GCV%35.46) (PVC%35.69) followed by Fruit Weight (g), Fruit Length (cm), Number of Branches (60 DAS) and Fruit yield (q/ha). Moderate GCV% and PCV% are recorded at Number of branches (30 DAS), Fruit Width (cm) and Fruit yield per plant (g). Genotypic coefficient of variation (GCV) ranged from 9.08% (number of branches 45 DAS) to 35.46% (yield per plot). High GCV (20% and above) was recorded for yield per plot (35.46%) followed by fruit weight (31.30%), fruit length (28.18%), fruit diameter (21.18%), number of branches 60 DAS (27.92%), number of branches 30 DAS (23.10%), fruit diameter (22.08%) and fruit yield per plant (20.94%). Moderate GCV (10-20%) was observed for number of branches 90 DAS (18.92%), number of leaves per plant 60 DAS (18.83%), number of leaves per plant 45 DAS (17.97%), plant height 90 DAS (17.77%), number of fruits per plant (16.91%), number of leaves per plant 90 DAS (16.32%), plant height 30 DAS (15.73%), plant height 45 DAS (14.23%), number of leaves per plant 30 DAS (13.26%), days taken to first picking (13.23%), days taken to 50% flowering (11.18%) and plant height 45 DAS (10.60%). Low

Table 2. Analysis of Variance for different traits in Okra

Var Genotypes	Plant height 30 days (cm)	Plant height 45 days (cm)	Plant height 60 days (cm)	Plant height 90 days (cm)	No. of leaves /plant 30 DAS	No. of leaves /plant 45 DAS	No. of leaves /plant 60 DAS	No. of leaves /plant 90 DAS	No. of bran-ches 30 DAS	No. of bran-ches 45 DAS	No. of bran-ches 60 DAS	No. of bran-ches 90 DAS	Days branch-es 50% flowring	Days taken to first picking	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	No. of fruits /plant	Fruit yield plant (g)	Yield/ plot (kg)	Fruit yield (q/ha)
1. Pusa Makhmali	14.35	26.07	64.08	110.64	5.37	13.97	19.19	28.96	3.57	6.07	11.73	14.42	42.11	42.99	13.43	0.98	14.57	9.86	80.35	0.71	21.48
2. PusaBhindi 5	12.20	24.76	58.80	103.60	5.17	11.87	18.78	33.34	4.83	7.10	12.15	13.13	52.67	52.72	8.73	1.43	6.70	8.76	112.31	1.06	36.11
3. Parbhani Kranti	12.19	24.55	60.50	75.66	4.73	12.10	14.87	34.36	4.87	7.27	13.55	15.58	56.40	55.77	10.33	0.98	8.80	6.95	117.60	1.47	40.85
4. Arka Anakika	12.59	24.74	57.10	63.27	5.03	8.40	14.00	23.67	5.50	7.97	16.04	16.51	56.03	57.27	10.17	1.18	7.33	7.20	97.66	0.95	25.69
5. Pusa Swami	16.60	24.53	64.81	116.10	6.27	10.37	20.48	31.83	3.27	7.02	11.61	12.89	41.10	43.92	8.97	0.95	8.73	8.54	96.80	0.93	28.66
6. Gujrat Okra 5	12.60	21.53	61.63	86.71	6.37	14.40	23.07	39.82	3.43	6.42	7.31	12.58	47.27	49.30	11.80	1.56	11.42	9.40	105.67	1.06	37.68
7. Gujrat Okra 8	12.69	24.13	60.00	90.97	5.50	14.13	20.72	38.52	3.46	6.83	9.81	12.53	47.13	47.15	9.07	1.20	7.54	9.26	117.51	1.44	38.64
8. Neelam Okra	13.23	23.73	61.30	95.95	4.67	13.53	17.33	35.81	4.10	6.17	8.95	10.54	51.67	49.58	9.57	1.29	8.83	9.26	81.33	0.60	20.03
9. Selection GR51	14.20	24.78	61.67	69.10	4.83	12.77	18.83	30.86	4.77	6.92	8.11	12.61	49.10	47.89	11.23	1.31	11.27	9.38	87.87	0.65	21.87
10. Jolika	13.31	23.07	62.40	98.48	4.93	14.43	20.27	33.15	4.53	6.34	11.90	14.30	47.93	50.21	15.86	1.66	15.52	9.87	83.94	1.12	36.99
11. Sonal Gold	13.20	24.53	60.48	96.15	4.72	13.30	12.26	30.43	4.47	6.75	10.62	11.85	42.47	56.90	16	1.76	15.70	11.13	82.15	0.71	24.01
12. Bjindi Green Bahar	11.77	24.53	59.47	95.37	4.75	13.33	18.74	37.42	2.97	7.30	9.02	12.84	42.60	52.62	8.97	1.43	9.60	9.43	80.38	0.61	24.13
13. Kashi Lalima	14.13	24.87	63.75	95.56	4.41	12.51	14.50	36.35	3.37	7.35	11.2	13.20	43.50	46.99	11.97	1.44	11.65	9.82	110.91	0.82	26.49
14. IC288892	11.17	21.97	62.62	97.90	4.77	14.07	18.42	25.55	3.50	7.23	12.11	13.66	49.53	59.47	17.93	1.42	14.93	9.65	117.42	1.42	36.80
15. DOV92	7.17	15.77	29.31	62.20	4.10	6.63	11.73	22.37	2.00	5.43	6.80	8.44	57.13	66.17	6.47	0.90	6.00	4.87	46.20	0.42	19.47
Mean	12.76	23.75	59.19	90.51	5.11	12.25	17.55	32.16	3.91`	6.81	10.30	12.21	48.44	51.46	11.38	1.33	10.57	8.89	94.54	0.93	29.26
Min	7.17	15.77	29.31	62.20	4.10	6.63	11.73	22.37	2.00	5.43	4.80	8.44	41.10	40.95	6.47	0.90	6.00	4.87	46.20	0.42	19.47
Max	16.60	26.53	64.81	116.10	6.37	14.40	23.07	39.82	5.50	7.97	16.04	16.51	57.13	66.17	17.93	1.76	15.70	11.13	117.60	1.47	40.85
SE(d)	0.39	0.60	1.83	3.29	0.29	0.37	0.61	0.89	0.21	0.20	0.45	0.34	1.03	1.40	0.28	0.05	0.34	0.32	2.49	0.03	0.86
C.D.	0.80	1.24	3.76	6.77	0.59	0.76	1.25	1.83	0.44	0.41	0.92	0.70	2.12	2.87	0.58	0.11	0.70	0.66	5.12	0.06	1.78
C.V.	0.75	3.10	3.78	4.45	6.91	3.66	4.25	3.39	6.70	3.55	5.29	3.39	2.61	3.32	3.04	4.86	3.95	4.44	3.22	4.07	3.61

GCV (<10%) was recorded for number of branches 45 DAS (9.08%).

Phenotypic coefficient of variation (PCV) ranged from 9.75% (number of branches 45 DAS) to 35.69% (yield per plot) (Table 4.3 and Figure 4.3.1). High PCV (20% and above) was recorded for yield per plot (35.69%) followed by fruit weight (31.55%), fruit length (28.34%), number of branches 60 DAS (28.42%), number of branches 30 DAS (24.05%), fruit diameter (22.60%) and fruit yield per plant (21.19%). Moderate PCV (10-20%) was observed for number of branches 90 DAS (19.22%), number of leaves per plant 60 DAS (19.31%), number of leaves per plant 45 DAS (17.97%), plant height 90 DAS (17.77%), number of fruits per plant (16.91%), number of leaves per plant 90 DAS (18.34%), plant height 30 DAS (16.17%), plant height 45 DAS (14.72%), number of leaves per plant 30 DAS (14.95%), days taken to first picking (13.64%), days taken to 50% flowering

(11.48%) and plant height 45DAS (11.02%). Low PCV (<10%) was recorded for number of branches 45 DAS (9.75%).

Heritability and Genetic Advance

The heritability estimate were found to be high (>60%) for almost all the characters viz., Plant height 30 days (cm), Plant height 45 days (cm), Plant height 60 days (cm), Plant height 90 days (cm), No. of leaves /plant 30 DAS, No. of leaves/ plant 45 DAS, No. of leaves /plant 60 DAS, No. of leaves /plant 90 DAS, No. of branches 30 DAS, No. of branches 45 DAS, No. of branches 60 DAS, No. of branches 90 DAS, Days taken to 50% flowering, Days taken to first picking. Fruit Length (cm), Fruit width (cm), Fruit Weight (g), No. of fruits /plant, Fruit yield/plant (g), Yield / plot (kg) and Fruit yield (q/ha).

Genetic advance ranged from 0.59 (fruit width) to 40.31 (fruit yield per plant). High genetic advance (20% and above) was recorded for fruit yield per plant (40.31) followed by plant height 90 DAS (32.14), plant height 60 DAS (16.77).

Moderate genetic advance (10-20%) was observe for fruit yield (q/ha) (15.64), days taken first picking (13.60), days taken to 50% flowering (10.86), number of leaves per plant 90 DAS (10.59). Low genetic advance (<10%) was recorded for fruit weight (6.76), number of leaves per plant 60DAS (6.64), fruit length (6.57), number of branches 60 DAS (5.82), plant height 45 DAS (4.98), number of branches 90 DAS (4.68), number of leaves per plant 45 DAS (4.44), plant height 30 DAS (4.02), number of fruits per plant (3.00), number of branches 30 DAS (1.79), number of leaves per plant 30 DAS (1.24), number of branches 45 DAS (1.19), yield per plot (0.68) and fruit width (0.59).

The high or moderate value of genetic advance indicates additive gene action whereas low genetic advance value indicates non-additive gene action. The high or moderate value of genetic advance indicates additive gene action whereas low genetic advance value indicates non-additive gene action.

The estimation of genetic advance for all the characters are presented in Genetic advance as percent mean was categorized as low (0-10%), moderate (10-20% and (≥20%) as given by Johnson *et al.* (1955). The genetic advance as percent mean have moderate estimates for all characters. This indicates closeness of respective σ2p and σ2g value thereby low environmental effect on expression of these characters. Such values may be attributed to the additive gene effects and direct selection for these traits would be fruitful. Thus, phenotypic selection may be effective for these characters.

Genotypic and Phenotypic Correlation

The correlation values for genotypic characters varied from (-) 0.001 (Days taken to first picking vs Fruit yield per plot) to 1.00, whereas the correlation coefficients for phenotypic characters ranged from -0.004 (Number of Branches at 60 DAS vs Days to 50% flowering) to 1.00. This shows that in most cases, the genotypic level is more closely related to the associated phenotypic level. Fruit length (r =

Table 3. Genetic parameters for different characters in Okra

Characters	Genotypic variance	Phenotypic variance	Heritability (%)	Genetic Advance	GA% mean	GCV (%)	PCV (%)	Percent contribution
Plant height 30 days (cm)	4.03	4.26	94.64	4.02	31.52	15.73	16.17	6.25
Plant height 45 days (cm)	6.34	6.88	92.12	4.98	20.95	10.60	11.04	7.03
Plant height 60 days (cm)	70.95	75.94	93.42	16.77	28.33	14.23	14.72	7.57
Plant height 90 days (cm)	258.67	274.87	94.11	32.14	35.51	17.77	18.32	5.79
No. of leaves/plant 30 DAS	0.46	0.58	78.67	1.24	24.24	13.26	14.95	7.37
No. of leaves / plant 45 DAS	4.85	5.05	96.01	4.44	36.26	17.97	18.34	5.67
No. of leaves /plant 60 DAS	10.92	11.47	95.16	6.64	37.85	18.83	19.31	5.51
No. of leaves /plant 90 DAS	27.56	28.75	95.86	10.59	32.92	16.32	16.67	5.34
No. of branches 30 DAS	0.82	0.88	92.24	1.79	45.70	23.10	24.05	5.90
No. of branches 45 DAS	0.38	0.44	86.77	1.19	17.43	9.08	9.75	5.72
No. of branches 60 DAS	8.26	8.56	96.54	5.82	56.51	27.92	28.42	4.92
No. of branches 90 DAS	5.33	5.50	96.89	4.68	38.36	18.92	19.22	4.63
Days taken to 50% flowering	29.32	30.92	94.84	10.86	22.43	11.18	11.48	4.52
Days taken to first picking	46.33	49.25	94.07	13.60	26.43	13.23	13.64	5.42
Fruit Length (cm)	10.28	10.40	98.85	6.57	57.72	28.18	28.34	2.50
Fruit width (cm)	0.09	0.09	95.40	0.59	44.42	22.08	22.60	3.76
Fruit Weight (g)	10.96	11.13	98.43	6.76	63.98	31.30	31.55	2.71
No. of fruits /plant	2.26	2.42	93.56	3.00	33.69	16.91	17.48	3.15
Fruit yield /plant (g)	391.88	401.15	97.69	40.31	42.63	20.94	21.19	1.91
Yield / plot (kg)	0.11	0.11	98.71	0.68	72.57	35.46	35.69	2.10
Fruit yield (q/ha)	58.75	59.86	98.14	15.64	53.46	26.20	26.44	2.22

Table 4. Genotypic correlation for different characters in Okra

Var	Plant height 30 days (cm)	Plant height 45 days (cm)	Plant height 60 days (cm)	Plant height 90 days (cm)	No. of leaves /plant 30 DAS	No. of leaves /plant 45 DAS	No. of leaves /plant 60 DAS	No. of leaves /plant 90 DAS	No. of branch-es 30 DAS	No. of bran-ches 45 DAS	No. of branch-es 60 DAS	No. of branch-es 90 DAS	Days taken to 50% flowring	Days taken to first plcking	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	No. of fruits plant	Fruit yield /plant (g)	Yield/ plot (kg)	Fruit yield (q/ha)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	1.00	0.438**	0.727**	0.379*	0.479*	0.617**	0.497**	0.241	0.476**	0.357*	0.404**	0.293	-0.418**	-0.724**	0.235	0.256	0.301*	0.691**	0.438**	0.230	0.144
2			0.888**	0.493**	0.231	0.557**	0.423**	0.452**	0.557**	0.563**	0.569**	0.223	-0.473**	-0.564**	0.291	0.263	0.321*	0.627**	0.531**	0.310**	0.238
3				0.491**	0.284	0.813**	0.610**	0.635**	0.528**	0.636**	0.551**	0.422**	-0.573**	-0.613**	0.486**	0.457**	0.497**	0.834**	0.720**	0.509**	0.443**
4					0.291	0.342*	0.474**	0.068	-0.109	0.558**	0.800**	0.377*	-0.192	-0.106	0.512**	0.580**	0.448**	0.452**	0.605**	0.483**	0.462**
5						0.147	0.156	-0.271	0.071	0.186	0.100	-0.235	0.257	-0.020	0.032	0.110	-0.176	0.036	0.222	0.084	0.061
6							0.648**	0.705**	0.335*	0.443**	0.337*	0.631*	-0.715**	-0.609**	0.481**	0.512**	0.521**	0.786**	0.522**	0.382**	0.378*
7								0.360*	0.000	0.436**	0.520**	0.711**	-0.336*	-0.216	0.601**	0.921**	0.864**	0.796**	0.673**	0.557**	0.632**
8									0.386**	0.401**	0.172	0.549**	-0.615**	-0.394**	0.512**	0.291	0.589**	0.647**	0.494**	0.474**	0.410**
9										0.161	0.217	-0.086	-0.075	-0.401**	0.271	-0.190	0.188	0.239	0.347*	0.167	0.143
10											0.739**	0.568**	0.019	0.027	0.561**	0.332*	0.559**	0.490**	0.661**	0.517**	0.411**
11												0.507**	-0.022	-0.054	0.616**	0.491**	0.594**	0.449**	0.767**	0.691**	0.613**
12													-0.423**	-0.188	0.668**	0.715**	0.567**	0.724**	0.625**	0.662**	0.653**
13														0.794**	-0.063	-0.312**	-0.261	-0.699**	-0.149	-0.119	-0.086
14															0.090	-0.102	-0.138	-0.645**	-0.152	-0.001	0.055
15																0.630**	0.881**	0.579**	0.870**	0.837**	0.817**
16																	0.749**	0.710**	0.702**	0.635**	0.749**
17																		0.734**	0.839**	0.809**	0.828**
18																			0.708**	0.573**	0.571**
19																				0.931**	0.897**
20																					0.937**
21																					1.000

0.817), fruit diameter (r = 0.749) and fruit weight (g) (r = 0.828) all had a strong, positive, and highly significant correlation with yield. A perfect positive significant correlation (r = 1.00) was observed between fruit weight and yield. It is preferable to select these three traits since they all contribute equally to seed yield improvement. Fruit weight (g) per plant may show an important contribution because of its direct positive and perfect effect on yield kg per hectare.

Conclusion

From the above investigation it is concluded that among 15 genotypes of okra, 3 genotypes namely Prabhani Kranti, Gujarat okra 8, Arka Anamika exhibited substantially higher fruit yield per plant and performed better for other desirable traits. The analysis of variance for all characters of okra genotypes revealed presence of good extent of significant differences among the genotypes for all traits. The data for all characters that showed sufficient amount of significant differences were subjected to further statistical analysis.

References

Anonymous, 2022. Area and Production estimates

Table 5. Phenotypic Correlation for different characters in Okra

Var	Plant height 30 days (cm)	Plant height 45 days (cm)	Plant height 60 days (cm)	Plant height 90 days (cm)	No. of leaves /plant 30 DAS	No. of leaves /plant 45 DAS	No. of leaves /plant 60 DAS	No. of leaves /plant 90 DAS	No. of branch-es 30 DAS	No. of branch-es 45 DAS	No. of bran-ches 60 DAS	No. of branch-es 90 DAS	Days taken to 50% flowring	Days taken to first packing	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	No. of fruits /plant	Fruit yield /plant (g)	Yield/ plot (kg)	Fruit yield (q/ha)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	1.000	0.738**	0.727**	0.379**	0.479**	0.617**	0.497**	0.281**	0.476**	0.357**	0.404**	0.293	-0.418**	-0.724**	0.235	0.256	0.301*	0.691**	0.438**	0.230	0.144
2.			0.888**	0.493**	0.231	0.557**	0.423**	0.452**	0.557**	0.563**	0.569**	0.223	-0.473**	-0.564**	0.291	0.263	0.321**	0.627**	0.531**	0.310**	0.238
3.				0.491**	0.284	0.813**	0.610**	0.635**	0.528**	0.636**	0.551**	0.422**	-0.473**	-0.564**	0.291	0.263	0.321**	0.627**	0.531**	0.310*	0.238
4.					0.291	0.342*	0.474*	0.068	-0.109	0.558**	0.800**	0.377**	-0.192*	-0.106	0.512**	0.580**	0.448**	0.452**	0.605**	0.483**	0.462**
5.						0.147	0.156	-0.271	0.071	0.186	0.100	-0.235	0.257	-0.020	0.032	0.110	-0.176	0.036	0.222	0.084	0.061
6.							0.648**	0.705**	0.355**	0.443**	0.337*	0.631*	-0.715**	-0.609**	0.481**	0.512**	0.521**	0.786**	0.522**	0.382**	0.378*
7.								0.360*	0.000	0.436**	0.520**	0.711**	-0.336*	-0.216	0.601**	0.921**	0.684**	0.796**	0.673**	0.557**	0.632**
8.									0.386**	0.401**	0.172	0.549**	-0.615**	-0.394**	0.512**	0.291	0.589**	0.647**	0.494**	0.474**	0.410**
9.										0.161	0.217	-0.086	-0.075	-0.401**	0.271	-0.190	0.188	0.239	0.347*	0.167	0.143
10.											0.739**	0.568**	0.019	0.027	0.561**	0.332**	0.559**	0.490**	0.661**	0.517**	0.411**
11.												0.507**	-0.022	-0.054	0.616**	0.491**	0.594**	0.449**	0.767**	0.691**	0.613**
12.													-0.423**	-0.188	0.668**	0.715**	0.867**	0.724**	0.625**	0.662**	0.653**
13.														0.794**	-0.063	-0.312*	-0.261	-0.699**	-0.149	-0.119	-0.086
14.															0.090	-0.102	-0.138	-0.645**	-0.152	-0.001	0.055
15.																0.630**	0.881**	0.579**	0.870**	0.837**	0.817**
16.																	0.749**	0.710**	0.702**	0.635**	0.749**
17.																		0.734**	0.839**	0.809**	0.828**
18.																			0.708**	0.573**	0.571**
19.																				0.931**	0.897**
20.																					0.937**
21.																					1.000

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